

PREPARING HAZARDOUS MATERIALS FOR MILITARY AIR SHIPMENTS

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SECRETARIES OF THE AIR FORCE,
THE ARMY, THE NAVY, THE MARINE CORPS,
AND THE DEFENSE LOGISTICS AGENCY**

**AIR FORCE INTERSERVICE MANUAL 24-204
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Transportation

**PREPARING HAZARDOUS MATERIALS FOR MILITARY AIR
SHIPMENTS**

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This manual implements AFD 24-2, *Preparation and Movement of Air Force Material*. It provides guidance and procedures for preparing hazardous materials for shipment by military aircraft to ensure that such materials are packaged, marked, labeled, and prepared properly for transportation. This manual includes the shipment of nuclear materials, except for nuclear weapon major assemblies and nuclear components packaged and shipped per Department of Energy-Defense Nuclear Agency (DOE-DNA) TP 45-51 and its supplements. It includes labeling requirements, instructions for transporting passengers with hazardous materials and instructions for notifying the aircraft commander regarding hazardous materials on the aircraft. It implements Department of Defense (DoD) Regulation 4500.9-R, *Defense Transportation Regulation (Parts II and III)* and Department of Transportation (DOT) Exemptions 7573 and 9232 (DOT-E 7573 and DOT-E 9232) for commercial aircraft under contract to the Air Mobility Command (AMC). The use of a name of any specific manufacturer, commercial product, commodity or service in this publication does not imply endorsement by the military services.** **Penalties and Disciplinary Action.** Failure to observe prohibitions and mandatory provisions of this manual by military personnel is a violation of Article 92, Uniform Code of Military Justice (UCMJ). Violations by civilian employees may result in administrative disciplinary action without regard to otherwise applicable criminal or civil sanctions for violations of related laws. See attachments 1 and 2 for terms, abbreviations, and acronyms used in this manual.

★SUMMARY OF REVISIONS

This revision incorporates applicable changes to the Department of Transportation (DOT) Title 49 *Code of Federal Regulations* (CFR) and the *International Civil Aviation Organization* (ICAO) *Technical Instructions*. This revision amends policy statements (Chapters 1-3), hazard classification and communication information (Attachment 4), and packaging requirements (Attachments 5-13). Other major changes include expanding guidance on inspection procedures (Attachment 28) and adding packaging requirements from AFR 71-4 (15 January 1988) for use with Grandfathered munitions shipments (Attachment 27). This manual reorganizes text to comply with Air Force Manual format and changes many procedures. These changes clarify requirements and further standardize DoD packaging and shipping with the commercial sector.

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Chapter 1

GENERAL GUIDANCE

1.1. Applicability. Handlers, packers, inspectors, and preparers (certifiers) of hazardous materials shall comply with rules designed to maximize safety and security of the aircraft, aircrew, cargo and passengers. They must know the exceptions, exemptions, and waivers to federal laws and related government directives that are unique to military airlift operations and how to apply them.

- This manual governs the transport of hazardous material as cargo on military fixed and rotary wing aircraft. Apply the requirements specified in this manual unless modified or updated according to 1.2.1.
- Hazardous materials required as operational equipment of the aircraft for ground/air servicing as identified in applicable aircraft flight publications are not regulated by this manual.
- The provisions of this manual are directive in nature, and must be complied with by those personnel whose positions or jobs entail responsibility for the functions covered.
- Ensure compliance with current applicable DOT and EPA requirements when transporting hazardous materials outside of the Defense Transportation System. Hazardous waste shipments entering or exiting a domestic location must comply with 40 CFR Parts 260-265, including preparation of a hazardous waste manifest.

1.2. Responsibilities Assigned.

1.2.1. **Office of Primary Responsibility (OPR)** will publish emergency changes of an operational or technical nature that do not change policies or major procedures without service coordination. Coordinate all policy changes with Service focal points. Issue hazardous cargo information, clarifications, updates, procedural and policy changes to Air Force activities and Service focal points. Focal points retransmit changes to their respective service or agency shippers.

★1.2.2. **Service Focal Points** jointly establish procedures and prepare any documentation necessary to implement this manual. Users contact their Service focal points for all clarifications and waivers. Service focal points are:

- **Air Force.** AFMC LSO/LOP, 5215 Thurlow Street, Wright-Patterson AFB, OH 45433-5540, (937) 257-4503/1984, DSN: 787-4503/1984.
- **Army.** US Army Material Command, Logistics Support Activity, Packaging, Storage, and Containterization Center, ATTN: AMXLS-TP, 11 Hap Arnold Blvd, Tobyhanna PA 18466-5097, (570) 895-6622/7070, DSN: 795-6622/7070.
- **Navy.** Commander, Naval Inventory Control Point, Code 07122.30, P.O. Box 2020, 5450 Carlisle Pike, Mechanicsburg, PA 17055-0788, (717) 605-2784, DSN: 430-2784.
- **Marine Corps.** Commandant of Marine Corps (LPP-2), Headquarters, U.S. Marine Corps, 2 Navy Annex, Washington, DC 20380-1775, (703) 695-8926 DSN: 225-8926.
- **Defense Logistics Agency.** HQ Defense Logistics Support Command, Attn: DLSC-LDD, 8725 John J. Kingman Road, Suite 4134, Fort Belvoir VA 22060-6221, (703) 767-3673/3511 DSN: 427-3673/3511.

★1.2.3. **Packers** package hazardous materials, but do not sign legally binding documents.

1.2.4. **Preparers** certify that hazardous materials are properly classified, described, packaged, marked and labeled, and in proper condition for military airlift according to the applicable regulations of the Department of Transportation and this manual. Preparers include Technical Specialists. These individuals are qualified based on their training in handling and preparing the hazardous material in the performance of their duties.

1.2.5. **Handlers** maintain safe operations when transporting hazardous materials and proficiency in job specific responsibilities. Handlers include warehouse workers, load planners, load selectors, special handling personnel, and aircraft load teams.

★1.2.6. **Inspectors** ensure hazardous materials are properly prepared and documented before entering into the military airlift system (see attachment 28).

1.2.7. **Installation or Activity Commanders (or their designated representatives).**

- Train personnel according to paragraph 1.3.

- Appoint preparers as certifying officials to complete the Shipper's Declaration for Dangerous Goods Certification. This authorization must include the scope of the individual's authority and qualified training according to attachment 25. Document the authorization in writing, electronically, or other auditable method.

1.2.8. **Contracting Officers.** Ensure all DoD contracts and purchase requests for hazardous materials include the provisions of the supplement to the Federal Acquisition Regulation (FAR), Paragraph 52.228-7007 (Safety, Ammunition, and Explosives). Contractors get copies of specifications, standards, and publications from the procuring agency or as directed by the contracting officer.

1.2.9. **Air terminal or base operations personnel.** Notify the aircraft commander (or designated representative), in writing, of all hazardous materials aboard the aircraft. The activity responsible for delivering the cargo to the aircraft provides this notification in the absence of an established air terminal or base operation. The briefing agency must meet the requirements of attachment 21.

1.3. Hazardous Material Training Requirements. Commanders assign hazardous material workers and ensure each successfully completes relevant training. Train hazardous material workers according to attachment 25. Training for all levels of hazardous material workers who may effect the safety of hazardous materials in transportation, as a minimum, must address the following areas:

- Hazardous material general awareness and familiarization.
- Safety procedures to include emergency response.
- Function specific responsibilities directly relevant to the individual's role in hazardous material transportation.

★1.4. **Special Assignment Airlift Missions (SAAM).** Process SAAM requests, cargo clearance, and appropriate confirmations according to DoD 4500.9-R, Defense Transportation Regulation, Part 1. Unless specifically exempted under the provisions of paragraph 2.3, properly prepare, package, mark, label, and document all hazardous materials transported by SAAM aircraft according to this manual. Do not automatically apply the provisions of Chapter 3 for use of SAAM aircraft. Refer to paragraph 3.2 for validation and use of SAAMs for tactical, contingency, or emergency operations.

1.5. Transportability Design Criteria. Configure hazardous materials (items and articles) to ensure transportability on military aircraft. Items in their shipping configuration and skidded or wheeled equipment must meet the transportability design criteria identified in MIL-STD-1791, *Designing for Internal Aerial Delivery in Fixed Wing Aircraft*.

1.6. General Packaging Requirements. Package hazardous materials in containers authorized by this manual, Title 49 *Code of Federal Regulations* (CFR) Part 173, the *International Civil Aviation Organization* (ICAO) *Technical Instructions*, or the *International Air Transport Association* (IATA) *Dangerous Goods Regulation*. Attachment 3 applies to all military air shipments. See paragraph A17.1.2 for certification instructions.

★1.7. **United Nations (UN) Performance Specification Packaging.** Prepare hazardous materials in UN specification containers unless exempted by a specific packaging paragraph in this manual. DoD activities use the DoD POP Program to locate tested and authorized DoD packaging configurations. If the hazardous material is procured in a manufacturer's UN specification container, use that container. Ensure compliance with all other requirements of this manual, including air-eligibility. If the managing activity has specified a container Special Packaging Instruction (SPI), use that UN specification container. Frustrate hazardous cargo not correctly packaged and marked to UN specification requirements. For additional information concerning UN specification packaging or performance test requirements see DLAD 4145.41/AR 700-143/AFJI 24-210/NAVSUPINST 4030.55/MCO 4030.40A, *Packaging of Hazardous Material*. Service focal points are unable to waive UN specification requirements.

1.7.1. **Exempt Items.** The following materials are exempt from UN performance specification packaging test requirements. The packaging paragraph from table A4.1 will specify required packaging.

- Compressed gas cylinders
- Radioactive material
- Dry ice
- Magnetized material

- Life-saving appliances
- Mercury contained in manufactured articles
- Packages whose net mass exceeds 400 kg (882 pounds) or with a capacity exceeding 450 liters (119 gallons)

1.7.2. **Grandfathered Items.** Government-owned goods packaged before 1 January 1990 are exempt from UN specification requirements. Ship these items under the packaging requirements in effect at the time of packaging. Annotate the shipping papers "Government-owned goods packaged before 1 January 1990." See attachment 17 for certification instructions.

1.8 Fueled Vehicles and Equipment. Limit quantity of fuel within a vehicle or wheeled support equipment to a minimum. Do not exceed the maximum fuel in tank limits specified in attachment 13. Commanders must consider availability of fuel at the destination and operational requirements for mission readiness when determining fuel levels and ship with less than the maximum allowable amount when applicable. The preparer (certifying official) must ensure any unnecessary fuel is drained prior to shipment.

★1.9. Damaged or Improper Shipments. Do not transport any damaged, leaking, or improperly packed, marked, or labeled item or material.

- Return shipments to the originator, at the originator's expense, when a shipment requiring UN specification containers is not packaged properly. The originating activity may provide the shipper with the appropriate UN specification marking to correct the shipment. Consider urgency of need when determining the best method for correcting a deficient shipment. Ensure compliance with applicable modal regulations when offering any shipment for transportation.
- Report deficiencies on SF 361, **Transportation Discrepancy Report**, or SF 364, **Supply Discrepancy Report** (or equivalent reporting means as designated by the Service Focal Points and coordinated with AFMC LSO/LOP). Report leaks from packages, equipment, and self-propelled vehicles during loading or unloading, or in flight as a packaging deficiency.
- Immediately report any release of a hazardous substance in a quantity equal or greater than its reportable quantity to the Environmental Protection Agency (EPA) by calling the US Coast Guard National Response Center at 800-424-8802 or 202-267-2675.
- Consult local installation operating procedures for hazardous material emergency planning, response, and reporting requirements in the event of an incident involving hazardous materials.
- Do not move dropped or damaged explosive items. The Transportation or Packaging Office will immediately contact Explosive Ordnance Disposal (EOD), safety or munitions personnel to determine disposition.

★1.10. Empty Containers, Cylinders, Radioactive Packages and Nonhazardous Materials. Except as specified in this paragraph, empty containers or articles are not subject to any other requirements of this manual.

1.10.1. Empty Containers. Inspect packages that formerly contained a hazardous material covered by this manual to determine the presence or absence of hazardous material. If there is presence of hazardous material, purge the hazardous material or the package is regulated in the same manner as prescribed for the package if full. A container is considered empty if:

- A hazardous article has been removed from its container and there is no possibility of remaining residue (i.e., empty torpedo or missile containers).
- If the container has been purged of the hazardous material it previously contained.

1.10.2. Empty Cylinders. Compressed gas cylinders are empty if the pressure in the cylinder is less than 40 pounds per square inch absolute (psia) at 21 degrees C (70 degrees F). Psia equals the gauge pressure plus atmospheric pressure (14.7 psi).

- Before shipment, inspect empty cylinders for dents, bulges, oxidation pits, or other damage. Handle faulty cylinders as required by the latest DOT regulations or DLAI 4145.25/AR 700-68/NAVSUPINST 4440.128D/MCO 10330.2D/AFJMAN 23-227(I), *Storage and Handling of Liquefied and Gaseous Compressed Gasses and Their Full and Empty Cylinders*.
- Tightly close valves of cylinders before offering for transportation. The requirements of A3.3.2.2 apply to the protection of the valves.

- If the cylinder contains residue of either of the following material, ship is regulated as full cylinders, regardless of psia, unless completely cleaned and purged of residue or vapors:
 - Ammonia, Anhydrous
 - Division 2.2 with a subsidiary risk
 - Contains a flammable or poisonous material

1.10.3. Empty Radioactive Material Packaging. Empty the contents of the packaging as far as practical and ensure:

- The requirements of A11.11 are met.
- The packaging is in unimpaired condition and is securely closed so that there will be no leakage of radioactive material under normal transportation conditions.
- Internal contamination is not over 100 times the limits specified in A3.3.7.11.
- The packaging is prepared for shipment according to the requirements of A11.12.

1.10.4. Identifying Nonregulated Material, Containers or Cylinders. An item listed in table A4.1 may not be regulated because it does not meet the definition of the hazard class. This includes containers or articles defined as empty according to this paragraph. In this situation, when the item is determined to be nonregulated, the shipper must alert the carrier by:

- Annotating "NONHAZARDOUS" in the address block of the DD Form 1387, **Military Shipment Label**. In the absence of a DD Form 1387, the shipper will use an equivalent means of notification.
- Ship the item as general cargo and a Shipper's Declaration for Dangerous Goods form is not required.
- Apply an "EMPTY" label according to Attachment 15, when applicable. A label is not required for equipment or articles unless packaged, crated, or otherwise enclosed to prevent ready identification.
- The "NONHAZARDOUS" entry on the DD Form 1387 and the use of an "EMPTY" label is not required when the hazardous contents are completely removed from the container and there is no possibility of remaining residue, and the hazard communication markings and labels are removed or covered.

★1.11. Stowing Hazardous Materials.

- Ensure hazardous materials are compatible (attachment 18) when stored in transit.
- Ensure hazardous materials are accessible in flight.
- Ensure hazard markings and warning labels are visible to aircrew and unloading personnel.
- Do not stow hazardous materials susceptible to leaking on the same aircraft pallet with foodstuff, feed, or any other edible material intended for consumption by humans or animals (see paragraph 3.6.3). Solid material, such as explosive articles, may be loaded on the same aircraft pallet with foodstuffs based on operational requirements.

★1.12. Protective Equipment. The aircraft operator will ensure appropriate equipment is available to protect aircrew and passengers when transporting materials whose vapors are toxic, irritating or corrosive. Aircraft must have a closed oxygen system or protective mask for each person aboard. The shipper will provide any required special equipment to meet unique cargo safety requirements. It is the shipper's responsibility, based on intimate knowledge of the material, to determine necessary required protective equipment. While the exact equipment required depends on the materials being transported, following are the recommended minimum (or equivalent substitutions):

- Two pairs of rubber gloves.
- One pair of protective gloves.
- One plastic or rubber apron.
- A five-pound (2.3 kg) package of incombustible absorbent material.
- Three large plastic bags (4-mil thick, as a minimum).
- One oxygen or protective mask for each person.
- The base must ensure availability of protective equipment to cope with ground emergencies involving the cargo during loading operations. Coordinate respiratory and other personal protection requirements with the medical service.

★1.13. Unitized, Palletized, Containerized, or Consolidated Loads. Shippers must ensure aerial ports can handle loads. Ensure load configurations are:

- As stable as a single container. Items within containerized units will be secured in a manner to prevent damage or breakage during transportation. Consider both horizontal and vertical movement when determining securement method.
- Individually packaged as prescribed by table A4.1. The containerization unit is for ease of handling, it is not considered the outer package for any item stowed inside.
- Individually marked, labeled, and certified to the requirements of this manual and MIL-STD-129.
- Designed to provide installed equipment in approved holders meeting airlift restraint criteria.
- Compatible as required by attachment 18.
- Developed not using fiberboard or plywood sideboards unless specifically required by this manual.
- Marked and labeled on the outer most container according to attachments 14 and 15.
- The requirements of this paragraph apply to Mobility Readiness Spares Package (MRSP).

1.13.1. Accessibility. Do not ship containerized loads of hazardous material that are not easily accessible to the aircrew during flight. Physically stow hazardous materials next to the container opening and position to allow access while on the aircraft. The aircrew must have visual and physical access to all hazardous materials to mitigate any hazard posed by an in-flight incident. If there is evidence of a leak, the crew-member can locate the hazard, determine the extent of the risk, and take appropriate action to get under control or declare an in-flight emergency. Ensure air transportation personnel have access to the contents for inspection. Provide a key to unescorted, locked containers to the aircraft commander or designated representative. Ship only the following hazardous materials in inaccessible containers or tactical shelters:

- Recompression vans, support vans, and shelters used by the Underwater Construction Team. Hazardous items inside these escorted containers have been identified to and approved for shipment by AFMC LSO/LOP.
- Fire extinguishers secured in appropriate holders or brackets, or properly packaged according to this manual.
- Vehicles, support equipment, or other mechanical apparatus. Completely drain (residual fuel not to exceed 17 oz) items fueled by a flammable liquid with a flash point at or above 38 degrees C (100 degrees F). Tightly seal fuel lines and tank to prevent residual fuel leaks. Drain and purge items fueled by a flammable liquid with a flash point below 38 degrees C (100 degrees F). Installed batteries must be nonspillable type and secured upright.
- Items shipped under the PSN "Life Saving Appliances" and packaged according to this manual.
- Air conditioners and environmental control units, magnetic material, radioactive material, and thermometers.
- Class/division 1.4S explosives packaged according to this manual.
- Non-flammable gases or non-flammable aerosols prepared according to this manual and packed in strong outer containers.
- "Consumer Commodities" not containing a liquid or a flammable gas.

1.14. Procedures for Airdropping Hazardous Materials. Prepare airdrop loads according to the TO 13C7/FM 10-500 series. Prepare, mark, label, certify, and accept airdrop hazardous cargo the same as air landed cargo.

1.15. Nuclear Weapons Material. Use the detailed information and procedures for preparing nuclear weapons material in DOE-DNA TP 45-51/Army TM 39-45-51/Navy SWOP 45-51/Air Force TO 11N-45-51, *Transportation of Nuclear Weapons Material* (including supplements). This document provides a chart indicating the air shipment compatibility of nuclear material with nonnuclear explosives and hazardous materials. Also, determine the inter-compatibility of explosives and hazardous materials according to attachment 18. Packaging and handling of nuclear material not specifically outlined in the above document must meet the requirements of this manual.

1.16. Air Standardization Coordinating Committee (ASCC) Air Standards. Member nations (Australia, Canada, New Zealand, United Kingdom, and United States) agree in Air Standards 44/9 to accept the categorization and authorization by participating nations of explosives, radioactive materials, and dangerous cargo for onward carriage in their own military aircraft. Label shipments according to the ICAO *Technical Instructions, IATA Dangerous Goods Regulation* or by nationally approved labels. Certify the shipment meets all requirements for air transport.

1.17. NATO STANAG 3854, Policies and Procedures Governing the Air Transportation of Dangerous Cargo.

Participating nations agree to apply the United Nations International System for the Classification of Dangerous Cargo for air transportation. This includes the labeling (supplemented where necessary by ICAO or IATA labels) and certification. National regulations are still the authority for preparing, packing, aircraft stowing, and restraining dangerous cargo. Apply the national handling regulations of the carrier when transferring dangerous cargo from one nation to another for onward carriage.

NOTE: Paragraphs 1.16 and 1.17 are subject to international military standardization agreements. Do not make changes or deviations without authorization as prescribed in AFI 60-103 or NAVAIR Instruction 5711.1.

1.18. Mail Shipments. Shipment of hazardous material by mail is not permitted on military aircraft.

Chapter 2

DEVIATIONS, WAIVERS, AND SPECIAL REQUIREMENTS

2.1. Deviations and Waivers. Deviations and waivers are a departure from established procedures in this manual.

2.2. Passenger Movement Deviations. Do not transport passengers with hazardous materials coded as cargo aircraft only in table A4.1, column 7 and table A4.2 Passenger Eligibility "P" Codes. See attachment 22 for deviation authority, additional passenger information, and supplemental oxygen requirements.

★2.3. Packaging and Compatibility Waivers. Waivers are exceptions to the packaging or compatibility requirements of this manual. Safety and risk management of airlift assets are the overriding factors for waiver consideration. Ease of operation, convenience, or program office preference are not reasons for waiver. Service focal points will not issue waivers if surface transportation is reasonably available.

2.3.1. Packaging Waivers. The shipper must obtain a waiver for any hazardous item or packaging not authorized in attachments 5 through 13. Submit waiver requests to your Service focal point (see paragraph 1.2.2) by letter, message, or telephone. Confirm waivers requested by telephone with a letter or message. Ensure receipt of the letter or message prior to issuing the waiver. A copy of the waiver must accompany the shipment. The DoD does not have authority to issue packaging waivers to UN specification requirements. Do not jeopardize safety for convenience or ease of operation. To obtain a waiver, the shipper must:

- Provide a detailed description of the package.
- Provide the PSN, hazard class, identification number, packing group, and net quantity of the material.
- Provide a detailed explanation why the established requirements can not be met.
- Provide a transportation analysis identifying why surface transportation can not be effectively utilized.

2.3.2. Compatibility Waivers for Military Aircraft. Shippers submit waiver requests to their Service focal point (see paragraph 1.2.2) for approval. For Air Force aircraft, the Service focal point forwards the waiver request, with their coordination, to HQ AMC/SEW/DONC Scott AFB IL 62225-5363. Waiver requests must contain the following information:

- Reason incompatible materials require shipment together.
- Reason for air movement and why other transportation modes cannot be utilized.
- Statement that if one item detonates or leaks, incompatible items (in the same container or on the same aircraft) will not cause a propagation detonation, fire, corrosive effect, or contamination of the aircraft. Provide a brief description (include tests, if performed) which support your safety conclusions. Also, provide any additional safety controls the carrier must exercise.
- Provide intended date of movement, routing, and type of airlift required.
- Provide national stock numbers; model numbers of explosive items; PSNs; hazard classes; identification numbers; quantity or net explosive weight (individual and total as applicable); and packaging paragraphs.
- Provide points of contact at origin and destination bases.

2.3.3. Compatibility Waivers for AMC-Contracted (Commercial) Aircraft. Do not move incompatible items by AMC-contracted aircraft unless authorized by a DOT exemption. If an emergency situation exists to airlift incompatible items by AMC-contracted aircraft, provide the information required by paragraph 2.3.2 to HQ AMC/DONC/SEG who will request an exemption from the DOT if warranted.

2.3.4. Operational Necessity Waivers. Variations to the requirements of this manual are authorized for a specific mission when strategic and compelling reasons exist. The Service/MAJCOM having operational control of the aircraft must approve the operating procedures for specific missions. USTRANSCOM approves operating procedures for overall program management of strategic lift assets operated by HQ AMC. This paragraph applies to the following conditions:

- Recovery of downed aircraft.
- Emergency rescue operations.
- Movement of portable generators to support critical and key functions where power has been disrupted.
- Movement of fueled support equipment (SE) to replace inoperative equipment supporting an ongoing mobility exercise or operational plan. Equipment may be transported with fuel not to exceed one-half tank.

- Shipments in accordance with the requirements of AFI 11-289, *Phoenix Banner, Phoenix Silver, and Copper Operations*.

2.3.5. Intelligence or Criminal Investigations. Variations to the requirements of this manual are authorized for airlift of hazardous materials involved in intelligence or criminal investigations. Qualified personnel of those agencies responsible for the cargo must certify that all safety precautions have been taken to transport the materials safely. The shipper must ensure compliance with as many requirements of this manual as possible. This authorization is valid only for movement out of an austere environment. At the first secure in-route airfield, the cargo must be prepared according to this manual or paragraph 2.3.1.

★2.4. DOT Exemptions. A DOT exemption is authority to deviate from the requirements of 49 CFR 100-199. Use exemptions as authority for shipment by military air, if applicable. Follow all requirements of the exemption.

- The shipping activity must provide a copy of the exemption for each shipment. If the approval date on the exemption has expired, but a renewal has been applied for, enter, "Renewal Requested, Current Exemption Still Valid". Place this statement on the exemption after verifying renewal request with the Service Focal Point.
- The exemption must accompany the cargo in the Defense Transportation System.
- Maintain a copy of the exemption at each facility where it is used in connection with the transportation of the hazardous material.
- Do not use DOT packaging exemptions for international shipments unless the item is exempted from UN specification requirements (see 1.7.1).
- Forward requests for new exemptions or copies of existing exemptions according to the DTR, Volume II.

★2.5 Competent Authority Approvals (CAA). A CAA is an approval issued by a national agency responsible under its national law for the regulation of hazardous materials transportation. The U.S. Competent Authority is the U.S. Department of Transportation. These may also be referred to as Special Approvals. The following information applies:

- One type of CAA is issued for explosive hazard classification. A copy of this CAA is not required to accompany military air shipments. See paragraph A3.3.1.2 for explosive classification approval requirements. If packaging requirements are included as part of an explosive hazard classification CAA, certify the shipment to A5.6 and attach a copy of the CAA to the shipper's declaration (see A17.4.1).
- A second type of CAA is issued for packaging or other transportation requirements when specified by the responsible national agency for the originating shipment. These include CAA's issued by the U.S. Competent Authority and foreign agencies.
 - Use this CAA as authority for military air shipment.
 - Follow all requirements of the approval.
 - The shipping activity must provide a copy of the CAA for each shipment.
 - The CAA must accompany the cargo in the Defense Transportation System.
 - The Inventory Control Point for the item (national stock number managing activity) must submit the CAA request to the Service/Agency focal point according to the DTR, Volume II. Request copies of existing CAA's according to the DTR, Volume II.

★2.6. DoD Certification of Equivalency (COE). A COE is a certification that the proposed packaging equals or exceeds the requirements of 49 CFR 100-199. Use COEs as authority for shipment by military air, if applicable. Follow all requirements of the approval.

- The shipping activity must provide a copy of the COE for each shipment.
- The COE must accompany the cargo in the Defense Transportation System.
- Do not use COEs for international shipments unless the item is exempted from UN specification requirements (see 1.7.1).
- Forward requests for new COE's according to the DTR, Volume II. Request copies of existing COE's according to 1.2.2.
- COE issuing officials, as identified in the DTR, Volume II, follow guidance in DLAD 4145.41/AR 700-143/AFJI 24-210/NAVSUPINST 4030.55/MCO 4030.40, *Packaging of Hazardous Material*, for approving COEs. Any COE that approves military airlift of a hazardous material that is forbidden by this manual, either primary or secondary hazard, must be coordinated with the respective Service Focal Point and AFMC LSO/LOP.

2.7. Limited and Excepted Quantities. Use good quality packaging specified in attachment 19 to ship small quantities of hazardous materials aboard military aircraft. Personnel may use UN specification packaging even though it's not required.

2.8. Emergency Response Information. Do not offer for transportation, accept for transportation, transfer, store, or otherwise handle hazardous materials unless emergency response information is available at all times. The shipper must provide a 24-hour emergency response telephone number that is monitored at all times by personnel who are knowledgeable of the hazards and characteristics of the materials being shipped. This information is required in the event of an emergency involving the material. Enter the phone number on the manifest (or on the Shipper's Declaration for Dangerous Goods attached to the manifest) immediately following the description of the hazardous material, in a clearly visible location. Enter the phone number only one time if the number applies to each hazardous material on the manifest. Indicate the telephone number is for emergency response information by annotating the words "EMERGENCY CONTACT," followed by the telephone number (including the area code or international access code). DoD activities use the following telephone numbers:

- For Class 1 material, contact The Army Operations Center, (703) 697-0218/0219. Ask for the Watch Officer.
- For radioactive material, contact Rock Island Arsenal, (309) 782-3510. Call collect. Ask for the Staff Duty Officer.
- For all other hazardous materials, contact The DoD Emergency Response Hotline, 1-800-851-8061 (toll free) or 1-804-279-3131.
- Shipments originating from non-DoD activities use a company, safety organization, or other contact telephone number applicable to the material shipped.

★2.9. Complying With Special Cargo Requirements. Ensure any Inhalation Hazard Zone A material (as identified by Special Provision 1 in table A4.1, column 7); Class 1, compatibility group K; Fissile Class III Radioactive Materials; infectious substances and biological research materials requiring a technical escort comply with the extensive protective measures outlined in attachment 24.

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Chapter 3

TACTICAL, CONTINGENCY, OR EMERGENCY AIRLIFT

★3.1. Purpose. Shippers must identify procedural exceptions for movement of hazardous materials under tactical, contingency, or emergency conditions as specified in DoD 4500.9-R, Defense Transportation Regulation and implementing Service directives. This chapter does not apply to helicopters being used for insertion or extraction of combat troops to, from, or within a combat area.

★3.2. Applicability. This chapter imposes a considerable increase in risk to the aircraft, air crew, and customers. Real world situations may dictate use, but mission validators must evaluate the strategic and compelling reason to increase the risk.

- The MAJCOM having operational control of the deploying unit justifies the applicability of this chapter by indicating the nature of the movement in the airlift request.
- Ensure this chapter is used for operations that support DoD agencies and allies in providing sustained, immediate, and responsive air movement, and delivery of personnel and material to, within, or from objective areas. Included are Joint Chiefs of Staff (JCS), component, and unilateral mobility exercises designed to simulate and evaluate responsiveness to tactical, contingency, or emergency situations requiring airlift.
- Do not use the provisions of this chapter during redeployments unless mission readiness is affected. Responsibility remains with the MAJCOM having operational control of the deploying unit to justify the applicability of this chapter by indicating the nature of the movement in the airlift request.
- Apply these provisions to notional tasking of Standard Air Munitions Package/Standard Tank Rack Adapter and Pylon Package (STAMP/STRAPP) and deployable munitions packages, as directed by HQ AFMC/DRW.
- Observe all practical ground and flight rules and brief each aircraft commander (or representative designated by the commander) according to attachment 21.
- Refer to Department of Defense (DoD) Regulation 4500.9-R, *Defense Transportation Regulation*, for manifesting requirements.
- Do not transport hazardous cargo aboard tactical or strategic aeromedical evacuation aircraft. The field commander may allow the transportation of casualties on aircraft carrying hazardous cargo in extreme circumstances that may result in potential loss of life.
- Theater commanders in coordination with USTRANSCOM evaluate acceptable risk relative to the urgency of need to determine if the procedures of this chapter will continue to apply to sustained logistical resupply airlift.

★3.3. Use of Commercial Airlift. Use DOT exemptions 7573 and 9232 (DOT-E 7573 and DOT-E 9232), as outlined in attachment 23, as required for AMC contracted commercial cargo airlift.

★3.4. Packaging Requirements. Comply with UN specification requirements (except when otherwise specified) and the packaging configurations specified in attachments 5 through 13. Do not remove hazardous materials from their required packaging except as authorized in this chapter.

3.4.1. Compliance with Technical Orders. Comply with all technical orders and technical publications to ensure correct storage of hazardous materials when removed from their packaging and stored in the racks or containers of tactical equipment or vehicles.

3.4.2. Basic Combat Load or Individual Issue. Personnel are permitted to carry their basic combat load or individual issue of hazardous materials removed from its required packaging under the following conditions:

3.4.2.1. Personnel will engage an enemy force immediately upon deplaning at the objective or will be airdropped.

3.4.2.2. Personnel not immediately engaging the enemy force when deplaning, but will assume a tactical mission on arrival or re-deploying upon mission completion, may deploy with their basic load or individual issue of hazardous materials. However, the troop commander must collect these items, including small arms ammunition, before the anti-hijack briefing. On arrival at the aircraft, the troop commander must brief the loadmaster on the hazardous materials and assist the loadmaster, as directed, in the tiedown before departing. The hazardous materials will be

redistributed on arrival at destination. If required, apply these provisions to redeployment of troops upon mission completion.

3.4.2.3. The following requirements apply when basic combat load or individual issue of hazardous materials are carried under the provisions of this paragraph:

- Personnel must not handle explosives and other hazardous materials during flight operations.
- Ensure all individual hazardous materials are safe from accidental initiation (i.e., grenades in fiber containers, safety pins secured, etc.).
- Ensure all small arms ammunition remain in the individual carrier (for example, bandoleers, ammunition belts, pouches), and all weapons remain clear until the aircraft has landed.
- Ensure all NBC equipment remain in the individual carrier (for example, protective mask bag, mobility bag), and accompany the individual at all times. First aid kit components must remain within individual kit carriers or pouches.
- Prepare all hazardous material other than small arms ammunition, nuclear, biological, and chemical (NBC) equipment, and first aid kits for shipment according to this manual, consolidate in one central location on the aircraft as directed by the loadmaster, and distribute to personnel before landing.
- Lithium batteries installed in electronic equipment battery box or compartment require no additional packaging. Individuals may handcarry (pockets, rucksack, backpacks, etc.) the minimum number of spare lithium batteries required to sustain the immediate operation (as determined by the troop commander). Pack handcarried lithium batteries in original wrapping or in nonconductive material to prevent external short-circuiting. Prepare equipment containing lithium batteries, not considered individual issue or basic combat, according to A13.8.
- The troop commander or team chief must brief the aircraft commander or designated representative (i.e. loadmaster) on the location of all hazardous materials.
- A Shipper's Declaration for Dangerous Goods is not required.
- See Attachment 23 for use of contract air carriers operating under DOT-E 9232.

3.5. Passenger Eligibility. Personnel moving under the authority of this chapter are participants in the tactical, contingency, or emergency operation and not considered passengers. Passenger deviation requirements do not apply. This authority does not apply to medical evacuees or passengers. If passenger seats are released to nonparticipants, the cargo must not be prepared using a provision authorized under the authority of this chapter and the requirements of 2.2 apply.

★3.6. Load Configurations.

3.6.1. **Compatibility for Chapter 3 Movements.** Review operational plans and implement procedures to minimize the exposure of personnel to hazards of the cargo when more than one aircraft is available. Separate incompatible explosives and other hazardous materials (and personnel) to the maximum extent possible, as the mission allows. Use attachment 18, paragraph A18.4 for incompatible hazardous materials transported on the same aircraft.

3.6.2. **Complete Round Rigging (CRR).** CRR (unassembled on airdrop platform) allows deploying units to airlift normally incompatible items. CRR encompasses all items necessary for mission completion (i.e., primers, propelling charges, projectiles, fuses, etc.). CRR will allow loss of one or more pallets without jeopardizing total mission accomplishment.

- Use CRR to meet operational requirements. Authorized for exercises only when there is an intent to fire munitions.
- Use only CRR load configurations shown in TO 13C7/FM 10-500 series for low and high velocity parachute airdrop. Remove hazardous material from required packaging only when specifically identified in the TO/FM.

3.6.3. **Meals Ready to Eat (MRE).** Follow the requirements of paragraph 1.11 for stowing edible material intended for human consumption on the same aircraft pallet as hazardous material. If required by operational necessity, load MRE's on the same 463L pallet with hazardous materials under the following conditions:

- Do not load MREs or other edible material on the same pallet with any hazardous material liquid or Class/division 2.3 gases.
- Separate hazardous materials (except Class 1) from the MREs by the greatest distance possible, but not less than 44 inches in all directions.
- Do not load hazardous materials above the MRE's.

- Flameless Ration Heaters (FRH) packed as a component of the MRE, regardless of the number shipped, are not regulated by this manual (see A3.3.4). Prepare FRHs shipped separately from the MRE as regulated hazardous material according to this manual.
- Do not open, handle, or activate fuel sources shipped along with the MRE's inside the aircraft.

★3.7. Fuel for Vehicles and Equipment. Transport fuel needed to operate vehicles and equipment at the deployment site in air-eligible UN specification containers listed in paragraph A7.3. If required, stow these containers in the vehicle or equipment according to paragraph 1.11. Prevent metal-to-metal contact between containers not secured in racks by using cushioning material or fiberboard. Only use DOT 5L jerricans under the following conditions:

- Allow sufficient ullage (outage) and tightly secure DOT 5L jerrican caps to prevent leakage.
- Secure DOT 5L jerricans in permanently configured and approved holders on vehicles or equipment. See attachment 14 for marking requirements.
- Total combined fuel quantity for a vehicle or equipment equipped with DOT 5L jerricans can not exceed the capacity of the item's fuel tank times two (2).
- DOT 5L jerricans must be drained but not purged when not shipped in an approved holder according to this paragraph. See paragraph A7.3 for certification.

3.7.1. Fuel-in-Tank Limitations. Transport fueled vehicles, self-propelled units, wheeled engine-powered support equipment, and all other types of support equipment according to attachment 13, paragraphs A13.5 and A13.6. Units transported under the provisions of this chapter may contain additional quantities of fuel in tank based on operational necessity during deployments. During redeployments, unless mission readiness is affected, limit fuel in tank to a minimum. See attachment 17 for certification requirements.

3.7.2. Bulk Fuel. Do not transport servicing trucks, trailers, semitrailers, or storage tanks containing bulk fuel, or any bulk hazardous material by air (except as authorized in paragraph 3.7.3). Purge the bulk tank of hazardous material according to service technical manuals. Drain (but need not purge unless directed by technical directives) bulk fuel tanks used to transport nonflammable liquids or flammable liquids with a flash point at or above 38 degrees C (100 degrees F). Provide air circulation in the cargo compartment of pressurized aircraft.

3.7.3. Additional Fuel. Transport flammable liquid fuel in MIL-D-23119 collapsible fabric drums, not to exceed 500 gallon rated capacity. Ship all other collapsible fabric drums completely drained. Prepare according to paragraph A7.3.

★3.8. Lithium Batteries.

- Do not transport damaged lithium batteries or those suspected of damage.
- Prepare lithium batteries according to this chapter or attachment 13, as applicable.
- Only transport used lithium batteries when properly installed in a battery box or compartment of electronic equipment.
- Do not transport used lithium batteries (not installed in equipment) by military airlift if surface transportation is available. Air movement from forward combat or exercise area is authorized if it is the only mode available. See paragraph A13.8 for proper packaging of used batteries.
- For airdrop missions, pack electronic equipment handcarried in a rucksack, in a shipping (airdrop) container, or as a door bundle depending on mission requirements. Shipper's Declaration for Dangerous Goods certification is not required.

3.9. Chemically Contaminated Cargo. Decontaminate items to the greatest extent possible in the theater in which they became contaminated. Destroy reusable wood and fiberboard containers in the theater in which they became contaminated. Decontaminate reusable shipping containers other than wood and fiberboard (drums, etc.) before reusing. Double wrap palletized cargo that is susceptible to exposure to contamination. Remove the outside wrap if exposed to contamination (the inner wrap should protect the cargo). Destroy the contaminated outside wrap in the theater in which it became contaminated. The following procedures apply to chemically contaminated cargo:

3.9.1. Handling Instructions. Handle carefully, wear protective equipment when necessary. Contamination could include nerve, blister, or blood chemical agents. Take precautions (protective clothing and breathing apparatus) when handling or opening contaminated containers and working on contaminated items. Open containers in a controlled, protected, and well-ventilated area.

3.9.2. **Packaging Requirements.** Package contaminated items in a hermetically sealed barrier bag, placed in an open head metal drum (1A2) with an air-tight gasket. In the absence of a hermetically sealed barrier bag, wrap and place the contaminated material in an open head metal drum with an air-tight gasket then overpack into an open head metal drum (1A2) with an air-tight gasket. The outer drum must meet PG I requirements.

3.10. Marking, Labeling, and Certification. Mark, label, and certify hazardous materials transported under the provisions of this chapter according to attachments 14, 15, and 17.

★3.11. Diverting Hazardous Materials to Nontactical Airlift. Prepare and forward redeployed hazardous materials prepared according to this chapter if off-loaded intransit as follows:

- The operating command forwards cargo on subsequent tactical/contingency aircraft to support same movement directive (when possible).
- When tactical/contingency airlift is not available, contact the Traffic Management Office/Installation Transportation Officer (TMO/ITO) who establishes mode of transportation by most expeditious means.
- Move cargo diverted to channel airlift on first available aircraft. Do not repackage unless transporting the cargo on a commercial aircraft not operating under DOT-E 7573 or DOT-E 9232. Use attachment 18 for compatibility requirements for channel airlift.

★3.12. Transporting Foreign Troops. Transport hazardous materials belonging to non-U.S. military units using the same guidelines as for U.S. forces.

- Comply with paragraph 3.4.2 for handcarried items
- Ensure use of serviceable UN specification containers or packaging approved by the competent authority of the transported force. Packaged hazardous materials must be properly marked and labeled to identify the contents.
- Equivalent foreign certification documents as approved by the competent authority of the transported force may be accepted in place of the Shipper's Declaration for Dangerous Goods form. As a minimum, the form must include in English, the proper shipping name, UN identification number, hazard class/division, and packing group (if required).

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Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION****References**

AFI 11-289, *Phoenix Banner, Phoenix Silver, and Copper Operations*
 DLAD 4145.41/AR 700-143/AFJI 24-210/NAVSUPINST 4030.55/MCO 4030.40A, *Packaging of Hazardous Materials*
 DLAI 4145.21/TB MED284/NAVSUPINST 4610.31/AFR 167-9, *Preparation of Medical Materiel Requiring Freeze or Chill Environment for Shipment.*
 DLAR 4145.25/AR 700-68/NAVSUPINST 4440.128B/MCO 10330.2B/AFR 67-12, *Storage and Handling of Compressed Gases and Liquid in Cylinders*
 DNA TP 45-51/Army TM 39-45-51/Navy SWOP 45-51/Air Force TO 11N-45-51, *Transportation of Nuclear Weapons Material*
 DoD Catalog 5010.16-c *Defense Management Education and Training*
 DoD 6055.9-STD, *Explosive Safety Standards*
 DoD 4500.9-R, *Defense Transportation Regulation*
 DoD 6050.5, *Hazardous Material Information System*
 DOT Title 49 *Code of Federal Regulations (CFR)*
 IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6"
 IAEA "Regulations for the Safe Transport of Radioactive Materials, No. TS-R-1"
 International Civil Aviation Organization (ICAO) *Technical Instructions*
 International Air Transport Association (IATA) *Dangerous Goods Regulation*
 MIL-STD-129, *Marking for Shipment and Storage*
 MIL-STD-1791, *Designing for Internal Aerial Delivery in Fixed Wing Aircraft*
 TB 700-2, NAVSEAINST 8020.8B, TO 11A-1-47, DLAR 8220.1, *DoD Ammunition and Explosive Hazard Classification Procedures*
 Title 40 CFR, Parts 260-265, *Protection of Environment*

Abbreviations and Acronyms

| | |
|--------|---|
| AFMC | Air Force Materiel Command |
| AFSC | Air Force Specialty Code |
| ALC | Air Logistics Center |
| ALCE | Airlift Control Element |
| AMC | Air Mobility Command |
| ASCC | Air Standardization Coordinating Committee |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society for Testing and Materials |
| ATOC | Air Terminal Operations Center |
| CAA | Competent Authority Approval |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| COE | Certification of Equivalency |
| CONUS | Continental United States |
| CRAF | Civil Reserve Air Fleet |
| CRR | Complete Round Rigging |
| DACG | Departure Airfield Control Group |
| DLA | Defense Logistics Agency |
| DLSC | Defense Logistics Support Command |
| DMET | Defense Management Education and Training |
| DoD | Department of Defense |

| | |
|--------|--|
| DOT | Department of Transportation |
| DSN | Defense Switched Network |
| DTS | Defense Transportation System |
| EOD | Explosive Ordnance Disposal |
| EPA | Environmental Protection Agency |
| ERG | Emergency Response Guidebook |
| FAR | Federal Acquisition Regulation |
| FPM | Federal Personnel Manual |
| FRH | Flameless Ration Heater |
| IAEA | International Atomic Energy Agency |
| IATA | International Air Transportation Association |
| IBD | Inhabited Building Distance |
| ICAO | International Civil Aviation Organization |
| ID | Identification |
| IHC | Interim Hazard Classification |
| IMDG | International Maritime Dangerous Goods |
| IRFNA | Inhibited Red Fuming Nitric Acid |
| ISO | International Standards Organization |
| ITO | Installation Transportation Officer |
| JCS | Joint Chiefs of Staff |
| kPa | Kilopascal |
| LAPE | Low Altitude Parachute Extraction |
| LSA | Low Specific Activity |
| MAJCOM | Major Command |
| MILVAN | Military Van |
| MOS | Military Occupational Specialty |
| MRE | Meals Ready to Eat |
| MRSP | Mobility Readiness Spares Package |
| MTMC | Military Traffic Management Command |
| NA | North American |
| NBC | Nuclear, Biological, and Chemical |
| NEW | Net Explosive Weight |
| N.O.S. | Not Otherwise Specified |
| OPR | Office of Primary Responsibility |
| PCB | Polychlorinated Biphenyls |
| PG | Packing Group |
| POD | Port of Debarkation |
| POE | Port of Embarkation |
| ppm | Parts Per Million |
| PSI | Pounds Per Square Inch |
| PSIA | Pounds Per Square Inch Absolute |
| PSIG | Pounds Per Square Inch Gauge |
| PSN | Proper Shipping Name |
| RQ | Reportable Quantity |
| SAAM | Special Assignment Airlift Mission |
| SCF | Standard Cubic Feet |
| SCFH | Standard Cubic Feet per Hour |
| SE | Support Equipment |
| SMPT | School of Military Packaging Technology |
| SPI | Special Packaging Instruction |
| STAMP | Standard Air Munitions Package |
| STRAPP | Standard Tank Rack Adapter and Pylon Package |
| TALCE | Tanker Airlift Control Element |
| TCN | Transportation Control Number |

| | |
|------------|--------------------------------------|
| TCU | Transportation Control Unit |
| TMO | Traffic Management Office |
| UCT | Underwater Construction Team |
| UN | United Nations |
| USG | United States Government |
| USTRANSCOM | United States Transportation Command |
| WRSK | War Readiness Spares Kit |

Terms

A₁--The maximum activity of special form radioactive material permitted in a type A package.

A₂--The maximum activity of radioactive material, other than special form or low specific activity radioactive material, permitted in a type A package. These values are either listed in A11.5 or may be derived using the procedure in A11.4.

★**Article**--A manufactured item, containing a hazardous material or substance, in a specific shape or design which end use is dependent on the shape or design. The shape or design prevents loss of hazardous contents during normal conditions of transport.

Atmospheric Pressure--Atmospheric pressure is 101.3kPa (14.7 psi).

Bag--A flexible packaging made of paper, plastic film textiles, woven material or other similar materials.

Bottle--An inner packaging having a neck of relatively smaller cross section than the body and an opening capable of holding a closure for retention of the contents.

Box--A packaging with complete rectangular or polygonal faces made of metal, wood, plywood, reconstituted wood, fiberboard, plastic, or other suitable material.

Bulk Packaging--A packaging, with no intermediate form of containment, that has a maximum capacity greater than 400 kg (882 lbs) or 450 L (119 gallons).

Class 1 (Explosives)--Any substance or article (including a device) which is designed to function by explosion (i.e., an extremely rapid release of gas and heat). Unless the substance or article is otherwise classed in table A4.1, the term "explosive" may also refer to an item that is able to produce a chemical reaction within itself and is able to function in a similar manner even if not designed to function by explosion. Explosives in Class 1 are divided into six divisions as follows:

- **Division 1.1**--Consists of explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.
- **Division 1.2**--Consists of explosives that have a projection hazard but not a mass explosion hazard.
- **Division 1.3**--Consists of explosives that have a fire hazard and a minor blast hazard or a minor projection hazard (or both), but not a mass explosion hazard.
- **Division 1.4**--Consists of explosive devices that present a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.
- **Division 1.5**--Consists of very insensitive explosives. This division is comprised of substances which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal transportation conditions.
- **Division 1.6**--Consists of extremely insensitive articles that do not have a mass explosion hazard. This division is comprised of articles which contain only extremely insensitive detonating substances and which

demonstrate a negligible probability of accidental initiation or propagation. The risk from these articles is limited to the explosion of a single article.

Class 2.1 (Flammable Gas)--Any material that is a gas (boiling point) at 20 degrees C (68 degrees F) or less and has a pressure of 101.3 kPa (14.7 psi), in addition to one of the following properties:

- Is ignitable at 101.3 kPa (14.7 psi) when in a mixture of 13 percent or less by volume with air.
- Has a flammable range of 101.3 kPa (14.7 psi) with air of at least 12 percent regardless of the lower limit.
- The limits specified above shall be determined at 101.3 kPa (14.7 psi) of pressure and a temperature of 20 degrees C (68 degrees F) according to ASTM E681-85 Standard Test Method for Concentration Limits of Flammability of Chemicals.

Class 2.2 (Nonflammable, Nonpoisonous Compressed Gas, Including Compressed Gas, Liquefied Gas, Pressurized Cryogenic Gas, and Compressed Gas in Solution)--Any material or mixture which has an absolute pressure of 280 kPa (41 psia) inside the container at 20 degrees C (68 degrees F) and does not meet the definition of a Class 2.1 or 2.3.

Class 2.3 (Gas Poisonous by Inhalation)--Any material that is a gas (boiling point) at 20 degrees C (68 degrees F) or less and has a pressure of 101.3 kPa (14.7 psi), in addition to one of the following properties:

- The material is known to be so toxic to humans as to pose a hazard to health during transportation.
- In the absence of adequate data on human toxicity, the material is presumed to be toxic to humans because when tested it has an LC50 (inhalation toxicity) value of not more than 5000 parts per million (ppm).

Class 3 (Flammable Liquid)--A flammable liquid is any liquid having a flash point equal to or below 60.5 degrees C (141 degrees F), except:

- Any liquid meeting the definition of a Class 2 material.
- Any mixture having one or more compounds with a flash point above 60.5 degrees C (141 degrees F) that makes up at least 99 percent of the total volume of the mixture. Distilled spirits of 140 proof or lower are considered to have a flash point no lower than 23 degrees C (73 degrees F).

Class 4.1 (Flammable Solids)--Flammable solids consist of solids (other than those classed as explosives) which are readily combustible under conditions encountered in transport, or may cause or contribute to fire through friction.

Class 4.2 (Spontaneously Combustible Material)--Liquids or solids which are prone to spontaneous heating under normal conditions encountered in transport or to heating in contact with air, thus being liable to ignite.

Class 4.3 (Dangerous When Wet Material)--Solids that are liable to become spontaneously flammable or emit flammable gases when they come into contact with water.

Class 5.1 (Oxidizers)--A material that may cause or enhance the combustion of other material, generally by yielding oxygen.

Class 5.2 (Organic Peroxides)--Any organic compound containing oxygen (O) in the bivalent -O-O- structure, and which may be considered a derivative of hydrogen peroxide where one or more of the hydrogen atoms have been replaced by organic radicals. Organic peroxides are thermally unstable substances which may undergo exothermic self-accelerating decomposition. These substances may be prone to explosive decomposition or rapid burning; be sensitive to impact or friction; react dangerously with other material; or cause damage to the eyes. A material which meets this definition must be classed in Class 5.2, unless it also meets the definition of a Class 1 material, or unless the available oxygen content of an organic peroxide formulation is less than the amount specified (by the percentage equation) in 49 CFR 173.128.

- Type A: An organic peroxide that can detonate or deflagrate rapidly as packaged for transport. Transportation of type A organic peroxides is forbidden.
- Type B: An organic peroxide that, as packaged for transport, neither detonates nor deflagrates rapidly, but can undergo a thermal explosion.

- Type C: An organic peroxide that, as packaged for transport, neither detonates or deflagrates rapidly and cannot undergo a thermal explosion.
- Type D: An organic peroxide which exhibits the following characteristics:
 - Detonates only partially, but does not deflagrate rapidly and is not affected by heat when confined.
 - Does not detonate, deflagrates slowly, and shows no violent effect if heated when confined.
 - Does not detonate or deflagrate, and shows a medium effect when heated under confinement.
- Type E: An organic peroxide that neither detonates or deflagrates, and shows low or no effect when heated under confinement.
- Type F: An organic peroxide that will not detonate in a cavitated state, does not deflagrate, shows low or no effect if heated when confined, and has low or no explosive power.
- Type G: An organic peroxide that will not detonate in a cavitated state, will not deflagrate, shows no effect when heated under confinement, has no explosive power, is thermally stable (self-accelerating decomposition temperature above 60 degrees C (140 degrees F)); and, for desensitized liquid formulations, is desensitized with a compatible organic liquid which boils above 150 degrees C (300 degrees F).

Class 6.1 (Poisonous Material)--A material, other than a gas, which is known to be so toxic to humans as to afford a hazard to health during transportation, or is presumed to be toxic to humans because it falls within one of the test categories identified in 49 CFR 173.132.

★Class 6.2 (Infectious Substances):

- An infectious substance is a viable microorganism, or its toxin, which causes or may cause disease in humans or animals, and includes those agents listed in 42 CFR 72.3 of the Department of Health and Human Services regulations, or any other agent that has the potential to cause severe disabling or fatal disease. The terms "infectious substance" and "etiologic agent" are synonymous.
- Substances known or suspected of containing pathogens.
- A biological product is a material prepared and manufactured according to 9 CFR, part 102 (Licenses for Biological Products), 9 CFR, part 103 (Biological Products for Experimental Treatment of Animals), 9 CFR, part 104 (Permits for Biological Products), 21 CFR, part 312 (Investigational New Drug Application), or 21 CFR, parts 600 to 800 (Biologics), and may be shipped according to this manual.

Class 7 (Radioactive Material)--Any material having a specific activity greater than 0.002 micro curies per gram (uCi/g) (see definition of "specific activity").

Class 8 (Corrosive Material)--A liquid or solid that causes visible destruction or irreversible alterations in human skin tissue on contact. If the packaging leaks, the liquid will have a severe corrosion rate on other materials such as steel and aluminum. The main hazard from Class 8 liquids and vapors is the corrosive effect on humans and the aircraft or cargo. Some Class 8 materials have very dangerous additional hazards such as toxicity, flammability, and explosiveness.

Class 9 Material--A material that may pose an unreasonable risk to health, safety, or property during transport, but does not meet any of the definitions of the other hazard classes specified in this manual. This class includes:

- A material that has an anesthetic, noxious, or other similar property which can cause extreme annoyance or discomfort to passengers and crew in the event of leakage during transportation, so as to prevent the correct performance of the crews assigned duties.
- A material in quantities that meets the definition of a hazardous waste or a hazardous substance, but does not meet the definition of any other class.

Combination Packaging--A combination of packaging, for transport purposes, consisting of one or more inner packagings secured in a nonbulk outer packaging. It does not include a composite packaging.

Combustible Liquid--A combustible liquid is any liquid that does not meet the definition of any other classification specified in this manual and has a flash point above 60.5 degrees C (141 degrees F) and below 93 degrees C (200 degrees F). Any mixture having one or more components with a flash point of 93 degrees C (200 degrees F) or higher, that makes up at least 99 percent of the total volume of the mixture is not a combustible liquid.

Compatibility Group Letter--A designated alphabetical letter used to categorize different types of explosive substances and articles for stowage and segregation.

Composite Packaging--Packaging consisting of an outer packaging and inner receptacle, so constructed that the inner receptacle and the outer packaging form an integral packaging. Once assembled it remains thereafter an integrated single unit; it is filled, stored, shipped, and emptied as such.

Compressed Gas in Solution--A nonliquified compressed gas dissolved in a solvent.

Consumer Commodity--A material that is packaged and distributed in a form intended or suitable for retail sale for purposes of personal care or household use. This does not include material designed for military or industrial use that is not readily available from commercial retail sources.

Contingency--An emergency involving military forces caused by natural disasters, terrorists, subversives, or by required military operations. Due to the uncertainty of the situation, contingencies require plans, rapid response, and special procedures to ensure the safety and readiness of personnel, installations, and equipment.

Conveyance--Any aircraft for the purposes of this manual.

Crate--An outer packaging with incomplete surfaces.

Cryogenic Liquid--A refrigerated liquefied gas having a boiling point colder than -90 degrees C (-130 degrees F) at 101.3 kPa (14.7 psi) absolute. A material meeting this definition is subject to requirements of attachment 6, regardless of whether it also meets the definition of a nonflammable, nonpoisonous compressed gas. The material is partially described as "(* * *), refrigerated liquid (cryogenic liquid)" in table A4.1, (with the asterisks replaced by the name of the gas).

Cylinder--A pressure vessel designed for pressures higher than 40 psia and having a circular cross section.

Depleted Uranium--Uranium containing less uranium²³⁵ than the naturally occurring distribution of uranium isotopes.

Dermal Toxicity--A material with an LD50 for acute dermal toxicity of not more than 1000 mg/kg.

Design--The description of a special form material, a package, or a packaging, that enables those items to be fully identified. The description may include specifications, engineering drawings, reports meeting regulatory requirements, and other relevant documentation.

★Diagnostic Specimens--A diagnostic specimen is any human or animal material including, but not limited to, excreta, secreta, blood, and its components, tissue, and tissue fluids, being shipped for purposes of diagnosis. Does not include live infected animals. Those specimens known to or expected to contain pathogens (microorganisms which cause infectious disease in humans or animals) must be shipped as a Class 6.2. Also, specimens transported for the purpose of screening or diagnosis for the presence of pathogens must be transported in the same manner. Live infected animals and diagnostic specimens known not to contain pathogens are not regulated by as a hazardous material. See Class 6.2 (Infectious Substances).

Diluent Type A--An organic liquid that does not damage the thermal stability or increase the hazard of the organic peroxide and with a boiling point not less than 150 degrees C (302 degrees F) at atmospheric pressure. Type A diluents may be used for desensitizing all organic peroxides.

Diluent Type B--An organic liquid that does not damage the thermal stability or increase the hazard of the organic peroxide and with a boiling point, at atmospheric pressure, of less than 150 degrees C (302 degrees F) but at least 60

degrees C (140 degrees F), and a flash point greater than 5 degrees C (41 degrees F). Type B diluents are only used when specified in table A9.1. The boiling point of a type B diluent must be at least 50 degrees C (122 degrees F) above the control temperature of the organic peroxide. A type A diluent may be substituted for a type B diluent in equal concentration.

Division--A subdivision of a hazard class.

Domestic Addressee--The continental United States, Alaska, Hawaii, the District of Columbia, the Commonwealth of Puerto Rico, the Commonwealth of the Northern Mariana Islands, the Virgin Islands, American Samoa, Guam, and other US Territories.

Drum--A flat-ended or convex-ended cylindrical packaging made of metal, fiberboard, plastic, plywood, or other suitable materials.

Emergency--An emergency operation is the movement of personnel, equipment and supplies of an organization so they can respond to a non combat (i.e. natural disaster) event requiring special and immediate action.

Enriched Uranium--Uranium containing more uranium²³⁵ than the naturally occurring distribution of uranium isotopes.

Exclusive Use--(Also referred to in other publications as "sole use" or "full load.") The sole use of a conveyance by a single consignor for which all initial, intermediate, and final loading and unloading are carried out according to the direction of the consignor or consignee. Specific instructions for maintaining exclusive use shipment controls must be issued in writing and included with the shipping paper information provided to the carrier by the consignor.

Filling Density--Designates the percent ratio of the weight of gas in a container to the weight of water that the container will hold at 15.5 degrees C (60 degrees F) (one pound of water equals 27.737 cubic inches at 15.5 degrees C).

Fissile Material--Any material consisting of or containing one or more fissile radionuclides. Fissile radionuclides are plutonium-238, plutonium-239, plutonium-241, uranium-233, and uranium-235. Neither natural nor depleted uranium are fissile material. Fissile materials are classified according to the controls needed to provide nuclear criticality safety during transportation, as provided in A4.3.7. Certain exclusions are provided in A3.3.7.9.

Flash Point--The minimum temperature at which a liquid within a test vessel gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. Flash points are determined by the testing prescribed in 49 CFR 173.120.

Freight Container--A reusable container having a volume of 1.81 cubic meters (64 cubic feet) or more, designed and constructed to permit lifting with its contents intact, and intended primarily for containment of packages in unit form during transportation. A small freight container has either one outer dimension less than 1.5 meters (4.9 feet) or an internal volume of not more than 3.0 cubic meters (106 cubic feet). All other freight containers are designated as "large freight containers." Also known as 'ISO Containers'.

Gross Weight (Gross Mass):

- Weight of a vehicle, fully equipped and serviced for operation, including the weight of the fuel, lubricants, coolant, vehicle tools and spares, crew, personal equipment, and load.
- Weight of a container or pallet including freight (contents) and binding.

Handlers--Personnel who only handle hazardous materials or hazardous materials documentation.

Hazard Class--The category of hazard assigned to a hazardous material based on defining criteria. Hazard classes are: explosives (Class 1), compressed gases (Class 2), flammable liquids (Class 3), flammable solids (Class 4),

oxidizers and organic peroxides (Class 5), poisons and infectious substances (etiologic agents) (Class 6), radioactive materials (Class 7), corrosive materials (Class 8), and miscellaneous dangerous goods (Class 9).

Hazard Zone--One of four levels of hazard (hazard zones A through D) assigned to gases and one of two levels of hazard (hazard zones A and B) assigned to liquids that are poisonous by inhalation. A hazard zone is based on the LC50 value for acute inhalation toxicity of gases and vapors.

Hazardous Materials Inspectors--DoD personnel whose duties require them to review the integrity of the packaging and accuracy of documentation for all hazardous materials being transported within the Defense Transportation System (DTS) or by commercial carriers.

Hazardous Materials Preparers--DoD personnel whose duties require them to sign legally binding documentation certifying that hazardous materials are properly classified, packaged, marked and labeled, and in all respects meet the legal requirements for transportation within the DTS or by commercial carriers.

Hazardous Materials--A substance or material that is capable of posing an unreasonable risk to health, safety, and property when transported and has been so designated by this manual. May also be referred to as hazardous cargo or dangerous goods. **NOTE:** For identification, listing and rules pertaining to hazardous WASTE, refer to Title 40 CFR, Parts 260-265, *Protection of Environment*, established by the U.S. Environmental Protection Agency (EPA).

Hazardous Substance--A material, including its mixtures and solutions, that meets ALL of the following conditions:

- Listed in table A4.3 as originated in Appendix A to 49 CFR 172.101.
- In a quantity, in one package, which equals or exceeds the reportable quantity (RQ) listed in table A4.3.
- When in a mixture or solution:
 - For radionuclides, conforms to paragraph 6 of the appendix to 49 CFR 172.101.
 - For other than radio nuclides, is in a concentration by weight which equals or exceeds the concentration corresponding to the RQ of the material shown in figure A1.1.

Figure A1.1. Quantity Required To Be a Hazardous Substance Mixture or Solution.

| RQ Pounds | RQ Kilograms | Concentration by Weight | |
|--------------|-----------------|-------------------------|---------|
| | | Percent | PPM |
| 5,000 | 2270 | 10 | 100,000 |
| 1,000 | 454 | 2 | 20,000 |
| 100 | 45.4 | 0.2 | 2,000 |
| 10 | 4.54 | 0.02 | 200 |
| 1 | 0.454 | 0.002 | 20 |

Hazardous Waste--Any material that is subject to the hazardous waste MANIFEST requirements of the EPA specified in 40 CFR 262.

Highway Route Controlled Quantity--A quantity within a single package that is over 3,000 times the A₁ (Special Form) or A₂ (Normal Form) value of the radionuclides specified in A11.4; or over 1000 TBq (27,000 Ci), whichever is least.

Inert Solid--A solid that does not damage the thermal stability or increase the hazard of the organic peroxide.

Inhalation Toxicity:

- A dust or mist with a lethal concentration where 50 percent of the test subjects die (LC50) from acute toxicity on inhalation of not more than 10 mg/L.

- A material with a saturated vapor concentration in air at 20 degrees C (68 degrees F) of more than one-fifth of the LC50 acute toxicity on inhalation of vapors and with an LC50 for acute toxicity on inhalation of vapors of not more than 5000 mL/m³ (5000 parts per million (PPM)).
- An irritating material, with properties similar to tear gas which causes extreme irritation, especially in confined spaces.

Inner Packaging--Packaging for which an outer packaging is required for transport. It does not include the inner receptacle of a composite packaging.

Inner Receptacle--Receptacle which requires an outer packaging in order to perform its containment function. The inner receptacle may be an inner packaging of a combination packaging or the inner receptacle of a composite packaging.

Jerrican--A metal or plastic packaging of rectangular or polygonal cross-section.

Kit--A set of materials or articles used for a specific purpose, shipped as a single item and assigned a single National Stock Number or Part Number by the Service/Agency Item Manager. A kit may include one or more different hazardous materials. Hazardous components may or may not be compatible but may be transported together as a kit.

Limited Quantity of Radioactive Materials--A quantity of radioactive material which is not over the limits specified in A11.15 and conforms to the requirements specified in A11.11.

Liquefied Compressed Gas--A gas, which under charged pressure, is partially liquid at a temperature of 20 degrees C (68 degrees F).

Low Specific Activity (LSA) Material:

- Uranium or thorium ores and physical or chemical concentrates of those ores.
- Unirradiated natural or depleted uranium or unirradiated natural thorium.
- Tritium oxide in aqueous solutions provided the concentration is not over 5.0 millicuries (mCi) per milliliter (mL).
- Material in which the radioactivity is essentially uniformly distributed and where the estimated average concentration of contents is:
 - Not over 0.0001 millicurie per gram (mCi/g) of radionuclides for which the A₂ quantity is not more than 0.05 Ci.
 - Not over 0.005 mCi/g of radionuclides for which the A₂ quantity is more than 0.05 Ci but not more than 1 Ci.
 - Not over 0.3 mCi/g of radionuclides for which the A₂ quantity is more than 1 Ci.
- Objects of nonradioactive material externally contaminated with radioactive material, provided that the radioactive material is not readily dispersible. The surface contamination, when averaged over an area of 1 square meter, must not exceed 0.0001 mCi (220,000 disintegrations per minute) per square centimeter of radionuclides for which the A₂ quantity is not more than 0.05 Ci or 0.001 mCi (2,200,000 disintegrations per minute) per cm² for other radionuclides. These items must be suitably wrapped or enclosed.

Magnetic Material--Any packaged material that has a magnetic field strength of 0.002 gauss or more measured at 2.1 m (7 ft) from any surface of the package.

Natural Thorium--Thorium with the naturally occurring distribution of thorium isotopes (essentially 100 weight percent thorium²³²).

Natural Uranium--Uranium with the naturally occurring distribution of uranium isotopes (approximately 0.711 weight percent uranium²³², and the remainder essentially uranium²³⁸).

★**Net Explosive Weight (NEW)**--As it relates to this manual, NEW is the total weight, expressed in kilograms, of all explosive components. Refer to DoD 6055.9-STD, *Explosive Safety Standards* or Service directives for definition of NEW used to determine Quantity Distance (QD) criteria.

Non-Bulk Packaging--A packaging that has a maximum net mass of 400 kg (882 lbs) or less and a maximum capacity of 450 L (119 gallons) or less.

Nonfixed Radioactive Contamination--Radioactive contamination that can be readily removed from a surface by wiping with an absorbent material. Nonfixed (removable) radioactive contamination is not significant if it is not over the limits specified in A3.3.7.11.

Nonliquefied Compressed Gas--A gas, other than gas in solution, which under charged pressure is entirely gaseous at a temperature of 20 degrees C (68 degrees F).

Normal Form Radioactive Material--Radioactive material that has not been demonstrated to qualify as "special form radioactive material."

Oral Toxicity--Liquid with a lethal dose where 50 percent of the test subjects die (LD50) from acute oral toxicity of not more than 500 mg/kg or a solid with an LD50 for acute oral toxicity of not more than 200 mg/kg.

ORM-D--For the purposes of this manual, ORM-D material, are only those materials with flammable properties (liquids, solids, and gases) that present a limited hazard during transportation due to their form, quantity, and packaging. Each ORM-D material is listed in table A4.1. ORM-D classification is only authorized for domestic shipments. International shipments must not be transported under the classification "ORM-D."

Outage or Ullage--The amount a packaging falls short of being liquid full, usually expressed in percent by volume.

Outer Packaging--The outermost enclosure of a composite or combination packaging together with any absorbent materials, cushioning, and any other components necessary to contain and protect the inner receptacles or inner packagings.

Overpack--1) A container used to hold one or more air eligible packages to form a single unit for convenience of handling or storage during transportation. 2) Placement of containers that do not meet air eligibility pressure requirements into an outer approved UN packaging.

Package--For radioactive materials, the packaging together with its radioactive contents as presented for transport.

Package or Outside Package--The packaging plus its contents.

Packaging--A receptacle and any other components or materials necessary for the receptacle to perform its containment function in conformance with the minimum packing requirements of this manual. For radioactive materials, the assembly of components necessary to ensure compliance with the packaging requirements of this manual. It may consist of one or more receptacles, absorbent materials, spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The conveyance, tie down system, and auxiliary equipment may sometimes be designated as part of the packaging.

Packers--Personnel who package hazardous materials, but do not sign legally binding documents.

Packing Group--The degree of danger presented by the hazardous material.

- Packing Group I indicates great danger.
- Packing Group II indicates medium danger.
- Packing Group III indicates minor danger.

Polymerizable Material--Any material that may polymerize (combine or react with itself) with an evolution of a dangerous quantity of heat or gas.

Pounds Per Square Inch (PSI)--The amount of force exerted on one square inch of the container or cylinder wall.

Pounds Per Square Inch Absolute (PSIA)--The absolute value of the force exerted on the container or cylinder wall. Absolute pressure is atmospheric pressure plus gauge pressure.

Pounds Per Square Inch Gauge (PSIG)--The gauge pressure is the pressure taken by a pressure gauge that represents the force exerted within the container or cylinder. Gauge pressure is always that pressure above atmospheric pressure.

★Purged--As it relates to this manual, purged means void of hazardous material. Removal of liquid hazardous material by physical, chemical, or mechanical means as directed by a technical publication or directive. In the absence of a specific technical procedure, it is the shipper's determination based on the specific knowledge of the item to decide the appropriate preparation to ensure the item is void of hazardous material.

Primary Hazard--The hazard class of the material as assigned by table A4.1.

Pyrophoric Material--This material is a liquid or solid that, even in small quantities and without an external ignition source, can ignite within five minutes of coming in contact with air. This material is the most likely to spontaneously combust.

Radiation Level--The radiation dose-equivalent rate expressed in millisievert per hour or mSv/h (millirem per hour or mrem/h). Neutron flux densities may be converted into radiation levels according to 49 CFR 173.403 (v).

Radioactive Article--Any manufactured instrument or article such as clock, electronic tube or apparatus, or a similar instrument or article having radioactive material as a component part.

Radioactive Contents--The radioactive material, together with any contaminated liquids or gases, within the package.

Radioactive Material--Any material having a specific activity greater than 70 Bq per gram (0.002 microcuries per gram) (uCi/g)(see definition of "specific activity").

Receptacle--A containment vessel for receiving and holding materials, including any means of closing.

Refrigerant Gas (Dispersant Gas)--This term applies to all flammable, nonflammable, nonpoisonous refrigerant gases, dispersant gases (fluorocarbons), or mixtures listed in table A4.1; or any other compressed gas meeting one of the following conditions:

- A nonflammable mixture containing not less than 50 percent fluorocarbon content, having a vapor pressure not over 1792 kPa (260 psig) at 54 degrees C (130 degrees F).
- A flammable mixture containing not less than 50 percent fluorocarbon content, not over 40 percent by weight of a flammable component, having a vapor pressure not over 1792 kPa (260 psig) at 54 degrees C (130 degrees F).

Reportable Quantity--The quantity of material, as set forth in 40 CFR 302.4, the release of which requires notification pursuant to 40 CFR Part 302. See also "Hazardous Substance."

Residue--The hazardous material remaining in a packaging after its contents have been removed to the maximum extent possible and before the packaging has been purged to remove any hazardous vapors.

Secondary Hazard--A distinct and separate hazardous item that is a component part of a larger item that is considered the primary hazard.

Self-Heating Material--This material, when in contact with air and without an energy supply, is liable to self-heat.

Self-Reactive Material--At normal or elevated temperatures, this material is liable to undergo a strong exothermic reaction. Exothermic reaction can be caused by excessively high transport temperatures or by contamination.

Service Pressure--This term refers to the authorized pressure marking on the container. For example, for a cylinder marked "DOT 3A1800" the service pressure is 12410 kPa (1800 psi).

Shipping Activity--Unit, organization, or activity that originally offers a hazardous material into the Defense Transportation System.

Shipping Paper--The Air Cargo Manifest which includes minimum hazardous material information as required by DoD 4500.32R. In the absence of an Air Cargo Manifest, the Shipper's Declaration for Dangerous Goods form may serve as a shipping paper.

Single Packaging--Nonbulk packaging other than a combination or composite packaging.

★**Special Approvals** – An authorization issued by the appropriate authority for transport of certain hazardous materials. These approvals may be a Department of Transportation Exemption, Competent Authority Approval (CAA), or a Certification of Equivalency (COE).

Special Form Radioactive Material--Radioactive material that satisfies the following conditions:

- It must be either a single solid piece or be contained in a sealed capsule that can be opened only by destroying the capsule.
- The piece or capsule must have at least one dimension not less than 5 mm (0.197 inch).
- It must satisfy the test requirements of 49 CFR 173.469. Special form encapsulations designed according to the requirements of the DOT in effect on 30 June 1983 and constructed before 1 July 1985 may still be used. Special form encapsulations, either designed or constructed after 30 June 1985, must meet the requirements of 49 CFR 178.350.

Specific Activity of a Radionuclide--The activity of the radionuclide per unit mass of that nuclide. The specific activity of a material in which the radionuclide is essentially uniformly distributed is the activity per unit mass of the material.

★**Stabilized**--The substance is in a condition that precludes uncontrolled reaction. This may be achieved by methods such as addition of an inhibiting chemical, degassing the substance to remove dissolved oxygen and inerting the air space in the package, or maintaining the substance under temperature control.

Subsidiary Risk--An additional hazardous property of a material other than the primary hazard as identified in table A4.1.

Tactical--A tactical operation is the movement of personnel, equipment and supplies of an organization so they can accomplish their immediate military combat objective.

Technical Name--A recognized chemical name or micro biological name currently used in scientific and technical handbooks, journals, and texts. Generic descriptions are authorized provided they readily identify the general chemical or micro biological group.

Transport Index--The dimensionless number (rounded up to the first decimal place) placed on the label of a package to designate the degree of control to be exercised by the carrier during transportation. The transport index is determined by:

- The number expressing the maximum radiation level in mSv/h at one meter (3.3 feet) from the external surface of the package.

- For fissile class II packages or packages in a fissile class III shipment, the number expressing the maximum radiation level at one meter (3.3 feet) from the external surface of the package, or the number obtained by dividing 50 by the allowable number of packages that may be transported together, whichever is larger.

Type A Package--A type A packaging (see definition for type A packaging) together with its limited radioactive contents. A type A package does not require competent authority approval since its contents are limited to A₁ or A₂.

Type A Packaging--A packaging designed to retain the integrity of containment and shielding required by this manual under normal conditions of transport, as demonstrated by the tests set forth in 49 CFR 173.465 or 173.466.

Type B (M) Package--A type B packaging (see definition for type B packaging), together with its radioactive contents, that for international shipments requires multilateral approval of the package design and may require approval of the conditions of shipment. Type B(M) packages are those type B package designs that have a maximum normal operating pressure of more than 7 kg/cm² (100 pounds/in² gauge) or a relief device that allows the release of radioactive material to the environment under the hypothetical accident conditions specified in 10 CFR, part 71.

Type B (U) Package--A type B packaging (see definition for type B packaging), together with its radioactive contents, that for international shipments requires unilateral approval only of the package design and of any stowage provisions that may be necessary for heat dissipation.

Type B Package--A type B packaging (see definition for type B packaging) together with its radioactive contents.

Type B Packaging--Is a packaging designed to retain the integrity of containment and shielding required when subjected to the normal conditions of transport and hypothetical accident test conditions set forth in 10 CFR, part 71.

Uncompressed Gas--For the purposes of this manual, gas at a pressure not exceeding the ambient atmospheric pressure at the time and location the containment system is closed. All other radioactive gases are considered to be compressed.

Unirradiated Thorium--Thorium containing not more than 10^{-7} grams uranium²³³ per gram of thorium²³².

Unirradiated Uranium--Uranium containing not more than 10^{-6} grams plutonium per gram of uranium²³⁵ and a fission product activity of not more than 0.25 mCi of fission products per gram of uranium²³⁵.

Wetted Explosive--This material, when dry, is a Class 1 material other than those of compatibility group A. Items in compatibility group A have been wetted with sufficient water, alcohol, or plasticizer to suppress explosive properties. Wetted explosives also includes items specifically authorized by name in table A4.1 or which have been assigned a PSN and hazard class by the DOT.

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★Attachment 2

STEPS FOR PREPARING HAZARDOUS MATERIAL

Use the following illustration as a guide for preparing hazardous materials for military air shipment.

| | |
|---|---|
| <p>STEP 1 – TRAINING</p> | <ul style="list-style-type: none">- Ensure you are properly trained and qualified according to paragraph 1.3 and attachment 25.- If a Preparer, ensure compliance with paragraph 1.2.4 for authorization to certify. |
| <p>STEP 2 – IDENTIFY MATERIAL</p> | <ul style="list-style-type: none">- Determine if material is hazardous and appropriate hazard classification by utilizing:- DoD 6050.5, Hazardous Material Information System (HMIS)- Product Material Safety Data Sheets (MSDS)- Manufacturers Information- Joint Hazardous Classification System (JHCS) or Service Technical Directives |
| <p>STEP 3 – DETERMINE PROPER SHIPPING NAME (PSN)</p> | <ul style="list-style-type: none">- See Table A4.1 for listing of PSNs.- Also listed with PSN is the hazard class, UN number, packaging group (PG), special provisions, and packaging paragraph(s).- Determine whether item is “forbidden.” If so, the item may not be shipped via military airlift.- Determine whether item is a “Hazardous Substance.”- Determine whether a technical name is required. |
| <p>STEP 4 – DETERMINE WHETHER CHAPTER 3 OR NON-CHAPTER 3 MISSION (CHANNEL)</p> | <ul style="list-style-type: none">- <u>Non-Chapter 3 (Channel) Airlift</u> – See Chapters 1 & 2 for general requirements that cover all hazardous materials shipments by military airlift. Chapter 2 covers deviations, waivers, and special requirements.- <u>Chapter 3 Operations</u> – See Chapter 3 for exceptions. |
| <p>STEP 5 – PACKAGE ITEM</p> | <ul style="list-style-type: none">- Package or prepare the item for airlift. Utilize:- DoD PC-POP computer program- Special Packaging Instruction or Drawing- Technical Order, directive or field manual- Manufacturer or Vendor packaging- If already packaged, go to step 6 |
| <p>STEP 6 – VERIFY PACKAGING IS ACCEPTABLE</p> | <ul style="list-style-type: none">- Some items list more than one packaging paragraph. Review the paragraphs listed to determine which paragraph best describes the hazardous material.- Determine whether special provisions apply. Atch 22 |

| | |
|--|---|
| | <p>outlines rules regarding passenger movement.</p> <ul style="list-style-type: none"> - Review Atch 3 to determine if package is air eligible and for general packaging requirements. - Ensure UN specification packaging requirements are met. - Review Atch 19 for “Excepted” and “Limited Quantity” exceptions. - Ensure absorbent cushioning requirements found in Atch 20 are met. |
| <p>STEP 7 – MARK AND LABEL PACKAGE</p> | <ul style="list-style-type: none"> - <u>Mark Container</u> – See Atch 14. - Review general marking requirements. - Review hazard class specific marking requirements. - <u>Label Container</u> – See Atch 15. Subsidiary labels are listed in column 6 of Table A4.1. - Review general labeling requirements. - Review handling label requirements (includes Chapter 3 requirements). - Review hazard class specific label requirements. |
| <p>STEP 8 – COMPLETE HAZARDOUS MATERIAL CERTIFICATION</p> | <ul style="list-style-type: none"> - Certify shipment in accordance with Atch 17. - Review hazard class specific requirements. - Review exceptions for Chapter 3 operations. - - Samples of shipper’s declarations are included in Atch 17 for reference. |
| <p>STEP 9 – COMPATIBILITY REQUIREMENTS</p> | <ul style="list-style-type: none"> - <u>Compatibility Requirements</u> – See Atch 18. - Table A18.1 details segregation requirements for all hazardous material - Table A18.2 specifies compatibility requirements for Class 1 - -- Review exceptions for Chapter 3 operations. |
| <p>STEP 10 – BRIEFING AGENCY REQUIREMENTS</p> | <ul style="list-style-type: none"> - Atch 21 details information required to be briefed to the aircraft commander (or designated representative) |

Attachment 3

GENERAL AND HAZARD CLASS SPECIFIC PACKAGING REQUIREMENTS

A3.1. General Packaging Requirements. The general requirements of attachment 3 are in addition to the specific packaging requirements outlined in attachments 5 through 13. Hazardous material packaging must be authorized by this manual, 49 CFR Part 173, the ICAO *Technical Instructions*, or the IATA *Dangerous Goods Regulation* and meet the requirements outlined in this attachment.

A3.1.1. Transportability. Securely close and construct containers to prevent leakage due to changes in temperature, humidity, and altitude during transportation and in-transit handling.

A3.1.1.1. Primary and secondary items and their containers (unit or exterior) must provide protection without deformation, leakage, or rupture against:

- Temperature changes (-40 to 65.5 degrees C [-40 to +150 degrees F]).
- Pressure changes due to altitude changes (sea level to 3.7 km (12,000 feet)).
- Pressure changes due to explosive decompression from 3.7 to 15.24 km (12,000 to 50,000 feet).

★**A3.1.1.2.** Do not fill a UN specification packaging to a gross mass greater than the authorized gross mass marked on the packaging.

A3.1.1.3. Provide adequate protection for material susceptible to damage by freezing during both ground and air operations.

A3.1.2. Compatibility. All containers must be designed and constructed of materials that do not react with, or are not decomposed by, the material contained therein. Plastic containers or liners must prevent permeation of contents. Plastic packaging or receptacles used for liquid hazardous materials must be capable of withstanding, without failure, the test specified in 49 CFR 173, appendix B, *Procedure for Testing Chemical Compatibility and Rate of Permeation in Plastic Packagings and Receptacles*.

★**A3.1.3. Ullage (Outage).** Do not entirely fill containers designed to hold liquids. When filling packagings with liquid hazardous material, leave sufficient interior space (outage) to prevent leakage of contents or distortion of containers due to change of temperature during transportation, storage, and handling. For flammable liquids and other volatile liquids with a high coefficient of expansion, a minimum outage of 2 percent at 54 degrees C (130 degrees F), is required.

★**A3.1.4. Closures.** Stoppers, corks, or other such friction-type closures must be held in place securely, tightly, and effectively. Secure screw-type closures on any inside plastic container to prevent the closures from loosening due to vibrations or substantial changes in temperature. Each screw-type closure on any packaging must be secured with pressure-sensitive tape, self-shrinking plastic, wire, a device designed to prevent the cap from loosening, or other positive means to prevent the closure from loosening due to vibration or substantial temperature change (that is, secondary seal).

A3.1.5. Inner Packaging. Pack, secure, and cushion inner packagings of combination packagings to prevent breakage or leakage and to control movement within the outer container. Cushioning material must not react dangerously with the contents of the inner packagings. Inner packagings are required as specified by the applicable packaging paragraph. If inner packagings are not required, the packaging paragraph will state that inner packagings are not necessary. See attachment 20 for absorbent cushioning requirements.

A3.1.6. Metal Containers. Unless otherwise specified, the maximum capacity of metal drums is 208 L (55 gallons). Do not accept for shipment metal containers having corrosion or dents at the chime or seam, soldered, or welded area.

A3.1.7. Indicators. Valves and indicators (with protective caps when required), which are necessary to ensure safe transportation, must be installed in the shipping container. Examples are relief valves (vacuum or pressure), humidity indicators, or leak indicators with adequate sensitivity to alert monitor or crew of imminent danger.

A3.1.8. Polymerizable Material. Transportation of any liquid, solid, or gaseous material that may polymerize (combine or react with itself) or decompose so as to cause dangerous evolution of heat or gas under normal transportation conditions is prohibited. Such materials may be offered for transportation when properly stabilized or inhibited.

A3.1.9. Solids in a Liquid Single Packaging. A single or composite packaging which is tested and marked for liquid hazardous materials may be filled with a solid hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked. In addition:

- A single or composite packaging which is tested and marked for PG I liquid hazardous materials may be filled with:
 - A PG II solid hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by 1.5, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked; or
 - A PG III solid hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by 2.25, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked.
- A single or composite packaging which is tested and marked for PG II liquid hazardous materials may be filled with a PG III solid hazardous material to a gross mass, in kilograms, not exceeding the rated capacity of the packaging in liters, multiplied by 1.5, multiplied by the specific gravity marked on the packaging, or 1.2 if not marked.

A3.2. Air-Eligible Packaging Requirements.

A3.2.1. Combination Packaging Pressure Standard. Inner receptacles (including closures) used to retain a hazardous liquid or semi-solid in a combination packaging must be capable of withstanding (without leaking) an internal air gauge pressure of not less than 95 kilopascal (kPa) (14 psi); or 75 kPa (11 psi) for PG III liquids in Class 3 or Class 6.1 and Consumer Commodities; or a pressure related to the vapor pressure of the liquid contained in the receptacle, whichever is greater. This standard may be determined through actual test data or the shipper's evaluation and transportation experience. Repack or overpack liquid hazardous materials in containers that do not meet the internal hydraulic pressure standard, into United Nations (UN) certified specification containers that meet this requirement. Determine the pressure related to the vapor pressure of the liquid by one of the following methods:

- The total gauge pressure measured in the receptacle (that is, the vapor pressure of the liquid and the partial pressure of the air, or other inert gases, less 100 kPa (15 psi) at 55 degrees C (131 degrees F), multiplied by a safety factor of 1.5. The total gauge pressure is determined on the basis of a filling temperature of 15 degrees C (59 degrees F) and a degree of filling such that the receptacle is not liquid full at a temperature of 55 degrees C (131 degrees F).
- times the vapor pressure at 50 degrees C (122 degrees F) less 100 kPa (15 psi).
- times the vapor pressure at 55 degrees C (131 degrees F) less 100 kPa (15 psi).

★**A3.2.2. Single and Composite Packaging Pressure Requirement.** Single packagings containing liquid hazardous material must meet the hydraulic pressure test requirements of 49 CFR 178.605. A test pressure of not less than 250 kPa (36 psi) for liquids of PG I; 80 kPa (12 psi) for PG III liquids in Class 3 or Class 6.1; and 100 kPa (15 psi) for all other liquids is required. If shipping liquid hazardous materials in containers that do not meet the internal hydraulic pressure requirement, repack or overpack into UN specification certified containers that do meet the requirement.

A3.2.3. Overpacking Containers. Pack containers holding liquids that do not meet the pressure requirement for air transport into an outer container that does meet the requirement. Separate interior containers by absorbent cushioning material as required by attachment 20. Do not overpack pressurized containers in sealed metal drums. See Figure A17.1 for certification instructions.

A3.3. General Requirements Applicable to Hazard Class. In addition to A3.1 and A3.2, the following general requirements apply to each hazard class:

A3.3.1. Class 1.

A3.3.1.1. Forbidden Explosives. Do not offer explosives listed below for air shipment:

- An explosive that has not been approved according to A3.3.1.2.
- Bulk fulminates or other detonating compounds in dry condition.
- Explosive compounds that ignite spontaneously or undergo marked decomposition when subjected to a temperature of 75 degrees C (167 degrees F) for 48 hours.
- An explosive mixture or device containing a chlorate and also containing:
 - An ammonium salt including a substituted ammonium or quaternary ammonium salt.
 - An acidic substance including a salt of a weak base and a strong acid.
- Leaking, dropped, or otherwise damaged explosives and ammunition.

- Do not ship explosives that have been dropped any distance until inspected by qualified Munitions/EOD personnel.
- Air terminal personnel must not repack leaking or otherwise damaged shipments of explosives and ammunition unless an ammunition inspector is present.
- Onward shipment of suspected or damaged explosives may be made provided the shipment is inspected, repacked, and certified to be in proper condition for safe transport. Qualified personnel must sign the certification.
- Propellants that are unstable, condemned, or deteriorated.
- Nitroglycerin, diethylene glycol dinitrate, or any other liquid explosives not specifically authorized by attachment 5.
- A loaded firearm except as authorized by chapter 3.
- Fireworks that combine an explosive and a detonator.
- Fireworks containing yellow or white phosphorus.
- A toy torpedo whose outside dimension exceeds 23 mm (0.906 in), or a toy torpedo containing a mixture of potassium chlorate, black antimony (antimony sulphide), and sulphur if the weight of the explosive material in the device exceeds 0.26 g (0.01 oz).
- Explosives specifically forbidden in table A4.1.

★A3.3.1.2. **Explosive Classification Approval.** Explosives, explosive devices, and munitions, including commercial and foreign, to be eligible for military air transportation must be either assigned a DoD classification or meet the provisions for transport without a DoD classification according to TB 700-2, NAVSEAINST 8020.8B, TO 11A-1-47, DLAR 8220.1, *DoD Ammunition and Explosive Hazard Classification Procedures*. All explosives assigned a National Stock Number (NSN) and indexed in the Joint Hazard Classification System (JHCS) are approved for movement by military controlled aircraft. Unless listed in the JHCS, a copy of the classification approval document (final or IHC) must accompany the shipment. A copy is not required for 1.4S munitions. Transport explosives not listed in the JHCS only under one of the following conditions:

- Assigned a DoD final or interim hazard classification (IHC) by a DoD classification authority according to TB 700-2, NAVSEAINST 8020.8B, TO 11A-1-47, DLAR 8220.1. This includes foreign owned or manufactured explosives (except under the provisions of 3.12) and commercial fireworks.
- Assigned a DOE final or interim hazard classification (IHC).
- Assigned a DOT approved final hazard classification and EX number, and listed in Table A4.1, Column 7 (Special Provision) as "A69".
- An explosive classified as 1.4S in accordance with a foreign issued CAA or Special Approval document.

A3.3.1.3. **Explosive Safety.** Comply with AFMAN 91-201 (Air Force), TM 9-1300-206 (Army), and NAVSEA OP 5 (Navy) for safety precautions, standards, and rules when operating in an environment with explosives.

A3.3.2. **Class 2.**

A3.3.2.1. **Cylinder Requirements.** Comply with Title 49 CFR and this manual for shipping compressed gas cylinders, including safety relief devices. Requirements covering cylinders also apply to spherical pressure vessels. Reference DLAR 4145.25/AR 700-68/ NAVSUPINST 4440.128B/MCO 10330.2B/AFR 67-12 for additional data on compressed gas cylinders.

- Cylinders or spherical pressure vessels must not contain gases or materials capable of combining chemically so as to endanger their serviceability. Make sure all cylinders, including closing devices and cushioning materials, are in good condition so that their contents are well protected during transit.
- Close each cylinder containing poisonous materials with a plug or valve meeting the following requirements:
 - Each plug or valve must have a taper-threaded connection directly to the cylinder and be capable of withstanding the test pressure of the cylinder.
 - Each valve must be of the packless type with nonperforated diaphragm, except that for corrosive materials, the valve may be of the packed type, provided the assembly is made gas-tight by means of a seal cap with gasketed joint attached to the valve body of the cylinder to prevent loss of material through or past the packing.
 - Each valve outlet must be sealed by a threaded cap or threaded solid plug.
 - Cylinders, valves, plugs, outlet caps, luting, and gaskets must be compatible with each other and with the material.

A3.3.2.2. **Valve Protection.** Protect all valves of containers charged with compressed gas by one of the following methods:

- By a securely attached metal cap of sufficient strength to protect the valve from injury during transit.
- By boxing or crating the cylinder or sphere to give proper protection to the valve.
- By recessed valve or otherwise protected valve so that it cannot be subjected to a blow when the container is dropped on a flat surface.
- By valves strong enough to avoid injury during transit for cylinders or spheres containing nonliquefied gas under pressure not over 2068.5 kPa (300 psig) at 21 degrees C (70 degrees F).

A3.3.2.3. **Cylinders Containing Poisonous Material.** Overpack cylinders containing a poisonous material, which have a wall thickness at any point of less than 2.03 mm (0.080 inch) and do not have fitted valve protection, in a 4C1, 4D, 4F, 4G, 4H1, or 4H2 box. The box must meet the requirements of A3.1. Ensure box and valve protection is of sufficient strength to protect all parts of the cylinder and valve (if it has a valve) from deformation and breakage resulting from a drop of 2.0 m (7 ft) or more onto a concrete floor, impacting at an orientation most likely to cause damage. If the cylinder is not overpacked, equip the cylinder with a protective cap or other means of valve protection sufficient to protect the valve from deformation and breakage resulting from a drop of 2.0 m (7 ft) or more onto a concrete floor, impacting at an orientation most likely to cause damage.

A3.3.2.4. **Cylinders Requiring an Outside Container.** Ship DOT 2P, 2Q, 3E, 3HT, 4BA spherical type, 4D, 4DA, 4DS, 9, 39, 40, and 41 cylinders in strong outside containers. Ensure the package is capable of protecting the cylinder and all its parts from deformation or breakage resulting from a 1.2 m (4 foot) drop on a solid concrete floor. Do not pack cylinders, spheres, or containers under pressure in metal drums or airtight outside packages. DOT 4BA spherical cylinders may be securely mounted on pallets to provide protection for the spheres and any attachments.

A3.3.2.5. **Pressure and Filling Requirements.**

- Ensure the pressure in the container at 21 degrees C (70 degrees F) is not more than the service pressure for which the container is marked or designated, except as provided below.
- When cylinders with a marked pressure limit are prescribed, other cylinders made under the same specification, but with a higher marked service pressure limit are authorized. For example, a cylinder marked DOT 4B500 may be used where DOT 4B300 is specified.
- The pressure in the cylinder or sphere at 54 degrees C (130 degrees F) must not exceed 1 1/4 times the service pressure except cylinders of acetylene, liquefied nitrous oxide, and liquefied carbon dioxide which must not exceed the allowable charging pressure of the cylinder.
- The pressure of a cylinder containing a poisonous material must not exceed the service pressure of the cylinder at 55 degrees C (131 degrees F). Provide sufficient outage to ensure the cylinder is not liquid full at 55 degrees C (131 degrees F).
- Use the service pressure identified for a current specification for containers made before the effective date of specifications.
- Except for carbon dioxide, nitrous oxide, and vinyl fluoride, stabilized, the liquid portion of the gas (if any) must not completely fill the cylinder at 54 degrees C (130 degrees F). The liquid portion of vinyl fluoride, stabilized, may completely fill the cylinder provided the pressure is not over 1 1/4 times the service pressure (see definition for filling density).
- Use the service pressure identified in figure A3.1 for authorized cylinders not marked with a service pressure.
- DOT 3A, 3AX, 3AA, 3AAX, and 3T cylinders may be charged with compressed gases other than liquefied, dissolved, poisonous, or flammable gases to a pressure of 10 percent over their marked service pressure, provided the following conditions are met:
 - Equip each cylinder with frangible disc safety devices (without fusible metal backing) having a bursting pressure not over the minimum prescribed test pressure.
 - Determine the elastic expansion at the time of the last test or retest by the water-jacket method.
 - Do not exceed either the average wall stress or the maximum wall stress limitations in figure A3.2.
- Use figure A3.3 for filling density requirements of Liquefied Petroleum Gases. Any filling density prescribed in figure A3.3 may be increased by 2 percent for liquefied petroleum gas in DOT 26 or DOT 3 cylinders (or in DOT 3A cylinders marked for 1,800 pounds or higher service pressure, subject to the bullet above).
- Use figure A3.4 for filling density requirements when shipping cryogenic liquids of argon, helium, neon, nitrogen, and oxygen. Ship hydrogen (minimum 95 percent parahydrogen) according to figure A3.5.

Figure A3.1. Cylinder Specification and Service Pressures.

| Specification Marking | Service Pressure Kilopascal (Pounds Per Square Inch) | |
|-----------------------|--|--------|
| DOT-3 | 12411.0 | (1800) |
| DOT-3E | 12411.0 | (1800) |
| DOT-4 | 2068.5 | (300) |
| DOT-8 | 1723.8 | (250) |
| DOT-9 | 1379.0 | (200) |
| DOT-25 | 2068.5 | (300) |
| DOT-33 | 3309.6 | (480) |
| DOT-38 | 1723.8 | (250) |
| DOT-40 | 1379.0 | (200) |
| DOT-41 | 1654.8 | (240) |

Figure A3.2. Wall-Stress Limitations.

| Type of Steel | Wall Stress Average | Limitation Maximum |
|---|---------------------|--------------------|
| Plain carbon steels over 0.35 carbon and medium manganese steels. | 53,000 | 58,000 |
| Steels of analysis and heat treatment specified in DOT Specification 3AA. | 67,000 | 73,000 |
| Plain carbon steels less than 0.35 carbon made before 1920. | 45,000 | 48,000 |

Figure A3.3. Prescribed Filling Density for Liquefied Petroleum Gas.

| Minimum Specific Gravity of the Liquid Material at 60 degrees F (15.5 degrees C) | Maximum Filling Density in Percent of the Water Capacity of the Container | Minimum Specific Gravity of the Liquid Material at 60 degrees F (15.5 degrees C) | Maximum Filling Density in Percent of the Water Capacity of the Container |
|--|---|--|---|
| 0.271-0.289 | 26 | 0.504-0.510 | 42 |
| 0.290-0.306 | 27 | 0.511-0.519 | 43 |
| 0.307-0.322 | 28 | 0.520-0.527 | 44 |
| 0.323-0.338 | 29 | 0.528-0.536 | 45 |
| 0.339-0.354 | 30 | 0.537-0.544 | 46 |
| 0.355-0.371 | 31 | 0.545-0.552 | 47 |
| 0.372-0.398 | 32 | 0.553-0.560 | 48 |
| 0.399-0.425 | 33 | 0.561-0.568 | 49 |
| 0.426-0.440 | 34 | 0.569-0.576 | 50 |
| 0.441-0.452 | 35 | 0.577-0.584 | 51 |
| 0.453-0.462 | 36 | 0.585-0.592 | 52 |
| 0.463-0.472 | 37 | 0.593-0.600 | 53 |
| 0.473-0.480 | 38 | 0.601-0.608 | 54 |
| 0.481-0.488 | 39 | 0.609-0.617 | 55 |
| 0.489-0.495 | 40 | 0.618-0.626 | 56 |
| 0.496-0.503 | 41 | 0.627-0.634 | 57 |

Figure A3.4. Filling Density for Cryogenic Liquids Except Hydrogen.

| Pressure control valve setting (maximum start-to-discharge pressure, kPa (psig.)) | Maximum permitted filling density (percent by weight) | | | | | |
|---|---|-------|----------|--------|--------|------|
| | Air | Argon | Nitrogen | Oxygen | Helium | Neon |
| 310.3 (45) | 82.5 | 133 | 76 | 108 | 12.5 | 109 |
| 517 (75) | 80.3 | 130 | 74 | 105 | 12.5 | 104 |
| 724 (105) | 78.4 | 127 | 72 | 103 | 12.5 | 100 |
| 1172 (170) | 76.2 | 122 | 70 | 100 | 12.5 | 92 |
| 1585.8 (230) | 75.1 | 119 | 69 | 98 | 12.5 | 85 |
| 2034 (295) | 73.3 | 115 | 68 | 96 | 12.5 | 77 |
| 2482 (360) | 70.7 | 113 | 65 | 93 | 12.5 | |
| 3103 (450) | 65.9 | 111 | 61 | 91 | 12.5 | |
| 3723 (540) | 62.9 | 107 | 58 | 88 | 12.5 | |
| 4309 (625) | 60.1 | 104 | 55 | 86 | 12.5 | |
| | | | | | | |
| Design Service Temperature (degrees F) | -320 | -320 | -320 | -320 | -452 | -411 |
| (degrees C) | -196 | -196 | -196 | -196 | -269 | -246 |

Figure A3.5. Filling Density for Cryogenic Liquids of Hydrogen.

| Column 1 | Column 2 |
|--|--|
| Design service temperature | Minus 253 degrees C (-423 degrees F) or colder |
| Maximum permitted filling density, based on cylinder capacity at -253 degrees C (-423 degrees F)(see note) | 6.7 percent |
| The pressure control valve must be designed and set to limit the pressure in the cylinder to not more than | 117 kPa (17 psig) |

NOTE: The filling density for hydrogen, cryogenic liquid, is defined as the percent ratio of the weight of lading in a package to the weight of water that the packaging will hold at -253 degrees C (-423 degrees F). The volume of the packaging at -253 degrees C (-423 degrees F) is determined in cubic inches. The volume is converted to pounds of water (1 pound of water = 27.737 cubic inches). Each cylinder must be constructed, insulated, and maintained so that the total rate of venting must not be over 30 standard cubic feet (SCF) of hydrogen per hour during transportation.

A3.3.2.6. Mandatory Color-Code Identification. Exact color-code identification of any material contained in a compressed gas cylinder is mandatory and must meet MIL-STD-101.

A3.3.2.7. Foreign Cylinders. A foreign cylinder may not be offered for military airlift unless manufactured, inspected, and tested according to 49 CFR, Part 178, or a copy of the competent authority approval of the nation manufacturing the cylinder accompanies the shipment. All other requirements of this manual also apply.

★A3.3.2.8. Unregulated Compressed Gases. Compressed gasses in the following items are not regulated:

- Inflated tires, when inflated to a pressure not greater than its rated inflation pressure.
- Inflated balls used for sports.
- Carbonated beverages.
- Refrigerating machines, including dehumidifiers, air conditioners, and components thereof such as precharged tubing containing 12 kg (25 pounds) or less of nonflammable liquefied gas.

★A3.3.2.9. Previously Authorized Cylinders. Cylinders marked with the prefix "ICC" (i.e. ICC-4BA240) are authorized in place of cylinders required by this manual with a "DOT" prefix. The cylinders must comply with all other applicable specification requirements for DOT cylinders.

★A3.3.3. Class 3.

A3.3.3.1. Combustible Liquids. The requirements in this manual do not apply to materials classed as combustible liquid. See attachment 14 for marking requirements.

A3.3.3.2. **Pads and Swabs.** Pads and swabs soaked with a flammable liquid and sealed in a bag are not subject to the requirements of this manual.

A3.3.3.3. **Alcoholic Beverages.** Alcoholic beverages in packagings of five liters or less are not subject to the requirements of this manual.

★A3.3.4. **Class 4.**

A3.3.4.1. **Packaging.** Unless otherwise specified by a packaging paragraph, package a material identified as PG III in table A4.1 in a container that meets the PG I or II performance level.

A3.3.4.2. **Flameless Ration Heaters (FRH).** FRH packaged as a component of meals-ready-to-eat are not subject to the requirements of this manual.

A3.3.4.3. **Charcoal Briquettes.** Lump charcoal briquettes, packaged in a form suitable for consumer use, generally will not meet the classifying criteria of a Class 4.2 spontaneously combustible material. If the charcoal briquettes do not meet the definition of a Class 4.2 material, it is not subject to any other requirements of this manual. Ensure the specific type and form of charcoal being shipped does not meet the definition of a Class 4.2 material and passed the self-heating test for carbon (which indicates that it is not spontaneously combustible).

A3.3.5. **Class 5.**

A3.3.5.1. **Packed with Other Materials.** Do not pack Class 5 materials in the same outside container with corrosive liquids, unless the corrosive liquids are in bottles cushioned by incombustible absorbent material in tightly closed metal containers. Class 5 materials in securely closed metal cans and in quantities not over 118 ml (4 ounces), are acceptable for air shipment if packed in the same compartment with other securely packed materials necessary for a complete fumigant.

A3.3.5.2. **Packaging.** Unless otherwise specified by a packaging paragraph, package a material identified as PG III in table A4.1 in a container that meets the PG I or II performance level.

★A3.3.6. **Class 6.** Do not place any liquid toxic material on the same 463L pallet with foodstuffs or rations.

A3.3.7. **Class 7.**

A3.3.7.1. **General Design Requirements.** Design each package used for shipment of radioactive materials so that:

- The package can be easily handled and properly secured during transport.
- Each lifting attachment on the package, when used in the intended manner, with a minimum safety factor of three, does not impose an unsafe stress on the structure of the package. In addition, design the lifting attachment so that failure under excessive load does not impair the ability of the package to meet all other requirements of this attachment and attachment 11. Remove, make inoperable for transport, or design with equivalent strength for lifting each attachment or other feature on the outer surface of the packaging that could be used to lift the package.
- The external surface, as far as practical, may be easily decontaminated.
- The outer layer of packaging avoids, as far as practicable, pockets or crevices where water might collect.
- Each feature that is added to the package at the time of transport, and is not a part of the package, does not reduce the safety of the package.
- The package will be capable of withstanding the effects of any acceleration, vibration, or vibration resonance that may occur during transportation without any deterioration in the effectiveness of the of any of the closing devices or in the integrity of the package and without loosening or unintentionally releasing the nuts, bolts, or other securing devices.
- The packaging materials and any components will be physically and chemically compatible with each other and the contents.
- All valves through which the package contents could escape will be protected against unauthorized operation.

A3.3.7.2. **Additional Design Requirements for Type A and B Packages.**

- In addition to meeting the general design requirements each Type A packaging must also meet the design requirements of 49 CFR 173.412 and test requirements of 49 CFR 173.461.
- Each type B(U) or type B(M) package must meet the design and test requirements of 10 CFR Part 71.

A3.3.7.3. **Radiation Level and Thermal Limitations.**

- Design each package of radioactive materials so that:
 - The radiation level is not more than 2 mSv/h (200 mrem/h) at any point on the external surface of the package.
 - The transport index is not over 10.

- Design, construct, and load each package of radioactive material so that:
 - The heat generated within the package due to the radioactive contents will not, at any time during transportation, affect the integrity of the package under normal transportation conditions.
 - The temperature of the accessible external surfaces of the loaded package will not, assuming still air in the shade at an ambient temperature of 38 degrees C (100 degrees F), exceed either a temperature of 50 degrees C (122 degrees F) in other than an exclusive use shipment or 82 degrees C (180 degrees F) in an exclusive use shipment.

A3.3.7.4. **General Transportation Requirements.**

- Secure each shipment of radioactive materials to prevent shifting during normal transportation conditions.
- Except as specifically required by a CAA, a package of radioactive materials may be carried among packaged general cargo without special stowage provisions, if:
 - The heat output in watts is not over 0.1 times the minimum package dimension in centimeters.
 - The average surface heat flux of the package is not over 15 watts per square meter (W/m^2) and the immediately surrounding cargo is not in sacks or bags or otherwise in a form that would seriously impede air circulation for heat removal.
- Aircraft in which radioactive materials have been spilled may not again be placed in service or routinely occupied until radiation dose rate at any accessible surface is less than 0.005 mSv/h (0.5 mrem/h) and there is no significant removable radioactive surface contamination as determined in A3.3.7.11. When contamination is present or suspected, segregate the package and any other materials it has touched as far as practical from personnel contact until needed radiological advice or assistance is obtained. For personnel safety, take care to avoid possible inhalation, ingestion, or contact with radioactive materials that may have leaked or spilled from its package. Leave any loose radioactive materials and associated packaging materials in a segregated area pending disposal instructions from responsible radiological authorities.
- Do not offer for military airlift:
 - Any type B(U) or type B(M) package with an accessible surface temperature in excess of 50 degrees C (122 degrees F).
 - Any continuously vented type B(M) packages, which require external cooling by an auxiliary cooling system or packages subject to operational controls during transport.
 - Any liquid pyrophoric radioactive materials.
- Do not transport exclusive use shipments of packages having a surface radiation level in excess of 2 mSv/h (200 mrem/h) except by special arrangement.

A3.3.7.5. **Approval of Special Form Radioactive Material.**

- Each shipper of special form radioactive materials must maintain on file for at least 1 year after the latest shipment, a complete safety analysis, including documentation of any tests demonstrating that the special form material meets the requirements of 49 CFR 173.469. An International Atomic Energy Agency (IAEA) certificate of competent authority issued for the special form material may be used to satisfy this requirement.
- Before the first export shipment of a special form radioactive material from the United States, each shipper must obtain a competent authority certificate for the specific material. For special form material manufactured outside the United States an IAEA certificate of component authority from the country of origin may be used to meet this requirement. For special form materials manufactured in the United States each shipper must obtain a US competent authority certificate for the specific material. Submit each petition for a US competent authority certificate according to 49 CFR 173.471 and include the following information:
 - A detailed description of the material or, if a capsule, a detailed description of the contents. Make a particular reference to both physical and chemical states.
 - If a capsule is used, a detailed statement of its design and dimensions, including complete engineering drawings and schedules of material, and methods of construction.
 - A statement of tests performed and their results; evidence based on calculative methods to show that the material is able to pass the tests; or other evidence that the special form radioactive material complies with 49 CFR 173.469.

- Unless otherwise required, the shipper is exempt from maintaining the documentation required in the bullets above if that documentation is maintained by the Inventory Control Point (national stock number managing activity).
- The documentation requirements specified in the bullets above do not apply in those cases where A_1 equals A_2 and the material is not described on the shipping papers as "Radioactive Material, Special Form, N.O.S."

A3.3.7.6. Stowage on Aircraft or Storage Incident to Transportation.

- Do not ship radioactive yellow II or radioactive yellow III material on the same aircraft or store in any one area, such as a transit area, terminal building, storeroom, or assembly yard, if the sum of the transport indexes in any individual group of packages exceeds 50.
- If the total transport index for all packages exceeds 50, separate the packages into groups. Store groups of these packages so as to maintain a spacing of at least 6 meters (20 feet) from other groups of packages containing radioactive materials.
- Ensure separation of yellow II or yellow III material from packages containing undeveloped film according to the distances shown in 49 CFR 175.703.

A3.3.7.7. Uranium Hexafluoride (Fissile and Low Specific Activity). In addition to any other applicable requirements of attachment 3 and attachment 11, package uranium hexafluoride, fissile or low specific activity, according to the following requirements:

- Before initial filling and during periodic inspection and test, clean packages according to American National Standard N14.1.
- Design, fabricate, inspect, test, and mark packagings according to American National Standard N14.1 in effect at the time the packaging was manufactured.
- Ensure uranium hexafluoride is in solid form when offered for transportation.
- The volume of the solid uranium hexafluoride at 20 degrees C (68 degrees F) must not exceed 61 percent of the volumetric capacity of the package.
- Ensure the pressure in the package at 20 degrees C (68 degrees F) is less than 101.3kPa (14.8 psia).
- Periodically inspect, test, and mark packages of uranium hexafluoride according to American National Standard N14.1-1987.
- Perform each repair to a package of uranium hexafluoride according to American National Standard N14.1-1987.

A3.3.7.8. Specific Requirements for Fissile Shipments.

- Fissile material packaging must meet the test requirements of 10 CFR Part 71.
- Mixing fissile material packages with other types of radioactive materials, including fissile class I with fissile class II packages is authorized if the total transport index is not over 50.
- See attachment 24 for Fissile Class III shipments.

A3.3.7.9. Fissile Materials--Exceptions. The requirements of A3.3.7.8 do not apply to:

- A package not containing more than 15 grams of fissile radionuclides.
- A package containing irradiated natural or depleted uranium including the products of irradiation if the irradiation has taken place only in the thermal reactor.
- A package containing homogeneous solutions or mixtures where:
 - The minimum ratio of the number of hydrogen atoms to the number of atoms of fissile radionuclides (H/X) is 5200.
 - The maximum concentration of fissile radionuclides is 5 grams per liter (g/l).
 - The maximum mass of fissile radionuclides in the package is 500 grams, except that for a mixture where the total mass of plutonium and uranium²³³ is not over 1 percent of the mass of uranium²³⁵, the limit is 800 grams.
- A package containing uranium enriched in uranium²³⁵ to a maximum of 1 percent by weight, and with a total plutonium and uranium²³³ content of up to 1 percent of the mass of uranium²³⁵, if the fissile radionuclides are distributed homogeneously throughout the package contents, and do not form a lattice arrangement within the package.

- A package containing any fissile material if it does not contain more than 5 grams of fissile radionuclides in any 10 liter volume, and if the material is packaged to maintain this limit of fissile radionuclide concentration during normal transport.
- A package containing not more than one kg of plutonium of which not more than 20 percent by mass may consist of plutonium²³⁹, plutonium²⁴¹, or any combination of those radionuclides.
- A package containing liquid solutions of uranyl nitrate enriched in uranium²³⁵ to a maximum of 2 percent by weight, with total plutonium and uranium²³³ not more than 0.1 percent of the mass of uranium²³⁵.
- A package containing thorium or uranium with not more than 0.72 percent by weight of fissile material used for shipment solely within the United States.

A3.3.7.10. **Requirements for Foreign-Made Packages.** In addition to the requirements of attachment 11, each shipper of a foreign-made type B, type B(U), type B(M) or fissile material package for which a competent authority certificate is required by the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6" or the IAEA "Regulations for the Safe Transport of Radioactive Materials, No. TS-R-1" must meet the requirements of 49 CFR 173.473.

A3.3.7.11. **Radioactive Contamination.**

- **Contamination Control.** Keep the level of nonfixed (removable) radioactive contamination on the external surfaces of each package offered for shipment as low as practical. The level of nonfixed radioactive contamination may be determined by wiping an area of 300 cm² of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Take sufficient measurements in the most appropriate locations to yield a representative assessment of the nonfixed contamination levels. The amount of radioactivity measured on any single wiping material, when averaged over the surface wiped, must not exceed the limits given in table A3.3 at any time during transport. Other methods of assessment of equal or greater efficiency may be used. When other methods are used, take the detection efficiency of the method used into account and in no case must the nonfixed contamination on the external surfaces of the package exceed 10 times the limits listed in table A3.3.
- **Inspecting Aircraft for Contamination.** Periodically check aircraft used to routinely transport radioactive materials for radioactive contamination. Determine frequency of the checks based on the likelihood of contamination and the extent to which radioactive materials are carried aboard the aircraft. An aircraft must be taken out of service if the radiation dose rate at any accessible surface is 0.005 mSv/h (0.5 mrem/h) or if there is significant removable radioactive surface contamination as outlined above.

Table A3.3. Removable External Radioactive Contamination--Wipe Limits.

| Contaminant | Maximum permissible limits | |
|--|--------------------------------------|--|
| | uCi/cm ² | depletion per minute (dpm)/cm ² |
| Beta-gamma emitting radionuclides; all radionuclide with half-lives less than 10 days; natural uranium; natural thorium; uranium- ²³⁵ ; uranium- ²³⁸ ; thorium- ²³² ; thorium- ²²⁸ ; and thorium- ²³⁰ when contained in ores or physical concentrates. All other alpha emitting radionuclides | 10 ⁻⁵ 10 ⁻⁶ | 22 2.2 |

A3.3.8. **Class 8.**

- **Packed with Other Materials.** Do not pack bottles containing corrosive liquids in the same outside container with other hazardous materials.
- **Packaging.** Unless otherwise specified by a packaging paragraph, package a liquid material identified as PG III in table A4.1 in a container that meets the PG I or II performance level.

A3.3.9. **Class 9.** Any package that has a magnetic field strength of more than 0.00525 gauss measured at 4.6 m (15 ft) from any surface of the package is forbidden on military aircraft.

A3.4. Household Goods (HHG) Shipments. DoD 4500.34-R, *Personnel Property Traffic Management Regulation* establishes requirements for the movement of HHG and specifies that hazardous materials are not authorized for military airlift. One exception is that engine power-driven equipment (motorcycle, moped, lawnmower, boat, snowmobile, etc.) may be transported as HHG under the following requirements:

- Completely drain all fuel.
- Run until the engine stalls.
- Drain all oil and cooling fluids.
- Allow fuel tanks and lines to remain open for at least 24 hours prior to pickup.
- Disconnect nonspillable gel-type batteries and tape the ends to prevent short circuit. Batteries may remain in the equipment holder, but ensure they are firmly secured and remain upright in the shipping container. Do not ship batteries with acid or alkali.
- Engine power-driven equipment prepared in this manner are not regulated by this manual. A Shipper's Declaration for Dangerous Goods is not required.

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Attachment 4

ITEMS LISTING

A4.1. General Requirements. This attachment contains :

- An alphabetical listing of the hazardous materials subject to the requirements of this manual. See paragraph 1.10.3 for material determined to be nonhazardous.
- Classification criteria for hazard classes. See attachment 1 for definitions.
- Identification of items prohibited for military air transportation.
- Listing of Hazardous Substances and applicable Reportable Quantities.

A4.2. Using Table A4.1. Table A4.1 identifies "hazardous materials" for the purpose of military air transportation. To use table A4.1 locate the proper shipping name (PSN) of the hazardous material and follow the information identified on the same line with the PSN. Use Table A4.1 to identify the following:

- Eligibility of material for shipment
- Proper shipping name (PSN)
- Hazard class and division
- Identification number
- Packing group (PG)
- Subsidiary Risk
- Special provisions applicable to the material, including passenger eligibility
- Basic packaging paragraph

A4.2.1. Column 1: Symbols. Column 1 contains symbols that pertain to the PSN.

- The letter "D" means that the PSN applies only to domestic shipments. These items are also identified by "NA" numbers in column 4. For international shipments, select an alternate PSN that is not preceded by a "D".
- The "*" (asterisk) identifies that a technical name is required in association with the PSN.
- The "+" (plus) fixes the proper shipping name, hazard class and packing group for that entry without regard

to whether the material meets the definition of that class or packing group or meets any other hazard class definition.

A4.2.2. Column 2: Proper Shipping Names (PSN). PSNs are listed alphabetically in all bold capital letters in table A4.1. Use either singular or plural wording. New and revised PSNs in 49 CFR, part 172, ICAO *Technical Instructions*, or IATA *Dangerous Goods Regulation* are authorized PSNs under this manual, provided the packaging requirements do not change. Words which appear in lower case italicized letters are descriptive words which may be used, but are not required as part of the PSN.

- **Technical or Chemical Group Names.** Provide a technical or chemical group name in association with the PSN when required by an "*" in column 1.
 - **Organic Peroxides.** Use technical names listed below the appropriate generic PSN (in lower case letters) in table A4.1. See A4.3.6 for PSN assignment based on technical name.
 - **Mixtures and Solutions.** If the hazardous material is a mixture or solution of two or more hazardous materials, enter the technical names of at least two components most contributing to the hazards of the mixture or solution in parentheses after the PSN.
- **The Word "OR" in Table A4.1.** The word "or" in a sequence of PSNs means that PSNs in the sequence are synonymous. Therefore, use of any one of the PSNs in the series is appropriate. Select only one PSN in the series when classifying the shipment.
- **The Word "SEE" in Table A4.1.** When one item references another item (by use of the word "see") and both names are in capital letters, use either name as the PSN. Forbidden designations and passenger restrictions applicable to the referenced entry also apply to the "see" entry.
- **The Words "SOLUTION" or "MIXTURE".** A mixture or solution containing a hazardous material listed by name in table A4.1 together with one or more materials not subject to this manual must be identified by the PSN of the hazardous material. The qualifying word "solution" or "mixture" should be added to the PSN.
- **Concentration Ranges.** When a shipping name includes a concentration range as part of the shipping description, the actual concentration shipped (if it is in the range stated) may be used in place of the concentration range. For example, ship a hydrogen peroxide solution containing 30 percent peroxide as

either "Hydrogen peroxide aqueous solution (with not less than 20 percent but not more than 40 percent hydrogen peroxide)" or "Hydrogen peroxide aqueous solution (with 30 percent hydrogen peroxide)."

- **Hazardous Wastes.** The PSN for a hazardous material that is a hazardous waste must include the word "WASTE" preceding the name of the material (i.e., WASTE, ACETONE). Comply with all requirements of this manual identified for the hazardous material when shipped as waste.

★A4.2.3. **Column 3: Hazard Class and Division.** Column 3 contains:

- Primary hazard class and division numbers. When this manual references hazard class, that includes any division number if appropriate. For Class 1 (explosives), the compatibility group is also given. See A4.3 for additional information on class/divisions.
- Identification of "FORBIDDEN" items. Do not transport "FORBIDDEN" items by military aircraft.
- Some items that contain explosive material may be assigned to a classification other than Class 1 by DoD explosives hazard classification approval authorities due to the predominant hazard (see A3.3.1.2). Compatibility group letters assigned to non-Class 1 material do not apply to military air transportation.

A4.2.4. **Column 4: Identification Number.** Column 4 lists the identification number assigned to each PSN.

- Ship items classified with "UN" (United Nations) or "ID" (identification) numbers domestically or internationally.
- Ship items classified with "NA" (North American) numbers domestically only, or to and from Canada or Mexico. Use of "UN" numbers is preferred even for domestic shipment.
- New or revised UN or NA numbers in 49 CFR, part 172, ICAO *Technical Instructions*, or IATA *Dangerous Goods Regulation* are recognized for use with this manual.

A4.2.5. **Column 5: Packing Group (PG).** Column 5 specifies one or more packing groups assigned to each PSN and hazard class. Hazard classes 2, 7, and ORM-D do not have packing groups. See A4.4 for additional information on PG.

A4.2.6. **Column 6: Subsidiary Risk.** Column 6 identifies the hazard class/division of any subsidiary risk posed by a material. Subsidiary risk may vary, depending on the applicable PG.

A4.2.7. **Column 7: Special Provisions.** Column 7 specifies codes for special provisions that are applicable for each PSN, hazard class, and PG. Special provision codes may vary, depending on the PG. Requirements of the special provision codes are identified in table A4.2. The codes reflect four categories: numeric codes, codes beginning with "A", codes beginning with "N", and codes beginning with a "P".

- Use codes beginning with a "P" to determine passenger eligibility for transport with hazardous materials.
- Use all other codes to determine packaging provisions, restrictions, and exceptions from requirements for particular quantities or forms of materials.
- When an additional packaging requirement is prescribed, the requirement is mandatory.

★A4.2.8. **Column 8: Packaging Paragraph.** This column lists the applicable packaging paragraph. "FORBIDDEN" items are also identified in this column.

- Except when otherwise identified, prepare hazardous material shipments according to the specified packaging paragraph.
- Packaging paragraphs in each attachment provide titles as a guide for PSNs covered by that paragraph. These titles are a guide only and are not all-inclusive.
- If a packaging paragraph in table A4.1 specifies packaging that is not applicable to the form of the material (i.e., the packaging specified is for a solid material and the material shipped is in liquid form) use the following guidance to select the appropriate paragraph:
 - Use either packaging paragraph A8.3 (liquids) or A8.4 (solids) as appropriate.
 - Use either packaging paragraph A9.7 (liquids) or A9.8 (solids) as appropriate.
 - Use either packaging paragraph A10.5 (liquids) or A10.6 (solids) as appropriate.
 - Use either packaging paragraph A12.3 (liquids) or A12.4 (solids) as appropriate.

A4.3. Classifying Hazardous Materials.

A4.3.1. **Hazard Class Names.** The hazard class and division is a numerical identification which describes the class (type) of primary hazard involved and if appropriate, its division within the class. Use DoD 6050.5, *Hazardous Material Information System*, product Material Safety Data Sheet, or other manufacturer's information if assistance in determining the hazard classification is needed. Figure A4.1 lists class and division numbers and the corresponding class and division names.

Figure A4.1. Hazard Classes.

| HAZARD CLASS/ DIVISION NUMBER | HAZARD CLASS/ DIVISION NAME | HAZARD CLASS/ DIVISION NUMBER | HAZARD CLASS/ DIVISION NAME |
|----------------------------------|---|----------------------------------|--|
| 1.1 | Explosives (with mass explosion hazard) | 4.1 | Flammable solid |
| 1.2 | Explosives (with a projection hazard) | 4.2 | Spontaneously combustible material |
| 1.3 | Explosives (with predominately a fire hazard) | 4.3 | Dangerous when wet material |
| 1.4 | Explosives (with no significant blast hazard) | 5.1 | Oxidizer |
| 1.5 | Very insensitive explosives; blasting agents | 5.2 | Organic peroxide |
| 1.6 | Extremely insensitive detonating substances | 6.1 | Poisonous (toxic) material |
| 2.1 | Flammable gas | 6.2 | Infectious substances (etiologic agents) |
| 2.2 | Nonflammable gas | 7 | Radioactive material |
| 2.3 | Poisonous gas | 8 | Corrosive material |
| 3 | Flammable liquid | 9 | Miscellaneous hazardous material |

A4.3.2. Items Not Specifically Listed. If a material is not specifically listed in table A4.1, determine the PSN by comparing the characteristics of the items with the definitions of the various hazard classes in this manual. Assign a "Not Otherwise Specified" (N.O.S.) name based on the hazard class of the material. Examples are: "FLAMMABLE LIQUID, N.O.S.; CORROSIVE SOLID, N.O.S." Attachment 1 contains hazardous class definitions. Determine the appropriate technical name according to A4.3.1.

A4.3.3. Tentative PSN Assignment. A material for which the hazard class must be determined by testing, or a material that is a hazardous waste, the shipper may assign a tentative shipping name, based on:

- The defining criteria of the hazard class.
- The hazard precedence prescribed in A4.3.
- The shipper's knowledge of the material.
- A3.3.1.2 for new explosives.
- If a N.O.S. PSN is assigned, a technical name is not required.

★A4.3.4 Precedence of Hazard. Assign any material specifically identified and listed in table A4.1 the hazard class identified in column 3 of table A4.1. Classification tools identified in A4.3.1 should be used to determine appropriate hazardous material description. If required, classify a hazardous material that is not specifically identified and listed in table A4.1 (or is a mixture of materials), and meets the definition of more than one hazard, according to the following order of precedence:

- Class 7 (Radioactive material, other than limited quantities). When limited quantities are involved the other hazardous properties take precedence.
- Class 1 (Explosives).
- Class 2.3 (poisonous gas).
- Class 2.1 (flammable gas). See also Class 9.
- Class 2.2 (nonflammable gas). See also Class 9.
- Class 5.2 (organic peroxide).
- Class 6.2 (infectious substances or etiologic agents).
- Class 4.1 (flammable solid). Only self-reactive substances and wetted explosives.
- Class 4.2 (substances liable to spontaneous combustion). Only pyrophoric substances.
- Class 6.1 (poisonous substances), PG I, poisonous by inhalation only.
- Small quantities of compressed gas such as starter fluid (Class 2.1) or fire extinguisher (Class 2.2) installed on a vehicle do not take precedence over the flammable liquid (Class 3).
- If required, classify other hazardous materials not identified above according to 49 CFR 173.2a

A4.3.5. **Hazard Classification of Class 5.2 Organic Peroxides.** Class 5.2 organic peroxides are categorized into one of seven "types" in a system of generic proper shipping names. The generic PSN for the organic peroxide describes the physical state of the material (i.e., liquid or solid), provides an indication of controlled temperature requirements, and includes the "type" of the organic peroxide. The seven types of organic peroxides are described in attachment 1. Transport all Class 5.2 material under one of the generic proper shipping names listed in table A4.1 beginning with the words "ORGANIC PEROXIDE". Technical names are listed below each PSN in lower case letters. To determine the correct PSN:

- Find the technical name in table A9.1 and select the UN identification number assigned to the technical name that best describes the item (in terms of concentration ranges, physical characteristics, etc).
- Turn to the "ORGANIC PEROXIDE" listed in table A4.1. These entries constitute the "generic" organic peroxide proper shipping names.
- Match the UN identification number for the technical name with a UN identification number associated with the generic PSN.
- The generic PSN associated with organic peroxides will include the "type" under which the organic peroxide falls. Organic peroxide types are defined in attachment 1.

A4.3.6. **Hazard Classification of Fissile Materials.** Except as provided in A3.3.7.9, classify each package of fissile materials as fissile class I, II, or III. Determine the numerical values for package assignments as fissile class I, the transport indexes for fissile class II packages, and the conveyance limitations for fissile class III shipments according to 10 CFR Part 71.

- **Fissile Class I.** Packages may be transported in unlimited numbers, and in any arrangement, and require no nuclear criticality safety controls during transportation. A transport index is not assigned to fissile class I packages for the purpose of nuclear criticality safety control, although, the external radiation levels may require a transport index number.
- **Fissile Class II.** Packages may be transported together in any arrangement, but in numbers that are not over an aggregate transport index of 50. For the purposes of nuclear criticality safety control, individual packages may have a transport index of not less than 0.1 and not more than 10. However, the external radiation levels may require a higher transport index number. These shipments require no nuclear criticality safety control by the shipper during transportation.
- **Fissile Class III.** Shipments of packages of fissile materials that do not meet the requirements of fissile class I or fissile class II and are controlled in transit as prescribed in A3.3.7.8 by appropriate arrangements between the shipper and the carrier.

A4.4. Determining Degree of Hazard (PG). For most material, the PG is assigned in column 5 of table A4.1. Packing groups I, II, and III indicate the degree of hazard associated with the materials and are used to identify the severity of UN specification performance tests associated with the packaging for the item. Poisonous by inhalation material are assigned hazard zones (see attachment 1) in table A4.1. If unknown, the PG or hazard zone may be determined according to this paragraph. Class 2, and 7 do not have packing groups.

A4.4.1. **Class 2 Hazard Zone.** The hazard zone of a Class 2.3 material is given in column 7 of table A4.1. When column 7 of table A4.1 provides more than one hazard zone or is blank, determine the hazard zone from figure A4.2. There are no hazard zones for Class 2.1 and 2.2.

Figure A4.2. Determination of Hazard Zone for Class 2.3.

| Hazard Zone | Inhalation Toxicity (parts per million) |
|-------------|---|
| A | LC50 less than or equal to 200 ppm |
| B | LC50 greater than 200 ppm and less than or equal to 1000 ppm |
| C | LC50 greater than 1000 ppm and less than or equal to 3000 ppm |
| D | LC50 greater than 3000 ppm or less than or equal to 5000 ppm |

A4.4.2. **Class 3 Packing Groups.** When table A4.1 lists more than one PG for a material, or indicates that the PG is to be determined on the basis of the PG criteria for Class 3, determine the PG by using figure A4.4. To use figure A4.3, match the initial boiling point of the material to the flash point, and assign the corresponding PG. Flash points may be determined from the material safety data sheet, DoD 6050.5 *Hazardous Material Information System*, the National Fire Protection Guide, or markings on the package. For example, a Class 3 material with an initial boiling

point of 38 degrees C (100 degrees F) and a flash point of 25 degrees C (77 degrees F) would be assigned a PG III. If the initial boiling point is less than or equal to 35 degrees C (95 degrees F), assign PG I. Viscous Class 3 material (i.e., paints, varnishes, enamels, lacquers, adhesives, and polishes) in PG II with a flash point of less than 23 degrees C (73 degrees F) may be grouped in PG III provided the requirements of 49 CFR 173.121(b) are met.

Figure A4.3. Criteria for Class 3 PG.

| PG | Flash Point (closed-cup) | Initial Boiling Point |
|-----|---|-----------------------------------|
| I | | less than or equal to 35 C (95 F) |
| II | less than 23 C (73 F) | greater than 35 C (95 F) |
| III | equal to or greater than 23 C (73 F) but less than or equal to 60.5 C (141 F) | greater than 35 C (95 F) |

A4.4.3 Class 4 Packing Groups. When table A4.1 indicates that the PG of the material is to be determined on the basis of test criteria for Class 4 material, the test methods and appropriate criteria must comply with 49 CFR, appendix E to part 173.

A4.4.4. Class 5 Packing Groups. When column 5 of table A4.1 is blank for a solid in Class 5.1, determine the PG based on the test criteria found in 49 CFR, part 173, appendix F. If column 5 is blank for a liquid in Class 5.1, packing groups can be assigned by a comparison to existing entries in table A4.1.

A4.4.5. Class 6 Packing Groups and Hazard Zone. When table A4.1, column 5 provides more than one PG and hazard zone for a specific Class 6.1 material, determine the PG and hazard zone by applying the following criteria:

- Determine the PG assignment for other than inhalation of vapors by using figure A4.4.

Figure A4.4. PG Assignment For Other Than Inhalation of Vapors.

| PG | Oral Toxicity LD50(mg/kg) | Dermal Toxicity LD50(mg/kg) LC50 mg/L) | Inhalation Toxicity by dusts and mists |
|-----|--|--|--|
| I | < 5 | <40 | <0.5 |
| II | > 5, < 50 | >40, <200 | <0.5, <2 |
| III | solids: > 50, <200, liquids > 50, <500 | >200, <1000 | > 2, <10 |

- Determine the PG and hazard zone assignments for inhalation of vapors by using figure A4.5.

Figure A4.5. Inhalation Toxicity.

| PG (Hazard Zone) | Vapor Concentration and Toxicity |
|---------------------|--|
| I (Hazard Zone A) | $V \geq 500 \text{ LC}_{50}$ and $\text{LC}^{50} \leq 200 \text{ mL/m}^3$ |
| I (Hazard Zone B) | $V \geq 10 \text{ LC}_{50}$ and $\text{LC}^{50} \leq 1000 \text{ mL/m}^3$, and the criteria for PG I, hazard zone A are not met |
| II (Hazard Zone C) | $V \geq \text{LC}_{50}$ and $\text{LC}^{50} \leq 3000 \text{ mL/m}^3$, and the criteria for PG I, hazard zones A and B are not met |
| III (Hazard Zone D) | $V \geq .2 \text{ LC}_{50}$ and $\text{LC}^{50} \leq 5000 \text{ mL/m}^3$, and the criteria for packing groups I and II, hazard zones A, B, and C are not met |

- "V" is the saturated vapor concentration in air of the material in mL/m^3 at 20 degrees C (68 degrees F) and standard atmospheric pressure.
- When the PG determined by figure A4.5 and figure A4.6 is different for two or more (oral, dermal, inhalation) requirements, the PG assigned to the material is the highest degree of toxicity identified.
- Compute the PG and hazard zone for Class 6.1 mixtures that are poisonous (toxic) by inhalation as identified in 49 CFR 173.133 (b).

A4.4.6. Class 8 Packing Groups. When table A4.1 lists more than one PG for a material, determine the PG according to 49 CFR 173.137.

A4.5. Hazardous Substances. Table A4.3 identifies materials that are designated hazardous substances under Section 101 (14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). See attachment 1 for a detailed definition of a hazardous substance. Ensure review of table A4.3 to determine if a material is a hazardous substance.

- Determine if the material is a hazardous substance by identifying the reportable quantity (RQ) in table A4.3. The RQ is used to determine if material is a hazardous substance. The material is a hazardous substance if the amount in one package equal or exceeds the RQ quantity. Table A4.3 specifies, in pounds and kilograms, the minimum quantity of the material that constitutes an RQ. For example: sodium arsenate (RQ-1.0/0.454) means the RQ is 1.0 pounds or 0.454 kilograms.
- A substance or solution is a "hazardous substance" when the concentration by weight equals or exceeds the concentration listed in figure A1.1.
- If the technical name of the hazardous substance appears in table A4.1, then the technical name is the PSN. If the hazardous substance does not appear in table A4.1 and is not a forbidden material, select an appropriate generic (N.O.S.) PSN. Specify the technical name in parenthesis after the PSN. See attachment 17 for certification requirements.
- For Radionuclides, see 49 CFR 172.101, Appendix A.

Table A4.1 Alphabetical Listing of Items:

| SYMBOL | PROPER SHIPPING NAME/ DESCRIPTION | HAZARD CLASS/ DIV | UN/ID NUMBER | PG | SUBSIDIARY RISK | SPECIAL PROVISION | PACKAGING PARAGRAPH |
|--------|---|-------------------------|-----------------|-----|--------------------|------------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Accellerene; see p-</i> NITROSODIMETHYLANILINE | | | | | | |
| | <i>Accumulators, electric; see BATTERIES, WET, etc.</i> | | | | | | |
| D | ACCUMULATORS, PRESSURIZED, PNEUMATIC or HYDRAULIC <i>(containing nonflammable gas)</i> | 2.2 | NA1956 | | | P5 | A6.9 |
| | ACETAL | 3 | UN1088 | II | | P5 | A7.3 |
| | ACETALDEHYDE | 3 | UN1089 | I | | P3, A3 | A7.3 |
| | ACETALDEHYDE AMMONIA | 9 | UN1841 | III | | P5 | A13.13 |
| | ACETALDEHYDE OXIME | 3 | UN2332 | III | | P5 | A7.3 |
| | ACETIC ACID, GLACIAL or ACETIC ACID SOLUTION, with more than 80% acid, by mass | 8 | UN2789 | II | 3 | P5, A3, A6, A7, A10 | A12.3 |
| | ACETIC ACID SOLUTION, with not less than 50%, but not more than 80% acid, by mass | 8 | UN2790 | II | | P5, A3, A6, A7, A10 | A12.3 |
| | ACETIC ACID SOLUTION, with more than 10%, but less than 50% acid, by mass | 8 | UN2790 | III | | P5 | A12.3 |
| | ACETIC ANHYDRIDE | 8 | UN1715 | II | 3 | P5, A3, A6, A7, A10 | A12.3 |
| | <i>Acetic oxide; see ACETIC ANHYDRIDE</i> | | | | | | |
| | <i>Acetoin; see ACETYL METHYL CARBINOL</i> | | | | | | |
| | ACETONE | 3 | UN1090 | II | | P5 | A7.3 |
| | ACETONE CYANOHYDRIN, STABILIZED | 6.1 | UN1541 | I | | P2, 2, A3, N34 | A10.7 |
| | ACETONE OILS | 3 | UN1091 | II | | P5 | A7.3 |
| | ACETONITRILE | 3 | UN1648 | II | | P5 | A7.3 |
| | <i>Acetyl acetone peroxide with more than 9% by mass active oxygen</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Acetyl benzoyl peroxide, solid, or with more than 40% in solution</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ACETYL BROMIDE | 8 | UN1716 | II | | P5 | A12.3 |
| | ACETYL CHLORIDE | 3 | UN1717 | II | 8 | P5, A3, A6, A7, N34 | A7.3 |
| | <i>Acetyl cyclohexanesulphonyl peroxide, with more than 82% wetted with less than 12% water</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Acetylene dichloride; see DICHLOROETHYLENE</i> | | | | | | |
| | ACETYLENE, DISSOLVED | 2.1 | UN1001 | | | P4 | A6.10 |
| | <i>Acetylene (liquefied)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Acetylene silver nitrate</i> | | | | | FORBIDDEN | FORBIDDEN |

| SYMBOL | PROPER SHIPPING NAME/ DESCRIPTION | HAZARD CLASS/ DIV | UN/ID NUMBER | PG | SUBSIDIARY RISK | SPECIAL PROVISION | PACKAGING PARAGRAPH |
|--------|---|-------------------------|-----------------|----------------|--------------------|----------------------|----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Acetylene tetrabromide; see</i> TETRABROMOETHANE | | | | | | |
| | <i>Acetylene tetrachloride; see</i> TETRACHLOROETHANE | | | | | | |
| | ACETYL IODIDE | 8 | UN1898 | II | | P5 | A12.3 |
| | ACETYL METHYL CARBINOL | 3 | UN2621 | III | | P5 | A7.3 |
| | <i>Acetyl oxide; see</i> ACETIC ANHYDRIDE | | | | | | |
| | <i>Acetyl peroxide, solid or more than 25% in solution</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Acid butyl phosphate, see</i> BUTYL ACID PHOSPHATE | | | | | | |
| | <i>Acid, sludge, see</i> Sludge Acid | | | | | | |
| | <i>Acids, liquid, N.O.S.; see</i> CORROSIVE LIQUIDS, N.O.S. | | | | | | |
| | <i>Acraldehyde, stabilized; see</i> ACROLEIN, STABILIZED | | | | | | |
| | ACRIDINE | 6.1 | UN2713 | III | | P5 | A10.6 |
| | ACROLEIN DIMER, STABILIZED | 3 | UN2607 | III | | P5 | A7.3 |
| | ACROLEIN, STABILIZED | 6.1 | UN1092 | I | 3 | P1, 1 | A10.7 |
| | ACRYLAMIDE | 6.1 | UN2074 | III | | P5 | A10.6 |
| | ACRYLIC ACID, STABILIZED | 8 | UN2218 | II | 3 | P5 | A12.3 |
| | ACRYLONITRILE, STABILIZED | 3 | UN1093 | I | 6.1 | P3 | A7.3 |
| | <i>Activated charcoal; see</i> CARBON, ACTIVATED | | | | | | |
| | ADHESIVES, containing flammable liquid | 3 | UN1133 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | ADIPONITRILE | 6.1 | UN2205 | III | | P5 | A10.5 |
| | AEROSOLS, flammable, containing substances in Class 8, Packing Group I or II | | | | | FORBIDDEN | FORBIDDEN |
| | AEROSOLS, flammable, containing substances in Division 6.1, Packing Group I or II (including tear gas devices) | | | | | FORBIDDEN | FORBIDDEN |
| | AEROSOLS, flammable, containing toxic gas | | | | | FORBIDDEN | FORBIDDEN |
| | AEROSOLS, flammable, each not exceeding 1L capacity | 2.1 | UN1950 | | | P5 | A6.3 |
| | AEROSOLS, flammable (each not exceeding 1L capacity), containing substances in Class 8, Packing Group III | 2.1 | UN1950 | | 8 | P5 | A6.3 |
| | AEROSOLS, flammable (each not exceeding 1L capacity), containing substances in Division 6.1, Packing Group III | 2.1 | UN1950 | | 6.1 | P5 | A6.3 |

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|--------|--|-------------------------|-----------------|-----|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | AEROSOLS , flammable (each not exceeding 1L capacity), containing substances in Division 6.1, Packing Group III and substances in Class 8, Packing Group III | 2.1 | UN1950 | | 6.1, 8 | P5 | A6.3 |
| | AEROSOLS , flammable, (engine starting fluid) | 2.1 | UN1950 | | | P5 | A6.3 |
| | AEROSOLS , non-flammable, containing substances in Class 8, Packing Group I or II | | | | | FORBIDDEN | FORBIDDEN |
| | AEROSOLS , non-flammable, containing substances in Division 6.1, Packing Group I or II (other than tear gas devices) | | | | | FORBIDDEN | FORBIDDEN |
| | AEROSOLS , non-flammable, containing toxic gas | | | | | FORBIDDEN | FORBIDDEN |
| | AEROSOLS , non-flammable, (each not exceeding 1L capacity) | 2.2 | UN1950 | | | P5 | A6.3 |
| | AEROSOLS , non-flammable (each not exceeding 1L capacity), containing substances in Class 8, Packing Group III | 2.2 | UN1950 | | 8 | P5 | A6.3 |
| | AEROSOLS , non-flammable (each not exceeding 1L capacity), containing substances in Division 6.1, Packing Group III | 2.2 | UN1950 | | 6.1 | P5 | A6.3 |
| | AEROSOLS , non-flammable (each not exceeding 1L capacity), containing substances in Division 6.1, Packing Group III and substances in Class 8 Packing Group III | 2.2 | UN1950 | | 6.1, 8 | P5 | A6.3 |
| | AEROSOLS , non-flammable, (tear gas devices) | 2.2 | UN1950 | | 6.1 | P5 | A6.3 |
| | AIR BAG INFLATORS , pyrotechnic or AIR BAG MODULES , pyrotechnic or SEAT-BELT PRETENSIONERS pyrotechnic | 9 | UN3268 | III | | P5 | A13.14 |
| | AIRBAG INFLATORS, COMPRESSED GAS or AIR BAG MODULES, COMPRESSED GAS or SEAT-BELT PRETENSIONERS COMPRESSED GAS | 2.2 | UN3353 | | | P5 | A13.14 |
| | AIR, COMPRESSED | 2.2 | UN1002 | | | P5 | A6.4, A6.6 |
| | AIR, REFRIGERATED LIQUID (cryogenic liquid) pressurized | 2.2 | UN1003 | | 5.1 | P4 | A6.12 |
| | AIR, REFRIGERATED LIQUID (cryogenic liquid) non-pressurized | 2.2 | UN1003 | | 5.1 | P4 | A6.12 |
| | Aircraft Engines; see ENGINES, INTERNAL COMBUSTION | | | | | | |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Aircraft evacuation slides; see LIFE-SAVING APPLIANCES</i> | | | | | | |
| | AIRCRAFT HYDRAULIC POWER UNIT FUEL TANK (containing a mixture of anhydrous hydrazine and monomethyl hydrazine) (M86 fuel) | 3 | UN3165 | I | 6.1, 8 | P3 | A7.5 |
| | <i>Aircraft Survival Kits; see LIFE-SAVING APPLIANCES</i> | | | | | | |
| * | ALCOHOLATES SOLUTION, N.O.S. in alcohol | 3 | UN3274 | II | 8 | P5 | A7.3 |
| | ALCOHOLIC BEVERAGES | 3 | UN3065 | II | | P5 | A7.3 |
| | ALCOHOLS, N.O.S. | 3 | UN1987 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| * | ALCOHOLS, FLAMMABLE, TOXIC, N.O.S. | 3 | UN1986 | I II III | 6.1 6.1 6.1 | P3 P4 P5 | A7.3 A7.3 A7.3 |
| | ALDEHYDES, N.O.S. | 3 | UN1989 | I II | | P3 P5 | A7.3 A7.3 |
| * | ALDEHYDES, FLAMMABLE, TOXIC, N.O.S. | 3 | UN1988 | I II III | 6.1 6.1 6.1 | P3 P4 P5 | A7.3 A7.3 A7.3 |
| | ALDOL | 6.1 | UN2839 | II | | P5 | A10.5 |
| D | ALDRIN, liquid | 6.1 | NA2762 | II III | | P5 P5 | A10.5 A7.3 |
| D | ALDRIN, solid | 6.1 | NA2761 | II | | P5 | A10.6 |
| * | ALKALI METAL ALCOHOLATES, SELF-HEATING, CORROSIVE, N.O.S. | 4.2 | UN3206 | II III | 8 8 | P4 P5 | A8.4 A8.4 |
| | ALKALI METAL ALLOYS, LIQUID, N.O.S. | 4.3 | UN1421 | I | | P3, A2, A3, N34 | A8.3 |
| | ALKALI METAL AMALGAMS, LIQUID | 4.3 | UN1389 | I | | P3, A2, A3, N34 | A8.3 |
| | ALKALI METAL AMALGAMS, SOLID | 4.3 | UN1389 | I | | P3, N40 | A8.4 |
| | ALKALI METAL AMIDES | 4.3 | UN1390 | II | | P5, A6, A7, A8, A19, A20 | A8.4 |
| | ALKALI METAL DISPERSIONS or ALKALINE EARTH METAL DISPERSIONS | 4.3 | UN1391 | I | | P3, A2, A3 | A8.3 |
| | <i>Alkaline corrosive liquids, N.O.S.; see CAUSTIC ALKALI LIQUIDS, N.O.S.</i> | | | | | | |
| * | ALKALINE EARTH METAL ALCOHOLATES, N.O.S. | 4.2 | UN3205 | II III | | P4 P5 | A8.4 A8.4 |
| | ALKALINE EARTH METAL ALLOYS, N.O.S. | 4.3 | UN1393 | II | | P5, A19 | A8.4 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | ALKALINE EARTH METAL AMALGAMS | 4.3 | UN1392 | I | | P3, A19, N34, N40 | A8.4 |
| * | ALKALOIDS, LIQUID, N.O.S. <i>or</i> ALKALOID SALTS, LIQUID, N.O.S. | 6.1 | UN3140 | I II III | | P3, A4 P5 P5 | A10.5 A10.5 A10.5 |
| * | ALKALOIDS, SOLID, N.O.S. <i>or</i> ALKALOID SALTS, SOLID, N.O.S., <i>poisonous</i> | 6.1 | UN1544 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | ALKYLSULFONIC ACIDS, LIQUID <i>or</i> ARYLSULFONIC ACIDS, LIQUID <i>with</i> <i>more than 5% free sulphuric acid</i> | 8 | UN2584 | II | | P5 | A12.3 |
| | ALKYLSULFONIC ACIDS, LIQUID <i>or</i> ARYLSULFONIC ACIDS, LIQUID <i>with</i> <i>not more than 5% free sulfuric acid</i> | 8 | UN2586 | III | | P5 | A12.3 |
| | ALKYLSULFONIC ACIDS, SOLID, <i>or</i> ARYLSULFONIC ACIDS, SOLID, <i>with</i> <i>more than 5% free sulfuric acid</i> | 8 | UN2583 | II | | P5 | A12.4 |
| | ALKYLSULFONIC ACIDS, SOLID, <i>or</i> ARYLSULFONIC ACIDS, SOLID, <i>with</i> <i>not more than 5% free sulfuric acid</i> | 8 | UN2585 | III | | P5 | A12.4 |
| | ALKYLPHENOLS, LIQUID, N.O.S. <i>(including C2-C12 homologues)</i> | 8 | UN3145 | I II III | | P3 P5 P5 | A12.3 A12.3 A12.3 |
| | ALKYLPHENOLS, SOLID, N.O.S. <i>(including C2-C12 homologues)</i> | 8 | UN2430 | I II III | | P5 P5 P5 | A12.4 A12.4 A12.4 |
| | ALKYLSULFURIC ACIDS | 8 | UN2571 | II | | P4 | A12.3 |
| | <i>Allethrin; see PESTICIDES, LIQUID, TOXIC, N.O.S.</i> | | | | | | |
| | ALLYL ACETATE | 3 | UN2333 | II | 6.1 | P4 | A7.3 |
| | ALLYL ALCOHOL | 6.1 | UN1098 | I | 3 | P2, 2 | A10.7 |
| | ALLYLAMINE | 6.1 | UN2334 | I | 3 | P2, 2 | A10.7 |
| | ALLYL BROMIDE | 3 | UN1099 | I | 6.1 | P3 | A7.3 |
| | ALLYL CHLORIDE | 3 | UN1100 | I | 6.1 | P3 | A7.3 |
| | ALLYL CHLOROFORMATE | 6.1 | UN1722 | I | 3, 8 | P2, 2, A3, N41 | A10.7 |
| | ALLYL ETHYL ETHER | 3 | UN2335 | II | 6.1 | P4 | A7.3 |
| | ALLYL FORMATE | 3 | UN2336 | I | 6.1 | P3 | A7.3 |
| | ALLYL GLYCIDYL ETHER | 3 | UN2219 | III | | P5 | A7.3 |
| | ALLYL IODIDE | 3 | UN1723 | II | 8 | P5, A3, A6, N34 | A7.3 |
| | ALLYL ISOTHIOCYANATE, STABILIZED | 6.1 | UN1545 | II | 3 | P4, A3, A7 | A10.5 |
| | ALLYLTRICHLOROSILANE, STABILIZED | 8 | UN1724 | II | 3 | P5, A7, N34 | A12.3 |
| | ALUMINIUM ALKYL HALIDES | 4.2 | UN3052 | I | 4.3 | P3 | A8.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | ALUMINIUM ALKYL HYDRIDES | 4.2 | UN3076 | I | 4.3 | P3 | A8.6 |
| | ALUMINIUM ALKYL | 4.2 | UN3051 | I | 4.3 | P3 | A8.6 |
| | ALUMINIUM BOROXYDRIDE <i>or</i> ALUMINIUM BOROXYDRIDE IN DEVICES | 4.2 | UN2870 | I | 4.3 | P3 | A8.6 |
| | ALUMINIUM BROMIDE, ANHYDROUS | 8 | UN1725 | II | | P5 | A12.4 |
| | ALUMINIUM BROMIDE, SOLUTION | 8 | UN2580 | III | | P5 | A12.3 |
| | ALUMINIUM CARBIDE | 4.3 | UN1394 | II | | P4, A20, N41 | A8.4 |
| | ALUMINIUM CHLORIDE, ANHYDROUS | 8 | UN1726 | II | | P5 | A12.4 |
| | ALUMINIUM CHLORIDE, SOLUTION | 8 | UN2581 | III | | P5 | A12.3 |
| | <i>Aluminium dross, wet or hot</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ALUMINIUM FERROSILICON POWDER | 4.3 | UN1395 | II III | 6.1 6.1 | P4, A19 P5, A19, A20 | A8.4 A8.4 |
| | ALUMINIUM HYDRIDE | 4.3 | UN2463 | I | | P3, A19, N40 | A8.4 |
| | <i>Aluminium molten</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ALUMINIUM NITRATE | 5.1 | UN1438 | III | | P5, A1, A29 | A9.8 |
| | <i>Aluminium phosphate solution; see CORROSIVE LIQUIDS, N.O.S.</i> | | | | | | |
| | ALUMINIUM PHOSPHIDE | 4.3 | UN1397 | I | 6.1 | P3, A8, A19, N40 | A8.4 |
| | ALUMINIUM PHOSPHIDE PESTICIDES | 6.1 | UN3048 | I | | P5, A8 | A10.6 |
| | ALUMINIUM POWDER, COATED | 4.1 | UN1309 | II III | | P5 P5 | A8.4 A8.4 |
| | ALUMINIUM POWDER, UNCOATED | 4.3 | UN1396 | II III | | P4, A19, A20 P5, A19, A20 | A8.4 A8.4 |
| | ALUMINIUM SMELTING BY- PRODUCTS <i>or</i> ALUMINIUM REMELTING BY-PRODUCTS | 4.3 | UN3170 | II III | | P4 P5 | A8.4 A8.4 |
| | ALUMINIUM RESINATE | 4.1 | UN2715 | III | | P5 | A8.4 |
| | ALUMINIUM SILICON POWDER, UNCOATED | 4.3 | UN1398 | III | | P5, A1, A19 | A8.4 |
| | <i>Amatols; see EXPLOSIVE, BLASTING, TYPE B</i> | | | | | | |
| * | AMINES, FLAMMABLE, CORROSIVE N.O.S. <i>or</i> POLYAMINES, FLAMMABLE, CORROSIVE N.O.S. | 3 | UN2733 | I II III | 8 8 8 | P3 P4 P4 | A7.3 A7.3 A7.3 |
| * | AMINES, LIQUID, CORROSIVE, FLAMMABLE N.O.S. <i>or</i> POLYAMINES, LIQUID, CORROSIVE, FLAMMABLE, N.O.S. | 8 | UN2734 | I II | 3 3 | P3, A3, A6, N34 P4 | A12.3 A12.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | AMINES, LIQUID, CORROSIVE, N.O.S. or POYLAMINES, LIQUID, CORROSIVE, N.O.S. | 8 | UN2735 | I II III | | P3, A3, A6, N34 P5 P5 | A12.3 A12.3 A12.3 |
| * | AMINES, SOLID, CORROSIVE, N.O.S. or POLYAMINES, SOLID, CORROSIVE N.O.S. | 8 | UN3259 | I II III | | P5 P5 P5 | A12.4 A12.4 A12.4 |
| | 2-AMINO-4, 6-DINITORPHENOL, wetted with not less than 20% water by mass | 4.1 | UN3317 | I | | P5, 23, A8, A19, A20, N41 | A8.4 |
| | 2-AMINO-4-CHLOROPHENOL | 6.1 | UN2673 | II | | P5 | A10.6 |
| | 2-AMINO-5- DIETHYLAMINOPENTANE | 6.1 | UN2946 | III | | P5 | A10.5 |
| | 2-(2-AMINOETHOXY) ETHANOL | 8 | UN3055 | III | | P5 | A12.3 |
| | N-AMINOETHYLPIPERAZINE | 8 | UN2815 | III | | P5 | A12.3 |
| | AMINOPHENOLS (o-; m-; p-) AMINOPROPYLDIETHANOLAMINE see AMINES, etc. | 6.1 | UN2512 | III | | P5 | A10.6 |
| | AMINOPYRIDINES (o-; m-; p) | 6.1 | UN2671 | II | | P5 | A10.6 |
| D | AMMONIA, ANHYDROUS | 2.2 | UN1005 | | | P2, 13 | A6.5 |
| | AMMONIA SOLUTIONS, relative density less than 0.880 at 15 degrees C in water, with more than 50% ammonia | 2.2 | UN3318 | | | P2, 13 | A6.5 |
| | AMMONIA SOLUTIONS, relative density between 0.880 and 0.957 at 15 degrees C in water, with more than 10%, but not more than 35% ammonia | 8 | UN2672 | III | | P5 | A12.3 |
| | AMMONIA SOLUTIONS, relative density less than 0.880 at 15 degrees C in water, with more than 35%, but not more than 50% ammonia | 2.2 | UN2073 | | | P5 | A6.4, A6.5 |
| | AMMONIUM ARSENATE | 6.1 | UN1546 | II | | P5 | A10.6 |
| | Ammonium azide | | | | | FORBIDDEN | FORBIDDEN |
| | Ammonium Bifluoride, Solid, see AMMONIUM HYDROGEN DIFLUORIDE, SOLID | | | | | | |
| | Ammonium Bifluoride, Solution, see AMMONIUM HYDROGEN DIFLUORIDE, SOLUTION | | | | | | |
| | Ammonium bromate | | | | | FORBIDDEN | FORBIDDEN |
| | Ammonium chlorate | | | | | FORBIDDEN | FORBIDDEN |
| | AMMONIUM DICHROMATE | 5.1 | UN1439 | II | | P5 | A9.8 |
| | AMMONIUM DINITRO-O- CRESOLATE | 6.1 | UN1843 | II | | P5 | A10.6 |
| | AMMONIUM FLUORIDE | 6.1 | UN2505 | III | | P5 | A10.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | AMMONIUM FLUROSILICATE | 6.1 | UN2854 | III | | P5 | A10.6 |
| | <i>Ammonium fulminate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Ammonium hydrate; see AMMONIA SOLUTIONS, etc.</i> | | | | | | |
| | AMMONIUM HYDROGENDIFLUORIDE, SOLID | 8 | UN1727 | II | | P5, N34 | A12.4 |
| | AMMONIUM HYDROGENDIFLUORIDE, SOLUTION | 8 | UN2817 | II III | 6.1 6.1 | P4, N34 P5 | A12.3 A12.3 |
| | AMMONIUM HYDROGEN SULPHATE | 8 | UN2506 | II | | P5 | A12.4 |
| D | <i>Ammonium hydroxide; see AMMONIA SOLUTIONS, etc</i> | | | | | | |
| | AMMONIUM METAVANADATE | 6.1 | UN2859 | II | | P5 | A10.6 |
| D | AMMONIUM NITRATE FERTILIZERS | 5.1 | NA2072 | III | | P5, 7 | A9.8 |
| | AMMONIUM NITRATE FERTILIZER; <i>which is more liable to explode than ammonium nitrate with 0.2 combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance</i> | | | | | FORBIDDEN | FORBIDDEN |
| | AMMONIUM NITRATE FERTILIZERS; <i>uniform nonsegregating mixtures of ammonium nitrate/ammonium sulfate, with more than 45%, but not more than 70% ammonium nitrate and not more than 0.4% of total combustible material</i> | 5.1 | UN2069 | III | | P5, A1, A29 | A9.8 |
| | AMMONIUM NITRATE FERTILIZER; <i>uniform non-segregating mixtures of nitrogen/phosphate or nitrogen/potash types or complete fertilizers of nitrogen/phosphate/potash type, with not more than 70% ammonium nitrate and not more than 0.4% total added combustible material or with not more than 45% ammonium nitrate with unrestricted combustible material</i> | 9 | UN2071 | III | | P5 | A13.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | AMMONIUM NITRATE FERTILIZERS; <i>uniform nonsegregating mixtures of ammonium nitrate with added matter which is inorganic and chemically inert towards ammonium nitrate, with not less than 90% ammonium nitrate and not more than 0.2% combustible material (including organic material calculated as carbon), or with more than 70%, but less than 90% ammonium nitrate and not more than 0.4% total combustible material</i> | 5.1 | UN2067 | III | | P5 | A9.8 |
| D | AMMONIUM NITRATE <i>mixed fertilizers</i> | 5.1 | NA2069 | III | | P5 | A9.8 |
| D | AMMONIUM NITRATE-FUEL OIL MIXTURE <i>(containing only prilled Ammonium Nitrate and fuel oil)</i> | 1.5D | NA0331 | II | | P4 | A5.14 |
| | AMMONIUM NITRATE, LIQUID <i>(hot concentrated solution)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | AMMONIUM NITRATE , <i>with more than 0.2% combustible substances, including any organic substance calculated as carbon to the exclusion of any other added substance</i> | 1.1D | UN0222 | II | P4, A69 | | A5.10 |
| | AMMONIUM NITRATE , <i>with not more than 0.2% of combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance</i> | 5.1 | UN1942 | III | | P5, A1, A29 | A9.8 |
| | <i>Ammonium nitrite</i> | | | | | FORBIDDEN | FORBIDDEN |
| | AMMONIUM PERCHLORATE | 1.1D | UN0402 | II | | P4, 107 | A5.10 |
| | AMMONIUM PERCHLORATE | 5.1 | UN1442 | II | | P5, 107, A9 | A9.8 |
| | <i>Ammonium Permanganate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | AMMONIUM PERSULPHATE | 5.1 | UN1444 | III | | P5, A1, A29 | A9.8 |
| | AMMONIUM PICRATE , <i>dry or wetted with less than 10% water, by mass</i> | 1.1D | UN0004 | II | | P4 | A5.9 |
| | AMMONIUM PICRATE, WETTED <i>with not less than 10% water, by mass</i> | 4.1 | UN1310 | I | | P4, 23, A2, N41 | A8.4 |
| | AMMONIUM POLYSULPHIDE, SOLUTION | 8 | UN2818 | II III | 6.1 6.1 | P4 P5 | A12.3 A12.3 |
| | AMMONIUM POLYVANADATE | 6.1 | UN2861 | II | | P5 | A10.6 |
| | <i>Ammonium silicofluoride; see</i> AMMONIUM FLUROSILICATE | | | | | | |
| | AMMONIUM SULPHIDE SOLUTION | 8 | UN2683 | II | 6.1, 3 | P4 | A12.3 |
| | <i>Ammunition, blank; see</i> FOR WEAPONS, BLANK | | | | | | |

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|--------|---|-------------------------|-----------------|-----|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Ammunition, fixed, semi-fixed or separate loading; see CARTRIDGES FOR WEAPONS, etc.</i> | | | | | | |
| | AMMUNITION, ILLUMINATING , with or without burster, expelling charge or propelling charge | 1.2G | UN0171 | II | | P4 | A5.15 |
| | AMMUNITION, ILLUMINATING , with or without burster, expelling charge or propelling charge | 1.3G | UN0254 | II | | P4 | A5.15 |
| | AMMUNITION, ILLUMINATING , with or without burster, expelling charge or propelling charge | 1.4G | UN0297 | II | | P5 | A5.15 |
| | AMMUNITION, INCENDIARY liquid or gel, with burster, expelling charge or propelling charge | 1.3J | UN0247 | II | | P3 | A5.15 |
| | <i>Ammunition, incendiary (water-activated contrivances) with burster, expelling charge or propelling charge; see CONTRIVANCES, WATER-ACTIVATED, etc.</i> | | | | | | |
| | AMMUNITION, INCENDIARY, WHITE PHOSPHOROUS , with burster expelling charge or propelling charge | 1.2H | UN0243 | II | | P3 | A5.15 |
| | AMMUNITION, INCENDIARY, WHITE PHOSPHOROUS , with burster expelling charge or propelling charge | 1.3H | UN0244 | II | | P3 | A5.15 |
| | AMMUNITION, INCENDIARY , with or without burster, expelling charge, or propelling charge | 1.2G | UN0009 | II | | P4 | A5.15 |
| | AMMUNITION, INCENDIARY , with or without burster, expelling charge, or propelling charge | 1.3G | UN0010 | II | | P4 | A5.15 |
| | AMMUNITION, INCENDIARY , with or without burster, expelling charge, or propelling charge | 1.4G | UN0300 | II | | P5 | A5.15 |
| | AMMUNITION, PRACTICE | 1.4G | UN0362 | II | | P5 | A5.15 |
| | AMMUNITION, PRACTICE | 1.3G | UN0488 | II | | P4 | A5.15 |
| | AMMUNITION, PROOF | 1.4G | UN0363 | II | | P5 | A5.15 |
| | <i>Ammunition, SA (small arms); see CARTRIDGES FOR WEAPONS, etc.</i> | | | | | | |
| | <i>Ammunition, smoke (water-activated contrivances), white phosphorus, with burster, expelling charge or propelling charge; see CONTRIVANCES, WATER-ACTIVATED, etc.</i> | | | | | | |

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|--------|---|-------------------------|-----------------|-----|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Ammunition, smoke (water-activated contrivances), without white phosphorus or phosphides, with burster, expelling charge or propelling charge; see CONTRIVANCES, WATER-ACTIVATED, etc.</i> | | | | | | |
| | AMMUNITION, SMOKE, WHITE PHOSPHORUS , with burster, expelling charge, or propelling charge | 1.3H | UN0246 | II | | P3 | A5.15 |
| | AMMUNITION, SMOKE, WHITE PHOSPHORUS , with burster, expelling charge, or propelling charge | 1.2H | UN0245 | II | | P3 | A5.15 |
| | AMMUNITION, SMOKE , with or without burster, expelling charge or propelling charge | 1.3G | UN0016 | II | 8 | P4 | A5.15 |
| | AMMUNITION, SMOKE , with or without burster, expelling charge or propelling charge | 1.4G | UN0303 | II | 8 | P5 | A5.15 |
| | AMMUNITION, SMOKE , with or without burster, expelling charge or propelling charge | 1.2G | UN0015 | II | 8 | P4 | A5.15 |
| | <i>Ammunition, sporting; see CARTRIDGES FOR WEAPONS, etc. (UN0012, UN0328, UN0339)</i> | | | | | | |
| | AMMUNITION, TEAR-PRODUCING, NONEXPLOSIVE , without burster or expelling charge, nonfuzed | 6.1 | UN2017 | II | 8 | P4 | A10.6 |
| | AMMUNITION, TEAR-PRODUCING , with burster expelling charge or propelling charge | 1.2G | UN0018 | II | 8, 6.1 | P4 | A5.15 |
| | AMMUNITION, TEAR-PRODUCING , with burster expelling charge or propelling charge | 1.3G | UN0019 | II | 8, 6.1 | P4 | A5.15 |
| | AMMUNITION, TEAR-PRODUCING , with burster expelling charge or propelling charge | 1.4G | UN0301 | II | 8, 6.1 | P5 | A5.15 |
| | AMMUNITION, TOXIC, NON-EXPLOSIVE , without burster or expelling charge, nonfuzed | 6.1 | UN2016 | II | | P2 | A10.6 |
| | <i>Ammunition, toxic (water-activated contrivances), with burster, expelling charge or propelling charge; see CONTRIVANCES, WATER-ACTIVATED, etc.</i> | | | | | | |
| * | AMMUNITION, TOXIC , with burster, expelling charge, or propelling charge | 1.2K | UN0020 | II | 6.1 | P1 | A5.6 |

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|--------|---|-------------------------|-----------------|-----------|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | AMMUNITION, TOXIC , with burster, <i>expelling charge, or propelling charge</i> | 1.3K | UN0021 | II | 6.1 | P1 | A5.6 |
| | AMYL ACETATES | 3 | UN1104 | III | | P5 | A7.3 |
| | AMYL ACID PHOSPHATE | 8 | UN2819 | III | | P5 | A12.3 |
| | AMYL ALCOHOLS | 3 | UN1105 | II III | | P5 P5 | A7.3 A7.3 |
| | AMYLAMINES | 3 | UN1106 | II III | 8 8 | P5 P5 | A7.3 A7.3 |
| | AMYL BUTYRATES | 3 | UN2620 | III | | P5 | A7.3 |
| | AMYL CHLORIDES | 3 | UN1107 | II | | P5 | A7.3 |
| | n-AMYLENE | 3 | UN1108 | I | | P3 | A7.3 |
| | AMYL FORMATES | 3 | UN1109 | III | | P5 | A7.3 |
| | AMYL MERCAPTANS | 3 | UN1111 | II | | P5, A3 | A7.3 |
| | n-AMYL METHYL KETONE | 3 | UN1110 | III | | P5 | A7.3 |
| | AMYL NITRATE | 3 | UN1112 | III | | P5 | A7.3 |
| | AMYL NITRITES | 3 | UN1113 | II | | P5 | A7.3 |
| | AMYLTRICHLOROSILANE | 8 | UN1728 | II | | P5, A7, N34 | A12.3 |
| | <i>Anaesthetic ether; see</i> DIETHYL ETHER | | | | | | |
| | <i>Anhydrous ammonia; see</i> AMMONIA, ANHYDROUS | | | | | | |
| | <i>Anhydrous hydrazine; see</i> HYDRAZINE, ANHYDROUS | | | | | | |
| | <i>Anhydrous hydrofluoric acid; see</i> HYDROGEN FLUORIDE, ANHYDROUS | | | | | | |
| + | ANILINE | 6.1 | UN1547 | II | | P5 | A10.5 |
| | ANLINE HYDROCHLORIDE | 6.1 | UN1548 | III | | P5 | A10.6 |
| | ANISIDINES | 6.1 | UN2431 | III | | P5 | A10.5 |
| | ANISOLE | 3 | UN2222 | III | | P5 | A7.3 |
| | ANISOYL CHLORIDE | 8 | UN1729 | II | | P5 | A12.3 |
| | <i>Anti-freeze liquid; see</i> FLAMMABLE LIQUIDS, N.O.S. | | | | | | |
| | <i>Anti-knock compound, mixture; see</i> MOTOR FUEL ANTI-KNOCK MIXTURES | | | | | | |
| | <i>Antimonious chloride, see</i> ANTIMONY TRICHLORIDE | | | | | | |
| | ANTIMONY COMPOUNDS, INORGANIC, LIQUID, N.O.S. | 6.1 | UN3141 | III | | P5 | A10.5 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|----------------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | ANTIMONY COMPOUNDS, INORGANIC, SOLID, N.O.S. | 6.1 | UN1549 | III | | P5 | A10.6 |
| | ANTIMONY LACTATE | 6.1 | UN1550 | III | | P5 | A10.6 |
| | ANTIMONY PENTACHLORIDE, LIQUID | 8 | UN1730 | II | | P5 | A12.3 |
| | ANTIMONY PENTACHLORIDE, SOLUTIONS | 8 | UN1731 | II III | | P5 P5 | A12.3 A12.3 |
| | ANTIMONY PENTAFLUORIDE | 8 | UN1732 | II | 6.1 | P4, A3, A6, A7, A10, N3 | A12.3 |
| | ANTIMONY POTASSIUM TARTRATE | 6.1 | UN1551 | III | | P5 | A10.6 |
| | ANTIMONY POWDER | 6.1 | UN2871 | III | | P5 | A10.6 |
| | <i>Antimony sulphide and chlorate, mixture of</i> | | | | | FORBIDDEN | FORBIDDEN |
| D | ANTIMONY TRIBROMIDE, SOLID | 8 | NA1549 | II | | P5 | A12.4 |
| D | ANTIMONY TRIBROMIDE, SOLUTION | 8 | NA1549 | II | | P5 | A12.3 |
| | ANTIMONY TRICHLORIDE, LIQUID | 8 | UN1733 | II | | P5 | A12.3 |
| | ANTIMONY TRICHLORIDE, SOLID | 8 | UN1733 | II | | P5 | A12.4 |
| D | ANTIMONY TRIFLUORIDE, SOLID | 8 | NA1549 | II | | P5 | A12.4 |
| D | ANTIMONY TRIFLUORIDE SOLUTION | 8 | NA1549 | II | | P5 | A12.3 |
| | <i>Aqua ammonia, see AMMONIA SOLUTION</i> | | | | | | |
| | ARGON, COMPRESSED | 2.2 | UN1006 | | | P5 | A6.4, A6.6 |
| | ARGON, REFRIGERATED LIQUID <i>(cryogenic liquid)</i> | 2.2 | UN1951 | | | P4 | A6.12 |
| | ARSENIC | 6.1 | UN1558 | II | | P5 | A10.6 |
| | ARSENIC ACID, LIQUID | 6.1 | UN1553 | I | | P3 | A10.5 |
| | ARSENIC ACID, SOLID | 6.1 | UN1554 | II | | P5 | A10.6 |
| | ARSENICAL DUST | 6.1 | UN1562 | II | | P5 | A10.6 |
| | ARSENICAL PESTICIDES, LIQUID, FLAMMABLE, TOXIC, <i>flashpoint less than 23 degrees C</i> | 3 | UN2760 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | ARSENICAL PESTICIDES, LIQUID, TOXIC, FLAMMABLE, N.O.S., <i>flashpoint not less than 23 degrees C</i> | 6.1 | UN2993 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | ARSENICAL PESTICIDES, LIQUID, TOXIC | 6.1 | UN2994 | I II III | | P3 P5 P5 | A10.5 A10.5 A10.5 |
| | ARSENICAL PESTICIDES, SOLID, TOXIC | 6.1 | UN2759 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | ARSENIC BROMIDE | 6.1 | UN1555 | II | | P5 | A10.6 |

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|--------|---|-------------------------|-----------------|----------------|--------------------|----------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | ARSENIC COMPOUNDS, LIQUID, N.O.S., including Arsenates, N.O.S., Arsenites, N.O.S., Arsenic sulphides, N.O.S., and Organic compounds of arsenic, N.O.S. | 6.1 | UN1556 | I II III | | P3 P5 P5 | A10.5 A10.5 A10.5 |
| | ARSENIC COMPOUNDS, SOLID, N.O.S., including Arsenates, N.O.S., Arsenites, N.O.S., Arsenic sulphides, N.O.S., and Organic compounds of arsenic, N.O.S. | 6.1 | UN1557 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | <i>Arsenic, fuming liquid, see ARSENIC TRICHLORIDE</i> | | | | | | |
| | ARSENIC PENTOXIDE | 6.1 | UN1559 | II | | P5 | A10.6 |
| D | ARSENIC SULPHIDE | 6.1 | NA1557 | II | | P5 | A10.6 |
| | <i>Arsenic sulphide and a chlorate, mixtures of</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ARSENIC TRICHLORIDE | 6.1 | UN1560 | I | | P2, 2 | A10.7 |
| | ARSENIC TRIOXIDE | 6.1 | UN1561 | II | | P5 | A10.6 |
| D | ARSENIC TRISULPHIDE | 6.1 | NA1557 | II | | P5 | A10.6 |
| | ARSINE | 2.3 | UN2188 | | 2.1 | P1, 1 | A6.16 |
| | ARTICLES, EXPLOSIVE, EXTREMELY INSENSITIVE or ARTICLES, EEI | 1.6N | UN0486 | II | | P5, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S | 1.4S | UN0349 | II | | P5, 101, A69 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.4B | UN0350 | II | | P5, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.4C | UN0351 | II | | P5, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.4D | UN0352 | II | | P5, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.4G | UN0353 | II | | P5, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.1L | UN0354 | II | | P3, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.2L | UN0355 | II | | P3, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.3L | UN0356 | II | | P3, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.1C | UN0462 | II | | P4, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.1D | UN0463 | II | | P4, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.1E | UN0464 | II | | P4, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.1F | UN0465 | II | | P4, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.2C | UN0466 | II | | P4, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.2D | UN0467 | II | | P4, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.2E | UN0468 | II | | P4, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.2F | UN0469 | II | | P4, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.3C | UN0470 | II | | P4, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.4E | UN0471 | II | | P5, 101 | A5.6 |
| * | ARTICLES, EXPLOSIVE, N.O.S. | 1.4F | UN0472 | II | | P5, 101 | A5.6 |
| | ARTICLES, PRESSURIZED HYDRAULIC containing nonflammable gas | 2.2 | UN3164 | | | P5 | A6.5, A6.6, A6.9 |
| | ARTICLES, PRESSURIZED, PNEUMATIC containing nonflammable gas | 2.2 | UN3164 | | | P5 | A6.5, A6.6, A6.9 |
| | ARTICLES, PYROPHORIC | 1.2L | UN0380 | II | | P3 | A5.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | ARTICLES, PYROTECHNIC for technical purposes | 1.1G | UN0428 | II | | P4 | A5.21 |
| | ARTICLES, PYROTECHNIC for technical purposes | 1.2G | UN0429 | II | | P4 | A5.21 |
| | ARTICLES, PYROTECHNIC for technical purposes | 1.3G | UN0430 | II | | P4 | A5.21 |
| | ARTICLES, PYROTECHNIC for technical purposes | 1.4G | UN0431 | II | | P5 | A5.21 |
| | ARTICLES, PYROTECHNIC for technical purposes | 1.4S | UN0432 | II | | P5, A69 | A5.21 |
| | Asbestos; see BLUE ASBESTOS, WHITE ASBESTOS, or BROWN ASBESTOS, etc. | | | | | | |
| D | Asphalt, cut back; see TARS, LIQUID, etc. | | | | | | |
| | ASPHALT, at or above its flashpoint | | | | | FORBIDDEN | FORBIDDEN |
| | Automobile, motorcycle, tractor, or other self-propelled vehicle, engine, or other mechanical apparatus; see BATTERY or VEHICLE | | | | | | |
| | Azaurolic Acid | | | | | FORBIDDEN | FORBIDDEN |
| * | AVIATION REGULATED LIQUID, N.O.S. | 9 | UN3334 | | | P5, A35 | A13.3, A13.13 |
| * | AVIATION REGULATED SOLID, N.O.S. | 9 | UN3335 | | | P5, A35 | A13.3, A13.13 |
| | Azidodithiocarbonic acid | | | | | FORBIDDEN | FORBIDDEN |
| | Azidoethyl nitrate | | | | | FORBIDDEN | FORBIDDEN |
| | Azido guanidine picrate (dry) | | | | | FORBIDDEN | FORBIDDEN |
| | 5-Azido-1-hydroxy tetrazole | | | | | FORBIDDEN | FORBIDDEN |
| | Azido hydroxy tetrazole (mercury and silver salts) | | | | | FORBIDDEN | FORBIDDEN |
| | 3-Azido-1, 2-propylene glycol dinitrate | | | | | FORBIDDEN | FORBIDDEN |
| | 1-Aziridinylphosphine oxide-(tris); see TRIS-(1-AZIRIDINYL) PHOSPHINE OXIDE, SOLUTION | | | | | | |
| | AZODICARBONAMIDE | | | | | FORBIDDEN | FORBIDDEN |
| | 2,2'-Azodi-(2,4-dimethyl-4-methoxyvaleronitrile) see SELF-REACTIVE SOLID TYPE D, TEMPERATURE CONTROLLED | | | | | | |
| | 2,2'-Azodi-(2,4 dimethylvaleronitrile) see SELF-REACTIVE SOLID TYPE D TEMPERATURE CONTROLLED | | | | | | |
| | 1,1'-Azodi-(hexahydrobenzonitrile) see SELF-REACTIVE SOLID TYPE D | | | | | | |

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|--------|---|-------------------------|-----------------|-----------|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Azodiisobutyronitrile, see SELF-REACTIVE SOLID TYPE C, TEMPERATURE CONTROLLED</i> | | | | | | |
| | <i>2,2'-Azodi-(2-methylbutyronitrile), see SELF-REACTIVE SOLID TYPE D, TEMPERATURE CONTROLLED</i> | | | | | | |
| | <i>Azotetrazole (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | BARIUM | 4.3 | UN1400 | II | | P4, A19 | A8.4 |
| | BARIUM ALLOYS, PYROPHORIC | 4.2 | UN1854 | I | | P3 | A8.6 |
| | BARIUM AZIDE, dry or wetted with less than 50% water, by mass | 1.1A | UN0224 | II | 6.1 | P3, 111, 117 | A5.7 |
| | BARIUM AZIDE, wetted with not less than 50% water, by mass | 4.1 | UN1571 | I | 6.1 | P4, A2 | A8.11 |
| | BARIUM BROMATE | 5.1 | UN2719 | II | 6.1 | P4 | A9.8 |
| | BARIUM CHLORATE | 5.1 | UN1445 | II | 6.1 | P4, A9, N34 | A9.8 |
| | BARIUM COMPOUNDS, N.O.S. | 6.1 | UN1564 | II III | | P5 P5 | A10.6 A10.6 |
| | BARIUM CYANIDE | 6.1 | UN1565 | I | | P5, N74, N75 | A10.6 |
| | BARIUM HYPOCHLORITE with more than 22% available chlorine | 5.1 | UN2741 | II | 6.1 | P5, A7, A9, N34 | A9.8 |
| | BARIUM NITRATE | 5.1 | UN1446 | II | 6.1 | P5 | A9.8 |
| | BARIUM OXIDE | 6.1 | UN1884 | III | | P5 | A10.6 |
| | BARIUM PERCHLORATE | 5.1 | UN1447 | II | 6.1 | P5 | A9.8 |
| | BARIUM PERMANGANATE | 5.1 | UN1448 | II | 6.1 | P5 | A9.8 |
| | BARIUM PEROXIDE | 5.1 | UN1449 | II | 6.1 | P5 | A9.8 |
| | <i>Barium selenate; see SELENATES</i> | | | | | | |
| | <i>Barium selenite; see SELENITES</i> | | | | | | |
| D | BARIUM STYPHNATE | 1.1A | NA0473 | II | | P3, 111, 117 | A5.7 |
| | BATTERIES, CONTAINING SODIUM | 4.3 | UN3292 | II | | P5 | A8.19 |
| | BATTERIES, DRY CONTAINING POTASSIUM HYDROXIDE SOLID, electric storage | 8 | UN3028 | III | | P5 | A12.4 |
| | BATTERIES, WET, FILLED WITH ACID, electric storage | 8 | UN2794 | III | | P5 | A12.5 |
| | BATTERIES, WET, FILLED WITH ALKALI, electric storage | 8 | UN2795 | III | | P5 | A12.5 |
| | BATTERIES, WET, NONSPILLABLE, electric storage | 8 | UN2800 | III | | P5 | A12.5 |
| | <i>Battery, Dry</i> | | | | | A67 | |
| | BATTERY FLUID, ACID | 8 | UN2796 | II | | P5, A3, A7, N6, N34 | A12.3, A12.5 |
| | BATTERY FLUID, ALKALI | 8 | UN2797 | II | | P5, N6 | A12.3, A12.5 |
| | BATTERY-POWERED EQUIPMENT (wet battery) | 9 | UN3171 | | | P5, 134 | A13.7 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | BATTERY-POWERED VEHICLE (<i>wet battery</i>) | 9 | UN3171 | | | P5, 134 | A13.7 |
| | <i>Battery, wet, with wheelchair; see</i> BATTERY-POWERED EQUIPMENT or BATTERY-POWERED VEHICLE | | | | | | |
| + | BENZALDEHYDE | 9 | UN1990 | III | | P5 | A13.3 |
| | BENZENE | 3 | UN1114 | II | | P5 | A7.3 |
| | <i>Benzene diazonium chloride (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Benzene diazonium nitrate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>1,4-Benzenediol, see</i> HYDROQUINONE | | | | | | |
| | <i>Benzene-1,3-disulphohydrazide, not more than 52% as a paste see</i> SELF-REACTIVE SOLID TYPE D | | | | | | |
| | <i>Benzene phosphorus dichloride; see</i> PHENYL PHOSPHORUS DICHLORIDE | | | | | | |
| | <i>Benzene phosphorus thiodichloride; see</i> PHENYL PHOSPHORUS THIODICHLORIDE | | | | | | |
| | <i>Benzene sulphohydrazide see</i> SELF-REACTIVE SOLID TYPE D | | | | | | |
| | BENZENE SULPHONYL CHLORIDE | 8 | UN2225 | III | | P5 | A12.3 |
| | <i>Benzenethiol; see</i> PHENYL MERCAPTAN | | | | | | |
| | <i>Benzene triozone</i> | | | | | FORBIDDEN | FORBIDDEN |
| | BENZIDINE | 6.1 | UN1885 | II | | P5 | A10.6 |
| | BENZONITRILE | 6.1 | UN2224 | II | | P5 | A10.5 |
| | BENZOQUINONE | 6.1 | UN2587 | II | | P5 | A10.6 |
| | BENZOTRICHLORIDE | 8 | UN2226 | II | | P5 | A12.3 |
| | BENZOTRIFLUORIDE | 3 | UN2338 | II | | P5 | A7.3 |
| | <i>Benzoxidazoles (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Benzoyl azide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | BENZOYL CHLORIDE | 8 | UN1736 | II | | P5 | A12.3 |
| | BENZYL BROMIDE | 6.1 | UN1737 | II | 8 | P4, A3, A7, N33, N34 | A10.5 |
| | BENZYL CHLORIDE | 6.1 | UN1738 | II | 8 | P4, A3, A7, N33, N42 | A10.5 |
| | BENZYL CHLORIDE, unstabilized | 6.1 | UN1738 | II | 8 | P4, A3, A7, N33, N34, N43 | A10.5 |
| | BENZYL CHLOROFORMATE | 8 | UN1739 | I | | P3, A3, A6, N41 | A12.3 |
| | BENZYLDIMETHYLAMINE | 8 | UN2619 | II | 3 | P5 | A12.3 |
| | <i>4-(benzyl(ethyl)amino)-3-ethoxybenzenediazonium zinc chloride see</i> SELF-REACTIVE SOLID TYPE D | | | | | | |
| | BENZYLIDENE CHLORIDE | 6.1 | UN1886 | II | | P5 | A10.5 |
| | BENZYL IODIDE | 6.1 | UN2653 | II | | P5 | A10.5 |

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|--------|---|-------------------------|-----------------|----------------|--------------------|----------------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | 4-(benzyl(methyl)amino)3-ethoxybenzenediazonium zinc chloride see SELF-REACTIVE SOLID TYPE D, TEMPERATURE CONTROLLED | | | | | | |
| | BERYLLIUM COMPOUNDS, N.O.S. | 6.1 | UN1566 | II III | | P5 P5 | A10.6 A10.6 |
| | BERYLLIUM NITRATE | 5.1 | UN2464 | II | 6.1 | P5 | A9.8 |
| | BERYLLIUM, POWDER | 6.1 | UN1567 | II | 4.1 | P5 | A10.6 |
| | BICYCLO [2,2,1] HEPTA-2-5-DIENE, STABILIZED or 2,5-NORBORNADIENE, STABILIZED | 3 | UN2251 | II | | | |
| | <i>Biphenyl triozone</i> | | | | | FORBIDDEN | FORBIDDEN |
| | BIPYRIDILIUM PESTICIDES, LIQUID, FLAMMABLE, TOXIC, flashpoint less than 23 degrees C | 3 | UN2782 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | BIPYRIDILIUM PESTICIDES, LIQUID, FLAMMABLE, flashpoint not less than 23 degrees C | 6.1 | UN3015 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | BIPYRIDILIUM PESTICIDES, LIQUID, TOXIC | 6.1 | UN3016 | I II | | P3 P4 | A10.5 A10.5 |
| | BIPYRIDILIUM PESTICIDES, SOLID, TOXIC | 6.1 | UN2781 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | BISULFATE, AQUEOUS SOLUTION | 8 | UN2837 | II III | | P5, A7, N34 P5, A7, N34 | A12.3 A12.3 |
| | BISULPHITES, AQUEOUS SOLUTIONS, N.O.S. | 8 | UN2693 | III | | P5 | A12.3 |
| | BLACK, POWDER, COMPRESSED or GUNPOWDER, COMPRESSED or BLACK POWDER, IN PELLETS or GUNPOWDER, IN PELLETS | 1.1D | UN0028 | II | | P4 | A5.11 |
| | BLACK POWDER or GUNPOWDER, granular or as a meal | 1.1D | UN0027 | II | | P4 | A5.11 |
| | <i>Blasting agent, n.o.s.; see EXPLOSIVES, BLASTING</i> | | | | | | |
| | <i>Blasting cap, assemblies; see DETONATOR ASSEMBLIES NONELECTRIC, for blasting</i> | | | | | | |
| | <i>Blasting caps, electric; see DETONATORS, ELECTRIC, for blasting</i> | | | | | | |
| | <i>Blasting caps, nonelectric; see DETONATORS, NONELECTRIC, for blasting</i> | | | | | | |
| | <i>Bleaching powder; see CALCIUM HYPOCHLORITE MIXTURES, etc</i> | | | | | | |

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|--------|--|-------------------------|-----------------|-----|--------------------|----------------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | BLUE ASBESTOS (<i>crocidolite</i>) or BROWN ASBESTOS (<i>amosite, mysorite</i>) | 9 | UN2212 | II | | P5 | A13.15 |
| | BOMBS, PHOTO-FLASH | 1.1F | UN0037 | II | | P4 | A5.15 |
| | BOMBS, PHOTO-FLASH | 1.1D | UN0038 | II | | P4 | A5.15 |
| | BOMBS, PHOTO-FLASH | 1.2G | UN0039 | II | | P4 | A5.15 |
| | BOMBS, PHOTO-FLASH | 1.3G | UN0299 | II | | P4 | A5.15 |
| | BOMBS, SMOKE, NONEXPLOSIVE, <i>with corrosive liquid, without initiating device</i> | 8 | UN2028 | II | | P4 | A12.6 |
| | BOMBS, with bursting charge | 1.1F | UN0033 | II | | P4 | A5.15 |
| | BOMBS, with bursting charge | 1.1D | UN0034 | II | | P4 | A5.15 |
| | BOMBS, with bursting charge | 1.2D | UN0035 | II | | P4 | A5.15 |
| | BOMBS, with bursting charge | 1.2F | UN0291 | II | | P4 | A5.15 |
| | BOMBS WITH FLAMMABLE LIQUID, <i>with bursting charge</i> | 1.1J | UN0399 | II | | P3 | A5.6 |
| | BOMBS WITH FLAMMABLE LIQUID, <i>with bursting charge</i> | 1.2J | UN0400 | II | | P3 | A5.6 |
| | BOOSTERS WITH DETONATOR | 1.1B | UN0225 | II | | P4 | A5.19 |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | BOOSTERS WITH DETONATOR | 1.2B | UN0268 | II | | P4 | A5.19 |
| | BOOSTERS, without detonator | 1.1D | UN0042 | II | | P4 | A5.18 |
| | BOOSTERS, without detonator | 1.2D | UN0283 | II | | P4 | A5.18 |
| | BORNEOL | 4.1 | UN1312 | III | | P5, A1 | A8.4 |
| + | BORON TRIBROMIDE | 8 | UN2692 | I | 6.1 | P2, 2, A3, A7, N34 | A12.12 |
| | BORON TRICHLORIDE | 2.3 | UN1741 | | 8 | P2, 3 | A6.5 |
| | BORON TRIFLUORIDE, COMPRESSED | 2.3 | UN1008 | | | P2, 2 | A6.6 |
| | BORON TRIFLUORIDE ACETIC ACID COMPLEX | 8 | UN1742 | II | | P4 | A12.3 |
| | BORON TRIFLUORIDE DIETHYL ETHERATE | 8 | UN2604 | I | 3 | P3, A19 | A12.3 |
| | BORON TRIFLUORIDE DIHYDRATE | 8 | UN2851 | II | | P5 | A12.4 |
| | BORON TRIFLUORIDE DIMETHYL ETHERATE | 4.3 | UN2965 | I | | P3, A19 | A8.3 |
| | BORON TRIFLUORIDE PROPIONIC ACID COMPLEX | 8 | UN1743 | II | 3, 8 | P4 | A12.3 |
| | <i>Box toe gum; see</i> NITROCELLULOSE | | | | | | |
| | BROMATES, INORGANIC, N.O.S. | 5.1 | UN1450 | II | | P5 | A9.8 |
| | BROMATES, INORGANIC, AQUEOUS SOLUTION, N.O.S. | 5.1 | UN3213 | II | | P4 | A9.7 |
| | 1-BROMOBUTANE | 3 | UN1126 | II | | P5 | A7.3 |
| | BROMINE CHLORIDE | 2.3 | UN2901 | | 5.1, 8 | P2, 2 | A6.5 |
| + | BROMINE or BROMINE SOLUTIONS | 8 | UN1744 | I | 6.1 | P1, 1, A3, A6, N34, N43 | A12.12 |

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|--------|--|-------------------------|-----------------|-----------|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Bromine azide</i> | | | | | FORBIDDEN | FORBIDDEN |
| + | BROMINE PENTAFLUORIDE | 5.1 | UN1745 | I | 6.1, 8 | P1, 1 | A9.11 |
| + | BROMINE TRIFLUORIDE | 5.1 | UN1746 | I | 6.1, 8 | P2, 2 | A9.11 |
| | BROMOACETIC ACID, solid | 8 | UN1938 | II | | P5, A7, N34 | A12.4 |
| | BROMOACETIC ACID, solution | 8 | UN1938 | II | | P4 | A12.3 |
| + | BROMOACETONE | 6.1 | UN1569 | II | 3 | P2, 2 | A10.4 |
| | BROMOACETYL BROMIDE | 8 | UN2513 | II | | P5 | A12.3 |
| | BROMOBENZENE | 3 | UN2514 | III | | P5 | A7.3 |
| | BROMOBENZYL CYANIDES, liquid | 6.1 | UN1694 | I | | P3 | A10.5 |
| | BROMOBENZYL CYANIDES, solid | 6.1 | UN1694 | I | | P5 | A10.6 |
| | 1-BROMO-3-CHLOROPROPANE | 6.1 | UN2688 | III | | P5, N36 | A10.5 |
| | 2-BROMOBUTANE | 3 | UN2339 | II | | P5 | A7.3 |
| | BROMOCHLOROMETHANE | 6.1 | UN1887 | III | | P5 | A10.5 |
| | <i>4-Bromo-1, 2-dinitrobenzene</i> | | | | | FORBIDDEN | FORBIDDEN |
| | 2-BROMOETHYL ETHYL ETHER | 3 | UN2340 | II | | P5 | A7.3 |
| | BROMOFORM | 6.1 | UN2515 | III | | P5 | A10.5 |
| | 1-BROMO-3-METHYLBUTANE | 3 | UN2341 | III | | P5 | A7.3 |
| | BROMOMETHYLPROPANES | 3 | UN2342 | II | | P5 | A7.3 |
| | 2-BROMO-2-NITROPROPANE-1,3,- DIOL | 4.1 | UN3241 | III | | P5, 46 | A8.4 |
| | <i>1Bromo-3-Nitrobenzene (unstable at 56 degrees C)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | 2-BROMOPENTANE | 3 | UN2343 | II | | P5 | A7.3 |
| | 2-BROMOPROPANES or BROMOPROPANES | 3 | UN2344 | II | | P5 | A7.3 |
| | 3-BROMOPROPYNE | 3 | UN2345 | II | | P5 | A7.3 |
| | <i>Bromosilane</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Bromotoluene-alpha; see BENZYL BROMIDE</i> | | | | | | |
| | BROMOTRIFLUOROETHYLENE | 2.1 | UN2419 | | | P4 | A6.5 |
| | BROMOTRIFLUOROMETHANE (R13B1) | 2.2 | UN1009 | | | P5 | A6.4, A6.5 |
| | BRUCINE | 6.1 | UN1570 | I | | P3 | A10.6 |
| | BURSTERS, explosive | 1.1D | UN0043 | II | | P4 | A5.19 |
| | BUTADIENES, STABILIZED | 2.1 | UN1010 | | | P4 | A6.4, A6.5 |
| | BUTANE or BUTANE MIXTURES; see also PETROLEUM GASES, LIQUEFIED | 2.1 | UN1011 | | | P4 | A6.4, A6.7 |
| | <i>Butane, butane mixtures and mixtures having similar properties in cartridges each not exceeding 500 grams see RECEPTACLES</i> | | | | | | |
| | BUTANEDIONE | 3 | UN2346 | II | | P5 | A7.3 |
| | BUTANOLS | 3 | UN1120 | II III | | P5 P5 | A7.3 A7.3 |

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|----------|--|-------------------------|-----------------|----------------|--------------------|----------------------|----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | BUTYL ACETATES | 3 | UN1123 | II III | | P5 P5 | A7.3 A7.3 |
| | BUTYL ACID PHOSPHATE | 8 | UN1718 | III | | P5 | A12.3 |
| | BUTYL ACRYLATE, STABILIZED | 3 | UN2348 | III | | P5 | A7.3 |
| | <i>Butyl alcohols; see BUTANOLS</i> | | | | | | |
| | N-BUTYLAMINE | 3 | UN1125 | II | 8 | P5 | A7.3 |
| | N-BUTYLANILINE | 6.1 | UN2738 | II | | P5 | A10.5 |
| | BUTYL BENZENES | 3 | UN2709 | III | | P5 | A7.3 |
| | N-BUTYL BROMIDE | 3 | UN1126 | II | | P5 | A7.3 |
| | <i>n-Butyl chloride; see CHLORO BUTANES</i> | | | | | | |
| | N-BUTYL CHLOROFORMATE | 6.1 | UN2743 | I | 8, 3 | P2, 2 | A10.7 |
| D | SEC-BUTYL CHLOROFORMATE | 6.1 | NA2742 | I | 3, 8 | P2, 2 | A10.7 |
| | TERT-BUTYLCYCLOHEXYLCHLOROFORMATE | 6.1 | UN2747 | III | | P5 | A10.5 |
| | BUTYLENE; see also PETROLEUM GASES, LIQUEFIED | 2.1 | UN1012 | | | P4 | A6.7 |
| | 1,2-BUTYLENE OXIDE, STABILIZED | 3 | UN3022 | II | | P5 | A7.3 |
| | <i>Butyl ethers; see DIBUTYL ETHERS</i> | | | | | | |
| | <i>Butyl ethyl ether; see ETHYL BUTYL ETHER</i> | | | | | | |
| | N-BUTYL FORMATE | 3 | UN1128 | II | | P5 | A7.3 |
| | TERT-BUTYL HYPOCHLORITE | 4.2 | UN3255 | I | 8 | P3 | A8.4 |
| | <i>Tert-Butyl Hydroperoxide, more than 90% with water</i> | | | | | FORBIDDEN | FORBIDDEN |
| | N-n-BUTYL IMIDAZOLE | 6.1 | UN2690 | II | | P5 | A10.5 |
| | TERT-BUTYL ISOCYANATE | 6.1 | UN2484 | I | 3 | P1, 1, A7 | A10.7 |
| | N-BUTYL ISOCYANATE | 6.1 | UN2485 | I | 3 | P2, 2, A7 | A10.7 |
| | BUTYL MERCAPTANS | 3 | UN2347 | II | | P5, A3 | A7.3 |
| | N-BUTYL METHACRYLATE, STABILIZED | 3 | UN2227 | III | | P5 | A7.3 |
| | BUTYL METHYL ETHER | 3 | UN2350 | II | | P5 | A7.3 |
| | BUTYL NITRITES | 3 | UN2351 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | <i>Butyl phosphoric acid; see BUTYL ACID PHOSPHATE</i> | | | | | | |
| | BUTYL PROPIONATES | 3 | UN1914 | III | | P5 | A7.3 |
| | BUTYL TOLUENES | 6.1 | UN2667 | III | | P5 | A10.5 |
| | BUTYLTRICHLOROSILANE | 8 | UN1747 | II | 3 | P4, A7, N34 | A12.3 |
| | 5-TERT-BUTYL-2,4,6-TRINITRO-M-XYLENE or MUSK XYLENE | 4.1 | UN2956 | III | | P5 | A8.5 |
| | BUTYL VINYL ETHER, STABILIZED | 3 | UN2352 | II | | P5 | A7.3 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|------------------------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | 1,4-BUTYNEEDIOL | 6.1 | UN2716 | III | | P5, A1 | A10.6 |
| | BUTYRALDEHYDE | 3 | UN1129 | II | | P5 | A7.3 |
| | BUTYRALDOXIME | 3 | UN2840 | III | | P5 | A7.3 |
| | BUTYRIC ACID | 8 | UN2820 | III | | P5 | A12.3 |
| | BUTYRIC ANHYDRIDE | 8 | UN2739 | III | | P5 | A12.3 |
| | BUTYRONITRILE | 3 | UN2411 | II | 6.1 | P4 | A7.3 |
| | BUTYRYL CHLORIDE | 3 | UN2353 | II | 8 | P5 | A7.3 |
| | <i>Cabazide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Cable cutters, explosive; see CUTTERS, CABLE, EXPLOSIVE</i> | | | | | | |
| | CACODYLIC ACID | 6.1 | UN1572 | II | | P5 | A10.6 |
| | CADMIUM COMPOUNDS | 6.1 | UN2570 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | CAESIUM HYDROXIDE | 8 | UN2682 | II | | P5 | A12.4 |
| | CAESIUM HYDROXIDE SOLUTION | 8 | UN2681 | II III | | P5 P5 | A12.3 A12.3 |
| | CALCIUM | 4.3 | UN1401 | II | | P5 | A8.4 |
| | CALCIUM ARSENATE | 6.1 | UN1573 | II | | P5 | A10.6 |
| | CALCIUM ARSENATE AND CALCIUM ARSENITE MIXTURES, SOLID | 6.1 | UN1574 | II | | P5 | A10.6 |
| D | CALCIUM ARSENITE, SOLID | 6.1 | NA1574 | II | | P5 | A10.6 |
| | <i>Calcium bisulphite solutions; see BISULPHITES, INORGANIC, AQUEOUS SOLUTIONS, N.O.S.</i> | | | | | | |
| | CALCIUM CARBIDE | 4.3 | UN1402 | I II | | P3, A1, A8, N34 P5, A1, A8, N34 | A8.4 A8.4 |
| | CALCIUM CHLORATE | 5.1 | UN1452 | II | | P5, N34 | A9.8 |
| | CALCIUM CHLORATE, AQUEOUS SOLUTION | 5.1 | UN2429 | II III | | P5, A2, N41 P5, A2, N41 | A9.7 A9.7 |
| | CALCIUM CHLORITE | 5.1 | UN1453 | II | | P5, A9, N34 | A9.8 |
| | CALCIUM CYANAMIDE <i>with more than 0.1% of calcium carbide</i> | 4.3 | UN1403 | III | | P5, A1, A19 | A8.4 |
| | CALCIUM CYANIDE | 6.1 | UN1575 | I | | P5, N79 | A10.6 |
| | CALCIUM DITHIONITE <i>or</i> CALCIUM HYDROSULPHITE | 4.2 | UN1923 | II | | P5, A19, A20 | A8.4 |
| | CALCIUM HYDRIDE | 4.3 | UN1404 | I | | P3, A19, N40 | A8.4 |
| | CALCIUM HYDROSULPHITE; see CALCIUM DITHIONITE | | | | | | |
| | CALCIUM HYPOCHLORITE, DRY <i>or</i> CALCIUM HYPOCHLORITE MIXTURES, DRY <i>with more than 39% available chlorine (8.8% available oxygen)</i> | 5.1 | UN1748 | | | P5, A7, A9, N34 | A9.8 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | CALCIUM HYPOCHLORITE, HYDRATED or CALCIUM HYPOCHLORITE, HYDRATED MIXTURES , with not less than 5.5% but not more than 10% water | 5.1 | UN2880 | II | | P5 | A9.8 |
| | CALCIUM HYPOCHLORITE MIXTURES, DRY with more than 10%, but not more than 39% available chlorine | 5.1 | UN2208 | III | | P5, A1, A29, N34 | A9.8 |
| | CALCIUM MANGANESE SILICON | 4.3 | UN2844 | III | | P5, A1, A19 | A8.4 |
| | CALCIUM NITRATE | 5.1 | UN1454 | III | | P5 | A9.8 |
| | CALCIUM OXIDE | 8 | UN1910 | III | | P5 | A12.4 |
| | CALCIUM PERCHLORATE | 5.1 | UN1455 | II | | P5 | A9.8 |
| | CALCIUM PERMANGANATE | 5.1 | UN1456 | II | | P5 | A9.8 |
| | CALCIUM PEROXIDE | 5.1 | UN1457 | II | | P5 | A9.8 |
| | CALCIUM PHOSPHIDE | 4.3 | UN1360 | I | 6.1 | P3, A8, A19, N40 | A8.4 |
| | CALCIUM, PYROPHORIC or CALCIUM ALLOYS, PYROPHORIC | 4.2 | UN1855 | I | | P3 | A8.12 |
| | CALCIUM RESINATE | 4.1 | UN1313 | III | | P5, A1, A19 | A8.4 |
| | CALCIUM RESINATE, FUSED | 4.1 | UN1314 | III | | P5, A1, A19 | A8.4 |
| | <i>Calcium selenate; see SELENATES or SELENITES</i> | | | | | | |
| | CALCIUM SILICIDE | 4.3 | UN1405 | II III | | P5, A19 P5, A1, A19 | A8.4 A8.4 |
| | CAMPHOR OIL | 3 | UN1130 | III | | P5 | A7.3 |
| | CAMPHOR , synthetic | 4.1 | UN2717 | III | | P5, A1 | A8.4 |
| | <i>Cannon primers; see PRIMERS, TUBULAR</i> | | | | | | |
| | CAPROIC ACID | 8 | UN2829 | III | | P5 | A12.3 |
| | <i>Caps, blasting; see DETONATORS, etc</i> | | | | | | |
| | <i>Caps, prime; see PRIMERS, CAP TYPE</i> | | | | | | |
| | CARBAMATE PESTICIDES, LIQUID, FLAMMABLE, TOXIC , flashpoint less than 23 degrees C | 3 | UN2758 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | CARBAMATE PESTICIDES, LIQUID, TOXIC, FLAMMABLE , flashpoint not less than 23 degrees C | 6.1 | UN2991 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | CARBAMATE PESTICIDES, LIQUID, TOXIC | 6.1 | UN2992 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | CARBAMATE PESTICIDES, SOLID, TOXIC | 6.1 | UN2757 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | <i>Carbolic acid; see PHENOL, SOLID, or PHENOL, MOLTEN</i> | | | | | | |

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|--------|---|-------------------------|-----------------|-----------|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Carbolic acid solutions; see PHENOL SOLUTIONS</i> | | | | | | |
| | CARBON, ACTIVATED | 4.2 | UN1362 | III | | P5 | A8.4 |
| | <i>CARBON, animal or vegetable origin</i> | 4.2 | UN1361 | II III | | P5 P5 | A8.4 A8.4 |
| | <i>Carbon bisulphide; see CARBON DISULPHIDE</i> | | | | | | |
| | <i>Carbon black (animal or vegetable origin); see CARBON</i> | | | | | | |
| | CARBON DIOXIDE | 2.2 | UN1013 | | | P5 | A6.4, A6.5, A6.6 |
| | CARBON DIOXIDE AND NITROUS OXIDE MIXTURES | 2.2 | UN1015 | | | P5 | A6.4, A6.5 |
| | CARBON DIOXIDE AND OXYGEN MIXTURES, COMPRESSED | 2.2 | UN1014 | | 5.1 | P5 | A6.4, A6.5 |
| | CARBON DIOXIDE, REFRIGERATED LIQUID <i>(cryogenic liquid)</i> | 2.2 | UN2187 | | | P5 | A6.4, A6.12 |
| | CARBON DIOXIDE, SOLID <i>or DRY ICE</i> | 9 | UN1845 | III | | P5 | A13.9 |
| | Carbon Disulphide | | | | | FORBIDDEN | FORBIDDEN |
| | CARBON MONOXIDE, COMPRESSED | 2.3 | UN1016 | | 2.1 | P2, 4 | A6.6 |
| | CARBON MONOXIDE AND HYDROGEN MIXTURE, COMPRESSED | 2.3 | UN2600 | | 2.1 | P2, 6 | A6.6 |
| D | CARBON MONOXIDE, REFRIGERATED LIQUID <i>(cryogenic liquid)</i> | 2.3 | NA9202 | | 2.1 | P2, 4 | A6.12 |
| | CARBON TETRABROMIDE | 6.1 | UN2516 | III | | P5 | A10.6 |
| | CARBON TETRACHLORIDE | 6.1 | UN1846 | II | | P5, N36 | A10.5 |
| | <i>Carbonyl chloride; see PHOSGENE</i> | | | | | | |
| | CARBONYL FLUORIDE, COMPRESSED | 2.3 | UN2417 | | 8 | P2, 2 | A6.6 |
| | CARBONYL SULPHIDE | 2.3 | UN2204 | | 2.1 | P2, 3 | A6.5 |
| | <i>Cartridge cases, empty primed; see CASES, CARTRIDGE, EMPTY WITH PRIMER</i> | | | | | | |
| | <i>Cartridges, actuating for aircraft ejector seat catapult, fire extinguisher, canopy removal or apparatus; see CARTRIDGES, POWER DEVICE</i> | | | | | | |
| | <i>Cartridges, explosive; see CHARGES, DEMOLITION</i> | | | | | | |
| | CARTRIDGES, FLASH | 1.1G | UN0049 | II | | P4 | A5.21 |
| | CARTRIDGES, FLASH | 1.3G | UN0050 | II | | P4 | A5.21 |
| | CARTRIDGES FOR WEAPONS, BLANK | 1.1C | UN0326 | II | | P4 | A5.15 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | CARTRIDGES FOR WEAPONS, BLANK | 1.2C | UN0413 | II | | P4 | A5.15 |
| | CARTRIDGES FOR WEAPONS, BLANK; <i>or</i> CARTRIDGES, SMALL ARMS, BLANK | 1.3C | UN0327 | II | | P4 | A5.15 |
| | CARTRIDGES FOR WEAPONS, BLANK; <i>or</i> CARTRIDGES, SMALL ARMS, BLANK | 1.4C | UN0338 | II | | P5, A69 | A5.15 |
| | CARTRIDGES FOR WEAPONS, BLANK; <i>or</i> CARTRIDGES, SMALL ARMS, BLANK | 1.4S | UN0014 | II | | P5, A69 | A5.15 |
| | CARTRIDGES FOR WEAPONS, INERT PROJECTILE <i>or</i> CARTRIDGES, SMALL ARMS | 1.2C | UN0328 | II | | P4 | A5.15 |
| | CARTRIDGES FOR WEAPONS, INERT PROJECTILE <i>or</i> CARTRIDGES, SMALL ARMS | 1.4S | UN0012 | II | | P5, A69 | A5.15 |
| | CARTRIDGES FOR WEAPONS, INERT PROJECTILE <i>or</i> CARTRIDGES, SMALL ARMS | 1.4C | UN0339 | II | | P5, A69 | A5.15 |
| | CARTRIDGES FOR WEAPONS, INERT PROJECTILE <i>or</i> CARTRIDGES, SMALL ARMS | 1.3C | UN0417 | II | | P4 | A5.15 |
| | CARTRIDGES FOR WEAPONS, <i>with bursting charge</i> | 1.1F | UN0005 | II | | P4 | A5.15 |
| | CARTRIDGES FOR WEAPONS, <i>with bursting charge</i> | 1.2F | UN0007 | II | | P4 | A5.15 |
| | CARTRIDGES FOR WEAPONS, <i>with bursting charge</i> | 1.4F | UN0348 | II | | P5 | A5.15 |
| | CARTRIDGES FOR WEAPONS, <i>with bursting charge</i> | 1.4E | UN0412 | II | | P5 | A5.15 |
| | CARTRIDGES FOR WEAPONS, <i>with bursting charge</i> | 1.1E | UN0006 | II | | P4 | A5.15 |
| | CARTRIDGES FOR WEAPONS, <i>with bursting charge</i> | 1.2E | UN0321 | II | | P4 | A5.15 |
| | <i>Cartridges, illuminating; see AMMUNITION ILLUMINATING, etc</i> | | | | | | |
| | CARTRIDGES, OIL WELL | 1.3C | UN0277 | II | | P4, A69 | A5.20 |
| | CARTRIDGES, OIL WELL | 1.4C | UN0278 | II | | P5, A69 | A5.20 |
| | CARTRIDGES, POWER DEVICE | 1.3C | UN0275 | II | | P4 | A5.20 |
| | CARTRIDGES, POWER DEVICE | 1.4C | UN0276 | II | | P5, 110 | A5.20 |
| | CARTRIDGES, POWER DEVICE | 1.2C | UN0381 | II | | P4 | A5.20 |
| | CARTRIDGES, POWER DEVICE | 1.4S | UN0323 | II | | P5, 110, A69 | A5.20 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Cartridges, safety; see</i> CARTRIDGES, FOR WEAPONS, INERT PROJECTILES | | | | | | |
| | CARTRIDGES, SIGNAL | 1.3G | UN0054 | II | | P4 | A5.21 |
| | CARTRIDGES, SIGNAL | 1.4G | UN0312 | II | | P5 | A5.21 |
| | CARTRIDGES, SIGNAL | 1.4S | UN0405 | II | | P5, A69 | A5.21 |
| | CARTRIDGES, SMALL ARMS; see CARTRIDGES FOR WEAPONS, INERT PROJECTILE | | | | | | |
| | CARTRIDGES, SMALL ARMS, BLANK; see CARTRIDGES FOR WEAPONS, BLANK | | | | | | |
| | <i>Cartridges, sporting; see</i> CARTRIDGES FOR WEAPONS, etc. | | | | | | |
| | <i>Cartridges, starter, jet engine; see</i> CARTRIDGES, POWER DEVICE | | | | | | |
| | CASES, CARTRIDGE, EMPTY WITH PRIMER | 1.4S | UN0055 | II | | P5, A69 | A5.22 |
| | CASES, CARTRIDGE, EMPTY WITH PRIMER | 1.4C | UN0379 | II | | P5, A69 | A5.22 |
| | CASES, COMBUSTIBLE, EMPTY WITHOUT PRIMER | 1.3C | UN0447 | II | | P4 | A5.22 |
| | CASES, COMBUSTIBLE, EMPTY WITHOUT PRIMER | 1.4C | UN0446 | II | | P5 | A5.22 |
| | <i>Casinghead gasoline; see</i> GASOLINE | | | | | | |
| | CASTOR BEANS or CASTOR MEAL or CASTER POMACE or CASTOR FLAKE | 9 | UN2969 | II | | P5 | A13.3 |
| * | CAUSTIC ALKALI LIQUIDS, N.O.S. | 8 | UN1719 | II III | | P4 P5 | A12.3 A12.3 |
| | <i>Caustic potash; see</i> POTASSIUM HYDROXIDE SOLUTION, etc | | | | | | |
| | <i>Caustic soda liquor; see</i> SODIUM HYDROXIDE, etc | | | | | | |
| | CELLS, CONTAINING SODIUM | 4.3 | UN3292 | II | | P4 | A8.19 |
| | CELLULOID, in blocks, rods, rolls, sheets, tubes, etc. except scrap | 4.1 | UN2000 | III | | P5 | A8.4 |
| | CELLULOID, SCRAP | 4.2 | UN2002 | III | | P5 | A8.4 |
| | <i>Cement, see</i> ADHESIVES containing flammable liquid | | | | | | |
| | CERIUM, slabs, ingots, or rods | 4.1 | UN1333 | II | | P5, N34 | A8.4 |
| | CERIUM, turnings or gritty powder | 4.3 | UN3078 | II | | P5, A1 | A8.4 |
| | CESIUM; see CAESIUM | 4.3 | UN1407 | I | | P3, A19, N34, N40 | A8.4 |
| | CESIUM NITRATE or CAESIUM NITRATE | 5.1 | UN1451 | III | | P5, A1, A29 | A9.8 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| D | CHARCOAL <i>briquettes, shell, screenings, wood, etc.</i> | 4.2 | NA1361 | III | | P5 | A8.4 |
| | CHARGES, BURSTING, PLASTICS BONDED | 1.1D | UN0457 | II | | P4 | A5.15 |
| | CHARGES, BURSTING, PLASTICS BONDED | 1.2D | UN0458 | II | | P4 | A5.15 |
| | CHARGES, BURSTING, PLASTICS BONDED | 1.4D | UN0459 | II | | P5 | A5.15 |
| | CHARGES, BURSTING, PLASTICS BONDED | 1.4S | UN0460 | II | | P5, A69 | A5.15 |
| | CHARGES, DEMOLITION | 1.1D | UN0048 | II | | P4, A69 | A5.15 |
| | CHARGES, DEPTH | 1.1D | UN0056 | II | | P4 | A5.15 |
| | <i>Charges, expelling, explosive, for fire extinguishers; see CARTRIDGES, POWER DEVICE</i> | | | | | | |
| | CHARGES, EXPLOSIVE, COMMERCIAL <i>without detonator</i> | 1.1D | UN0442 | II | | P4, A69 | A5.23 |
| | CHARGES, EXPLOSIVE, COMMERCIAL <i>without detonator</i> | 1.2D | UN0443 | II | | P4, A69 | A5.23 |
| | CHARGES, EXPLOSIVE, COMMERCIAL <i>without detonator</i> | 1.4D | UN0444 | II | | P5, A69 | A5.23 |
| | CHARGES, EXPLOSIVE, COMMERCIAL <i>without detonator</i> | 1.4S | UN0445 | II | | P5, A69 | A5.23 |
| | CHARGES, PROPELLING | 1.1C | UN0271 | II | | P4 | A5.29 |
| | CHARGES, PROPELLING | 1.3C | UN0272 | II | | P4 | A5.29 |
| | CHARGES, PROPELLING | 1.2C | UN0415 | II | | P4 | A5.29 |
| | CHARGES, PROPELLING | 1.4C | UN0491 | II | | P5 | A5.29 |
| | CHARGES, PROPELLING, FOR CANNON | 1.2C | UN0414 | II | | P4 | A5.15 |
| | CHARGES, PROPELLING, FOR CANNON | 1.3C | UN0242 | II | | P4 | A5.15 |
| | CHARGES, PROPELLING, FOR CANNON | 1.1C | UN0279 | II | | P4 | A5.15 |
| | CHARGES, SHAPED, <i>without detonator</i> | 1.1D | UN0059 | II | | P4 | A5.23 |
| | CHARGES, SHAPED, <i>without detonator</i> | 1.2D | UN0439 | II | | P4 | A5.23 |
| | CHARGES, SHAPED, <i>without detonator</i> | 1.4D | UN0440 | II | | P5 | A5.23 |
| | CHARGES, SHAPED, COMMERCIAL <i>without detonator</i> | 1.4S | UN0441 | II | | P5, A69 | A5.23 |
| | CHARGES, SHAPED, FLEXIBLE, LINEAR | 1.4D | UN0237 | II | | P5, A69 | A5.24 |
| | CHARGES, SHAPED, FLEXIBLE, LINEAR | 1.1D | UN0288 | II | | P4, 101, A69 | A5.24 |
| | CHARGES, SUPPLEMENTARY, EXPLOSIVE | 1.1D | UN0060 | II | | P4 | A5.18 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | CHEMICAL KITS | 8 | NA1760 | II | | P5 | A12.7 |
| | CHEMICAL KITS or FIRST AID KITS | 9 | UN3316 | | | | A13.17 |
| | CHLORAL, ANHYDROUS, STABILIZED | 6.1 | UN2075 | II | | P5 | A10.6 |
| | CHLORATE AND BORATE MIXTURES | 5.1 | UN1458 | II III | | P5, A9, N34 P5, A9, N34 | A9.8 A9.8 |
| | CHLORATE AND MAGNESIUM CHLORIDE MIXTURES | 5.1 | UN1459 | II III | | P5, A9, N34 P5, A9, N34 | A9.8 A9.8 |
| | CHLORATES, INORGANIC, AQUEOUS SOLUTION, N.O.S. | 5.1 | UN3210 | II | | P5 | A9.7 |
| | CHLORATES, INORGANIC, N.O.S. | 5.1 | UN1461 | II | | P5, A9, N34 | A9.8 |
| | CHLORIC ACID AQUEOUS SOLUTION, with not more than 10% chloric acid | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Chloride of phosphorous; see PHOSPHORUS TRICHLORIDE</i> | | | | | | |
| | <i>Chloride of sulphur; see SULPHUR CHLORIDE</i> | | | | | | |
| | <i>Chlorinated lime; see CALCIUM HYPOCHLORITE MIXTURES, etc</i> | | | | | | |
| | CHLORINE | 2.3 | UN1017 | | 8 | P2, 2 | A6.5 |
| | <i>Chlorine azide</i> | | | | | FORBIDDEN | FORBIDDEN |
| D | <i>Chlorine dioxide hydrate, frozen</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Chlorine dioxide (not hydrate)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | CHLORINE PENTAFLUORIDE | 2.3 | UN2548 | | 5.1, 8 | P1, 1 | A6.5 |
| | CHLORINE TRIFLUORIDE | 2.3 | UN1749 | | 5.1, 8 | P2, 2 | A6.5 |
| | CHLORITE SOLUTION with not less than 16% available chlorine | 8 | UN1908 | II III | | P5, A3, A6, A7, N34 P5, A3, A6, A7, N34 | A12.3 A12.3 |
| | CHLORITES, INORGANIC, N.O.S. | 5.1 | UN1462 | II | | P5, A7, N34 | A9.8 |
| | CHLOROACETIC ACID, SOLID | 6.1 | UN1751 | II | 8 | P5, A3, A7, N34 | A10.6 |
| | CHLOROACETIC ACID, SOLUTION | 6.1 | UN1750 | II | 8 | P4, A7, N34 | A10.5 |
| | CHLOROACETONE, STABILIZED | 6.1 | UN1695 | I | 3, 8 | P5, 2, N12, N32, N34 | A10.7 |
| | <i>Chloroacetone (unstabilized)</i> | | | | | FORBIDDEN | FORBIDDEN |
| + | CHLOROACETONITRILE | 6.1 | UN2668 | II | 3 | P2, 2 | A10.7 |
| | CHLOROACETOPHENONE, (CN), liquid | 6.1 | UN1697 | II | | P5, A3, N12, N32, N33 | A10.5 |
| | CHLOROACETOPHENONE, (CN), solid | 6.1 | UN1697 | II | | P5, A3, N12, N32, N33, N34 | A10.6 |
| | CHLOROACETYL CHLORIDE | 6.1 | UN1752 | I | 8 | P2, 2, A3, A6, A7, N34, N43 | A12.12 |
| | CHLOROANILINES, LIQUID | 6.1 | UN2019 | II | | P5 | A10.5 |
| | CHLOROANILINES, SOLID | 6.1 | UN2018 | II | | P5 | A10.6 |
| | CHLOROANISIDINES | 6.1 | UN2233 | III | | P5 | A10.6 |
| | CHLOROBENZENE | 3 | UN1134 | III | | P5 | A7.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Chlorobenzol</i> ; see CHLORO BENZENE | | | | | | |
| | CHLORO BENZOTRIFLUORIDES | 3 | UN2234 | III | | P5 | A7.3 |
| | CHLORO BENZYL CHLORIDES | 6.1 | UN2235 | III | | P5 | A10.5 |
| | 1-CHLORO-3-BROMOPROPANE | 6.1 | UN2688 | III | | P5 | A10.5 |
| | CHLORO BUTANES | 3 | UN1127 | II | | P5 | A7.3 |
| | CHLORO CRESOLS, liquid | 6.1 | UN2669 | II | | P5 | A10.5 |
| | CHLORO CRESOLS, solid | 6.1 | UN2669 | II | | P5 | A10.6 |
| | <i>3-Chloro-4-diethylaminobenzenediazonium zinc chloride</i> ; see SELF-REACTIVE SOLID TYPE D | | | | | | |
| | CHLORO DIFLUORO BROMOMETHANE or REFRIGERANT GAS R12B1 | 2.2 | UN1974 | | | P5 | A6.4, A6.5 |
| | 1-CHLORO-1, 1-DIFLUOROETHANES or REFRIGERANT GAS R142B | 2.1 | UN2517 | | | P4 | A6.4, A6.5 |
| | CHLORO DIFLUOROMETHANE or REFRIGERANT GAS R22 | 2.2 | UN1018 | | | P5 | A6.4, A6.5 |
| | CHLORO DIFLUOROMETHANE AND CHLORO PENTAFLUROETHANE MIXTURE or REFRIGERANT GAS 502 <i>with fixed boiling point, with approximately 49% chlorodifluoromethane</i> | 2.2 | UN1973 | | | P5 | A6.4, A6.5 |
| + | CHLORO DINITRO BENZENES, LIQUID | 6.1 | UN1577 | II | | P5 | A10.6 |
| + | CHLORO DINITRO BENZENES, SOLID | 6.1 | UN1577 | II | | P5 | A10.6 |
| | <i>Chloroethane</i> ; see ETHYL CHLORIDE | | | | | | |
| | 2-CHLOROETHANAL | 6.1 | UN2232 | I | | P2, 2 | A10.7 |
| | CHLOROFORM | 6.1 | UN1888 | III | | P5, N36 | A10.5 |
| * | CHLOROFORMATES, TOXIC, CORROSIVE, FLAMMABLE, N.O.S. | 6.1 | UN2742 | II | 8, 3 | P2, 5 | A10.5 |
| * | CHLOROFORMATES, TOXIC, CORROSIVE, N.O.S. | 6.1 | UN3277 | II | 8 | P3 | A10.5 |
| | <i>Chloromethane</i> ; see METHYL CHLORIDE | | | | | | |
| | <i>1-Chloro-3-methylbutane</i> ; see AMYL CHLORIDE | | | | | | |
| | <i>2-Chloro-2-methylbutane</i> ; see AMYL CHLORIDE | | | | | | |
| | CHLORO METHYL CHLOROFORMATE | 6.1 | UN2745 | II | 8 | P4 | A10.5 |
| | CHLORO METHYL ETHYL ETHER | 3 | UN2354 | II | 6.1 | P4 | A7.3 |
| | 3-CHLORO-4-METHYLPHENYL ISOCYANATE | 6.1 | UN2236 | II | | P5 | A10.5 |
| | <i>1-Chloro-2-methylpropane</i> ; see CHLORO BUTANES | | | | | | |

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| | 2 Chloro-2-methylpropane; see CHLOROBUTANES | | | | | | |
| | CHLORONITROANILINES | 6.1 | UN2237 | III | | P5 | A10.6 |
| + | CHLORONITROBENZENES, ortho, liquid | 6.1 | UN1578 | II | | P4 | A10.5 |
| + | CHLORONITROBENZENES, meta or para, solid | 6.1 | UN1578 | II | | P5 | A10.6 |
| | CHLORONITROTOLUENES, liquid | 6.1 | UN2433 | III | | P5 | A10.5 |
| | CHLORONITROTOLUENES, solid | 6.1 | UN2433 | III | | P5 | A10.6 |
| | CHLOROPENTAFLUOROETHANE or REFRIGERANT GAS R115 | 2.2 | UN1020 | | | P5 | A6.4, A6.5 |
| | CHLOROPHENOLATES, LIQUID, or PHENOLATES, LIQUID | 8 | UN2904 | III | | P5 | A12.3 |
| | CHLOROPHENOLATES, SOLID or PHENOLATES SOLID | 8 | UN2905 | III | | P5 | A12.4 |
| | CHLOROPHENOLS, LIQUID | 6.1 | UN2021 | III | | P5 | A10.5 |
| | CHLOROPHENOLS, SOLID | 6.1 | UN2020 | III | | P5 | A10.6 |
| | CHLOROPHENYLTRICHLOROSILAN E | 8 | UN1753 | II | | P4, A7, N34 | A12.3 |
| + | CHLOROPICRIN | 6.1 | UN1580 | I | | P2, 2 | A10.7 |
| | CHLOROPICRIN AND METHYL BROMIDE MIXTURES | 2.3 | UN1581 | | | P2, 2 | A6.17 |
| | CHLOROPICRIN AND METHYL CHLORIDE MIXTURES | 2.3 | UN1582 | | | P2, 2 | A6.17 |
| | <i>Chloropicrin mixture, flammable (pressure not exceeding 14.7 psia at 115 degrees F flashpoint below 100 degrees F); see TOXIC LIQUIDS, FLAMMABLE, etc</i> | | | | | | |
| | CHLOROPICRIN MIXTURES, N.O.S. | 6.1 | UN1583 | I II III | | P2, 5 P3 P5 | A10.5 A10.5 A10.5 |
| D | CHLOROPIVALOYL CHLORIDE | 6.1 | NA9263 | I | 8 | P2, 2 | A10.7 |
| | CHLOROPLATINIC ACID, SOLID | 8 | UN2507 | III | | P5 | A12.4 |
| | CHLOROPRENE, STABILIZED | 3 | UN1991 | I | 6.1 | P3 | A7.3 |
| | <i>Chloroprene, unstabilized</i> | | | | | FORBIDDEN | FORBIDDEN |
| | 2-CHLOROPROPANE | 3 | UN2356 | I | | P3, N36 | A7.3 |
| | 3-CHLOROPROPANOL-1 | 6.1 | UN2849 | III | | P5 | A10.5 |
| | 2-CHLOROPROPENE | 3 | UN2456 | I | | P3, A3, N36 | A7.3 |
| | 2-CHLOROPROPIONIC ACID, LIQUID | 8 | UN2511 | III | | P5 | A12.3 |
| | 2-CHLOROPROPIONIC ACID, SOLID | 8 | UN2511 | III | | P5 | A12.4 |
| | 2-CHLOROPYRIDINE | 6.1 | UN2822 | II | | P5 | A10.5 |
| | CHLOROSILANES, CORROSIVE N.O.S. | 8 | UN2987 | II | | P4 | A12.3 |
| | CHLOROSILANES, CORROSIVE, FLAMMABLE, N.O.S. | 3 | UN2985 | II | 8 | P4 | A7.3 |

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|--------|--|-------------------------|-----------------|-----------|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | CHLOROSILANES, FLAMMABLE, CORROSIVE, N.O.S. | 8 | UN2986 | II | 3 | P4 | A12.3 |
| | CHLOROSILANES, WATER- REACTIVE, FLAMMABLE, CORROSIVE, N.O.S. | 4.3 | UN2988 | I | 3, 8 | P3, A2 | A8.3 |
| + | CHLOROSULPHONIC ACID (<i>with or without sulphur trioxide</i>) | 8 | UN1754 | I | 6.1 | P2, 2, A3, A6, A10 | A12.12 |
| | 1-CHLORO-1,2,2,2- TETRAFLUOROETHANE <i>or</i> REFRIGERANT GAS R124 | 2.2 | UN1021 | | | P5 | A6.4, A6.5 |
| | CHLOROTOLUENES | 3 | UN2238 | III | | P5 | A7.3 |
| | 4-CHLORO-O-TOLUIDINE HYDROCHLORIDE | 6.1 | UN1579 | III | | P5 | A10.6 |
| | CHLOROTOLUIDINES, <i>liquid or solid</i> | 6.1 | UN2239 | III | | P5 | A10.5, A10.6 |
| | 1-CHLORO-2,2,2-TRIFLUOROETHANE <i>or</i> REFRIGERANT GAS R133A | 2.2 | UN1983 | | | P5 | A6.4, A6.5 |
| | CHLOROTRIFLUOROMETHANE <i>or</i> REFRIGERANT GAS R13 | 2.2 | UN1022 | | | P5 | A6.4, A6.5 |
| | CHLOROTRIFLUOROMETHANE AND TRIFLUOROMETHANE AZEOTROPIC MIXTURE (R503) <i>with approximately 60% Chlorotrifluoromethane</i> | 2.2 | UN2599 | | | P5 | A6.4, A6.5 |
| D | CHROMIC ACID, SOLID | 5.1 | NA1463 | II | 8 | P5 | A9.8 |
| | CHROMIC ACID, SOLUTION | 8 | UN1755 | II III | | P5 P5 | A12.3 A12.3 |
| | CHROMIC FLUORIDE, SOLID | 8 | UN1756 | II | | P5 | A12.4 |
| | CHROMIC FLUORIDE, SOLUTION | 8 | UN1757 | II III | | P5 P5 | A12.3 A12.3 |
| | CHROMIUM NITRATE | 5.1 | UN2720 | III | | P5, A1, A29 | A9.8 |
| | CHROMIUM OXYCHLORIDE | 8 | UN1758 | I | | P3, A3, A6, A7, N34 | A12.3 |
| | CHROMIUM TRIOXIDE, ANHYDROUS | 5.1 | UN1463 | II | 8 | P5 | A9.8 |
| | CHROMOSULFURIC ACID | 8 | UN2240 | I | | P3, A3, A6, A7, N34 | A12.3 |
| | <i>Chromyl chloride; see CHROMIUM OXYCHLORIDE</i> | | | | | | |
| | <i>Cigar and cigarette lighters, charged with fuel, see LIGHTERS FOR CIGARS, CIGARETTES, etc</i> | | | | | | |
| | <i>Cleaning fluid or liquid; see FLAMMABLE LIQUIDS, etc</i> | | | | | | |
| | <i>Coal briquettes, hot</i> | | | | | FORBIDDEN | FORBIDDEN |
| | COAL GAS, COMPRESSED | 2.3 | UN1023 | | 2.1 | P2, 3 | A6.6 |
| | COAL TAR DISTILLATES, FLAMMABLE | 3 | UN1136 | II III | | P5 P5 | A7.3 A7.3 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|------------------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Coal tar dye, corrosive liquid, n.o.s.; see DYES, LIQUID or SOLID N.O.S. or DYE INTERMEDIATES, LIQUID or SOLID N.O.S.</i> | | | | | | |
| | COATING SOLUTION (includes surface treatments or coatings used for industrial or other purposes such as vehicle undercoating, drum or barrel lining) | 3 | UN1139 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | COBALT NAPHTHENATES, POWDER | 4.1 | UN2001 | III | | P5, A19 | A8.4 |
| | COBALT RESINATE, PRECIPITATED | 4.1 | UN1318 | III | | P5, A1, A19 | A8.4 |
| | <i>Coke, hot</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | COMPONENTS, EXPLOSIVE TRAIN, N.O.S. | 1.1B | UN0461 | II | | P4, 101 | A5.6 |
| * | COMPONENTS, EXPLOSIVE TRAIN, N.O.S. | 1.2B | UN0382 | II | | P4, 101 | A5.6 |
| * | COMPONENTS, EXPLOSIVE TRAIN, N.O.S. | 1.4B | UN0383 | II | | P5, 101 | A5.6 |
| * | COMPONENTS, EXPLOSIVE TRAIN, N.O.S. | 1.4S | UN0384 | II | | P5, 101, A69 | A5.6 |
| * | COMPOUNDS, CLEANING LIQUID | 8 | NA1760 | I II III | | P3, A7 P5, N37 P5, N37 | A12.3 A12.3 A12.3 |
| * | COMPOUNDS, CLEANING LIQUID | 3 | NA1993 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | <i>Compounds, enamel; see PAINT, etc</i> | | | | | | |
| * | COMPOUNDS, TREE KILLING, LIQUID or COMPOUNDS WEED KILLING, LIQUID | 8 | NA1760 | I II III | | P3, A7 P5, N37 P5, N37 | A12.3 A12.3 A12.3 |
| * | COMPOUNDS, TREE KILLING LIQUID or COMPOUNDS, WEED KILLING, LIQUID | 3 | NA1993 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| * | COMPOUNDS, TREE KILLING LIQUID or COMPOUNDS, WEED KILLING, LIQUID | 6.1 | NA2810 | I II III | | P3 P5 P5 | A10.5 A10.5 A10.5 |
| * | COMPRESSED GAS, N.O.S. | 2.2 | UN1956 | | | P5 | A6.4, A6.5, A6.6 |
| * | COMPRESSED GAS, FLAMMABLE, N.O.S. | 2.1 | UN1954 | | | P4 | A6.4, A6.6 |
| * | COMPRESSED GAS, OXIDIZING, N.O.S. | 2.2 | UN3156 | | 5.1 | P5 | A6.4, A6.6 |
| * | COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S. Inhalation Hazard Zone A | 2.3 | UN3304 | | 8 | P1, 1 | A16.6 |

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|--------|---|-------------------------|-----------------|-----|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S. <i>Inhalation Hazard Zone B</i> | 2.3 | UN3304 | | 8 | P2, 2 | A6.5, A6.6 |
| * | COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S. <i>Inhalation Hazard Zone C</i> | 2.3 | UN3304 | | 8 | P2, 3 | A6.5, A6.6 |
| * | COMPRESSED GAS, TOXIC, CORROSIVE, N.O.S. <i>Inhalation Hazard Zone D</i> | 2.3 | UN3304 | | 8 | P2, 4 | A6.5, A6.6 |
| * | COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S. <i>Inhalation Hazard Zone A</i> | 2.3 | UN3305 | | 2.1, 8 | P1, 1 | A6.16 |
| * | COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S. <i>Inhalation Hazard Zone B</i> | 2.3 | UN3305 | | 2.1, 8 | P2, 2 | A6.5, A6.6 |
| * | COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S. <i>Inhalation Hazard Zone C</i> | 2.3 | UN3305 | | 2.1, 8 | P2, 3 | A6.5, A6.6 |
| * | COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S. <i>Inhalation Hazard Zone D</i> | 2.3 | UN3305 | | 2.1, 8 | P2, 4 | A6.5, A6.6 |
| * | COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S., <i>Inhalation Hazard Zone A</i> | 2.3 | UN1953 | | 2.1 | P1, 1 | A6.16 |
| * | COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S., <i>Inhalation Hazard Zone B</i> | 2.3 | UN1953 | | 2.1 | P2, 2 | A6.5, A6.6 |
| * | COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S., <i>Inhalation Hazard Zone C</i> | 2.3 | UN1953 | | 2.1 | P2, 3 | A6.5, A6.6 |
| * | COMPRESSED GAS, TOXIC, FLAMMABLE N.O.S., <i>Inhalation Hazard Zone D</i> | 2.3 | UN1953 | | 2.1 | P2, 4 | A6.5, A6.6 |
| * | COMPRESSED GAS, TOXIC, N.O.S., <i>Inhalation Hazard Zone A</i> | 2.3 | UN1955 | | | P1, 1 | A6.16 |
| * | COMPRESSED GAS, TOXIC, N.O.S., <i>Inhalation Hazard Zone B</i> | 2.3 | UN1955 | | | P2, 2 | A6.5, A6.6 |
| * | COMPRESSED GAS, TOXIC, N.O.S., <i>Inhalation Hazard Zone C</i> | 2.3 | UN1955 | | | P2, 3 | A6.5, A6.6 |
| * | COMPRESSED, GAS, TOXIC, N.O.S., <i>Inhalation Hazard Zone D</i> | 2.3 | UN1955 | | | P2, 4 | A6.5, A6.6 |
| * | COMPRESSED, GAS, TOXIC, OXIDING, CORROSIVE, N.O.S. <i>Inhalation Hazard Zone A</i> | 2.3 | UN3306 | | 5.1, 8 | P1, 1 | A6.16 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | COMPRESSED, GAS, TOXIC, OXIDING, CORROSIVE, N.O.S. <i>Inhalation Hazard Zone B</i> | 2.3 | UN3306 | | 5.1, 8 | P2, 2 | A6.5, A6.6 |
| * | COMPRESSED, GAS, TOXIC, OXIDING, CORROSIVE, N.O.S. <i>Inhalation Hazard Zone C</i> | 2.3 | UN3306 | | 5.1, 8 | P2, 3 | A6.5, A6.6 |
| * | COMPRESSED, GAS, TOXIC, OXIDING, CORROSIVE, N.O.S. <i>Inhalation Hazard Zone D</i> | 2.3 | UN3306 | | 5.1, 8 | P2, 4 | A6.5, A6.6 |
| * | COMPRESSED, GAS, TOXIC, OXIDING, N.O.S. <i>Inhalation Hazard Zone A</i> | 2.3 | UN3303 | | 5.1 | P1, 1 | A6.16 |
| * | COMPRESSED, GAS, TOXIC, OXIDING, N.O.S. <i>Inhalation Hazard Zone B</i> | 2.3 | UN3303 | | 5.1 | P2, 2 | A6.5 |
| * | COMPRESSED, GAS, TOXIC, OXIDING, N.O.S. <i>Inhalation Hazard Zone C</i> | 2.3 | UN3303 | | 5.1 | P2, 3 | A6.5 |
| * | COMPRESSED, GAS, TOXIC, OXIDING, N.O.S. <i>Inhalation Hazard Zone D</i> | 2.3 | UN3303 | | 5.1 | P2, 4 | A6.5 |
| | CONSUMER COMMODITY | 9 | ID8000 | | | P5 | A13.4, A13.13 |
| | CONTRIVANCES, WATER- ACTIVATED, with burster, expelling charge or propelling charge | 1.2L | UN0248 | II | | P3, 101 | A5.30 |
| | CONTRIVANCES, WATER- ACTIVATED, with burster, expelling charge or propelling charge | 1.3L | UN0249 | II | | P3, 101 | A5.30 |
| | COPPER ACETOARSENITE | 6.1 | UN1585 | II | | P5 | A10.6 |
| | <i>Copper acetylde</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Copper amine azide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | COPPER ARSENITE | 6.1 | UN1586 | II | | P5 | A10.6 |
| | COPPER BASED PESTICIDES, LIQUID, FLAMMABLE, TOXIC, flashpoint less than 23 degrees C | 3 | UN2776 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | COPPER BASED PESTICIDES, LIQUID, TOXIC, FLAMMABLE, flashpoint not less than 23 degrees C | 6.1 | UN3009 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | COPPER BASED PESTICIDES, LIQUID, TOXIC | 6.1 | UN3010 | I II III | | P3 P5 P5 | A10.5 A10.5 A10.5 |
| | COPPER BASED PESTICIDES, SOLID, TOXIC | 6.1 | UN2775 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | COPPER CHLORATE | 5.1 | UN2721 | II | | P5, A1 | A9.8 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | COPPER CHLORIDE | 8 | UN2802 | III | | P5 | A12.4 |
| | COPPER CYANIDE | 6.1 | UN1587 | II | | P5 | A10.6 |
| | COPPER SELENATE; see SELENATES | | | | | | |
| | COPPER SELENITE; see SELENITES | | | | | | |
| | <i>Copper tetramine nitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Copra</i> | | | | | FORBIDDEN | FORBIDDEN |
| | CORD, DETONATING, flexible | 1.1D | UN0065 | II | | P4, 102, A69 | A5.25 |
| | CORD, DETONATING, flexible | 1.4D | UN0289 | II | | P5, A69 | A5.25 |
| | CORD, DETONATING or FUSE, DETONATING, metal clad | 1.2D | UN0102 | II | | P4, A69 | A5.25 |
| | CORD, DETONATING or FUSE, DETONATING, metal clad | 1.1D | UN0290 | II | | P4, A69 | A5.25 |
| | CORD, DETONATING, MILD EFFECT or FUSE, DETONATING, MILD EFFECT, metal clad | 1.4D | UN0104 | II | | P5, A69 | A5.25 |
| | CORD, IGNITER | 1.4G | UN0066 | II | | P5, A69 | A5.26 |
| | <i>Cordite, see POWDER, SMOKELESS</i> | | | | | | |
| | <i>Corrosive battery fluid; see BATTERY FLUID, ACID or BATTERY FLUID, ALKALI</i> | | | | | | |
| * | CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. | 8 | UN3264 | I II III | | P3 P4 P5 | A12.3 A12.3 A12.3 |
| * | CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. | 8 | UN3265 | I II III | | P3 P4 P5 | A12.3 A12.3 A12.3 |
| * | CORROSIVE LIQUID, BASIC, INORGANIC, N.O.S. | 8 | UN3266 | I II III | | P3 P4 P5 | A12.3 A12.3 A12.3 |
| * | CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S. | 8 | UN3267 | I II III | | P3 P4 P5 | A12.3 A12.3 A12.3 |
| * | CORROSIVE LIQUID, FLAMMABLE, N.O.S. | 8 | UN2920 | I II | 3 3 | P3 P4 | A12.3 A12.3 |
| * | CORROSIVE LIQUID, SELF-HEATING, N.O.S. | 8 | UN3301 | I II | 4.2 4.2 | P3 P4 | A12.3 A12.3 |
| * | CORROSIVE LIQUID, N.O.S. | 8 | UN1760 | I II III | | P3, A7 P4 P5 | A12.3 A12.3 A12.3 |
| * | CORROSIVE LIQUID, OXIDIZING, N.O.S. | 8 | UN3093 | I II | 5.1 5.1 | P3 P4 | A12.3 A12.3 |
| * | CORROSIVE LIQUID, TOXIC N.O.S. | 8 | UN2922 | I II III | 6.1 6.1 6.1 | P3, A7 P4 P5 | A12.3 A12.3 A12.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | CORROSIVE LIQUID, WATER- REACTIVE, N.O.S. | 8 | UN3094 | I II | 4.3 4.3 | P3 P4 | A12.3 A12.3 |
| * | CORROSIVE SOLID, ACIDIC, INORGANIC, N.O.S. | 8 | UN3260 | I II III | | P5 P5 P5 | A12.4 A12.4 A12.4 |
| * | CORROSIVE SOLID, ACIDIC, ORGANIC, N.O.S. | 8 | UN3261 | I II III | | P5 P5 P5 | A12.4 A12.4 A12.4 |
| * | CORROSIVE SOLID, BASIC, INORGANIC, N.O.S | 8 | UN3262 | I II III | | P5 P5 P5 | A12.4 A12.4 A12.4 |
| * | CORROSIVE SOLID, BASIC, ORGANIC, N.O.S | 8 | UN3263 | I II III | | P5 P5 P5 | A12.4 A12.4 A12.4 |
| * | CORROSIVE SOLID, FLAMMABLE, N.O.S. | 8 | UN2921 | I II | 4.1 4.1 | P3 P4 | A12.4 A12.4 |
| * | CORROSIVE SOLID, N.O.S. | 8 | UN1759 | I II III | | P5 P5 P5 | A12.4 A12.4 A12.4 |
| * | CORROSIVE SOLID, OXIDIZING, N.O.S. | 8 | UN3084 | I II | 5.1 5.1 | P5 P5 | A12.4 A12.4 |
| * | CORROSIVE SOLID, TOXIC N.O.S. | 8 | UN2923 | I II III | 6.1 6.1 6.1 | P5 P5 P5 | A12.4 A12.4 A12.4 |
| * | CORROSIVE SOLID, SELF-HEATING, N.O.S. | 8 | UN3095 | I II | 4.2 4.2 | P5 P5 | A12.4 A12.4 |
| * | CORROSIVE SOLIDS, WATER- REACTIVE, N.O.S. | 8 | UN3096 | I II | 4.3 4.3 | P3 P4 | A12.4 A12.4 |
| | COTTON WASTE, OILY | 4.2 | UN1364 | III | | P5 | A8.4 |
| | <i>Cotton Wet</i> | | | | | FORBIDDEN | FORBIDDEN |
| | COUMARIN DERIVATIVE PESTICIDES, LIQUID, FLAMMABLE, TOXIC, flashpoint not less than 23 degrees C | 3 | UN3024 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | COUMARIN DERIVATIVE PESTICIDES, LIQUID, TOXIC, FLAMMABLE, flashpoint less than 23 degrees C | 6.1 | UN3025 | I II III | 3 3 3 | P3 P5 P5 | A10.5 A10.5 A10.5 |
| | COUMARIN DERIVATIVE PESTICIDES, LIQUID, TOXIC | 6.1 | UN3026 | I II III | | P3 P5 P5 | A10.5 A10.5 A10.5 |
| | COUMARIN DERIVATIVE PESTICIDES, SOLID, TOXIC | 6.1 | UN3027 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | CRESOLS, LIQUID (o-, m-, p-) | 6.1 | UN2076 | II | 8 | P5 | A10.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | CRESOLS, SOLID (o-, m-, p-) | 6.1 | UN2076 | II | 8 | P5 | A10.5 |
| | CRESYLIC ACID | 6.1 | UN2022 | II | 8 | P5 | A10.5 |
| | CROTONALDEHYDE, STABILIZED | 6.1 | UN1143 | I | 3 | P2, 2 | A10.7 |
| | CROTONIC ACID, liquid or solid | 8 | UN2823 | III | | P5 | A12.3, A12.4 |
| | CROTONYLENE | 3 | UN1144 | I | | P3 | A7.3 |
| | CUPRIETHYLENEDIAMINE SOLUTION | 8 | UN1761 | II III | 6.1 6.1 | P4 P5 | A12.3 A12.3 |
| | CUTTERS, CABLE, EXPLOSIVE | 1.4S | UN0070 | II | | P5, A69 | A5.20 |
| | <i>Cyanide or cyanide mixtures, dry; see</i> CYANIDES, INORGANIC, SOLID N.O.S. | | | | | | |
| | CYANIDES, INORGANIC, SOLID N.O.S. | 6.1 | UN1588 | I II III | | P5, N74, N75 P5, N74, N75 | A10.6 A10.6 A10.6 |
| | CYANIDE SOLUTIONS, N.O.S. | 6.1 | UN1935 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | CYANOGEN BROMIDE | 6.1 | UN1889 | I | 8 | P3, A6, A8 | A10.6 |
| | CYANOGEN CHLORIDE, STABILIZED | 2.3 | UN1589 | | 8 | P1, 1 | A6.16 |
| | <i>Cyanogen Chloride, unstabilized</i> | | | | | FORBIDDEN | FORBIDDEN |
| | CYANOGEN | 2.3 | UN1026 | | 2.1 | P2, 2 | A6.16 |
| | CYANURIC CHLORIDE | 8 | UN2670 | II | | P5 | A12.4 |
| | <i>Cyanuric triazide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | CYCLOBUTANE | 2.1 | UN2601 | | | P4 | A6.4, A6.5 |
| | CYCLOBUTYL CHLOROFORMATE | 6.1 | UN2744 | II | 3, 8 | P4 | A10.5 |
| | 1,5,9-CYCLODODECATRIENE | 6.1 | UN2518 | III | | P5 | A10.5 |
| | CYCLOHEPTANE | 3 | UN2241 | II | | P5 | A7.3 |
| | CYCLOHEPTATRIENE | 3 | UN2603 | II | 6.1 | P5 | A7.3 |
| | CYCLOHEPTENE | 3 | UN2242 | II | | P5 | A7.3 |
| | CYCLOHEXANE | 3 | UN1145 | II | | P5 | A7.3 |
| | CYCLOHEXANONE | 3 | UN1915 | III | | P5 | A7.3 |
| | CYCLOHEXENE | 3 | UN2256 | II | | P5 | A7.3 |
| | CYCLOHEXENYLTRICHLOROSILAN E | 8 | UN1762 | II | | P4, A7, N34 | A12.3 |
| | CYCLOHEXYL ACETATE | 3 | UN2243 | III | | P5 | A7.3 |
| | CYCLOHEXYLAMINE | 8 | UN2357 | II | 3 | P5 | A12.3 |
| | CYCLOHEXYL ISOCYANATE | 6.1 | UN2488 | I | 3 | P2, 2 | A10.7 |
| | CYCLOHEXYL MERCAPTAN | 3 | UN3054 | III | | P5 | A7.3 |
| | CYCLOHEXYLTRICHLOROSILANE | 8 | UN1763 | II | | P4, A7, N34 | A12.3 |
| | CYCLOOCTADIENE PHOSPHINES; see 9-PHOSPHABICYCLONONANES | | | | | | |
| | CYCLOOCTADIENES | 3 | UN2520 | III | | P5 | A7.3 |
| | CYCLOOCTATETRAENE | 3 | UN2358 | II | | P5 | A7.3 |
| | CYCLOPENTANE | 3 | UN1146 | II | | P5 | A7.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Cyclopentane, methyl; see</i> METHYLCYCLOPENTANE | | | | | | |
| | CYCLOPENTANOL | 3 | UN2244 | III | | P5 | A7.3 |
| | CYCLOPENTANONE | 3 | UN2245 | III | | P5 | A7.3 |
| | CYCLOPENTENE | 3 | UN2246 | II | | P5 | A7.3 |
| | CYCLOPROPANE | 2.1 | UN1027 | | | P4 | A6.4, A6.5 |
| | CYCLOTETRAMETHYLENETETRANI TRAMINE, DESENSITIZED, or OCTOGEN, DESENSITIZED or HMX DESENSITIZED | 1.1D | UN0484 | II | | P4 | A5.9 |
| | <i>Cyclotetramethylenetetranitramine (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | CYCLOTETRAMETHYLENETETRANI TRAMINE, WETTED, or HMX, WETTED or OCTOGEN, WETTED with not less than 15% water, by mass | 1.1D | UN0226 | II | | P4 | A5.9 |
| | | | | | | FORBIDDEN | FORBIDDEN |
| | CYCLOTETRAMETHYLENE- TETRANITRAMINE, HMX, or OCTOGEN, WETTED with less than 15% water, by mass | | | | | | |
| | CYCLOTRIMETHYLENETRINITRAMI NE, CYCLONITE, HEXOGEN, or RDX, AND CYCLOTETRAMETHYLENETETRANI TRAMINE, NMX, or OCTOGEN MIXTURES, WETTED with not less than 15% water by mass, or CYCLOTRIMETHYLENETRINITRAMI NE, CYCLONITE, HEXOGEN, or RDX, AND CYCLOTETRAMETHYLENETETRANI TRAMINE, NMX, or OCTOGEN MIXTURES, DESENSITIZED with not less than 10% phlegmatizer by mass | 1.1D | UN0391 | II | | P4 | A5.9 |
| | CYCLOTRIMETHYLENETRINITRAMI NE, CYCLONITE, HEXOGEN, or RDX, DESENSITIZED | 1.1D | UN0483 | II | | P4 | A5.9 |
| | CYCLOTRIMETHYLENETRINITRAMI NE, WETTED, CYCLONITE, WETTED, HEXOGEN, RDX, WETTED with not less than 15% water by mass | 1.1D | UN0072 | II | | P4 | A5.9 |
| | CYMENES | 3 | UN2046 | III | | P5 | A7.3 |
| | DANGEROUS GOODS IN APPARATUS or MACHINERY | 9 | UN3363 | | | P5 | A13.12 |
| | DECABORANE | 4.1 | UN1868 | II | 6.1 | P5, A19, A20 | A8.4 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | DECAHYDRONAPHTHALENE | 3 | UN1147 | III | | P5 | A7.3 |
| | N-DECANE | 3 | UN2247 | III | | P5 | A7.3 |
| | DEFLAGRATING METAL SALTS OF AROMATIC NITRODERIVATIVES, N.O.S. | 1.3C | UN0132 | II | | P4 | A5.12 |
| D | DENATURED ALCOHOL | 3 | NA1986 | I II III | 6.1 6.1 6.1 | P3 P5 P5 | A7.3 A7.3 A7.3 |
| D | DENATURED ALCOHOL | 3 | NA1987 | II III | | P5 P5 | A7.3 A7.3 |
| | <i>Detonating relays; see DETONATORS, etc</i> | | | | | | |
| | DETONATOR ASSEMBLIES, NON- ELECTRIC <i>for blasting</i> | 1.1B | UN0360 | II | | P4, A69 | A5.17 |
| | DETONATOR ASSEMBLIES, NON- ELECTRIC <i>for blasting</i> | 1.4B | UN0361 | II | | P5, 103, A69 | A5.17 |
| | DETONATOR ASSEMBLIES, NON- ELECTRIC <i>for blasting</i> | 1.4S | UN0500 | II | | P5, A69 | A5.17 |
| | DETONATORS, ELECTRIC, <i>for blasting</i> | 1.1B | UN0030 | II | | P4, A69 | A5.16 |
| | DETONATORS, ELECTRIC, <i>for blasting</i> | 1.4B | UN0255 | II | | P5, A69 | A5.16 |
| | DETONATORS, ELECTRIC, <i>for blasting</i> | 1.4S | UN0456 | II | | P5, A69 | A5.16 |
| | DETONATORS FOR AMMUNITION | 1.1B | UN0073 | II | | P4 | A5.19 |
| | DETONATORS FOR AMMUNITION | 1.2B | UN0364 | II | | P4 | A5.19 |
| | DETONATORS FOR AMMUNITION | 1.4B | UN0365 | II | | P5, 103 | A5.19 |
| | DETONATORS FOR AMMUNITION | 1.4S | UN0366 | II | | P5, A69 | A5.19 |
| | DETONATORS, NON-ELECTRIC, <i>for blasting</i> | 1.1B | UN0029 | II | | P4, A69 | A5.17 |
| | DETONATORS, NON-ELECTRIC, <i>for blasting</i> | 1.4B | UN0267 | II | | P5, 103, A69 | A5.17 |
| | DETONATORS, NON-ELECTRIC, <i>for blasting</i> | 1.4S | UN0455 | II | | P5, A69 | A5.17 |
| | DEUTERIUM, COMPRESSED | 2.1 | UN1957 | | | P4 | A6.4, A6.6 |
| | DEVICES, SMALL, HYDROCARBON GAS POWERED <i>or</i> HYDROCARBON GAS REFILLS FOR SMALL DEVICES <i>with release device</i> | 2.1 | UN3150 | | | P5 | A6.4, A6.5 |
| | DIACETONE ALCOHOL | 3 | UN1148 | II III | | P5 P5 | A7.3 A7.3 |
| | <i>Diacetyl, see BUTANEDIONE</i> | | | | | | |
| | DIALLYLAMINE | 3 | UN2359 | II | 6.1, 8 | P4 | A7.3 |
| | DIALLYL ETHER | 3 | UN2360 | II | 6.1 | P4, N12 | A7.3 |
| | 4,4'-DIAMINODIPHENYL METHANE | 6.1 | UN2651 | III | | P5 | A10.6 |
| | DI-N-AMYLAMINE | 3 | UN2841 | III | 6.1 | P5 | A7.3 |
| | <i>p</i> -Diazidobenzene | | | | | FORBIDDEN | FORBIDDEN |
| | <i>1,1'</i> -Diazaminonaphthalene | | | | | FORBIDDEN | FORBIDDEN |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | DIAZODINITROPHENOL, WETTED <i>with not less than 40% water, or mixture of alcohol and water, by mass</i> | 1.1A | UN0074 | II | | P4, 111, 117 | A5.7 |
| | <i>Diazodiphenylmethane</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>2-Diazo-1-Naphthol-4-Sulphochloride; see SELF-REACTIVE SOLID TYPE B</i> | | | | | | |
| | <i>Diazonium nitrates (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Diazonium perchlorates (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | DIBENZYL DICHLOROSILANE | 8 | UN2434 | II | | P5 | A12.3 |
| | <i>Diborane</i> | | | | | FORBIDDEN | FORBIDDEN |
| | DIBORANE, COMPRESSED | 2.3 | UN1911 | | 2.1 | P1, 1 | A6.6 |
| D | <i>Diborane mixtures</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Dibromoacetylene</i> | | | | | FORBIDDEN | FORBIDDEN |
| | DIBROMOBENZENE | 3 | UN2711 | III | | P5 | A7.3 |
| | 1,2-DIBROMOBUTAN-3-ONE | 6.1 | UN2648 | II | | P5 | A10.5 |
| | 1,2 DI-(DIMETHYL AMINO) ETHANE | 3 | UN2372 | II | | P4 | A7.3 |
| | DIBROMOCHLOROPROPANE | 6.1 | UN2872 | III | | P5 | A10.5 |
| | DIBROMODIFLUOROMETHANE, R12B2 | 9 | UN1941 | III | | P5 | A13.3 |
| | <i>1,2-Dibromoethane; see ETHYLENE DIBROMIDE</i> | | | | | | |
| | DIBROMOMETHANE | 6.1 | UN2664 | III | | P5 | A10.5 |
| | DI-N-BUTYLAMINE | 8 | UN2248 | II | 3 | P5 | A12.3 |
| | DIBUTYLAMINOETHANOL | 6.1 | UN2873 | III | | P5 | A10.5 |
| | DIBUTYL ETHERS | 3 | UN1149 | III | | P5 | A7.3 |
| | DICHLOROACETIC ACID | 8 | UN1764 | II | | P5, A3, A6, A7, N34 | A12.3 |
| | 1,3-DICHLOROACETONE | 6.1 | UN2649 | II | | P5 | A10.6 |
| | DICHLOROACETYL CHLORIDE | 8 | UN1765 | II | | P5, A3, A6, A7, N34 | A12.3 |
| | <i>Dichloroacetylene</i> | | | | | FORBIDDEN | FORBIDDEN |
| + | DICHLOROANILINES, SOLID or LIQUID | 6.1 | UN1590 | II | | P5 | A10.5, A10.6 |
| + | O-DICHLORO BENZENE | 6.1 | UN1591 | III | | P5 | A10.5 |
| D | DICHLOROBUTENE | 8 | NA2920 | I | 3 | P3 | A12.3 |
| | 2,2'-DICHLORODIETHYL ETHER | 6.1 | UN1916 | II | 3 | P5, N33, N34 | A10.5 |
| | DICHLORODIFLUOROMETHANE or REFRIGERANT GAS R12 | 2.2 | UN1028 | | | P5 | A6.4, A6.5 |
| | DICHLORODIFLUOROMETHANE AND DIFLUOROETHANE AZEOTROPIC MIXTURE or REFRIGERANT GAS R500 with approximately 74% dichlorodifluoromethane | 2.2 | UN2602 | | | P5 | A6.4, A6.5 |
| | DICHLORODIMETHYL ETHER, SYMMETRICAL | 6.1 | UN2249 | I | | P3 | A10.5 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | 1,1-DICHLOROETHANE | 3 | UN2362 | II | | P5 | A7.3 |
| | <i>1,2-Dichloroethane; see ETHYLENE DICHLORIDE</i> | | | | | | |
| | 1,2-DICHLOROETHYLENE | 3 | UN1150 | II | | P5 | A7.3 |
| | <i>Dichloroethyl sulphide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | DICHLOROISOCYANURIC ACID, DRY or DICHLOROISOCYANURIC ACID SALTS | 5.1 | UN2465 | II | | P5 | A9.8 |
| | DICHLOROISOPROPYL ETHER | 6.1 | UN2490 | II | | P5 | A10.5 |
| | DICHLOROMETHANE | 6.1 | UN1593 | III | | P5, N36 | A10.5 |
| | DICHLOROFUOROMETHANE or REFRIGERANT GAS R21 | 2.2 | UN1029 | | | P5 | A6.4, A6.5 |
| | 1,1-DICHLORO-1-NITROETHANE | 6.1 | UN2650 | II | | P5 | A10.5 |
| | DICHLOROPENTANES | 3 | UN1152 | III | | P5 | A7.3 |
| | DICHLOROPHENYL ISOCYANATES | 6.1 | UN2250 | II | | P5 | A10.6 |
| | DICHLOROPHENYLTRICHLOROSILA NE | 8 | UN1766 | II | | P4, A7, N34 | A12.3 |
| | 1,2-DICHLOROPROPANE | 3 | UN1279 | II | | P5, N36 | A12.3 |
| | 1,3-DICHLOROPROPANOL-2 | 6.1 | UN2750 | II | | P5 | A10.5 |
| | DICHLOROPROPENES | 3 | UN2047 | II III | | P5 P5 | A7.3 A7.3 |
| | DICHLOROSILANE | 2.3 | UN2189 | | 2.1, 8 | P2, 2 | A6.5 |
| | 1,2-DICHLORO-1,1,2,2- TERTAFLUROETHANE or REFRIGERANT GAS R114 | 2.2 | UN1958 | | | P5 | A6.4, A6.5 |
| D | 3,5 DICHLORO-2,4,6 TRIFLUOROPYRIDINE | 6.1 | NA9264 | I | | P2, 2 | A10.7 |
| | <i>Dichlorovinylchloroarsine</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>1,4-Dicyanobutane; see ADIPONITRILE</i> | | | | | | |
| | DICYCLOHEPTADIENE; see 2,5- NORBORNADIENE | | | | | | |
| | DICYCLOHEXYLAMINE | 8 | UN2565 | III | | P5 | A12.3 |
| | DICYCLOHEXYLAMMONIUM NITRITE | 4.1 | UN2687 | III | | P5 | A8.4 |
| | DICYCLOPENTADIENE | 3 | UN2048 | III | | P5 | A7.3 |
| | 1,2-DI-(DIMETHYLAMINO) ETHANE | 3 | UN2372 | II | | P5 | A7.3 |
| | DIDYMIUM NITRATE | 5.1 | UN1465 | III | | P5, A1 | A9.8 |
| D | DIELDRIN | 6.1 | NA2761 | II | | P5 | A10.6 |
| | DIESEL FUEL; also see GAS OIL | 3 | UN1202 | III | | P5 | A7.3 |
| | DIETHOXYMETHANE | 3 | UN2373 | II | | P5 | A7.3 |
| | 3,3-DIETHOXYPROPENE | 3 | UN2374 | II | | P5 | A7.3 |
| | DIETHYLAMINE | 3 | UN1154 | II | 8 | P4, N34 | A7.3 |
| | 2-DIETHYLAMINOETHANOL | 8 | UN2686 | II | 3 | P5 | A7.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | DIETHYLAMINOPROPYLAMINE | 3 | UN2684 | III | 8 | P5 | A7.3 |
| + | N,N-DIETHYLANILINE | 6.1 | UN2432 | III | | P5 | A10.5 |
| | DIETHYLBENZENE | 3 | UN2049 | III | | P5 | A7.3 |
| | DIETHYL CARBONATE | 3 | UN2366 | III | | P5 | A7.3 |
| | DIETHYLDICHLOROSILANE | 8 | UN1767 | II | 3 | P4, A7, N34 | A12.3 |
| | <i>Diethylene glycol dinitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Diethylene glycol dinitrate, desensitized with not less than 25% nonvolatile water-insoluble phlegmatizer, by mass</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Diethylgold bromide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | DIETHYLENETRIAMINE | 8 | UN2079 | II | | P5 | A12.3 |
| | <i>N,N-Diethylethanolamine; see</i> DIETHYLAMINOETHANOL | | | | | | |
| | DIETHYL ETHER or ETHYL ETHER | 3 | UN1155 | I | | P3 | A7.3 |
| | N,N-DIETHYLETHYLENEDIAMINE | 8 | UN2685 | II | 3 | P5 | A12.3 |
| | DIETHYL KETONE | 3 | UN1156 | II | | P5 | A7.3 |
| | DIETHYL SULPHATE | 6.1 | UN1594 | II | | P5 | A10.5 |
| | DIETHYL SULPHIDE | 3 | UN2375 | II | | P5 | A7.3 |
| | DIETHYLTHIOPHOSPHORYL CHLORIDE | 8 | UN2751 | II | | P5 | A12.4 |
| | DIETHYLZINC | 4.2 | UN1366 | I | 4.3 | P3 | A8.6 |
| | DIFLUOROETHANE or REFRIGERANT GAS R152A | 2.1 | UN1030 | | | P4 | A6.4, A6.5 |
| | 1,1-DIFLUOROETHYLENE or REFRIGERANT GAS R1132A | 2.1 | UN1959 | | | P4 | A6.4, A6.5 |
| | DIFLUOROMETHANE or REFRIGERANT GAS R32 | 2.1 | UN3252 | | | P4 | A6.4, A6.6 |
| | DIFLUOROPHOSPHORIC ACID, ANHYDROUS | 8 | UN1768 | II | | P5, A6, A7, N5, N34 | A12.3 |
| | 2,3-DIHYDROPYRAN | 3 | UN2376 | II | | P5 | A7.3 |
| | DIISOBUTYLAMINE | 3 | UN2361 | III | 8 | P5 | A7.3 |
| | DIISOBUTYLENE, ISOMETRIC COMPOUNDS | 3 | UN2050 | II | | P5 | A7.3 |
| | DIISOBUTYL KETONE | 3 | UN1157 | III | | P5 | A 7.3 |
| | DIISOCTYL ACID PHOSPHATE | 8 | UN1902 | III | | P5 | A12.3 |
| | DIISOPROPYLAMINE | 3 | UN1158 | II | 8 | P4 | A7.3 |
| | DIISOPROPYL ETHER | 3 | UN1159 | II | | P5 | A7.3 |
| | DIKETENE, STABILIZED | 6.1 | UN2521 | I | 3 | P2, 2 | A10.7 |
| | 1,1-DIMETHOXYETHANE | 3 | UN2377 | II | | P3 | A7.3 |
| | 1,2-DIMETHOXYETHANE | 3 | UN2252 | II | | P3 | A7.3 |
| | DIMETHYLAMINE, ANHYDROUS | 2.1 | UN1032 | | | P4 | A6.5 |
| | DIMETHYLAMINE SOLUTION | 3 | UN1160 | II | 8 | P4 | A7.3 |
| | 2-DIMETHYLAMINOACETONITRILE | 3 | UN2378 | II | 6.1 | P4 | A7.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>4-dimethylamino-6-(2-dimethylaminoethoxy) toluene-2-diazonium zinc chloride; see SELF-RELATIVE SOLID TYPE D, TEMPERATURE CONTROLLED</i> | | | | | | |
| | 2-DIMETHYLAMINOETHYL ACRYLATE | 6.1 | UN3302 | II | | P5 | A10.5 |
| | 2-DIMETHYLAMINOETHANOL | 8 | UN2051 | II | 3 | P5 | A12.3 |
| | 2-DIMETHYLAMINOETHYL METHACRYLATE | 6.1 | UN2522 | II | | P5 | A10.5 |
| | N,N-DIMETHYLANILINE | 6.1 | UN2253 | II | | P5 | A10.5 |
| | 2,3-DIMETHYLBUTANE | 3 | UN2457 | II | | P5 | A7.3 |
| | 1,3-DIMETHYLBUTYLAMINE | 3 | UN2379 | II | 8 | P5 | A7.3 |
| | DIMETHYLCARBAMOYL CHLORIDE | 8 | UN2262 | II | | P5 | A12.3 |
| | DIMETHYL CARBONATE | 3 | UN1161 | II | | P5 | A7.3 |
| | DIMETHYLCYCLOHEXANES | 3 | UN2263 | II | | P5 | A7.3 |
| | DIMETHYLCYCLOHEXYLAMINE | 8 | UN2264 | II | 3 | P5 | A12.3 |
| | DIMETHYLDICHLOROSILANE | 3 | UN1162 | II | 8 | P5 | A7.3 |
| | DIMETHYLDIETHOXSILANE | 3 | UN2380 | II | | P5 | A7.3 |
| | DIMETHYLDIOXANES | 3 | UN2707 | II III | | P5 P5 | A7.3 A7.3 |
| | DIMETHYL DISULPHIDE | 3 | UN2381 | II | | P5 | A7.3 |
| | DIMETHYL ETHER | 2.1 | UN1033 | | | P4 | A6.4, A6.5 |
| | N,N-DIMETHYFORMAMIDE | 3 | UN2265 | III | | P5 | A7.3 |
| | DIMETHYLHYDRAZINE, SYMMETRICAL | 6.1 | UN2382 | I | 3 | P2, 2, A7 | A10.7 |
| | DIMETHYLHYDRAZINE, UNSYMMETRICAL | 6.1 | UN1163 | I | 3, 8 | P2, 2 | A10.7 |
| | 2,2-DIMETHYLPROPANE | 2.1 | UN2044 | | | P4 | A6.4, A6.5 |
| | DIMETHYL-N-PROPYLAMINE | 3 | UN2266 | II | 8 | P5 | A7.3 |
| | DIMETHYL SULPHATE | 6.1 | UN1595 | I | 8 | P2, 2 | A10.7 |
| | DIMETHYL SULPHIDE | 3 | UN1164 | II | | P5 | A7.3 |
| | DIMETHYL THIOPHOSPHORYL CHLORIDE | 6.1 | UN2267 | II | 8 | P5 | A10.5 |
| | DIMETHYLZINC | 4.2 | UN1370 | I | 4.3 | P3 | A8.6 |
| | DINGU; see DINITROGLYCOLURIL | | | | | | |
| | DINITROANILINES | 6.1 | UN1596 | II | | P5 | A10.6 |
| | DINITROBENZENES, LIQUID or SOLID | 6.1 | UN1597 | II | | P5 | A10.5, A10.6 |
| | DINITRO-O-CRESOL, solid or solution | 6.1 | UN1598 | II | | P5 | A10.5, A10.6 |
| | <i>1,3-Dinitro-4,5-dinitrosobenzene</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>1,2-Dinitroethane</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Dinitrogen tetroxide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | DINITROGLYCOLURIL or DINGU | 1.1D | UN0489 | II | | P4 | A5.10 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Dinitromethane</i> | | | | | FORBIDDEN | FORBIDDEN |
| | DINITROPHENOLATES, alkali metals, dry or wetted with less than 15% water, by mass | 1.3C | UN0077 | II | 6.1 | P4 | A5.12 |
| | DINITROPHENOLATES, WETTED with not less than 15% water, by mass | 4.1 | UN1321 | I | 6.1 | P4, 23, A8, A19, A20, N41 | A8.4 |
| | <i>Dinitropropylene glycol</i> | | | | | FORBIDDEN | FORBIDDEN |
| | DINITROPHENOL, dry or wetted with less than 15% water, by mass | 1.1D | UN0076 | II | 6.1 | P4 | A5.9 |
| | DINITROPHENOL SOLUTIONS | 6.1 | UN1599 | II III | | P5 P5 | A10.5 A10.5 |
| | DINITROPHENOL, WETTED with not less than 15% water, by mass | 4.1 | UN1320 | I | 6.1 | P4, 23, A8, A19, A20, N41 | A8.4 |
| | <i>Dinitropropylene glycol</i> | | | | | FORBIDDEN | FORBIDDEN |
| | DINITRORESORCINOL, dry or wetted with less than 15% water, by mass | 1.1D | UN0078 | II | | P4 | A5.9 |
| | DINITRORESORCINOL, WETTED with not less than 15% water, by mass | 4.1 | UN1322 | I | | P4, 23, A8, A19, A20, N41 | A8.4 |
| | DINITROSOBENZENE | 1.3C | UN0406 | II | | P4 | A5.12 |
| | <i>2,2-Dinitrostilbene</i> | | | | | FORBIDDEN | FORBIDDEN |
| | DINITROTOLUENES, liquid or solid | 6.1 | UN2038 | II | | P5 | A10.5, A10.6 |
| | <i>2,4-Dinitro-1,3,5-trimethylbenzene</i> | | | | | FORBIDDEN | FORBIDDEN |
| | DIOXANE | 3 | UN1165 | II | | P5 | A7.3 |
| | DIOXOLANE | 3 | UN1166 | II | | P5 | A7.3 |
| | DIPENTENE | 3 | UN2052 | III | | P5 | A7.3 |
| | DIPHENYLAMINE CHLOROARSINE | 6.1 | UN1698 | I | | P3 | A10.5 |
| | DIPHENYLCHLOROARSINE, LIQUID or SOLID | 6.1 | UN1699 | I | | P3, A8, N33, N34 | A10.5, A10.6 |
| | DIPHENYLDICHLOROSILANE | 8 | UN1769 | II | | P4, A7, N34 | A12.3 |
| | DIPHENYLMETHANE-4,4'-DIISOCYANATE | 6.1 | UN2489 | III | | P5 | A10.5 |
| | DIPHENYLMETHYL BROMIDE | 8 | UN1770 | II | | P5 | A12.4 |
| | <i>Dipicrylamine; see</i> HEXANITRODIPHENYLAMINE | | | | | | |
| | DIPICRYL SULPHIDE, dry or wetted with less than 10% water, by mass | 1.1D | UN0401 | II | | P4 | A5.9 |
| | DIPICRYL SULPHIDE, WETTED with not less than 10% water, by mass | 4.1 | UN2852 | I | | P4, A2, N41 | A8.4 |
| | DIPROPYLAMINE | 3 | UN2383 | II | 8 | P4 | A7.3 |
| | DI-N-PROPYL ETHER | 3 | UN2384 | II | | P5 | A7.3 |
| | DIPROPYL KETONE | 3 | UN2710 | III | | P5 | A7.3 |
| * | DISINFECTANTS, LIQUID, CORROSIVE, N.O.S | 8 | UN1903 | I II III | | P3, A7 P5 P5 | A12.3 A12.3 A12.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | DISINFECTANTS, LIQUID, TOXIC, N.O.S. | 6.1 | UN3142 | I II III | | P3, A4 P5 P5 | A10.5 A10.5 A10.5 |
| * | DISINFECTANTS, SOLID, TOXIC, N.O.S. | 6.1 | UN1601 | II III | | P5 P5 | A10.6 A10.6 |
| | DISODIUM TRIOXOSILICATE | 8 | UN3253 | III | | P5 | A12.4 |
| * | DISPERSANT GASES; N.O.S. <i>see</i> REFRIGERANT GASES, N.O.S. | | | | | | |
| | DIVINYL ETHER, STABILIZED | 3 | UN1167 | I | | P3 | A7.3 |
| D | DODECYLBENZENESULPHONIC ACID | 8 | NA2584 | II | | P5 | A12.3 |
| | DODECYLTRICHLOROSILANE | 8 | UN1771 | II | | P4, A7, N34 | A12.3 |
| | DRY ICE, <i>see</i> CARBON DIOXIDE SOLID | | | | | | |
| * | DYES, LIQUID, CORROSIVE, N.O.S., <i>or</i> DYE INTERMEDIATES, LIQUID, CORROSIVE, N.O.S | 8 | UN2801 | I II III | | P5, 11 P5, 11 P5, 11 | A12.3 A12.3 A12.3 |
| * | DYES, LIQUID, TOXIC, N.O.S., <i>or</i> DYE INTERMEDIATES, LIQUID, TOXIC, N.O.S | 6.1 | UN1602 | II III | | P4 P5 | A10.5 A10.5 |
| * | DYES, SOLID, CORROSIVE, N.O.S., <i>or</i> DYE INTERMEDIATES, SOLID, CORROSIVE N.O.S. | 8 | UN3147 | I II III | | P5 P5 P5 | A12.4 A12.4 A12.4 |
| * | DYES, SOLID, TOXIC, N.O.S., <i>or</i> DYE INTERMEDIATES, SOLID, TOXIC, N.O.S. | 6.1 | UN3143 | I II III | | P5, A5 P5 P5 | A10.6 A10.6 A10.6 |
| | <i>Dynamite; see</i> EXPLOSIVE, BLASTING, TYPE A | | | | | | |
| | <i>Electrolyte (acid or alkali) for batteries; see</i> BATTERY FLUID, ACID <i>or</i> BATTERY FLUID, ALKALI | | | | | | |
| | <i>Elevated temperature liquid, flammable, n.o.s., with flashpoint above 37.8 C, at or above its flashpoint</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Elevated temperature liquid, n.o.s., at or above 100 C, and below its flashpoint (including molten metals, molten salts, etc.)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Elevated temperature solid, n.o.s., at or above 240 C</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ENGINES, INTERNAL COMBUSTION, <i>flammable gas powered</i> | 9 | UN3166 | | | P5, 135 | A13.6 |
| | ENGINES, INTERNAL COMBUSTION, <i>flammable liquid powered</i> | 9 | UN3166 | | | P5, 135 | A13.6 |
| * | ENVIRONMENTALLY HAZARDOUS SUBSTANCES, LIQUID, N.O.S. | 9 | UN3082 | III | | P5, 8 | A13.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S. | 9 | UN3077 | III | | P5, 8 | A13.3 |
| | EPIBROMOHYDRIN | 6.1 | UN2558 | I | 3 | P3 | A10.5 |
| + | EPICHLOROHYDRIN | 6.1 | UN2023 | II | 3 | P5 | A10.5 |
| | 1,2-EPOXY-3-ETHOXYPROPANE | 3 | UN2752 | III | | P5 | A7.3 |
| | ESTERS, N.O.S. | 3 | UN3272 | II III | | P5 P5 | A7.3 A7.3 |
| | ETHANE | 2.1 | UN1035 | | | P4 | A6.4, A6.5 |
| | ETHANE, REFRIGERATED LIQUID | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Ethanol amine dinitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ETHANOLAMINE or ETHANOLAMINE SOLUTIONS | 8 | UN2491 | III | | P5 | A12.3 |
| | ETHANOL or ETHANOL SOLUTIONS or ETHYL ALCOHOL or ETHYL ALCOHOL SOLUTIONS | 3 | UN1170 | II III | | P5 P5 | A7.3 A7.3 |
| | <i>Ether; see DIETHYL ETHER</i> | | | | | | |
| * | ETHERS, N.O.S. | 3 | UN3271 | II III | | P5 P5 | A7.3 A7.3 |
| | ETHYL ACETATE | 3 | UN1173 | II | | P5 | A7.3 |
| | ETHYLACETYLENE, STABILIZED | 2.1 | UN2452 | | | P4 | A6.5 |
| | ETHYL ACRYLATE, STABILIZED | 3 | UN1917 | II | | P5 | A7.3 |
| | ETHYL ALCOHOL <i>see</i> ETHANOL | | | | | | |
| | <i>Ethyl aldehyde; see ACETALDEHYDE</i> | | | | | | |
| | ETHYLAMINE | 2.1 | UN1036 | | | P4 | A6.15 |
| | ETHYLAMINE, AQUEOUS SOLUTIONS <i>with not less than 50%, but not more than 70% ethylamine</i> | 3 | UN2270 | II | 8 | P5 | A7.3 |
| | ETHYL AMYL KETONE | 3 | UN2271 | III | | P5 | A7.3 |
| | N-ETHYLANILINE | 6.1 | UN2272 | III | | P5 | A10.5 |
| | 2-ETHYLANILINE | 6.1 | UN2273 | III | | P5 | A10.5 |
| | ETHYLBENZENE | 3 | UN1175 | II | | P5 | A7.3 |
| | N-ETHYL-N-BENZYLANILINE | 6.1 | UN2274 | III | | P5 | A10.5 |
| | N-ETHYLBENZYL TOLUIDINES SOLID, or LIQUID | 6.1 | UN2753 | III | | P5 | A10.5, A10.6 |
| | ETHYL BORATE | 3 | UN1176 | II | | P5 | A7.3 |
| | ETHYL BROMIDE | 6.1 | UN1891 | II | | P5 | A10.5 |
| | ETHYL BROMOACETATE | 6.1 | UN1603 | II | 3 | P4 | A10.5 |
| | 2-ETHYLBUTANOL | 3 | UN2275 | III | | P5 | A7.3 |
| | ETHYLBUTYL ACETATE | 3 | UN1177 | III | | P5 | A7.3 |
| | ETHYL BUTYL ETHER | 3 | UN1179 | II | | P5 | A7.3 |
| | 2-ETHYLBUTYRALDEHYDE | 3 | UN1178 | II | | P5 | A7.3 |
| | ETHYL BUTYRATE | 3 | UN1180 | III | | P5 | A7.3 |
| | ETHYL CHLORIDE | 2.1 | UN1037 | | | P4 | A6.13 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | ETHYL CHLOROACETATE | 6.1 | UN1181 | II | 3 | P5 | A10.5 |
| | ETHYL CHLOROFORMATE | 6.1 | UN1182 | I | 3, 8 | P3, 2, A3, A6, A7, N34 | A10.7 |
| | ETHYL 2-CHLOROPROPIONATE | 3 | UN2935 | III | | P5 | A7.3 |
| + | ETHYL CHLOROTHIOFORMATE | 8 | UN2826 | II | 3, 6.1 | P2, 2 | A12.12 |
| | ETHYL CROTONATE | 3 | UN1862 | II | | P5 | A7.3 |
| | ETHYLDICHLOROARSINE | 6.1 | UN1892 | I | | P2, 2 | A10.7 |
| | ETHYLDICHLOROSILANE | 4.3 | UN1183 | I | 3, 8 | P3, A2, A3, A7, N34 | A8.3 |
| | <i>Ethylene, acetylene and propylene in mixtures, refrigerated liquid (cryogenic liquids) containing at least 71.5% ethylene with not more than 22.5% acetylene and not more than 6% propylene</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ETHYLENE CHLOROHYDRIN | 6.1 | UN1135 | I | 3 | P2, 2 | A10.7 |
| | ETHYLENE, COMPRESSED | 2.1 | UN1962 | | | P4 | A6.4, A6.5 |
| | ETHYLENEDIAMINE | 8 | UN1604 | II | 3 | P5 | A12.3 |
| | <i>Ethylene diamine diperchlorate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ETHYLENE DIBROMIDE | 6.1 | UN1605 | I | | P2, 2 | A10.7 |
| | ETHYLENE DICHLORIDE | 3 | UN1184 | II | 6.1 | P4 | A7.3 |
| | ETHYLENE GLYCOL DIETHYL ETHER | 3 | UN1153 | III | | P5 | A7.3 |
| | <i>Ethylene glycol dinitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ETHYLENE GLYCOL MONOETHYL ETHER | 3 | UN1171 | III | | P5 | A7.3 |
| | ETHYLENE GLYCOL MONOETHYL ETHER ACETATE | 3 | UN1172 | III | | P5 | A7.3 |
| | ETHYLENE GLYCOL MONOMETHYL ETHER | 3 | UN1188 | III | | P5 | A7.3 |
| | ETHYLENE GLYCOL MONOMETHYL ETHER ACETATE | 3 | UN1189 | III | | P5 | A7.3 |
| | ETHYLENEIMINE, STABILIZED | 6.1 | UN1185 | I | 3 | P1, 1, N25, N32 | A10.7 |
| | ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 87% ethylene oxide | 2.3 | UN3300 | | 2.1 | P2, 4 | A6.5 |
| | ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with more than 9% but not more than 87% ethylene oxide | 2.1 | UN1041 | | | P4 | A6.4, A6.5 |
| | ETHYLENE OXIDE AND CARBON DIOXIDE MIXTURE with not more than 9% ethylene oxide | 2.2 | UN1952 | | | P5 | A6.4, A6.5 |
| | ETHYLENE OXIDE AND CHLOROTETRAFLUORO- ETHANE MIXTURE with not more than 8.8% ethylene oxide | 2.2 | UN3297 | | | P5 | A6.4, A6.5 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | ETHYLENE OXIDE AND DICHLORODIFLUORO- METHANE MIXTURE with not more than 12.5% <i>ethylene oxide</i> | 2.2 | UN3070 | | | P5 | A6.4, A6.5 |
| | ETHYLENE OXIDE AND PENTAFLUOROETHANE MIXTURE with not more than 7.9% <i>ethylene oxide</i> | 2.2 | UN3298 | | | P5 | A6.4, A6.5 |
| | ETHYLENE OXIDE AND PROPYLENE OXIDE MIXTURES , not more than 30% <i>ethylene oxide</i> | 3 | UN2983 | I | 6.1 | P2, 5, A11, N4, N34 | A7.3 |
| | ETHYLENE OXIDE AND TETRAFLUROETHANE MIXTURE with not more than 5.6% <i>ethylene oxide</i> | 2.2 | UN3299 | | | P5 | A6.4, A6.5 |
| | ETHYLENE OXIDE, or ETHYLENE OXIDE WITH NITROGEN up to a total pressure of 1 MPA (10 bar) at 50 degrees C | 2.3 | UN1040 | | 2.1 | P2, 4 | A6.14 |
| | ETHYLENE, REFRIGERATED LIQUID <i>(cryogenic liquid)</i> | 2.1 | UN1038 | | | P3 | A6.12 |
| | ETHYL ETHER; see DIETHYL ETHER | | | | | | |
| | ETHYL FLUORIDE or REFRIGERANT GAS R161 | 2.1 | UN2453 | | | P4 | A6.4, A6.5 |
| | ETHYL FORMATE | 3 | UN1190 | II | | P5 | A7.3 |
| | 2-ETHYLHEXYLAMINE | 3 | UN2276 | III | 8 | P5 | A7.3 |
| | 2-ETHYLHEXYL CHLOROFORMATE | 6.1 | UN2748 | II | 8 | P5 | A10.5 |
| | ETHYL ISOBUTYRATE | 3 | UN2385 | II | | P5 | A7.3 |
| + | ETHYL ISOCYANATE | 3 | UN2481 | I | 6.1 | P1, 1, A7 | A7.6 |
| | ETHYL LACTATE | 3 | UN1192 | III | | P5 | A7.3 |
| | ETHYL MERCAPTAN | 3 | UN2363 | I | | P3 | A7.3 |
| | ETHYL METHACRYLATE | 3 | UN2277 | II | | P5 | A7.3 |
| | ETHYL METHYL ETHER | 2.1 | UN1039 | | | P4 | A6.22 |
| | ETHYL METHYL KETONE or METHYL ETHYL KETONE | 3 | UN1193 | II | | P5 | A7.3 |
| | <i>Ethyl nitrite</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ETHYL NITRITE SOLUTIONS | | | | | FORBIDDEN | FORBIDDEN |
| | ETHYL ORTHOFORMATE | 3 | UN2524 | III | | P5 | A7.3 |
| | ETHYL OXALATE | 6.1 | UN2525 | III | | P5 | A10.5 |
| | <i>Ethyl perchlorate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ETHYLPHENYLDICHLOROSILANE | 8 | UN2435 | II | | P5, A7, N34 | A12.3 |
| D | ETHYL PHOSPHONOTHIOIC DICHLORIDE, ANHYDROUS | 6.1 | NA2927 | I | 8 | P2, 2 | A10.7 |
| D | ETHYL PHOSPHONOUS DICHLORIDE, ANHYDROUS <i>pyrophoric liquid</i> | 6.1 | NA2845 | I | 4.2 | P2, 2 | A10.7 |
| D | ETHYL PHOSPHORODICHLORIDATE | 6.1 | NA2927 | I | 8 | P2, 2 | A10.7 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | 1-ETHYLPIPERIDINE | 3 | UN2386 | II | 8 | P5 | A7.3 |
| | ETHYL PROPIONATE | 3 | UN1195 | II | | P5 | A7.3 |
| | ETHYL PROPYL ETHER | 3 | UN2615 | II | | P5 | A7.3 |
| | <i>Ethyl sulphate; see</i> DIETHYL SULPHATE | | | | | | |
| | ETHYLPHENYLIDICHLOROSILANE | 8 | UN2435 | II | | P5, A7, N34 | A12.3 |
| | N-ETHYLTOLUIDINES | 6.1 | UN2754 | II | | P5 | A10.5 |
| | ETHYLTRICHLOROSILANE | 3 | UN1196 | II | 8 | P4, A7, N34 | A7.3 |
| | <i>Etiologic agent; see</i> INFECTIOUS SUBSTANCES, etc. | | | | | | |
| | EXPLOSIVE, BLASTING, TYPE A | 1.1D | UN0081 | II | | P4, A69 | A5.14 |
| | EXPLOSIVE, BLASTING, TYPE B | 1.1D | UN0082 | II | | P4, A69 | A5.14 |
| | EXPLOSIVE, BLASTING, TYPE B or AGENT BLASTING TYPE B | 1.5D | UN0331 | II | | P4, 105, 106, A69 | A5.14 |
| | EXPLOSIVE, BLASTING, TYPE C | 1.1D | UN0083 | II | | P4, 123, A69 | A5.14 |
| | EXPLOSIVE, BLASTING, TYPE E | 1.1D | UN0241 | II | | P4, A69 | A5.14 |
| | EXPLOSIVE, BLASTING, TYPE E or AGENT BLASTING TYPE E | 1.5D | UN0332 | II | | P4, 105, 106, A69 | A5.14 |
| | EXPLOSIVE, BLASTING, TYPE D | 1.1D | UN0084 | II | | P4, A69 | A5.14 |
| | <i>Explosives, slurry; see</i> EXPLOSIVE, BLASTING, TYPE E | | | | | | |
| | <i>Explosives substances; see</i> SUBSTANCES, EXPLOSIVE, N.O.S. etc. | | | | | | |
| | <i>Explosives, water gels; see</i> EXPLOSIVE, BLASTING, TYPE E | | | | | | |
| | EXTRACTS, AROMATIC, LIQUID | 3 | UN1169 | II III | | P5 P5 | A7.3 A7.3 |
| | EXTRACTS, FLAVORING, LIQUID | 3 | UN1197 | II III | | P5 P5 | A7.3 A7.3 |
| | FERRIC ARSENATE | 6.1 | UN1606 | II | | P5 | A10.6 |
| | FERRIC ARSENITE | 6.1 | UN1607 | II | | P5 | A10.6 |
| | FERRIC CHLORIDE, ANHYDROUS | 8 | UN1773 | III | | P5 | A12.4 |
| | FERRIC CHLORIDE, SOLUTION | 8 | UN2582 | III | | P5 | A12.3 |
| | FERRIC NITRATE | 5.1 | UN1466 | III | | P5, A1, A29 | A9.8 |
| | FERROCERIUM | 4.1 | UN1323 | II | | P5, A19 | A8.4 |
| | FERROSILICON, with 30% or more, but less than 90% silicon | 4.3 | UN1408 | III | 6.1 | P5, A1, A19 | A8.4 |
| | FERROUS ARSENATE | 6.1 | UN1608 | II | | P5 | A10.6 |
| D | FERROUS CHLORIDE, SOLID | 8 | NA1759 | II | | P5 | A12.4 |
| D | FERROUS CHLORIDE, SOLUTION | 8 | NA1760 | II | | P5 | A12.3 |

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| | FERROUS METAL BORINGS; or FERROUS METAL SHAVINGS; or FERROUS METAL TURNINGS, or FERROUS METAL CUTTINGS in a form liable to self-heating | 4.2 | UN2793 | | III | P5, A1, A19 | A8.4 |
| | FERTILIZER AMMONIATING SOLUTION with free ammonia | 2.2 | UN1043 | | | P5 | A6.4, A6.5 |
| | FIBRES or FABRICS, ANIMAL or VEGETABLE, or SYNTHETIC N.O.S. with animal or vegetable oil | 4.2 | UN1373 | III | | P5 | A8.4 |
| | FIBERS or FIBER IMPREGNATED WITH WEAKLY NITRATED NITROCELLULOSE, N.O.S | 4.1 | UN1353 | III | | P5, A1 | A8.4 |
| | <i>Films, nitrocellulose base, from which gelatine has been removed; film scrap; see CELLULOID SCRAP</i> | | | | | | |
| | FILMS, NITROCELLULOSE BASE, gelatine coated (except scrap) | 4.1 | UN1324 | III | | P5 | A8.13 |
| | FIRE EXTINGUISHER CHARGES, corrosive liquid | 8 | UN1774 | II | | P5, N41 | A12.3 |
| | <i>Fire extinguisher charges, expelling, explosive; see CARTRIDGES, POWER DEVICE</i> | | | | | | |
| | FIRE EXTINGUISHERS containing compressed or liquified gas | 2.2 | UN1044 | | | P5 | A6.8 |
| | FIRELIGHTERS, SOLID with flammable liquid | 4.1 | UN2623 | III | | P5, A1, A19 | A8.4 |
| | FIREWORKS | 1.1G | UN0333 | II | | P4, 108 | A5.21 |
| | FIREWORKS | 1.2G | UN0334 | II | | P4, 108 | A5.21 |
| | FIREWORKS | 1.3G | UN0335 | II | | P4, 108 | A5.21 |
| | FIREWORKS | 1.4G | UN0336 | II | | P5, 108 | A5.21 |
| | FIREWORKS | 1.4S | UN0337 | II | | P5, 108 | A5.21 |
| | <i>First Aid Kits; see CHEMICAL KITS</i> | | | | | | |
| | FISH MEAL, UNSTABILIZED, or FISH SCRAP, UNSTABILIZED | 4.2 | UN1374 | II | | P5, A1, A19 | A8.4 |
| | <i>Flammable compressed gas (small receptacles not fitted with a dispersion device, not refillable); see RECEPTACLES, etc.</i> | | | | | | |
| | <i>Flammable gas in lighters; see LIGHTERS or LIGHTER REFILLS containing flammable gas</i> | | | | | | |
| * | FLAMMABLE LIQUIDS, CORROSIVE, N.O.S. | 3 | UN2924 | I II III | 8 8 8 | P3 P5 P5 | A7.3 A7.3 A7.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | FLAMMABLE LIQUIDS, N.O.S. | 3 | UN1993 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| * | FLAMMABLE LIQUIDS, TOXIC, N.O.S. | 3 | UN1992 | I II III | 6.1 6.1 6.1 | P3 P4 P5 | A7.3 A7.3 A7.3 |
| * | FLAMMABLE LIQUID, TOXIC, CORROSIVE, N.O.S. | 3 | UN3286 | I II | 6.1, 8 6.1, 8 | P3 P4 | A7.3 A7.3 |
| * | FLAMMABLE SOLID, CORROSIVE, INORGANIC, N.O.S. | 4.1 | UN3180 | II III | 8 8 | P5, A1 P5, A1 | A8.4 A8.4 |
| * | FLAMMABLE SOLIDS, CORROSIVE, ORGANIC, N.O.S. | 4.1 | UN2925 | II III | 8 8 | P5, A1 P5, A1 | A8.4 A8.4 |
| * | FLAMMABLE SOLID, INORGANIC, N.O.S. | 4.1 | UN3178 | II III | | P5, A1 P5, A1 | A8.4 A8.4 |
| * | FLAMMABLE SOLIDS, ORGANIC, N.O.S. | 4.1 | UN1325 | II III | | P5, A1 P5, A1 | A8.4 A8.4 |
| * | FLAMMABLE SOLID, ORGANIC, MOLTEN, N.O.S. | | | | | FORBIDDEN | FORBIDDEN |
| | FLAMMABLE SOLID, OXIDIZING, N.O.S. | | | | | FORBIDDEN | FORBIDDEN |
| * | FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S. | 4.1 | UN3179 | II III | 6.1 6.1 | P5, A1 P5, A1 | A8.4 A8.4 |
| * | FLAMMABLE SOLIDS, TOXIC, ORGANIC, N.O.S. | 4.1 | UN2926 | II III | 6.1 6.1 | P5, A1 P5, A1 | A8.4 A8.4 |
| | FLARES, AERIAL | 1.3G | UN0093 | II | | P4 | A5.21 |
| | FLARES, AERIAL | 1.4G | UN0403 | II | | P5 | A5.21 |
| | FLARES, AERIAL | 1.4S | UN0404 | II | | P5, A69 | A5.21 |
| | FLARES, AERIAL | 1.1G | UN0420 | II | | P4 | A5.21 |
| | FLARES, AERIAL | 1.2G | UN0421 | II | | P4 | A5.21 |
| | <i>Flares, aeroplane; see</i> FLARES, AERIAL | | | | | | |
| | <i>Flares, signal; see</i> CARTRIDGES, SIGNAL | | | | | | |
| | FLARES, SURFACE | 1.1G | UN0418 | II | | P4 | A5.21 |
| | FLARES, SURFACE | 1.2G | UN0419 | II | | P4 | A5.21 |
| | FLARES, SURFACE | 1.3G | UN0092 | II | | P4 | A5.21 |
| | <i>Flares, water-activated; see</i> CONTRIVANCES, WATER- ACTIVATED, etc. | | | | | | |
| | FLASH POWDER | 1.1G | UN0094 | II | | P4 | A5.11 |
| | FLASH POWDER | 1.3G | UN0305 | II | | P4 | A5.11 |
| | FLUORINE, COMPRESSED | 2.3 | UN1045 | | 5.1, 8 | P1, 1 | A6.6 |
| | FLUOROACETIC ACID | 6.1 | UN2642 | I | | P5 | A10.6 |
| | FLUOROANILINES | 6.1 | UN2941 | III | | P5 | A10.5 |
| | FLUOROBENZENE | 3 | UN2387 | II | | P5 | A7.3 |

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|--------|---|-------------------------|-----------------|----------------|--------------------|----------------------------|----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | FLUOROBORIC ACID | 8 | UN1775 | II | | P5, A6, A7, N3, N34 | A12.3 |
| | FLUOROPHOSPHORIC ACID, ANHYDROUS | 8 | UN1776 | II | | P5, A6, A7, N3, N34 | A12.3 |
| | FLUROSILICATES, N.O.S. | 6.1 | UN2856 | III | | P5 | A10.6 |
| | FLUROSILICIC ACID | 8 | UN1778 | II | | P5, A6, A7, N3, N34 | A12.3 |
| | FLUROSULPHONIC ACID | 8 | UN1777 | I | | P3, A3, A6, A7, A10, N3 | A12.3 |
| | FLUOROTOLUENES | 3 | UN2388 | II | | P5 | A7.3 |
| | FORMALDEHYDE SOLUTIONS <i>with not less than 25% formaldehyde</i> | 8 | UN2209 | III | | P5 | A12.3 |
| | FORMALDEHYDE SOLUTIONS, FLAMMABLE | 3 | UN1198 | III | 8 | P5 | A7.3 |
| | <i>Formalin; see</i> FORMALDEHYDE, SOLUTIONS | | | | | | |
| | FORMIC ACID | 8 | UN1779 | II | | P5 | A12.3 |
| | FRACTURING DEVICES, EXPLOSIVE, without detonators for oil wells | 1.1D | UN0099 | II | | P4 | A5.20 |
| | FUEL, AVIATION, TURBINE ENGINE | 3 | UN1863 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | <i>Fuel devices, lanterns, heaters, etc., see</i> DANGEROUS GOODS IN APPARATUS or MACHINERY | | | | | | |
| D | FUEL OIL (NO, 1, 2, 3, 4, 5, or 6) | 3 | NA1993 | III | | P5 | A7.3 |
| | <i>Fulminate of mercury (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Fulminate of mercury, wet; see</i> MERCURY FULMINATE, etc. | | | | | | |
| | <i>Fulminating gold</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Fulminating mercury</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Fulminating platinum</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Fulminating silver</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Fulminic acid</i> | | | | | FORBIDDEN | FORBIDDEN |
| | FUMARYL CHLORIDE | 8 | UN1780 | II | | P5 | A12.3 |
| | FURAN | 3 | UN2389 | I | | P3 | A7.3 |
| | FURALDEHYDE | 6.1 | UN1199 | II | 3 | P2 | A10.5 |
| | FURFURYL ALCOHOL | 6.1 | UN2874 | III | | P5 | A10.5 |
| | FURFURYLAMINE | 3 | UN2526 | III | 8 | P5 | A7.3 |
| | FUSE, DETONATING, metal clad; see CORD, DETONATING, metal clad | | | | | | |
| | FUSE DETONATING, MILD EFFECT, metal clad, see CORD, DETONATING, MILD EFFECT, metal clad | | | | | | |
| | FUSE, IGNITER, tubular metal clad | 1.4G | UN0103 | II | | P5 | A5.26 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | FUSE, NONDETONATING (<i>instantaneous or Quickmatch</i>) | 1.3G | UN0101 | II | | P4 | A5.26 |
| | <i>Fusee, matches; see MATCHES, FUSEE</i> | | | | | | |
| | <i>Fusees, railway or highway, explosive; see SIGNAL DEVICES, HAND</i> | | | | | | |
| D | FUSEE (<i>railway or highway</i>) | 4.1 | NA1325 | II | | P5 | A8.14 |
| | FUSEL OIL | 3 | UN1201 | II III | | P5 P5 | A7.3 A7.3 |
| | FUSE, SAFETY | 1.4S | UN0105 | II | | P5, A69 | A5.26 |
| | <i>Fuses, tracer; see TRACERS FOR AMMUNITION</i> | | | | | | |
| | <i>Fuzes, combination, percussion and time; see FUZES, DETONATING or FUZES, IGNITING</i> | | | | | | |
| | FUZES, DETONATING | 1.1B | UN0106 | II | | P4 | A5.27 |
| | FUZES, DETONATING | 1.2B | UN0107 | II | | P4 | A5.27 |
| | FUZES, DETONATING | 1.4B | UN0257 | II | | P5, 116 | A5.27 |
| | FUZES, DETONATING | 1.4S | UN0367 | II | | P5, 116, A69 | A5.27 |
| | FUZES, DETONATING , <i>with protective features</i> | 1.1D | UN0408 | II | | P4 | A5.27 |
| | FUZES, DETONATING , <i>with protective features</i> | 1.2D | UN0409 | II | | P4 | A5.27 |
| | FUZES, DETONATING , <i>with protective features</i> | 1.4D | UN0410 | II | | P5, 116 | A5.27 |
| | FUZES, IGNITING | 1.3G | UN0316 | II | | P4 | A5.27 |
| | FUZES, IGNITING | 1.4G | UN0317 | II | | P4 | A5.27 |
| | FUZES, IGNITING | 1.4S | UN0368 | II | | P5, A69 | A5.27 |
| | GALLIUM | 8 | UN2803 | III | | P3 | A12.8 |
| | GAS CARTRIDGE , (<i>flammable</i>) <i>without a release device, non-refillable</i> | 2.1 | UN2037 | | | P4 | A6.4 A6.5 |
| | GAS GENERATOR ASSEMBLIES (AIRCRAFT) , <i>containing a nonflammable, nontoxic gas and a propellant cartridge</i> | 2.2 | ID8013 | | | P5 | A6.23 |
| D | GAS IDENTIFICATION SET , <i>must be classified and labeled according to the hazard class of the constituent(s)</i> | 2.3 | NA9035 | | | P2, 6 | A6.17 |
| D | GASOHOL (<i>gasoline mixed with ethyl alcohol, maximum 20% alcohol</i>) | 3 | NA1203 | II | | P5 | A7.3 |
| | GAS OIL or DIESEL FUEL or HEATING OIL, LIGHT | 3 | UN1202 | III | | P5 | A7.3 |
| | GASOLINE | 3 | UN1203 | II | | P5 | A7.3 |
| * | GAS, REFRIGERATED LIQUID, FLAMMABLE, N.O.S. (<i>cryogenic liquid</i>) | 2.1 | UN3312 | | | P3 | A6.12 |

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|--------|--|-------------------------|-----------------|-----|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | GAS, REFRIGERATED LIQUID, N.O.S. <i>(cryogenic liquid)</i> | 2.2 | UN3158 | | | P4 | A6.12 |
| * | GAS, REFRIGERATED LIQUID, OXIDIZING, N.O.S. <i>(cryogenic liquid)</i> | 2.2 | UN3311 | | 5.1 | P4 | A6.12 |
| | GAS SAMPLE, NONPRESSURIZED, FLAMMABLE, N.O.S., not refrigerated liquid | 2.1 | UN3167 | | | P4 | A6.4, A6.5, A6.6 |
| | GAS SAMPLE, NONPRESSURIZED, TOXIC, FLAMMABLE, N.O.S., not refrigerated liquid | 2.3 | UN3168 | | 2.1 | P3 | A6.4, A6.6 |
| | GAS SAMPLE, NONPRESSURIZED, TOXIC, N.O.S., not refrigerated liquid | 2.3 | UN3169 | | | P4 | A6.4, A6.5, A6.6 |
| | <i>Gelatine, blasting; see</i> EXPLOSIVE, BLASTING, TYPE A | | | | | | |
| | <i>Gelatine dynamites; see</i> EXPLOSIVE, BLASTING, TYPE A | | | | | | |
| | GERMANE | 2.3 | UN2192 | | 2.1 | P2, 2 | A6.16 |
| | <i>Glycerol-1,3-dinitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Glycerol gluconate trinitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Glycerol lactate trinitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | GLYCEROL ALPHA- MONOCHLOROHYDRIN | 6.1 | UN2689 | III | | P5 | A10.5 |
| | <i>Glyceryl trinitrate; see</i> NITROGLYCERIN, etc. | | | | | | |
| | GLYCIDALDEHYDE | 3 | UN2622 | II | 6.1 | P5 | A7.3 |
| D | GRENADES, EMPTY PRIMED | 1.4S | NA0349 | II | | P5, A69 | A5.19 |
| | GRENADES, hand or rifle, with bursting charge | 1.1D | UN0284 | II | | P4 | A5.27 |
| | GRENADES, hand or rifle, with bursting charge | 1.2D | UN0285 | II | | P4 | A5.27 |
| | GRENADES, hand or rifle, with bursting charge | 1.1F | UN0292 | II | | P4 | A5.27 |
| | GRENADES, hand or rifle, with bursting charge | 1.2F | UN0293 | II | | P4 | A5.27 |
| | <i>Grenades, illuminating; see</i> AMMUNITION, ILLUMINATING, etc. | | | | | | |
| | GRENADES, PRACTICE, hand or rifle | 1.4G | UN0452 | II | | P5 | A5.27 |
| | GRENADES, PRACTICE, hand or rifle | 1.4S | UN0110 | II | | P5, A69 | A5.27 |
| | GRENADES, PRACTICE, hand or rifle | 1.3G | UN0318 | II | | P4 | A5.27 |
| | GRENADES, PRACTICE, hand or rifle | 1.2G | UN0372 | II | | P4 | A5.27 |
| | <i>Grenades, smoke; see</i> AMMUNITION, SMOKE, etc. | | | | | | |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | GUANIDINE NITRATE | 5.1 | UN1467 | III | | P5, A1 | A9.8 |
| | <i>Guanyl nitrosaminoguanylidene hydrazine (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | GUANYL NITROSAMINO GUANYLIDENE HYDRAZINE, WETTED with not less than 30% water, by mass | 1.1A | UN0113 | II | | P3, 111, 117 | A5.7 |
| | <i>Guanyl nitrosaminoguanyltetrazene (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | GUANYL NITROSAMINO GUANYLTETRAZENE, WETTED; or TETRAZENE, WETTED with not less than 30% water, or mixture of alcohol and water, by mass | 1.1A | UN0114 | II | | P3, 111, 117 | A5.7 |
| | GUNPOWDER, COMPRESSED or GUNPOWDER IN PELLETS; see BLACK POWDER (UN0028) | | | | | | |
| | GUNPOWDER, granular or as a meal; see BLACK POWDER (UN0027) | | | | | | |
| | HAFNIUM POWDER, DRY | 4.2 | UN2545 | I II III | | P3 P5, A19, A20, N34 P5 | A8.4 A8.4 A8.4 |
| | HAFNIUM POWDER, WETTED with not less than 25% water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns | 4.1 | UN1326 | II | | P5, A6, A19, A20, N34 | A8.4 |
| D* | HAZARDOUS WASTE, LIQUID, N.O.S. | 9 | NA3082 | III | | P5 | A13.3 |
| D* | HAZARDOUS WASTE, SOLID, N.O.S. | 9 | NA3077 | III | | P5 | A13.3 |
| | HELIUM, COMPRESSED | 2.2 | UN1046 | | | P5 | A6.4, A6.6 |
| | <i>Helium-oxygen mixture; see RARE GASES AND OXYGEN MIXTURES</i> | | | | | | |
| | HELIUM, REFRIGERATED LIQUID (cryogenic liquid) | 2.2 | UN1963 | | | P5 | A6.12 |
| | HEPTAFLUOROPROPANE or REFRIGERANT GAS R227 | 2.2 | UN3296 | | | P5 | A6.4, A6.5 |
| | N-HEPTALDEHYDE | 3 | UN3056 | III | | P5 | A7.3 |
| | <i>n-Heptanal; see N-HEPTALDEHYDE</i> | | | | | | |
| | HEPTANES | 3 | UN1206 | II | | P5 | A7.3 |
| | N-HEPTENE | 3 | UN2278 | II | | P5 | A7.3 |
| | HEXACHLOROACETONE | 6.1 | UN2661 | III | | P5 | A10.5 |
| | HEXACHLORO BENZENE | 6.1 | UN2729 | III | | P5 | A10.5 |
| | HEXACHLORO BUTADIENE | 6.1 | UN2279 | III | | P5 | A10.5 |

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|--------|---|-------------------------|-----------------|-----------|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | HEXACHLOROCYCLOPENTADIENE | 6.1 | UN2646 | I | | P2, 2 | A10.7 |
| | HEXACHLOROPHENE | 6.1 | UN2875 | III | | P5 | A10.6 |
| | HEXADECYLTRICHLOROSILANE | 8 | UN1781 | II | | P4, A7, N34 | A12.3 |
| | HEXADIENES | 3 | UN2458 | II | | P5 | A7.3 |
| | HEXAETHYL TETRAPHOSPHATE AND COMPRESSED GAS MIXTURES | 2.3 | UN1612 | | | P2, 3 | A6.19 |
| | HEXAETHYL TETRAPHOSPHATE, <i>liquid or solid</i> | 6.1 | UN1611 | II | | P5, N76 | A10.5, A10.6 |
| | HEXAFLUOROACETONE | 2.3 | UN2420 | | 8 | P2, 2 | A6.5 |
| | HEXAFLUOROACETONE HYDRATE | 6.1 | UN2552 | II | | P5 | A10.5 |
| | HEXAFLUOROETHANE, COMPRESSED or REFRIGERANT GAS R116 | 2.2 | UN2193 | | | P5 | A6.4, A6.5 |
| | HEXAFLUOROPHOSPHORIC ACID | 8 | UN1782 | II | | P5, A6, A7, N3, N34 | A12.3 |
| | HEXAFLUOROPROPYLENE, COMPRESSED or REFRIGERANT GAS R1216 | 2.2 | UN1858 | | | P5 | A6.4, A6.5 |
| D | HEXAFLUOROPROPYLENE OXIDE | 2.2 | NA1956 | | | P5 | A6.4, A6.5 |
| | HEXALDEHYDE | 3 | UN1207 | III | | P5 | A7.3 |
| | HEXAMETHYLENEDIAMINE, SOLID | 8 | UN2280 | III | | P5 | A12.4 |
| | HEXAMETHYLENEDIAMINE SOLUTION | 8 | UN1783 | II III | | P5 P5 | A12.3 A12.3 |
| | HEXAMETHYLENE DIISOCYANATE | 6.1 | UN2281 | II | | P5 | A10.5 |
| | HEXAMETHYLENEIMINE | 3 | UN2493 | II | 8 | P5 | A7.3 |
| | HEXAMETHYLENETETRAMINE | 4.1 | UN1328 | III | | P5, A1 | A8.4 |
| | HEXANES | 3 | UN1208 | II | | P5 | A7.3 |
| | HEXANITRODIPHENYLAMINE or DIPICRYLAMINE or HEXYL <i>Hexanitroethane</i> | 1.1D | UN0079 | II | | P4 | A5.9 |
| | <i>Hexanitrooxanilide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | HEXANITROSTILBENE | 1.1D | UN0392 | II | | P4 | A5.9 |
| | HEXANOLS | 3 | UN2282 | III | | P5 | A7.3 |
| | 1-HEXENE | 3 | UN2370 | II | | P5 | A7.3 |
| | HEXOGEN; <i>see</i> CYCLOTRIMETHYLENETRI- NITRAMINE <i>etc.</i> | | | | | | |
| | HEXOLITE, or HEXOTOL <i>dry or wetted</i> <i>with less than 15% water, by mass</i> | 1.1D | UN0118 | II | | P4 | A5.9 |
| | HEXOTONAL | 1.1D | UN0393 | II | | P4 | A5.9 |
| | HEXYL; <i>see</i> HEXANITRODIPHENYLAMINE | | | | | | |
| | HEXYLTRICHLOROSILANE | 8 | UN1784 | II | | P4, A7, N34 | A12.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | HMX ; <i>see</i> CYCLOTETRAMETHYLENE- TETRANITRAMINE , <i>etc.</i> | | | | | | |
| | HYDRAZINE, ANHYDROUS <i>or</i> HYDRAZINE AQUEOUS SOLUTIONS <i>with more than 64% hydrazine, by mass</i> | 8 | UN2029 | I | 3, 6.1 | P3, A3, A6, A7, A10 | A12.3 |
| | <i>Hydrazine azide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Hydrazine chlorate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Hydrazine dicarbonic acid diazide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | HYDRAZINE, AQUEOUS SOLUTION <i>with not more than 37% hydrazine, by mass</i> | 6.1 | UN3293 | III | | P5 | A10.5 |
| | HYDRAZINE HYDRATE <i>or</i> HYDRAZINE AQUEOUS SOLUTIONS , <i>with not less than 37% but not more than 64% hydrazine, by mass</i> | 8 | UN2030 | II | 6.1 | P4 | A12.3 |
| | <i>Hydrazine perchlorate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Hydrazine selenate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Hydriodic acid, anhydrous</i> ; <i>see</i> HYDROGEN IODIDE, ANHYDROUS | | | | | | |
| | HYDRIODIC ACID | 8 | UN1787 | | II III | P5, A3, A6, N41 P5 | A12.3 A12.3 |
| | <i>Hydrobromic acid, anhydrous</i> ; <i>see</i> HYDROGEN BROMIDE, ANHYDROUS | | | | | | |
| | HYDROBROMIC ACID, SOLUTION , <i>more than 49% strength</i> | 8 | UN1788 | II III | | P4, N41 P5 | A12.3 A12.3 |
| | HYDROBROMIC ACID, SOLUTION , <i>not more than 49% strength</i> | 8 | UN1788 | II III | | P5, A3, A6, N41 P5 | A12.3 A12.3 |
| | HYDROCARBON GAS, MIXTURES COMPRESSED, N.O.S. | 2.1 | UN1964 | | | P4 | A6.4, A6.6 |
| | HYDROCARBON GAS, MIXTURES, LIQUEFIED, N.O.S. | 2.1 | UN1965 | | | P4 | A6.4, A6.5 |
| | HYDROCARBON GAS REFILLS FOR SMALL DEVICES , <i>with release device</i> ; <i>see</i> DEVICES, SMALL , | | | | | | |
| | HYDROCARBON GAS POWERED , <i>with release device</i> <i>Hydrochloric acid, anhydrous</i> ; <i>see</i> HYDROGEN CHLORIDE, ANHYDROUS | | | | | | |
| | HYDROCARBONS, LIQUID, N.O.S. | 3 | UN3295 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | HYDROCHLORIC ACID | 8 | UN1789 | II III | | P4, A3, A6, N41 P5 | A12.3 A12.3 |
| | <i>Hydrocyanic acid, anhydrous; see HYDROGEN CYANIDE, etc.</i> | | | | | | |
| | HYDROCYANIC ACID, AQUEOUS SOLUTIONS or HYDROGEN CYANIDE, AQUEOUS SOLUTIONS not more than 20% hydrogen cyanide | | | | | FORBIDDEN | FORBIDDEN |
| | HYDROFLUORIC ACID AND SULPHURIC ACID MIXTURES | 8 | UN1786 | I | 6.1 | P3, A6, A7, N5, N34 | A12.3 |
| | <i>Hydrofluoric acid, anhydrous; see HYDROGEN FLUORIDE, ANHYDROUS</i> | | | | | | |
| | HYDROFLUORIC ACID, with more than 60% strength | 8 | UN1790 | I | 6.1 | P3, A6, A7, N5, N34 | A12.3 |
| | HYDROFLUORIC ACID, with not more than 60% strength | 8 | UN1790 | II | 6.1 | P4, A6, A7, N5, N34 | A12.3 |
| | <i>Hydrofluosilicic acid; see FLUOROSILICIC ACID</i> | | | | | | |
| | HYDROGEN AND METHANE MIXTURES, COMPRESSED | 2.1 | UN2034 | | | P4 | A6.4, A6.6 |
| | HYDROGEN BROMIDE, ANHYDROUS | 2.3 | UN1048 | | 8 | P2, 3 | A6.5 |
| | HYDROGEN CHLORIDE, ANHYDROUS | 2.3 | UN1050 | | 8 | P2, 3 | A6.5 |
| | HYDROGEN CHLORIDE, REFRIGERATED LIQUID | | | | | FORBIDDEN | FORBIDDEN |
| | HYDROGEN, COMPRESSED | 2.1 | UN1049 | | | P4 | A6.4, A6.6 |
| | HYDROGEN CYANIDE, STABILIZED, with less than 3% water | | | | | FORBIDDEN | FORBIDDEN |
| | HYDROGEN CYANIDE, SOLUTION IN ALCOHOL with not more than 45% of hydrogen cyanide | | | | | FORBIDDEN | FORBIDDEN |
| | HYDROGEN FLUORIDE, ANHYDROUS | 8 | UN1052 | I | 6.1 | P2, 3 | A12.9 |
| | HYDROGEN IODIDE, ANHYDROUS | 2.3 | UN2197 | | | P2, 3 | A6.5 |
| | <i>Hydrogen iodide solution; see HYDRIODIC ACID, SOLUTION</i> | | | | | | |
| | HYDROGEN PEROXIDE AND PEROXYACETIC ACID MIXTURES, STABILIZED with acids, water and not more than 5% peroxyacetic acid, | 5.1 | UN3149 | II | 8 | P5, A2, A3, A6 | A9.7 |
| | HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS with more than 40%, but not more than 60% hydrogen peroxide | | | | | FORBIDDEN | FORBIDDEN |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS with not less than 8%, but less than 20% hydrogen peroxide(stabilized as necessary) | 5.1 | UN2984 | III | | P5, A1 | A9.7 |
| | HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS with not less than 20%, but not more than 40% hydrogen peroxide (stabilized as necessary) | 5.1 | UN2014 | II | 8 | P5, A2, A3, A6 | A9.7 |
| | HYDROGEN PEROXIDE, STABILIZED or HYDROGEN PEROXIDE AQUEOUS SOLUTIONS, STABILIZED with more than 60% hydrogen peroxide | | | | | FORBIDDEN | FORBIDDEN |
| | HYDROGEN, REFRIGERATED LIQUID (cryogenic liquid) | 2.1 | UN1966 | | | P3 | A6.12 |
| | HYDROGEN SELENIDE, ANHYDROUS | | | | | FORBIDDEN | FORBIDDEN |
| | HYDROGEN SULPHIDE | 2.3 | UN1053 | | 2.1 | P2, 2 | A6.5 |
| | HYDROGEN DIFLUORIDES, N.O.S. SOLID or SOLUTION | 8 | UN1740 | II III | | P5, N3, N34 P5, N3, N34 | A12.3, A12.4 A12.3, A12.4 |
| | HYDROQUINONE | 6.1 | UN2662 | III | | P5 | A10.6 |
| | HYDROXYLAMINE SULPHATE | 8 | UN2865 | III | | P5 | A12.4 |
| | <i>Hydroxyl amine iodide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | HYPOCHLORITE SOLUTIONS | 8 | UN1791 | II III | | P5, A7, A21, N34 P5, A21, N34 | A12.3 A12.3 |
| | <i>Hyponitrous acid</i> | | | | | FORBIDDEN | FORBIDDEN |
| | HYPOCHLORITES, INORGANIC, N.O.S. | 5.1 | UN3212 | II | | P5 | A9.8 |
| | <i>Igniter fuse, metal clad; see FUSE, IGNITER, tubular, metal clad</i> | | | | | | |
| | IGNITERS | 1.1G | UN0121 | II | | P4 | A5.28 |
| | IGNITERS | 1.2G | UN0314 | II | | P4 | A5.28 |
| | IGNITERS | 1.3G | UN0315 | II | | P5 | A5.28 |
| | IGNITERS | 1.4G | UN0325 | II | | P5 | A5.28 |
| | IGNITERS | 1.4S | UN0454 | II | | P5, A69 | A5.28 |
| | 3,3'-IMINODIPROPYLAMINE | 8 | UN2269 | III | | P5 | A12.3 |
| * | INFECTIOUS SUBSTANCES, AFFECTING ANIMALS only | 6.2 | UN2900 | | | P1, P5 | A10.9 |
| * | INFECTIOUS SUBSTANCES, AFFECTING HUMANS | 6.2 | UN2814 | | | P1, P5 | A10.9 |
| * | INSECTICIDE GASES, FLAMMABLE, N.O.S | 2.1 | UN3354 | | | P4 | A6.4, A6.6 |
| * | INSECTICIDE GASES, N.O.S | 2.2 | UN1968 | | | P5 | A6.4, A6.6 |

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| * | INSECTICIDE GASES, TOXIC, FLAMMABLE, N.O.S <i>Inhalation hazard Zone A</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | INSECTICIDE GASES, TOXIC, FLAMMABLE, N.O.S <i>Inhalation hazard Zone B</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | INSECTICIDE GASES, TOXIC, FLAMMABLE, N.O.S <i>Inhalation hazard Zone C</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | INSECTICIDE GASES, TOXIC, FLAMMABLE, N.O.S <i>Inhalation hazard Zone D</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | INSECTICIDE GASES, TOXIC, N.O.S. <i>Iodine azide (dry)</i> | | | | | FORBIDDEN FORBIDDEN | FORBIDDEN FORBIDDEN |
| | IODINE MONOCHLORIDE | 8 | UN1792 | II | | P4, N41 | A12.3 |
| | IODINE PENTAFLUORIDE | 5.1 | UN2495 | I | 6.1, 8 | P3 | A9.9 |
| | 2-IODOBUTANE | 3 | UN2390 | II | | P5 | A7.3 |
| | IODOMETHYLPROPANES | 3 | UN2391 | II | | P5 | A7.3 |
| | IODOPROPANES | 3 | UN2392 | III | | P5 | A7.3 |
| | <i>Iron chloride; see FERRIC CHLORIDE</i> | | | | | | |
| | IRON OXIDE, SPENT, or IRON SPONGE, SPENT <i>obtained from coal gas purification</i> | | | | | FORBIDDEN | FORBIDDEN |
| | IRON PENTACARBONYL | 6.1 | UN1994 | I | 3 | P1, 1 | A10.3 |
| | <i>Irritating material; see TEAR GAS SUBSTANCE, etc.</i> | | | | | | |
| | ISOBUTANE <i>see also</i> PETROLEUM GASES, LIQUEFIED | 2.1 | UN1969 | | | P4, 19 | A6.4, A6.5 |
| | ISOBUTANOL or ISOBUTYL ALCOHOL | 3 | UN1212 | III | | P5 | A7.3 |
| | ISOBUTYL ACETATE | 3 | UN1213 | II | | P5 | A7.3 |
| | ISOBUTYL ACRYLATE, STABILIZED | 3 | UN2527 | III | | P5 | A7.3 |
| | <i>Isobutyl Alcohol; see ISOBUTANOL</i> | | | | | | |
| | <i>Isobutyl Aldehyde; see ISOBUTYRALDEHYDE</i> | | | | | | |
| | ISOBUTYLAMINE | 3 | UN1214 | II | 8 | P5 | A7.3 |
| D | ISOBUTYL CHLOROFORMATE | 6.1 | NA2742 | I | 3, 8 | P2, 2 | A10.7 |
| | ISOBUTYLENE, <i>see</i> PETROLEUM GASES, LIQUEFIED | 2.1 | UN1055 | | | P4 | A6.4, A6.5 |
| | ISOBUTYL FORMATE | 3 | UN2393 | II | | P5 | A7.3 |
| | ISOBUTYL ISOBUTYRATE | 3 | UN2528 | III | | P5 | A7.3 |
| + | ISOBUTYL ISOCYANATE | 3 | UN2486 | I | 6.1 | P1, 1 | A7.6 |
| | ISOBUTYL METHACRYLATE, STABILIZED | 3 | UN2283 | III | | P5 | A7.3 |

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| | ISOBUTYL PROPIONATE | 3 | UN2394 | III | | P5 | A7.3 |
| | ISOBUTYRALDEHYDE <i>or</i> ISOBUTYL ALDEHYDE | 3 | UN2045 | II | | P5 | A7.3 |
| | ISOBUTYRIC ACID | 3 | UN2529 | III | 8 | P5 | A7.3 |
| | ISOBUTYRIC ANHYDRIDE | 3 | UN2530 | III | 8 | P5 | A7.3 |
| | ISOBUTYRONITRILE | 3 | UN2284 | II | 6.1 | P5 | A7.3 |
| | ISOBUTYRYL CHLORIDE | 3 | UN2395 | II | 8 | P5 | A7.3 |
| * | ISOCYANATES, TOXIC N.O.S. <i>or</i> ISOCYANATE SOLUTIONS, TOXIC N.O.S., flashpoint more than 61 degrees C and boiling point less than 300 degrees C | 6.1 | UN2206 | II III | | P4 P4 | A10.5 A10.5 |
| * | ISOCYANATES, TOXIC, FLAMMABLE N.O.S. <i>or</i> ISOCYANATE SOLUTIONS, TOXIC, FLAMMABLE, N.O.S., flashpoint not less than 23 degrees C but not more than 61 degrees C and boiling point less than 300 degrees C | 6.1 | UN3080 | II | 3 | P4 | A10.5 |
| * | ISOCYANATES, FLAMMABLE, TOXIC, N.O.S. <i>or</i> ISOCYANATE SOLUTIONS, FLAMMABLE, TOXIC, N.O.S., flashpoint less than 23 degrees C | 3 | UN2478 | II | 6.1 | P2, 5, A3, A7 | A7.3 |
| | ISOCYANATOBENZOTRIFLUORIDES | 6.1 | UN2285 | II | 3 | P2, 5 | A10.5 |
| | ISOHEPTENE | 3 | UN2287 | II | | P5 | A7.3 |
| | ISOHEXENE | 3 | UN2288 | II | | P5 | A7.3 |
| | <i>Isooctane, see</i> OCTANES | | | | | | |
| | ISOCTENE | 3 | UN1216 | II | | P5 | A7.3 |
| | ISOPENTANE, <i>see</i> PENTANE | | | | | | |
| | ISOPENTENES | 3 | UN2371 | I | | P3 | A7.3 |
| | <i>Isopentyl nitrite, see</i> AMYL NITRITE | | | | | | |
| | ISOPHORONEDIAMINE | 8 | UN2289 | III | | P5 | A12.3 |
| | ISOPHORONE DIISOCYANATE | 6.1 | UN2290 | III | | P5 | A10.5 |
| | ISOPRENE, STABILIZED | 3 | UN1218 | I | | P3 | A7.3 |
| | ISOPROPANOL <i>or</i> ISOPROPYL ALCOHOL | 3 | UN1219 | II | | P5 | A7.3 |
| | ISOPROPENYL ACETATE | 3 | UN2403 | II | | P5 | A7.3 |
| | ISOPROPENYLBENZENE | 3 | UN2303 | III | | P5 | A7.3 |
| | ISOPROPYL ACETATE | 3 | UN1220 | II | | P5 | A7.3 |
| | ISOPROPYL ACID PHOSPHATE | 8 | UN1793 | III | | P5 | A12.4 |
| | <i>Isopropyl Alcohol, see</i> ISOPROPANOL | | | | | | |
| | ISOPROPYLAMINE | 3 | UN1221 | I | 8 | P3 | A7.3 |
| | ISOPROPYLBENZENE | 3 | UN1918 | III | | P5 | A7.3 |
| | ISOPROPYL BUTYRATE | 3 | UN2405 | III | | P5 | A7.3 |
| | ISOPROPYL CHLOROACETATE | 3 | UN2947 | III | | P5 | A7.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | ISOPROPYL CHLOROFORMATE | 6.1 | UN2407 | I | 3, 8 | P2, 2 | A10.7 |
| | ISOPROPYL 2-CHLOROPROPIONATE | 3 | UN2934 | III | | P5 | A7.3 |
| | <i>Isopropyl-alpha-chloropropionate, see</i> ISOPROPYL 2- CHLOROPROPIONATE | | | | | | |
| | ISOPROPYL ISOBUTYRATE | 3 | UN2406 | II | | P5 | A7.3 |
| + | ISOPROPYL ISOCYANATE | 3 | UN2483 | I | 6.1 | P1, 1 | A7.6 |
| | <i>Isopropyl mercaptan, see</i> PROPANETHIOLS | | | | | | |
| | ISOPROPYL NITRATE | 3 | UN1222 | II | | P5 | A7.3 |
| | <i>Isopropyl phosphoric acid, see</i> ISOPROPYL ACID PHOSPHATE | | | | | | |
| | ISOPROPYL PROPIONATE | 3 | UN2409 | II | | P5 | A7.3 |
| | ISOSORBIDE DINITRATE MIXTURE <i>with not less than 60% lactose, mannose, starch or calcium hydrogen phosphate</i> | 4.1 | UN2907 | II | | P5 | A8.4 |
| | ISOSORBIDE-5-MONONITRATE | 4.1 | UN3251 | III | | P5 | A8.4 |
| | <i>Isothiocyanic acid</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Jet fuel, see</i> FUEL, AVIATION, TURBINE ENGINE | | | | | | |
| D | JET PERFORATING GUNS, CHARGED <i>oil well, with detonator</i> | | | | | FORBIDDEN | FORBIDDEN |
| D | JET PERFORATING GUNS, CHARGED <i>oil well, with detonator</i> | 1.4D | NA0494 | II | | P5, 56, A69 | A5.6 |
| | JET PERFORATING GUNS, CHARGED <i>oil well, without detonator</i> | | | | | FORBIDDEN | FORBIDDEN |
| | JET PERFORATING GUNS, CHARGED <i>oil well, without detonator</i> | 1.4D | UN0494 | II | | P5, 56, A69 | A5.6 |
| | <i>Jet perforators, see</i> CHARGES, SHAPED, COMMERCIAL etc. | | | | | | |
| | <i>Jet tappers, without detonator, see</i> CHARGES, SHAPED, COMMERCIAL etc. | | | | | | |
| | <i>Jet thrust igniters, for rocket motors or Jato, see</i> IGNITERS | | | | | | |
| | <i>Jet thrust unit (Jato) see</i> ROCKET MOTORS | | | | | | |
| | KEROSENE | 3 | UN1223 | III | | P5 | A7.3 |
| * | KETONES, LIQUID, N.O.S. | 3 | UN1224 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | KRYPTON, COMPRESSED | 2.2 | UN1056 | | | P5 | A6.4, A6.6 |
| | KRYPTON, REFRIGERATED LIQUID (cryogenic liquid) | 2.2 | UN1970 | | | P4 | A6.12 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Lacquer base or lacquer chips, nitrocellulose, dry, see NITROCELLULOSE, etc</i> | | | | | | |
| | <i>Lacquer base or lacquer chips, plastic, wet with alcohol or solvent, see NITROCELLULOSE or PAINT, etc.</i> | | | | | | |
| | LEAD ACETATE | 6.1 | UN1616 | III | | P5 | A10.6 |
| | LEAD ARSENATES | 6.1 | UN1617 | II | | P5 | A10.6 |
| | LEAD ARSENITES | 6.1 | UN1618 | II | | P5 | A10.6 |
| | <i>Lead azide (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | LEAD AZIDE , wetted with not less than 20% water or mixture of alcohol and water, by mass | 1.1A | UN0129 | II | | P3, 111, 117 | A5.7 |
| | LEAD COMPOUNDS, SOLUBLE, N.O.S. | 6.1 | UN2291 | III | | P5 | A10.6 |
| | LEAD CYANIDE | 6.1 | UN1620 | II | | P5 | A10.6 |
| | LEAD DIOXIDE | 5.1 | UN1872 | III | | P5, A1 | A9.8 |
| D | LEAD MONONITRORESORCINATE | 1.1A | NA0473 | II | | P3, 111, 117 | A5.7 |
| | LEAD NITRATE | 5.1 | UN1469 | II | 6.1 | P5 | A9.8 |
| | <i>Lead nitroresorcinate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | LEAD PERCHLORATE SOLID or SOLUTION | 5.1 | UN1470 | II | 6.1 | P5 | A9.7, A9.8 |
| | <i>Lead peroxide; see LEAD DIOXIDE</i> | | | | | | |
| | LEAD PHOSPHITE, DIBASIC | 4.1 | UN2989 | II III | | P5 P5 | A8.4 A8.4 |
| | <i>Lead picrate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Lead styphnate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | LEAD STYPHNATE, WETTED or LEAD TRINITRORESORCINATE, WETTED with not less than 20% water or mixture of alcohol and water, by mass | 1.1A | UN0130 | II | | P3, 111, 117 | A5.7 |
| | LEAD SULPHATE with more than 3% free acid | 8 | UN1794 | II | | P5 | A12.4 |
| | LEAD TRINITRORESORCINATE; see LEAD STYPHNATE, etc. | | | | | | |
| | LIFE-SAVING APPLIANCES, NOT SELF INFLATING containing dangerous goods as equipment | 9 | UN3072 | | | P5 | A13.11 |
| | LIFE-SAVING APPLIANCES, SELF INFLATING | 9 | UN2990 | | | P5 | A13.11 |
| D | LIGHTERS FOR CIGARS, CIGARETTES, etc. with lighter fluids | | | | | FORBIDDEN | FORBIDDEN |
| | LIGHTERS, FUSE | 1.4S | UN0131 | II | | P5, A69 | A5.28 |
| | LIGHTERS or LIGHTER REFILLS (cigarettes) containing flammable gas | 2.1 | UN1057 | | | P5, N10 | A6.11 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | LIQUEFIED GASES, <i>nonflammable</i> <i>charged with nitrogen, carbon dioxide or air</i> | 2.2 | UN1058 | | | P5 | A6.4, A6.5 |
| * | LIQUEFIED GAS, N.O.S | 2.2 | UN3163 | | | P5 | A6.4, A6.5 |
| * | LIQUEFIED GAS OXIDIZING, N.O.S | 2.2 | UN3157 | | 5.1 | P5 | A6.4, A6.5 |
| * | LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S, <i>Inhalation Hazard</i> <i>Zone A</i> | 2.3 | UN3160 | | 2.1 | P1, 1 | A6.16 |
| * | LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S, <i>Inhalation Hazard</i> <i>Zone B</i> | 2.3 | UN3160 | | 2.1 | P2, 2 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S, <i>Inhalation Hazard</i> <i>Zone C</i> | 2.3 | UN3160 | | 2.1 | P2, 3 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, FLAMMABLE, N.O.S, <i>Inhalation Hazard</i> <i>Zone D</i> | 2.3 | UN3160 | | 2.1 | P2, 4 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, N.O.S, <i>Inhalation Hazard Zone A</i> | 2.3 | UN3162 | | | P1, 1 | A6.16 |
| * | LIQUEFIED GAS, TOXIC, N.O.S, <i>Inhalation Hazard Zone B</i> | 2.3 | UN3162 | | | P2, 2 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, N.O.S, <i>Inhalation Hazard Zone C</i> | 2.3 | UN3162 | | | P2, 3 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, N.O.S, <i>Inhalation Hazard Zone D</i> | 2.3 | UN3162 | | | P2, 4 | A6.5 |
| * | LIQUEFIED GASES, FLAMMABLE, N.O.S. | 2.1 | UN3161 | | | P4 | A6.4, A6.5 |
| | <i>Liquefied hydrocarbon gas; see</i> HYDROCARBON GASES, LIQUEFIED, N.O.S., etc. | | | | | | |
| * | LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S, <i>Inhalation Hazard</i> <i>Zone A</i> | 2.3 | UN3308 | | 8 | P1, 1 | A6.16 |
| * | LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S, <i>Inhalation Hazard</i> <i>Zone B</i> | 2.3 | UN3308 | | 8 | P2, 2 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S, <i>Inhalation Hazard</i> <i>Zone C</i> | 2.3 | UN3308 | | 8 | P2, 3 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S, <i>Inhalation Hazard</i> <i>Zone D</i> | 2.3 | UN3308 | | 8 | P2, 4 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S, <i>Inhalation Hazard</i> <i>Zone A</i> | 2.3 | UN3309 | | 2.1, 8 | P1, 1 | A6.16 |

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| * | LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S, <i>Inhalation Hazard Zone B</i> | 2.3 | UN3309 | | 2.1, 8 | P2, 2 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S, <i>Inhalation Hazard Zone C</i> | 2.3 | UN3309 | | 2.1, 8 | P2, 3 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, CORROSIVE, N.O.S, <i>Inhalation Hazard Zone D</i> | 2.3 | UN3309 | | 2.1, 8 | P2, 4 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S, <i>Inhalation Hazard Zone A</i> | 2.3 | UN3310 | | 5.1, 8 | P1, 1 | A6.16 |
| * | LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S, <i>Inhalation Hazard Zone B</i> | 2.3 | UN3310 | | 2.1, 8 | P2, 2 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S, <i>Inhalation Hazard Zone C</i> | 2.3 | UN3310 | | 2.1, 8 | P2, 3 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S, <i>Inhalation Hazard Zone D</i> | 2.3 | UN3310 | | 2.1, 8 | P2, 4 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S, <i>Inhalation Hazard Zone A</i> | 2.3 | UN3307 | | 5.1 | P1, 1 | A6.16 |
| * | LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S, <i>Inhalation Hazard Zone B</i> | 2.3 | UN3307 | | 5.1 | P2, 2 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S, <i>Inhalation Hazard Zone C</i> | 2.3 | UN3307 | | 5.1 | P2, 3 | A6.5 |
| * | LIQUEFIED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S, <i>Inhalation Hazard Zone D</i> | 2.3 | UN3307 | | 5.1 | P2, 4 | A6.5 |
| | <i>Liquefied natural gas; see METHANE etc.</i> | | | | | | |
| | <i>Liquefied petroleum gas; see PETROLEUM GASES, LIQUEFIED</i> | | | | | | |
| | LITHIUM | 4.3 | UN1415 | I | | P3, A7 | A8.4 |
| | LITHIUM ALKYLs | 4.2 | UN2445 | I | 4.3 | P3 | A8.6 |
| | LITHIUM ALUMINIUM HYDRIDE | 4.3 | UN1410 | I | | P3, A19 | A8.4 |
| | LITHIUM ALUMINIUM HYDRIDE, ETHEREAL | 4.3 | UN1411 | I | 3 | P3, A2, A3, A11, N34 | A8.3 |
| | LITHIUM BATTERIES CONTAINED IN EQUIPMENT <i>or</i> LITHIUM BATTERIES PACKED WITH EQUIPMENT | 9 | UN3091 | II | | P5 | A13.8 |
| | LITHIUM BATTERIES | 9 | UN3090 | II | | P5 | A13.8 |

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|--------|---|-------------------------|-----------------|-----------|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | LITHIUM BOROHYDRIDE | 4.3 | UN1413 | I | | P3, A19, N40 | A8.4 |
| | LITHIUM FERROSILICON | 4.3 | UN2830 | II | | P5, A19 | A8.4 |
| | LITHIUM HYDRIDE | 4.3 | UN1414 | I | | P3, A19, N40 | A8.4 |
| | LITHIUM HYDRIDE, FUSED SOLID | 4.3 | UN2805 | II | | P5, A8, A19, A20 | A8.4 |
| | LITHIUM HYDROXIDE, MONOHYDRATE <i>or</i> LITHIUM HYDROXIDES, SOLID | 8 | UN2680 | II | | P5, A19, N45 | A12.4 |
| | LITHIUM HYDROXIDE, SOLUTION | 8 | UN2679 | II III | | P5 P5 | A12.3 A12.3 |
| | LITHIUM HYPOCHLORITE, DRY <i>or</i> LITHIUM HYPOCHLORITE MIXTURES, DRY | 5.1 | UN1471 | II | | P5, A9, N34 | A9.8 |
| | LITHIUM NITRATE | 5.1 | UN2722 | III | | P5, A1 | A9.8 |
| | LITHIUM NITRIDE | 4.3 | UN2806 | I | | P3, A19, N40 | A8.4 |
| | LITHIUM PEROXIDE | 5.1 | UN1472 | II | | P5, A9, N34 | A9.8 |
| | LITHIUM SILICON | 4.3 | UN1417 | II | | P5, A19, A20 | A8.4 |
| | LONDON PURPLE | 6.1 | UN1621 | II | | P5 | A10.6 |
| | <i>LPG, see</i> PETROLEUM GASES, LIQUEFIED | | | | | | |
| | <i>Lye, see</i> SODIUM HYDROXIDE, SOLUTIONS | | | | | | |
| | MAGNESIUM ALKYLs | 4.2 | UN3053 | I | 4.3 | P3 | A8.6 |
| | MAGNESIUM ALUMINIUM PHOSPHIDE | 4.3 | UN1419 | I | 6.1 | P3, A19, N34, N40 | A8.4 |
| + | MAGNESIUM ARSENATE | 6.1 | UN1622 | II | | P5 | A10.6 |
| | <i>Magnesium bisulfite solution, see</i> BISULFITES AQUEOUS SOLUTIONS, N.O.S. | | | | | | |
| | MAGNESIUM BROMATE | 5.1 | UN1473 | II | | P5, A1 | A9.8 |
| | MAGNESIUM CHLORATE | 5.1 | UN2723 | II | | P5 | A9.8 |
| | MAGNESIUM DIAMIDE | 4.2 | UN2004 | II | | P5, A8, A19, A20 | A8.4 |
| | MAGNESIUM DIPHENYL | 4.2 | UN2005 | I | | P3 | A8.12 |
| | <i>Magnesium dross, wet or hot</i> | | | | | FORBIDDEN | FORBIDDEN |
| | MAGNESIUM FLUOROSILICATE | 6.1 | UN2853 | III | | P5 | A10.6 |
| | MAGNESIUM GRANULES, COATED, <i>particle size not less than 149 Microns</i> | 4.3 | UN2950 | III | | P5, A1, A19 | A8.4 |
| | MAGNESIUM HYDRIDE | 4.3 | UN2010 | I | | P3, A19, N40 | A8.4 |
| | MAGNESIUM <i>or</i> MAGNESIUM ALLOYS <i>with more than 50% magnesium in</i> <i>pellets, turnings or ribbons</i> | 4.1 | UN1869 | III | | P5, A1 | A8.4 |
| | MAGNESIUM NITRATE | 5.1 | UN1474 | III | | P5, A1 | A9.8 |
| | MAGNESIUM PERCHLORATE | 5.1 | UN1475 | II | | P5 | A9.8 |
| | MAGNESIUM PEROXIDE | 5.1 | UN1476 | II | | P5 | A9.8 |
| | MAGNESIUM PHOSPHIDE | 4.3 | UN2011 | I | 6.1 | P3, A19, N40 | A8.4 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|-------------------------------|----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | MAGNESIUM, POWDER <i>or</i> MAGNESIUM ALLOYS, POWDER | 4.3 | UN1418 | I II III | 4.2 4.2 4.2 | P3, A19 P5, A19 P5, A19 | A8.4 A8.4 A8.4 |
| | <i>Magnesium scrap, see MAGNESIUM, etc.</i> | | | | | | |
| | MAGNESIUM SILICIDE | 4.3 | UN2624 | II | | P5, A19, A20 | A8.4 |
| | MAGNETIZED MATERIAL | 9 | UN2807 | | | P5 | A13.10 |
| D | MALEIC ACID | 8 | NA2215 | III | | P5 | A12.4 |
| | MALEIC ANHYDRIDE | 8 | UN2215 | III | | P5 | A12.4 |
| | MALONONITRILE | 6.1 | UN2647 | II | | P5 | A10.6 |
| | <i>Mancozeb (manganese, ethylenebisdithiocarbamate complex with zinc) see MANEB</i> | | | | | | |
| | MANEB <i>or</i> MANEB PREPARATIONS <i>with not less than 60% maneb</i> | 4.2 | UN2210 | III | 4.3 | P5, A1, A19 | A8.4 |
| | MANEB STABILIZED <i>or</i> MANEB PREPARATIONS, STABILIZED <i>against</i> <i>self-heating</i> | 4.3 | UN2968 | III | | P5, A1, A19 | A8.4 |
| | MANGANESE NITRATE | 5.1 | UN2724 | III | | P5, A1 | A9.8 |
| | MANGANESE RESINATE | 4.1 | UN1330 | III | | P5, A1 | A8.4 |
| | <i>Mannitan tetranitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Mannitol hexanitrate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | MANNITOL HEXANITRATE, WETTED <i>or</i> NITROMANNITE, WETTED <i>with not</i> <i>less than 40% water, or mixture of alcohol</i> <i>and water, by mass</i> | 1.1D | UN0133 | II | | P4 | A5.9 |
| | <i>Matches, block, see MATCHES, STRIKE</i> ANYWHERE | | | | | | |
| | MATCHES, FUSEE | 4.1 | UN2254 | III | | P4 | A8.15 |
| | MATCHES, SAFETY <i>(book, card or strike</i> <i>on box)</i> | 4.1 | UN1944 | III | | P5 | A8.15 |
| | MATCHES, STRIKE ANYWHERE | 4.1 | UN1331 | III | | P4 | A8.15 |
| | MATCHES, WAX, VESTA | 4.1 | UN1945 | III | | P5 | A8.15 |
| | <i>Matting Acid, see SULPHURIC ACID</i> | | | | | | |
| D | MEDICINE, corrosive, liquid, n.o.s. | 8 | NA1760 | II III | | P5 P5 | A12.3 A12.3 |
| D | MEDICINE, corrosive, solid, n.o.s. | 8 | NA1759 | II III | | P5 P5 | A12.4 A12.4 |
| D | MEDICINE, flammable, liquid, n.o.s. | 3 | NA1993 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| D | MEDICINE, flammable, solid, n.o.s. | 4.1 | NA1325 | II | | P5 | A8.4 |
| D | MEDICINE, oxidizing substance, solid, <i>n.o.s.</i> | 5.1 | NA1479 | II | | P5 | A9.8 |

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|--------|---|-------------------------|-----------------|----------------|--------------------|----------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S. | 3 | UN3248 | II III | 6.1 6.1 | P4, 36 P5, 36 | A7.3 A7.3 |
| | MEDICINE, LIQUID TOXIC, N.O.S. | 6.1 | UN1851 | II III | | P5 P5 | A10.5 A10.5 |
| | MEDICINE, SOLID, TOXIC, N.O.S. | 6.1 | UN3249 | II III | | P5, 36 P5, 36 | A10.6 A10.6 |
| | MERCAPTANS, LIQUID, FLAMMABLE, N.O.S. or MERCAPTAN MIXTURE, LIQUID, FLAMMABLE, N.O.S. | 3 | UN3336 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | MERCAPTANS, LIQUID, FLAMMABLE, TOXIC, N.O.S. or MERCAPTAN MIXTURES, LIQUID, FLAMMABLE, TOXIC, N.O.S. | 3 | UN1228 | II III | 6.1 6.1 | P4 P5 | A7.3 A7.3 |
| | MERCAPTANS, LIQUID, TOXIC, FLAMMABLE, N.O.S. or MERCAPTAN MIXTURES, LIQUID, TOXIC, FLAMMABLE, N.O.S., flashpoint not less than 23 degrees C | 6.1 | UN3071 | II | 3 | P5 | A10.5 |
| | 5-MERCAPTOTETRAZOL-1-ACETIC ACID | 1.4C | UN0448 | II | | P5 | A5.12 |
| | MERCURIC ARSENATE | 6.1 | UN1623 | II | | P5 | A10.6 |
| | MERCURIC CHLORIDE | 6.1 | UN1624 | II | | P5 | A10.6 |
| | MERCURIC NITRATE | 6.1 | UN1625 | II | | P5, N73 | A10.6 |
| + | MERCURIC POTASSIUM CYANIDE | 6.1 | UN1626 | I | | P5, N74, N75 | A10.6 |
| | <i>Mercuric sulfocyanate, see MERCURY THIOCYANATE</i> | | | | | | |
| | <i>Mercuriol, see MERCURY NUCLEATE</i> | | | | | | |
| | <i>Mercurous azide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | MERCUROUS NITRATE | 6.1 | UN1627 | II | | P5 | A10.6 |
| | MERCURY | 8 | UN2809 | III | | P5 | A12.10 |
| | MERCURY ACETATE | 6.1 | UN1629 | II | | P5 | A10.6 |
| | <i>Mercury acetylde</i> | | | | | FORBIDDEN | FORBIDDEN |
| | MERCURY AMMONIUM CHLORIDE | 6.1 | UN1630 | II | | P5 | A10.6 |
| | MERCURY BASED PESTICIDES, LIQUID, FLAMMABLE, TOXIC, flashpoint less than 23 degrees C | 3 | UN2778 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.2 |
| | MERCURY BASED PESTICIDES, LIQUID, TOXIC, FLAMMABLE, flashpoint not less than 23 degrees C | 6.1 | UN3011 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | MERCURY BASED PESTICIDES, LIQUID, TOXIC | 6.1 | UN3012 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|----------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | MERCURY BASED PESTICIDES, SOLID, TOXIC | 6.1 | UN2777 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | MERCURY BENZOATE | 6.1 | UN1631 | II | | P5 | A10.6 |
| | MERCURY BROMIDES | 6.1 | UN1634 | II | | P5 | A10.6 |
| | MERCURY COMPOUNDS, LIQUID, N.O.S. | 6.1 | UN2024 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | MERCURY COMPOUNDS, SOLID, N.O.S. | 6.1 | UN2025 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | MERCURY CONTAINED IN MANUFACTURED ARTICLES | 8 | UN2809 | III | | P5 | A12.10 |
| | MERCURY CYANIDE | 6.1 | UN1636 | II | | P5, N74, N75 | A10.6 |
| | MERCURY FULMINATE, WETTED <i>with not less than 20% water, or mixture of alcohol and water, by mass</i> | 1.1A | UN0135 | II | | P3, 111, 117 | A5.7 |
| | MERCURY GLUCONATE | 6.1 | UN1637 | II | | P5 | A10.6 |
| | MERCURY IODIDE, <i>solid or solution</i> | 6.1 | UN1638 | II | | P5 | A10.5, A10.6 |
| | <i>Mercury iodine aquabasic ammonobasic</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Mercury Nitride</i> | | | | | FORBIDDEN | FORBIDDEN |
| | MERCURY NUCLEATE | 6.1 | UN1639 | II | | P5 | A10.6 |
| | MERCURY OLEATE | 6.1 | UN1640 | II | | P5 | A10.6 |
| | MERCURY OXIDE | 6.1 | UN1641 | II | | P5 | A10.6 |
| | <i>Mercury oxycyanide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | MERCURY OXYCYANIDE, DESENSITIZED | 6.1 | UN1642 | II | | P5 | A10.6 |
| | MERCURY POTASSIUM IODIDE | 6.1 | UN1643 | II | | P5 | A10.6 |
| | MERCURY SALICYLATE | 6.1 | UN1644 | II | | P5 | A10.6 |
| + | MERCURY SULPHATES | 6.1 | UN1645 | II | | P5 | A10.6 |
| | MERCURY THIOCYANATE | 6.1 | UN1646 | II | | P5 | A10.6 |
| | MESITYL OXIDE | 3 | UN1229 | III | | P5 | A7.3 |
| | METAL ALKYL HALIDES, WATER- REACTIVE, N.O.S. <i>or</i> METAL ARYL HALIDES, WATER-REACTIVE, N.O.S | 4.2 | UN3049 | I | 4.3 | P3 | A8.6 |
| | METAL ALKYL HYDRIDES, WATER- REACTIVE, N.O.S. <i>or</i> METAL ARYL HYDRIDES, WATER-REACTIVE, N.O.S. | 4.2 | UN3050 | I | 4.3 | P3 | A8.6 |
| | METAL ALKYL, WATER-REACTIVE, N.O.S. <i>or</i> METAL ARYL, WATER- REACTIVE, N.O.S | 4.2 | UN2003 | I | 4.3 | P3 | A8.6 |
| D | METAL ALKYL, SOLUTION, N.O.S. | 3 | NA9195 | II | | P5 | A7.3 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|--|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | METAL CARBONYLS, N.O.S. | 6.1 | UN3281 | I II III | | P3, 5 P4 P5 | A10.5 A10.5 A10.5 |
| | METAL CATALYST, DRY | 4.2 | UN2881 | I II III | | P3, N34 P5, N34 P5, N34 | A8.12 A8.12 A8.12 |
| | METAL CATALYST, WETTED <i>with a visible excess of liquid</i> | 4.2 | UN1378 | II | | P5, A2, A8, N34 | A8.4 |
| | METALDEHYDE | 4.1 | UN1332 | III | | P5, A1 | A8.4 |
| | METAL HYDRIDES, FLAMMABLE, N.O.S. | 4.1 | UN3182 | II III | | P5, A1 P5, A1 | A8.4 A8.4 |
| | METAL HYDRIDES, WATER-REACTIVE, N.O.S. | 4.3 | UN1409 | I II | | P3, A19, N34, N40 P5, A19, N34, N40 | A8.4 A8.4 |
| | METAL POWDER, FLAMMABLE, N.O.S. | 4.1 | UN3089 | II III | | P5 P5 | A8.4 A8.4 |
| | METAL POWDER, SELF-HEATING, N.O.S. | 4.2 | UN3189 | II III | | P5 P5 | A8.4 A8.4 |
| | <i>Metal salts of methyl nitramine (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | METAL SALTS OF ORGANIC COMPOUNDS, FLAMMABLE, N.O.S. | 4.1 | UN3181 | II III | | P4, A1 P4, A1 | A8.4 A8.4 |
| * | METALLIC SUBSTANCE, WATER-REACTIVE, N.O.S. | 4.3 | UN3208 | I II III | | P3 P5 P5 | A8.4 A8.4 A8.4 |
| * | METALLIC SUBSTANCE, WATER-REACTIVE, SELF-HEATING, N.O.S. | 4.3 | UN3209 | I II III | 4.2 4.2 4.2 | P3 P4 P5 | A8.4 A8.4 A8.4 |
| | METHACRYLALDEHYDE, STABILIZED | 3 | UN2396 | II | 6.1 | P5 | A7.3 |
| | METHACRYLIC ACID, STABILIZED | 8 | UN2531 | III | | P5 | A12.3 |
| + | METHACRYLONITRILE, STABILIZED | 3 | UN3079 | I | 6.1 | P2, 2 | A7.6 |
| | METHALLYL ALCOHOL | 3 | UN2614 | III | | P5 | A7.3 |
| | METHANE, COMPRESSED <i>or</i> NATURAL GAS, COMPRESSED (<i>with high methane content</i>) | 2.1 | UN1971 | | | P4 | A6.4, A6.6 |
| | METHANE, REFRIGERATED LIQUID (<i>cryogenic liquid</i>) <i>or</i> NATURAL GAS, REFRIGERATED LIQUID (<i>cryogenic liquid, with high methane content</i>) | 2.1 | UN1972 | | | P3 | A6.12 |
| | METHANESULPHONYL CHLORIDE | 6.1 | UN3246 | I | 8 | P2, 2 | A10.7 |
| | METHANOL | 3 | UN1230 | II | 6.1 | P5 | A7.3 |
| | METHAZOIC ACID | | | | | FORBIDDEN | FORBIDDEN |
| + | METHOXYMETHYL ISOCYANATE | 3 | UN2605 | I | 6.1 | P1, 1 | A7.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | 4-METHOXY-4-METHYLPENTAN-2-ONE | 3 | UN2293 | III | | P5 | A7.3 |
| | 1-METHOXY-2-PROPANOL | 3 | UN3092 | III | | P5 | A7.3 |
| | METHYL ACETATE | 3 | UN1231 | II | | P5 | A7.3 |
| | METHYL ACETYLENE AND PROPADIENE MIXTURES, STABILIZED | 2.1 | UN1060 | | | P4 | A6.4, A6.5 |
| | METHYL ACRYLATE, STABILIZED | 3 | UN1919 | II | | P5 | A7.3 |
| | METHYLAL | 3 | UN1234 | II | | P5 | A7.3 |
| | <i>Methyl Alcohol, see METHANOL</i> | | | | | | |
| | METHYL ALLYL CHLORIDE | 3 | UN2554 | II | | P5 | A7.3 |
| | METHYLAMINE, ANHYDROUS | 2.1 | UN1061 | | | P4 | A6.4, A6.5 |
| | METHYLAMINE, AQUEOUS SOLUTION | 3 | UN1235 | II | 8 | P4 | A7.3 |
| | <i>Methylamine dinitramine and dry salts thereof</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Methylamine nitroform</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Methylamine perchlorate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | METHYLAMYL ACETATE | 3 | UN1233 | III | | P5 | A7.3 |
| | <i>Methyl amyl ketone, see AMYL METHYL KETONE</i> | | | | | | |
| | N-METHYLANILINE | 6.1 | UN2294 | III | | P5 | A10.5 |
| | METHYL BENZOATE | 6.1 | UN2938 | III | | P5 | A10.5 |
| | ALPHA-METHYLBENZYL ALCOHOL | 6.1 | UN2937 | III | | P5 | A10.5 |
| | METHYL BROMIDE | 2.3 | UN1062 | | | P2, 3 | A6.17 |
| | <i>Methyl bromide and chloropicrin mixtures with more than 2% chloropicrin, see CHLOROPICRIN AND METHYL BROMIDE MIXTURES</i> | | | | | | |
| | METHYL BROMIDE AND ETHYLENE DIBROMIDE MIXTURES, LIQUID | 6.1 | UN1647 | I | | P2, 2, N65 | A10.7 |
| | METHYL BROMOACETATE | 6.1 | UN2643 | II | | P5 | A10.5 |
| | 3-METHYLBUTAN-2-ONE | 3 | UN2397 | II | | P5 | A7.3 |
| | 3-METHYL-1-BUTENE | 3 | UN2561 | I | | P3 | A7.3 |
| | 2-METHYL-1-BUTENE | 3 | UN2459 | I | | P3 | A7.3 |
| | 2-METHYL-2-BUTENE | 3 | UN2460 | II | | P5 | A7.3 |
| | N-METHYLBUTYLAMINE | 3 | UN2945 | II | 8 | P4 | A7.3 |
| | METHYL-TERT-BUTYL ETHER | 3 | UN2398 | II | | P5 | A7.3 |
| | METHYL BUTYRATE | 3 | UN1237 | II | | P5 | A7.3 |
| | METHYL CHLORIDE <i>or</i> REFRIGERANT GAS R40 | 2.1 | UN1063 | | | P4 | A6.4, A6.5 |
| | METHYL CHLORIDE AND METHYLENE CHLORIDE MIXTURE | 2.1 | UN1912 | | | P4 | A6.4, A6.5 |
| | METHYL CHLOROACETATE | 6.1 | UN2295 | I | 3 | P5 | A10.5 |

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|--------|---|-------------------------|-----------------|-----|--------------------|------------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Methyl chlorocarbonate, see METHYL CHLOROFORMATE</i> | | | | | | |
| | METHYL CHLOROFORMATE | 6.1 | UN1238 | I | 3, 8 | P1, 1, N34 | A10.7 |
| | <i>Methyl chloroform, see 1,1,1-TRICHLOROETHANE</i> | | | | | | |
| | METHYL CHLOROMETHYL ETHER | 6.1 | UN1239 | I | 3 | P1, 1 | A10.7 |
| | METHYL-2-CHLOROPROPIONATE | 3 | UN2933 | III | | P5 | A7.3 |
| | METHYLCHLOROSILANE | 2.3 | UN2534 | | 2.1, 8 | P2, 2, A2, A3, A7, N34 | A6.20 |
| | METHYLCYCLOHEXANE | 3 | UN2296 | II | | P5 | A7.3 |
| | METHYLCYCLOHEXANOLS, flammable | 3 | UN2617 | III | | P5 | A7.3 |
| | METHYLCYCLOHEXANONE | 3 | UN2297 | III | | P5 | A7.3 |
| | METHYLCYCLOPENTANE | 3 | UN2298 | II | | P5 | A7.3 |
| | METHYL DICHLOROACETATE | 6.1 | UN2299 | III | | P5 | A10.5 |
| D | METHYLDICHLOROARSINE | 6.1 | NA1556 | I | | P2, 2 | A10.3 |
| | METHYLDICHLOROSILANE | 4.3 | UN1242 | I | 3, 8 | P3, A2, A3, A7, N34 | A8.3 |
| | <i>Methylene chloride, see DICHLOROMETHANE</i> | | | | | | |
| | <i>Methylene glycol dinitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Methyl ethyl ether, see ETHYL METHYL ETHER</i> | | | | | | |
| | METHYL ETHYL KETONE, see ETHYL METHYL KETONE | | | | | | |
| | <i>Methyl ethyl ketone peroxide, in solution with more than 9% by mass active oxygen</i> | | | | | FORBIDDEN | FORBIDDEN |
| | 2-METHYL-5-ETHYLPYRIDINE | 6.1 | UN2300 | III | | P5 | A10.5 |
| | METHYL FLUORIDE | 2.1 | UN2454 | | | P4 | A6.4, A6.5 |
| | METHYL FORMATE | 3 | UN1243 | I | | P3 | A7.3 |
| | 2-METHYLFURAN | 3 | UN2301 | II | | P5 | A7.3 |
| | <i>a-Methylglucoside Tetranitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>a-Methylglycerol Trinitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | 5-METHYLHEXAN-2-ONE | 3 | UN2302 | III | | P5 | A7.3 |
| | METHYLHYDRAZINE | 6.1 | UN1244 | I | 3, 8 | P1, 1, N34 | A10.7 |
| | 2-METHYL-2-HEPTANETHIOL | 6.1 | UN3023 | I | 3 | P2, 2 | A10.7 |
| | METHYL IODIDE | 6.1 | UN2644 | I | | P2, 2 | A10.7 |
| | METHYL ISOBUTYL CARBINOL | 3 | UN2053 | III | | P5 | A7.3 |
| | METHYL ISOBUTYL KETONE | 3 | UN1245 | II | | P5 | A7.3 |
| | <i>Methyl isobutyl ketone peroxide, in solution with more than 9% by mass active oxygen</i> | | | | | FORBIDDEN | FORBIDDEN |
| | METHYL ISOCYANATE | 6.1 | UN2480 | I | 3 | P1, 1 | A10.7 |
| | METHYL ISOPROPENYL KETONE, STABILIZED | 3 | UN1246 | II | | P5 | A7.3 |
| | METHYL ISOTHIOCYANATE | 6.1 | UN2477 | I | 3 | P2, 2 | A7.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | METHYL ISOVALERATE | 3 | UN2400 | II | | P5 | A7.3 |
| | METHYL MAGNESIUM BROMIDE IN ETHYL ETHER | 4.3 | UN1928 | I | 3 | P3 | A8.3 |
| | METHYL MERCAPTAN | 2.3 | UN1064 | | 2.1 | P2, 3 | A6.5 |
| | METHYL METHACRYLATE MONOMER, STABILIZED | 3 | UN1247 | II | | P5 | A7.3 |
| | 4-METHYLMORPHOLINE or N- METHYLMORPHOLINE | 3 | UN2535 | II | 8 | P5 | A7.3 |
| | <i>Methyl nitramine (dry),</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Methyl nitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Methyl nitrite</i> | | | | | FORBIDDEN | FORBIDDEN |
| | METHYL ORTHOSILICATE | 6.1 | UN2606 | I | 3 | P2, 2 | A10.7 |
| D | METHYL PARATHION <i>liquid</i> | 6.1 | NA3018 | II | | P5, N76 | A10.5 |
| D | METHYL PARATHION <i>solid</i> | 6.1 | NA2783 | II | | P5, N77 | A10.6 |
| | METHYLPENTADIENE | 3 | UN2461 | II | | P5 | A7.3 |
| | 2-METHYLPENTAN-2-OL | 3 | UN2560 | III | | P5 | A7.3 |
| | METHYLPHENYLDICHLOROSILANE | 8 | UN2437 | II | | P5 | A12.3 |
| D | METHYL PHOSPHONIC DICHLORIDE | 6.1 | NA9206 | I | 8 | P2, 2, A3 N34, N43 | A10.7 |
| | <i>Methyl phosphonothioic dichloride, anhydrous, see CORROSIVE LIQUID, N.O.S</i> | | | | | | |
| | METAL PICRIC ACID (<i>heavy metal salts of</i>) | | | | | FORBIDDEN | FORBIDDEN |
| | 1-METHYLPYPERIDINE | 3 | UN2399 | II | 8 | P4 | A7.3 |
| | METHYL PROPIONATE | 3 | UN1248 | II | | P5 | A7.3 |
| | METHYL PROPYL ETHER | 3 | UN2612 | II | | P5 | A7.3 |
| | METHYL PROPYL KETONE | 3 | UN1249 | II | | P5 | A7.3 |
| | <i>Methyl sulfate, see DIMETHYL SULFATE</i> | | | | | | |
| | <i>Methyl sulphide, see DIMETHYL SULPHIDE</i> | | | | | | |
| | METHYLTETRAHYDROFURAN | 3 | UN2536 | II | | P5 | A7.3 |
| | METHYL TRICHLOROACETATE | 6.1 | UN2533 | III | | P5 | A10.5 |
| | METHYLTRICHLOROSILANE | 3 | UN1250 | I | 8 | P3, A7, N34 | A7.3 |
| | <i>Methyl trimethylol methane trinitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ALPHA-METHYLVALERALDEHYDE | 3 | UN2367 | II | | P5 | A7.3 |
| | METHYL VINYL KETONE, STABILIZED | 6.1 | UN1251 | I | 3, 8 | P1, 1 | A7.6 |
| | MINES <i>with bursting charge</i> | 1.1F | UN0136 | II | | P4 | A5.15 |
| | MINES <i>with bursting charge</i> | 1.1D | UN0137 | II | | P4 | A5.15 |
| | MINES <i>with bursting charge</i> | 1.2D | UN0138 | II | | P4 | A5.15 |
| | MINES <i>with bursting charge</i> | 1.2F | UN0294 | II | | P4 | A5.15 |
| | MOLYBDENUM PENTACHLORIDE | 8 | UN2508 | III | | P5 | A12.4 |
| | <i>Monochloroacetone (unstabilized)</i> | | | | | FORBIDDEN | FORBIDDEN |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Monochloroethylene, see</i> VINYL CHLORIDE, STABILIZED | | | | | | |
| | MORPHOLINE | 8 | UN2054 | I | 3 | P5 | A12.3 |
| | <i>Morpholine, aqueous, mixture, see</i> CORROSIVE LIQUID, N.O.S. | | | | | | |
| + | MOTOR FUEL ANTI-KNOCK MIXTURES | 6.1 | UN1649 | I | 3 | P3 | A10.5 |
| | <i>Motor spirit, see</i> GASOLINE | | | | | | |
| | <i>Muriatic acid, see</i> HYDROCHLORIC ACID SOLUTION | | | | | | |
| | MUSK XYLENE, see 5-TERT-BUTYL-2,4,6-TRINITO-M-XYLENE | | | | | | |
| | <i>Naphtha, see</i> PETROLEUM DISTALLATE N.O.S. | | | | | | |
| | NAPHTHALENE, CRUDE or REFINED | 4.1 | UN1334 | III | | P5, A1 | A8.4 |
| | <i>Naphthalene diozonide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NAPHTHALENE, MOLTEN | | | | | FORBIDDEN | FORBIDDEN |
| | ALPHA-NAPHTHYLAMINE | 6.1 | UN2077 | III | | P5 | A10.6 |
| | BETA-NAPHTHYLAMINE | 6.1 | UN1650 | II | | P5 | A10.6 |
| | <i>Naphthylamineperchlorate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NAPHTHYLTHIOUREA | 6.1 | UN1651 | II | | P5 | A10.6 |
| | NAPHTHYLUREA | 6.1 | UN1652 | II | | P5 | A10.6 |
| | NATURAL GAS, REFRIGERATED LIQUID, with high methane content (cryogenic liquid) | 2.1 | UN1972 | | | P3 | A6.11 |
| | NEON, COMPRESSED | 2.2 | UN1065 | | | P5 | A6.4, A6.6 |
| | NEON, REFRIGERATED LIQUID (cryogenic liquid) | 2.2 | UN1913 | | | P4 | A6.12 |
| | NICKEL CARBONYL | | | | | FORBIDDEN | FORBIDDEN |
| | NICKEL CYANIDE | 6.1 | UN1653 | II | | P5, N74, N75 | A10.6 |
| | NICKEL NITRATE | 5.1 | UN2725 | III | | P5, A1 | A9.8 |
| | NICKEL NITRITE | 5.1 | UN2726 | III | | P5, A1 | A9.8 |
| | <i>Nickel Picrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NICOTINE | 6.1 | UN1654 | II | | P5 | A10.5 |
| | NICOTINE COMPOUNDS, LIQUID, N.O.S. or NICOTINE PREPARATIONS, LIQUID, N.O.S. | 6.1 | UN3144 | I II III | | P3, A4 P5 P5 | A10.5 A10.5 A10.5 |
| | NICOTINE COMPOUNDS, SOLID, N.O.S. or NICOTINE PREPARATIONS, SOLID, N.O.S. | 6.1 | UN1655 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | NICOTINE HYDROCHLORIDE or NICOTINE HYDROCHLORIDE SOLUTION | 6.1 | UN1656 | II | | P5 | A10.5 |
| | NICOTINE SALICYLATE | 6.1 | UN1657 | II | | P5 | A10.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | NICOTINE SULPHATE, <i>solid or solution</i> | 6.1 | UN1658 | II | | P5 | A10.5, A10.6 |
| | NICOTINE TARTRATE | 6.1 | UN1659 | II | | P5 | A10.6 |
| | NITRATED PAPER (<i>unstable</i>) | | | | | FORBIDDEN | FORBIDDEN |
| | NITRATES, INORGANIC, N.O.S. | 5.1 | UN1477 | II III | | P5 P5 | A9.8 A9.8 |
| | NITRATES, INORGANIC, AQUEOUS SOLUTIONS, N.O.S. | 5.1 | UN3218 | II III | | P5 P5 | A9.7 A9.7 |
| | <i>Nitrates of diazonium compounds</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NITRATING ACID MIXTURES, SPENT <i>with not more than 50% nitric acid</i> | 8 | UN1826 | II | | P4 | A12.11 |
| | NITRATING ACID MIXTURES, SPENT <i>with 50% or more nitric acid</i> | 8 | UN1826 | I | 5.1 | P3 | A12.11 |
| | NITRATING ACID MIXTURES <i>with not more than 50% nitric acid</i> | 8 | UN1796 | II | | P4 | A12.11 |
| | NITRATING ACID MIXTURES <i>with 50% or more nitric acid</i> | 8 | UN1796 | I | 5.1 | P3 | A12.11 |
| | NITRIC ACID <i>other than red fuming, with more than 70% nitric acid</i> | 8 | UN2031 | I | 5.1 | P3 | A12.11 |
| | NITRIC ACID, <i>other than red fuming, with not more than 70% nitric acid</i> | 8 | UN2031 | II | | P4 | A12.11 |
| + | NITRIC ACID, RED FUMING | 8 | UN2032 | I | 5.1, 6.1 | P2, 2 | A12.12 |
| | NITRIC OXIDE, COMPRESSED | 2.3 | UN1660 | | 5.1, 8 | P1, 1 | A6.20 |
| | NITRIC OXIDE AND DINITROGEN TETROXIDE MIXTURES <i>or</i> NITRIC OXIDE AND NITROGEN DIOXIDE MIXTURES | | | | | FORBIDDEN | FORBIDDEN |
| * | NITRILES, TOXIC, N.O.S. | 6.1 | UN3276 | I II III | | P3, 5 P4 P5 | A10.5 A10.5 A10.5 |
| * | NITRILES, TOXIC, FLAMMABLE, N.O.S. | 6.1 | UN3275 | I II | 3 3 | P3, 5 P4 | A10.5 A10.5 |
| * | NITRILES, FLAMMABLE, TOXIC, N.O.S. | 3 | UN3273 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | NITRITES, INORGANIC, N.O.S. | 5.1 | UN2627 | II | | P5, 33 | A9.8 |
| | NITRITES, INORGANIC, AQUEOUS SOLUTION, N.O.S. | 5.1 | UN3219 | II III | | P5 P5 | A9.7 A9.7 |
| | <i>N-Nitroaniline</i> | | | | | FORBIDDEN | FORBIDDEN |
| + | NITROANILINES (<i>o-;m-;p-;</i>) | 6.1 | UN1661 | II | | P5 | A10.6 |
| + | NITROANISOLE | 6.1 | UN2730 | III | | P5 | A10.5, A10.6 |
| + | NITROBENZENE | 6.1 | UN1662 | II | | P5 | A10.5 |
| | <i>m-Nitrobenzene diazonium perchlorate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NITROBENZENESULPHONIC ACID | 8 | UN2305 | II | | P5 | A12.3 |
| | <i>Nitrobenzol, see NITROBENZENE</i> | | | | | | |
| | 5-NITROBENZOTRIAZOL | 1.1D | UN0385 | II | | P4 | A5.9 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | NITROBENZOTRIFLUORIDES | 6.1 | UN2306 | II | | P5 | A10.5 |
| | NITROBROMOBENZENES, LIQUID or SOLID | 6.1 | UN2732 | III | | P5 | A10.5, A10.6 |
| | NITROCELLULOSE , dry or wetted with less than 25% water (or alcohol), by mass | 1.1D | UN0340 | II | | P4 | A5.9 |
| | NITROCELLULOSE MEMBRANE FILTERS | 4.1 | UN3270 | II | | P5, 43, A1 | A8.4 |
| | NITROCELLULOSE, PLASTICIZED with not less than 18% plasticizing substance, by mass | 1.3C | UN0343 | II | | P4 | A5.8 |
| | NITROCELLULOSE SOLUTION, FLAMMABLE with not more than 12.6% nitrogen, by mass, and not more than 55% nitrocellulose | 3 | UN2059 | II III | | P5 P5 | A7.3 A7.3 |
| | NITROCELLULOSE , unmodified or plasticized with less than 18% plasticizing substance, by mass | 1.1D | UN0341 | II | | P4 | A5.9 |
| | NITROCELLULOSE, WETTED with 25% or more alcohol, by mass | 1.3C | UN0342 | II | | P4 | A5.12 |
| | NITROCELLULOSE WITH ALCOHOL 25% or more alcohol by mass, and 12.6% or less nitrogen, by dry mass | 4.1 | UN2556 | II | | P5 | A8.4 |
| | NITROCELLULOSE WITH WATER with not less than 25% water by mass | 4.1 | UN2555 | II | | P5 | A8.4 |
| | NITROCELLULOSE , with not more than 12.6% nitrogen, by dry mass, or NITROCELLULOSE, MIXTURE WITHOUT PIGMENT or NITROCELLULOSE, MIXTURE WITHOUT PLASTICIZER , or NITROCELLULOSE, MIXTURE WITH PIGMENT or NITROCELLULOSE, MIXTURE WITH PLASTICIZER | 4.1 | UN2557 | II | | P5 | A8.4 |
| | 3-NITRO-4-CHLOROBENZOTRIFLUORIDE | 6.1 | UN2307 | II | | P5 | A10.5 |
| | NITROCREOLS | 6.1 | UN2446 | III | | P5 | A10.6 |
| | 6-Nitro-4-diazotoluene-3-sulphonic acid (dry) | | | | | FORBIDDEN | FORBIDDEN |
| | NITROETHANE | 3 | UN2842 | III | | P5 | A7.3 |
| | Nitroethylene polymer | | | | | FORBIDDEN | FORBIDDEN |
| | Nitroethyl nitrate | | | | | FORBIDDEN | FORBIDDEN |
| | NITROGEN, COMPRESSED | 2.2 | UN1066 | | | P5 | A6.4, A6.6 |
| | NITROGEN DIOXIDE see also DINITROGEN TETROXIDE | | | | | FORBIDDEN | FORBIDDEN |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Nitrogen fertilizer solution; see</i> FERTILIZER AMMONIATING SOLUTION, etc. | | | | | | |
| | <i>Nitrogen peroxide, see</i> DINITROGEN TETROXIDE, LIQUEFIED | | | | | | |
| | NITROGEN, REFRIGERATED LIQUID (cryogenic liquid) | 2.2 | UN1977 | | | P4 | A6.12 |
| | <i>Nitrogen tetroxide and nitric oxide mixtures, see</i> NITRIC OXIDE AND NITROGEN TETROXIDE MIXTURES | | | | | | |
| | <i>Nitrogen tetroxide, see</i> DINITROGEN TETROXIDE, LIQUEFIED | | | | | | |
| | <i>Nitrogen trichloride</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NITROGEN TRIFLUORIDE, COMPRESSED | 2.2 | UN2451 | | 5.1 | P4 | A6.6 |
| | <i>Nitrogen triiodide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Nitrogen triiodide monoamine</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NITROGEN TRIOXIDE | | | | | FORBIDDEN | FORBIDDEN |
| | NITROGLYCERIN, MIXTURE, DESENSITIZED LIQUID, FLAMMABLE, N.O.S., with not less than 30% Nitroglycerin by mass | 3 | UN3343 | | | P5 | A8.5 |
| | NITROGLYCERIN, MIXTURE, DESENSITIZED SOLID, FLAMMABLE, N.O.S., with more than 2% but not more than 10% Nitroglycerin by mass | 4.1 | UN3319 | II | | P4 | A8.5 |
| | NITROGLYCERIN, DESENSITIZED with not less than 40% nonvolatile water insoluble phlegmatizer, by mass | 1.1D | UN0143 | II | 6.1 | P4 | A5.13 |
| | <i>Nitroglycerin, liquid, not desensitized</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NITROGLYCERIN, SOLUTION IN ALCOHOL, with more than 1%, but not more than 5% nitroglycerin | 3 | UN3064 | II | | P3, N8 | A7.3 |
| | NITROGLYCERIN, SOLUTION IN ALCOHOL with more than 1%, but not more than 10% nitroglycerin | 1.1D | UN0144 | II | | P4 | A5.13 |
| | NITROGLYCERIN SOLUTION IN ALCOHOL, with not more than 1% nitroglycerin | 3 | UN1204 | II | | P3, N34 | A7.3 |
| | <i>Nitroguanidine nitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NITROGUANIDINE or PICRITE, dry or wetted with less than 20% water, by mass | 1.1D | UN0282 | II | | P4 | A5.9 |
| | NITROGUANIDINE WETTED, or PICRITE WETTED with not less than 20% water, by mass | 4.1 | UN1336 | I | | P4, 23, A8, A19, A20, N41 | A8.4 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>1-Nitrohydantoin</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NITROHYDROCHLORIC ACID | 8 | UN1798 | I | | P3, A3, N41 | A12.3 |
| | <i>Nitromannite (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NITROMANNITE, WETTED; see MANNITOL HEXANITRATE, WETTED etc. | | | | | | |
| | NITROMETHANE | 3 | UN1261 | II | | P5 | A7.3 |
| | <i>N-Nitro-N-methylglycolamide nitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>2-Nitro-2-methylpropanol nitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Nitromuriatic acid; see NITROHYDROCHLORIC ACID</i> | | | | | | |
| | NITRONAPHTHALENE | 4.1 | UN2538 | III | | P5, A1 | A8.4 |
| + | NITROPHENOLS (o-,m-,p-) | 6.1 | UN1663 | III | | P5 | A10.6 |
| | <i>m-Nitrophenyldinitro methane</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NITROPROPANES | 3 | UN2608 | III | | P5 | A7.3 |
| | P-NITROSODIMETHYLANILINE | 4.2 | UN1369 | II | | P5, A19, A20, N34 | A8.4 |
| D | NITROSOGUANIDINE | 1.1A | NA0473 | II | | P3, 111, 117 | A5.13 |
| | NITROSTARCH, dry or wetted with less than 20% water, by mass | 1.1D | UN0146 | II | | P4 | A5.9 |
| | NITROSTARCH, WETTED with not less than 20% water by mass | 4.1 | UN1337 | I | | P4, 23, A8, A19, A20, N41 | A8.4 |
| | <i>Nitrosugars (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | NITROSYL CHLORIDE | 2.3 | UN1069 | | 8 | P2, 3 | A6.5 |
| | NITROSYLSULPHURIC ACID | 8 | UN2308 | II | | P5, A3, A6, A7, N34 | A12.3 |
| | NITROTOLUENES, liquid or solid (o-,m-, p-) | 6.1 | UN1664 | II | | P5 | A10.5, A10.6 |
| | NITROTOLUIDINES (MONO) | 6.1 | UN2660 | III | | P5 | A10.6 |
| | NITROTRIAZOLONE or NTO | 1.1D | UN0490 | II | | P4 | A5.9 |
| | NITRO UREA | 1.1D | UN0147 | II | | P4 | A5.9 |
| | <i>Nitrous oxide and carbon dioxide mixtures see CARBON DIOXIDE AND NITROUS; OXIDE MIXTURES</i> | | | | | | |
| | NITROUS OXIDE | 2.2 | UN1070 | | 5.1 | P5 | A6.4, A6.5 |
| | NITROUS OXIDE, REFRIGERATED LIQUID | 2.2 | UN2201 | | 5.1 | P4 | A6.5 |
| | NITROXYLENES (o-,m-,p-) | 6.1 | UN1665 | II | | P5 | A10.5 |
| | NONANES | 3 | UN1920 | III | | P5 | A7.3 |
| | <i>Nonflammable gas, n.o.s.; see COMPRESSED or LIQUEFIED GASES, etc.</i> | | | | | | |
| | <i>Nonliquefied gases; see COMPRESSED GASES, etc</i> | | | | | | |

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|--------|---|-------------------------|-----------------|-----|--------------------|----------------------|--------------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Nonliquefied hydrocarbon gas; see</i> HYDROCARBON GASES COMPRESSED, N.O.S. | | | | | | |
| | NONYLTRICHLOROSILANE | 8 | UN1799 | II | | P4, A7, N34 | A12.3 |
| | OCTADECYLTRICHLOROSILANE | 8 | UN1800 | II | | P4, A7, N34 | A12.3 |
| | OCTADIENE | 3 | UN2309 | II | | P5 | A7.3 |
| | <i>1,7-Octadiene-3,5-diyne-1,8-dimethoxy-9- octadecynoic acid</i> | | | | | FORBIDDEN | FORBIDDEN |
| | OCTAFLUOROBUT-2-ENE or REFRIGERANT GAS R1316 | 2.2 | UN2422 | | | P5 | A6.5 |
| | OCTAFLUOROCYCLOBUTANE or REFRIGERANT GAS RC1318 | 2.2 | UN1976 | | | P5 | A6.5 |
| | OCTAFLUOROPROPANE or REFRIGERANT GAS R218 | 2.2 | UN2424 | | | P5 | A6.5 |
| | OCTANES | 3 | UN1262 | II | | P5 | A7.3 |
| | OCTOGEN; see CYLCOTETRAMETHYLENE TETRANITRAMINE, etc | | | | | | |
| | OCTOLITE or OCTOL dry or wetted with less than 15% water by mass | 1.1D | UN0266 | II | | P4 | A5.9 |
| | OCTONAL | 1.1D | UN0496 | II | | P4 | A5.10 |
| | OCTYL ALDEHYDES | 3 | UN1191 | III | | P5 | A7.3 |
| + | TERT-OCTYL MERCAPTAN | 6.1 | UN3023 | II | 3 | P2, 2 | A10.7 |
| | OCTYLTRICHLOROSILANE | 8 | UN1801 | II | | P4, A7, N34 | A12.3 |
| | OIL GAS, COMPRESSED | 2.3 | UN1071 | | 2.1 | P2, 6 | A6.5 |
| | <i>Oleum; see</i> SULPHURIC ACID, FUMING | | | | | | |
| | ORGANIC PEROXIDE TYPE A, LIQUID or SOLID | | | | | FORBIDDEN | FORBIDDEN |
| * | ORGANIC PEROXIDE TYPE B, LIQUID | 5.2 | UN3101 | II | EXPLOSIVE | P3, 53 | TABLE A9.2.5 |
| * | ORGANIC PEROXIDE TYPE B, LIQUID, TEMPERATURE CONTROLLED | 5.2 | UN3111 | II | EXPLOSIVE | P3, 53 | TABLE A9.2.5 |
| * | ORGANIC PEROXIDE TYPE B, SOLID | 5.2 | UN3102 | II | EXPLOSIVE | P3, 53 | SEE BELOW BY TECHNICAL NAME |
| | <i>tert-Butyl Monoperoxymaneate</i> | | | | | | TABLE A9.3.5 |
| | <i>3-Chloroperoxybenzoic Acid</i> | | | | | | TABLE A9.3.1 |
| | <i>Dibenzoyl Peroxide > 52 < 100</i> | | | | | | TABLE A9.3.2 |
| | <i>Dibenzoyl Peroxide > 78, < 94</i> | | | | | | TABLE A9.3.6 |
| | <i>Di-4-Chlorobenzoyl Peroxide</i> | | | | | | TABLE A9.3.5 |
| | <i>Di-2,4-Dichlorobenzoyl Peroxide</i> | | | | | | TABLE A9.3.5 |
| | <i>2,2-Dihydroperoxypropane</i> | | | | | | TABLE A9.3.5 |
| | <i>2,5-Dimethyl -2,5-di-(Benzoyl-Peroxy) Hexane</i> | | | | | | TABLE A9.3.5 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Di-(2 Phenoxyethyl) Peroxydicarbonate</i> | | | | | | TABLE A9.3.5 |
| | <i>Disuccinic Acid Peroxide</i> | | | | | | TABLE A9.3.4 |
| | <i>3,3,6,6,9,9,-Hexamethyl-1,2,4,5-Tetraoxa- cylcononane</i> | | | | | | TABLE A9.3.4 |
| * | ORGANIC PEROXIDE TYPE B, SOLID, TEMPERATURE CONTROLLED | 5.2 | UN3112 | II | EXPLOSIVE | P3, 53 | SEE BELOW BY TECHNICAL NAME |
| | <i>Acetyl Cyclohexanesulphonyl Peroxide</i> | | | | | | TABLE A9.3.4 |
| | <i>Dibenzyl Peroxydicarbonate</i> | | | | | | TABLE A9.3.5 |
| | <i>Dicyclohexyl Peroxydicarbonate</i> | | | | | | TABLE A9.3.5 |
| | <i>Diisopropyl Peroxydicarbonate</i> | | | | | | TABLE A9.3.2 |
| | <i>Di-(2-Methylbenzoyl) Peroxide</i> | | | | | | TABLE A9.3.5 |
| * | ORGANIC PEROXIDE TYPE C, LIQUID | 5.2 | UN3103 | II | | P5 | SEE BELOW BY TECHNICAL NAME |
| | <i>n-Butyl-4,4-di-(Tertcutylperoxy)-Valerate</i> | | | | | | TABLE A9.2.5 |
| | <i>tert-Butyl Hydroperoxide</i> | | | | | | TABLE A9.2.5 |
| | <i>tert-Butyl Hydroperoxide and di-tert-Butyl Peroxide</i> | | | | | | TABLE A9.2.5 |
| | <i>tert-Butyl Monoperoxymaneate</i> | | | | | | TABLE A9.2.6 |
| | <i>tert-Butyl Peroxyacetate</i> | | | | | | TABLE A9.2.6 |
| | <i>tert-Butyl Peroxybenzoate</i> | | | | | | TABLE A9.2.5 |
| | <i>tert-Butylperoxy Isopropyl Carbonate</i> | | | | | | TABLE A9.2.5 |
| | <i>2,2-Di-(tert-Butylperoxy) Butane</i> | | | | | | TABLE A9.2.6 |
| | <i>1,1-Di-(tert-Butylperoxy) Cyclohexane</i> | | | | | | TABLE A9.2.5 |
| | <i>2,5-Dimethyl-2,5-Di-(tert-Butyl- Peroxyl)Hexane -3</i> | | | | | | TABLE A9.2.5 |
| | <i>Ethyl-3,3-Di-(tert-Butylperoxy)-Butyrate</i> | | | | | | TABLE A9.2.5 |
| | <i>Organic Peroxide, Liquid, Sample</i> | | | | | | TABLE A9.2.2 |
| * | ORGANIC PEROXIDE TYPE C, LIQUID, TEMPERATURE CONTROLLED | 5.2 | UN3113 | II | | P3 | SEE BELOW BY TECHNICAL NAME |
| | <i>tert-Amyl Peroxypivalate</i> | | | | | | TABLE A9.2.5 |
| | <i>tert-Butyl Peroxydiethylacetate</i> | | | | | | TABLE A9.2.5 |
| | <i>tert-Butyl Peroxy-2-Ethylhexanoate</i> | | | | | | TABLE A9.2.6 |
| | <i>tert-Butyl Peroxypivalate</i> | | | | | | TABLE A9.2.5 |
| | <i>Di-sec-Butyl-Peroxydicarbonate</i> | | | | | | TABLE A9.2.4 |
| | <i>Di-(2-Ethylhexyl) Peroxydicarbonate</i> | | | | | | TABLE A9.2.5 |
| | <i>Di-n-Propyl Peroxydicarbonate</i> | | | | | | TABLE A9.2.4 |
| | <i>Organic Peroxide, Liquid Temperature Controlled</i> | | | | | | TABLE A9.2.2 |
| * | ORGANIC PEROXIDE TYPE C, SOLID | 5.2 | UN3104 | II | | P5 | SEE BELOW BY TECH- NICAL NAME |
| | <i>Cyclohexanone Peroxide(s)</i> | | | | | | TABLE A9.3.6 |
| | <i>Dibenzoyl Peroxide</i> | | | | | | TABLE A9.3.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | 2,5-Dimethyl-2,5-di-(Benzoyl Peroxy) Hexane | | | | | | TABLE A9.3.5 |
| | 2,5-Dimethyl-2,5-Dihydroperoxyhexane | | | | | | TABLE A9.3.6 |
| | Organic Peroxide, Solid, Sample | | | | | | TABLE A9.3.2 |
| * | ORGANIC PEROXIDE TYPE C, SOLID, TEMPERATURE CONTROLLED | 5.2 | UN3114 | II | | P3 | SEE BELOW BY TECH- NICAL NAME |
| | Di-(4-tert-Butylcyclohexyl) Peroxydicarbonate | | | | | | TABLE A9.3.6 |
| | Dicyclohexyl Peroxydicarbonate | | | | | | TABLE A9.3.3 |
| | Dideconoyl Peroxide | | | | | | TABLE A9.3.6 |
| | Di-n-Octanoyl Peroxide | | | | | | TABLE A9.3.5 |
| | Organic Peroxide, Solid, Temperature Controlled | | | | | | TABLE A9.3.2 |
| * | ORGANIC PEROXIDE TYPE D, LIQUID | 5.2 | UN3105 | II | | P5 | TABLE A9.2.7 |
| | Acetyl acetone peroxide | | | | | | |
| | Acetyl benzoyl peroxide | | | | | | |
| | tert-Amyl peroxybenzoate | | | | | | |
| | tert-Butyl cumyl peroxide | | | | | | |
| | tert-Butyl hydroperoxide | | | | | | |
| | tert-Butyl peroxybenzoate | | | | | | |
| | tert-Butyl peroxyacrylonate | | | | | | |
| | tert-Butyl peroxydiethylacetate and tert-Butyl eroxybenzoate | | | | | | |
| | tert-Butyl peroxy-3,5,5-trimethylhexanoate | | | | | | |
| | Cyclohexanone peroxide(s) | | | | | | |
| | 1,1 Di-(tert-butylperoxy) cyclohexane | | | | | | |
| | Di-(tert-butylperoxy) phthalate | | | | | | |
| | 2,2-Di-(tert-butylperoxy)-propane | | | | | | |
| | 2,5-Dimethyl-2,5-di-(tert-butyl- peroxy)hexane | | | | | | |
| | 2,5-Dimethyl-2,5-di-(3,5,5- trimethylhexanoylperoxy) | | | | | | |
| | hexane | | | | | | |
| | Ethyl-3,3-di-(tert-amylperoxy)-butyrate | | | | | | |
| | Ethyl-3,3-di-(tert-butylperoxy)-butyrate | | | | | | |
| | 3,3,6,6,9,9-Hexamethyl-1,2,4,5- tetraoxacyclononane | | | | | | |
| | p-Menthyl hydroperoxide | | | | | | |
| | Methyl ethyl ketone peroxide(s) | | | | | | |
| | Methyl isobutyl ketone peroxide(s) | | | | | | |
| | Peroxyacetic acid, type D, stabilized | | | | | | |
| | 1,1,3,3-Tertamethylbutyl hydroperoxide | | | | | | |

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|--------|---|-------------------------|-----------------|-----|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | ORGANIC PEROXIDE TYPE D, LIQUID, TEMPERATURE CONTROLLED | 5.2 | UN3115 | II | | P3 | TABLE A9.2.7 |
| | <i>Acetyl cyclohexanesulphonyl peroxide</i> | | | | | | |
| | <i>tert-Amyl peroxy-2-ethylhexanoate</i> | | | | | | |
| | <i>tert-Amyl peroxyneodecanoate</i> | | | | | | |
| | <i>tert-Butyl peroxy-2-ethylhexanoate and 2,2-Di-(tert-butylperoxy)butane</i> | | | | | | |
| | <i>tert-Butyl peroxyisobutyrate</i> | | | | | | |
| | <i>tert-Butyl peroxyneodecanoate</i> | | | | | | |
| | <i>tert-Butyl peroxy-pivalate</i> | | | | | | |
| | <i>Cumyl peroxyneodecanoate</i> | | | | | | |
| | <i>Cumyl peroxy-pivalate</i> | | | | | | |
| | <i>Diacetone alcohol peroxides</i> | | | | | | |
| | <i>Diacetyl peroxide</i> | | | | | | |
| | <i>Di-n-butyl-peroxydicarbonate</i> | | | | | | |
| | <i>Di-sec-butyl peroxydicarbonate</i> | | | | | | |
| | <i>Di-(2-ethylhexyl) peroxydicarbonate</i> | | | | | | |
| | <i>Diethyl peroxydicarbonate</i> | | | | | | |
| | <i>Diisobutyl peroxide</i> | | | | | | |
| | <i>Diisopropyl peroxydicarbonate</i> | | | | | | |
| | <i>Diisotridecyl peroxydicarbonate</i> | | | | | | |
| | <i>2,5-Dimethyl-2,5-di-(2-ethylhexanoylperoxy)hexane</i> | | | | | | |
| | <i>Di-(3,5,5-trimethylhexanoyl) peroxide</i> | | | | | | |
| | <i>Methylcyclohexanone peroxide(s)</i> | | | | | | |
| | <i>1,1,3,3-Tetramethylbutylperoxy-2-ethylhexanoate</i> | | | | | | |
| | <i>2,4,4-Trimethylpentyl-2-peroxyphenoxyacetate</i> | | | | | | |
| * | ORGANIC PEROXIDE TYPE D, SOLID | 5.2 | UN3106 | II | | P5 | TABLE A9.3.7 |
| | <i>Acetyl acetone peroxide, as a paste</i> | | | | | | |
| | <i>n-Butyl-4-4-di-(tertbutyl-peroxy)-valerate</i> | | | | | | |
| | <i>tert-Butyl peroxybenzoate</i> | | | | | | |
| | <i>tert-Butyl-peroxy-2-ethylhexanoate and 2,2-Di-(tert-butylperoxy)butane</i> | | | | | | |
| | <i>3-tert-Butylperoxy-3-phenylphthalide</i> | | | | | | |
| | <i>tert-Butylperoxy stearylcarbonate</i> | | | | | | |
| | <i>3-Chloroperoxybenzoic acid</i> | | | | | | |
| | <i>Cyclohexanone peroxide(s) as a paste</i> | | | | | | |
| | <i>Dibenzoyl peroxide</i> | | | | | | |
| | <i>Dibenzoyl peroxide, as a paste</i> | | | | | | |
| | <i>1,1-Di-(tert-butylperoxy) cyclohexane</i> | | | | | | |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>2,2-Di(1,4-tert-butylperoxycyclohexyl)propane</i> | | | | | | |
| | <i>Di-(2-tert-butylperoxyisopropyl)-benzene(s)</i> | | | | | | |
| | <i>Di-(tert-butylperoxy) phthalate, as a paste</i> | | | | | | |
| | <i>2,2-Di-(tert-butylperoxy)propane</i> | | | | | | |
| | <i>1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane</i> | | | | | | |
| | <i>Di-4-chlorobenzoyl peroxide, as a paste</i> | | | | | | |
| | <i>Di-2,4-dichlorobenzoyl proxide, as a paste with silicon oil</i> | | | | | | |
| | <i>Di-(1-hydroxycyclohexyl) peroxide</i> | | | | | | |
| | <i>Dilauroyl peroxide</i> | | | | | | |
| | <i>2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3</i> | | | | | | |
| | <i>2,5-Dimethyl-2,5-di-(tert-butylperoxy) hexane</i> | | | | | | |
| | <i>Di-(2 phenoxyethyl) peroxydicarbonate</i> | | | | | | |
| | <i>Distearyl peroxydicarbonate</i> | | | | | | |
| | <i>Ethyl-3,3-di-(tert-butylperoxy)-butyrate</i> | | | | | | |
| | <i>3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxacyclononae</i> | | | | | | |
| | <i>Tetrahydronaphthyl hydroperoxide</i> | | | | | | |
| * | ORGANIC PEROXIDE TYPE D, SOLID, TEMPERATURE CONTROLLED | 5.2 | UN3116 | II | | P3 | TABLE A9.3.7 |
| | <i>Dicetyl peroxydicarbonate</i> | | | | | | |
| | <i>Dimyristyl peroxydicarbonate</i> | | | | | | |
| | <i>Di-n-nonanoyl peroxide</i> | | | | | | |
| | <i>Diperoxy azelaic acid</i> | | | | | | |
| | <i>Diperoxy dodecane diacid</i> | | | | | | |
| | <i>Disuccinic acid peroxide</i> | | | | | | |
| | <i>Di-(3,5,5-trimethyl-1,2-dioxo-lanyl-3) peroxide, as a paste</i> | | | | | | |
| * | ORGANIC PEROXIDE TYPE E, LIQUID | 5.2 | UN3107 | II | | P5 | TABLE A9.2.8 |
| | <i>tert-Amyl hydroperoxide</i> | | | | | | |
| | <i>Di-tert-amyl peroxide</i> | | | | | | |
| | <i>Di-tert-butyl peroxide</i> | | | | | | |
| | <i>1,1-Di-(tert-butylperoxy)cyclohexane</i> | | | | | | |
| | <i>Di-(tert-butylperoxy)phthalate</i> | | | | | | |
| | <i>1,1-Di-(tert-butylperoxy)-3,3,5-trimethyl cyclohexane</i> | | | | | | |
| | <i>Methyl ethyl ketone peroxide(s)</i> | | | | | | |
| | <i>Peroxyacetic acid, type E, stabilized</i> | | | | | | |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | ORGANIC PEROXIDE TYPE E, LIQUID, TEMPERATURE CONTROLLED | 5.2 | UN3117 | II | | P3 | SEE BELOW BY TECH- NICAL NAME |
| | <i>tert-Butyl peroxy-2-ethylhexanolate</i> | | | | | | TABLE A9.2.8 |
| | <i>Di-n-butyl peroxydicarbonate</i> | | | | | | TABLE A9.2.8 |
| | <i>Di-(2-ethylhexyl) peroxydicarbonate as a stable dispersion in water</i> | | | | | | TABLE A9.2.8 |
| | <i>Di-(2-Ethylhexyl) Peroxydicarbonate as a stable dispersion in water (frozen)</i> | | | | | | TABLE A9.3.8 |
| | <i>Dipropionyl peroxide</i> | | | | | | TABLE A9.2.8 |
| * | ORGANIC PEROXIDE TYPE E, SOLID | 5.2 | UN3108 | II | | P5 | TABLE A9.3.8 |
| | <i>tert-Butyl monoperoxymaleate, as a paste</i> | | | | | | |
| | <i>Dibenzoyl peroxide, as a paste</i> | | | | | | |
| * | ORGANIC PEROXIDE TYPE E, SOLID, TEMPERATURE CONTROLLED | 5.2 | UN3118 | II | | P3 | TABLE A9.3.8 |
| * | ORGANIC PEROXIDE TYPE F, LIQUID | 5.2 | UN3109 | II | | P5 | TABLE A9.2.8 |
| | <i>tert-Butylhydroperoxide</i> | | | | | | |
| | <i>Cumyl hydroperoxide</i> | | | | | | |
| | <i>Dilauroyl peroxide, as a stable dispersion in water</i> | | | | | | |
| | <i>Isopropylcumyl hydroperoxide</i> | | | | | | |
| | <i>p-Menthyl hydroperoxide</i> | | | | | | |
| | <i>Peroxyacetic acid, Type F, stabilized</i> | | | | | | |
| | <i>Pinanyl hydroperoxide</i> | | | | | | |
| * | ORGANIC PEROXIDE TYPE F, LIQUID TEMPERATURE CONTROLLED | 5.2 | UN3119 | II | | P3 | TABLE A9.2.8 |
| | <i>Di-(4-tert-butylcyclohexyl) peroxydicarbonate, as a stable dispersion in water</i> | | | | | | |
| | <i>Dicetyl peroxydicarbonate, as a stable dispersion in water</i> | | | | | | |
| | <i>Dimyristyl peroxydicarbonate, as a stable dispersion in water</i> | | | | | | |
| * | ORGANIC PEROXIDE TYPE F, SOLID Dicumyl peroxide | 5.2 | UN3110 | II | | P5 | TABLE A9.3.8 |
| * | ORGANIC PEROXIDE TYPE F, SOLID, TEMPERATURE CONTROLLED | 5.2 | UN3120 | II | | P3 | TABLE A9.3.8 |
| | ORGANIC PIGMENTS, SELF- HEATING | 4.2 | UN3313 | II III | | P5 P5 | A8.4 A8.4 |
| | ORGANIC PHOSPHATE, ORGANIC PHOSPHATE COMPOUND or ORGANIC PHOSPHORUS COMPOUND; MIXED WITH COMPRESSED GAS | | | | | FORBIDDEN | FORBIDDEN |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | ORGANOARSENIC COMPOUND, N.O.S. | 6.1 | UN3280 | I II III | | P5, 5 P5 P5 | A10.6 A10.6 A10.6 |
| | ORGANOCHLORINE PESTICIDES LIQUID, FLAMMABLE, TOXIC, <i>flashpoint less than 23 degrees C</i> | 3 | UN2762 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | ORGANOCHLORINE PESTICIDES, LIQUID, TOXIC, FLAMMABLE, <i>flashpoint not less than 23 degrees C</i> | 6.1 | UN2995 | I II III | 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | ORGANOCHLORINE PESTICIDES, LIQUID, TOXIC | 6.1 | UN2996 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | ORGANOCHLORINE PESTICIDES, SOLID, TOXIC | 6.1 | UN2761 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| * | ORGANOMETALLIC COMPOUNDS, WATER- REACTIVE, FLAMMABLE, N.O.S. | 4.3 | UN3207 | I II III | 3 3 3 | P3 P4 P5 | A8.3 A8.3 A8.3 |
| * | ORGANOMETALLIC COMPOUND DISPERSION, WATER-REACTIVE, FLAMMABLE, N.O.S. | 4.3 | UN3207 | I II III | 3 3 3 | P3 P4 P5 | A8.3 A8.3 A8.3 |
| * | ORGANOMETALLIC COMPOUND SOLUTION, WATER-REACTIVE, FLAMMABLE, N.O.S. | 4.3 | UN3207 | I II III | 3 3 3 | P3 P4 P5 | A8.3 A8.3 A8.3 |
| * | ORGANOMETALLIC COMPOUND, TOXIC, N.O.S. | 6.1 | UN3282 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | ORGANOPHOSPHORUS COMPOUND, TOXIC, FLAMMABLE, <i>n.o.s.</i> | 6.1 | UN3279 | I II | 3 3 | P3, 5 P4 | A10.5 A10.5 |
| | ORGANOPHOSPHORUS COMPOUND, TOXIC, N.O.S. | 6.1 | UN3278 | I II III | | P3, 5 P4 P5 | A10.5 A10.5 A10.5 |
| | ORGANOPHOSPHOROUS PESTICIDES, LIQUID, FLAMMABLE, TOXIC, <i>flashpoint less than 23 degrees C</i> | 3 | UN2784 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | ORGANOPHOSPHORUS PESTICIDES, LIQUID, TOXIC, FLAMMABLE, <i>flashpoint not less than 23 degrees C</i> | 6.1 | UN3017 | I II III | 3 3 3 | P3, N76 P4, N76 P5, N76 | A10.5 A10.5 A10.5 |
| | ORGANOPHOSPHORUS PESTICIDES, LIQUID, TOXIC | 6.1 | UN3018 | I II III | | P3, N76 P4, N76 P5, N76 | A10.5 A10.5 A10.5 |
| | ORGANOPHOSPHORUS PESTICIDES, SOLID, TOXIC | 6.1 | UN2783 | I II III | | P5, N77 P5, N77 P5, N77 | A10.6 A10.6 A10.6 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|--|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | ORGANOTIN COMPOUNDS, LIQUID, N.O.S. | 6.1 | UN2788 | I II III | | P3, A3, N33, N34 P4, A3, N33, N34 P5 | A10.5 A10.5 A10.5 |
| | ORGANOTIN COMPOUNDS, SOLID, N.O.S. | 6.1 | UN3146 | I II III | | P5, A5 P5 P5 | A10.6 A10.6 A10.6 |
| | ORGANOTIN PESTICIDES, LIQUID, FLAMMABLE, TOXIC, flashpoint less than 23 degrees C | 3 | UN2787 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | ORGANOTIN PESTICIDES, LIQUID, TOXIC, FLAMMABLE, flashpoint more than 23 degrees C | 6.1 | UN3019 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | ORGANOTIN PESTICIDES, LIQUID, TOXIC | 6.1 | UN3020 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | ORGANOTIN PESTICIDES, SOLID, TOXIC | 6.1 | UN2786 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | OSMIUM TETROXIDE | 6.1 | UN2471 | I | | P5, A8, N33, N34 | A10.6 |
| | <i>Other Regulated Substances, aromatic extracts or aromatic flavorings not falling under the definitions of classes 1-8; see AVIATION REGULATED LIQUID or SOLID</i> | | | | | | |
| * | OXIDIZING LIQUID, CORROSIVE, N.O.S. | 5.1 | UN3098 | I II III | 8 8 8 | P3 P4 P5 | A9.7 A9.7 A9.7 |
| * | OXIDIZING LIQUID, N.O.S. | 5.1 | UN3139 | I II III | | P3, A2 P4, A2 P5, A2 | A9.7 A9.7 A9.7 |
| * | OXIDIZING LIQUID, TOXIC, N.O.S. | 5.1 | UN3099 | I II III | 6.1 6.1 6.1 | P3 P4 P5 | A9.7 A9.7 A9.7 |
| | OXIDIZING SOLID, CORROSIVE, N.O.S. | 5.1 | UN3085 | I II III | 8 8 8 | P5 P5 P5 | A9.8 A9.8 A9.8 |
| * | OXIDIZING SOLID, FLAMMABLE, N.O.S. | 5.1 | UN3137 | I | 4.1 | P4 | A9.10 |
| * | OXIDIZING SOLID, N.O.S. | 5.1 | UN1479 | I II III | | P5 P5 P5 | A9.8 A9.8 A9.8 |
| * | OXIDIZING SOLID, SELF-HEATING, N.O.S. | 5.1 | UN3100 | II | 4.2 | P4 | A9.10 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | OXIDIZING SOLID, TOXIC, N.O.S. | 5.1 | UN3087 | I II III | 6.1 6.1 6.1 | P5 P5 P5 | A9.8 A9.8 A9.8 |
| * | OXIDIZING SOLID, WATER- REACTIVE, N.O.S. | 5.1 | UN3121 | | 4.3 | P4 | A9.10 |
| | OXYGEN, COMPRESSED | 2.2 | UN1072 | | 5.1 | P5 | A6.4, A6.6 |
| | OXYGEN DIFLUORIDE, COMPRESSED | 2.3 | UN2190 | | 5.1, 8 | P1, 1 | A6.5 |
| | OXYGEN GENERATORS, CHEMICAL | 5.1 | UN3356 | II | | P4, 60 | A9.10 |
| | OXYGEN, REFRIGERATED LIQUID (<i>cryogenic liquid</i>) | 2.2 | UN1073 | | 5.1 | P4 | A6.12 |
| | PAINT (<i>including paint, lacquer, enamel, stain, shellac solutions, varnish, polish, liquid filler, and liquid lacquer base</i>) or PAINT RELATED MATERIAL (<i>including paint thinning or reducing compounds</i>) | 3 | UN1263 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | PAINT or PAINT RELATED MATERIAL | 8 | UN3066 | II III | | P5 P5, N71 | A12.3 A12.3 |
| | PAPER, UNSATURATED OIL TREATED <i>incompletely dried (including carbon paper)</i> | 4.2 | UN1379 | III | | P5 | A8.4 |
| | PARAFORMALDEHYDE | 4.1 | UN2213 | III | | P5, A1 | A8.4 |
| | PARALDEHYDE | 3 | UN1264 | III | | P5 | A7.3 |
| D | PARATHION | 6.1 | NA2783 | I II | | P3 P4 | A10.5 A10.5 |
| D | PARATHION AND COMPRESSED GAS MIXTURE | 2.3 | NA1967 | | | P2, 3 | A6.19 |
| | PCB, see POLYCHLORINATED BIPHENYLS | | | | | | |
| + | PENTABORANE | | | | | FORBIDDEN | FORBIDDEN |
| | PENTACHLOROETHANE | 6.1 | UN1669 | II | | P5 | A10.5 |
| | PENTACHLOROPHENOL | 6.1 | UN3155 | II | | P5 | A10.6 |
| | <i>Pentaerythrite Tetranitrate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | PENTAERYTHRITETETRANITRATE, WETTED or PENTAERYTHRITOL TETRANITRATE, WETTED or PETN, WETTED <i>with not less than 25% water by mass, or PENTAERYTHRITETETRANITRATE or PENTAERYTHRITOL TETRANITRATE or PETN; DESENSITIZED</i> <i>with not less than 15% phlegmatizer by mass</i> | 1.1D | UN0150 | II | | P4 | A5.9 |

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|--------|--|-------------------------|-----------------|-----------|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | PENTAERYTHRITOL TETRANITRATE <i>or PENTAERYTHRITOL TETRANITRATE or PETN, with not less than 7% wax by mass</i> | 1.1D | UN0411 | II | | P4 | A5.9 |
| | PENTAERYTHRITOL TETRANITRATE MIXTURE, DESENSITIZED SOLID, N.O.S. <i>with more than 10% but not more than 20% PETN by mass</i> | 4.1 | UN3344 | II | | P4 | A8.5 |
| | PENTAERYTHRITOL TETRANITRATE; see PENTAERYTHRITOL TETRANITRATE, etc. | | | | | | |
| | PENTAFLUOROETHANE or REFRIGERANT GAS R125 | 2.2 | UN3220 | | | P5 | A6.4, A6.5 |
| | PENTAMETHYLHEPTANE | 3 | UN2286 | III | | P5 | A7.3 |
| | PENTAN-2,4-DIONE | 3 | UN2310 | III | 6.1 | P5 | A7.3 |
| | PENTANES | 3 | UN1265 | I II | | P3 P5 | A7.3 A7.3 |
| | <i>Pentanitroaniline (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | 1-PENTENE (N-AMYLENE) | 3 | UN1108 | I | | P3 | A7.3 |
| | 1-PENTOL | 8 | UN2705 | II | | P5 | A12.3 |
| | PENTANOLS | 3 | UN1105 | II III | | P5 P5 | A7.3 A7.3 |
| | PENTOLITE, dry or wetted with less than 15% water by mass | 1.1D | UN0151 | II | | P4 | A5.9 |
| | PERCHLORATES, INORGANIC, N.O.S. | 5.1 | UN1481 | II III | | P5 P5 | A9.8 A9.8 |
| | PERCHLORATES, INORGANIC, AQUEOUS SOLUTIONS, N.O.S. | 5.1 | UN3211 | II | | P5 | A9.7 |
| | <i>Perchloric Acid, with more than 72% acid by mass</i> | | | | | FORBIDDEN | FORBIDDEN |
| | PERCHLORIC ACID more than 50% but not more than 72% acid, by mass | 5.1 | UN1873 | I | 8 | P3, A2, A3, N41 | A9.7 |
| | PERCHLORIC ACID not more than 50% acid by mass | 8 | UN1802 | II | 5.1 | P4, N41 | A12.3 |
| | <i>Perchloroethylene; see TETRACHLOROETHYLENE</i> | | | | | | |
| | PERCHLOROMETHYL MERCAPTAN | 6.1 | UN1670 | I | | P2, 2, A3, A7, N34 | A10.7 |
| | PERCHLORYL FLUORIDE | 2.3 | UN3083 | | 5.1 | P2, 2 | A6.6 |
| | <i>Percussion Caps; see PRIMERS, CAP TYPE</i> | | | | | | |
| | PERFLUORO (ETHYL VINYL ETHER) | 2.1 | UN3154 | | | P4 | A6.4, A6.5, A6.6 |
| | PERFLUORO (METHYL VINYL ETHER) | 2.1 | UN3153 | | | P4 | A6.4, A6.5, A6.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Perfluoro-2-butene; see</i> OCTAFLUOROBUT-2-ENE | | | | | | |
| | PERFUMERY PRODUCTS with <i>flammable solvents</i> | 3 | UN1266 | II III | | P5 P5 | A7.3 A7.3 |
| | PERMANGANATES, INORGANIC, N.O.S. | 5.1 | UN1482 | II III | | P5, A30 P5, A30 | A9.8 A9.8 |
| | PERMANGANATES, INORGANIC AQUEOUS SOLUTIONS, N.O.S. | 5.1 | UN3214 | II | | P5 | A9.7 |
| | PEROXIDES, INORGANIC, N.O.S. | 5.1 | UN1483 | II III | | P5, A7, A20, N34 P5, A7, A20, N34 | A9.8 A9.8 |
| | <i>Peroxyacetic acid, more than 43% and with more than 6% hydrogen peroxide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | PERSULFATES, INORGANIC, N.O.S. | 5.1 | UN3215 | III | | P5 | A9.8 |
| | PERSULFATES, INORGANIC, AQUEOUS SOLUTIONS, N.O.S. | 5.1 | UN3216 | III | | P5 | A9.7 |
| * | PESTICIDES, LIQUID, FLAMMABLE, TOXIC, flashpoint less than 23 degrees C | 3 | UN3021 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| * | PESTICIDES, LIQUID, TOXIC, FLAMMABLE, N.O.S. flashpoint not less than 23 degrees C | 6.1 | UN2903 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| * | PESTICIDES, LIQUID, TOXIC, N.O.S. | 6.1 | UN2902 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| * | PESTICIDES, SOLID, TOXIC, N.O.S. | 6.1 | UN2588 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | PETN; see PENTAERYTHRITE TETRANITRATE | | | | | | |
| | PETN/TNT; see PENTOLITE, etc | | | | | | |
| | PETROL; see GASOLINE | | | | | | |
| | PETROLEUM CRUDE OIL | 3 | UN1267 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | PETROLEUM DISTILLATES, N.O.S. or PETROLEUM PRODUCTS, N.O.S. | 3 | UN1268 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | PETROLEUM GASES, LIQUEFIED or LIQUEFIED PETROLEUM GAS | 2.1 | UN1075 | | | P4 | A6.4, A6.5 |
| D | PETROLEUM OIL | 3 | NA1270 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | PHENACYL BROMIDE | 6.1 | UN2645 | II | | P5 | A10.6 |
| + | PHENETIDINES | 6.1 | UN2311 | III | | P5 | A10.5 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|----------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | PHENOLATES, <i>liquid</i> | 8 | UN2904 | III | | | |
| | PHENOL, MOLTEN | | | | | FORBIDDEN | FORBIDDEN |
| + | PHENOL, SOLID | 6.1 | UN1671 | II | | P5, N78 | A10.6 |
| | PHENOL SOLUTIONS | 6.1 | UN2821 | II III | | P5 P5 | A10.5 A10.5 |
| | PHENOLSULFONIC ACID, LIQUID | 8 | UN1803 | II | | P5, N41 | A12.3 |
| * | PHENOXY PESTICIDES, LIQUID, FLAMMABLE, TOXIC, <i>flashpoint less than 23 degrees C</i> | 3 | UN2766 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| * | PHENOXY PESTICIDES, LIQUID, TOXIC, FLAMMABLE, <i>flashpoint not less than 23 degrees C</i> | 6.1 | UN2999 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| * | PHENOXY PESTICIDES, LIQUID, TOXIC | 6.1 | UN3000 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| * | PHENOXY PESTICIDES, SOLID, TOXIC | 6.1 | UN2765 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC (<i>flashpoint less than 23 degrees C</i>) | 3 | UN3346 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, TOXIC | 6.1 | UN3348 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | PHENOXYACETIC ACID DERIVATIVE PESTICIDE, LIQUID, FLAMMABLE, TOXIC (<i>flashpoint not less than 23 degrees C</i>) | 6.1 | UN3347 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | PHENOXYACETIC ACID DERIVATIVE PESTICIDE, SOLID, TOXIC | 6.1 | UN3345 | I II | | P5 P5 | A10.6 A10.6 |
| | PHENYLACETONITRILE, LIQUID | 6.1 | UN2470 | III | | P5 | A10.5 |
| | PHENYLACETYL CHLORIDE | 8 | UN2577 | II | | P5 | A12.3 |
| | PHENYL CARBYLAMINE CHLORIDE | 6.1 | UN1672 | I | | P2, 2 | A10.7 |
| | PHENYL CHLOROFORMATE | 6.1 | UN2746 | II | 8 | P4 | A10.5 |
| | <i>m-Phenylene diaminediperchlorate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| + | PHENYLENEDIAMINES (<i>o-,m-,p-</i>) | 6.1 | UN1673 | III | | P5 | A10.6 |
| | PHENYLHYDRAZINE | 6.1 | UN2572 | II | | P5 | A10.5 |
| | PHENYL ISOCYANATE | 6.1 | UN2487 | II | 3 | P2, 2, N33, N34 | A10.7 |
| | PHENYL MERCAPTAN | 6.1 | UN2337 | I | 3 | P2, 2 | A10.7 |
| | PHENYLMERCURIC ACETATE | 6.1 | UN1674 | II | | P5 | A10.6 |
| | PHENYLMERCURIC COMPOUNDS, N.O.S. | 6.1 | UN2026 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | PHENYLMERCURIC HYDROXIDE | 6.1 | UN1894 | II | | P5 | A10.6 |
| | PHENYLMERCURIC NITRATE | 6.1 | UN1895 | II | | P5 | A10.6 |
| | PHENYL PHOSPHORUS DICHLORIDE | 8 | UN2798 | II | | P4 | A12.3 |
| | PHENYL PHOSPHOROUS THIODICHLORIDE | 8 | UN2799 | II | | P4 | A12.3 |
| | PHENYLTRICHLOROSILANE | 8 | UN1804 | II | | P4, A7, N34 | A12.3 |
| * | PHENYL UREA PESTICIDES, LIQUID, FLAMMABLE, TOXIC <i>flashpoint less than 23 degrees C</i> | 3 | UN2768 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| * | PHENYL UREA PESTICIDES, LIQUID, TOXIC, FLAMMABLE <i>flash point more than 23 degrees C</i> | 6.1 | UN3001 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | PHENYL UREA PESTICIDES, LIQUID, TOXIC | 6.1 | UN3002 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| * | PHENYL UREA PESTICIDES, SOLID, TOXIC | 6.1 | UN2767 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | PHOSGENE | 2.3 | UN1076 | | 8 | P1, 1 | A6.16 |
| | 9-PHOSPHABICYCLONANES or CYCLOOCTADIENE PHOSPHINES | 4.2 | UN2940 | II | | P5, A19 | A8.4 |
| | PHOSPHINE | 2.3 | UN2199 | | 2.1 | P1, 1 | A6.16 |
| | <i>Phosphoric acid triethyleneimine; see TRIS- (1-AZIRIDIYL)</i> | | | | | | |
| | PHOSPHINE OXIDE, SOLUTION <i>Phosphoric Anhydride; see PHOSPHORUS PENTOXIDE</i> | | | | | | |
| | PHOSPHORIC ACID | 8 | UN1805 | III | | P5, A7, N34 | A12.3 |
| | PHOSPHOROUS ACID | 8 | UN2834 | III | | P5 | A12.4 |
| | PHOSPHORUS, AMORPHOUS | 4.1 | UN1338 | III | | P5, A1, A19 | A8.4 |
| | PHOSPHORUS HEPTASULPHIDE, free from yellow or white phosphorus | 4.1 | UN1339 | II | | P5, A20, N34 | A8.4 |
| | PHOSPHORUS OXYBROMIDE | 8 | UN1939 | II | | P5, N41, N43 | A12.4 |
| | PHOSPHORUS OXYBROMIDE, MOLTEN | | | | | FORBIDDEN | FORBIDDEN |
| + | PHOSPHORUS OXYCHLORIDE | 8 | UN1810 | II | 6.1 | P2, 2, A7, N34 | A12.12 |
| | PHOSPHORUS PENTABROMIDE | 8 | UN2691 | II | | P4, A7, N34 | A12.3 |
| | PHOSPHORUS PENTACHLORIDE | 8 | UN1806 | II | | P4, A7, N34 | A12.3 |
| | PHOSPHORUS PENTAFLUORIDE, COMPRESSED | 2.3 | UN2198 | | 8 | P1, 2 | A6.5, A6.6 |
| | PHOSPHORUS PENTASULPHIDE, free from yellow or white phosphorus | 4.3 | UN1340 | II | 4.1 | P5, A20 | A8.4 |
| | PHOSPHORUS PENTOXIDE | 8 | UN1807 | II | | P4, A7, N34 | A12.4 |

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|--------|---|-------------------------|-----------------|-----|--------------------|--------------------------|------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | PHOSPHORUS SESQUISULPHIDE , <i>free from yellow or white phosphorus</i> | 4.1 | UN1341 | II | | P5, A20, N34 | A8.4 |
| | PHOSPHORUS TRIBROMIDE | 8 | UN1808 | II | | P4, A3, A6, A7, N34, N43 | A12.3 |
| | PHOSPHORUS TRICHLORIDE | 6.1 | UN1809 | I | 8 | P2, 2, N34 | A12.12 |
| | PHOSPHORUS TRIOXIDE | 8 | UN2578 | III | | P5 | A12.4 |
| | PHOSPHORUS TRISULPHIDE , <i>free from yellow or white phosphorus</i> | 4.1 | UN1343 | II | | P5, A20, N34 | A8.4 |
| | PHOSPHORUS WHITE, MOLTEN <i>Phosphorus (white or red) and a chlorate, mixtures of</i> | | | | | FORBIDDEN FORBIDDEN | FORBIDDEN FORBIDDEN |
| | PHOSPHORUS, WHITE DRY or PHOSPHORUS, WHITE, UNDER WATER OR PHOSPHORUS WHITE IN SOLUTION or PHOSPHORUS YELLOW DRY or PHOSPHORUS UNDER WATER or PHOSPHORUS IN SOLUTION <i>Phosphoryl Chloride; see PHOSPHORUS OXYCHLORIDE</i> | 4.2 | UN1381 | I | 6.1 | P3, N34 | A8.17 |
| | PHTHALIC ANHYDRIDE <i>with more than .05% maleic anhydride</i> | 8 | UN2214 | III | | P5 | A12.4 |
| | PICOLINES <i>Picramide see TRINITROANILINE Picric Acid; see TRINITROPHENOL, etc</i> | 3 | UN2313 | III | | P5 | A7.3 |
| D | PICRIC ACID, WET , <i>with not less than 10% water</i> <i>Picrite; see NITROGUANIDINE, etc</i> <i>Picryl Chloride; see TRINITROCHLOROBENZENE</i> | 4.1 | NA1344 | I | | P3, A19, A20, N41 | A8.4 |
| | ALPHA-PINENE | 3 | UN2368 | III | | P5 | A7.3 |
| | PINE OIL | 3 | UN1272 | III | | P5 | A7.3 |
| | PIPERAZINE | 8 | UN2579 | III | | P5 | A12.4 |
| | PIPERIDINE <i>Pivaloyl Chloride; see TRIMETHYLACETYL CHLORIDE</i> | 3 | UN2401 | II | 8 | P4 | A7.3 |
| | PLASTIC MOULDING COMPOUND <i>in dough, sheet, or extruded rope form evolving flammable vapor</i> | 9 | UN3314 | III | | P5 | A13.16 |
| | PLASTICS, NITROCELLULOSE BASED, SELF- HEATING, N.O.S. <i>Plastic solvent, n.o.s.; see FLAMMABLE LIQUIDS, N.O.S.</i> | 4.2 | UN2006 | III | | P2 | A8.4 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Poisonous gases, n.o.s.; see COMPRESSED or LIQUEFIED GASES, FLAMMABLE or TOXIC, N.O.S.</i> | | | | | | |
| | <i>POLYALKYLAMINES, see AMINES, ect</i> | | | | | | |
| | POLYCHLORINATED BIPHENYLS, LIQUID | 9 | UN2315 | II | | P5, 9 | A13.3 |
| | POLYCHLORINATED BIPHENYLS, SOLID | 9 | UN2315 | II | | P5, 9 | A13.3 |
| | POLYESTER RESIN KIT | 3 | UN3269 | II | | P5 | A7.7 |
| | POLYHALOGENATED BIPHENYLS, LIQUID or POLYHALOGENATED TERPHENYLS, LIQUID | 9 | UN3151 | II | | P5 | A13.3 |
| | POLYHALOGENATED BIPHENYLS, SOLID, or POLYHALOGENATED TERPHENYLS, SOLIDS | 9 | UN3152 | II | | P5 | A13.3 |
| | POLYMERIC BEADS, EXPANDABLE, evolving flammable vapor | 9 | UN2211 | III | | P5 | A13.16 |
| | POTASSIUM | 4.3 | UN2257 | I | | P3, A19, A20, N6, N34 | A8.4 |
| | POTASSIUM ARSENATE | 6.1 | UN1677 | II | | P5 | A10.6 |
| | POTASSIUM ARSENITE | 6.1 | UN1678 | II | | P5 | A10.6 |
| | <i>Potassium bisulfite solution, see BISULFITES, INORGANIC, AQUEOUS SOLUTIONS, N.O.S.</i> | | | | | | |
| | POTASSIUM BOROHYDRIDE | 4.3 | UN1870 | I | | P3, A19, N40 | A8.4 |
| | POTASSIUM BROMATE | 5.1 | UN1484 | II | | P5 | A9.8 |
| | <i>Potassium Carbonyl</i> | | | | | FORBIDDEN | FORBIDDEN |
| | POTASSIUM CHLORATE | 5.1 | UN1485 | II | | P5, A9, N34 | A9.8 |
| | POTASSIUM CHLORATE, AQUEOUS SOLUTION | 5.1 | UN2427 | II III | | P5, A2 P5, A2 | A9.7 A9.7 |
| | POTASSIUM CUPROCYANIDE | 6.1 | UN1679 | II | | P5 | A10.6 |
| | POTASSIUM CYANIDE | 6.1 | UN1680 | I | | P5, N74, N75 | A10.6 |
| | POTASSIUM DITHIONITE or POTASSIUM HYDROSULFITE | 4.2 | UN1929 | II | | P5, A8, A19, A20 | A8.4 |
| | POTASSIUM FLUORIDE | 6.1 | UN1812 | III | | P5 | A10.6 |
| | POTASSIUM FLUOROACETATE | 6.1 | UN2628 | I | | P5 | A10.6 |
| | POTASSIUM FLUROSILICATE | 6.1 | UN2655 | III | | P5 | A10.6 |
| | <i>Potassium hydrate; see POTASSIUM HYDROXIDE, SOLID</i> | | | | | | |
| | <i>Potassium hydrogen fluoride; see POTASSIUM HYDROGENDIFLUORIDE</i> | | | | | | |
| | POTASSIUM HYDROGENDIFLUORIDE, solid or solution | 8 | UN1811 | II | 6.1 | P5, N3, N34 | A12.3, A12.4 |

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|--------|--|-------------------------|-----------------|-----------|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Potassium hydrogen fluoride solution; see</i> CORROSIVE LIQUID, N.O.S. | | | | | | |
| | POTASSIUM HYDROGEN SULPHATE | 8 | UN2509 | II | | P5, A7,N34 | A12.4 |
| | <i>Potassium Hydrosulfite; see</i> POTASSIUM DITHIONITE | | | | | | |
| | POTASSIUM, HYDROXIDE, SOLID | 8 | UN1813 | II | | P5 | A12.4 |
| | POTASSIUM HYDROXIDE, SOLUTION | 8 | UN1814 | II III | | P5 P5 | A12.3 A12.3 |
| | <i>Potassium hypochlorite, solution, see</i> HYPOCHLORITE SOLUTIONS, etc | | | | | | |
| | POTASSIUM, METAL ALLOYS | 4.3 | UN1420 | I | | P3, A19, A20 | A8.4 |
| | <i>Potassium metal, liquid alloy; see</i> ALKALI METAL ALLOYS, LIQUID | | | | | | |
| | POTASSIUM METAVANADATE | 6.1 | UN2864 | II | | P5 | A10.6 |
| | POTASSIUM MONOXIDE | 8 | UN2033 | II | | P5 | A12.4 |
| | POTASSIUM NITRATE | 5.1 | UN1486 | III | | P5, A1, A29 | A9.8 |
| | POTASSIUM NITRATE AND SODIUM NITRITE MIXTURES | 5.1 | UN1487 | II | | P5 | A9.8 |
| | POTASSIUM NITRITE | 5.1 | UN1488 | II | | P5 | A9.8 |
| | POTASSIUM PERCHLORATE, solid or solution | 5.1 | UN1489 | II | | P5 | A9.7, A9.8 |
| | POTASSIUM PERMANGANATE | 5.1 | UN1490 | II | | P5 | A9.8 |
| | POTASSIUM PEROXIDE | 5.1 | UN1491 | I | | P5, A20, N34 | A9.8 |
| | POTASSIUM PERSULFATE | 5.1 | UN1492 | III | | P5, A1, A29 | A9.8 |
| | POTASSIUM PHOSPHIDE | 4.3 | UN2012 | I | 6.1 | P3, A19, N40 | A8.4 |
| | POTASSIUM SALTS OF AROMATIC NITRO- DERIVATIVES, explosive | 1.3C | UN0158 | II | | P4 | A5.69 |
| | <i>Potassium selenate; see</i> SELENATES | | | | | | |
| | <i>Potassium selenite; see</i> SELENITES | | | | | | |
| | POTASSIUM SODIUM ALLOYS | 4.3 | UN1422 | I | | P3, A19 N34, N40 | A8.3 |
| | POTASSIUM SULPHIDE, ANHYDROUS <i>or POTASSIUM SULPHIDE with less than 30% water of crystallization</i> | 4.2 | UN1382 | II | | P5, A19, A20, N34 | A8.4 |
| | POTASSIUM SULPHIDE, HYDRATED <i>with not less than 30% water of crystallization</i> | 8 | UN1847 | II | | P5 | A12.4 |
| | POTASSIUM SUPEROXIDE | 5.1 | UN2466 | I | | P5, A20 | A9.8 |
| | POWDER CAKE, WETTED, or POWDER PASTE, WETTED <i>with not less than 17% alcohol by mass</i> | 1.1C | UN0433 | II | | P4 | A5.8 |
| | POWDER CAKE, WETTED, or POWDER PASTE, WETTED <i>with not less than 25% water, by mass</i> | 1.3C | UN0159 | II | | P4 | A5.8 |
| | <i>Powder Paste, see</i> POWDER CAKE | | | | | | |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | POWDER, SMOKELESS | 1.1C | UN0160 | II | | P4, A69 | A5.12 |
| | POWDER, SMOKELESS | 1.3C | UN0161 | II | | P4, A69 | A5.12 |
| | <i>Power device, explosive; see</i> CARTRIDGES, POWER DEVICE | | | | | | |
| | PRIMERS, CAP TYPE | 1.4S | UN0044 | II | | P5, A69 | A5.19 |
| | PRIMERS, CAP TYPE | 1.1B | UN0377 | II | | P4, A69 | A5.19 |
| | PRIMERS, CAP TYPE | 1.4B | UN0378 | II | | P5, A69 | A5.19 |
| | <i>Primers small arms, see</i> PRIMERS, CAP TYPE | | | | | | |
| | PRIMERS, TUBULAR | 1.3G | UN0319 | II | | P4 | A5.19 |
| | PRIMERS, TUBULAR | 1.4G | UN0320 | II | | P5 | A5.19 |
| | PRIMERS, TUBULAR | 1.4S | UN0376 | II | | P5, A69 | A5.19 |
| | PRINTING INK, flammable | 3 | UN1210 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | <i>Projectiles illuminating; see</i> AMMUNITION, ILLUMINATING, etc | | | | | | |
| | PROJECTILES, inert with tracer | 1.4S | UN0345 | II | | P5, A69 | A5.15 |
| | PROJECTILES, inert, with tracer | 1.3G | UN0424 | II | | P4 | A5.15 |
| | PROJECTILES, inert, with tracer | 1.4G | UN0425 | II | | P5 | A5.15 |
| | PROJECTILES, with burster or expelling charge | 1.2D | UN0346 | II | | P4 | A5.15 |
| | PROJECTILES, with burster or expelling charge | 1.4D | UN0347 | II | | P5 | A5.15 |
| | PROJECTILES, with burster or expelling charge | 1.2F | UN0426 | II | | P4 | A5.15 |
| | PROJECTILES, with burster or expelling charge | 1.2G | UN0434 | II | | P4 | A5.15 |
| | PROJECTILES, with burster or expelling charge | 1.4F | UN0427 | II | | P5 | A5.15 |
| | PROJECTILES, with burster or expelling charge | 1.4G | UN0435 | II | | P5 | A5.15 |
| | PROJECTILES, with bursting charge | 1.4D | UN0344 | II | | P5 | A5.15 |
| | PROJECTILES, with bursting charge | 1.1D | UN0168 | II | | P4 | A5.15 |
| | PROJECTILES, with bursting charge | 1.1F | UN0167 | II | | P4 | A5.15 |
| | PROJECTILES, with bursting charge | 1.2D | UN0169 | II | | P4 | A5.15 |
| | PROJECTILES, with bursting charge | 1.2F | UN0324 | II | | P4 | A5.15 |
| | PROPADIENE, STABILIZED | 2.1 | UN2200 | | | P4 | A6.5 |
| | PROPANE, see PROPANE GASES, LIQUEFIED | 2.1 | UN1978 | | | P4 | A6.4, A6.5 |
| | PROPANETHIOLS | 3 | UN2402 | II | | P5 | A7.3 |
| | N-PROPANOL or PROPYL ALCOHOL, NORMAL | 3 | UN1274 | II III | | P5 P5 | A7.3 A7.3 |
| D | PROPARGYL ALCOHOL | 3 | NA1986 | II | 6.1 | P4 | A7.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| D | PROPELLANT EXPLOSIVE, LIQUID | 1.1C | NA0474 | II | | P4 | A5.11 |
| D | PROPELLANT EXPLOSIVE, LIQUID | 1.3C | NA0477 | II | | P4 | A5.11 |
| | PROPELLANT, LIQUID | 1.3C | UN0495 | II | | P4 | A5.13 |
| | PROPELLANT, LIQUID | 1.1C | UN0497 | II | | P4 | A5.13 |
| | PROPELLANT, SOLID | 1.1C | UN0498 | II | | P4 | A5.12 |
| | PROPELLANT, SOLID | 1.3C | UN0499 | II | | P4 | A5.12 |
| | PROPIONALDEHYDE | 3 | UN1275 | II | | P5 | A7.3 |
| | PROPIONIC ACID | 8 | UN1848 | III | | P5 | A12.3 |
| | PROPIONIC ANHYDRIDE | 8 | UN2496 | III | | P5 | A12.3 |
| | PROPIONITRILE | 3 | UN2404 | II | 6.1 | P4 | A7.3 |
| | PROPIONYL CHLORIDE | 3 | UN1815 | II | 8 | P5 | A7.3 |
| | N-PROPYL ACETATE | 3 | UN1276 | II | | P5 | A7.3 |
| | PROPYLAMINE | 3 | UN1277 | II | 8 | P5, N34 | A7.3 |
| | N-PROPYL BENZENE | 3 | UN2364 | III | | P5 | A7.3 |
| | PROPYL CHLORIDE | 3 | UN1278 | II | | P5, N34 | A7.3 |
| | N-PROPYL CHLOROFORMATE | 6.1 | UN2740 | I | 3, 8 | P2, 2, A3, A6, A7, N34 | A10.7 |
| | PROPYLENE <i>see also</i> PETROLEUM GASES, LIQUEFIED | 2.1 | UN1077 | | | P4 | A6.4, A6.5 |
| | PROPYLENE CHLOROHYDRIN | 6.1 | UN2611 | II | 3 | P5 | A10.5 |
| | 1,2-PROPYLENEDIAMINE | 8 | UN2258 | II | 3 | P5, A3, A6, N34 | A12.4 |
| | PROPYLENEIMINE, STABILIZED | 3 | UN1921 | I | 6.1 | P3, A3, N34 | A7.3 |
| | PROPYLENE OXIDE | 3 | UN1280 | I | | P3, A3, N34 | A7.3 |
| | PROPYLENE TETRAMER | 3 | UN2850 | III | | P5 | A7.3 |
| | PROPYL FORMATES | 3 | UN1281 | II | | P5 | A7.3 |
| | N-PROPYL ISOCYANATE | 6.1 | UN2482 | I | 3 | P1, 1, A7 | A10.7 |
| | N-PROPYL NITRATE | 3 | UN1865 | II | | P5 | A7.3 |
| | PROPYL TRICHLOROSILANE | 8 | UN1816 | II | 3 | P5, A7, N34 | A12.3 |
| | PYRETHROID PESTICIDE, LIQUID, FLAMMABLE, TOXIC (<i>flashpoint less than 23 degrees C</i>) | 3 | UN3350 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | PYRETHROID PESTICIDE, LIQUID, TOXIC | 6.1 | UN3352 | I II III | | P3 P4 P5 | A10.6 A10.6 A10.6 |
| | PYRETHROID PESTICIDE, LIQUID, TOXIC, FLAMMABLE (<i>flashpoint not less than 23 degrees C</i>) | 6.1 | UN3351 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | PYRETHROID PESTICIDE, SOLID, TOXIC | 6.1 | UN3349 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | PYRIDINE | 3 | UN1282 | II | | P4 | A7.3 |
| | <i>Pyridine perchlorate</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | PYROPHORIC LIQUIDS, ORGANIC, N.O.S. | 4.2 | UN2845 | I | | P3 | A8.6 |

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|--------|--|-------------------------|-----------------|-----|--------------------|----------------------|---------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | PYROPHORIC LIQUIDS, INORGANIC, N.O.S. | 4.2 | UN3194 | I | | P3 | A8.6 |
| * | PYROPHORIC METALS, N.O.S., or PYROPHORIC ALLOYS, N.O.S. | 4.2 | UN1383 | I | | P3 | A8.12 |
| | PYROPHORIC SOLIDS, ORGANIC, N.O.S. | 4.2 | UN2846 | I | | P3 | A8.12 |
| | PYROPHORIC SOLIDS, INORGANIC, N.O.S. | 4.2 | UN3200 | I | | P3 | A8.12 |
| * | PYROPHORIC ORGANOMETALLIC COMPOUNDS, WATER-REACTIVE, N.O.S. | 4.2 | UN3203 | I | 4.3 | P3 | A8.12 |
| | PYROSULFURYL CHLORIDE | 8 | UN1817 | II | | P5 | A12.3 |
| | PYRROLIDINE | 3 | UN1922 | II | 8 | P5 | A7.3 |
| | <i>Quebrachitol pentanitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Quicklime; see CALCIUM OXIDE</i> | | | | | | |
| | QUINOLINE | 6.1 | UN2656 | III | | P5 | A10.5 |
| | <i>(R12), see</i> DICHLORODIFLUOROMETHANE | | | | | | |
| | <i>(R12B1), see</i> CHLORODIFLUOROBROMOMETHANE | | | | | | |
| | <i>(R13B1), see</i> BROMOTRIFLUOROMETHANE | | | | | | |
| | <i>(R13), see</i> CHLOROTRIFLUOROMETHANE | | | | | | |
| | <i>(R14), see</i> TETRAFLUOROMETHANE | | | | | | |
| | <i>(R21), see</i> DICHLOROFLUOROMETHANE | | | | | | |
| | <i>(R22), see</i> CHLORODIFLUOROMETHANE | | | | | | |
| | <i>(R114), see</i> DICHLOROTETRAFLUROETHANE | | | | | | |
| | <i>(R115), see</i> CHLOROPENTAFLUROETHANE | | | | | | |
| | <i>(R116), see</i> HEXAFLUROETHANE | | | | | | |
| | <i>(R124), see</i> CHLOROTETRAFLUROETHANE | | | | | | |
| | <i>(R133a), see</i> CHLOROTRIFLUOROETHANE | | | | | | |
| | <i>(R152a) see</i> DIFLUOROETHANE | | | | | | |
| | <i>(R218), see</i> OCTAFLUROPROPANE | | | | | | |
| | <i>(R500), see</i> DICHLORODIFLUOROMETHANE AND DIFLUOROETHANE etc. | | | | | | |

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|--------|---|-------------------------|-----------------|-----|--------------------|----------------------|------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | (R502), see CHLORODIFLUOROMETHANE AND CHLOROPENTAFLUOROETHANE MIXTURE, etc. | | | | | | |
| | (R503), see CHLOROTRIFLUOROMETHANE AND TRIFLUOROMETHANE etc. | | | | | | |
| D | RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, ARTICLES MANUFACTURED FROM NATURAL <i>or</i> DEPLETED URANIUM <i>or</i> NATURAL THORIUM | 7 | UN2910 | | | P5 | A11.12, A11.16 |
| | RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-ARTICLES MANUFACTURED FROM NATURAL URANIUM OR DEPLETED URANIUM OR NATURAL THORIUM | 7 | UN2909 | | | | A11.12 A11.16 |
| D | RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-EMPTY PACKAGE <i>or</i> EMPTY PACKAGING | 7 | UN2910 | | | P5 | 1.10.3 |
| | RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-EMPTY PACKAGING | 7 | UN2908 | | | | A11.12, 1.10.3 |
| D | RADIOACTIVE MATERIAL, EXCEPTED PACKAGE- INSTRUMENTS <i>or</i> ARTICLES | 7 | UN2910 | | | P5 | A11.12, A11.14 |
| | RADIOACTIVE MATERIAL, EXCEPTED PACKAGE- INSTRUMENTS OR ARTICLES | 7 | UN2911 | | | | A11.12, A11.14 |
| | RADIOACTIVE MATERIAL, EXCEPTED PACKAGE- LIMITED QUANTITY OF MATERIAL | 7 | UN2910 | | | P5 | A11.11, A11.12 |
| D | RADIOACTIVE MATERIAL, FISSILE, N.O.S. | 7 | UN2918 | | | P1, P4, P5 | A11.8 |
| | RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-I) NON FISSILE OR FISSILE-EXCEPTED | 7 | UN2912 | | | | A11.17 |
| | RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-II) NON FISSILE OR FISSILE-EXCEPTED | 7 | UN3321 | | | | A11.17 |
| | RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA-III) NON FISSILE OR FISSILE EXCEPTED | 7 | | | | | A11.17 |
| D | RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY (LSA), N.O.S. | 7 | UN2912 | | | P4, P5 | 1.10.3, A11.11, A11.17 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| D | RADIOACTIVE MATERIAL, N.O.S. | 7 | UN2982 | | | P3, P4, P5 | A11.6, A11.7, A11.11, 1.10.3 |
| D | RADIOACTIVE MATERIAL, SPECIAL FORM, N.O.S. | 7 | UN2974 | | | P3, P4, P5 | A11.6, A11.7, A11.11, A11.14 |
| D | RADIOACTIVE MATERIAL SURFACE CONTAMINATED OBJECT <i>or</i> RADIOACTIVE MATERIAL, SCO | 7 | UN2913 | | | P4, P5 | A11.11, A11.14 A11.16, A11.17 |
| | RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECTS (SCO-I OR SCO-II) NON FISSILE OR FISSILE-EXCEPTED | 7 | UN2913 | | | | A11.17 |
| | RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, NON FISSILE OR FISSILE EXCEPTED | 7 | UN2919 | | | 139 | |
| | RADIOACTIVE MATERIAL, TRANSPORTED UNDER SPECIAL ARRANGEMENT, FISSILE | 7 | UN3331 | | | 139 | |
| | RADIOACTIVE MATERIAL, TYPE A PACKAGE, FISSILE NON-SPECIAL FORM | 7 | UN3327 | | | | A11.8 |
| | RADIOACTIVE MATERIAL, TYPE A PACKAGE NON -SPECIAL FORM, NON FISSILE | 7 | UN2915 | | | | A11.6 |
| | RADIOACTIVE MATERIAL,TYPE A PACKAGE, SPECIAL FORM NON FISSILE OR FISSILE EXCEPTED | 7 | UN3332 | | | | A11.6 A3.3.7.5 |
| | RADIOACTIVE MATERIAL, TYPE A PACKAGE, SPECIAL FORM, FISSILE | 7 | UN3333 | | | | A11.8, A3.3.7.5 |
| | RADIOACTIVE MATERIAL, TYPE B(M) PACKAGE, FISSILE | 7 | UN3329 | | | | A11.8 |
| | RADIOACTIVE MATERIAL,TYPE B(M) PACKAGE NON FISSILE OR FISSILE-EXCEPTED | 7 | UN2917 | | | | A11.7 |
| | RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE, FISSILE | 7 | UN3328 | | | | A11.8 |
| | RADIOACTIVE MATERIAL, TYPE B(U) PACKAGE NON FISSILE OR FISSILE-EXCEPTED | 7 | UN2916 | | | | A11.7 |
| | RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE NON FISSILE OR FISSILE-EXCEPTED | 7 | UN2978 | | | | A11.17, A11.18 |
| | RADIOACTIVE MATERIAL, URANIUM HEXAFLUORIDE, FISSILE | 7 | UN2977 | | | | A11.8, A11.18 |
| | <i>Railway torpedo, see</i> SIGNALS, RAILWAY TRACK, EXPLOSIVE | | | | | | |

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|--------|--|-------------------------|-----------------|----------------|--------------------|----------------------|----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | RARE GASES AND NITROGEN MIXTURES, COMPRESSED | 2.2 | UN1981 | | | P5 | A6.4, A6.6 |
| | RARE GASES AND OXYGEN MIXTURES, COMPRESSED | 2.2 | UN1980 | | | P5 | A6.4, A6.6 |
| | RARE GASES MIXTURES, COMPRESSED | 2.2 | UN1979 | | | P5 | A6.4, A6.6 |
| | RDX AND HMX MIXTURES, WETTED <i>with not more than 15% water by mass or</i> RDX AND HMX MIXTURES, DESENSITIZED <i>with not less than 10% phlegmatizer by mass</i> | | | | | FORBIDDEN | FORBIDDEN |
| | RECEPTACLES, SMALL, CONTAINING GAS (gas cartridges) <i>nonflammable, without release device, not refillable and not exceeding 1L capacity</i> | 2.2 | UN2037 | | | P5 | A6.4, A6.5 |
| | RECEPTACLES, SMALL, CONTAINING GAS (gas cartridges) <i>flammable without release device, not refillable and not exceeding 1L capacity</i> | 2.1 | UN2037 | | | P5 | A6.4, A6.5 |
| | <i>Red Phosphorus, see</i> PHOSPHORUS, AMORPHUS | | | | | | |
| | REFRIGERANT GAS R404A | 2.2 | UN3337 | | | P5 | A6.4, A6.5 |
| | REFRIGERANT GAS R407A | 2.2 | UN3338 | | | P5 | A6.5, A6.8 |
| | REFRIGERANT GAS R407B | 2.2 | UN3339 | | | P5 | A6.4, A6.5 |
| | REFRIGERANT GAS R407C | 2.2 | UN3340 | | | P5 | A6.4, A6.5 |
| * | REFRIGERANT GASES, N.O.S. | 2.2 | UN1078 | | | P5 | A6.4, A6.5 |
| D | REFRIGERANT GASES, N.O.S. or DISPERSANT GASES, N.O.S. | 2.1 | NA1954 | | | P4 | A6.4, A6.5 |
| D | REFRIGERATING MACHINE | 3 | NA1993 | III | | P5 | A7.4 |
| D | REFRIGERATING MACHINES, <i>containing flammable nonpoisonous, liquefied gas</i> | 2.1 | NA1954 | | | P4 | A6.4, A6.9 |
| | REFRIGERATING MACHINES, <i>containing nonflammable non-toxic, liquefied gas or ammonia solutions</i> | 2.2 | UN2857 | | | P5 | A6.4, A6.9 |
| D | REGULATED MEDICAL WASTE | 6.2 | UN3291 | II | | P5 | A10.10 |
| | RELEASE DEVICES, EXPLOSIVE | 1.4S | UN0173 | II | | P5, A69 | A5.20 |
| | RESIN SOLUTION, flammable | 3 | UN1866 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | RESORCINOL | 6.1 | UN2876 | III | | P5 | A10.6 |
| | <i>Rifle grenade, see</i> GRENADES, hand or rifle, etc. | | | | | | |
| | <i>Rifle powder, see</i> POWDER, SMOKELESS | | | | | | |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | RIVETS, EXPLOSIVE | 1.4S | UN0174 | II | | P5, A69 | A5.20 |
| | ROCKET MOTORS | 1.3C | UN0186 | II | | P4, 109 | A5.15 |
| | ROCKET MOTORS | 1.1C | UN0280 | II | | P4, 109 | A5.15 |
| | ROCKET MOTORS | 1.2C | UN0281 | II | | P4, 109 | A5.15 |
| | ROCKET MOTORS, LIQUID FUELED | 1.2J | UN0395 | II | | P3, 109 | A5.6 |
| | ROCKET MOTORS, LIQUID FUELED | 1.3J | UN0396 | II | | P3, 109 | A5.6 |
| | ROCKET MOTORS WITH HYPERGOLIC LIQUIDS with or without an expelling charge | 1.3L | UN0250 | II | | P3, 109 | A5.6 |
| | ROCKET MOTORS WITH HYPERGOLIC LIQUIDS with or without an expelling charge | 1.2L | UN0322 | II | | P3, 109 | A5.6 |
| | ROCKETS, LINE-THROWING | 1.4G | UN0453 | II | | P5 | A5.15 |
| | ROCKETS, LINE-THROWING | 1.2G | UN0238 | II | | P4 | A5.15 |
| | ROCKETS, LINE-THROWING | 1.3G | UN0240 | II | | P4 | A5.15 |
| | ROCKETS, LIQUID FUELED with bursting charge | 1.2J | UN0398 | II | | P3 | A5.6 |
| | ROCKETS, LIQUID FUELED with bursting charge | 1.1J | UN0397 | II | | P3 | A5.6 |
| | ROCKETS, with bursting charge | 1.1F | UN0180 | II | | P4 | A5.15 |
| | ROCKETS, with bursting charge | 1.1E | UN0181 | II | | P4 | A5.15 |
| | ROCKETS, with bursting charge | 1.2E | UN0182 | II | | P4 | A5.15 |
| | ROCKETS, with bursting charge | 1.2F | UN0295 | II | | P4 | A5.15 |
| | ROCKETS, with expelling charge | 1.2C | UN0436 | II | | P4 | A5.15 |
| | ROCKETS, with expelling charge | 1.3C | UN0437 | II | | P4 | A5.15 |
| | ROCKETS, with expelling charge | 1.4C | UN0438 | II | | P5 | A5.15 |
| | ROCKETS, with inert head | 1.3C | UN0183 | II | | P4 | A5.15 |
| | ROSIN OIL | 3 | UN1286 | II III | | P5 P5 | A7.3 A7.3 |
| | RUBBER SCRAP or RUBBER SHODDY, <i>powdered or granulated, not exceeding 840 microns & rubber Content exceeding 45%</i> | | | | | | |
| | RUBBER SOLUTION | 3 | UN1287 | II III | | P5 P5 | A7.3 A7.3 |
| | RUBIDIUM | 4.3 | UN1423 | I | | P3, 22, A7, A19, N34, N40, N45 | A8.4 |
| | RUBIDIUM HYDROXIDE | 8 | UN2678 | II | | P5 | A12.4 |
| | RUBIDIUM HYDROXIDE SOLUTION | 8 | UN2677 | II III | | P5 P5 | A12.3 A12.3 |
| | <i>Safety fuse, see FUSE, SAFETY</i> | | | | | | |
| * | SAMPLES, EXPLOSIVE, other than initiating explosives | use class/ division of sample | UN0190 | II | | P4, 113 | A5.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | SEED CAKE , containing vegetable oil solvent extractions and expelled seeds, with not more than 10% of oil and when the amount of moisture is higher than 11%, not more than 20% of oil and moisture combined | 4.2 | UN1386 | III | | P5, N7 | A8.4 |
| | SEED CAKE with more than 1.5% oil and not more than 11% moisture | 4.2 | UN1386 | III | | P5, N7 | A8.4 |
| | SEED CAKE with not more than 1.5% oil and not more than 11% moisture | 4.2 | UN2217 | III | | P5, N7 | A8.4 |
| | SELENATES or SELENITES | 6.1 | UN2630 | I | | P5 | A10.6 |
| | SELENIC ACID | 8 | UN1905 | I | | P3, N34 | A12.4 |
| | SELENIUM COMPOUND, N.O.S. | 6.1 | UN3283 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | SELENIUM DISULPHIDE | 6.1 | UN2657 | II | | P5 | A10.6 |
| | SELENIUM HEXAFLUORIDE | 2.3 | UN2194 | | 8 | P1, 1 | A6.6 |
| | <i>Selenium nitride</i> | | | | | FORBIDDEN | FORBIDDEN |
| D | SELENIUM OXIDE | 6.1 | NA2811 | I | | P5 | A10.6 |
| | SELENIUM OXYCHLORIDE | 8 | UN2879 | I | 6.1 | P3, A3, A6, A7, N34 | A12.3 |
| +, D | SELF-DEFENSE SPRAY, NON-PRESSURIZED | 9 | NA3334 | | | P5, A37 | A13.3 |
| * | SELF-HEATING LIQUID, CORROSIVE, INORGANIC, N.O.S. | 4.2 | UN3188 | II III | 8 8 | P4 P5 | A8.3 A8.3 |
| * | SELF-HEATING LIQUID, CORROSIVE, ORGANIC, N.O.S. | 4.2 | UN3185 | II III | 8 8 | P4 P5 | A8.3 A8.3 |
| * | SELF-HEATING LIQUID, INORGANIC, N.O.S. | 4.2 | UN3186 | II III | | P4 P5 | A8.3 A8.3 |
| * | SELF-HEATING LIQUID, ORGANIC, N.O.S. | 4.2 | UN3183 | II III | | P4 P5 | A8.3 A8.3 |
| * | SELF-HEATING LIQUID, TOXIC, INORGANIC, N.O.S. | 4.2 | UN3187 | II III | 6.1 6.1 | P4 P5 | A8.3 A8.3 |
| * | SELF-HEATING LIQUID, TOXIC, ORGANIC, N.O.S. | 4.2 | UN3184 | II III | 6.1 6.1 | P4 P5 | A8.3 A8.3 |
| * | SELF-HEATING SOLID, CORROSIVE, INORGANIC, N.O.S. | 4.2 | UN3192 | II III | 8 8 | P5 P5 | A8.4 A8.4 |
| * | SELF-HEATING SOLID, CORROSIVE, ORGANIC, N.O.S. | 4.2 | UN3126 | II III | 8 8 | P5 P5 | A8.4 A8.4 |
| * | SELF-HEATING SOLID, INORGANIC, N.O.S. | 4.2 | UN3190 | II III | | P5 P5 | A8.4 A8.4 |
| * | SELF-HEATING SOLID, ORGANIC, N.O.S. | 4.2 | UN3088 | II III | | P5 P5 | A8.4 A8.4 |
| * | SELF-HEATING SOLID, OXIDIZING, N.O.S. | 4.2 | UN3127 | | 5.1 | P3 | A8.5 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | SELF-HEATING SOLID, TOXIC, INORGANIC, N.O.S. | 4.2 | UN3191 | II III | 6.1 6.1 | P5 P5 | A8.4 A8.4 |
| * | SELF-HEATING SOLID, TOXIC, ORGANIC, N.O.S. | 4.2 | UN3128 | II III | 6.1 6.1 | P5 P5 | A8.4 A8.4 |
| * | SELF-REACTIVE LIQUID TYPE B | | | | | FORBIDDEN | FORBIDDEN |
| * | SELF-REACTIVE LIQUID TYPE C <i>(specific technical name required)</i> | 4.1 | UN3223 | II | | P5 | A8.8 |
| * | SELF-REACTIVE LIQUID TYPE D <i>(specific technical name required)</i> | 4.1 | UN3225 | II | | P5 | A8.8 |
| * | SELF-REACTIVE LIQUID TYPE E <i>(specific technical name required)</i> | 4.1 | UN3227 | II | | P5 | A8.8 |
| * | SELF-REACTIVE LIQUID TYPE F <i>(specific technical name required)</i> | 4.1 | UN3229 | II | | P5 | A8.8 |
| * | SELF-REACTIVE LIQUID TYPE B, TEMPERATURE CONTROLLED <i>(specific technical name required)</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | SELF-REACTIVE LIQUID TYPE C TEMPERATURE CONTROLLED <i>(specific technical name required)</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | SELF-REACTIVE LIQUID TYPE D, TEMPERATURE CONTROLLED <i>(specific technical name required)</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | SELF-REACTIVE LIQUID TYPE E, TEMPERATURE CONTROLLED <i>(specific technical name required)</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | SELF-REACTIVE LIQUID TYPE F, TEMPERATURE CONTROLLED <i>(specific technical name required)</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | SELF-REACTIVE SOLID TYPE B <i>(see below for specific technical name)</i> | 4.1 | UN3222 | II | | P5, 53 | (see technical name below for packaging para-graph reference) |
| | <i>2-diazo-1-naphthol-4-sulphochloride</i> | | | | | | A8.10 |
| | <i>2-diazo-1-naphthol-5-sulphochloride</i> | | | | | | A8.10 |
| * | SELF-REACTIVE SOLID TYPE C <i>(see below for specific technical name)</i> | 4.1 | UN3224 | II | | P5 | (see technical name below for packaging para-graph reference) |
| | <i>n,n'-dinitroso-n,n'-dimethyl terephthalamide, as a paste</i> | | | | | | A8.7 |
| | <i>n,n'-dinitrosopentamethylenetetramine</i> | | | | | | A8.8 |
| * | SELF-REACTIVE SOLID TYPE D <i>(see below for specific technical name)</i> | 4.1 | UN3226 | II | | P5 | (see technical name below for packaging para-graph reference) |
| | <i>1,1'-azodi-(hexahydrobenzotriazole)</i> | | | | | | A8.8 |
| | <i>benzene-1,3-disulphohydrazide as a paste</i> | | | | | | A8.8 |
| | <i>benzene sulphohydrazide</i> | | | | | | A8.8 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | 4-(benzyl(ethyl)amino)- 3-ethoxybenzenediazonium zinc chloride | | | | | FORBIDDEN | FORBIDDEN |
| | 3-chloro-4-diethylamino-benzenediazonium zinc chloride | | | | | | A8.9 |
| | diphenyloxide-4,4'-disulphohydrazide | | | | | | A8.7 |
| | 4-dipropylaminobenzenediazonium zinc chloride 4-methylbenzene sulphonylhydrazide | | | | | | A8.9 |
| | sodium 2-diazo-1-naphthol-4-sulphonate | | | | | | A8.9 |
| | sodium 2-diazo-1-naphthol-5-sulphonate | | | | | | A8.9 |
| * | SELF-REACTIVE SOLID TYPE E, (specific technical name required) | 4.1 | UN3228 | II | | P5 | A8.9 |
| * | SELF-REACTIVE SOLID TYPE F, (specific technical name required) | 4.1 | UN3230 | II | | P5 | A8.9 |
| * | SELF-REACTIVE SOLID TYPE B, TEMPERATURE CONTROLLED (specific technical name required) | | | | | FORBIDDEN | FORBIDDEN |
| * | SELF-REACTIVE SOLID TYPE C, TEMPERATURE CONTROLLED (specific technical name required) | | | | | FORBIDDEN | FORBIDDEN |
| * | SELF-REACTIVE SOLID TYPE D, TEMPERATURE CONTROLLED (specific technical name required) | | | | | FORBIDDEN | FORBIDDEN |
| * | SELF-REACTIVE SOLID TYPE E, TEMPERATURE CONTROLLED (specific technical name required) | | | | | FORBIDDEN | FORBIDDEN |
| * | SELF-REACTIVE SOLID TYPE F, TEMPERATURE CONTROLLED (specific technical name required) | | | | | FORBIDDEN | FORBIDDEN |
| | SHALE OIL | 3 | UN1288 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | <i>Shaped Charges, commercial, see CHARGES, SHAPED, COMMERCIAL, etc</i> | | | | | | |
| | SIGNAL DEVICES, HAND | 1.4G | UN0191 | II | | P5, A69 | A5.21 |
| | SIGNAL DEVICES, HAND | 1.4S | UN0373 | II | | P5, A69 | A5.21 |
| | SIGNALS, DISTRESS, ship | 1.1G | UN0194 | II | | P4, A69 | A5.21 |
| | SIGNALS, DISTRESS, ship | 1.3G | UN0195 | II | | P4, A69 | A5.21 |
| | <i>Signals, highway, see SIGNAL DEVICES, HAND; FIREWORKS TYPE D</i> | | | | | | |
| | SIGNALS, RAILWAY TRACK, EXPLOSIVE | 1.1G | UN0192 | II | | P4, A69 | A5.21 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | SIGNALS, RAILWAY TRACK, EXPLOSIVE | 1.3G | UN0492 | II | | P4, A69 | A5.21 |
| | SIGNALS, RAILWAY TRACK, EXPLOSIVE | 1.4G | UN0493 | II | | P5, A69 | A5.21 |
| | SIGNALS, RAILWAY TRACK, EXPLOSIVE | 1.4S | UN0193 | II | | P5, A69 | A5.21 |
| | <i>Signals, ship distress, water-activated; see CONTRIVANCES, WATER- ACTIVATED, etc</i> | | | | | | |
| | SIGNALS, SMOKE | 1.1G | UN0196 | II | | P4 | A5.21 |
| | SIGNALS, SMOKE | 1.2G | UN0313 | II | | P4 | A5.21 |
| | SIGNALS, SMOKE | 1.4G | UN0197 | II | | P5 | A5.21 |
| | SIGNALS, SMOKE | 1.3G | UN0487 | II | | P4 | A5.21 |
| | SILANE, COMPRESSED | 2.1 | UN2203 | | | P4 | A6.6 |
| | SILICON POWDER, AMORPHOUS | 4.1 | UN1346 | III | | P5, A1 | A8.4 |
| | SILICON TETRACHLORIDE | 8 | UN1818 | II | | P5, A3, A6 | A12.3 |
| | SILICON TETRAFLUORIDE, COMPRESSED | 2.3 | UN1859 | | 8 | P2, 2 | A6.6 |
| | <i>Silver acetylde (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | SILVER ARSENITE | 6.1 | UN1683 | II | | P5 | A10.6 |
| | <i>Silver azide (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Silver chlorite (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | SILVER CYANIDE | 6.1 | UN1684 | II | | P5 | A10.6 |
| | <i>Silver fulminate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | SILVER NITRATE | 5.1 | UN1493 | II | | P5 | A9.8 |
| | <i>Silver oxadate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Silver picrate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | SILVER PICRATE, WETTED, with not less than 30% water, by mass | 4.1 | UN1347 | I | | P3 | A8.4 |
| | SLUDGE, ACID | 8 | UN1906 | II | | P5, A3, A7, N34 | A12.3 |
| D | SMOKELESS POWDER FOR SMALL ARMS (100 pounds or less) | 4.1 | NA3178 | I | | P4 | A8.18 |
| | SODA LIME with more than 4% sodium hydroxide | 8 | UN1907 | III | | P5 | A12.4 |
| | SODIUM | 4.3 | UN1428 | I | | P3, A7, A8, A19, A20, N34 | A8.4 |
| | SODIUM ALUMINATE, SOLID | 8 | UN2812 | III | | P5 | A12.4 |
| | SODIUM ALUMINATE, SOLUTION | 8 | UN1819 | II III | | P5 P5 | A12.3 A12.3 |
| | SODIUM ALUMINUM HYDRIDE | 4.3 | UN2835 | II | | P5, A8, A19, A20 | A8.4 |
| | SODIUM AMMONIUM VANADATE | 6.1 | UN2863 | II | | P5 | A10.6 |
| | SODIUM ARSANILATE | 6.1 | UN2473 | III | | P5 | A10.6 |
| | SODIUM ARSENATE | 6.1 | UN1685 | II | | P5 | A10.6 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | SODIUM ARSENITE, AQUEOUS SOLUTIONS | 6.1 | UN1686 | II III | | P5 P5 | A10.5 A10.5 |
| | SODIUM ARSENITE, SOLID | 6.1 | UN2027 | II | | P5 | A10.6 |
| | SODIUM AZIDE | 6.1 | UN1687 | II | | P5 | A10.6 |
| | <i>Sodium bifluoride, see SODIUM HYDROGENFLUORIDE</i> | | | | | | |
| | SODIUM BOROXYDRIDE and SODIUM HYDROXIDE SOLUTION <i>with no more than 12% sodium borohydride and not more than 40% sodium hydroxide by mass</i> | 8 | UN3320 | II III | | P5, N34 P5, N34 | A12.3 A12.3 |
| | SODIUM BOROXYDRIDE | 4.3 | UN1426 | I | | P3, N40 | A8.4 |
| | SODIUM BROMATE | 5.1 | UN1494 | II | | P5 | A9.8 |
| | SODIUM CACODYLATE | 6.1 | UN1688 | II | | P5 | A10.6 |
| | SODIUM CHLORATE | 5.1 | UN1495 | II | | P5, A9, N34 | A9.8 |
| | SODIUM CHLORATE, AQUEOUS SOLUTION | 5.1 | UN2428 | II III | | P5, A2 P5, A2 | A9.7 A9.7 |
| | SODIUM CHLORITE | 5.1 | UN1496 | II | | P5, A9, N34 | A9.8 |
| | SODIUM CHLOROACETATE | 6.1 | UN2659 | III | | P5 | A10.6 |
| | SODIUM CUPROCYANIDE, SOLID | 6.1 | UN2316 | I | | P5 | A10.6 |
| | SODIUM CUPROCYANIDE, SOLUTION | 6.1 | UN2317 | I | | P3 | A10.5 |
| | SODIUM CYANIDE | 6.1 | UN1689 | I | | P5, N74, N75 | A10.6 |
| | SODIUM DINITRO-O-CRESOLATE , <i>dry or wetted, with less than 15% water, by mass</i> | 1.3C | UN0234 | II | | P4 | A5.12 |
| | SODIUM DINITRO-O-CRESOLATE, WETTED , <i>with not less than 15% water, by mass</i> | 4.1 | UN1348 | I | 6.1 | P4, 23, A8, A19, A20, N41 | A8.4 |
| | SODIUM DITHIONITE or SODIUM HYDROSULFITE | 4.2 | UN1384 | II | | P5, A19, A20 | A8.4 |
| | SODIUM FLUORIDE | 6.1 | UN1690 | III | | P5 | A10.6 |
| | SODIUM FLUOROACETATE | 6.1 | UN2629 | I | | P5 | A10.6 |
| | SODIUM FLUOROSILICATE | 6.1 | UN2674 | III | | P5 | A10.6 |
| | SODIUM HYDRIDE | 4.3 | UN1427 | I | | P3, A19, N40 | A8.4 |
| | SODIUM HYDROGENDIFLUORIDE , <i>solid or solution</i> | 8 | UN2439 | II | | P5, N3, N34 | A12.3, A12.4 |
| D | SODIUM HYDROSULPHIDE, SOLUTION | 8 | NA2922 | II | 6.1 | P5 | A12.3 |
| | SODIUM HYDROSULPHIDE , <i>with less than 25% water of crystallization</i> | 4.2 | UN2318 | II | | P5, A7, A19, A20 | A8.4 |
| | SODIUM HYDROSULPHIDE , <i>with not less than 25% water of crystallization</i> | 8 | UN2949 | II | | P5, A7 | A12.4 |
| | SODIUM HYDROSULFITE; see SODIUM DITHIONITE | | | | | | |
| | SODIUM HYDROXIDE, SOLID | 8 | UN1823 | II | | P5 | A12.4 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | SODIUM HYDROXIDE, SOLUTION | 8 | UN1824 | II III | | P5, N34 P5, N34 | A12.3 A12.3 |
| | SODIUM METHYLATE | 4.2 | UN1431 | II | 8 | P5, A19 | A8.4 |
| | SODIUM METHYLATE SOLUTIONS <i>in alcohol</i> | 3 | UN1289 | II III | 8 8 | P5 P5 | A7.3 A7.3 |
| | SODIUM MONOXIDE | 8 | UN1825 | II | | P5 | A12.4 |
| | SODIUM NITRATE | 5.1 | UN1498 | III | | P5, A1, A29 | A9.8 |
| | SODIUM NITRATE AND POTASSIUM NITRATE MIXTURES | 5.1 | UN1499 | III | | P5, A1, A29 | A9.8 |
| | SODIUM NITRITE | 5.1 | UN1500 | III | 6.1 | P5, A1, A29 | A9.8 |
| | SODIUM PENTACHLOROPHENATE | 6.1 | UN2567 | II | | P5 | A10.6 |
| | SODIUM PERCARBONATES | 5.1 | UN2467 | III | | P5, 27, A1, A29 | A9.8 |
| | SODIUM PERCHLORATE | 5.1 | UN1502 | II | | P5 | A9.8 |
| | SODIUM PERMANGANATE | 5.1 | UN1503 | II | | P5 | A9.8 |
| | SODIUM PEROXIDE | 5.1 | UN1504 | I | | P3, A20, N34 | A9.8 |
| | SODIUM PEROXOBORATE, ANHYDROUS | 5.1 | UN3247 | II | | P5 | A9.8 |
| | SODIUM PERSULPHATE | 5.1 | UN1505 | III | | P5, A1 | A9.8 |
| | SODIUM PHOSPHIDE | 4.3 | UN1432 | I | 6.1 | P3, A19, N40 | A8.4 |
| | SODIUM PICRAMATE , <i>dry or wetted, with less than 20% water, by mass</i> | 1.3C | UN0235 | II | | P3 | A5.12 |
| | SODIUM PICRAMATE, WETTED , <i>with not less than 20% water, by mass</i> | 4.1 | UN1349 | I | | P4, 23, A8, A19, N41 | A8.4 |
| | <i>Sodium picryl peroxide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Sodium selenate; see SELENATES or SELENITES</i> | | | | | | |
| D | SODIUM SELENITE | 6.1 | NA2630 | II | | P5 | A10.6 |
| | SODIUM SULPHIDE, ANHYDROUS <i>or SODIUM SULPHIDE with less than 30% water of crystallization</i> | 4.2 | UN1385 | II | | P5, A19, A20, N34 | A8.4 |
| | PROPER SHIPPING NAME/ DESCRIPTION | HAZARD CLASS/ DIV | UN/ID NUMBER | PG | SUBSIDIARY RISK | SPECIAL PROVISION | PACKAGING PARAGRAPH |
| | SODIUM SULPHIDE, HYDRATED <i>with at least 30% water</i> | 8 | UN1849 | II | | P5 | A12.4 |
| | SODIUM SUPEROXIDE | 5.1 | UN2547 | I | | P5, A20, N34 | A9.8 |
| | <i>Sodium tetranitride</i> | | | | | FORBIDDEN | FORBIDDEN |
| * | SOLIDS CONTAINING CORROSIVE LIQUID, N.O.S. | 8 | UN3244 | II | | P5 | A12.4 |
| * | SOLIDS CONTAINING FLAMMABLE LIQUID, N.O.S. | 4.1 | UN3175 | II | | P5 | A8.4 |
| * | SOLIDS CONTAINING TOXIC LIQUID, N.O.S. | 6.1 | UN3243 | II | | P5 | A10.6 |
| | SOUNDING DEVICES, EXPLOSIVE | 1.2F | UN0204 | II | | P4 | A5.20 |

| SYMBOL | PROPER SHIPPING NAME/ DESCRIPTION | HAZARD CLASS/ DIV | UN/ID NUMBER | PG | SUBSIDIARY RISK | SPECIAL PROVISION | PACKAGING PARAGRAPH |
|--------|---|-------------------------|-----------------|----------------|--------------------|----------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | SOUNDING DEVICES, EXPLOSIVE | 1.1F | UN0296 | II | | P4 | A5.20 |
| | SOUNDING DEVICES, EXPLOSIVE | 1.1D | UN0374 | II | | P4 | A5.20 |
| | SOUNDING DEVICES, EXPLOSIVE | 1.2D | UN0375 | II | | P4 | A5.20 |
| | STANNIC CHLORIDE, ANHYDROUS | 8 | UN1827 | II | | P5 | A12.3 |
| | STANNIC CHLORIDE, PENTAHYDRATE | 8 | UN2440 | III | | P5 | A12.4 |
| | STANNIC PHOSPHIDES | 4.3 | UN1433 | I | 6.1 | P3, A19, N40 | A8.4 |
| | STIBINE | 2.3 | UN2676 | | 2.1 | P1, 1 | A6.5 |
| | <i>Storage batteries, wet, see BATTERIES, wet, etc.</i> | | | | | | |
| | STRONTIUM ARSENITE | 6.1 | UN1691 | II | | P5 | A10.6 |
| | STRONTIUM CHLORATE | 5.1 | UN1506 | II | | P5, A1, A9, N34 | A9.8 |
| | STRONTIUM NITRATE | 5.1 | UN1507 | III | | P5, A1, A29 | A9.8 |
| | STRONTIUM PERCHLORATE | 5.1 | UN1508 | II | | P5 | A9.8 |
| | STRONTIUM PEROXIDE | 5.1 | UN1509 | II | | P5 | A9.8 |
| | STRONTIUM PHOSPHIDE | 4.3 | UN2013 | I | 6.1 | P3, A19, N40 | A8.4 |
| | STRYCHNINE <i>or</i> STRYCHNINE SALTS | 6.1 | UN1692 | I | | P5 | A10.6 |
| | STYRENE MONOMER, STABILIZED | 3 | UN2055 | III | | P5 | A7.3 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.1L | UN0357 | II | | P3, 101 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.2L | UN0358 | II | | P3, 101 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.3L | UN0359 | II | | P3, 101 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.1A | UN0473 | II | | P3, 101, 111 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.1C | UN0474 | II | | P4, 101 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.1D | UN0475 | II | | P4, 101 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.1G | UN0476 | II | | P4, 101 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.3C | UN0477 | II | | P4, 101 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.3G | UN0478 | II | | P4, 101 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.4C | UN0479 | II | | P5, 101 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.4D | UN0480 | II | | P5, 101 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.4S | UN0481 | II | | P5, 101, A69 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, N.O.S. | 1.4G | UN0485 | II | | P5, 101 | A5.6 |
| * | SUBSTANCES, EXPLOSIVE, VERY INSENSITIVE, N.O.S. <i>or</i> SUBSTANCES EVI, N.O.S. | 1.5D | UN0482 | II | | P5, 101 | A5.6 |
| | SUBSTITUTED NITROPHENOL PESTICIDES, LIQUID, FLAMMABLE, TOXIC <i>flashpoint less than 23 degrees C</i> | 3 | UN2780 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | SUBSTITUTED NITROPHENOL PESTICIDES, LIQUID, TOXIC | 6.1 | UN3014 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|----------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | SUBSTITUTED NITROPHENOL PESTICIDES, LIQUID, TOXIC, FLAMMABLE <i>flashpoint not less than 23 degrees C</i> | 6.1 | UN3013 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | SUBSTITUTED NITROPHENOL PESTICIDES, SOLID, TOXIC | 6.1 | UN2779 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | <i>Sucrose octanitrate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | SULPHAMIC ACID | 8 | UN2967 | III | | P5 | A12.4 |
| | SULPHUR | 4.1 | UN1350 | III | | P5 | A8.4 |
| | <i>Sulphur and chlorate, loose mixtures of</i> | | | | | FORBIDDEN | FORBIDDEN |
| | SULPHUR CHLORIDES | 8 | UN1828 | I | | P2, 5, A3, N34 | A12.3 |
| | <i>Sulphur dichloride, see SULPHUR CHLORIDES</i> | | | | | | |
| | SULPHUR DIOXIDE, LIQUEFIED | 2.3 | UN1079 | | 8 | P2, 3 | A6.5 |
| | <i>Sulphur dioxide solution, see SULPHUROUS ACID</i> | | | | | | |
| | SULPHUR HEXAFLUORIDE | 2.2 | UN1080 | | | P5 | A6.4, A6.5 |
| | SULPHURIC ACID <i>with more than 51% acid</i> | 8 | UN1830 | II | | P4, A3, A7, N34 | A12.3 |
| | SULPHURIC ACID , <i>not more than 51% acid</i> | 8 | UN2796 | II | | P5, A3, A7 N6, N34 | A12.3 |
| | SULPHURIC ACID, FUMING <i>with less than 30% free sulfur trioxide</i> | 8 | UN1831 | I | | P3, A3, A7, N34 | A12.12 |
| | SULPHURIC ACID, FUMING <i>with 30% or more free sulfur trioxide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | SULPHURIC ACID, SPENT | 8 | UN1832 | II | | P4, A3, A7, N34 | A12.3 |
| | <i>Sulphuric anhydride, see SULFUR TRIOXIDE, STABILIZED</i> | | | | | | |
| | SULPHUR, MOLTEN | | | | | FORBIDDEN | FORBIDDEN |
| | SULPHUROUS ACID | 8 | UN1833 | II | | P5 | A12.3 |
| | SULPHUR TETRAFLUORIDE | 2.3 | UN2418 | | 8 | P1, 1 | A6.6 |
| + | SULPHUR TRIOXIDE, STABILIZED <i>or SULPHUR TRIOXIDE, STABILIZED</i> | 8 | UN1829 | I | 6.1 | P2, 2, A7, N34 | A12.12 |
| +, D | SULPHUR TRIOXIDE, UNSTABILIZED | 8 | NA1829 | I | 6.1 | P2, 2, A7, N34 | A10.7 |
| + | SULPHURYL CHLORIDE | 8 | UN1834 | I | 6.1 | P1, 1, A3, N34 | A12.12 |
| | SULPHURYL FLUORIDE | 2.3 | UN2191 | | | P2, 4 | A6.5 |
| | TARS, LIQUID , <i>including road asphalt and oils, bitumen and cut backs</i> | 3 | UN1999 | II III | | P5 P5 | A7.3 A7.3 |
| | TEAR GAS CANDLES | 6.1 | UN1700 | II | 4.1 | P4 | A10.8 |
| | <i>Tear gas cartridges, see AMMUNITION, TEAR- PRODUCING, etc</i> | | | | | | |
| D,* | TEAR GAS DEVICES , <i>with more than 2% tear gas substance, by mass</i> | 6.1 | NA1693 | I II | | P4 P4 | A10.8 A10.8 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|----------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Tear gas grenades, see</i> TEAR GAS Candles | | | | | | |
| * | TEAR GAS SUBSTANCES LIQUID, N.O.S. | 6.1 | UN1693 | I II | | P3 P5 | A10.5 A10.5 |
| * | TEAR GAS SUBSTANCES, SOLID, N.O.S. | 6.1 | UN1693 | I II | | P5 P5 | A10.6 A10.6 |
| | TELLURIUM COMPOUND, N.O.S. | 6.1 | UN3284 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | TELLURIUM HEXAFLUORIDE | 2.3 | UN2195 | | 8 | P1, 1 | A6.6 |
| | TERPENE HYDROCARBONS, N.O.S. | 3 | UN2319 | III | | P5 | A7.3 |
| | TERPINOLENE | 3 | UN2541 | III | | P5 | A7.3 |
| | <i>Tetraazido benzene quinone</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TETRABROMOETHANE | 6.1 | UN2504 | III | | P5 | A10.5 |
| | TETRACHLOROETHANE | 6.1 | UN1702 | II | | P5, N36 | A10.5 |
| | TETRACHLOROETHYLENE | 6.1 | UN1897 | III | | P5, N36 | A10.5 |
| | <i>Tetraethylammonium perchlorate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TETRAETHYL DITHIOPYROPHOSPHATE | 6.1 | UN1704 | II | | P5 | A10.6 |
| | TETRAETHYLENEPENTAMINE | 8 | UN2320 | III | | P5 | A12.3 |
| D | TETRAETHYL LEAD, LIQUID | 6.1 | NA1649 | I | 3 | P3 | A10.5 |
| D | TETRAETHYL PYROPHOSPHATE (liquid) | 6.1 | NA3018 | I | | P3 | A10.5 |
| D | TETRAETHYL PYROPHOSPHATE (solid) | 6.1 | NA2783 | I | | P5, N77 | A10.6 |
| | TETRAETHYL SILICATE | 3 | UN1292 | III | | P5 | A7.3 |
| | 1,1,1,2-TETRAFLUOROETHANE or REFRIGERANT GAS R134A | 2.2 | UN3159 | | | P5 | A6.4, A6.5 |
| | TETRAFLUROETHYLENE, STABILIZED | 2.1 | UN1081 | | | P4 | A6.4, A6.5 |
| | TETRAFLUOROMETHANE or REFRIGERANT GAS R14 | 2.2 | UN1982 | | | P5 | A6.6 |
| | 1,2,3,6-TETRAHYDROBENZALDEHYDE | 3 | UN2498 | III | | P5 | A7.3 |
| | TETRAHYDROFURAN | 3 | UN2056 | II | | P5 | A7.3 |
| | TETRAHYDROFURFURYLAMINE | 3 | UN2943 | III | | P5 | A7.3 |
| | TETRAHYDROPHTHALIC ANHYDRIDES <i>with more than 0.05% of maleic anhydride</i> | 8 | UN2698 | III | | P5 | A12.4 |
| | 1,2,3,6-TETRAHYDROPYRIDINE | 3 | UN2410 | II | | P5 | A7.3 |
| | TETRAHYDROTHIOPHENE | 3 | UN2412 | II | | P5 | A7.3 |
| | TETRAMETHYLAMMONIUM HYDROXIDE | 8 | UN1835 | II | | P5 | A12.3 |
| | <i>Tetramethylene diperoxide dicarbamide</i> | | | | | FORBIDDEN | FORBIDDEN |

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|--------|---|-------------------------|-----------------|----------------|--------------------|----------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | TETRAMETHYLSILANE | 3 | UN2749 | I | | P3 | A7.3 |
| | TETRANITROANILINE | 1.1D | UN0207 | II | | P4 | A5.10 |
| | <i>Tetranitro diglycerin</i> | | | | | FORBIDDEN | FORBIDDEN |
| + | TETRANITROMETHANE | | | | | FORBIDDEN | FORBIDDEN |
| | <i>2,3,4,6-Tetranitrophenol</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>2,3,4,6-Tetranitrophenyl methyl nitramine</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>2,3,4,6-Tetranitrophenylnitramine</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Tetranitroresorcinol (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>2,3,5,6-Tetranitroso-1,4-dinitrobenzene</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>2,3,5,6-Tetranitroso nitrobenzene (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TETRAPROPYLOROTHITANATE | 3 | UN2413 | III | | P5 | A7.3 |
| | TETRAZENE, see GUANYL NITROSAMINO GUANYLTETRAZENE | | | | | | |
| | <i>Tetrazine</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Tetrazolyl azide (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TETRAZOL-1-ACETIC ACID | 1.4C | UN0407 | II | | P5 | A5.12 |
| | TETRYL, see TRINITROPHENYLMETHYLNITRAMI NE | | | | | | |
| | THALLIUM CHLORATE | 5.1 | UN2573 | II | 6.1 | P5 | A9.8 |
| | THALLIUM COMPOUNDS, N.O.S. | 6.1 | UN1707 | II | | P5 | A10.6 |
| | THALLIUM NITRATE | 6.1 | UN2727 | II | 5.1 | P5 | A10.6 |
| D | THALLIUM SULPHATE, SOLID | 6.1 | NA1707 | II | | P5 | A10.6 |
| | 4-THIAPENTANAL | 6.1 | UN2785 | III | | P5 | A10.5 |
| | THIOACETIC ACID | 3 | UN2436 | II | | P5 | A7.3 |
| | THIOCARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flashpoint less than 23 degrees C | 3 | UN2772 | I II | 6.1 6.1 | P3 P5 | A7.3 A7.3 |
| | THIOCARBAMATE PESTICIDE, LIQUID, TOXIC | 6.1 | UN3006 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | THIOCARBAMATE PESTICIDE, LIQUID, FLAMMABLE, TOXIC, flashpoint not less than 23 degrees C | 6.1 | UN3005 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | THIOCARBAMATE PESTICIDE, SOLID, TOXIC | 6.1 | UN2771 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | <i>Thiocarbonylchloride, see THIOPHOSGENE</i> | | | | | | |
| | THIOGLYCOL | 6.1 | UN2966 | II | | P5 | A10.5 |
| | THIOGLYCOLIC ACID | 8 | UN1940 | II | | P5, A7, N34 | A12.3 |
| | THIOLACTIC ACID | 6.1 | UN2936 | II | | P5 | A10.6 |
| | THIONYL CHLORIDE | 8 | UN1836 | I | | P3, A7, N34 | A12.3 |
| | THIOPHENE | 3 | UN2414 | II | | P5 | A7.3 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|-----------------------------------|----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| + | THIOPHOSGENE | 6.1 | UN2474 | II | | P2, 2, A7, N33, N34 | A10.7 |
| | THIOPHOSPHORYL CHLORIDE | 8 | UN1837 | II | | P4, A3, A7, N34 | A12.3 |
| | THIOREA DIOXIDE | 4.2 | UN3341 | II III | | P5 P5 | A8.4 A8.4 |
| D | THORIUM METAL, PYROPHORIC | 7 | UN2975 | | 4.2 | P3, P4, P5 | A11.9 |
| D | THORIUM NITRATE, SOLID | 7 | UN2976 | | 5.1 | P3, P4, P5 | A11.10 |
| | <i>Tin chloride, fuming, see STANNIC CHLORIDE, ANHYDROUS</i> | | | | | | |
| | TINCTURES, MEDICINAL | 3 | UN1293 | II III | | P5 P5 | A7.3 A7.3 |
| | <i>Tinning flux, see ZINC CHLORIDE</i> | | | | | | |
| | <i>Tin perchloride or Tin tetrachloride, see STANNIC CHLORIDE, ANHYDROUS</i> | | | | | | |
| | TITANIUM DISULPHIDE | 4.2 | UN3174 | III | | P5 | A8.4 |
| | TITANIUM HYDRIDE | 4.1 | UN1871 | II | | P5, A19, A20, N34 | A8.4 |
| | TITANIUM POWDER, DRY | 4.2 | UN2546 | I II III | | P3 P5, A19, A20, N5, N34 P5 | A8.4 A8.4 A8.4 |
| | TITANIUM POWDER, WETTED , with not less than 25% water (a visible excess of water must be present) (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns) | 4.1 | UN1352 | II | | P5, A19, A20, N34 | A8.4 |
| | TITANIUM SPONGE GRANULES or TITANIUM SPONGE POWDERS | 4.1 | UN2878 | III | | P5, A1 | A8.4 |
| D | TITANIUM SULPHATE SOLUTION | 8 | NA1760 | II | | P5 | A12.3 |
| + | TITANIUM TETRACHLORIDE | 8 | UN1838 | II | 6.1 | P2, 2, A3, A6 | A12.12 |
| | TITANIUM TRICHLORIDE MIXTURES | 8 | UN2869 | II III | | P5, A7, N34 P5, A7, N34 | A12.4 A12.4 |
| | TITANIUM TRICHLORIDE, PYROPHORIC, or TITANIUM TRICHLORIDEMIXTURES, PYROPHORIC | 4.2 | UN2441 | I | 8 | P3, A7, A8, A19, A20, N34 | A8.6 |
| | <i>TNT mixed with aluminium, see TRITONAL</i> | | | | | | |
| | <i>TNT, see TRINITROTOLUENE, etc.</i> | | | | | | |
| | TOLUENE | 3 | UN1294 | II | | P5 | A7.3 |
| + | TOLUENE DIISOCYANATE | 6.1 | UN2078 | II | | P5 | A10.5 |
| + | TOLUIDINES, LIQUID or SOLID | 6.1 | UN1708 | II | | P5 | A10.5, A10.6 |
| + | 2,4-TOLUYLENEDIAMINE or 2,4-TOLUTENEDIAMINE | 6.1 | UN1709 | III | | P5 | A10.6 |
| | TORPEDOES, LIQUID FUELED , with inert head | 1.3J | UN0450 | II | | P3 | A5.6 |

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|--------|--|-------------------------|-----------------|----------------|--------------------|----------------------|-------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | TORPEDOES, LIQUID FUELED , with or without bursting charge | 1.1J | UN0449 | II | | P3 | A5.6 |
| | TORPEDOES , with bursting charge | 1.1E | UN0329 | II | | P4 | A5.15 |
| | TORPEDOES , with bursting charge | 1.1F | UN0330 | II | | P4 | A5.15 |
| | TORPEDOES , with bursting charge | 1.1D | UN0451 | II | | P4 | A5.15 |
| * | TOXIC LIQUID, CORROSIVE, INORGANIC, N.O.S. | 6.1 | UN3289 | I II | 8 8 | P3 P4 | A10.5 A10.5 |
| * | TOXIC LIQUID, CORROSIVE, INORGANIC, N.O.S. , Inhalation Hazard, Packing Group I, Zone A | 6.1 | UN3289 | I | 8 | P1, 1 | A10.7 |
| * | TOXIC LIQUID, CORROSIVE, INORGANIC, N.O.S. , Inhalation Hazard, Packing Group I, Zone B | 6.1 | UN3289 | I | 8 | P2, 2 | A10.7 |
| * | TOXIC LIQUIDS, CORROSIVE, ORGANIC, N.O.S. | 6.1 | UN2927 | I II | 8 8 | P3 P4 | A10.5 A10.5 |
| * | TOXIC LIQUIDS, CORROSIVE, ORGANIC, N.O.S. , Inhalation Hazard Packing Group I, Zone A | 6.1 | UN2927 | I | 8 | P1, 1 | A10.7 |
| * | TOXIC LIQUIDS, CORROSIVE, ORGANIC, N.O.S. , Inhalation Hazard Packing Group I, Zone B | 6.1 | UN2927 | I | 8 | P2, 2 | A10.7 |
| * | TOXIC LIQUIDS, FLAMMABLE, ORGANIC, N.O.S. | 6.1 | UN2929 | I II | 3 3 | P3 P4 | A10.5 A10.5 |
| * | TOXIC LIQUIDS, FLAMMABLE, ORGANIC, N.O.S. , Inhalation Hazard Packing Group I, Zone A | 6.1 | UN2929 | I | 3 | P1, 1 | A10.7 |
| * | TOXIC LIQUIDS, FLAMMABLE, ORGANIC, N.O.S. , Inhalation Hazard, Packing Group I, Zone B | 6.1 | UN2929 | I | 3 | P2, 2 | A10.7 |
| * | TOXIC LIQUID, INORGANIC, N.O.S. | 6.1 | UN3287 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| * | TOXIC LIQUID, INORGANIC, N.O.S. , Inhalation Hazard, Packing Group I, Zone A | 6.1 | UN3287 | I | | P1, 1 | A10.7 |
| * | TOXIC LIQUID, INORGANIC, N.O.S. , Inhalation Hazard, Packing Group I, Zone B | 6.1 | UN3287 | I | | P2, 2 | A10.7 |
| * | TOXIC LIQUIDS, ORGANIC, N.O.S. | 6.1 | UN2810 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |
| * | TOXIC LIQUIDS, ORGANIC, N.O.S. , Inhalation Hazard, Packing Group I, Zone A | 6.1 | UN2810 | I | | P1, 1 | A10.7 |
| * | TOXIC LIQUIDS, ORGANIC, N.O.S. , Inhalation Hazard, Packing Group I, Zone B | 6.1 | UN2810 | I | | P2, 2 | A10.7 |
| * | TOXIC LIQUIDS, OXIDIZING, N.O.S. | 6.1 | UN3122 | I II | 5.1 5.1 | P3, A4 P4 | A10.5 A10.5 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| * | TOXIC LIQUIDS, OXIDIZING, N.O.S., <i>Inhalation Hazard, Packing Group I, Zone A</i> | 6.1 | UN3122 | I | 5.1 | P1, 1 | A10.7 |
| * | TOXIC LIQUIDS, OXIDIZING, N.O.S., <i>Inhalation Hazard, Packing Group I, Zone B</i> | 6.1 | UN3122 | I | 5.1 | P2, 2 | A10.7 |
| * | TOXIC LIQUIDS, WATER-REACTIVE, N.O.S. | 6.1 | UN3123 | I II | 4.3 4.3 | P3, A4 P4 | A10.5 A10.5 |
| * | TOXIC LIQUIDS, WATER-REACTIVE, N.O.S., <i>Inhalation Hazard, Packing Group I, Zone A</i> | 6.1 | UN3123 | I | 4.3 | P1, 1 | A10.7 |
| * | TOXIC LIQUIDS, WATER-REACTIVE, N.O.S., <i>Inhalation Hazard, Packing Group I, Zone B</i> | 6.1 | UN3123 | I | 4.3 | P2, 2 | A10.7 |
| * | TOXIC SOLID, CORROSIVE, INORGANIC, N.O.S. | 6.1 | UN3290 | I II | 8 8 | P5 P5 | A10.6 A10.6 |
| * | TOXIC SOLID, INORGANIC, N.O.S. | 6.1 | UN3288 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| * | TOXIC SOLIDS, CORROSIVE, ORGANIC, N.O.S. | 6.1 | UN2928 | I II | 8 8 | P5 P5 | A10.6 A10.6 |
| * | TOXIC SOLIDS, FLAMMABLE, ORGANIC, N.O.S. | 6.1 | UN2930 | I II | 4.1 4.1 | P5 P5 | A10.6 A10.6 |
| * | TOXIC SOLIDS, ORGANIC, N.O.S. | 6.1 | UN2811 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| * | TOXIC SOLIDS, OXIDIZING, N.O.S. | 6.1 | UN3086 | I II | 5.1 5.1 | P5 P5 | A10.6 A10.6 |
| * | TOXIC SOLIDS, SELF-HEATING, N.O.S. | 6.1 | UN3124 | I II | 4.2 4.2 | P5, A5 P5 | A10.6 A10.6 |
| * | TOXIC SOLIDS, WATER-REACTIVE, N.O.S. | 6.1 | UN3125 | I II | 4.3 4.3 | P5, A5 P5 | A10.6 A10.6 |
| | TRACERS FOR AMMUNITION | 1.3G | UN0212 | II | | P4 | A5.19 |
| | TRACERS FOR AMMUNITION | 1.4G | UN0306 | II | | P5 | A5.19 |
| | TRIALYLAMINE | 3 | UN2610 | III | 8 | P5 | A7.3 |
| | TRIALYL BORATE | 6.1 | UN2609 | III | | P5 | A10.5 |
| | TRIAZINE PESTICIDES, LIQUID, FLAMMABLE, TOXIC, <i>flashpoint less than 23 degrees C</i> | 3 | UN2764 | I II | 6.1 6.1 | P3 P4 | A7.3 A7.3 |
| | TRIAZINE PESTICIDES, LIQUID, TOXIC, FLAMMABLE, <i>flashpoint not less than 23 degrees C</i> | 6.1 | UN2997 | I II III | 3 3 3 | P3 P4 P5 | A10.5 A10.5 A10.5 |
| | TRIAZINE PESTICIDES, LIQUID, TOXIC | 6.1 | UN2998 | I II III | | P3 P4 P5 | A10.5 A10.5 A10.5 |

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| | TRIAZINE PESTICIDES, SOLID, TOXIC | 6.1 | UN2763 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | TRIBUTYLAMINE | 6.1 | UN2542 | II | | P5 | A10.5 |
| | TRIBUTYLPHOSPHANE | 4.2 | UN3254 | I | | P3 | A8.4 |
| | TRICHLOROACETIC ACID | 8 | UN1839 | II | | P5, A7, N34 | A12.4 |
| | TRICHLOROACETIC ACID, SOLUTION | 8 | UN2564 | II III | | P5, A3, A6, A7, N34 P5, A3, A6 A7, N34 | A12.3 A12.3 |
| + | TRICHLOROACETYL CHLORIDE | 8 | UN2442 | II | 6.1 | P2, 2, A3, A7, N34 | A12.12 |
| | TRICHLOROBENZENES, LIQUID | 6.1 | UN2321 | III | | P5 | A10.5 |
| | TRICHLOROBUTENE | 6.1 | UN2322 | II | | P5 | A10.5 |
| | 1,1,1-TRICHLOROETHANE | 6.1 | UN2831 | III | | P5, N36 | A10.5 |
| | TRICHLOROETHYLENE | 6.1 | UN1710 | III | | P5, N36 | A10.5 |
| | TRICHLOROISOCYANURIC ACID, DRY | 5.1 | UN2468 | II | | P5 | A9.8 |
| | <i>Trichloromethyl perchlorate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TRICHLOROSILANE | 4.3 | UN1295 | I | 3, 8 | P3, A7, N34 | A8.3 |
| D | MONO-(TRICHLORO) TETRA- (MONOPOTASSIUM DICHLORO)- PENTA-S-TRIAZINETRIONE, DRY <i>(containing over 39% available chlorine)</i> | 5.1 | NA2468 | II | | P5 | A9.8 |
| | <i>Trichloro-s-triazinetrione dry, containing over 39% available chlorine, see TRICHLOROISOCYANURIC ACID, DRY</i> | | | | | | |
| | TRICRESYL PHOSPHATE <i>with more than 3% ortho isomer</i> | 6.1 | UN2574 | II | | P5, A3, N33, N34 | A10.5 |
| | TRIETHYLAMINE | 3 | UN1296 | II | 8 | P4 | A7.3 |
| | TRIETHYLENETETRAMINE | 8 | UN2259 | II | | P5 | A12.3 |
| | TRIETHYL PHOSPHITE | 3 | UN2323 | III | | P5 | A7.3 |
| | TRIFLUOROACETIC ACID | 8 | UN2699 | I | | P3, A3, A6, A7, N3, N34 | A12.3 |
| | TRIFLUOROACETYL CHLORIDE | 2.3 | UN3057 | | 8 | P2, 2 | A6.5 |
| | TRIFLUOROCHLOROETHYLENE, STABILIZED | 2.3 | UN1082 | | 2.1 | P2, 3 | A6.4, A6.5 |
| | 1,1,1-TRIFLUOROETHANE, COMPRESSED <i>or</i> REFRIGERANT GAS R143A | 2.1 | UN2035 | | | P4 | A6.4, A6.5 |
| | TRIFLUOROMETHANE <i>or</i> REFRIGERANT GAS R23 | 2.2 | UN1984 | | | P5 | A6.4, A6.5 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| D | TRIFLUOROMETHANE AND CHLOROTRIFLUORO- METHANE MIXTURE (<i>constant boiling mixture</i>) (R- 503), <i>see</i> REFRIGERANT GAS, N.O.S. | | | | | | |
| | TRIFLUOROMETHANE, REFRIGERATED LIQUID (<i>cryogenic liquids</i>) | 2.2 | UN3136 | | | P4 | A6.4, A6.12 |
| | 3-TRIFLUOROMETHYLANILINE | 6.1 | UN2948 | II | | P5 | A10.5 |
| | 2-TRIFLUOROMETHYLANILINE | 6.1 | UN2942 | III | | P5 | A10.5 |
| | <i>Triformoxime trinitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TRISOBUTYLENE | 3 | UN2324 | III | | P5 | A7.3 |
| | TRISOCYANATOISOCYANURATE OF ISOPHORONEDIISOCYANTE, SOLUTION, 70%, by mass | 3 | UN2906 | III | | P5 | A7.3 |
| | TRISOPROPYL BORATE | 3 | UN2616 | II III | | P5 P5 | A7.3 A7.3 |
| D | TRIMETHOXYSILANE | 6.1 | NA9269 | I | 3 | P2, 2 | A10.7 |
| | TRIMETHYLACETYL CHLORIDE | 6.1 | UN2438 | I | 8, 3 | P2, 2, A3, A6, A7, N34 | A12.12 |
| | TRIMETHYLAMINE, ANHYDROUS | 2.1 | UN1083 | | | P4 | A6.4, A6.5 |
| | TRIMETHYLAMINE, AQUEOUS SOLUTIONS <i>not more than 50% trimethylamine, by mass</i> | 3 | UN1297 | I II III | 8 8 8 | P3 P4 P5 | A7.3 A7.3 A7.3 |
| | 1,3,5-TRIMETHYLBENZENE | 3 | UN2325 | III | | P5 | A7.3 |
| | TRIMETHYL BORATE | 3 | UN2416 | II | | P5 | A7.3 |
| | TRIMETHYLCHLOROSILANE | 3 | UN1298 | II | 8 | P5, A3, A7, N34 | A7.3 |
| | TRIMETHYLCYCLOHEXYLAMINE | 8 | UN2326 | III | | P5 | A12.3 |
| | <i>Trimethylene glycol diperchlorate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TRIMETHYLHEXAMETHYLENEDIA MINES | 8 | UN2327 | III | | P5 | A12.3 |
| | TRIMETHYLHEXAMETHYLENE DIISOCYANATE | 6.1 | UN2328 | III | | P5 | A10.5 |
| | <i>Trimethylol nitromethane trinitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TRIMETHYL PHOSPHITE | 3 | UN2329 | III | | P5 | A7.3 |
| | <i>1,3,5-Trimethyl-2,4,6-trinitrobenzene</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Trimethoxy silane</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Trinitroacetic acid</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Trinitroacetonitrile</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Trinitroamine cobalt</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TRINITROANILINE <i>or</i> PICRAMIDE | 1.1D | UN0153 | II | | P4 | A5.10 |
| | TRINITROANISOLE | 1.1D | UN0213 | II | | P4 | A5.10 |
| | TRINITROBENZENE , <i>dry or wetted, with less than 30% water, by mass</i> | 1.1D | UN0214 | II | | P4 | A5.9 |
| | TRINITROBENZENESULPHONIC ACID | 1.1D | UN0386 | II | | P4 | A5.10 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | TRINITROBENZENE, WETTED with not less than 30% water, by mass | 4.1 | UN1354 | I | | P4, 23, A2, A8, A19, N41 | A8.4 |
| | TRINITROBENZOIC ACID, dry or wetted with less than 30% water, by mass | 1.1D | UN0215 | II | | P4 | A5.9 |
| | TRINITROBENZOIC ACID, WETTED with not less than 30% water, by mass | 4.1 | UN1355 | I | | P4, 23, A2, A8, A19, N41 | A8.4 |
| | TRINITROCHLOROBENZENE or PICRYL CHLORIDE | 1.1D | UN0155 | II | | P4 | A5.10 |
| | TRINITRO-META-CRESOL | 1.1D | UN0216 | II | | P4 | A5.10 |
| | <i>2,4,6-Trinitro-1,3-diazobenzene</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Trinitroethanol</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Trinitroethylnitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TRINITROFLUORENONE | 1.1D | UN0387 | II | | P4 | A5.10 |
| | <i>Trinitromethane</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>1,3,5-Trinitronaphthalene</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TRINITRONAPHTHALENE | 1.1D | UN0217 | II | | P4 | A5.10 |
| | TRINITROPHENETOLE | 1.1D | UN0218 | II | | P4 | A5.10 |
| | TRINITROPHENOL or PICRIC ACID, dry or wetted with less than 30% water, by mass | 1.1D | UN0154 | II | | P4 | A5.9 |
| | TRINITROPHENOL, WETTED with not less than 30% water, by mass | 4.1 | UN1344 | I | | P4, 23, A8, A19, N41 | A8.4 |
| | <i>2,4,6-Trinitrophenyl guanidine (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TRINITROPHENYLMETHYLNITRAMINE or TETRYL | 1.1D | UN0208 | II | | P4 | A5.9 |
| | <i>2,4,6-Trinitrophenyl nitramine</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>2,4,6-Trinitrophenyl trimethylol methyl nitramine trinitrate (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TRINITRORESORCINOL or STYPHNIC ACID, dry or wetted with less than 20% water, or mixture mixture of alcohol and water, by mass | 1.1D | UN0219 | II | | P4 | A5.9 |
| | TRINITRORESORCINOL WETTED or STYPHNIC ACID, WETTED with not less than 20% water, or mixture of alcohol and water, by mass | 1.1D | UN0394 | II | | P4 | A5.9 |
| | TRINITROTOLUENE or TNT AND TRINITRO- BENZENE MIXTURES or TRINITROTOLUENE or TNT AND HEXANITROSTILBENE MIXTURES | 1.1D | UN0388 | II | | P4 | A5.10 |
| | TRINITROTOLUENE or TNT, dry or wetted with less than 30% water, by mass | 1.1D | UN0209 | II | | P4, A69 | A5.10 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | TNT MIXTURES, CONTAINING TRINITROBENZENE AND HEXANITROSTILBENE | 1.1D | UN0389 | II | | P4 | A5.10 |
| | TRINITROTOLUENE WETTED, with not less than 30% water, by mass | 4.1 | UN1356 | I | | P4, 23, A2, A8, A19, N41 | A8.4 |
| | <i>2,4,6-Trinitro-1,3,6-triazido benzene (dry)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | <i>Tri-(b-nitroxyethyl) ammonium nitrate</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TRIPROPYLAMINE | 3 | UN2260 | III | 8 | P5 | A7.3 |
| | TRIPROPYLENE | 3 | UN2057 | II III | | P5 P5 | A7.3 A7.3 |
| | TRIS-(1-AZIRIDINYL) PHOSPHINE OXIDE SOLUTION | 6.1 | UN2501 | II III | | P5 P5 | A10.5 A10.5 |
| | <i>Tris bis-bifluoroamino diethoxy propane (TVOPA)</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TRITONAL | 1.1D | UN0390 | II | | P4 | A5.9 |
| | <i>Tungsten hexafluoride</i> | | | | | FORBIDDEN | FORBIDDEN |
| | TURPENTINE | 3 | UN1299 | III | | P5 | A7.3 |
| | TURPENTINE SUBSTITUTE | 3 | UN1300 | I II III | | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | UNDECANE | 3 | UN2330 | III | | P5 | A7.3 |
| D | URANIUM HEXAFLUORIDE, FISSILE <i>(with more than 1% U-235)</i> | 7 | UN2977 | | 8 | P3, P4 | A11.8, A11.18 |
| D | URANIUM HEXAFLUORIDE, fissile <i>excepted or nonfissile</i> | 7 | UN2978 | | 8 | P3, P4, P5 | A11.11, A11.18 |
| D | URANIUM METAL, PYROPHORIC | 7 | UN2979 | | 4.2 | P3, P4, P5 | A11.9 |
| D | URANYL NITRATE HEXAHYDRATE SOLUTION | 7 | UN2980 | | 8 | P3, P4, P5 | A11.6, A11.7, A11.8 |
| D | URANYL NITRATE, SOLID | 7 | UN2981 | | 5.1 | P3, P4, P5 | A11.10 |
| | UREA HYDROGEN PEROXIDE | 5.1 | UN1511 | III | 8 | P5, A1, A7, A29 | A9.8 |
| | UREA NITRATE, dry or wetted with less than 20% water, by mass | 1.1D | UN0220 | II | | P4 | A5.9 |
| | UREA NITRATE, WETTED with not less than 20% water, by mass | 4.1 | UN1357 | I | | P4, A8, A19, N41 | A8.4 |
| | <i>Urea peroxide, see UREA HYDROGEN PEROXIDE</i> | | | | | | |
| | VALERALDEHYDE | 3 | UN2058 | II | | P5 | A7.3 |
| | <i>Valeric acid, see CORROSIVE LIQUID, N.O.S.</i> | | | | | | |
| | VALERYL CHLORIDE | 8 | UN2502 | II | 3 | P5, A3, A6, A7, N34 | A12.3 |
| | VANADIUM COMPOUND, N.O.S. | 6.1 | UN3285 | I II III | | P5 P5 P5 | A10.6 A10.6 A10.6 |
| | VANADIUM OXYTRICHLORIDE | 8 | UN2443 | II | | P5, A3, A6, A7, N34 | A12.3 |

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| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | VANADIUM PENTOXIDE, <i>nonfused form</i> | 6.1 | UN2862 | III | | P5 | A10.6 |
| | VANADIUM TETRACHLORIDE | 8 | UN2444 | I | | P3, A3, A6, A7, N34 | A12.3 |
| | VANADIUM TRICHLORIDE | 8 | UN2475 | III | | P5 | A12.4 |
| | VANADYL SULPHATE | 6.1 | UN2931 | II | | P5 | A10.6 |
| | VEHICLE, FLAMMABLE GAS POWERED | 9 | UN3166 | | | P5, 135 | A13.5 |
| | VEHICLE, FLAMMABLE LIQUID POWERED | 9 | UN3166 | | | P5, 135 | A13.5 |
| | VINYL ACETATE, STABILIZED | 3 | UN1301 | II | | P5 | A7.3 |
| | VINYL BROMIDE, STABILIZED | 2.1 | UN1085 | | | P4 | A6.4, A6.5 |
| | VINYL BUTYRATE, STABILIZED | 3 | UN2838 | II | | P5 | A7.3 |
| | VINYL CHLORIDE, STABILIZED <i>or</i> VINYL CHLORIDE, STABILIZED | 2.1 | UN1086 | | | P4, 21 | A6.4, A6.5 |
| | VINYL CHLOROACETATE | 6.1 | UN2589 | II | 3 | P5 | A10.5 |
| | VINYL ETHYL ETHER, STABILIZED | 3 | UN1302 | I | | P3, A3 | A7.3 |
| | VINYL FLUORIDE, STABILIZED | 2.1 | UN1860 | | | P4 | A6.4, A6.5 |
| | VINYLDENE CHLORIDE, STABILIZED | 3 | UN1303 | I | | P3 | A7.3 |
| | VINYL ISOBUTYL ETHER, STABILIZED | 3 | UN1304 | II | | P5 | A7.3 |
| | VINYL METHYL ETHER, STABILIZED | 2.1 | UN1087 | | | P4 | A6.4, A6.5 |
| | <i>Vinyl nitrate polymer</i> | | | | | FORBIDDEN | FORBIDDEN |
| | VINYLPYRIDINES, STABILIZED | 6.1 | UN3073 | II | 3, 8 | P5 | A10.5 |
| | VINYLTOLUENE, STABILIZED | 3 | UN2618 | III | | P5 | A7.3 |
| | VINYLTRICHLOROSILANE, STABILIZED | 3 | UN1305 | I | 8 | P3, A3, A7, N34 | A7.3 |
| | WARHEADS,ROCKET <i>with burster or expelling charge</i> | 1.4D | UN0370 | II | | P5 | A5.15 |
| | WARHEADS, ROCKET <i>with burster or expelling charge</i> | 1.4F | UN0371 | II | | P5 | A5.15 |
| | WARHEADS, ROCKET <i>with bursting charge</i> | 1.1D | UN0286 | II | | P4 | A5.15 |
| | WARHEADS, ROCKET <i>with bursting charge</i> | 1.2D | UN0287 | II | | P4 | A5.15 |
| | WARHEADS, ROCKET <i>with bursting charge</i> | 1.1F | UN0369 | II | | P4 | A5.15 |
| | WARHEADS, TORPEDO <i>with bursting charge</i> | 1.1D | UN0221 | II | | P4 | A5.15 |
| * | WATER-REACTIVE LIQUID, N.O.S. | 4.3 | UN3148 | I II III | | P3 P5 P5 | A8.3 A8.3 A8.3 |
| * | WATER-REACTIVE LIQUID, CORROSIVE, N.O.S. | 4.3 | UN3129 | I II III | 8 8 8 | P3 P4 P5 | A8.3 A8.3 A8.3 |

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| * | WATER-REACTIVE LIQUID, N.O.S. | 4.3 | UN3130 | I II III | 6.1 6.1 6.1 | P3, A4 P4 P5 | A8.3 A8.3 A8.3 |
| * | WATER-REACTIVE SOLID, N.O.S. | 4.3 | UN2813 | I II III | | P3, N40 P5 P5 | A8.4 A8.4 A8.4 |
| * | WATER-REACTIVE SOLID, CORROSIVE, N.O.S. | 4.3 | UN3131 | I II III | 8 8 8 | P3, N40 P5 P5 | A8.4 A8.4 A8.4 |
| * | WATER-REACTIVE SOLID, FLAMMABLE, N.O.S. | 4.3 | UN3132 | I II III | 4.1 4.1 4.1 | P3, N40 P5 P5 | A8.4 A8.4 A8.4 |
| * | WATER-REACTIVE SOLID, OXIDIZING, N.O.S. | 4.3 | UN3133 | II III | 5.1 5.1 | P3 P5 | A8.5 A8.5 |
| * | WATER-REACTIVE SOLID, TOXIC, N.O.S. | 4.3 | UN3134 | I II III | 6.1 6.1 6.1 | P3, A8, N40 P5 P5 | A8.4 A8.4 A8.4 |
| * | WATER-REACTIVE SOLID, SELF- HEATING, N.O.S. | 4.3 | UN3135 | I II III | 4.2 4.2 4.2 | P3, N40 P5 P5 | A8.4 A8.4 A8.4 |
| | <i>Wheelchair, electric see</i> BATTERY- POWERED EQUIPMENT <i>or</i> BATTERY- POWERED VEHICLE | | | | | | |
| | WHITE ASBESTOS (<i>Chrysotile, actinolite, anthophyllite, tremolite</i>) | 9 | UN2590 | III | | P5 | A13.15 |
| | WOOD PRESERVATIVES, LIQUID | 3 | UN1306 | II III | | P5 P5 | A7.3 A7.3 |
| | XANTHATES | 4.2 | UN3342 | II III | | P5 P5 | A8.4 A8.4 |
| | XENON, COMPRESSED | 2.2 | UN2036 | | | P5 | A6.4, A6.6 |
| | XENON, REFRIGERATED LIQUID (<i>cryogenic liquid</i>) | 2.2 | UN2591 | | | P4 | A6.12 |
| | XYLENES | 3 | UN1307 | II III | | P5 P5 | A7.3 A7.3 |
| | XYLENOLS | 6.1 | UN2261 | II | | P5 | A10.6 |
| | XYLIDINES, SOLID <i>or</i> LIQUID | 6.1 | UN1711 | II | | P5 | A10.5, A10.6 |
| | XYLYL BROMIDE | 6.1 | UN1701 | II | | P4, A3, A6, A7, N33 | A10.8 |
| | <i>p-Xylyl diazide</i> | | | | | FORBIDDEN | FORBIDDEN |
| | ZINC AMMONIUM NITRITE | 5.1 | UN1512 | II | | P5 | A9.8 |
| | ZINC ARSENATE <i>or</i> ZINC ARESINITE <i>or</i> ZINC ARSENATE AND ZINC ARSENITE MIXTURES | 6.1 | UN1712 | II | | P5 | A10.6 |
| | ZINC ASHES | 4.3 | UN1435 | III | | P5, A1, A19 | A8.4 |

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| SYMBOL | PROPER SHIPPING NAME/ DESCRIPTION | HAZARD CLASS/ DIV | UN/ID NUMBER | PG | SUBSIDIARY RISK | SPECIAL PROVISION | PACKAGING PARAGRAPH |
|--------|--|-------------------------|-----------------|----------------|--------------------|-----------------------------------|----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | <i>Zinc bisulfite solution, see</i> BISULFITES, INORGANIC AQUEOUS SOLUTIONS, N.O.S. | | | | | | |
| | ZINC BROMATE | 5.1 | UN2469 | III | | P5, A1, A29 | A9.8 |
| | ZINC CHLORATE | 5.1 | UN1513 | II | | P5, A9, N34 | A9.8 |
| | ZINC CHLORIDE, ANHYDROUS | 8 | UN2331 | III | | P5 | A12.4 |
| | ZINC CHLORIDE, SOLUTION | 8 | UN1840 | III | | P5 | A12.3 |
| | ZINC CYANIDE | 6.1 | UN1713 | I | | P5 | A10.6 |
| | ZINC DITHIONITE or ZINC HYDROSULPHITE | 9 | UN1931 | III | | P5 | A13.3 |
| | <i>Zinc ethyl, see</i> DIETHYLZINC | | | | | | |
| | ZINC FLUROSILICATE | 6.1 | UN2855 | III | | P5 | A10.6 |
| | ZINC NITRATE | 5.1 | UN1514 | II | | P5 | A9.8 |
| | ZINC PERMANGANATE | 5.1 | UN1515 | II | | P5 | A9.8 |
| | ZINC PEROXIDE | 5.1 | UN1516 | II | | P5 | A9.8 |
| | ZINC PHOSPHIDE | 4.3 | UN1714 | I | 6.1 | P3, A19, N40 | A8.4 |
| | ZINC POWDER or ZINC DUST | 4.3 | UN1436 | I II III | 4.2 4.2 4.2 | P3, A19, N40 P4, A19 P5 | A8.4 A8.4 A8.4 |
| | ZINC RESINATE | 4.1 | UN2714 | III | | P5, A1 | A8.4 |
| | ZINC SELENATE, <i>see</i> SELENATES | | | | | | |
| | ZINC SELENITE, <i>see</i> SELENITES | | | | | | |
| | ZIRCONIUM, DRY, coiled wire, finished metal sheets, strip (thinner than 254 microns but not thinner than 18 microns) | 4.1 | UN2858 | III | | P5, A1 | A8.4 |
| | ZIRCONIUM, DRY, finished sheets, strip, or coiled wire | 4.2 | UN2009 | III | | P5, A1, A19 | A8.4 |
| | ZIRCONIUM HYDRIDE | 4.1 | UN1437 | II | | P5, A19, A20, N34 | A8.4 |
| | ZIRCONIUM NITRATE | 5.1 | UN2728 | III | | P5, A1, A29 | A9.8 |
| | ZIRCONIUM PICRAMATE, dry or wetted with less than 20% water, by mass | 1.3C | UN0236 | II | | P4 | A5.12 |
| | ZIRCONIUM PICRAMATE, WETTED with not less than 20% water, by mass | 4.1 | UN1517 | I | | P4, 23, N41 | A8.4 |
| | ZIRCONIUM POWDER, DRY | 4.2 | UN2008 | I II III | | P3 P5, A19, A20, N5, N34 P5 | A8.4 A8.4 A8.4 |

| SYMBOL | PROPER SHIPPING NAME/ DESCRIPTION | HAZARD CLASS/ DIV | UN/ID NUMBER | PG | SUBSIDIARY RISK | SPECIAL PROVISION | PACKAGING PARAGRAPH |
|--------|--|-------------------------|-----------------|-----|--------------------|----------------------|----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | ZIRCONIUM POWDER, WETTED, with not less than 25% water (a visible excess of water must be present (a) mechanically produced, particle size less than 53 microns; (b) chemically produced, particle size less than 840 microns) | 4.1 | UN1358 | II | | P5, A19, A20, N34 | A8.4 |
| | ZIRCONIUM SCRAP | 4.2 | UN1932 | III | | P5, N34 | A8.4 |
| D | ZIRCONIUM SULFATE | 8 | NA9163 | III | | P5, N34 | A12.4 |
| | ZIRCONIUM SUSPENDED IN A LIQUID | 3 | UN1308 | | I II III | P3 P5 P5 | A7.3 A7.3 A7.3 |
| | ZIRCONIUM TETRACHLORIDE | 8 | UN2503 | III | | P5 | A12.4 |

Table A4.2. Special Provisions

When column 7 of table A4.1 refers to a special provision for a hazardous material, the meaning and requirements of that provision are defined in this table. The following list identifies the requirements of the special provisions referred to in column 7 of table A4.1:

1. **Passenger Eligibility “P” Codes.** These provisions apply to passenger movement with hazardous materials (see also attachment 22).

P1 Transport this material on Special Assignment Airlift Mission aircraft as identified in attachment 24. Material authorized on cargo aircraft only. Passenger deviations are not authorized.

P2 Transport this material on cargo aircraft only. Passenger deviations are not authorized.

P3 Transport this material on cargo aircraft only. Deviations are authorized according to paragraph 2.2 and attachment 22. Apply to radioactive material requiring a Yellow III label.

P4 Transport this material on cargo aircraft only. Deviations are authorized according to paragraph 2.2 and attachment 22. DoD duty passengers do not require a deviation. Apply to radioactive material requiring a Yellow II label.

P5 Transport this material on passenger or cargo aircraft without passenger restriction. Apply to radioactive material requiring a White I or no label.

2. **Additional Codes.** The Special Provision column may provide material and/or packaging requirements. This information is in addition to the standard requirements already prescribed in this manual. The following numeric (1-117), airlift (A codes), and nonbulk packaging (N Codes) special provisions apply (some numbers are intentionally not included):

- **Numeric Provisions.**

1 This material is poisonous by inhalation in Hazard Zone A, describe as an inhalation hazard.

2 This material is poisonous by inhalation in Hazard Zone B, describe as an inhalation hazard.

3 This material is poisonous by inhalation in Hazard Zone C, describe as an inhalation hazard.

4 This material is poisonous by inhalation in Hazard Zone D, describe as an inhalation hazard.

5 If this material meets the defining criteria for a material poisonous by inhalation (49 CFR 173.116(a) or 173.133(a)) use an appropriate Class 2.3 or Class 6.1 generic PSN that identifies the inhalation hazard.

6 This material is poisonous by inhalation and must be described as an inhalation hazard.

8 A hazardous substance that is not a hazardous waste may be shipped under the shipping description "Other regulated substance, liquid or solid", as appropriate.

7 An ammonia nitrate fertilizer is a fertilizer formulation, containing 90 percent or more ammonium nitrate and no more than 0.2 percent organic combustible material which does not meet the definition and criteria of a Class 1 material.

9 EPA in 40 CFR 761.60 and 761.65 prescribes packaging for certain PCBs for disposal and storage.

11 Package material either as a liquid or solid, as appropriate, depending on its physical form at 55 degrees C (131 degrees F) at atmospheric pressure.

12 In concentrations greater than 40 percent, this material has strong oxidizing properties and is capable of starting fires in contact with combustible materials. If applicable, a package containing this material must comply with the subsidiary risk labeling requirements of attachment 15.

13 The words "Inhalation Hazard" shall be entered on each shipping paper in association with the shipping description.

17 Aqueous solutions of hydrogen peroxide containing less than 8 percent hydrogen peroxide are not subject to the requirements of this manual.

21 This material must be stabilized by appropriate means to prevent dangerous polymerization.

22 If the hazardous material is in dispersion in organic liquid, the organic liquid must have a flash point above 50 degrees C (122 degrees F).

23 Classify this material as Class 4.1 only if it is packed so that the percentage of diluent will not fall below that stated in the shipping description at any time during transport.

27 Sodium carbonate peroxyhydrate is considered nonhazardous.

31 Materials that have undergone sufficient heat treatment to render them nonhazardous are not subject to the requirements of this manual.

33 Ammonium nitrites and mixtures of an inorganic nitrite with an ammonium salt are prohibited.

36 The maximum net quantity per package is 5 L (1 gallon) or 5 kg (11 lbs.).

43 The nitrogen content of the nitrocellulose must not exceed 11.5 percent. Pack each single filter sheet between sheets of glazed paper. Ensure the portion of glazed paper between the filter sheets is not less than 65 percent, by mass. The membrane filters/paper arrangement must not be liable to propagate a detonation.

46 During transport, it must be protected from direct sunshine and stored (or kept) in a cool and well-ventilated place, away from all sources of heat.

53 Packages of these materials must bear a subsidiary risk label, "EXPLOSIVE", unless exempted by the DOT. A copy of the exemption must accompany the shipment.

56 Ensure a means to interrupt and prevent detonation of the detonator from initiating the detonating cord is installed between each electric detonator and the detonating cord ends of the jet perforating guns.

60 An oxygen generator, chemical, that is shipped with its means of initiation attached must incorporate at least two positive means of preventing unintentional actuation of the generator, and be classed and approved by the Associate Administrator for Hazardous Materials Safety.

101 Specify the name of the particular substance or article.

102 This article may be transported as Class 1.4D if all of the conditions specified in 49 CFR 173.63(a) are met. Reclassification requires approval by a DoD Explosive Hazard Classification Authority according to A3.3.1.2.

103 Detonators that will not mass detonate and undergo only limited propagation in the shipping package may be assigned to Class 1.4B. Mass detonate means that more than 90 percent of the devices tested in a package explode practically simultaneously. Limited propagation means that if one detonator near the center of a shipping package is exploded, the aggregate weight of explosives, excluding ignition and delay charges, in this and all additional detonators in the outside packaging that explode, may not exceed 25 g. Reclassification requires approval by a DoD Explosive Hazard Classification Authority according to A3.3.1.2.

104 Detonators which meet the following conditions may be assigned to Class 1.4S: Each detonator may contain no more than 1 g of explosive, excluding ignition and delay charges, and if one detonator near the center of the package detonates it will not cause functioning of any other device in the same or adjacent packages. Reclassification requires approval by a DoD Explosive Hazard Classification Authority according to A3.3.1.2.

105 The word "Agents" may be used instead of "Explosives" when approved by the DOT.

106 The recognized name of the particular explosive may be specified in addition to the type.

107 The classification of the substance is expected to vary especially with the particle size and packaging, but the border lines have not been experimentally determined; appropriate classifications should be verified following the test procedures in 49 CFR 173.57 and 173.58. Reclassification requires approval by a DoD Explosive Hazard Classification Authority according to A3.3.1.2.

108 Fireworks must be constructed and packaged so that loose pyrotechnic composition is not present in packages during transportation.

109 Rocket motors must be nonpropulsive in transportation unless approved according to A3.3.1.2. To be considered "nonpropulsive", a rocket motor must be capable of unrestrained burning and must not appreciably move in any direction when ignited by any means.

110 Fire extinguisher charges containing 3.2 g or less of propellant explosives per unit are not subject to the requirements of this manual.

111 Explosive substances of Class 1.1A are forbidden for transportation if dry or not desensitized, unless incorporated in a device.

112 Cartridges, small arms, Class 1.4S, may be reclassified and offered for domestic transportation as ORM-D material if they are offered for transportation and transported according to the limitations and packaging requirements of 49 CFR 173.230. Reclassification requires approval by a DoD Explosive Hazard Classification Authority according to A3.3.1.2.

113 The sample must be given a tentative approval by an agency or laboratory according to the provisions of 49 CFR 173.56.

115 Boosters with detonator (detonating primers) in which the total explosive charge per unit does not exceed 25 g, and which will not mass detonate and undergo only limited propagation in the shipping package may be assigned to Class 1.4B. Mass detonate means more than 90 percent of the devices tested in a package explode practically simultaneously. Limited propagation means that if one booster near the center of the package is exploded, the aggregate weight of explosives, excluding ignition and delay charges, in this and all additional boosters in the outside packaging that explode may not exceed 25 g. Reclassification requires approval by a DoD Explosive Hazard Classification Authority according to A3.3.1.2.

116 Fuzes, detonating, may be classed in Class 1.4 if the fuzes do not contain more than 25 g of explosive per fuze and are made and packaged so that they will not cause functioning of other fuzes, explosives, or other explosive devices if one of the fuzes detonates in a shipping packaging or in adjacent packages. Reclassification requires approval by a DoD Explosive Hazard Classification Authority according to A3.3.1.2.

117 If a shipment of the explosive substance is to take place at a time that freezing weather is anticipated, the water contained in the explosive substance must be mixed with denatured alcohol so that freezing will not occur.

123 Any explosive, blasting, type C containing chlorate must be segregated from explosives containing ammonium nitrate or other ammonium salts.

134 This entry applies to vehicles, machinery and equipment that are powered by wet batteries or sodium batteries and which are transported with these batteries installed.

135 Use the entries "Vehicle, flammable gas powered" or "Vehicle, flammable liquid powered", as appropriate, when internal combustion engines are installed in a vehicle.

139 - Use of the "special arrangement" proper shipping names for international shipments must be made under an IAEA Certificate of Competent Authority issued by the Associate Administrator in accordance with the requirements in 49 CFR 173.471, 173.472, or 173.473. Use of these proper shipping names for domestic shipments may be made only under a DOT exemption.

- **"A" Codes.** These special provisions are in addition to other requirements for military air shipment.
- A1 Single packaging is not permitted on passenger aircraft. P4 restrictions apply.
- A2 Single packagings are not permitted.
- A3 For combination packagings, if glass inner packagings (including ampoules) are used, they must be packed with absorbent material in tightly closed metal receptacles before packing in outer packagings.
- A4 Liquids having an inhalation toxicity of PG I and are identified as P1, P2, or P3 are not permitted on passenger aircraft. Deviations are not allowed.
- A5 Solids having an inhalation toxicity of PG I and are identified as P1, P2, or P3, are not permitted on passenger aircraft and may not exceed a maximum net quantity per package of 15 kg (33 pounds) on cargo aircraft. See paragraph 2.2 for deviation authority.
- A6 For combination packagings, if plastic inner packagings are used, pack in tightly closed metal receptacles before packing into outer packagings.
- A7 Steel packagings must be corrosion-resistant or have protection against corrosion.
- A8 For combination packagings, if glass inner packagings (including ampoules) are used, they must be packed with cushioning material in tightly closed metal receptacles before packing in outer packagings
- A9 For combination packages, if plastic bags are used, they must be packed in tightly closed metal receptacles before packing in outer packagings.
- A10 When aluminum or aluminum alloy construction materials are used, they must be resistant to corrosion.
- A11 For combination packagings, when metal inner packagings are permitted, only specification cylinders constructed of metals which are compatible with the hazardous material may be used.
- A19 Combination packagings consisting of outer fiber drums or plywood drums, with inner plastic packagings, are not authorized.
- A20 Plastic bags as inner receptacles of combination packagings are not authorized.
- A21 Hypochlorite solution with 5% or less available chloride is not regulated by this manual.

A29 Combination packagings consisting of outer expanded plastic boxes with inner plastic bags are not authorized.

A30 Ammonium permanganate is not authorized.

A33 Ammonium nitrates and mixtures of an inorganic nitrite with an ammonium salt are prohibited.

A35 This includes material which is not covered by any other hazard class but has anesthetic, narcotic, noxious or other properties such that, in the event of spillage or leakage on the aircraft, extreme annoyance or discomfort could be caused to aircrew members so as to prevent correct performance of assigned duties. For material containing aromatic extract or flavoring, use packaging paragraph A13.3. For all other material shipped under this PSN, use packaging paragraph A13.13.

A67 Nonspillable batteries are considered dry batteries and not subject to any other requirements of this manual if:

- At a temperature of 55 degrees C (130 degrees F), the electrolyte will not flow from a ruptured or cracked case and there is no free liquid to flow.
- Packaged for transport in inner packagings that effectively prevent short circuit and prevent movement that could lead to short circuit.

A68 Articles drained to the maximum extent possible, not to exceed 500 ml (17 ounces) of flammable liquid residue remaining, and containing no other hazard may be shipped under this PSN and assigned to hazard class 9 for military airlift. This applies to fuel devices, mechanical components, tent heaters, etc. See A14.3.10 for marking and A15.2 for labeling requirements.

A69 May be transported using a DOT hazard classification approval. A copy of the approval must accompany the shipment. See A3.3.1.2.

- **"N" Codes.** These provisions apply only to nonbulk packagings:

N3 Glass inner packagings are permitted in combination or composite packagings only if the hazardous material is free from hydrofluoric acid.

N4 For combination or composite packagings, glass inner packagings, other than ampoules, are not permitted.

N5 Glass materials of construction are not authorized for any part of the packaging which is normally in contact with the hazardous material.

N6 Battery fluid packaged with electric storage batteries, wet or dry, must conform to the packaging provisions of A12.5.3.

N7 The hazard class or division number of the material must be marked on the package according to 49 CFR 172.302. However, the hazard label corresponding to the hazard class or division may be substituted for the marking.

N8 Nitroglycerin solution in alcohol may be transported under this entry only when the solution is packed in metal cans of not more than 1 L capacity each, overpacked in a wooden box containing not more than 5 L. Completely surround metal cans with absorbent cushioning material. Completely line wooden boxes with a suitable material impervious to water and nitroglycerin.

N12 Plastic packagings are not authorized.

N25 Steel single packagings are not authorized.

N32 Aluminum materials of construction are not authorized for single packagings.

N33 Aluminum drums are not authorized.

N34 Aluminum construction materials are not authorized for any part of a packaging which is normally in contact with the hazardous materials.

N36 Aluminum or aluminum alloy construction materials are permitted only for halogenated hydrocarbons that will not react with aluminum.

N37 This material may be shipped in an integrally-lined fiber drum (1G) which meets the general packaging requirements of attachment 3, the UN performance tests required based on the PG assigned to the material and to any other special provisions of column 7 of table A4.1.

N40 This material is not authorized in the following packagings:

- A combination packaging consisting of a 4G fiberboard box with inner receptacles of glass or earthenware.
- A single packaging of a 4C2 sift-proof, natural wood box.
- A composite packaging 6PG2 (glass, porcelain, or stoneware receptacles within a fiberboard box).

N41 Metal construction materials are not authorized for any part of a packaging that is normally in contact with the hazardous material.

N43 Metal drums are permitted as single packagings only if constructed of nickel or Monel.

N45 For combination packagings, copper cartridges are permitted as inner packagings when the hazardous material is not in dispersion.

N65 Outage must be sufficient to prevent cylinders or spheres from becoming liquid full at 55 degrees C (130 degrees F). The vacant space (outage) may be charged with a nonflammable, nonliquefied compressed gas if the pressure in the cylinder or sphere at 55 degrees C (130 degrees F) does not exceed 125 percent of the marked service pressure.

N73 Packagings consisting of outer wooden or fiberboard boxes with inner glass, metal, or other strong containers; metal or fiber drums; kegs or barrels; or strong metal cans are authorized and need not conform to the UN test requirements for domestic shipment.

N74 Packages consisting of tightly closed inner containers of glass, earthenware, metal or polyethylene, capacity not over 0.5 kg (1.1 pounds) securely cushioned and packed in outer wooden barrels or wooden or fiberboard boxes, not over 15 kg (33 pounds) net weight, are authorized and need not conform to the UN test requirements for domestic shipment.

N75 Packages consisting of tightly closed inner packagings of glass, earthenware, or metal, securely cushioned and packed in outer wooden barrels, or wooden or fiberboard boxes, capacity not over 2.5 kg (5.5 pounds) net weight, are authorized and need not conform to the UN test requirements for domestic shipment.

N76 For materials of not more than 25 percent active ingredient by weight, packages consisting of inner metal packagings not greater than 250 ml (8 ounces) capacity each, packed in strong outer packagings together with sufficient absorbent material to completely absorb the liquid contents are authorized and need not conform to the UN test requirements for domestic shipment.

N77 For materials of not more than two percent active ingredients by weight and the liquid contents are absorbed in an inert material, the packagings need not conform to the UN test requirements for domestic shipment.

N78 Packages consisting of inner glass, earthenware, polyethylene, or other nonfragile plastic bottles or jars not over 0.5 kg (1.1 pounds) capacity each, or metal cans not over 5 pounds capacity each, packed in outer wooden boxes, barrels, kegs, or fiberboard boxes, are authorized and need not conform to the UN test requirements for domestic shipments. Net weight of contents in fiberboard boxes may not exceed 29 kg (64 pounds). Net weight of contents in wooden boxes, barrels, or kegs may not exceed 45 kg (99 pounds).

N79 Packages consisting of tightly closed metal inner packagings not over 0.5 kg (1.1 pounds) capacity each, packed in outer wooden or fiberboard boxes, or wooden barrels, are authorized and need not conform to UN test requirements for domestic shipment. Net weight of contents may not exceed 15 kg (33 pounds).

Table A4.3. Hazardous Substances and Reportable Quantities.

| Hazardous Substance | Reportable | Hazardous Substance | Reportable |
|---------------------------------------|---------------|---|---------------|
| | Quantity (RQ) | | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| Acenaphthene | 100 (45.4) | Ammonium acetate | 5000 (2270) |
| Acenaphthylene | 5000 (2270) | Ammonium benzoate | 5000 (2270) |
| Acetaldehyde | 1000 (454) | Ammonium bicarbonate | 5000 (2270) |
| Acetaldehyde, chloro- | 1000 (454) | Ammonium bichromate | 10 (4.54) |
| Acetaldehyde, trichloro- | 5000 (2270) | Ammonium bifluoride | 100 (45.4) |
| Acetamide | 100 (45.4) | Ammonium bisulfite | 5000 (2270) |
| Acetamide, N-(aminothioxomethyl)- | 1000 (454) | Ammonium carbamate | 5000 (2270) |
| Acetamide, N-(4-ethoxyphenyl)- | 100 (45.4) | Ammonium carbonate | 5000 (2270) |
| Acetamide, N-fluoren-2-yl- | 1 (0.454) | Ammonium chloride | 5000 (2270) |
| Acetamide, 2-fluoro- | 100 (45.4) | Ammonium chromate | 10 (4.54) |
| Acetic acid | 5000 (2270) | Ammonium citrate, dibasic | 5000 (2270) |
| Acetic acid (2,4-dichlorophenoxy)- | 100 (45.4) | Ammonium dichromate * | 10 (4.54) |
| Acetic acid, ethyl ester | 5000 (2270) | Ammonium fluoborate | 5000 (2270) |
| Acetic acid, fluoro-, sodium salt | 10 (4.54) | Ammonium fluoride | 100 (45.4) |
| Acetic acid, lead (2+) salt | 10 (4.54) | Ammonium hydroxide | 1000 (454) |
| Acetic acid, thallium (I+) salt | 1000 (454) | Ammonium oxalate | 5000 (2270) |
| Acetic acid, (2,4,5-trichlorophenoxy) | 1000 (454) | Ammonium picrate | 10 (4.54) |
| Acetic anhydride | 5000 (2270) | Ammonium silicofluoride | 1000 (454) |
| Acetone | 5000 (2270) | Ammonium sulfamate | 5000 (2270) |
| Acetone cyanohydrin | 10 (4.54) | Ammonium sulfide | 100 (45.4) |
| Acetonitrile | 5000 (2270) | Ammonium sulfite | 5000 (2270) |
| Acetophenone | 5000 (2270) | Ammonium tartrate | 5000 (2270) |
| 2-Acetylaminofluorene | 1 (0.454) | Ammonium thiocyanate | 5000 (2270) |
| Acetyl bromide | 5000 (2270) | Ammonium vanadate | 1000 (454) |
| Acetyl chloride | 5000 (2270) | Amyl acetate | 5000 (2270) |
| 1-Acetyl-2-thiourea | 1000 (454) | iso-Amyl acetate | |
| Acrolein | 1 (0.454) | sec-Amyl acetate | |
| Acrylamide | 5000 (2270) | tert-Amyl acetate | |
| Acrylic acid | 5000 (2270) | Aniline | 5000 (2270) |
| Acrylonitrile | 100 (45.4) | o-Anisidine | 100 (45.4) |
| Adipic acid | 5000 (2270) | Anthracene | 5000 (2270) |
| Aldicarb | 1 (0.454) | Antimony + | 5000 (2270) |
| Aldrin | 1 (0.454) | Antimony pentachloride | 1000 (454) |
| Allyl alcohol | 100 (45.4) | Antimony potassium tartrate | 100 (45.4) |
| Allyl chloride | 1000 (454) | Antimony tribromide | 1000 (454) |
| Aluminum phosphide | 100 (45.4) | Antimony trichloride | 1000 (454) |
| Aluminum sulfate | 5000 (2270) | Antimony trifluoride | 1000 (454) |
| 4-Aminobiphenyl | 1 (0.454) | Antimony trioxide | 1000 (454) |
| 5-(Aminomethyl)-3-isoxazolol | 1000 (454) | Argentate(I-), bis(cyano-C)-, potassium | 1 (0.454) |
| Amitrole | 10 (4.54) | Aroclor 1221 | 1 (0.454) |

| Hazardous Substance | Reportable | Hazardous Substance | Reportable |
|---|---------------|---|---------------|
| | Quantity (RQ) | | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| 4-Aminopyridine | 1000 (454) | Aroclor 1016 | 1 (0.454) |
| Ammonia | 100 (45.4) | | |
| Aroclor 1232 | 1 (0.454) | Benzal chloride | 5000 (2270) |
| Aroclor 1242 | 1 (0.454) | Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl) | 5000 (2270) |
| Aroclor 1248 | 1 (0.454) | Benz[a]anthracene | 10 (4.54) |
| Aroclor 1254 | 1 (0.454) | 1,2-Benzanthracene | 10 (4.54) |
| Aroclor 1260 | 1 (0.454) | Benz[a]anthracene 7,12-dimethyl- | 1 (0.454) |
| Arsenic + | 1 (0.454) | Benzenamine | 5000 (2270) |
| Arsenic acid | 1 (0.454) | Benzenamine, 4,4'-carbonimidoylbis (N,N-dimethyl- | 100 (45.4) |
| Arsenic acid H3AsO4 | 1 (0.454) | Benzenamine, 4-chloro- | 1000 (454) |
| Arsenic disulfide | 1 (0.454) | Benzenamine, 4-chloro-2-methyl-, hydrochloride | 100 (45.4) |
| Arsenic oxide As2O3 | 1 (0.454) | Benzenamine, N,N-dimethyl-4-(phenylazo)- | 10 (4.54) |
| Arsenic oxide As2O5 | 1 (0.454) | Benzenamine, 2-methyl- | 100 (45.4) |
| Arsenic pentoxide | 1 (0.454) | Benzenamine, 4-methyl- | 100 (45.4) |
| Arsenic trichloride | 1 (0.454) | Benzenamine, 4,4'-methylenebis(2-chloro- | 10 (4.54) |
| Arsenic trioxide | 1 (0.454) | Benzenamine, 2-methyl-,hydrochloride | 100 (45.4) |
| Arsenic trisulfide | 1 (0.454) | Benzenamine, 2-methyl-5-nitro- | 100 (45.4) |
| Arsine, diethyl- | 1 (0.454) | Benzenamine, 4-nitro- | 5000 (2270) |
| Arsinic acid, dimethyl- | 1 (0.454) | Benzene | 10 (4.54) |
| Arsonous dichloride, phenyl- | 1 (0.454) | Benzene, 1-bromo-4-phenoxy- | 100 (45.4) |
| Asbestos ++ | 1 (0.454) | Benzene, chloro- | 100 (45.4) |
| Auramine | 100 (45.4) | Benzene, chloromethyl- | 100 (45.4) |
| Azaserine | 1 (0.454) | Benzene, 1,2-dichloro- | 100 (45.4) |
| Aziridine | 1 (0.454) | Benzene, 1,3-dichloro- | 100 (45.4) |
| Aziridine, 2-methyl- | 1 (0.454) | Benzene, 1,4-dichloro- | 100 (45.4) |
| Azirino[2',3':3,4]pyrrolo(1,2-a)indole-4,7-dione,6-amino-8-[[aminocarbonyl)oxy)methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-,[1aS-(aalpha,8beta,8aalpha,8balpha)] | 10 (4.54) | Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro | 1 (0.454) |
| Barium cyanide | 10 (4.54) | Benezene, dichloromethyl- | 5000 (2270) |
| Benz[j]aceanthrylene,1,2-dihydro-3-methyl- | 10 (4.54) | Benzene, 1,3-diisocyanatomethyl | 100 (45.4) |
| Benz[c]acridine | 100 (45.4) | Benzene, dimethyl- | 100 (45.4) |
| 3,4-Benzacridine | 100 (45.4) | Benzene, m-dimethyl- | 1000 (454) |
| | | Benzene, o-dimethyl- | 1000 (454) |

| | Reportable | | Reportable |
|--|---------------|--|---------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| Benzene, p-dimethyl- | 100 (45.4) | 1,3-Benzenediol | 5000 (2270) |
| Benzene, hexachloro- | 10 (4.54) | 1,2-Benzenediol,4-[1-hydroxy-2-(methylamino) ethyl]- | 1000 (454) |
| Benzene, hexahydro- | 1000 (454) | Benzeneethanamine, alpha,alpha-dimethyl- | 5000 (2270) |
| Benzene, hydroxy- | 1000 (454) | Benzenesulfonic acid chloride | 100 (45.4) |
| Benzene, methyl- | 1000 (454) | Benzenesulfonyl chloride | 100 (4.54) |
| Benzene, 1-methyl-2,4-dinitro- | 10 (4.54) | Benzenethiol | 100 (45.4) |
| Benzene, 2-methyl-1,3-dinitro- | 100 (45.4) | Benzidine | 1 (0.454) |
| Benzene, 1-methylethyl- | 5000 (2270) | 1,2-Benzisothiazol-3(2H)-one,1,1-dioxide | 100 (45.4) |
| Benzene, nitro- | 1000 (454) | Benz[o]anthracene | 10 (4.54) |
| Benzene, pentachloro- | 10 (4.54) | 1,3-Benzodioxole, 5-(2-propenyl)- | 100 (45.4) |
| Benzene, pentachloronitro- | 100 (45.4) | 1,3-Benzodioxole, 5-(1-propenyl)- | 100 (45.4) |
| Benzene, 1,2,4,5-tetrachloro- | 5000 (2270) | 1,3-Benzodioxole, 5-propyl- | 10 (4.54) |
| Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-chloro- | 1 (0.454) | Benzo[b]fluoranthene | 1 (0.454) |
| Benzene, 1,1'-(2,2,2-trichloroethylidene) bis[4-methoxy]- | 1 (0.454) | Benzo[k]fluoranthene | 5000 (2270) |
| Benzene, (trichloromethyl) | 10 (4.54) | Benzo[j,k]fluorene | 100 (45.4) |
| Benzene, 1,3,5-trinitro- | 10 (4.54) | Benzoic acid | 5000 (2270) |
| Benzenoacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy, ethyl ester | 10 (4.54) | Benzonitrile | 5000 (2270) |
| Benzenobutanoic acid, 4-[bis(2-chloroethyl)amino]- | 10 (4.54) | Benzo[g,h,i]perylene | 5000 (2270) |
| Benzenediamine, ar-methyl- | 10 (4.54) | 2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts, when present at concentrations greater than 0.3% | 100 (45.4) |
| 1,2-Benzenedicarboxylic acid, [bis(2-ethylhexyl)] ester | 100 (45.4) | Benzo[a]pyrene | 1 (0.454) |
| 1,2-Benzenedicarboxylic acid, dibutyl ester | 10 (4.54) | 3,4-Benzopyrene | 1 (0.454) |
| 1,2-Benzenedicarboxylic acid, diethyl ester | 1000 (454) | p-Benzoquinone | 10 (4.54) |
| 1,2-Benzenedicarboxylic acid, dimethyl ester | 5000 (2270) | Benzo [rst]pentaphene | 10 (4.54) |
| 1,2-Benzenedicarboxylic acid, dioctyl ester | 5000 (2270) | Benzotrichloride | 10 (4.54) |

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| | Reportable | | Reportable |
|--|---------------|---|---------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| Benzoyl chloride | 1000 (454) | 2-Butenal | 100 (45.4) |
| 1,2-Benzphenanthrene | 100 (45.4) | 2-Butene, 1,4-dichloro- | 1 (0.454) |
| Benzyl chloride | 100 (45.4) | 2-Butenoic acid,2-methyl-,7 [[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1alpha(Z), 7(2S*,3R*),7aalpha]]- | 10 (4.54) |
| Beryllium + | 10 (4.54) | Butyl acetate | 5000 (2270) |
| Beryllium chloride | 1 (0.454) | iso-Butyl acetate | |
| Beryllium dust + | 10 (4.54) | sec-Butyl acetate | |
| Beryllium fluoride | 1 (0.454) | tert-Butyl acetate | |
| Beryllium nitrate | 1 (0.454) | n-Butyl alcohol | 5000 (2270) |
| alpha - BHC | 10 (4.54) | Butylamine | 1000 (454) |
| beta - BHC | 1 (0.454) | iso-Butylamine | |
| delta - BHC | 1 (0.454) | sec-Butylamine | |
| gamma - BHC | 1 (0.454) | tert-Butylamine | |
| 2,2'-Bioxirane | 10 (4.54) | Butyl benzyl phthalate | 100 (45.4) |
| Biphenyl | 100 (45.4) | n-Butyl phthalate | 10 (4.54) |
| (1,1'-Biphenyl)-4,4'-diamine | 1 (0.454) | Butyric acid | 5000 (2270) |
| (1,1'-Biphenyl)-4,4'-diamine,3,3'-dichloro- | 1 (0.454) | iso-Butyric acid | |
| (1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethoxy- | 10 (4.54) | Cacodylic acid | 1 (0.454) |
| (1,1'-Biphenyl)-4,4'-diamine,3,3'-dimethyl- | 10 (4.54) | Cadmium + | 10 (4.54) |
| Bis(2-chloroethoxy) methane | 1000 (454) | Cadmium acetate | 10 (4.54) |
| Bis(2-chloroethyl) ether | 10 (4.54) | Cadmium bromide | 10 (4.54) |
| Bis(2-ethylhexyl)phthalate | 100 (45.4) | Cadmium chloride | 10 (4.54) |
| Bromoacetone | 1000 (454) | Calcium arsenate | 1 (0.454) |
| Bromoform | 100 (45.4) | Calcium arsenite | 1 (0.454) |
| 4-Bromophenyl phenyl ether | 100 (45.4) | Calcium carbide | 10 (4.54) |
| Brucine | 100 (45.4) | Calcium chromate | 10 (4.54) |
| 1,3-Butadiene | 10 (4.54) | Calcium cyanamide | 1000 (454) |
| 1,3-Butadiene, 1,1,2,3,4,4-hexachloro- | 1 (0.454) | Calcium cyanide | 10 (4.54) |
| 1-Butanamine, N-butyl-N-nitroso- | 10 (4.54) | Calcium cyanide Ca(CN)2 | 10 (4.54) |
| 1-Butanol | 5000 (2270) | Calcium dodecylbenzene sulfonate | 1000 (454) |
| 2-Butanone | 5000 (2270) | Calcium hypochlorite | 10 (4.54) |
| 2-Butanone, 3,3-dimethyl-1-(methylthio)-,O-[(methylamino)carbonyl] oxime | 100 (45.4) | Camphene, octachloro- | 1 (0.454) |
| 2-Butanone peroxide | 10 (4.54) | Caprolactam | 5000 (2270) |

| | Reportable | | Reportable |
|--|---------------|---|---------------|
| Hazardous Substance | Quantity (RQ) | | Reportable |
| | Pounds | Hazardous Substance | Quantity (RQ) |
| | (Kilograms) | | Pounds |
| | | | (Kilograms) |
| Captan | 10 (4.54) | | |
| Carbamic acid, ethyl ester | 100 (45.4) | Chloroform | 10 (4.54) |
| Carbamic acid, methylnitroso-, ethyl ester | 1 (0.454) | Chloromethane | 100 (45.4) |
| Carbamic chloride, dimethyl- | 1 (0.454) | Chloromethyl methyl ether | 1 (0.454) |
| Carbamide, thio- | 10 (4.54) | beta-Chloronaphthalene | 5000 (2270) |
| Carbamimidoseleonic acid | 1000 (454) | 2-Chloronaphthalene | 5000 (2270) |
| Carbamothioic acid, bis (1-methylethyl)-,S-(2,3-dichloro-2-propenyl) ester | 100 (45.4) | 2-Chlorophenol | 100 (45.4) |
| Carbaryl | 100 (45.4) | o-Chlorophenol | 100 (45.4) |
| Carbofuran | 10 (4.54) | 4-Chlorophenyl phenyl ether | 5000 (2270) |
| Carbon bisulfide | 100 (45.4) | 1-(o-Chlorophenyl)thiourea | 100 (45.4) |
| Carbon disulfide | 100 (45.4) | Chloroprene | 100 (45.4) |
| Carbonic acid, dithallium (1+) | 100 (45.4) | 3-Chloropropionitrile | 1000 (454) |
| Carbonic dichloride | 10 (4.54) | Chlorosulfonic acid | 1000 (454) |
| Carbonic difluoride | 1000 (454) | 4-Chloro-o-toluidine, hydrochloride | 100 (45.4) |
| Carbonochloridic acid, methyl ester | 1000 (454) | Chlorpyrifos | 1 (0.454) |
| Carbon oxyfluoride | 1000 (454) | Chromic acetate | 1000 (454) |
| Carbon tetrachloride | 10 (4.54) | Chromic acid | 10 (4.54) |
| Carbonyl sulfide | 100 (45.4) | Chromic acid H ₂ CrO ₄ , calcium salt | 10 (4.54) |
| Catechol | 100 (45.4) | Chromic sulfate | 1000 (454) |
| Chloral | 5000 (2270) | Chromium + | 5000 (2270) |
| Chloramben | 100 (45.4) | Chromous chloride | 1000 (454) |
| Chlorambucil | 10 (4.54) | Chrysene | 100 (45.4) |
| Chlordane | 1 (0.454) | Cobaltous bromide | 1000 (454) |
| Chlordane, alpha & gamma isomers | 1 (0.454) | Cobaltous formate | 1000 (454) |
| Chlordane, technical | 1 (0.454) | Cobaltous sulfamate | 1000 (454) |
| Chlorine | 10 (4.54) | Coke Oven Emissions | 1 (0.454) |
| Chlornaphazine | 100 (45.4) | Copper + | 5000 (2270) |
| Chloroacetaldehyde | 1000 (454) | Copper chloride * | 10 (4.54) |
| Chloroacetic acid | 100 (45.4) | Copper cyanide | 10 (4.54) |
| 2-Chloroacetophenone | 100 (45.4) | Copper cyanide CuCN | 10 (4.54) |
| p-Chloroaniline | 1000 (454) | Coumaphos | 10 (4.54) |
| Chlorobenzene | 100 (45.4) | Creosote | 1 (0.454) |
| Chlorobenzilate | 10 (4.54) | Cresols (isomers and mixture) | 100 (45.4) |
| 4-Chloro-m-cresol | 5000 (2270) | m-Cresol | 100 (45.4) |
| p-Chloro-m-cresol | 5000 (2270) | o-Cresol | 100 (45.4) |
| Chlorodibromomethane | 100 (45.4) | p-Cresol | 100 (45.4) |
| Chloroethane | 100 (45.4) | Cresylic acid (isomers and mixture) | 100 (45.4) |
| 2-Chloroethyl vinyl ether | 1000 (454) | m-Cresylic acid | 100 (45.4) |

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| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| o-Cresylic acid | 100 (45.4) | Diazomethane | 100 (45.4) |
| p-Cresylic acid | 100 (45.4) | Dibenz[a,h]anthracene | 1 (0.454) |
| Crotonaldehyde | 100 (45.4) | 1,2:5,6-Dibenzanthracene | 1 (0.454) |
| Cumene | 5000 (2270) | Dibenzo[a,h]anthracene | 1 (0.454) |
| Cupric acetate | 100 (45.4) | Dibenz[a,i]pyrene | 10 (4.54) |
| Cupric acetoarsenite | 1 (0.454) | Dibenzofuran | 100 (45.4) |
| Cupric chloride | 10 (4.54) | 1,2-Dibromo-3-chloropropane | 1 (0.454) |
| Cupric nitrate | 100 (45.4) | Dibutyl phthalate | 10 (4.54) |
| Cupric oxalate | 100 (45.4) | Di-n-butyl phthalate | 10 (4.54) |
| Cupric sulfate | 10 (4.54) | Dicamba | 1000 (454) |
| Cupric sulfate ammoniated | 100 (45.4) | Dichlobenil | 100 (45.4) |
| Cupric tartrate | 100 (45.4) | Dichlone | 1 (0.454) |
| Cyanides (soluble salts and complexes) not otherwise specified | 10 (4.54) | Dichlorobenzene | 100 (45.4) |
| Cyanogen | 100 (45.4) | 1,2-Dichlorobenzene | 100 (45.4) |
| Cyanogen bromide | 1000 (454) | 1,3-Dichlorobenzene | 100 (45.4) |
| Cyanogen bromide (CN)Br | 1000 (454) | 1,4 Dichlorobenzene | 100 (45.4) |
| Cyanogen chloride | 10 (4.54) | m-Dichlorobenzene | 100 (45.4) |
| Cyanogen chloride (CN)Cl | 10 (4.54) | o-Dichlorobenzene | 100 (45.4) |
| 2,5-Cyclohexadiene-1,4-dione | 10 (4.54) | p-Dichlorobenzene | 100 (45.4) |
| Cyclohexane | 1000 (454) | 3,3'-Dichlorobenzidine | 1 (0.454) |
| Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1alpha,2alpha, 3beta, 4alpha,5alpha,6beta)- | 1 (0.454) | Dichlorobromomethane | 5000 (2270) |
| Cyclohexanone | 5000 (2270) | 1,4 Dichloro-2-butene | 1 (0.454) |
| 2-Cyclohexyl-4,6-dinitrophenol | 100 (45.4) | Dichlorodifluoromethane | 5000 (2270) |
| 1,3-Cyclopentadiene, 1,2,3,4,5,5- hexachloro- | 10 (4.54) | 1,1 Dichloroethane | 1000 (454) |
| Cyclophosphamide | 10 (4.54) | 1,2 Dichloroethane | 100 (45.4) |
| 2,4-D Acid | 100 (45.4) | 1,1-Dichloroethylene | 100 (45.4) |
| 2,4-D Ester | 100 (45.4) | 1,2 Dichloroethylene | 1000 (454) |
| Daunomycin | 10 (4.54) | Dichloroethyl ether | 10 (4.54) |
| DDD | 1 (0.454) | Dichloroisopropyl--ether | 1000 (454) |
| 4,4'-DDD | 1 (0.454) | Dichloromethane * | 1000 (454) |
| DDE | 5000 (2270) | Dichloromethoxy ethane | 1000 (454) |
| 4,4'-DDE | 5000 (2270) | Dichloromethyl ether | 1 (0.454) |
| DDT | 1 (0.454) | 2,4 Dichlorophenol | 100 (45.4) |
| 4,4'-DDT | 1 (0.454) | 2,6-Dichlorophenol | 100 (45.4) |
| Diallate | 100 (45.4) | Dichlorophenylarsine | 1 (0.454) |
| Diamine | 1 (0.454) | Dichloropropane | 1000 (454) |
| Diazinon | 1 (0.454) | | |

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| Hazardous Substance | Quantity (RQ) | | Quantity (RQ) |
| | Pounds | Hazardous Substance | Pounds |
| | (Kilograms) | | (Kilograms) |
| 1,1-Dichloropropane | | Diethylstilbestrol | 1 (0.454) |
| 1,3-Dichloropropane | | Diethyl sulfate | 10 (4.54) |
| 1,2-Dichloropropane | 1000 (454) | Dihydrosafrole | 10 (4.54) |
| Dichloropropane - Dichloropropene (mixture) | 100 (45.4) | Diisopropyl fluorophosphate | 100 (45.4) |
| Dichloropropene | 100 (45.4) | 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10, 10-hexachloro-1,4, 4a,5, 8,8a-hexahydro, (1alpha, 4alpha, 4abeta, 5abeta,8beta, 8abeta)- | 1 (0.454) |
| 2,3-Dichloropropene | | 1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10, 10-10-hexachloro-1,4, 4a,5,8,8a-hexahydro-,(1alpha, 4alpha, 4abeta,5alpha,8alpha, 8abeta)- | 1 (0.454) |
| 1,3-Dichloropropene | 100 (45.4) | 2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7, 7a-octahydro-, (1aalpha,2beta, 2abeta, 3alpha,6alpha,6abeta, 7beta, 7aalpha)- | 1 (0.454) |
| 2,2-Dichloropropionic acid | 5000 (2270) | 2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro - 1a,2,2a,3,6,6a,7, 7a-octahydro-, (1aalpha,2beta,2aalpha, 3beta, 6beta,6aalpha,7beta, 7aalpha)- | 1 (0.454) |
| Dichlorvos | 10 (4.54) | Dimethoate | 10 (4.54) |
| Dicofol | 10 (4.54) | 3,3'-Dimethoxybenzidine | 10 (4.54) |
| Dieldrin | 1 (0.454) | Dimethylamine | 1000 (454) |
| 1,2:3,4-Diepoxybutane | 10 (4.54) | p-Dimethylaminoazobenzene | 10 (4.54) |
| Diethanolamine | 100 (45.4) | N,N-dimethylaniline | 100 (45.4) |
| Diethylamine | 1000 (454) | 7,12-Dimethylbenz[a]anthracene | 1 (0.454) |
| N,N-diethylaniline | 1000 (454) | 3,3'-Dimethylbenzidine | 10 (4.54) |
| Diethylarsine | 1 (0.454) | alpha,alpha-Dimethylbenzylhydroperoxide | 10 (4.54) |
| 1,4-Diethylenedioxiide | 100 (45.4) | Dimethylcarbamoyl chloride | 1 (0.454) |
| Diethylhexyl phthalate | 100 (45.4) | Dimethylformamide | 100 (45.4) |
| N,N'-Diethylhydrazine | 10 (4.54) | 1,1-Dimethylhydrazine | 10 (4.54) |
| O,O-Diethyl S-methyl dithiophosphate | 5000 (2270) | 1,2-Dimethylhydrazine | 1 (0.454) |
| Diethyl-p-nitrophenyl phosphate | 100 (45.4) | Dimethylhydrazine, unsymmetrical * | 10 (4.54) |
| Diethyl phthalate | 1000 (454) | | |
| O,O-Diethyl O-pyrazinyl phosphorothioate | 100 (45.4) | | |

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| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| alpha,alpha-Dimethylphenethylamine | 5000 (2270) | Endosulfan sulfate | 1 (0.454) |
| 2,4-Dimethylphenol | 100 (45.4) | Endothall | 1000 (454) |
| Dimethyl phthalate | 5000 (2270) | Endrin | 1 (0.454) |
| Dimethyl sulfate | 100 (45.4) | Endrin, & metabolites | 1 (0.454) |
| Dinitrobenzene (mixed) | 100 (45.4) | Endrin aldehyde | 1 (0.454) |
| m-Dinitrobenzene | | Epichlorohydrin | 100 (45.4) |
| o-Dinitrobenzene | | Epinephrine | 1000 (454) |
| p-Dinitrobenzene | | 1,2-Epoxybutane | 100 (45.4) |
| 4,6-Dinitro-o-cresol and salts | 10 (4.54) | Ethanal | 1000 (454) |
| Dinitrogen tetroxide * | 10 (4.54) | Ethanamine, N-ethyl-N-nitroso- | 1 (0.454) |
| Dinitrophenol | 10 (4.54) | Ethane, 1,2-dibromo- | 1 (0.454) |
| 2,5-Dinitrophenol | | Ethane, 1,1-dichloro- | 1000 (454) |
| 2,6-Dinitrophenol | | Ethane, 1,2-dichloro- | 100 (45.4) |
| 2,4-Dinitrophenol | 10 (4.54) | Ethane, hexachloro- | 100 (45.4) |
| Dinitrotoluene | 10 (4.54) | Ethane, 1,1'-[methylenebis (oxy)]bis(2-chloro- | 1000 (454) |
| 3,4-Dinitrotoluene | | Ethane, 1,1'-oxybis- | 100 (45.4) |
| 2,4-Dinitrotoluene | 10 (4.54) | Ethane, 1,1'-oxybis(2-chloro- | 10 (4.54) |
| 2,6-Dinitrotoluene | 100 (45.4) | Ethane, pentachloro- | 10 (4.54) |
| Dinoseb | 1000 (454) | Ethane, 1,1,1,2-tetrachloro- | 100 (45.4) |
| Di-n-octyl phthalate | 5000 (2270) | Ethane, 1,1,2,2 tetrachloro- | 100 (45.4) |
| 1,4-Dioxane | 100 (45.4) | Ethane, 1,1,2-trichloro- | 100 (45.4) |
| 1,2-Diphenylhydrazine | 10 (4.54) | Ethane, 1,1,1-trichloro- | 1000 (454) |
| Diphosphoramidate, octamethyl- | 100 (45.4) | 1,2-Ethanediamine, N, N-dimethyl- N'-2-pyridinyl-N'-(2-thienyl- methyl)- | 5000 (2270) |
| Diphosphoric acid, tetraethyl ester | 10 (4.54) | Ethanedinitrile | 100 (45.4) |
| Dipropylamine | 5000 (2270) | Ethanenitrile | 5000 (2270) |
| Di-n-propylnitrosamine | 10 (4.54) | Ethanethioamide | 10 (4.54) |
| Diquat | 1000 (454) | Ethanimidothioic acid, N- [[[(methylamino) carbonyl] oxy]-, methyl ester | 100 (45.4) |
| Disulfoton | 1 (0.454) | Ethanol, 2-ethoxy- | 1000 (454) |
| Dithiobiuret | 100 (45.4) | Ethanol, 2,2'-(nitrosoimino)bis- | 1 (0.454) |
| Diuron | 100 (45.4) | Ethanone, 1-phenyl- | 5000 (2270) |
| Dodecylbenzenesulfonic acid | 1000 (454) | Ethanoyl chloride | 5000 (2270) |
| 2,4-D,salts and esters | 100 (45.4) | Ethene, chloro- | 1 (0.454) |
| Endosulfan | 1 (0.454) | Ethene, 2-chloroethoxy- | 1000 (454) |
| alpha - Endosulfan | 1 (0.454) | | |
| beta - Endosulfan | 1 (0.454) | | |

| | Reportable | | Reportable |
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| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| Ethene, 1,1-dichloro- | 100 (45.4) | Ferric sulfate | 1000 (454) |
| Ethene, 1,2-dichloro- (E) | 1000 (454) | Ferrous ammonium sulfate | 1000 (454) |
| Ethene, tetrachloro- | 100 (45.4) | Ferrous chloride | 100 (45.4) |
| Ethene, trichloro- | 100 (45.4) | Ferrous sulfate | 1000 (454) |
| Ethion | 10 (4.54) | Fluoranthene | 100 (45.4) |
| Ethyl acetate | 5000 (2270) | Fluorene | 5000 (2270) |
| Ethyl acrylate | 1000 (454) | Fluorine | 10 (4.54) |
| Ethylbenzene | 1000 (454) | Fluoroacetamide | 100 (45.4) |
| Ethyl carbamate (Urethan) | 100 (45.4) | Fluoroacetic acid, sodium salt | 10 (4.54) |
| Ethyl chloride * | 100 (45.4) | Formaldehyde | 100 (45.4) |
| Ethyl cyanide | 10 (4.54) | Formic acid | 5000 (2270) |
| Ethylene dibromide | 1 (0.454) | Fulminic acid, mercury(2+)salt | 10 (4.54) |
| Ethylene dichloride | 100 (45.4) | Fumaric acid | 5000 (2270) |
| Ethylene glycol | 5000 (2270) | Furan | 100 (45.4) |
| Ethylene glycol monoethyl ether | 1000 (454) | Furan, tetrahydro- | 1000 (454) |
| Ethylene oxide | 10 (4.54) | 2-Furancarboxaldehyde | 5000 (2270) |
| Ethylenebisdithiocarbamic acid | 5000 (2270) | 2,5-Furandione | 5000 (2270) |
| Ethylenebisdithiocarbamic acid, salts and esters | 5000 (2270) | Furfural | 5000 (2270) |
| Ethylenediamine | 5000 (2270) | Furfuran | 100 (45.4) |
| Ethylenediamine tetraacetic acid (EDTA) | 5000 (2270) | Glucopyranose, 2-deoxy-2-(3-methyl-3- nitrosoureido)- | 1 (0.454) |
| Ethylenethiourea | 10 (4.54) | D-Glucose, 2-deoxy-2-[[methylnitrosoamino)-carbonyl]amino]- | 1 (0.454) |
| Ethylenimine | 1 (0.454) | Glycidylaldehyde | 10 (4.54) |
| Ethyl ether | 100 (45.4) | Guanidine, N-methyl-N' nitro-N-nitroso | 10 (4.54) |
| Ethylidene dichloride | 1000 (454) | Guthion | 1 (0.454) |
| Ethyl methacrylate | 1000 (454) | Heptachlor | 1 (0.454) |
| Ethyl methanesulfonate | 1 (0.454) | Heptachlor epoxide | 1 (0.454) |
| Ethyl methyl ketone * | 5000 (2270) | Hexachlorobenzene | 10 (4.54) |
| Famphur | 1000 (454) | Hexachlorobutadiene | 1 (0.454) |
| Ferric ammonium citrate | 1000 (454) | Hexachlorocyclohexane (gamma isomer) | 1 (0.454) |
| Ferric ammonium oxalate | 1000 (454) | Hexachlorocyclopentadiene | 10 (4.54) |
| Ferric chloride | 1000 (454) | Hexachloroethane | 100 (45.4) |
| Ferric fluoride | 100 (45.4) | 1,2,3,4,10-10-Hexachloro-1,4,4a,5,8, 8a-hexahydro-1,4:5,8-endo,exo- dimethanonaphthalene | 1 (0.454) |
| Ferric nitrate | 1000 (454) | | |

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| | Reportable | | Reportable |
|---|---------------|--------------------------------------|---------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| Hexachlorophene | 100 (45.4) | Lead arsenate | 1 (0.454) |
| Hexachloropropene | 1000 (454) | Lead, bis(acetato-O) tetrahydroxytri | 10 (4.54) |
| Hexaethyl tetraphosphate | 100 (45.4) | Lead chloride | 10 (4.54) |
| Hexamethylene-1,6-diisocyanate | 100 (45.4) | Lead fluoborate | 10 (4.54) |
| Hexamethylphosphoramide | 1 (0.454) | Lead fluoride | 10 (4.54) |
| Hexane | 5000 (2270) | Lead iodide | 10 (4.54) |
| Hydrazine | 1 (0.454) | Lead nitrate | 10 (4.54) |
| Hydrazine, 1,2-diethyl- | 10 (4.54) | Lead phosphate | 10 (4.54) |
| Hydrazine, 1,1-dimethyl- | 10 (4.54) | Lead stearate | 10 (4.54) |
| Hydrazine, 1,2-dimethyl- | 1 (0.454) | Lead subacetate | 10 (4.54) |
| Hydrazine, 1,2-diphenyl- | 10 (4.54) | Lead sulfate | 10 (4.54) |
| Hydrazine, methyl- | 10 (4.54) | Lead sulfide | 10 (4.54) |
| Hydrazinecarbothioamide | 100 (45.4) | Lead thiocyanate | 10 (4.54) |
| Hydrochloric acid | 5000 (2270) | Lindane | 1 (0.454) |
| Hydrocyanic acid | 10 (4.54) | Lithium chromate | 10 (4.54) |
| Hydrofluoric acid | 100 (45.4) | Malathion | 100 (45.4) |
| Hydrogen chloride | 5000 (2270) | Maleic acid | 5000 (2270) |
| Hydrogen cyanide | 10 (4.54) | Maleic anhydride | 5000 (2270) |
| Hydrogen fluoride | 100 (45.4) | Maleic hydrazide | 5000 (2270) |
| Hydrogen phosphide | 100 (45.4) | Malononitrile | 1000 (454) |
| Hydrogen sulfide | 100 (45.4) | MDI | 5000 (2270) |
| Hydrogen sulfide H2S | 100 (45.4) | Melphalan | 1 (0.454) |
| Hydroperoxide, 1-methyl-1-phenylethyl- | 10 (4.54) | Mercaptodimethur | 10 (4.54) |
| Hydroquinone | 100 (45.4) | Mercuric cyanide | 1 (0.454) |
| 2-Imidazolidinethione | 10 (4.54) | Mercuric nitrate | 10 (4.54) |
| Indeno(1,2,3-cd)pyrene | 100 (45.4) | Mercuric sulfate | 10 (4.54) |
| 1,3-Isobenzofurandione | 5000 (2270) | Mercuric thiocyanate | 10 (4.54) |
| Isobutyl alcohol | 5000 (2270) | Mercurous nitrate | 10 (4.54) |
| Isodrin | 1 (0.454) | Mercury | 1 (0.454) |
| Isophorone | 5000 (2270) | Mercury, (acetato-O)phenyl- | 100 (45.4) |
| Isoprene | 100 (45.4) | Mercury fulminate | 10 (4.54) |
| Isopropanolamine dodecylbenzene sulfonate | 1000 (454) | Methacrylonitrile | 1000 (454) |
| Isosafrole | 100 (45.4) | Methanamine, N-methyl- | 1000 (454) |
| 3(2H)-Isoxazolone, 5-(aminomethyl)- | 1000 (454) | Methanamine, N-methyl-N-nitroso | 10 (4.54) |
| Kepone | 1 (0.454) | Methane, bromo | 1000 (454) |
| Lasiocarpine | 10 (4.54) | Methane, chloro- | 100 (45.4) |
| Lead + | 10 (4.54) | Methane, chloromethoxy- | 1 (0.454) |
| Lead acetate | 10 (4.54) | Methane, dibromo- | 1000 (454) |

| | Reportable | | Reportable |
|---|---------------|------------------------------------|---------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| Methane, dichloro- | 1000 (454) | Methyl chloroformate | 1000 (454) |
| Methane, dichlorodifluoro | 5000 (2270) | Methylchloromethyl ether * | 1 (0.454) |
| Methane, iodo- | 100 (45.4) | 3-Methylcholanthrene | 10 (4.54) |
| Methane, isocyanato- | 10 (4.54) | 4,4'-Methylenebis(2-chloroaniline) | 10 (4.54) |
| Methane, oxybis(chloro- | 1 (0.454) | Methylene bromide | 1000 (454) |
| Methane, tetrachloro- | 10 (4.54) | Methylene chloride | 1000 (454) |
| Methane, tetranitro- | 10 (4.54) | 4,4'-Methylenedianiline | 10 (4.54) |
| Methane, tribromo- | 100 (45.4) | Methylene diphenyl diisocyanate | 5000 (2270) |
| Methane, trichloro- | 10 (4.54) | Methylene oxide | 100 (45.4) |
| Methane, trichlorofluoro- | 5000 (2270) | Methyl ethyl ketone (MEK) | 5000 (2270) |
| Methanesulfonyl chloride, trichloro- | 100 (45.4) | Methyl ethyl ketone peroxide | 10 (4.54) |
| Methanesulfonic acid, ethyl ester | 1 (0.454) | Methyl hydrazine | 10 (4.54) |
| Methanethiol | 100 (45.4) | Methyl iodide | 100 (45.4) |
| 6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro -1,5,5a,6,9, 9a-hexahydro-, 3-oxide | 1 (0.454) | Methyl isobutyl ketone | 5000 (2270) |
| Methanoic acid | 5000 (2270) | Methyl isocyanate | 1 (0.454) |
| 4,7-Methano-1H-indene, 1,4,5,6,7,8, 8-heptachloro-a,4,7,7a-tetrahydro- | 1 (0.454) | 2-Methylacetonitrile | 10 (4.54) |
| 4,7-Methano-1H-indene, 1,4,5,6,7,8, 8-octachloro-2,3,3a,4,7,7a-hexahydro- | 1 (0.454) | Methyl mercaptan | 100 (45.4) |
| Methanol | 5000 (2270) | Methyl methacrylate | 1000 (454) |
| Methapyrilene | 5000 (2270) | Methyl parathion | 100 (45.4) |
| 1,3,4-Metheno-2H-cyclobutal[cd]-pentalen-2-one, 1, 1a, 3, 3a, 4, 5, 5,5a,5b,6- decachlorooctahydro- | 1 (0.454) | 4-Methyl-2-pentanone | 5000 (2270) |
| Methomyl | 100 (45.4) | Methyl tert-butyl ether | 1000 (454) |
| Methoxychlor | 1 (0.454) | Methylthiouracil | 10 (4.54) |
| Methyl alcohol | 5000 (2270) | Mevinphos | 10 (4.54) |
| Methylamine * | 100 (45.4) | Mexacarbate | 1000 (454) |
| Methyl bromide | 1000 (454) | Mitomycin C | 10 (4.54) |
| 1-Methylbutadiene | 100 (45.4) | MNNG | 10 (4.54) |
| Methyl chloride | 100 (45.4) | Monoethylamine | 100 (45.4) |
| Methyl chlorocarbonate | 1000 (454) | Monomethylamine | 100 (45.4) |
| Methyl chloroform | 1000 (454) | Muscimol | 1000 (454) |
| | | Naled | 10 (4.54) |

| | Reportable | | Reportable |
|---|---------------|-------------------------------|---------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| 5,12-Naphthacenedione, 8-acetyl-10-[3-amino-2,3,6-trideoxy- alpha-L-lyxo-hexopyranosyl) oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-,(8S-cis)- | 10 (4.54) | Nitrogen oxide NO2 | 10 (4.54) |
| Naphthalenamine, N,N-bis(2-chloroethyl)- | 100 (45.4) | Nitroglycerine | 10 (4.54) |
| Naphthalene | 100 (45.4) | Nitrophenol (mixed) | 100 (45.4) |
| Naphthalene, 2-chloro- | 5000 (2270) | m- | |
| 1,4-Naphthalenedione | 5000 (2270) | o- | |
| 2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl-(1,1'-biphenyl)-4,4'-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt | 10 (4.54) | p- | |
| Naphthenic acid | 100 (45.4) | o-Nitrophenol | 100 (45.4) |
| 1,4-Naphthoquinone | 5000 (2270) | p-Nitrophenol | 100 (45.4) |
| alpha-Naphthylamine | 100 (45.4) | 2-Nitrophenol | 100 (45.4) |
| beta-Naphthylamine | 1 (0.454) | 4-Nitrophenol | 100 (45.4) |
| 1-Naphthylamine | 100 (45.4) | 2-Nitropropane | 10 (4.54) |
| 2-Naphthylamine | 1 (0.454) | N-Nitrosodi-n-butylamine | 10 (4.54) |
| alpha-Naphthylthiourea | 100 (45.4) | N-Nitrosodiethanolamine | 1 (0.454) |
| Nickel + | 100 (45.4) | N-Nitrosodiethylamine | 1 (0.454) |
| Nickel ammonium sulfate | 100 (45.4) | N-Nitrosodimethylamine | 10 (4.54) |
| Nickel carbonyl | 10 (4.54) | N-Nitrosodiphenylamine | 100 (45.4) |
| Nickel carbonyl Ni(CO)4,(T-4)- | 10 (4.54) | N-Nitroso-N-ethylurea | 1 (0.454) |
| Nickel chloride | 100 (45.4) | N-Nitroso-N-methylurea | 1 (0.454) |
| Nickel cyanide | 10 (4.54) | N-Nitroso-N-methylurethane | 1 (0.454) |
| Nickel cyanide Ni(CN)2 | 10 (4.54) | N-Nitrosomethylvinylamine | 10 (4.54) |
| Nickel hydroxide | 10 (4.54) | n-Nitrosomorpholine | 1 (0.454) |
| Nickel nitrate | 100 (45.4) | N-Nitrosopiperidine | 10 (4.54) |
| Nickel sulfate | 100 (45.4) | N-Nitrosopyrrolidine | 1 (0.454) |
| Nicotine and salts | 100 (45.4) | Nitrotoluene | 1000 (454) |
| Nitric acid | 1000 (454) | m-Nitrotoluene | |
| Nitric acid, thallium (1+) salt | 100 (45.4) | o-Nitrotoluene | |
| Nitric oxide | 10 (4.54) | p-Nitrotoluene | |
| p-Nitroaniline | 5000 (2270) | 5-Nitro-o-toluidine | 100 (45.4) |
| Nitrobenzene | 1000 (454) | Octamethylpyrophosphoramidate | 100 (45.4) |
| 4-nitrobiphenyl | 10 (4.54) | Osmium oxide OsO4 (T-4)- | 1000 (454) |
| Nitrogen dioxide | 10 (4.54) | | |
| Nitrogen oxide NO | 10 (4.54) | | |

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|---|---------------|---|---------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| Osmium tetroxide | 1000 (454) | Phenol, 2,4-dinitro- | 10 (4.54) |
| 7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid | 1000 (454) | Phenol, methyl- | 100 (45.4) |
| 1,2-Oxathiolane, 2,2-dioxide | 10 (4.54) | Phenol, 2-methyl-4,6-dinitro- | 10 (4.54) |
| 2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl) tetrahydro-2-oxide | 10 (4.54) | Phenol, 2,2'-methylenebis [3,4,6-trichloro- | 100 (45.4) |
| Oxirane | 10 (4.54) | Phenol, 2-(1-methylpropyl)-4,6-dinitro | 1000 (454) |
| Oxiranecarboxyaldehyde | 10 (4.54) | Phenol, 4-nitro- | 100 (45.4) |
| Oxirane, (chloromethyl)- | 100 (45.4) | Phenol, pentachloro- | 10 (4.54) |
| Paraformaldehyde | 1000 (454) | Phenol, 2,3,4,6-tetrachloro- | 10 (4.54) |
| Paraldehyde | 1000 (454) | Phenol, 2,4,5-trichloro- | 10 (4.54) |
| Parathion | 10 (4.54) | Phenol, 2,4,6-trichloro- | 10 (4.54) |
| Pentachlorobenzene | 10 (4.54) | Phenol, 2,4,6-trinitro-, ammonium salt | 10 (4.54) |
| Pentachloroethane | 10 (4.54) | L-Phenylalanine, 4-[bis(2-chloroethyl)aminol] | 1 (0.454) |
| Pentachloronitrobenzene (PCNB) | 100 (45.4) | p-Phenylenedimine | 5000 (2270) |
| Pentachlorophenol | 10 (4.54) | 1,10-(1,2-Phenylene)pyrene | 100 (45.4) |
| 1,3-Pentadiene | 100 (45.4) | Phenyl mercaptan * | 100 (45.4) |
| Perchloroethylene | 100 (45.4) | Phenylmercuric acetate | 100 (45.4) |
| Perchloromethyl mercaptan * | 100 (45.4) | Phenylthiourea | 100 (45.4) |
| Phenacetin | 100 (45.4) | Phorate | 10 (4.54) |
| Phenanthrene | 5000 (2270) | Phosgene | 10 (4.54) |
| Phenol | 1000 (454) | Phosphine | 100 (45.4) |
| Phenol, 2-chloro- | 100 (45.4) | Phosphoric acid | 5000 (2270) |
| Phenol, 4-chloro-3-methyl- | 5000 (2270) | Phosphoric acid, diethyl 4-nitrophenyl ester | 100 (45.4) |
| Phenol, 2-cyclohexyl-4,6-dinitro- | 100 (45.4) | Phosphoric acid, lead(2+) salt (2:3) | 10 (4.54) |
| Phenol, 2,4-dichloro- | 100 (45.4) | Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl]ester | 1 (0.454) |
| Phenol, 2,6-dichloro- | 100 (45.4) | Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester | 10 (4.54) |
| Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E) | 1 (0.454) | Phosphorodithioic acid, O,O-diethyl S-methyl ester | 5000 (2270) |
| Phenol, 2,4-dimethyl- | 100 (45.4) | Phosphorodithioic acid, O,O-dimethyl S-[2 (methylamino)-2-oxoethyl] ester | 10 (4.54) |

| | Reportable | | Reportable |
|--|---------------|---|---------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| Phosphorofluoridic acid, bis(1-methylethyl) ester | 100 (45.4) | Propane, 1,2-dibromo-3-chloro- | 1 (0.454) |
| Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester | 10 (4.54) | Propane, 1,2-dichloro- | 1000 (454) |
| Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester | 100 (45.4) | Propane, 2-nitro- | 10 (4.54) |
| Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester | 100 (45.4) | Propane, 2,2'-oxybis [2-chloro- | 1000 (454) |
| Phosphorothioic acid, O,[4-[(dimethylamino) sulfonyl phenyl]O,O-dimethyl ester | 1000 (454) | 1,3-Propane sultone | 10 (4.54) |
| Phosphorus | 1 (0.454) | Propanedinitrile | 1000 (454) |
| Phosphorus oxychloride | 1000 (454) | Propanenitrile | 10 (4.54) |
| Phosphorus pentasulfide | 100 (45.4) | Propanenitrile, 3-chloro- | 1000 (454) |
| Phosphorus sulfide | 100 (45.4) | Propanenitrile, 2-hydroxy-2-methyl- | 10 (4.54) |
| Phosphorus trichloride | 1000 (454) | 1,2,3-Propanetriol, trinitrate- | 10 (4.54) |
| Phthalic anhydride | 5000 (2270) | 1-Propanol, 2,3-dibromo-, phosphate (3:1) | 10 (4.54) |
| 2-Picoline | 5000 (2270) | 1-Propanol, 2-methyl- | 5000 (2270) |
| Piperidine, 1-nitroso- | 10 (4.54) | 2-Propanone | 5000 (2270) |
| Plumbane, tetraethyl- | 10 (4.54) | 2-Propanone, 1-bromo- | 1000 (454) |
| POLYCHLORINATED BIPHENYLS (PCBs) | 1 (0.454) | Propargite | 10 (4.54) |
| Potassium arsenate | 1 (0.454) | Propargyl alcohol | 1000 (454) |
| Potassium arsenite | 1 (0.454) | 2-Propenal | 1 (0.454) |
| Potassium bichromate | 10 (4.54) | 2-Propenamide | 5000 (2270) |
| Potassium chromate | 10 (4.54) | 1-Propene, 1,3-dichloro- | 100 (45.4) |
| Potassium cyanide | 10 (4.54) | 1-Propene, 1,1,2,3,3,3-hexachloro- | 1000 (454) |
| Potassium cyanide K(CN) | 10 (4.54) | 2-Propenenitrile | 100 (45.4) |
| Potassium hydroxide | 1000 (454) | 2-Propenenitrile, 2-methyl | 1000 (454) |
| Potassium permanganate | 100 (45.4) | 2-Propenoic acid | 5000 (2270) |
| Potassium silver cyanide | 1 (0.454) | 2-Propenoic acid, ethyl ester | 1000 (454) |
| Pronamide | 5000 (2270) | 2-Propenoic acid, 2-methyl-, ethyl ester | 1000 (454) |
| Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl] oxime | 1 (0.454) | 2-Propenoic acid, 2-methyl-, methyl ester | 1000 (454) |
| 1-Propanamine | 5000 (2270) | 2-Propen-1-ol | 100 (45.4) |
| 1-Propanamine, N-nitroso-N-propyl- | 10 (4.54) | beta-Propioaldehyde | 1000 (454) |
| 1-Propanamine, N-propyl- | 5000 (2270) | Propionic acid | 5000 (2270) |
| | | Propionic acid, 2-(2,4,5-trichlorophenoxy)- | 100 (45.4) |
| | | Propionic anhydride | 5000 (2270) |

| | Reportable | | Reportable |
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| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| Propoxur (baygon) | 100 (45.4) | Sodium azide | 1000 (454) |
| n-Propylamine | 5000 (2270) | Sodium bichromate | 10 (4.54) |
| Propylene dichloride | 1000 (454) | Sodium bifluoride | 100 (45.4) |
| Propylene oxide | 100 (45.4) | Sodium bisulfite | 5000 (2270) |
| 1,2-Propyleimine | 1 (0.454) | Sodium chromate | 10 (4.54) |
| 2-Propyn-1-ol | 1000 (454) | Sodium cyanide | 10 (4.54) |
| Pyrene | 5000 (2270) | Sodium cyanide Na(CN) | 10 (4.54) |
| Pyrethrins | 1 (0.454) | Sodium dodecylbenzene sulfonate | 1000 (454) |
| 3,6-Pyridazinedione, 1,2-dihydro- | 5000 (2270) | Sodium fluoride | 1000 (454) |
| 4-Pyridinamine | 1000 (454) | Sodium hydrosulfide | 5000 (2270) |
| Pyridine | 1000 (454) | Sodium hydroxide | 1000 (454) |
| Pyridine, 2-methyl- | 5000 (2270) | Sodium hypochlorite | 100 (45.4) |
| Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S) | 100 (45.4) | Sodium methylate | 1000 (454) |
| 2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]- | 10 (4.54) | Sodium nitrite | 100 (45.4) |
| 4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo- | 10 (4.54) | Sodium phosphate, dibasic | 5000 (2270) |
| Pyrrolidine, 1-nitroso- | 1 (0.454) | Sodium phosphate, tribasic | 5000 (2270) |
| Quinoline | 5000 (2270) | Sodium selenite | 100 (45.4) |
| Reserpine | 5000 (2270) | Streptozotocin | 1 (0.454) |
| Resorcinol | 5000 (2270) | Strontium chromate | 10 (4.54) |
| Saccharin and salts | 100 (45.4) | Strychnidin-10-one | 10 (4.54) |
| Safrole | 100 (45.4) | Strychnidin-10-one, 2,3-dimethoxy- | 100 (45.4) |
| Selenious acid | 10 (4.54) | Strychnine and salts | 10 (4.54) |
| Selenious acid, dithallium(I+) salt | 1000 (454) | Styrene | 1000 (454) |
| Selenium + | 100 (45.4) | Styrene oxide | 100 (45.4) |
| Selenium dioxide | 10 (4.54) | Sulfur chloride * | 1000 (454) |
| Selenium oxide | 10 (4.54) | Sulfur monochloride | 1000 (454) |
| Selenium sulfide | 10 (4.54) | Sulfur phosphide | 100 (45.4) |
| Selenium sulfide SeS2 | 10 (4.54) | Sulfuric acid | 1000 (454) |
| Selenourea | 1000 (454) | Sulfuric acid, dimethyl ester | 100 (45.4) |
| L-Serine, diazoacetate (ester) | 1 (0.454) | Sulfuric acid, dithallium(I+) salt | 100 (45.4) |
| Silver | 1000 (454) | 2,4,5-T | 1000 (454) |
| Silver cyanide | 1 (0.454) | 2,4,5-T acid | 1000 (454) |
| Silver cyanide Ag(CN) | 1 (0.454) | 2,4,5-T amines | 5000 (2270) |
| Silver nitrate | 1 (0.454) | 2,4,5-T esters | 1000 (454) |
| Silvex (2,4,5-TP) | 100 (45.4) | 2,4,5-T salts | 1000 (454) |
| Sodium | 10 (4.54) | TDE | 1 (0.454) |
| Sodium arsenate | 1 (0.454) | 1,2,4,5-Tetrachlorobenzene | 5000 (2270) |
| Sodium arsenite | 1 (0.454) | 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) | 1 (0.454) |

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| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| 1,1,1,2-Tetrachloroethane | 100 (45.4) | Toluene diisocyanate | 100 (45.4) |
| 1,1,2,2-Tetrachloroethane | 100 (45.4) | o-Toluidine | 100 (45.4) |
| Tetrachloroethane * | 100 (45.4) | p-Toluidine | 100 (45.4) |
| Tetrachloroethene | 100 (45.4) | o-Toluidine hydrochloride | 100 (45.4) |
| Tetrachloroethylene | 100 (45.4) | Toxaphene | 1 (0.454) |
| 2,3,4,6-Tetrachlorophenol | 10 (4.54) | 2,4,5-TP acid | 100 (45.4) |
| Tetraethyl lead | 10 (4.54) | 2,4,5-TP acid esters | 100 (45.4) |
| Tetraethyl pyrophosphate | 10 (4.54) | 1H-1,2,4-Triazol-3-amine | 10 (4.54) |
| Tetraethyldithiopyrophosphate | 100 (45.4) | Trichlorfon | 100 (45.4) |
| Tetrahydrofuran | 1000 (454) | 1,2,4-Trichlorobenzene | 100 (45.4) |
| Tetranitromethane | 10 (4.54) | 1,1,1-Trichloroethane | 1000 (454) |
| Tetraphosphoric acid, hexaethyl ester | 100 (45.4) | 1,1,2-Trichloroethane | 100 (45.4) |
| Thallic oxide | 100 (45.4) | Trichloroethene | 100 (45.4) |
| Thallium + | 1000 (454) | Trichloroethylene | 100 (45.4) |
| Thallium(I) acetate | 100 (45.4) | Trichloromethanesulfonyl chloride | 100 (45.4) |
| Thallium(I) carbonate | 100 (45.4) | Trichloromonofluoromethane | 5000 (2270) |
| Thallium(I) chloride | 100 (45.4) | Trichlorophenol | 10 (4.54) |
| Thallium chloride TICI | 100 (45.4) | 2,3,4-Trichlorophenol | |
| Thallium(I) nitrate | 100 (45.4) | 2,3,5-Trichlorophenol | |
| Thallium oxide T1203 | 100 (45.4) | 2,3,6-Trichlorophenol | |
| Thallium selenite | 1000 (454) | 2,4,5-Trichlorophenol | |
| Thallium(I) sulfate | 100 (45.4) | 2,4,6-Trichlorophenol | |
| Thioacetamide | 10 (4.54) | 3,4,5-Trichlorophenol | |
| Thiodiphosphoric acid, tetraethyl ester | 100 (45.4) | 2,4,5-Trichlorophenol | 10 (4.54) |
| Thiofanox | 100 (45.4) | 2,4,6-Trichlorophenol | 10 (4.54) |
| Thioimidodicarbonic diamide [(H2N)C(S)]2NH | 100 (45.4) | Triethanolamine dodecylbenzene sulfonate | 1000 (45.4) |
| Thiomethanol | 100 (45.4) | Triethylamine | 5000 (2270) |
| Thioperoxydicarbonic diamide [(H2N)C(S)]2S2, tetramethyl- | 10 (4.54) | Trifluralin | 10 (4.54) |
| Thiophenol | 100 (45.4) | Trimethylamine | 100 (45.4) |
| Thiosemicarbazide | 100 (45.4) | 2,2,4-Trimethylpentane | 1000 (454) |
| Thiourea | 10 (4.54) | 1,3,5-Trinitrobenzene | 10 (4.54) |
| Thiourea, (2-chlorophenyl)- | 100 (45.4) | 1,3,5-Trioxane, 2,4,6-trimethyl- | 1000 (45.4) |
| Thiourea, 1-naphthalenyl- | 100 (45.4) | Tris(2,3-dibromopropyl) phosphate | 10 (4.54) |
| Thiourea, phenyl- | 100 (45.4) | Trypan blue | 10 (4.54) |
| Thiram | 10 (4.54) | Uracil mustard | 10 (4.54) |
| Titanium tetrachloride | 1000 (454) | Uranyl acetate | 100 (45.4) |
| Toluene | 1000 (454) | Uranyl nitrate | 100 (45.4) |
| Toluenediamine | 10 (4.54) | Urea, N-ethyl-N-nitroso- | 1 (0.454) |

| | Reportable | | Reportable |
|---|---------------|---|---------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| Urea, N-methyl-N-nitroso- | 1 (0.454) | Zinc cyanide Zn(CN) ₂ | 10 (4.54) |
| Vanadic acid, ammonium salt | 1000 (454) | Zinc fluoride | 1000 (454) |
| Vanadium oxide V2O5 | 1000 (454) | Zinc formate | 1000 (454) |
| Vanadium pentoxide | 1000 (454) | Zinc hydrosulfite | 1000 (454) |
| Vanadyl sulfate | 1000 (454) | Zinc nitrate | 1000 (454) |
| Vinyl acetate | 5000 (2270) | Zinc phenolsulfonate | 5000 (2270) |
| Vinyl acetate monomer | 5000 (2270) | Zinc phosphide | 100 (45.4) |
| Vinylamine, N-methyl-N-nitroso- | 10 (4.54) | Zinc phosphide Zn ₃ P ₂ , when present at concentrations greater than 10% | 100 (45.4) |
| Vinyl bromide | 100 (45.4) | Zinc silicofluoride | 5000 (2270) |
| Vinyl chloride | 1 (0.454) | Zinc sulfate | 1000 (454) |
| Vinylidene chloride | 100 (45.4) | Zirconium nitrate | 5000 (2270) |
| Warfarin, & salts, when present at concentrations greater than 0.3% | 100 (45.4) | Zirconium potassium fluoride | 1000 (454) |
| Xylene | 100 (45.4) | Zirconium sulfate | 5000 (2270) |
| m-Xylene | 1000 (454) | Zirconium tetrachloride | 5000 (2270) |
| o-Xylene | 1000 (454) | D001 Unlisted Hazardous Wastes Characteristic of Ignitability | 100 (45.4) |
| p-Xylene | 100 (45.4) | D002 Unlisted Hazardous Wastes Characteristic of Corrosivity | 100 (45.4) |
| Xylene (mixed) | 100 (45.4) | D003 Unlisted Hazardous Wastes Characteristic of Reactivity | 100 (45.4) |
| Xylenes (isomers and mixture) | 100 (45.4) | D004 - D043 Specific Hazardous Wastes with Toxicity Characteristics | |
| Xylenol | 1000 (454) | D004 Arsenic | 1 (0.454) |
| Yohimban-16-carboxylic acid, 11, 17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl) oxy]-, methyl ester(3beta, 16beta, 17alpha, 18beta, 20alpha)- | 5000 (2270) | D005 Barium | 1000 (454) |
| Zinc + | 1000 (454) | D006 Cadmium | 10 (4.54) |
| Zinc acetate | 1000 (454) | D007 Chromium | 10 (4.54) |
| Zinc ammonium chloride | 1000 (454) | D008 Lead | 10 (4.54) |
| Zinc borate | 1000 (454) | D009 Mercury | 1 (0.454) |
| Zinc bromide | 1000 (454) | D010 Selenium | 10 (4.54) |
| Zinc carbonate | 1000 (454) | D011 Silver | 1 (0.454) |
| Zinc chloride | 1000 (454) | D012 Endrin | 1 (0.454) |
| Zinc cyanide | 10 (4.54) | D013 Lindane | 1 (0.454) |
| | | D014 Methoxychlor | 1 (0.454) |

| | Reportable | | Reportable |
|---------------------------------|---------------|--|---------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| D015 Toxaphene | 1 (0.454) | D035 Methyl ethyl ketone | 5000 (2270) |
| D016 2,4-D | 100 (45.4) | D036 Nitrobenzene | 1000 (454) |
| D017 2,4,5-TP (Silvex) | 100 (45.4) | D037 Pentachlorophenol | 10 (4.54) |
| D018 Benzene | 10 (4.54) | D038 Pyridine | 1000 (454) |
| D019 Carbon tetrachloride | 10 (4.54) | D039 Tetrachloroethylene | 100 (45.4) |
| D020 Chlordane | 1 (0.454) | D040 Trichloroethylene | 100 (45.4) |
| D021 Chlorobenzene | 100 (45.4) | D041 2,4,5-Trichlorophenol | 10 (4.54) |
| D022 Chloroform | 10 (4.54) | D042 2,4,6-Trichlorophenol | 10 (4.54) |
| D023 o-Cresol | 100 (45.4) | D043 Vinyl chloride | 1 (0.454) |
| D024 m-Cresol | 100 (45.4) | F001 | 10 (4.54) |
| D025 p-Cresol | 100 (45.4) | The following spent halogenated solvents used in degreasing; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more, (by volume) of one or more of the below listed halogenated solvents or those solvents listed in F002, F004 and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | |
| D026 Cresol | 100 (45.4) | (a) Tetrachloroethylene | 100 (45.4) |
| D027 1,4-Dichlorobenzene | 100 (45.4) | (b) Trichloroethylene | 100 (45.4) |
| D028 1,2-Dichloroethane | 100 (45.4) | (c) Methylene chloride | 1000 (454) |
| D029 1,1-Dichloroethylene | 100 (45.4) | (d) 1,1,1-Trichloroethane | 1000 (454) |
| D030 2,4-Dinitrotoluene | 10 (4.54) | (e) Carbon tetrachloride | 10 (45.4) |
| D031 Heptachlor (and hydroxide) | 1 (0.454) | (f) Chlorinated fluorocarbons | 5000 (2270) |
| D032 Hexachlorobenzene | 10 (4.54) | F002 | 10 (45.4) |
| D033 Hexachlorobutadiene | 1 (0.454) | The following spent halogenated solvents; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the below listed halogenated solvents or those listed in F001, F004, F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures. | |
| D034 Hexachloroethane | 100 (45.4) | (a) Tetrachloroethylene | 100 (45.4) |

| | Reportable | | Reportable |
|--|---------------|---|---------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| (b) Methylene chloride | 1000 (454) | F004 | 100 (45.4) |
| (c) Trichloroethylene | 100 (45.4) | The following spent non-halogenated solvents and the stillbottoms from the recovery of these solvents | |
| (d) 1,1,1-Trichloroethane | 1000 (454) | (a) Cresols/Cresylic acid | 1000 (454) |
| (e) Chlorobenzene | 100 (45.4) | (b) Nitrobenzene | 100 (45.4) |
| (f) 1,1,2-Trichloro-1,2,2-trifluoroethane | 5000 (2270) | F005 | 100 (45.4) |
| (g) o-Dichlorobenzene | 100 (45.4) | The following spent non-halogenated solvents and the stillbottoms from the recovery of these solvents: | |
| (h) Trichlorofluoromethane | 5000 (2270) | (a) Toluene | 1000 (454) |
| (i) 1,1,2 Trichloroethane | 100 (45.4) | (b) Methyl ethyl ketone | 5000 (2270) |
| F003 | 100 (45.4) | (c) Carbon disulfide | 100 (45.4) |
| The following spent non-halogenated solvents and solvents: | | (d) Isobutanol | 5000 (2270) |
| (a) Xylene | 1000 (454) | (e) Pyridine | 1000 (454) |
| (b) Acetone | 5000 (2270) | F006 | 10 (4.54) |
| (c) Ethyl acetate | 5000 (2270) | Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum,(2) tin plating on carbon steel, (3) zinc plating (segregated basis) on carbonsteel, (4) aluminum or zinc-aluminum plating on carbon steel, (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel, and (6) chemical etching and milling of aluminum. | |
| (d) Ethylbenzene | 1000 (454) | F007 | 10 (4.54) |
| (e) Ethyl ether | 100 (45.4) | Spent cyanide plating bath solutions from electroplating operations. | |
| (f) Methyl isobutyl ketone | 5000 (2270) | F008 | 10 (4.54) |
| (g) n-Butyl alcohol | 5000 (2270) | Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process. | |
| (h) Cyclohexanone | 5000 (2270) | | |
| (i) Methanol | 5000 (2270) | | |

| | Reportable | | Reportable |
|---|---------------|--|---------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| F009 | 10 (4.54) | F020 | 1 (0.454) |
| Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process. | | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5,- trichlorophenol. | |
| F010 | 10 (4.54) | F021 | 1 (0.454) |
| Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process. | | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives. | |
| F011 | 10 (4.54) | F022 | 1 (0.454) |
| Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations (except for precious metals heat treating spent cyanide solutions from salt bath pot cleaning). | | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions | |
| F012 | 10 (4.54) | F023 | 1 (0.454) |
| Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process. | | Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-trichlorophenol.) | |
| F019 | 10 (4.54) | F024 | 1 (0.454) |
| Wastewater treatment sludges from the chemical conversion coating of aluminum-- except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process. | | Wastes, including but not limited to distillation residues, heavy ends, tars, and reactor cleanout wastes, from the production of chlorinated aliphatic hydrocarbons, having carbon content from one to five, utilizing free radical catalyzed processes. (This listing does not include light ends, spent filters and filter aids, spent dessicants(sic), wastewater, wastewater treatment sludges, spent catalysts, and wastes listed in 40 CFR 261.32.). | |

| | Reportable | | Reportable |
|--|----------------------|--|----------------------|
| Hazardous Substance | Quantity (RQ) | Hazardous Substance | Quantity (RQ) |
| | Pounds | | Pounds |
| | (Kilograms) | | (Kilograms) |
| F025 | 1 (0.454) | F028 | 1 (0.454) |
| Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic with varying amounts and positions of with varying amounts and positions of chlorine substitution. | | Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027. | |
| F026 | 1 (0.454) | F032 | 1 (0.454) |
| Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions. | | F034 | 1 (0.454) |
| F027 | 1 (0.454) | F035 | 1 (0.454) |
| Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5-trichlorophenol as the sole component.). | | F037 | 1 (0.454) |
| | | F038 | 1 (0.454) |
| | | F039 | 1 (0.454) |
| Footnotes: | | | |
| + The RQ for these hazardous substances is limited to those pieces of metal having a diameter smaller than 100 micrometer (0.004 inches) | | | |
| ++ The RQ for asbestos is limited to friable forms only | | | |
| * Indicates that the name was added by DOT because (1) the name is a synonym for a specific hazardous substance for a specific hazardous substance and (2) the name appears in the Hazardous Materials Table as a proper shipping name. | | | |

Attachment 5**★ CLASS 1--EXPLOSIVES AND AMMUNITION**

A5.1. General Requirements. This attachment contains information concerning packaging and general handling instructions for Class 1 material.

A5.2. General Handling Instructions. Class 1 materials can function by detonation or combustion. Store away from fire hazards and handle carefully. Do not drop. Handle dropped Class 1 material according to A3.3.1.1.

A5.2.1. Instructions applicable to all DoD explosives.

- Comply with the requirements in A3.3.1 for forbidden material, DoD explosive classification and safety requirements.
- Package explosives according to applicable Special Packaging Instruction (SPI), technical manual, drawings, or other Service approved directives.

A5.2.2. Chemical Munitions. Chemical munitions are dangerous materials that are found in a variety of forms such as artillery shells, mortar shells, spray tanks, aircraft bombs, grenades, candles, rockets, and containers of chemical agents that are not high explosives or shrapnel. Chemical munitions are filled with war gases, smoke, or incendiaries. They are divided into four groups, according to the nature of fillings. These groupings are described in the service regulations referenced in A3.3.1.3.

A5.2.2.1. Handling Chemical Ammunitions. Use maximum preferential handling. Use the same materials handling equipment for high explosive munitions that is used for chemical munitions.

A5.2.2.2. Reporting and Disposing of Chemical Ammunitions. Immediately report any leaking chemical munitions to the agency initiating the shipment. If the leak is due to causes other than faulty munitions construction, report according to 1.9. Dispose of leaking or damaged chemical munitions according to applicable service directives. The report should include the following:

- Type and amount of chemical munitions.
- Lot number.
- Date discovered.
- Detailed information concerning the nature and possible cause of leak.
- Disposition or recommendation for disposition.

A5.3. Installed Explosive Devices. Remove installed explosive devices from aircraft systems before shipment by military cargo aircraft unless a technical directive authorizes installation for military air shipment or the directive identifies the explosives are permanently imbedded in the system. When installation is authorized, ensure compliance with the following requirements:

- The safety devices are in place and secured to the maximum extent possible (including blocking or banding when advantageous) to prevent arming.
- The aircraft system's packaging provides reasonable security against tampering with the installed explosive items or the arming systems.
- Mark items according to Attachment 14, paragraph A14.4.1.
- The shipping documentation properly identifies the explosive nature of the shipment to include the proper hazard classification for each configured item. The Shipper's Declaration will identify the article's overall description as the proper shipping name (i.e., Engine, Internal Combustion for an aircraft containing the engine). Identify all installed explosive components as secondary hazards in Key 19. Reference this paragraph on the Shipper's Declaration rather than the specific paragraphs for the individual installed devices.

A5.4. Unpackaged Explosives. Unless otherwise authorized in this manual, package all explosives according to Attachment 5. Explosive may be removed from their required packaging to meet operational requirements of Chapter 3 under the following:

A5.4.1. Airdrop parachute platforms configured according to TO 13C7/FM 10-500 series publications.

A5.4.2. Stored in approved racks or containers, or secured in tactical equipment or vehicles as operational components according to technical orders or publications.

A5.5. Captured Ammunition and Ammunition With Unknown Characteristics. Transport this ammunition on military aircraft only under the following provisions:

- Explosive ordinance disposal (EOD) personnel must inspect the items and complete necessary action to make them safe for air shipment, and sign a certificate to this effect.
- Qualified personnel assign a hazard classification. Pack and mark according to the prescribed packaging in table A4.1, including UN performance specification packaging requirements.

A5.6. Items requiring Special Approval. Ship according to a Special Approval (includes CAA or COE) issued for the particular item. See paragraphs 2.5 and 2.6 for more information on CAAs and COEs. Comply with the following handling instructions only when shipping items containing a fuel that is corrosive or toxic.

A5.6.1. Handling Instructions. Exercise extreme caution in handling this item. Keep well ventilated, away from sparks, fire hazards, and oxidizing materials. Vapors are toxic when inhaled. Liquid is corrosive. Fuel in presence of an oxidizer is self-igniting and highly reactive. Personnel exposed to this material must wear protective clothing, gloves, safety goggles, and must use a positive pressure breathing apparatus.

A5.6.2. Shipping Requirements. The following requirements apply:

- Load containers having an installed indicator in such a manner as to provide access to the indicator during flight. Inspect the indicator before aircraft loading, after aircraft loading, at cruise altitude, periodically during flight as cargo tiedown is inspected, and after landing. The normal color of the indicator is white or off-white. The color will change to yellow if inhibited red fuming nitric acid (IRFNA) leak occurs. The color will change to black if an amine fuel mixture (AFM) leak occurs. Changes will be obvious and will not require technical escort personnel to monitor.
- Containers that do not have an indicator installed must be preplanned under the same conditions as described in 2.9. The shipper must contact the carrier no less than 72 hours before movement. The shipper must also furnish the following:
- Protective clothing, gloves, and a positive pressure breathing apparatus for all personnel aboard the aircraft (see also paragraph 1.12).
- Fume-detecting equipment.
- A qualified technical escort or courier with equipment to monitor the item for leaks and is prepared to take emergency in-flight action.

A5.6.3. When a leak is detected, either by observation of the indicator or by monitoring equipment:

- Get personnel out of the cargo compartment.
- Alert pilot and crew.
- Depressurize cargo compartment and ventilate as soon as possible.
- All personnel should go on 100 percent oxygen.
- Declare an in-flight emergency.
- Be prepared to jettison cargo if possible.
- Descend and land as soon as possible.
- Aircraft must be parked in an isolated area.
- Aircraft must be unloaded by EOD personnel as soon as possible.

A5.7. Barium Azide; Barium Styphnate; Diazodinitrophenol, Wetted; Guanyl Nitrosaminoguanilydene Hydrazine, Wetted; Guanyl Nitrosaminoguanilyltetrazene, Wetted; Tetrazene, Wetted; Lead Azide, Wetted; Lead Mononitroresorcinate; Lead Styphnate, Wetted; Lead Trinitroresorcinate, Wetted; and Mercury Fulminate, Wetted.

A5.7.1. Fill the intermediate and outer packagings with an appropriate water-saturated material. The outer drum must have a watertight seal (except UN0224 when shipped dry). Package as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|---|---|--|
| Bags: plastic textile, plastic coated or lined rubber textile, or rubberized textile | Bags: plastic textile, plastic coated or lined rubber textile, or rubberized textile bag Receptacles: plastic or metal | Drums: removable head steel (1A2) or removable head plastic (1H2) |

A5.7.2. Inner packagings must not contain more than 50 g of explosive substance (quantity corresponding to dry substance); separate inner packagings from each other with dividing partitions; and do not partition within the outer packaging with more than 25 compartments. Package as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|---|---|---|
| Bags: conductive rubber or plastic Receptacles: conductive rubber or plastic, metal, or wood | Dividing partitions: metal, wood, plastic, or fiberboard | Boxes: natural wood, sift-proof wall (4C2), plywood (4D), or reconstituted wood (4F) |

A5.8. Powder Cake or Powder Paste, Wetted; or Nitrocellulose Plasticized. Inner packagings are not required for UN0159 when metal (1A2 or 1B2) or plastic (1H2) drums are used as the outer packaging.

A5.8.1. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: waterproof paper, plastic, or rubberized textile Sheets: plastic or rubberized textile | Boxes: steel (4A), aluminum (4B), fiberboard (4G), ordinary wood (4C1), natural sift-proof wood (4C2), plywood (4D), reconstituted wood (4F), expanded plastic (4H1), or solid plastic (4H2) |

A5.8.2. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: waterproof paper, plastic, or rubberized textile Sheets: plastic or rubberized textile | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), plywood (1D), or fiberboard (1G) |

A5.9. Ammonium Picrate; Cyclotetramethylenetetranitramine, HMX, or Octogen Wetted; Cyclotrimethylenetrinitramine and Octogen, Mixtures, Wetted or Desensitized; Cyclotrimethylenetrinitramine, Cyclonite, Hexogen, or RDX Wetted; Cyclotrimethylenetrinitramine and Cyclotetramethylenetetranitramine, Mixtures, Wetted or Desensitized; Cyclotrimethylenetrinitramine and HMX Mixtures, Wetted or Desensitized; Dinitrophenol; Dinitroresorcinol; Dipicryl Sulfide; Hexolite or Hexotol; Hexotonal; Mannitol Hexanitate or Nitromannite, Wetted; Nitrocellulose; Nitrostarch; Nitro Urea; Nitroguanidine or Picrite Trinitrophenol or Picric Acid; Octolite or Octol; Pentolite; Pentaerythrite Tetranitrate or Pentaerythritol Tetranitrate or PETN, Wetted; or Pentaerythrite Tetranitrate or Pentaerythritol Tetranitrate or PETN, Desensitized; RDX and Cyclotetramethylenetetranitramine, Wetted or Desensitized; Trinitrobenzene; Trinitrobenzoic Acid; Trinitroresorcinol or Styphnic Acid; Trinitroresorcinol, Wetted; Trinitrotoluene or TNT Tritonal; RDX and HMX Mixtures, Wetted or Desensitized Urea Nitrate. Packaging must be lead free for UN 0004, 0076, 0078, 0154, 0216, 0219, 0386, and 0394.

A5.9.1. Package wetted solids as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|---|--|--|
| Bags: multiwall water resistant paper, plastic, textile, rubberized textile, woven plastic Receptacles: metal or plastic | Bags: plastics, plastic coated or lined textile Receptacles: metal or plastic Not required for UN0072 and UN0226 | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), expanded plastic (4H1), solid plastic (4H2) |

A5.9.2. Package wetted solids as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|---|--|---|
| Bags: multiwall water resistant paper, plastic, textile, rubberized textile, woven plastic Receptacles: metal or plastic | Bags: plastics, plastic coated or lined textile Receptacles: metal or plastic Not required for UN0072 and UN 00226 or if leakproof drums are used as outer packaging | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), fiber (1G) |

A5.9.3. Package dry solids other than powders as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|--|--|---|
| Bags: Kraft paper, multiwall water resistant paper, plastic, textile, rubberized plastic textile, woven plastic Not required for UN0222 and UN0223 | Bags (required for UN 0150 only): plastics, plastic coated or lined textile | Bags: sift-proof woven plastic (5H2/3), plastic film (5H4), sift-proof textile (5L2), water resistant textile (5L3), multiwall water resistant paper (5M2) |

A5.9.4. Package dry solids other than powders as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|--|--|--|
| Bags: Kraft paper, multiwall water resistant paper, plastic, textile, rubberized plastic textile, woven plastic Not required for UN0222 and UN0223 | Bags (required for UN 0150 only): plastics, plastic coated or lined textile | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), expanded plastic (4H1), solid plastic (4H2) |

A5.9.5. Package dry solids other than powders as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|--|--|---|
| Bags: Kraft paper, multiwall water resistant paper, plastic, textile, rubberized plastic textile, woven plastic Not required for UN0222 and UN0223 | Bags (required for UN 0150 only): plastics, plastic coated or lined textile | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2) |

A5.9.6. Package solid dry powders as follows (at least one of the packagings must be sift-proof):

| Inner packaging | Intermediate packaging | Outer packaging |
|--|--|---|
| Bags: multiwall water resistant paper, plastic, woven plastic Receptacles: fiberboard, metal, plastic, wood | Bags: multiwall water resistant paper with inner lining plastic Receptacles: metal or plastic | Boxes: steel (4A), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastic (4H2) |

A5.9.7. Package solid dry powders as follows (at least one of the packagings must be sift-proof):

| Inner packaging | Intermediate packaging | Outer packaging |
|-----------------|--|---|
| Not required | Bags: multiwall water resistant paper with inner lining plastic Receptacles: metal or plastic | Drums: removable head steel (1A2), removable head aluminum (1B2), fiber (1G) |

A5.10. Ammonium Nitrate; Ammonium Perchlorate; Cyclotetramethylenetetranitramine, Octogen, or HMX Desensitized; Cyclotrimethylenetrinitramine, Cyclonite, Hexogen, or RDX Desensitized; Dinitroglucouril or Dingu; Octonal; Tetranitroaniline; Trinitro-Meta-Cresol; Trinitroaniline or Picramide; Trinitroanisole; Trinitrobenzenesulfonic Acid; Trinitrochlorobenzene or Picryl Chloride; Trinitrofluorenone; Trinitronaphthalene; Trinitrophenetole; Trinitrotoluene and Trinitrobenzene Mixtures or TNT and Trinitrobenzene Mixtures or TNT and Hexanitrostilbene Mixtures or Trinitrotoluene and Hexanitrostilbene Mixtures; Trinitrotoluene Mixtures Containing Trinitrobenzene and Hexanitrostilbene or TNT Mixtures containing Trinitrobenzene and Hexanitrostilbene. Packaging must be lead free for UN 0004, 0076, 0078, 0154, 0216, 0219, and 0386.

A5.10.1. Package dry solids other than powders as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|--|--|---|
| Bags: Kraft paper, multiwall water resistant paper, plastic, textile, rubberized plastic textile, woven plastic Not required for UN0222 and UN0223 | Bags (required for UN 0150 only): plastics, plastic coated or lined textile | Bags: sift-proof woven plastic (5H2/3), plastic film (5H4), sift-proof textile (5L2), water resistant textile (5L3), multiwall water resistant paper (5M2) |

A5.10.2. Package dry solids other than powders as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|--|--|--|
| Bags: Kraft paper, multiwall water resistant paper, plastic, textile, rubberized plastic textile, woven plastic Not required for UN0222 and UN0223 | Bags (required for UN 0150 only): plastics, plastic coated or lined textile | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), expanded plastic (4H1), solid plastic (4H2) |

A5.10.3. Package dry solids other than powders as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|--|--|---|
| Bags: Kraft paper, multiwall water resistant paper, plastic, textile, rubberized plastic textile, woven plastic Not required for UN0222 and UN0223 | Bags (required for UN 0150 only): plastics, plastic coated or lined textile | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2) |

A5.10.4. Package solid dry powders as follows (at least one of the packagings must be sift-proof):

| Inner packaging | Intermediate packaging | Outer packaging |
|--|--|---|
| Bags: multiwall water resistant paper, plastic, woven plastic Receptacles: fiberboard, metal, plastic, wood | Bags: multiwall water resistant paper with inner lining plastic Receptacles: metal or plastic | Boxes: steel (4A), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastic (4H2) |

A5.10.5. Package solid dry powders as follows (at least one of the packagings must be sift-proof):

| Inner packaging | Intermediate packaging | Outer packaging |
|-----------------|--|---|
| Not required | Bags: multiwall water resistant paper with inner lining plastic Receptacles: metal or plastic | Drums: removable head steel (1A2), removable head aluminum (1B2), fiber (1G) |

A5.11. Black Powder or Gunpowder; Black Powder, Compressed or Gunpowder, Compressed; Black Powder, in Pellets or Gunpowder, in Pellets, Flash Powder. At least one of the packagings must be sift-proof. Do not package more than 50 g (1.8 oz) of flash powder (UN0094 or UN0305) in each inner packaging.

A5.11.1. Package as follows:

| Inner packaging | Outer packaging |
|--|---|
| Bags: paper, plastic, or rubberized textile Receptacles: fiberboard, metal, plastic, wood Sheets: Kraft paper or waxed paper (only authorized for UN0028) | Boxes: steel (4A), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastic (4H2) |

A5.11.2. Package as follows:

| Inner packaging | Outer packaging |
|---|--|
| Bags: paper, plastic, or rubberized textile Receptacles: fiberboard, metal, plastic, wood Sheets: Kraft paper or waxed paper (only authorized for UN0028) Inner packaging not required for UN0027 | Drums: removable head steel (1A2), removable head aluminum (1B2), fiber (1G) Inner packaging not required for UN0027 |

A5.12. Deflagrating Metal Salts of Aromatic Nitroderivatives, N.O.S.; Dinitrophenolates; Dinitrosobenzene; Nitrocellulose, Wetted; 5-Mercaptotetrazol-1-Acetic Acid; Tetrazol-1-Acetic Acid; Powder, Smokeless; Propellant, Solid; Sodium Dinitro-O-Cresolate; Sodium Picramate; and Zirconium Picramate. Packagings must be lead free for UN0077, 0132, 0234, 0235 and 0236. Use paragraph A5.12.1 or A5.12.2 for UN0342. Use paragraph A5.12.3 or A5.12.4 for UN0132, 0160, UN0161, 0406, 0497, 0448, 0498, and 0499.

A5.12.1. Package wetted solids as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|--|---|---|
| Bags: plastic, textile, woven plastic Receptacles: metal or plastic | Bags: plastic, plastic coated or lined textile Receptacles: metal or plastic | Boxes: steel (4A), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastic (4H2) |

A5.12.2. Package wetted solids as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|--|--|---|
| Bags: plastic, textile, woven plastic Receptacles: metal or plastic Not required for UN0342 when packed in outer 1A2, 1B2, or 1H2 drum | Bags: plastic, plastic coated or lined textile Receptacles: metal or plastic Not required if packed in outer leakproof removable head drum | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), plywood (1D), fiber (1G) |

A5.12.3. Package dry solids as follows:

| Inner packaging | Outer packaging |
|---|--|
| Bags: Kraft paper, plastic, sift-proof woven plastic or textile Receptacles: fiberboard, metal, paper, plastic | Boxes: ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G) |

A5.12.4. Package dry solids as follows:

| Inner packaging | Outer packaging |
|---|--|
| <p>Bags: Kraft paper, plastic, sift-proof woven plastic or textile</p> <p>Receptacles: fiberboard, metal, paper, plastic</p> <p>Not required for UN0160 and 0161 when packed in outer 1A2 or 1B2 drum</p> | <p>Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), plywood (1D), fiber (1G)</p> <p>For UN0160 and 0161, 1A2 and 1B2 drums must be constructed so that risk of explosion caused by increased internal pressure (from internal or external causes) is prevented</p> |

A5.13. Nitroglycerin, Desensitized; Nitroglycerin, Solution in Alcohol; and Propellant, Liquid. For liquid explosives, surround each inner packaging with sufficient amount of non-combustible absorbent cushioning material to absorb the entire contents. Cushion metal receptacles from each other in all directions. Liquid substances must not freeze at temperatures above 15 degrees C (5 degrees F). A composite packaging consisting of a plastic receptacle in a metal drum (6HA1) may be used instead of the inner and intermediate packagings.

A5.13.1. Packages as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|---|--|---|
| <p>Receptacles: metal or plastic</p> <p>Tape screw cap closures and do not exceed 5 liters capacity each (does not apply to UN 0144)</p> | <p>Bags: plastic in metal receptacles</p> <p>Drums: metal</p> <p>Not required for UN0144</p> | <p>Boxes: ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G)</p> <p>Maximum net mass 30 kg</p> |

A5.13.2. Packages as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|---|--|---|
| <p>Receptacles: metal or plastic</p> | <p>Bags: plastic in metal receptacles</p> <p>Drums: metal</p> <p>Not required for UN0144</p> | <p>Drums: removable head steel (1A2), removable head aluminum (1B2), plywood (1D), fiber (1G)</p> <p>Maximum net volume 120 liters</p> |

A5.14. Ammonium Nitrate-Fuel Oil Mixture; Explosive, Blasting, Type A (UN 0081); Explosive, Blasting, Type B (UN 0082); and Explosive, Blasting, Type E (UN 0241); Explosive, Blasting, Type B (UN 0331) or Agent Blasting, Type B; Explosive, Blasting, Type C (UN 0083); Explosive, Blasting, Type D (UN 0084) and Explosive, Blasting, Type E (UN 0332). Inner packaging is not required for UN 0082, 0241, 0331, and 0332 when the explosive is contained in a material impervious to liquid.

A5.14.1. Package as follows:

| Inner packaging | Outer packaging |
|---|--|
| Bags: water and oil resistant paper, plastic, plastic coated or lined textile, sift-proof woven plastic Receptacles: water resistant fiberboard, metal, plastic, sift-proof wood Sheets: water resistant paper, waxed paper, plastic | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastic (4H2) |

A5.14.2. Package as follows:

| Inner packaging | Outer packaging |
|--|---|
| Bags: water and oil resistant paper, plastic, plastic coated or lined textile, sift-proof woven plastic Receptacles: water resistant fiberboard, metal, plastic, sift-proof wood Sheets: water resistant paper, waxed paper, plastic Not required for UN 0082, 0241, 0331, and 0332 if outer drum is leakproof | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2) |

A5.14.3. Package as follows:

| Inner packaging | Outer packaging |
|---|--|
| Bags: water and oil resistant paper, plastic, plastic coated or lined textile, sift-proof woven plastic Receptacles: water resistant fiberboard, metal, plastic, sift-proof wood Sheets: water resistant paper, waxed paper, plastic | Jerricans: removable head steel (3A2), removable head plastic (3H2) |

A5.14.4. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: water and oil resistant paper, plastic, plastic coated or lined textile, sift-proof woven plastic Receptacles: water resistant fiberboard, metal, plastic, sift-proof wood Sheets: water resistant paper, waxed paper, plastic Not required for UN 0331 when 5H2, 5H3 or 5H4 bags are outer packaging | Bags: woven plastic (5H1/2/3), multiwall water resistant paper (5M2), plastic film (5H4), sift-proof textile (5L2), water resistant textile (5L3) 5H2 or 5H3 bags only authorized for UN 0082, 0241, 0331, and 0332 Do not use for UN 0081 |

A5.15. Ammunition, Illuminating; Ammunition, Incendiary; Ammunition, Incendiary, White Phosphorus; Ammunition, Practice; Ammunition, Proof; Ammunition, Smoke; Ammunition, Smoke, White Phosphorus; Ammunition, Tear-Producing; Bombs; Bombs, Photo-Flash; Cartridges, Demolition; Cartridges, Depth; Cartridges for Weapons; Cartridges for Weapons, Blank; Cartridges for Weapons, Inert Projectile; Cartridges, Small Arms; Cartridges, Small Arms, Blank; Charges, Bursting, Plastic Bonded; Charges, Propelling for Cannon; Mines;

Projectiles; Rocket Motors; Rockets; Rockets, Line-Throwing; Torpedoes; Warheads, Rocket; and Warheads, Torpedo.

A5.15.1. Package as follows:

| Inner packaging | Outer packaging |
|-----------------|--|
| Not required | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), expanded plastic (4H1), solid plastic (4H2) |

A5.15.2. Package as follows:

| Inner packaging | Outer packaging |
|-----------------|---|
| Not required | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), fiber (1G) |

A5.15.3. Package as follows:

Large and robust articles without their means of initiation, or with their means of initiation containing at least two effective protective features, may be carried unpacked if secured to pallets or other suitable handling device, securely blocked and braced, or crated.

A5.16. Detonators, Electric: Inner packaging is not required when detonators are packed in pasteboard tubes, or when their leg wires are wound on spools with the caps either placed inside the spool or securely taped to the wire on the spool restricting movement of the caps and protecting from impact.

A5.16.1. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: paper, plastic Receptacles: fiberboard, metal, plastic Reels | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G) |

A5.16.2. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: paper, plastic Receptacles: fiberboard, metal, plastic Reels | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), fiber (1G) |

A5.17. Detonators, Non-electric and Detonator Assemblies, Non-electric: For detonators assemblies (UN 0360, 0361, 0500), detonators are not required to be attached to the safety fuse, metalclad mild detonating cord, detonating cord, or shock tube. Inner packaging is not required if the packing configuration restricts free movement of the caps and protects them from impact forces. For UN 0029, 0267, and 0455, bags and reels may not be used as inner packaging.

A5.17.1. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: paper, plastic Receptacles: fiberboard, metal, plastic Reels | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G) |

A5.17.2. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: paper, plastic Receptacles: fiberboard, metal, plastic Reels | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), fiber (1G) |

A5.18. Boosters and Charges, Supplementary Explosive.

A5.18.1. Package as follows:

| Inner packaging | Outer packaging |
|-----------------|--|
| Not required | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastic (4H2) |

A5.18.2. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Receptacles: fiberboard, metal, plastic Sheets: paper, plastic | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastics (4H2) |

A5.19. Boosters with Detonator; Bursters; Detonators for Ammunition; Grenades, Empty Primed; Primers, Cap Type; Primers, Tubular; and Tracers for Ammunition. Package as follows:

| Inner packaging | Intermediate packaging | Outer packaging |
|---|--|---|
| Receptacles: fiberboard, metal, plastic, wood Trays (fitted with dividing partitions): fiberboard, plastics, wood. Do not use trays for UN 0043, 0212, 0225, 0268 or 0306. | Receptacles: fiberboard, metal, plastic, wood. Intermediate packaging only required when trays are used as inner packaging. | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastics (4H2) |

A5.20. Cutters, Cable, Explosive; Cartridges, Power Device; Cartridges, Oil Well; Fracturing Devices, Explosive; Release Devices, Explosive; Rivets, Explosive; and Sounding Devices, Explosive.

A5.20.1. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: water resistant material Receptacles: fiberboard, metal, plastic, wood Sheets: fiberboard corrugated Tubes: fiberboard | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastics |

A5.20.2. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: water resistant material Receptacles: fiberboard, metal, plastic, wood Sheets: fiberboard corrugated Tubes: fiberboard | Drums: removable head steel (1A2), removable head aluminum (1B2) |

A5.21. Articles, Pyrotechnic; Cartridges, Flash; Cartridges, Signal; Fireworks; Flares, Aerial; Flares, Surface; Signal Devices, Hand; Signals, Distress; Signals, Smoke; and Signals, Railway Track, Explosive.

A5.21.1. Package as follows:

| Inner packaging | Outer packaging |
|--|---|
| Bags: paper, plastic Receptacles: fiberboard, metal, plastic, wood Sheets: paper, plastic | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastics (4H2) |

A5.21.2. Package as follows:

| Inner packaging | Outer packaging |
|--|---|
| Bags: paper, plastic Receptacles: fiberboard, metal, plastic, wood Sheets: paper, plastic | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), fiber (1G) |

A5.22. Cases, Cartridge, Empty with Primer and Cases, Combustible, Empty, without Primer.

A5.22.1. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: plastic, textile Boxes: fiberboard, plastic, wood Dividing partitions within outer packaging | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastics (4H2) |

A5.22.2. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: plastic, textile Boxes: fiberboard, plastic, wood Dividing partitions within outer packaging | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), fiber (1G) |

A5.23. Charges, Shaped or Explosive, Commercial. For UN0059, 0439, 0440, and 0441, when shaped charges are packed singly, the conical cavity must face downwards and the package marked "THIS END UP". When shaped charges are packed in pairs, the conical cavities must face inwards. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: plastic Boxes: fiberboard Tubes: fiberboard, metal, plastic Dividing partitions within outer packaging | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G) |

A5.24. Charges, Shaped, Flexible, Linear.

A5.24.1. Package as follows:

| Inner packaging | Outer packaging |
|---|--|
| Bags: plastic If ends of articles are sealed, inner packaging is not required | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastic (4H2) |

A5.24.2. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: plastic If ends of articles are sealed, inner packaging is not required | Drums: removable head steel (1A2) removable head aluminum (1B2) |

A5.25. Cord or Fuse, Detonating; Cord or Fuse, Detonating Mild Effect. Seal and tie securely the ends of the detonating cord. Inner packaging is not required for UN 0065 and 0289 when securely fastened in coils.

A5.25.1. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: plastic Receptacles: fiberboard, metal, plastic, wood Sheets: paper, plastic Reels | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastics (4H2) |

A5.25.2. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: plastic Receptacles: fiberboard, metal, plastic, wood Sheets: paper, plastic Reels | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), plywood (1D), fiber (1G) |

A5.26. Cord, Igniter; Fuse, Igniter; Fuse, Non-detonating; or Fuse, Safety. For UN 0101, do not use steel or aluminum packaging and the packaging must be sift-proof unless the fuse is covered by a paper tube and both ends of tube are covered with removable caps.

A5.26.1. Package as follows:

| Inner packaging | Outer packaging |
|--|---|
| Bags: plastic Sheets: Kraft paper, plastic Reels Not required for UN 0105 if ends are sealed | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastics (4H2) |

A5.26.2. Package as follows:

| Inner packaging | Outer packaging |
|--|---|
| Bags: plastic Sheets: Kraft paper, plastic Reels Not required for UN 0105 if ends are sealed | Drums: removable head steel (1A2), removable head aluminum (1B2), fiber (1G) |

A5.27. Fuzes, Detonating; Fuzes, Igniting; Grenades; and Grenades, Practice.

A5.27.1. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Receptacles: fiberboard, metal, plastic, wood Trays (individual partitions): plastic wood Dividing partitions in the outer packaging | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastics (4H2) |

A5.27.2. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Receptacles: fiberboard, metal, plastic, wood Trays (individual partitions): plastic wood Dividing partitions in the outer packaging | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), fiber (1G) |

A5.28. Igniters or Lighters, Fuse.

A5.28.1. Package as follows:

| Inner packaging | Outer packaging |
|--|---|
| Bags: paper, plastic Receptacles: fiberboard, metal, plastic, wood Sheets: paper Trays (individual partitions): plastic | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastics (4H2) |

A5.28.2. Package as follows:

| Inner packaging | Outer packaging |
|--|---|
| Bags: paper, plastic Receptacles: fiberboard, metal, plastic, wood Sheets: paper Trays (individual partitions): plastic | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), fiber (1G) |

A5.29. Charges, Propelling. Ensure metal packagings are constructed so that risk of explosion, by reason of increase in internal pressure (from internal or external causes), is prevented.

A5.29.1. Package as follows:

| Inner packaging | Outer packaging |
|--|---|
| Bags: Kraft paper, plastic, textile, rubberized textile Receptacles: fiberboard, metal, plastic Trays (individual partitions): plastic, wood Not required with use of 6HH2 package | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), sift-proof natural wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), solid plastics (4H2) Composite: plastic receptacle with outer solid box (6HH2) |

A5.29.2. Package as follows:

| Inner packaging | Outer packaging |
|---|---|
| Bags: Kraft paper, plastic, textile, rubberized textile Receptacles: fiberboard, metal, plastic Trays (individual partitions): plastic, wood | Drums: removable head steel (1A2), removable head aluminum (1B2), removable head plastic (1H2), plywood (1D), fiber (1G) |

A5.30. Contrivances, Water-Activated.

A5.30.1. Package as follows:

| Inner packaging | Outer packaging |
|---|--|
| Receptacles: fiberboard, metal, plastic Dividing partitions in the outer packaging | Boxes: steel (4A), aluminum (4B), ordinary natural wood (4C1), plywood (4D), reconstituted wood (4F), expanded plastic (4H1). Wooden boxes 4C1, 4D and 4F must contain a metal liner. Seal packagings against the ingress of water. |

A5.30.2. Package as follows:

| |
|---|
| Large articles without their means of initiation, or with their means of initiation containing at least two effective protective features, may be carried unpacked if secured to pallets or securely blocked and braced. Must contain at least two independent features which prevent the ingress of water. |
|---|

Attachment 6

CLASS 2--COMPRESSED GASES

A6.1. General Requirements. This attachment contains information concerning the packaging and general handling instructions for Class 2.1 (flammable gas), Class 2.2 (nonflammable, nontoxic compressed gas), and Class 2.3 (toxic gas).

A6.2. General Handling Instructions for Compressed Gases.

- Store compressed gases in a cool, ventilated area away from fire hazards, sources of heat, ignition, or sparks.
- When stored in an upright position, secure cylinders to fixed supports. Compressed gas cylinders may be palletized for shipment provided the valves are protected and cylinders are adequately secured to the pallet.
- Exercise care when handling compressed gases. Do not drop, jar, or slide cylinders since the gas may be toxic or asphyxiating. Personnel must know the importance of handling compressed gases properly.
- Ensure valves are always tightly closed and protected before offering for transportation.

★A6.3. Aerosols. Prepare aerosols meeting the definition of “Consumer Commodity as authorized under paragraph A13.4.” Package aerosol products identified under the proper shipping name “Aerosols” as follows:

A6.3.1. For an aerosol containing non-toxic substances, pack in inner non-refillable non-metal receptacles not exceeding 120 mL (4 fluid-ounce) capacity each, or in inner non-refillable metal or plastic receptacles not exceeding 1 L (34 fluid-ounces) provided all of the following conditions are met:

- Pressure in the aerosol container must not exceed 1245 kPa at 55 degrees C (180 psig at 130 degrees F) and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55 degrees C (130 degrees F).
- If the pressure exceeds 970 kPa at 55 degrees C (140 psig at 130 degrees F) but does not exceed 1105 kPa at 55 degrees C (160 psig at 130 degrees F) use a DOT 2P, IP7, IP7A, or IP7B inner metal receptacle. If the pressure exceeds 1105 kPa at 55 degrees C (160 psig at 130 degrees F) but does not exceed 1245 kPa at 55 degrees C (180 psig at 130 degrees F) use a DOT 2Q, IP7A, or IP7B inner metal receptacle.
- Liquid content of the material and the gas must not completely fill the receptacle at 55 degrees C (130 degrees F).
- Each aerosol exceeding 120 mL (4 fluid ounce) capacity must have been heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the content at 55 degrees C (130 degrees F) without evidence of leakage, distortion, or other defects.
- Protect the valves by a cap or other suitable means.
- Tightly pack aerosols in a strong outer packaging capable of meeting packaging performance test outlined in A19.3.4. The complete package must not exceed 30 kg (66 lbs) gross weight.

A6.3.2. For an aerosol containing toxic substances, pack in inner non-refillable non-metal receptacles not exceeding 120 mL (4 fluid ounce) capacity each, or in inner non-refillable metal receptacles not exceeding 1 L (34 fluid ounces) provided all of the following conditions are met:

- Pressure in the aerosol container must not exceed 1500 kPa at 55 degrees C (217 psig at 130 degrees F) and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55 degrees C (130 degrees F).
- If the pressure exceeds 970 kPa at 55 degrees C (140 psig at 130 degrees F) but does not exceed 1105 kPa at 55 degrees C (160 psig at 130 degrees F) use a DOT 2P, IP7, IP7A, or IP7B inner metal receptacle. If the pressure exceeds 1105 kPa at 55 degrees C (160 psig at 130 degrees F) but does not exceed 1245 kPa at 55 degrees C (180 psig at 130 degrees F) use a DOT 2Q, IP7A, or IP7B inner metal receptacle. If the pressure exceeds 1245 kPa at 55 degrees C (180 psig at 130 degrees F) but does not exceed 1500 kPa at 55 degrees C (217 psig at 130 degrees F) use an IP7B inner metal receptacle.
- Liquid content of the material and the gas must not completely fill the receptacle at 55 degrees C (130 degrees F).
- Each aerosol exceeding 120 mL (4 fluid ounce) capacity must have been heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55 degrees C (130 degrees F) without evidence of leakage, distortion, or other defects.

- Protect the valves by a cap or other suitable means.
- Tightly pack aerosols in an outer fiberboard (4G), wooden (4C1, 4C2), plywood (4D), reconstituted (4F), or plastic (4H1, 4H2) box. The packaging must meet PG II requirements.

A6.3.3. For an aerosol charged with a non-toxic solution containing a biological product or medical preparation that could be deteriorated by heat and compressed gases that, except Class 6.1, PG III material, are poisonous or nonflammable, pack in inner non-refillable metal receptacles with provided all of the following conditions are met:

- The capacity of each inner receptacle must not exceed 575 mL (20 fluid ounces).
- Pressure in the receptacle must not exceed 970 kPa at 55 degrees C (140 psig at 130 degrees F).
- The liquid content of the product and gas must not completely fill the receptacle at 55 degrees C.
- One aerosol out of each lot of 500 or less, filled for shipment, must be heated until the pressure in the container is equivalent to the equilibrium pressure of the contents at 55 degrees C (130 degrees F) without evidence of leakage, distortion, or other defects.
- Protect the valves by a cap or other suitable means.
- Package inner receptacles in a strong outer packaging. The outer packaging must be capable of meeting the limited quantity performance standards outlined in A19.3.4. UN specification (UN marked) packaging is not required.
- The complete package must not exceed 30 kg (66 lbs) gross weight.

A6.3.4. For an aerosol containing a biological product or medical preparation that could be deteriorated by heat and is nonflammable pack in inner non-refillable metal receptacles provided all of the following conditions are met:

- The first five bullet requirements of A6.3.3 related to the aerosol receptacles apply.
- Tightly pack aerosol containers in an outer fiberboard (4G), wooden (4C1, 4C2), plywood (4D), reconstituted (4F), or plastic (4H1, 4H2) box. The packaging must meet PG II requirements.

★A6.4. Small Receptacles Containing Compressed Gas. Package small receptacles of compressed gases, other than aerosols or Consumer Commodities, as identified in this paragraph. Unless otherwise specified, UN specification (UN marked) packaging is not required. Each package must not exceed 30 kg (66 lbs) gross weight. For unregulated compressed gases, see A3.3.2.

A6.4.1. Use containers, except cigarette lighters, of not more than 120 mL (4 fluid ounces, 7.22 cubic inches or less) capacity each. Package inner receptacles in a strong outer packaging.

A6.4.2. Use metal containers filled with nonhazardous material not over 90 percent capacity at 21 degrees C (70 degrees F) then charged with a nonflammable, nonliquefied gas. Each container must be tested to three times the gas pressure at 21 degrees C (70 degrees F). When refilled, the container must be retested to three times the gas pressure at 21 degrees C (70 degrees F) provided one of the following conditions are met:

- Container is not over 1 L (1 quart) capacity and charged to not more than 1172 kPa at 21 degrees C (170 psig at 70 degrees F).
- Container is not over 114L (30 gallon) capacity and charged to not more than 517 kPa at 21 degrees C (75 psig at 70 degrees F).

A6.4.3. Package electronic tubes of not more than 489 mL (30 cubic inch) volume charged with gas to a pressure of not more than 241 kPa (35 psig) in strong outside containers.

A6.4.4. Use inside metal containers of a capacity not over 570.7 mL (35 cubic inches, 19.3 fluid ounces), charged with nonflammable, nonpoisonous or noncorrosive liquefied compressed gas designed for audible fire alarm systems. Pressure in the container must not exceed 482.6 kPa at 21 degrees C (70 psig at 70 degrees F). The completely assembled non-refillable container must be designed and fabricated with a burst pressure of not less than four times its charged pressure at 55 degrees C (130 degrees F.) Each refillable inside container must be designed and fabricated with a burst pressure of not less than five times its charged pressure at 55 degrees C (130 degrees F). The liquid portion of the gas must not completely fill the container at 55 degrees C (130 degrees F).

A6.4.5. A cylinder that is a component part of a passenger restraint system and is installed in a motor vehicle, charged with nonliquefied, nonflammable compressed gas and having no more than two actuating cartridges per valve, is exempt from the requirements of this manual except each:

- Cylinder must comply with one of the cylinder specifications in 49 CFR, Part 178, and be authorized for use in A6.7 for the gas it contains.
- Cylinder must comply with the filling requirements of A3.3.2.5.
- Actuating cartridge must be approved according to 49 CFR 173.86 and meet the definition of an actuating cartridge, explosive, fire extinguisher, or valve.

A6.4.6. A cylinder that is part of a tire inflation system in a motor vehicle, charged with a nonliquefied, nonflammable compressed gas, and is excepted from the requirements of this manual except:

- Cylinder must comply with one of the cylinder specifications in 49 CFR, Part 178, and be authorized for use in A6.7 for the gas it contains.
- Cylinder must comply with the filling requirements of A3.3.2.5.
- Each cylinder must be securely installed in the trunk of the motor vehicle, and the valve must be protected against accidental discharge.

A6.5. Liquefied Compressed Gases.

A6.5.1. Ship liquefied compressed gases in accordance with the filling, pressure, and DOT cylinder specification requirements of table A6.1. If the compressed gas is not specifically identified in table A6.1, ship (except gas in solution) in DOT 3, 3A, 3AA, 3B, 3BN, 3D, 3E, 4, 4A, 4B, 4BA, 4B240ET, 4BW, 4E, 9, 25, 26, 38, 39, 40, or 41 cylinders. Ensure compliance with A3.2.2. Do not charge and ship DOT 4E, 9, 39, 40, or 41 cylinders with a mixture containing a pyroforic liquid, carbon bisulfide (disulfide), ethyl chloride, ethylene oxide, nickel carbonyl, spirits of nitroglycerin, or toxic material, (Class 6.1 or 2.3) unless authorized in a specific packaging paragraph. Use of existing cylinders, DOT 3, 3D, 4, 4A, 9, 25, 26, 38, 40, and 41 is authorized, but new construction of these cylinders is not authorized. Ship a nontoxic and nonflammable mixture (including insecticides) that contains a compressed gas according to this paragraph.

A6.5.2. Use DOT 3AL cylinders to ship carbonyl sulfide, cyclobutane, dimethyl ether, hydrogen selenide, propylene, silane, and vinyl bromide. Shipments are authorized on cargo aircraft only.

A6.5.3. Use DOT 3AL cylinders to ship nitrous oxide only under the following conditions:

- The cylinder must be equipped only with brass or stainless steel valve.
- Each cylinder must be cleaned and in compliance with the requirements of Federal Specification RR-C-901c, paragraphs 3.7.2, 3.8.2, and 4.4.2.3.

A6.5.4. Ship a mixture containing any Class 2.3 material or irritating material, in such proportion that the mixture would be classed as toxic, in containers authorized in attachment 10.

A6.5.5 Ship refrigerant gases that are nonpoisonous and nonflammable in cylinders prescribed in A6.5.1 or as follows: In DOT 2P and 2Q inside metal containers packed in a strong wooden or fiberboard box designed to protect valves from injury or accidental functioning under conditions incident to transportation. Pressure in the container must not exceed 586 kPa at 21 degrees C (85 psia at 70 degrees F). Each completed metal container filled for shipment must be heated until contents reach a minimum temperature of 55 degrees C (130 degrees F), without evidence of leakage, distortion, or other defects.

A6.5.6. Ship engine-starting fluids containing compressed gas (or gases) that are flammable in cylinders prescribed in A6.5.1 or as follows:

- Inside nonrefillable metal containers not over 522 mL (32 cubic inch) capacity. Pressure in the container must not exceed 966 kPa at 55 degrees C (140 psia at 130 degrees F).
- If the pressure exceeds 966 kPa at 55 degrees C (140 psia at 130 degrees F) use a DOT 2P container.
- Any metal container must be capable of withstanding a pressure of 1 1/2 times the pressure of the content at 55 degrees C (130 degrees F) without bursting.
- Each container filled for shipment must have been heated until the contents reach a minimum temperature of 55 degrees C (130 degrees F) without evidence of leakage, distortion, or other defects.
- Pack inside nonrefillable metal containers in a strong tight outside packaging.

A6.5.7. Foreign cylinders meeting the requirements of A3.3.2.7.

★A6.6. Nonliquefied Compressed Gases.

A6.6.1. Ship nonliquefied, compressed gases in accordance with the filling, pressure, and DOT cylinder specification requirements of table A6.1. If the compressed gas is not specifically identified in table A6.1, ship in DOT 3, 3A, 3AA, 3B, 3C, 3D, 3E, 4, 4A, 4B, 4BA, 4BW, 4C, 25, 26, 33, or 38. Use of existing cylinders, DOT 3, 3C, 3D, 4, 4A, 4C, 25, 26, 33, and 38 is authorized, but new construction of these cylinders is not authorized.

A6.6.2. Cylinders DOT-3HT, for use in aircraft only, having a maximum service life of 24 years, are only authorized for nonflammable gases. They must be equipped with a frangible disc safety relief device, without fusible metal backing, with a rated bursting pressure not over 90 percent of the minimum required test pressure of the cylinder with which the device is used. Package cylinders in strong outside containers.

A6.6.3. Use DOT 39 cylinder. For flammable gases, the internal volume must not exceed 1.2 L (75 cubic inches). Use aluminum cylinders for oxygen only under the following conditions:

- Cylinder threads must be straight threads.
- Valves must be made of brass or stainless steel.
- Each cylinder must be cleaned to comply with the requirements of Federal Specification RR-C-901c, paragraphs 3.7.2, 3.8.2, and 4.4.2.3.

A6.6.4. Use DOT 3AL cylinder only for the following nonliquefied gases: air, argon, carbon monoxide, ethylene, helium, mercury free hydrogen, krypton, methane, nitrogen, neon, oxygen, and xenon. Ship flammable gases in 3AL cylinders on cargo aircraft only. When used in oxygen service, the cylinders must comply with 49 CFR 173.302(a)(5).

A6.6.5. Ship carbon monoxide in a DOT-3A, 3AX, 3AA, 3AAX, 3AL, 3, 3E, or 3T cylinder having a minimum service pressure of 12,411 kPa (1800 psig). The pressure in the cylinder must not exceed 6895 kPa at 21 degrees C (1000 psig at 70 degrees F), except that if the gas is dry and sulfur free, the cylinder may be charged to five-sixths of the cylinder service pressure of 13,790 kPa (2000 psig), whichever is the least.

A6.6.6. Use cylinders, DOT 3AX, 3AAX, or 3T only for the following nonliquefied gases: air, argon, boron trifluoride, carbon monoxide, ethane, ethylene, helium, hydrogen, methane, neon, nitrogen, or oxygen, except that specification 3T is not authorized for hydrogen. As used in this paragraph, methane is a nonliquefied gas which has a minimum purity of 98.0 percent methane and which is commercially free of corroding components.

A6.6.7. For fluorine gas use only DOT 3A1000, 3AA1000, or 3BN400 cylinders without a safety relief device and equipped with valve protection caps. Do not charge cylinders over 2758 kPa at 21 degrees C (400 psig at 70 degrees F) and ensure contents do not exceed 2.7 kg (6 pounds) of gas.

A6.6.8. Pack recoil mechanisms or artillery gun mounts containing nitrogen charged to a maximum pressure of 15,858 kPa at 21 degrees C (2300 psig at 70 degrees F) in strong outer wooden containers. Ship recoil mechanisms or artillery gun mounts containing nitrogen unpackaged when securely attached to the weapon system.

A6.6.9. Liquid argon, oxygen, or nitrogen samples under pressure, may be shipped in Cosmodyne Gas Samplers, Models CS 4.4 and CS 2.0 or in TTU-131/E Sampler (MIL-S-27626). See applicable technical directive for overpack instructions. Take samples in the liquid state but vaporize before shipment.

A6.6.10. Ship LAU-7/A launcher-receiver assemblies charged with nitrogen not over 1724 kPa (250 psig).

A6.6.11. Satellites, spacecraft, and other articles charged with nitrogen or dry air. These items may be transported inside a protective shipping container with a nitrogen or air purge during flight. The compressed gas must be in authorized cylinders and protected from damage during transport. The system must be equipped with a safety valve, enabling the nitrogen flow to be immediately shut off in the event of a problem while on the aircraft. Transport authorized on C-141, C-5, and C-17 aircraft only. The following limitations apply:

- Nitrogen may be purged into the shipping container at a rate not to exceed five (5) cubic feet per hour.
- Nitrogen may be purged into the shipping container at a rate not to exceed twenty (20) cubic feet per hour during transport. A technical escort must, using a portable oxygen monitor, continuously check the atmosphere inside the aircraft during flight. If the percentage of oxygen drops to 19.5% per volume, the escort must notify the aircraft commander immediately and the nitrogen purge immediately discontinued. All personnel will utilize supplemental oxygen until the percentage of oxygen exceeds 19.5% per volume. Provide maximum airflow rate in the cargo compartment during flight. Cargo doors must remain open during ground operations to provide adequate ventilation.
- Dry air may be purged into the shipping container at a rate not to exceed 70 cubic feet per hour.
- All other requirements of this manual must be met.
- See attachment 17 for additional certification requirements.

A6.6.12. Foreign cylinders meeting the requirements of A3.3.2.7.

Table A6.1. Cylinder Requirements for Compressed Gases.

| Name of Gas | Maximum Permitted Filling Density in Percent (See A3.3.2.5) | Cylinders Marked as Shown Below Must be Used |
|--|---|--|
| Bromotrifluoromethane (R-13B1 or H-1301) | 124 | DOT-3A400, DOT-3AA400, DOT-3AL400, DOT-3B400, DOT-3E1800, DOT-4A400, DOT-4AA480, DOT-4B400, DOT-4BA400, DOT-4BW400, DOT-39 |
| | | |
| Carbon dioxide (see notes 3 and 4) | 68 | DOT-3, DOT-3A1800, DOT-3AA1800, DOT-3AL1800, DOT-3AX1800, DOT-3AAX1800, DOT-3E1800, DOT-3HT2000, DOT-3T1800, DOT-39 |
| | | |
| Chlorine (see note 1) | 125 | DOT-3, DOT-3A480, DOT-3AA480, DOT-3BN480, DOT-3E1800, DOT-25 |
| | | |
| Chlorodifluoroethane (R142b) or Chloro-1,1-Difluoroethane (see note 4) | 100 | DOT-3A150, DOT-3AA150, DOT-3AL150, DOT-3B150, DOT-3E1800, DOT-4B150, DOT-4BA225, DOT-4BW225, DOT-39 |
| | | |
| Chlorodifluoromethane (R22) (see note 4) | 105 | DOT-3A240, DOT-3AA240, DOT-3ALA240, DOT-3B240, DOT-3E1800, DOT-4B240, DOT-4B240ET, DOT-4BA240, DOT-4BW240, DOT-4E240, DOT-39, DOT-41 |
| Chloropentafluorethane (R-115) | 110 | DOT-3A225, DOT-3AA225, DOT-3AL225, DOT-3B225, DOT-3E1800, DOT-4A225, DOT-4B225, DOT-4BA225, DOT-4BW225, DOT-39 |
| | | |
| Chlorotrifluoromethane (R-13) (see note 4) | 100 | DOT-3, DOT-3A1800, DOT-3AA1800, DOT-3AL1800, DOT-3E1800, DOT-39 |

| Name of Gas | Maximum Permitted Filling Density in Percent (See A3.3.2.5) | Cylinders Marked as Shown Below Must be Used |
|--|---|--|
| Cyclopropane (see notes 4 and 5) | 55 | DOT-3, DOT-3A225, DOT-3A480X, DOT-3AA225, DOT-3AL225, DOT-3B225, DOT-3E1800, DOT-4A225, DOT-4AA480, DOT-4B225, DOT-4B240ET, DOT-4BA225, DOT-4BW225, DOT-39 |
| Dichlorodifluoromethane (R-12) (see note 4) | 119 | DOT-3A225, DOT-3AA225, DOT-3AL225, DOT-3B225, DOT-3E1800, DOT-4A225, DOT-4B225, DOT-4BA225, DOT-4BW225, DOT-4B240ET, DOT-4E225, DOT-9, DOT-39, DOT-41 |
| Dichlorodifluoromethane and difluoroethane mixture (constant boiling mixture) (R-500) (see note 4) | Not liquid full at 54 degrees C (130 degrees F) | DOT-3A240, DOT-3AA240, DOT-3B240, DOT-3E1800, DOT-4A240, DOT-4B240, DOT-4BA240, DOT-4BW240, DOT-4E240, DOT-9, DOT-39 |
| Difluoroethane (R-152a) (see note 4) | 79 | DOT-3A150, DOT-3AA150, DOT-3B150, DOT-3AL150, DOT-3E1800, DOT-4B150, DOT-4BA225, DOT-4BW225 |
| 1,1-Difluoroethylene (R-1132A) | 73 | DOT-3A2200, DOT-3AA2200, DOT-3AX2200, DOT-3AAX2200, DOT-3T2200, DOT-39 |
| Dimethylamine, anhydrous | 59 | DOT-3A150, DOT-3AA150, DOT-3B150, DOT-4B150, DOT-4BA225, DOT-4BW225, ICC-3E1800 |
| Ethane (see notes 4 and 5) | 35.8 | DOT-3, DOT-3A1800, DOT-3AA1800, DOT-3AL1800, DOT-3AAX1800, DOT-3AX1800, DOT 3E1800, DOT-3T1800, DOT-39 |
| Ethane (see notes 4 and 5) | 36.8 | DOT-3A2000, DOT-3AA2000, DOT-3AAX2000, DOT-3AL2000, DOT-3AX2000, DOT-3T2000, DOT-39 |

| Name of Gas | Maximum Permitted Filling Density in Percent (See A3.3.2.5) | Cylinders Marked as Shown Below Must be Used |
|--|---|--|
| Ethylene (see notes 4 and 5) | 31.0 | DOT -3, DOT-3A1800, DOT -3AA1800, DOT-3AAX1800, DOT-3AL1800, DOT-3AX1800, DOT-3E1800, DOT-3T1800, DOT-39 |
| Ethylene (see notes 4 and 5) | 32.5 | DOT-3A2000, DOT-3AA2000, DOT-3AAX2000, DOT-3AL2000, DOT-3AX2000, DOT-3T2000, DOT-39 |
| Ethylene (see notes 4 and 5) | 35.5 | DOT-3A2400, DOT-3AA2400, DOT-3AAX2400, DOT-3AL2400, DOT-3AX2400, DOT-3T2400, DOT-39 |
| Hydrogen chloride | 65 | DOT-3, DOT-3A1800, DOT-3AA1800, DOT-3AAX1800, DOT-3AX1800, DOT-3E1800, DOT-3T1800 |
| Hydrogen sulfide (see note 6) | 62.5 | DOT-3A480, DOT -3AA480, DOT-3AL480, DOT-3B480, DOT-3E1800, DOT-4A480, DOT-4B480, DOT-4BA480, DOT-4BW480, DOT-26-480 |
| Insecticide liquefied gas (see note 4 and 8) | Not liquid full at 54 degrees C (130 degrees F) | DOT-3A300, DOT-3AA300, DOT-3B300, DOT-3E1800, DOT-4B300, DOT-4BA300, DOT-4BW300, DOT-9, DOT-40, DOT-41 |
| Liquefied nonflammable gases, liquids other than those classified as flammable, corrosive, or poisonous, and mixtures or solutions thereof, charged with nitrogen, carbon dioxide or air (see notes 3 and 4) | Not liquid full at 54 degrees C (130 degrees F) | DOT specification cylinders identified in A6.5.1 and DOT-3HT, DOT-4D, DOT-4DA, DOT-4DS |
| Methylacetylene-propadiene stabilized (see note 2) | Not liquid full at 54 degrees C (130 degrees F) | DOT-3A240, DOT-3AA240, DOT-3AL240, DOT-3B240, DOT-3E1800, DOT-4, DOT-4B240, without brazed seams; DOT-4B240ET, DOT-4BA240, without brazed seams; DOT-4BW240, DOT-4E240, DOT-41 |

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| Name of Gas | Maximum Permitted Filling Density in Percent (See A3.3.2.5) | Cylinders Marked as Shown Below Must be Used |
|---|---|---|
| Methyl chloride | 84 | DOT-3, DOT-3A225, DOT-3AA225, DOT-3B225, DOT-3E1800, DOT-4, DOT-4A225, DOT-4B225, DOT-4BA225, DOT-4BW225, DOT-4B240ET, DOT-25, DOT-26-300, DOT-38, Cylinders complying with DOT-3A150, 3B150, 4A150, and 4B150 manufactured before 7 December 1936 are also authorized. |
| Methyl mercaptan | 80 | DOT-3A240, DOT-3AA240, DOT-3B240, DOT-3E1800, DOT-4B240, DOT-4B240ET, DOT-4BA204, DOT-4BW240 |
| Monomethylamine, anhydrous | 60 | DOT-3A150, DOT-3AA150, DOT-3B150, DOT-3E1800, DOT-4B150, DOT-4BA225, DOT-4BW225 |
| Nitrosyl Chloride | 110 | DOT-3BN400 only |
| Nitrous Oxide (see notes 3, 4, and 7) | 68 | DOT-3, DOT-3A1800, DOT-3AA1800, DOT-3AAX1800, DOT-3AL1800, DOT-3AX1800, DOT-3E1800, DOT-3HT2000, DOT-3T1800, DOT-39 |
| Refrigerant gas, NOS or Dispersant gas, NOS (see notes 4 and 9) | Not liquid full at 54 degrees C (130 degrees F) | DOT-3A240, DOT-3AA240, DOT-3AL240, DOT-3B240, DOT-3E1800, DOT-4A240, DOT-4B240, DOT-4BA240, DOT-4BW240, DOT-4E240, DOT-9, DOT-39 |
| Sulfur dioxide (see note 4) | 125 | DOT-3, DOT-3A225, DOT-3AA225, DOT-3AL225, DOT-3B225, DOT-3E1800, DOT-4, DOT-4A225, DOT-4B225, DOT-4B240ET, DOT-4BA225, DOT-4BW225, DOT-25, DOT-26-150, DOT-38, DOT-39 |

| Name of Gas | Maximum Permitted Filling Density in Percent (See A3.3.2.5) | Cylinders Marked as Shown Below Must be Used |
|---------------------------------|---|---|
| Sulfur hexafluoride | 120 | DOT-3, DOT-3A1000, DOT- 3AA1000, DOT-3AAX2400, DOT-3AL1000, DOT-3E1800, DOT-3T1800 |
| Sulfuryl fluoride | 106 | DOT-3A480, DOT-3AA480, DOT-3E1800, DOT-4B480, DOT-4BA480, DOT-4BW480 |
| Tetrafluoroethylene, stabilized | 90 | DOT-3A1200, DOT-3AA1200, DOT-3E1800 |
| Trifluorochloroethylene | 115 | DOT-3A300, DOT-3AA300, DOT-3B300, DOT-3E1800, DOT-4A300, DOT-4B300, DOT-4BA300, DOT-4BW300 |
| Trimethylamine, anhydrous | 57 | DOT-3A150, DOT-3AA150, DOT-3B150, DOT-3E1800, DOT-4B150, DOT-4BA225, DOT-4BW225 |
| Vinyl chloride (see note 2) | 84 | DOT-3A150, DOT- 3AA150, DOT-3AL150, DOT-3E1800, DOT-4B150, without brazed seams; DOT-4BA225, without brazed seams; DOT-4BW225, DOT-25 |
| Vinyl fluoride, stabilized | 62 | DOT-3A1800, DOT-3AA1800, DOT-3AL1800, DOT-3E1800 |
| Vinyl methyl ether (see note 2) | 68 | DOT-3A150, DOT-3AA150, DOT-3B150, DOT 3E1800, DOT-4B150, without brazed seams; DOT-4BA225, without brazed seams; DOT-4BW225, DOT-25 |

NOTES:

1. Cylinders purchased after 1 October 1944 for the transportation of chlorine must contain no aperture other than that provided in the neck of the cylinder for attachment of a valve equipped with an approved safety device. Cylinders purchased after November 1, 1935 and charged with chlorine must not contain over 150 pounds of gas.
2. All parts of valve and safety devices in contact with contents of cylinders must be of a metal or other material, suitably treated if necessary, which will not cause formation of any acetylides.
3. DOT-3HT cylinders are authorized for use in aircraft only for a maximum service life of 24 years. They must be equipped with a frangible disc safety relief device, without fusible metal backing, and with a rated bursting pressure

not over 9 percent of the minimum required test pressure of the cylinder with which the device is used. Ship only nonflammable gases in these cylinders and pack in strong outside containers.

4. Ship DOT-2P, 2Q, 3E, 3HT, 4BA spherical type, 4D, 4DA, 9, 39, 40, 41, and 4DS spheres and cylinders in strong outside containers.
5. When used for shipment of flammable gases, the internal volume of the specification 39 cylinders must not be over 75 cubic inches.
6. Ensure each valve outlet is sealed by a threaded cap or a threaded solid plug.
7. Ensure DOT-3AL cylinders are equipped with brass or stainless steel valves and cleaned in compliance with Federal Specification RR-C-901c.
8. See A6.5.1 and A6.5.5 (except only DOT 2P is authorized).
9. See A6.5.5.

A6.7. Liquefied Petroleum Gas (see A3.3.2 for additional cylinder and filling requirements).

A6.7.1. Use DOT 3, 3A, 3AA, 3AL, 3B, 3E, 4, 4A, 4B, 4BA, 4BW, 4B240FLW, 4B240ET, 4B240X, 4E, 9, 25, 26, 38, 39, or 41 cylinders. Ensure the internal volume of DOT 39 cylinders is not over 1.2 L (75 cubic inches). Use of existing DOT 3, 4, 4A, 4B240X, 9, 25, 26, 38, and 41 cylinders is authorized, but new construction of these cylinders is not authorized.

A6.7.2. Use cylinders marked as complying with DOT 4B240FLW, bearing manufacturers symbol WCO and serial numbers 47A-1 to 47A-59200 (inclusive), and varying from the specification requirements for the physical properties of steel.

A6.7.3. Use DOT 3C or 4C cylinders, when the capacity of cylinders is not over 60.5 L (3,881 cubic inches, 16 gallons) with 5 percent tolerance. Do not exceed a gas pressure over 1000 kPa (145 psig) at 55 degrees C (130 degrees F). Comply with the requirements of table A6.1 for the gases named.

A6.7.4. Use inside metal containers, DOT 2P or 2Q, packed in strong wooden or fiberboard boxes designed to protect valves from injury or accidental functioning under normal transportation conditions. These containers are authorized for liquefied petroleum gas with a gas pressure of 241 kPa (35 psig) at 21 degrees C (70 degrees F) and 689.5 kPa (100 psig) at 55 degrees C (130 degrees F) (or not over 310.3 kPa (45 psig) at 21 degrees C (70 degrees F) and 724 kPa (105 psig) at 55 degrees C (130 degrees F) when equipped with safety devices which will prevent rupture of the container when it is exposed to fire.) Each completed container filled for shipment must have been heated until contents reached a minimum temperature of 55 degrees C (130 degrees F) without evidence of leakage, distortion, or other defects.

A6.7.5. Foreign cylinders meeting the requirements of A3.3.2.7.

★A6.8. Fire Extinguishers. Fire extinguishers authorized below may be shipped secured in holders of equipment and protected from possible accidental damage. If these fire extinguishers are not fastened in a holder designed for them, pack in strong outer containers.

- Ship fire extinguishers in DOT specification cylinders identified in paragraphs A6.8.1 and A6.8.2.
- Ship fire extinguishers in non-DOT specification cylinders as identified in paragraphs A6.8.3 and A6.8.4.
- Fire suppression bottles in DOT specification 3HT, 4D, 4DA, or 4DS, use description "Liquified Gases, UN1058". See paragraph A6.5.1 and table A6.1.

A6.8.1. Use DOT 3A, 3AA, 3AL, 3E, 4B, 4BA, 4B240ET, or 4BW cylinders provided:

- Cylinders contain only fire extinguishing agents such as ammonium phosphate, sodium bicarbonate, potassium bicarbonate, potassium imido dicarboxamide and bromochlorodifluoromethane or bromotrifluoromethane, which is commercially free from corroding components.
- Cylinders are charged with a nonflammable, nontoxic, noncorrosive, dry gas, having a dew point at or below minus 46.7 degrees C (minus 52 degrees F) at 101 kPa (1 atmosphere), to not more than the service pressure of the cylinder.
- Cylinders have an external corrosion-resistant coating.
- Cylinders are retested in accordance with Title 49 CFR 173.34(e)(18).
- Fire extinguisher, DOT 4BW240, on a cart does not require additional packaging.

A6.8.2. Use DOT 2P or 2Q inner nonrefillable metal containers provided:

- The liquid portion of the gas plus any additional liquid or solid does not completely fill the container at 55 degrees C (130 degrees F).

- The pressure in the container does not exceed 1250 kPa (181 psig) at 55 degrees C (130 degrees F). If the pressure exceeds 920 kPa (141 psig) at 55 degrees C (130 degrees F), but does not exceed 1100 kPa (160 psig) at 55 degrees C (130 degrees F), use a DOT 2P inner metal container. If the pressure exceeds 1100 kPa (160 psig) at 55 degrees C (130 degrees F) use a DOT 2Q inner metal container. The metal container must be capable of withstanding, without bursting, a pressure of one and one-half times the equilibrium pressure of the contents at 55 degrees C (130 degrees F).
- Each completed inner container filled for shipment must have been heated until the pressure in the container is equivalent to the equilibrium pressure of the contents at 55 degrees C (130 degrees F) without evidence of leakage, distortion, or other defect.

A6.8.3. In fire extinguishers charged with a small amount of compressed gas of not more than 1660 kPa at 21 degrees C (241 psig at 70 degrees F). These fire extinguishers are excepted from DOT cylinder specification requirements provided:

- They are shipped as inside containers.
- The contents are not flammable, toxic, or corrosive.
- Internal volume is not over 18 L (1,100 cubic inches). For fire extinguishers not over 900 mL (55 cubic inch) capacity, the liquid portion of the gas plus any additional liquid or solid must not completely fill the container at 55 degrees C (130 degrees F). Fire extinguishers over 900 mL (35 cubic inches) may not contain liquefied compressed gas.
- Fire extinguishers manufactured on and after 1 January 1976 must be designed and fabricated with a burst pressure not less than six times its charged pressure at 21 degrees C (70 degrees F).
- Fire extinguishers are tested to three times the charged pressure at 21 degrees C (70 degrees F), but not less than 825 kPa (120 psig) without failure before the initial shipment. For any subsequent shipments, they must meet retest requirements of 29 CFR 1910.157(e).

A6.8.4. Transport extinguisher (FEU-1/M) 10 gallon (37.8 L) capacity on military aircraft without special packing and crating. Use caution during handling and transportation to avoid damage to valves.

A6.9. Refrigerating Machines, Air Conditioners, and Accumulators.

A6.9.1. **Refrigerating Machines, Air Conditioners, and Components.** Factory-tested refrigerating machines, air conditioners, and components are exempted from specification packaging, marking, and labeling except for the name of contents on the outside container, provided (see A6.3.2.8 for small quantities):

- Each pressure vessel is charged to not more than 2268 kg (5,000 pounds) of Group A1 refrigerant as classified in ANSI/ASHRAE Standard 15, or not more than 22.7 kg (50 pounds) of refrigerant other than Group A1.
- Machines containing two or more charged vessels may not contain more than 907 kg (2,000 pounds) of Group 1 refrigerant, or more than 45.4 kg (100 pounds) of refrigerant other than Group 1.
- Each pressure vessel is equipped with a safety relief device meeting the requirements of ANSI/ASHRAE Standard 15.
- Each pressure vessel is equipped with an individual shut-off valve at each opening except openings used for safety devices and with no other connection. Close shut-off valves during transportation.
- Pressure vessels are manufactured, inspected, and tested according to ANSI/ASHRAE Standard 15, or when over 152.4 mm (6 inches) internal diameter, according to American Society of Mechanical Engineers (ASME) Code.
- All parts subject to refrigerant pressure during shipment are tested under ANSI/ASHRAE Standard 15.
- The liquid portion of refrigerant, if any, does not completely fill any pressure vessel at 55 degrees C (130 degrees F).
- Filling densities prescribed in A3.3.2.5 are not exceeded.

A6.9.2. **Accumulators.** The following apply to hydraulic accumulators containing nonliquefied, nonflammable gas, and nonflammable liquids or pneumatic accumulators containing nonliquefied, nonflammable gas, fabricated from materials that do not fragment upon rupture:

A6.9.2.1. Accumulators installed in motor vehicles, construction equipment, and assembled machinery, designed and fabricated with a burst pressure of not less than five times their charged pressure at 21 degrees C (70 degrees F) are exempt from the requirements of this manual.

A6.9.2.2. When charged to not more than 1379 kPa (200 psig) at 21 degrees C (70 degrees F), the following conditions apply:

- Ship each accumulator as an inside package. There are no specification requirements.
- Each accumulator may not have a gas space over 40.7 L (2,500 cubic inches) under stored pressure.
- Each accumulator must be tested, without evidence of failure or damage, to at least three times its charged pressure at 21 degrees C (70 degrees F) but not less than 120 psig (827 kPa) before initial shipment and before each refilling and reshipment.

A6.9.2.3. When charged over 1379 kPa (200 psig) at 21 degrees C (70 degrees F) the following conditions apply:

- Each accumulator must be in compliance with the requirements stated in A6.9.2.2.
- Each accumulator must be designed and fabricated with a burst pressure of not less than five times its charged pressure when shipped.

A6.10. Acetylene Gas. Ship in DOT 8 or 8AL cylinders.

- Ensure cylinders are filled with a porous material charged with a suitable solvent as identified in 49 CFR, paragraph 178.59 or 178.60.
- The specific gravity of acetone solvent in acetylene cylinders must be 0.796 or over at 15.5 degrees C (60 degrees F). The amount of solvent added in the refilling operation must not cause the tare weight of the cylinder to be over its marked tare weight. The tare weight includes the weight of the cylinder shell, porous filling, safety relief devices, valve, and solvent, but without removable cap.
- The pressure in cylinders containing acetylene gas must not exceed 1724 kPa at 21 degrees C (250 psig at 70 degrees F); however, if the cylinders are marked for a lower allowable charging pressure at 21 degrees C (70 degrees F), then do not exceed that pressure.

A6.11. Cigarette Lighters or Other Similar Devices Charged With Fuel. Do not ship any package containing a cigarette lighter or other similar ignition device charged with fuel and equipped with an ignition element, or any self-lighting cigarette, unless the design of the device and its packaging has been approved according to 2.3 or by the DOT. Ship a cigarette lighter or other similar device charged with a flammable gas according to the following:

- No more than 70 mL (2.3 fluid ounces) of liquefied gas may be loaded into each device.
- The liquid portion of the gas may not be over 85 percent of the volumetric capacity of each chamber at 15 degrees C (59 degrees F).
- Each device including closures must be capable of withstanding, without leakage or rupture, an internal pressure of at least two times the vapor pressure of the fuel at 55 degrees C (130 degrees F).
- Overpack devices in packaging that is designed or arranged to prevent movement of the device itself.

A6.12. Cryogenic Liquids.

A6.12.1. **Handling Instructions.** Store in cool, well-ventilated area away from fire hazards, direct rays of the sun, and organic or easily oxidizable materials such as grease and oil. Handle containers with extreme care. Avoid direct contact.

A6.12.2. **Container Requirements:**

- Do not load a cylinder with a cryogenic liquid colder than the design service temperature of the packaging.
- Do not load a cylinder with any material that may combine chemically with any residue in the packaging to produce an unsafe condition.
- The jacket covering the insulation on a cylinder used to transport any flammable cryogenic liquid must be made of steel.
- Do not install a valve or fitting made of aluminum, with internal rubbing or abrading aluminum parts that may come in contact with oxygen in the cryogenic liquid form, on any cylinder used to transport oxygen, cryogenic liquid unless the parts are anodized according to ASTM Standard B 580.
- Do not install an aluminum valve, pipe, or fitting on any cylinder used to transport any flammable cryogenic liquid.
- Provide each cylinder with one or more pressure relief devices.
- Install each pressure relief device and locate so that the cooling effect of the contents during venting will not prevent effective operation of the device.
- The maximum weight of the contents in a cylinder with a design service temperature colder than -195.5 degrees C (-320 degrees F) may not be over the design weight marked on the cylinder.
- Each cylinder containing a cryogenic liquid must have a pressure control system that conforms to 49 CFR 173.34(d) and must be designed and installed so that it will prevent the cylinder from becoming liquid full.

A6.12.3. Venting Requirements. Protect all containers by vent openings or safety relief devices to prevent excessive pressure buildup within the containers. The shipper must provide specific venting instructions in the additional handling information block of the Shipper's Declaration for Dangerous Goods (unless venting procedures are provided in a separate instruction accompanying the shipment or attached to the cargo) and must provide required equipment (see A17.4.2). Crew members must monitor vent valves during flight. Containers charged with a nonflammable, nonpoisonous cryogenic liquid, with a net capacity of 25 liters (6.6 gallons) or less, are excepted from the overboard venting requirement. Tubing or hose for venting to the outside of the aircraft is required. Provide at least 4.6 m (15 feet) of 25.4 mm (one inch) inside diameter tubing or hose compatible with the product. Do not use rubber tubing for liquid oxygen. Make sure there are:

- Sufficient clamps to attach tubing to the unit, the aircraft vent adapter, and other hoses if more than one unit is transported. Do not use sealing compound on tubing or hose connections.
- T fittings and extra tubing or hose for the manifolding of two or more unit to one aircraft vent.
- Tubing or hose must be routed to ensure freedom from kinks, sharp bends, or restrictions that prevent free venting and cause pressure buildup in the tubing or hose.

A6.12.4. Packaging Requirements. Ensure all containers are designed to hold low temperature liquefied gases and are strong enough to withstand all shocks and loading normally incident to air shipment and associated handling. Ship cryogenic liquids of argon, helium, neon, nitrogen, and oxygen according to filling density requirements in figure A3.4. Ship hydrogen (minimum 95 percent parahydrogen) according to filling density requirements in figure A3.5. Protect container accessories against damage in handling. Ship in containers as follows:

A6.12.4.1. DOT 4L cylinders in a vertical position.

A6.12.4.2. Type TMU-27M, MIL-T-38170, or MA-1, trailer mounted, 189 L (50 gallon) capacity containers.

A6.12.4.3. C-1, 1892 L (500 gallons) capacity containers.

A6.12.4.4. Dewars, 25 L (6.6 gallon) capacity each. Not more than 6 per aircraft.

A6.12.4.5. Nonpressurized metal vacuum-type containers, dewars, 100 liter (26.42 gallon capacity) attached to nonskid base. Ship no more than one container per aircraft.

A6.12.4.6. NRU-5/E air-transportable 1514L (400 gallon tank) (MIL-T-38261).

A6.12.4.7. LS-160 container attached to shipping platform. Ship a maximum of one container per aircraft. Maximum 150 liters (39.63 gallons) nitrogen per container.

A6.12.4.8. TMU-70/M (MIL-A-85415) LOX servicing trailers. The trailers must be equipped with absolute pressure relief valve and vented to outside of aircraft.

A6.12.4.9. TMU-24E (MIL-T-27720), mounted on aircraft cargo pallet, 1514 L (400 gallons), liquid oxygen or liquid nitrogen storage and transfer tanks.

A6.12.4.10. LSHe-102, 109 L (28.79 gallon) capacity, attached to shipping skid. Container must be equipped with an absolute pressure relief valve for air shipment. Authorized for liquid helium.

A6.12.4.11. LSHe-30, 30 L (7.92 gallon) capacity, packed in a specially designed shipping container (P/N 0305-0002) equipped with plastic foam pads. Ship no more than five containers per aircraft. Authorized for liquid helium and neon.

A6.12.4.12. LSNe-75, liquid neon container, with a maximum quantity of 75 L (19.81 gallon) attached to a shipping skid. Ship not more than two containers per aircraft. Containers must be equipped with an absolute pressure relief valve.

A6.12.4.13. Liquid oxygen and liquid nitrogen in specification MIL-T-38170 containers vented to the outside of the aircraft. The container vent valve must be monitored by a crewmember to make sure the pressure buildup within the container is not over 40 psig. The container must be vented down to 5 psig whenever necessary during flight and the valve again shut off.

A6.12.4.14. CRU-87/U, 10-liter, Portable Therapeutic Liquid Oxygen (PTLOX) Converters. Up to 25 PTLOX converters per aircraft may be shipped without overboard venting, except that C-21 aircraft is limited to 10 PTLOX converters without overboard venting.

A6.12.4.15. Foreign cylinders meeting the requirements of A3.3.2.7.

A6.13. Ethyl Chloride. Package ethyl chloride in any of the following single or combination nonbulk packagings which meet the PG I performance level. (Outage for all containers must be 7.5 percent or more at 21 degrees C (70 degrees F.)

A6.13.1. Wooden boxes (4C1, 4C2, 4D, or 4F) with glass, earthenware, or metal inner receptacles not over 500 g (17.6 ounces) capacity each.

A6.13.2. Metal drums, (1A1), not over 100 L (26 gallon) capacity each.

A6.13.3. Fiberboard box (4G) with inside glass, earthenware, or metal inner receptacles not over 500 g (17.6 ounces) capacity each. Gross weight must not exceed 30 kg (66 pounds).

A6.13.4. Any DOT specification cylinder prescribed for any compressed gas except acetylene.

A6.14. Ethylene Oxide. Silver mercury, or any of its alloys, or copper must not be used in any part of a packaging, valve, or other packaging appurtenance if that part, during normal conditions of transportation, may come in contact with ethylene oxide liquid or vapor. Copper alloys may be used only where gas mixtures do not contain free acetylene at any concentration that will form copper acetylene. All packaging and gaskets must be constructed of materials which are compatible with ethylene oxide and do not lower the auto-ignition temperature of ethylene oxide. Each completed package must meet PG I performance requirements. Package ethylene oxide as follows:

A6.14.1. In inner glass ampoules or vials and placed in a fiberboard (4G) box. The total quantity of ethylene oxide must not exceed 100 g (3.5 ounces) per package.

A6.14.2. In inner aluminum receptacles and placed in a fiberboard (4G) box constructed with top and bottom pads and perimeter liner. The inner aluminum receptacles must not contain more than 135 g (4.8 ounces.) The inner aluminum receptacles must be cushioned with an incombustible material. No more than 12 inner receptacles may be packed in one fiberboard (4G) box, and no more than 10 fiberboard (4G) boxes may be overpacked.

A6.14.3. In inner metal receptacles and placed in a wooden (4C1, 4C2, 4D, or 4F), or fiberboard (4G) box. The capacity of the inner metal receptacles must not exceed 340 g (12 ounces). The metal receptacles must be capable of withstanding a 1124 kPa (180 psig) burst pressure. Each inner metal receptacle must be insulated and equipped with a relief device of the fusible plug type with a yield temperature of 69 to 77 degrees C (156 to 171 degrees F). The capacity of relief device and insulation must be such that the charged receptacle will not explode when tested by the method described in Compressed Gas Association Pamphlet C-14 or other equivalent method. No more than 12 receptacles may be packed in one outer box. Each receptacle must not be liquid full below 82 degrees C (180 degrees F).

A6.14.4. In 1A1 steel drums of no more than 231 L (61 gallons). The drum must be lagged, of all welded construction with the inner shell having a minimum thickness of 1.7 mm (0.068 inches) and the outer shell must have a minimum thickness of 2.4 mm (0.095 inches). Drums must be capable of withstanding a hydrostatic test pressure of 690 kPa (100 psig). Lagging must be of sufficient thickness so that the drum, when filled with ethylene oxide and equipped with the required pressure relief device, will not rupture when exposed to fire. The drum may not be liquid full below 85 degrees C (185 degrees F). Before each refilling, each drum must be pressure tested for leakage at no less than 103 kPa (15 psig). Each drum must be equipped with a fusible-type relief device with a yield temperature of 69 to 77 degrees C (157 to 170 degrees F). The capacity of the relief device and the effectiveness of the insulation must be such that the charged cylinder will not explode when tested by the method described in CGA Pamphlet C-14 or other equivalent method.

A6.14.5. In DOT specification cylinders, as authorized for any compressed gas except acetylene. Pressurizing valves and insulation are required for cylinders over 4 L (1 gallon) capacity. Eductor tubes must be provided for cylinders over 19 L (5 gallon) capacity. Cylinders must be seamless or welded steel (not brazed) with nominal capacity of no more than 115 L (30 gallons) and may not be liquid full below 82 degrees C (180 degrees F). Before each refilling, each cylinder must be pressure tested for leakage at no less than 103 kPa (15 psig). Each cylinder must be equipped with a fusible-type relief device with a yield temperature of 69 to 77 degrees C (157 to 170 degrees F). The capacity of the relief device and the effectiveness of the insulation must be such that the charged cylinder will not explode when tested by the method described in CGA Pamphlet C-14 or other equivalent method.

A6.15. Ethylamine (Monoethylamine, Aminoethane).

A6.15.1. Use metal drums (1A1) which meet PG I performance level requirements.

A6.15.2. Use any DOT specification cylinder prescribed for any compressed gas except acetylene.

A6.16. Arsine; Cyanogen Chloride, Stabilized; Cyanogen, Liquefied; Germane; Liquefied Gas, Toxic; Phosgene; Phosphine. See 2.9 for additional information.

A6.16.1. **Handling Instructions.** These items are extremely dangerous. Wear approved chemical safety mask and clothing when handling this material.

A6.16.2. **Packaging Requirements.** Package in DOT specification 3A1800, 3AA1800, 3AL1800, 3D, 3E1800, and 33 cylinders. Specification 3A, 3AA, 3AL, 3D, and 33 cylinders may not exceed 57 kg (125 pounds) water capacity (nominal). Shipments of "Arsine" or "Phosphine" will not be accepted for transportation if packaged in a specification 3AL cylinder. Cylinders containing "phosgene" may not exceed a filling density of 125 percent (see A3.3.2.5). The cylinder may not contain more than 68 kg (150 pounds) of phosgene. Also, each filled cylinder must be tested for leakage before it is offered for transportation and must show absolutely no leakage. This test must consist of immersing the cylinder and valve, without the protection cap attached, in a bath of water at a temperature of approximately 66 degrees C (150 degrees F) for at least 30 minutes. During which time, frequent examinations must be made to identify any escape of gas. After the test has been accomplished the valve of the cylinder must not be loosened before the cylinder is offered for transportation, and must not be loosened during transportation.

A6.17. Bromoacetone; Methyl Bromide; Chloropicrin and Methyl Bromide, or Methyl Chloride Mixtures; Insecticide Gases, Toxic, NOS. See 2.9 for additional requirements.

A6.17.1. **Handling Instructions.** These materials and mixtures are extremely dangerous poisons. Wear approved chemical safety mask and clothing when handling this material.

A6.17.2. Packaging Requirements:

A6.17.2.1. Pack bromoacetone in ordinary wood (4C1), ordinary wood, with sift-proof walls (4C2), plywood (4D), or reconstituted wood (4F), boxes with inner glass receptacles or tubes in hermetically sealed metal receptacles in corrugated fiberboard cartons. Bottles may not contain over 500 g (17.6 ounces) of liquid each and must be cushioned in cans with at least 12.7 mm (.5 inches) of absorbent cushioning material. The total amount of liquid in the outer box must not exceed 11 kg (24 pounds). Packagings must conform to the PG I performance level.

A6.17.2.2. Pack bromoacetone, methyl bromide, chloropicrin and methyl bromide mixtures, chloropicrin and methyl chloride mixtures, and chloropicrin mixtures charged with a nonflammable, nonliquefied compressed gas in DOT specification 3A, 3AA, 3B, 3C, 3E, 4A, 4B, 4BA, 4BW, or 4C cylinders having not over 113 kg (250 pounds) water capacity (nominal). However, this capacity does not apply to shipments of methyl bromide.

A6.17.2.3. Package methyl bromide mixtures containing up to 2 percent chloropicrin in a fiberboard (4G) box with inside metal cans containing not over 0.454 kg (1 pound) each, or inside metal cans with a minimum wall thickness of 0.178 mm (0.007 inch) containing not over 0.7945 kg (1 3/4 pounds) each. The 0.454 kg (1 pound) can must be capable of withstanding an internal pressure of 896.6 kPa (130 psig) without leakage or permanent distortion. Vapor pressure of the contents must not exceed 896.6 kPa (130 psig) at 55 degrees C (130 degrees F). The 0.7945 kg (1 3/4 pound) can must be capable of withstanding an internal pressure of 965.6 kPa (140 psig) without leakage or permanent distortion. Vapor pressure of the contents must not exceed 965.6 kPa (140 psig) at 55 degrees C (130 degrees F). Cans must not be liquid full at 55 degrees C (130 degrees F). Cans must be constructed of tinsplate or lined with suitable material and must have concave or pressure ends.

A6.18. Gas Identification Sets. Gas identification sets containing toxic material must meet the requirements of the PG I performance level.

A6.18.1. Pack in hermetically sealed glass inner receptacles not over 40 ml (1.4 fluid ounces). Each glass inner receptacle must be placed in a sealed fiberboard receptacle cushioned with absorbent material. Not more than 12 fiberboard receptacles may be placed in a 4G fiberboard box. No more than four fiberboard boxes, well-cushioned, may be placed in a steel cylinder. The cylinder must have a wall thickness of at least 3.7 mm (0.146 inches) and must have a hermetically sealed steel closure.

A6.18.2. When the toxic material is absorbed in a medium such as activated charcoal or silical gel, pack gas identification sets as follows:

A6.18.2.1. If the liquid toxic material does not exceed 5 ml (0.2 fluid ounces) or the solid toxic material does not exceed 5 g (0.2 ounces), they may be packed in glass inner receptacles of not over 120 ml (4.1 fluid ounces) each. Each glass receptacle, cushioned with absorbent material, must be packed in a hermetically sealed metal can. The metal can must have a wall thickness of not less than 0.30 mm (0.012 inch). Then the metal cans must be packed in wooden boxes (4C1, 4C2, 4D, or 4F) surrounded on all sides by at least 25 mm (1 inch) of dry sawdust. Not more than 100 ml (3.4 fluid ounces) or 100 g (3.5 ounces) of toxic materials may be packed in one outer wooden box.

A6.18.2.2. If the liquid toxic material does not exceed 5 ml (0.2 fluid ounces) or the solid toxic material does not exceed 20 g (0.7 ounces), they may be packed in glass inner receptacles with screw-top closures of not less than 60 ml (2 ounces) that are hermetically sealed. Twelve bottles containing toxic material not exceeding 100 ml (3.4

ounces) for liquids or 100 g (3.5 ounces) for solids may be placed in a plastic carrying case. Each glass receptacle must be surrounded by absorbent cushioning material and must also be separated from each other by sponge rubber partitions. The plastic carrying case must be placed in a tightly fitted fiberboard box and then placed in a tight fitting wooden box (4C1, 4C2, 4D, or 4F).

A6.19. Hexaethyl Tetraphosphate and Compressed Gas Mixtures; Insecticide Gases, Toxic, NOS; Parathion and Compressed Gas Mixture; Tetraethyl Dithiopyrophosphate and Gases, in Solution or Tetraethyl Dithiopyrophosphate and Gases, Mixtures (LC50 Less Than or Equal to 200 Parts Per Million (ppm)); Tetraethyl Dithiopyrophosphate and Gases, in Solution or Tetraethyl Dithiopyrophosphate and Gases, Mixtures (LC50 over 200 but not Greater Than 5000 ppm); Tetraethyl Pyrophosphate and Compressed Gas Mixture (LC50 Less Than or Equal to 200 ppm); Tetraethyl Pyrophosphate and Compressed Gas Mixture (LC50 Over 200 but not greater than 5000 ppm). See 2.9 for additional requirements.

A6.19.1. Handling Instructions. These materials and mixtures are extremely dangerous poisons. Wear approved chemical safety mask and clothing when handling this material.

A6.19.2. Packaging Requirements. Hexaethyl tetraphosphate, parathion, tetraethyl dithiopyrophosphate, and tetraethyl pyrophosphate may be mixed with a nonflammable compressed gas. This mixture must not contain more than 20 percent by weight of an organic phosphate and must be packaged in DOT specification 3A240, 3AA240, 3B240, 4A240, 4B240, 4BA240, or 4BW240 cylinders meeting the following requirements:

- Each cylinder must not be charged with more than 5 kg (11.0 pounds) of the mixture. The maximum filling density of the cylinder must not exceed 80 percent of its water capacity.
- Each cylinder must be charged in compliance with A3.2.2.5.
- No cylinder may be equipped with an education tube or a fusible plug.
- No cylinder may be equipped with any valve unless the valve is a type approved by the DOT.

A6.19.2.1. Cylinders must be overpacked in a fiberboard box (4G) and packaged in a way to protect each valve or other closing device from damage. Except as provided in A6.18.2.2, no more than four cylinders may be packed in a box. Each box with its closing device protection must be sufficiently strong to protect all parts of each inside cylinder from deformation or breakage if the completed package is dropped 1.8 m (5.9 feet) onto solid concrete impacting at the package's weakest point.

A6.19.2.2. Cylinders may be packed in a strong wooden box (4C1, 4C2, 4D, or 4F) and packed in a way to protect each valve or other closing device from damage. No more than twelve cylinders may be packed in one outer wooden box. Each wooden box with its closing device protection must be sufficiently strong to protect all parts of each inside cylinder from deformation or breakage if the completed package is dropped 1.8 m (5.9 feet) onto solid concrete impacting at the package's weakest point.

★A6.20. Packaging for Class 2.3 Materials, Poisonous by Inhalation (Hazard Zone A).

A6.20.1. Handling Instructions. These items are extremely dangerous. Wear approved chemical safety mask and clothing when handling this material.

A6.20.2. Packaging Requirements. Package Class 2.3, PG I materials with an Inhalation Hazard Zone A as follows:

A6.20.2.1. In DOT cylinders as identified in 49 CFR, part 178, subpart C, except that specification 8, 8AL, and 39 cylinders are not authorized. Cylinders must also meet the requirements of A3.3.2.

A6.20.2.2. Pack in an inner drum (1A1, 1B1, 1H1, 1N1, or 6HA1), then place in an outer drum (1A2 or 1H2). Both the inner and outer drum must be tested to the PG I performance level. The outer 1A2 drum must have a minimum thickness of 1.35 mm (0.053 inches). The outer 1H2 drum must have a minimum thickness of 6.30 mm (0.248 inches). The outer 1A2 and 1H2 drums must withstand a hydrostatic test pressure of 100 kPa (15 psi). The capacity of the inner drum must not exceed 220 L (58 gallons). The inner drum must also meet the following requirements:

- Satisfactorily withstand a hydrostatic pressure test (as outlined in 49 CFR, paragraph 178.605) of 550 kPa (80 psig).
- Satisfactorily withstand a leak-proofness test (as outlined in 49 CFR, paragraph 178.604) using an internal air pressure at 55 degrees C (130 degrees F) of at least twice the vapor pressure of the material to be packaged.
- Have screw-type closures that are:
 - Closed and tightened to a torque as prescribed by the closure manufacturer, using a device that is capable of measuring torque.

- Physically held in place by any means capable of preventing back-off or loosening of the closure by impact or vibration during transportation.
- Provided with a cap seal that is properly applied according to the cap seal manufacturer's recommendations. The cap seal must be capable of withstanding an internal pressure of at least 100 kPa (15 psi).
- Meet the following minimum thickness requirements:
 - If the capacity of the inner drum is less than or equal to 120 L (32 gallons) the minimum thickness of the inner drum is: 1.3 mm (0.051 inches) for 1A1 and 1N1 drums, 3.9 mm (0.154 inches) for 1B1 drums, 3.16 mm (0.124 inches) for 1H1 drums, 1.58 mm (0.0622 inches) for the plastic inner container and 0.96 mm (0.0378) for the outer steel drum of a 6HA1 drum.
 - If the capacity of the inner drum is greater than 120 L (32 gallons) the minimum thickness of the inner drum is: 1.7 mm (0.067 inches) for 1A1 and 1N1 drums, 4.7 mm (0.185 inches) for 1B1 drums, 3.16 mm (0.124 inches) for 1H1 drums, 1.58 mm (0.0622 inches) for the plastic inner container and 1.08 mm (0.0378) for the outer steel drum of a 6HA1 drum.
- Cushion the inner drum within the outer drum with a shock-mitigating, nonreactive material. There must be a minimum of 5.0 cm (2 inches) of cushioning material between the outer surface (side) of the inner drum and the inner surface (side) of the outer drum, and at least 7.6 cm (3 inches) of cushioning material between the outer surface (top and bottom) of the inner drum and the inner surface (top and bottom) of the outer drum.

A6.20.2.3. Pack in an inner packaging system that consists of an impact-resistant receptacle of glass, earthenware, plastic, or metal securely cushioned with a nonreactive absorbent material. The package must be packed within a leak-tight packaging of metal or plastic, then packed in a steel drum (1A2), aluminum drum (1B2), metal drum (other than steel or aluminum (1N2)), plywood drum (1D), fiber drum (1G), plastic drum (1H2), wooden barrel (2C2), steel jerrican (3A2), plastic jerrican (3H2), steel box (4A), aluminum box (4B), natural wood box (4C1 or 4C2), plywood box (4D), reconstituted wood box (4F), fiberboard box (4G), expanded plastic box (4H1), or solid plastic box (4H2.) The capacity of the inner receptacle must not exceed 4 L (1 gallon). An inner receptacle that has a closure, must have the closure held in place by any means capable of preventing backoff or loosening of the closure by impact or vibration during transportation. Both the inner packaging system and the outer container must each meet the test requirements of the PG I performance level independently. The total amount of liquid that can be packed in the outer container must not exceed 16 L (4 gallons).

A6.21. Nitric Oxide. See 2.9 for additional requirements.

A6.21.1. **Handling Instructions.** Nitric oxide is extremely dangerous and poisonous. Wear an approved safety mask and clothing when handling this material.

A6.21.2. **Packaging Requirements.** Pack nitric oxide in DOT 3A1800, 3AA1800, 3E1800, or 3AL1800 cylinders, charged to a pressure of not more than 5,170 kPa (750 psi) at 21 degrees C (70 degrees F). Cylinders must be equipped with a valve of stainless steel and a valve seat of material that is not deteriorated by contact with nitric oxide or nitrogen dioxide. Cylinders or valves must not be equipped with safety devices (pressure relief) of any type. Ensure valve outlets are sealed by a solid threaded cap or plug and an inert gasketing material. Each cylinder must be cleaned as identified in 49 CFR, 173.337(c). Additionally:

A6.21.2.1. Pack cylinders, DOT 3E1800, in strong wooden boxes designed to protect valves from injury or accidental functioning under conditions incident to transportation.

A6.21.2.2. Cylinders, DOT 3A, 3AA, and 3AL, must have their valves protected by metal caps, or other equally protective guards, securely attached to the cylinders and be of sufficient strength to protect the valves from injury during transit, or by packing in strong wooden boxes designed to protect valves from injury or accidental functioning under conditions incident to transportation.

A6.22. Ethyl Methyl Ether. Each packaging must meet the requirements of the PG I performance level.

A6.22.1. Package items in combination packages consisting of glass, earthenware, plastic, metal receptacles, or glass ampoules, then packed in steel drums (1A1 or 1A2), aluminum drums (1B1 or 1B2), metal drums other than steel or aluminum (1N1 or 1N2), plywood drum (1D), fiber drum (1G), plastic drum (1H1 or 1H2), steel jerrican (3A1 or 3A2), plastic jerrican (3H1 or 3H2), steel box (4A1 or 4A2), aluminum box (4B1 or 4B2), natural wood box (4C1 or 4C2), plywood box (4D), reconstituted wood box (4F), fiberboard box (4G), expanded plastic box (4H1), solid plastic box (4H2).

A6.22.2. Package items in single packagings consisting of steel drums (1A1 or 1A2), aluminum drum (1B1 or 1B2), metal drum other than steel or aluminum (1N1 or 1N2), plastic drum (1H1 or 1H2), steel jerrican (3A1 or 3A2), plastic jerrican (3H1 or 3H2), plastic receptacle in steel, aluminum, fiber or plastic drum (6HA1, 6HB1, 6HG1, 6HH), plastic receptacle in steel, aluminum, wooden, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, 6HG2), glass, porcelain or stoneware in steel, aluminum or fiber drum (6PA1, 6PB1, 6PG1), glass, porcelain or stoneware in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, 6PG2), glass, porcelain or stoneware in solid or expanded plastic packaging (6PH1 or 6PH2).

A6.22.3. Any DOT specification cylinders as prescribed for any compressed gas, except for acetylene.

A6.23. Gas Generator Assemblies. Package gas generator assemblies (aircraft) containing liquefied non-flammable, non-toxic gas and a solid propellant cartridge as follows:

- Package the gas in specification steel cylinders authorized for any compressed gas except acetylene not exceeding 10.5L (2.8 gallons) internal volume and having a minimum design burst pressure of 19,000 kPa (2,857 psi).
- Protect fittings against damage under conditions normal to transport, any trigger must be fitted with a safety locking pin, and a non-propulsive plug must be installed on the discharge tube; and
- Individually and tightly pack each complete unit to prevent movement in wooden boxes (4C1 or 4C2), plywood boxes (4D), reconstituted wood boxes (4F), fiberboard boxes (4G), or plastic boxes (4H1 and 4H2) of PG II performance level, or in the original manufacturer's transit box.

Attachment 7

CLASS 3--FLAMMABLE LIQUIDS

A7.1. General Requirements. This attachment contains information concerning the packaging and general handling instructions for Class 3 material (flammable liquids).

A7.2. General Handling Instructions. Store flammable liquids in cool, well-ventilated areas. Do not store near sources of heat, flames, sparks, combustible materials, or oxidizing agents. Keep containers tightly closed to prevent the evaporation of flammable liquids. Although classed as a flammable liquid, some materials in this attachment may also be described as corrosive or toxic. In the event of leakage or spillage, use rubber gloves, goggles, aprons, and respirators.

★A7.3. Packaging for Class 3 Materials. Package in (see also Atch 3):

A7.3.1. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2) with inside glass, earthenware, plastic, or metal receptacles.

A7.3.2. Plywood drum (1D), fiber drum (1G), or plastic drum (1H1 or 1H2), with inside glass, earthenware, plastic, or metal receptacles.

A7.3.3. Wooden barrel (2C2), with inside glass, earthenware, plastic, or metal receptacles. Not authorized for PG I material.

A7.3.4. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2), with inside glass, earthenware, plastic, or metal receptacles.

A7.3.5. Steel box (4A) or aluminum box (4B) with inside glass, earthenware, plastic, or metal receptacles.

A7.3.6. Natural wood box (4C1 or 4C2), plywood box (4D), or reconstituted wood box (4F), with inside glass, earthenware, plastic, or metal receptacles.

A7.3.7. Fiberboard box (4G) with inside glass, earthenware, plastic, or metal receptacles.

A7.3.8. Expanded plastic box (4H1) or solid plastic box (4H2) with inside glass, earthenware, plastic, or metal receptacles.

A7.3.9. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2).

A7.3.10. Plastic drum (1H1 or 1H2) or fiber drum (1G) with liner (only authorized for PG III material).

A7.3.11. Wooden barrel (2C1). Not authorized for PG I material.

A7.3.12. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2).

A7.3.13. Single, composite package comprised of a plastic receptacle in steel, aluminum, fiber, or plastic drum (6HA1, 6HB1, 6HG1, or 6HH1).

A7.3.14. Single, composite package comprised of a plastic receptacle in steel, aluminum, wooden, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, or 6HG2).

A7.3.15. Single, composite package comprised of glass, porcelain, or stoneware in steel, aluminum, or fiber drum (6PA1, 6PB1, or 6PG1).

A7.3.16. Single, composite package comprised of glass, porcelain, or stoneware, in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, or 6PG2).

A7.3.17. Single, composite package comprised of glass, porcelain, or stoneware in solid or expanded plastic packaging (6PH1 or 6PH2).

A7.3.18. Single, composite package comprised of a plastic receptacle in a plywood drum (6HD1.) Not authorized for PG I material.

A7.3.19. DOT specification cylinders as prescribed for any compressed gas, except DOT 8 (acetylene) and DOT 3HT.

A7.3.20. Pack BLU-27 firebombs according to SPI 1325-912-3175. Pack BLU-32 firebombs according to SPI 1325-912-3175 or SPI 1325-483-3035. Do not stack containers more than two high for air transportation. Ship firebombs as flammable liquids, NOS.

A7.3.21. DOT 5L jerry cans authorized by paragraph 3.7. Completely drain cans for shipment.

A7.3.22. MIL-D-23119 500-gallon capacity collapsible fabric drums authorized under 3.7. Five hundred (500) gallon fabric drums shipped on other than tactical/contingency/emergency missions must be drained to the greatest extent possible.

A7.3.23. Bulk storage tanks completely drained according to paragraph 3.7.2.

A7.4. Refrigerating Machine. A refrigerating machine assembled for shipment and containing 7 kg (15 pounds) or less of flammable liquid for operation in a strong, tight receptacle is excepted from specification packaging, marking, and labeling except for the PSN of the flammable liquid.

A7.5. Aircraft Hydraulic Power Unit Fuel Tank.

A7.5.1. **Handling Instructions.** In the event of a leak during transportation of hydrazine, crew members should use their aircraft oxygen masks in a positive pressure mode.

A7.5.2. **Packaging Requirements.** Aircraft hydraulic power unit fuel tanks containing a mixture of anhydrous hydrazine and monomethyl hydrazine (M86 fuel) and designed for installation as complete units in aircraft are excepted from specification packaging requirements if the units comply with one of the following:

- The unit must consist of an aluminum pressure vessel made from tubing and having welded heads. Primary containment of the fuel within this vessel must consist of a welded aluminum bladder having a maximum internal volume of 46 L (12 gallons). The outer vessel must have a minimum design gauge pressure of 1.275 kPa (185 psi) and a minimum burst gauge pressure of 2.755 kPa (400 psi). Each vessel must be leak-checked during manufacture and before shipment and must be found leak proof. The complete inner unit must be securely packed in noncombustible cushioning material, in a strong outer tightly closed metal packaging that will adequately protect all fittings. The maximum quantity of fuel per unit and package is 42 L (11 gallons).
- The unit must consist of an aluminum pressure vessel. Primary containment of the fuel within this vessel must consist of a welded hermetically sealed fuel compartment with an elastomeric bladder having a maximum internal volume of 46 L (12 gallons). The pressure vessel must have a minimum design gauge pressure of 5.17 kPa (750 psi). Each vessel must be leak-checked during manufacture and before shipment and must be found leak proof. The complete inner unit must be securely packed in noncombustible cushioning material, in a strong outer tightly closed metal packaging that will adequately protect all fittings. The maximum quantity of fuel per unit and package is 42 L (11 gallons).

A7.6. Packaging for Class 3 Materials, Poisonous by Inhalation (Hazard Zone A or B). Package Class 3 materials with an Inhalation Hazard (Hazard Zone A and B) as follows:

A7.6.1. Package in DOT specification cylinders as identified in 49 CFR, part 178, subpart C, except that specification 8, 8AL, and 39 cylinders are not authorized. Cylinders must also meet the requirements of A3.3.2.

A7.6.2. Pack in an inner drum (1A1, 1B1, 1N1, 1H1, or 6HA1), then place in an outer drum (1A2 or 1H2). Both the inner and outer drum must be tested to the PG I performance level. The outer 1A2 drum must have a minimum thickness of 1.35 mm (0.053 inches). The outer 1H2 drum must have a minimum thickness of 6.30 mm (0.248 inches). The capacity of the inner drum (1A1, 1B1, or 1N1) must not exceed 220 L (58 gallons). The inner drum must also meet the following requirements:

- Satisfactorily withstand a hydrostatic pressure test (as outlined in 49 CFR, paragraph 178.605) of 550 kPa (80 psig).
- Satisfactorily withstand a leak proof test (as outlined in 49 CFR, 178.604) using an internal air pressure at 55 degrees C (131 degrees F) of at least twice the vapor pressure of the material to be packaged.
- Have screw-type closures that meet all the following requirements:
 - Closed and tightened to a torque as prescribed by the closure manufacturer, using a device that is capable of measuring torque.
 - Physically held in place by any means capable of preventing backoff or loosening of the closure by impact or vibration during transportation.
- Provided with a cap seal that is properly applied according to the cap seal manufacturer's recommendations. The cap seal must be capable of withstanding an internal pressure of at least 100 kPa (15 psi).
- Meet the following minimum thickness requirements:

- 1A1 and 1N1 drums with a capacity of less than or equal to 120 L (32 gallons) must have a minimum thickness of 1.3 mm (0.051 inches). 1B1 drums with a capacity of less than or equal to 120 L (32 gallons) must have a minimum thickness of 3.9 mm (0.154 inches).
- 1A1 and 1N1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 1.7 mm (0.067 inches). 1B1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 4.7 mm (0.185 inches).

A7.6.2.1. Cushion the inner drum within the outer drum with a shock-mitigating, non-reactive material. There must be a minimum of 5.0 cm (2 inches) of cushioning material between the outer surface (side) of the inner drum and the inner surface (side) of the outer drum. There must also be at least 7.6 cm (3 inches) of cushioning material between the outer surface (top and bottom) of the inner drum and the inner surface (top and bottom) of the outer drum.

A7.6.3. Pack in an inner packaging system that consists of an impact-resistant receptacle of glass, earthenware, plastic, or metal securely cushioned with a non reactive absorbent material. The package must be packed within a leak-tight packaging of metal or plastic, then packed in a steel drum (1A2), aluminum drum (1B2), metal drum (other than steel or aluminum (1N2)), plywood drum (1D), fiber drum (1G), plastic drum (1H2), wooden barrel (2C2), steel jerrican (3A2), plastic jerrican (3H2), steel box (4A), aluminum box (4B), natural wood box (4C1 or 4C2), plywood box (4D), reconstituted wood box (4F), fiberboard box (4G), expanded plastic box (4H1), or solid plastic box (4H2). The capacity of the inner receptacle must not exceed 4 L (1 gallon). An inner receptacle that has a closure must have a screw-type closure, which is held in place by any means capable of preventing backoff or loosening of the closure by impact or vibration during transportation. Both the inner packaging system and the outer container must each meet the test requirements of the PG I performance level independently. The total amount of liquid that can be packed in the outer container must not exceed 16 L (4 gallons).

A7.6.4. This paragraph is only authorized for Crotonaldehyde, stabilized; Diketene, Stabilized; Dimethylhydrazine, symmetrical; Isopropyl Chloroformate and Methyl Orthosilicate. Pack in metal drums (1A1, 1B1, or 1N1), or plastic drum (1H1), then place in metal drums (1A2 or 1H2), or a plastic receptacle with outer steel drum (6HA1). Both the inner and outer drum must be tested to the PG I performance level. The outer 1A2 drum must have a minimum thickness of 1.35 mm (0.053 inches). The outer 1H2 drum must have a minimum thickness of 6.30 mm (0.248 inches). The capacity of the inner drum (1A1, 1B1, 1N1, or 1H1) must not exceed 220 L (58 gallons). The inner drum must meet the following requirements:

- Satisfactorily withstand a leak-proof test (as outlined in 49 CFR, paragraph 178.604) using an internal air pressure at 55 degrees C (131 degrees F) of at least twice the vapor pressure of the material to be packaged.
 - Have screw-type closures that meet all the following requirements:
 - Closed and tightened to a torque as prescribed by the closure manufacturer, using a device that is capable of measuring torque.
 - Physically held in place by any means capable of preventing backoff or loosening of the closure by impact or vibration during transportation.
 - Provided with a cap seal that is properly applied according to the cap seal manufacturer's recommendations. The cap seal must be capable of withstanding an internal pressure of at least 100 kPa (15 psi).
- Meet the following minimum thickness requirements:
 - 1A1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 0.69 mm (0.027 inches). 1B1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 2.79 mm (0.110 inches). 1H1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 1.14 mm (0.045 inches). 6HA1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 1.58 mm (0.0625 inches) for the inner plastic drum and a minimum thickness of 0.96 mm (0.038 inches) for the outer steel drum.
 - 1A1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 1.08 mm (0.043 inches). 1B1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 3.9 mm (0.154 inches). 1H1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 3.16 mm (0.125 inches). 6HA1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 1.58 mm (0.0625 inches) for the inner plastic drum and a minimum thickness of 0.96 mm (0.038 inches) for the outer steel drum.

- 1A1 or 1N1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 1.35 mm (0.053 inches). 1B1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 4.7 mm (0.185 inches). 1H1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 3.16 mm (0.124 inches). 6HA1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 1.58 mm (0.0625 inches) for the inner plastic drum and a minimum thickness of 1.08 mm (0.43 inches) for the outer steel drum.

A7.6.4.1. Cushion the inner drum within the outer drum with a shock-mitigating, non reactive material. There must be a minimum of 5.0 cm (2 inches) of cushioning material between the outer surface (side) of the inner drum and the inner surface (side) of the outer drum. There must also be at least 7.6 cm (3 inches) of cushioning material between the outer surface (top and bottom) of the inner drum and the inner surface (top and bottom) of the outer drum.

A7.7. Polyester Resin Kits. Polyester resin and fiberglass repair kits consist of two components: a base material in Class 3, PG II or III, and an organic peroxide activator.

- Only organic peroxides of Type D, E, or F not requiring temperature controls are authorized.
- Assign PG II or III according to the criteria for Class 3, applied to the base material.
- Ensure each component is separately packed in an inner packaging. The components may be placed in the same outer packaging provided they will not react dangerous in the event of leakage.
- Pack organic peroxides in inner plastic or flexible tube packaging. Maximum quantity of organic peroxide per inner packaging is 125 ml (4.22 ounces) for liquids and 500 g (1 lb.) for solids.
- Pack flammable liquids in inner glass or earthenware, plastic, metal, or aluminum packaging.
- Pack the inner packagings in one of the following outer packagings:

A7.7.1. Steel (1A2), aluminum (1B2), plywood (1D), fiber (1G), or plastic (1H2) drum.

A7.7.2. Steel (3A2) or plastic (3H2) jerrican.

A7.7.3. Fiberboard (4G), wooden (4C1 or 4C2), reconstituted wood (4F), plywood (4D), or plastic (4H2) box.

Attachment 8

CLASS 4--FLAMMABLE SOLIDS, SPONTANEOUSLY COMBUSTIBLE MATERIAL, AND DANGEROUS WHEN WET MATERIAL

A8.1. General Requirements. This attachment contains information concerning the packaging and general handling instructions for Class 4.1 (flammable solids), Class 4.2 (spontaneously combustible material), and Class 4.3 (dangerous when wet material).

A8.2. General Handling Instructions. Store Class 4 material in a cool, well-ventilated area away from moisture. Do not store near corrosives (Class 8). Tightly and securely close all containers. These items may be water reactive and spontaneously combustible. Do not pack Class 4 material in the same outside container with corrosive liquids, unless the corrosive liquids are in bottles cushioned by incombustible, nonreactive absorbent material. Place the cushioned bottles in tightly closed metal containers. Material in quantities not over 118 ml (4 ounces) in securely closed metal cans can be packed for military air transport in the same compartment with other securely packed materials necessary for a complete fumigant.

A8.3. Packaging for Class 4 Liquids. Package in (see also Atch 3):

A8.3.1. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2) with inside glass, earthenware, plastic, or metal receptacles.

A8.3.2. Plywood drum (1D), fiber drum (1G), or plastic drum (1H1 or 1H2), with inside glass, earthenware, plastic, or metal receptacles.

A8.3.3. Wooden barrel (2C2), with inside glass, earthenware, plastic, or metal receptacles. Not authorized for PG I material.

A8.3.4. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2), with inside glass, earthenware, plastic, or metal receptacles.

A8.3.5. Steel box (4A) or aluminum box (4B) with inside glass, earthenware, plastic, or metal receptacles.

A8.3.6. Natural wood box (4C1 or 4C2), plywood box (4D), or reconstituted wood box (4F), with inside glass, earthenware, plastic, or metal receptacles.

A8.3.7. Fiberboard box (4G) with inside glass, earthenware, plastic, or metal receptacles.

A8.3.8. Expanded plastic box (4H1) or solid plastic box (4H2) with inside glass, earthenware, plastic, or metal receptacles.

A8.3.9. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2).

A8.3.10. Plastic drum (1H1 or 1H2) or fiber drum (1G) with liner (only authorized for PG III material).

A8.3.11. Wooden barrel (2C1). Not authorized for PG I material.

A8.3.12. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2).

A8.3.13. Single composite package comprised of a plastic receptacle in steel, aluminum, fiber, or plastic drum (6HA1, 6HB1, 6HG1, or 6HH1).

A8.3.14. Single, composite package comprised of a plastic receptacle in steel, aluminum, wooden, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, or 6HG2).

A8.3.15. Single, composite package comprised of glass, porcelain, or stoneware in steel, aluminum, or fiber drum (6PA1, 6PB1, or 6PG1).

A8.3.16. Single, composite package comprised of glass, porcelain, or stoneware, in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, or 6PG2).

A8.3.17. Single, composite package comprised of glass, porcelain, or stoneware in solid or expanded plastic packaging (6PH1 or 6PH2).

A8.3.18. Single, composite package comprised of a plastic receptacle in a plywood drum (6HD1). Not authorized for PG I material.

A8.3.19. DOT specification cylinders as prescribed for any compressed gas, except DOT 8 (acetylene) and DOT 3HT.

A8.4. Packaging for Class 4 Solids. Package in (see also A3.3.4.1):

- A8.4.1. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2) with inside glass, earthenware, plastic, or metal receptacles.
- A8.4.2. Plywood drum (1D), fiber drum (1G), or plastic drum (1H1 or 1H2), with inside glass, earthenware, plastic, or metal receptacles.
- A8.4.3. Wooden barrel (2C2), with inside glass, earthenware, plastic, or metal receptacles.
- A8.4.4. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2), with inside glass, earthenware, plastic, or metal receptacles.
- A8.4.5. Steel box (4A) or aluminum box (4B) with inside glass, earthenware, plastic, or metal receptacles.
- A8.4.6. Natural wood box (4C1 or 4C2), plywood box (4D), or reconstituted wood box (4F), with inside glass, earthenware, plastic, or metal receptacles.
- A8.4.7. Fiberboard box (4G) with inside glass, earthenware, plastic, or metal receptacles.
- A8.4.8. Solid plastic box (4H2) with inside glass, earthenware, plastic, or metal receptacles.
- A8.4.9. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2).
- A8.4.10. Plywood drum (1D). Not authorized for PG I material.
- A8.4.11. Plastic drum (1H1 or 1H2).
- A8.4.12. Fiber drum (1G).
- A8.4.13. Wooden barrel (2C1 or 2C2). Not authorized for PG I material.
- A8.4.14. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2).
- A8.4.15. Steel box with liner (4A), or aluminum box with liner (4B).
- A8.4.16. Steel box (4A), aluminum box (4B). Not authorized for PG I material.
- A8.4.17. Natural wood box sift-proof (4C2).
- A8.4.18. Natural wood box (4C1). Not authorized for PG I material.
- A8.4.19. Plywood box (4D) or reconstituted wood box (4F). Not authorized for PG I material.
- A8.4.20. Fiberboard box (4G). Not authorized for PG I material.
- A8.4.21. Expanded plastic box (4H1) or solid plastic box (4H2). Not authorized for PG I material.
- A8.4.22. Bag, woven plastic (5H1, 5H2, or 5H3); bag, plastic film (5H4); bag, textile (5L1, 5L2, or 5L3); bag, paper, multiwall, water-resistant (5M2). Not authorized for PG I material.
- A8.4.23. Single, composite package comprised of a plastic receptacle in steel, aluminum, plywood, fiber, or plastic drum (6HA1, 6HB1, 6HD1, 6HG1, or 6HH1).
- A8.4.24. Single, composite package comprised of a plastic receptacle in steel, aluminum, wood, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, or 6HG2).
- A8.4.25. Single, composite package comprised of glass, porcelain, or stoneware in steel, aluminum, plywood, or fiber drum (6PA1, 6PB1, 6PD1, or 6PG1).
- A8.4.26. Single, composite package comprised of glass, porcelain, or stoneware, in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, or 6PG2).
- A8.4.27. Single, composite package comprised of glass, porcelain, or stoneware in expanded or solid plastic packaging (6PH1 or 6PH2).

A8.5. Class 4 Materials requiring CAA. Ship Class 4 materials identified in table A4.1 to this paragraph according to a competent authority approval (CAA). See 2.5 for more information on CAAs.

A8.6. Pyrophoric Liquid Materials (Class 4.2). Package in (see also A3.3.4.1):

- A8.6.1. Specification steel or nickel cylinders prescribed for any compressed gas except acetylene having a minimum design pressure of 1206 kPa (175 psi).
- Cylinders with valves must be equipped with steel valve protection caps or collars, or
 - Pack in wooden box (4C1, 4C2, 4D, or 4F), fiberboard box (4G), or plastic box (4H1 or 4H2). Secure cylinders to prevent movement in the box and when offered for transportation, load so that the pressure relief devices remain in the vapor space of the cylinder.
- A8.6.2. Wooden boxes (4C1, 4C2, 4D, or 4F), or fiberboard boxes (4G) with not more than four strong, tight metal cans with inner receptacles of glass or metal. Inner receptacles must not be over 1 L (0.3 gallons) capacity each. Inner receptacles must have a positive screw cap closure with gasket. Cushion inner packagings on all sides with dry, incombustible absorbent cushioning material in a quantity sufficient to absorb the entire contents. The strong, tight metal cans must be closed by positive means, not by friction.

A8.6.3. Steel drums (1A2) or fiber drums (1G) not exceeding 220 L (58 gallons) capacity each with inner metal cans not over 4 L (1 gallon) capacity each, closed by positive means, not by friction. The following additional requirements must be met:

- Inner packaging must have no opening exceeding 25 mm (1 inch) in diameter and must be surrounded with non combustible absorbent cushioning material.
- Net quantity of pyrophoric liquids must not exceed two-thirds of the rated capacity of the outer drum. For example, a 220 L (58 gallon) outer drum must not contain more than 147 L (39 gallons) of pyrophoric liquids.
- A metal plate separator in addition to the noncombustible absorbent cushioning material must separate each layer of inner packagings.

A8.7. Diphenyloxide-4, 4-Disulphohydrazide; N, N Dinitroso-N, N Dimethyl Teraphthlamide (not more than 72 percent as a paste). Temperature controls are not required.

A8.7.1. Package in a fiber drum (1G) with a plastic liner or internal coating. Maximum gross weight is 50 kg (110 pounds).

A8.7.2. Package in a sift-proof fiber drum (1G). Maximum gross weight must not exceed 110 pounds (50 kg).

A8.8. 1,1 Azodi-(Hexahydrobenzonitrile); Benzene Sulfohydrazide; Benzene-1,3-Disulfohydrazide (not more than 52 percent as a paste); N,N-Dinitrosopentamethylenetetramine (not more than 82 percent with phlegmatizer). Temperature controls are not required.

A8.8.1. Package in a fiber drum (1G) with a plastic liner or internal coating. Maximum gross weight is 50 kg (110 pounds).

A8.8.2. Package in an inner container that must be a single plastic bag. Outer packaging must be a fiberboard box (4G). Maximum gross weight is 50 kg (110 pounds).

A8.8.3. Package in an inner packaging which must be either plastic boxes, plastic bottles or jars. Outer packaging must be a fiberboard box (4G). Maximum weight of inner packaging is 5 kg (11 pounds). Maximum gross weight: 40 kg (88 pounds).

A8.8.4. Outer package must be a sift-proof fiber drum (1G). Maximum gross weight is 55 kg (110 pounds).

A8.9. 3-Chloro-4-DiethylaminobenzenediazoniumZinc Chloride; 4-Dipropylaminobenzenediazonium Zinc Chloride; Sodium 2-Diazo-1Naphthol-4-Sulphonate; Sodium 2-Diazo-1-Naphthol-5-Sulphonate. Temperature controls are not required.

A8.9.1. Package in a fiber drum (1G) with a plastic liner or internal coating. Maximum gross weight is 50 kg (110 pounds).

A8.9.2. Package in an inner packaging which must be a plastic bag. Place in an outer packaging which must be either a steel removable head drum (1A2) or an aluminum removable head drum (1B2). Maximum gross weight is 55 kg (121 pounds).

A8.10. 2-Diazo-1-Naphthol-4-Sulphochloride and 2-Diazo-1-Naphthol-5-Sulphochloride. Temperature controls are not required. Package in a fiber drum (1G) with plastic liner or internal coating. Maximum gross weight is 50 kg (110 pounds).

A8.11. Barium Azide, Wetted (with not less than 50 percent water by mass). Pack barium azide, wetted (with not less than 50 percent water by mass) in wooden boxes (4C1, 4C2, 4D, or 4F), or fiber drums (1G) with inner glass receptacles not over 0.5 kg (1.1 pounds) capacity each. Inner receptacles must have rubber stoppers wire-tied for securement. If transportation is to take place when freezing weather is possible, a suitable antifreeze solution must be used to prevent freezing.

A8.12. Calcium Pyrophoric; Magnesium Diphenyl; Metal Catalyst, Dry; Pyrophoric Metals, NOS and Pyrophoric Solids, NOS.

A8.12.1. Package in wooden boxes (4C1, 4C2, 4D, or 4F) with inner metal receptacles that have a positive (not friction) means of closure. Inner metal receptacles must not contain more than 15 kg (33 pounds) each.

A8.12.2. Package in fiberboard boxes (4G) with inner metal receptacles that have a positive (not friction) means of closure. Inner metal receptacles must not contain more than 7.5 kg (17 pounds) each.

A8.12.3. Package in steel drums (1A1 or 1A2) with a gross weight not exceeding 150 kg (331 pounds) each.

A8.12.4. Package in fiber (1G) or plywood (1D) drums with inner metal receptacles that have a positive (not friction) means of closure. Inner metal receptacles must not contain more than 15 kg (33 pounds) each.

A8.13. Films, Nitrocellulose Base (gelatin coated [except scrap]).

A8.13.1. Package in steel drums (1A2), aluminum drums (1B2), steel jerricans (3A2), wooden boxes (4C1, 4C2), plywood boxes (4D), reconstituted wood boxes (4F), or plywood drums (1D) with each reel in a tightly closed metal can, polypropylene cannister, or strong fiberboard inner packaging with its cover securely held in place with adhesive tape or adhesive paper.

A8.13.2. Package in a fiberboard box (4G) or fiber drum (1G) with a single tightly closed metal can, polypropylene cannister, or strong fiberboard inner packaging with cover securely held in place with adhesive tape or adhesive paper. This type packaging authorized only for film not exceeding 600 m (1969 feet).

A8.14. Fusee (railway or highway).

A8.14.1. **General Requirements.** Fusees that are equipped with spikes must have reinforced ends to prevent penetration of the spikes through the outer packaging. Also, the packages must be capable of passing at least one drop test with the spike in a downward position. The PSN "FUSEE" is only valid for domestic movement. For international shipment you must use the PSN "SIGNAL DEVICES, HAND" and package the material as required by the packaging paragraph for signal devices, hand.

A8.14.2. **Packaging Requirements.** Package fusees (railway or highway) in steel drums (1A2), steel jerricans (3A2), wooden box (4C1, 4C2), plywood box (4D), reconstituted wood box (4F), fiberboard box (4G), plywood drum (1D), or fiber drum (1G).

A8.15. Matches, Fusee; Matches, Safety (book, card, or strike-on-box); Matches Strike-Anywhere, and Matches, Wax Vesta. Matches must be of a type that will not ignite spontaneously when subjected to a temperature of 93.3 degrees C (200 degrees F) for 8 consecutive hours in a properly conducted laboratory test.

A8.15.1. Do not pack matches, strike-anywhere, in the same outside container with any other article except safety matches or wax vesta matches. The safety matches or wax vesta matches must be packaged in separate inside containers. Package matches, strike-anywhere in a steel drum (1A2), aluminum drum (1B2), steel jerrican (3A2), wooden box (4C1, 4C2), plywood box (4D), reconstituted wood box (4F), fiberboard box (4G), plywood drum (1D), or fiber drum (1G) with inside securely closed chipboard, fiberboard, wooden, or metal inner containers. Each inside packaging must not contain over 700 matches. Gross weight must not be over 27.2 kg (60 pounds) for fiberboard boxes or 45.4 kg (100 pounds) for all other outer packagings.

A8.15.2. Do not pack fusee matches, in the same outside container with any other article except safety matches or wax vesta matches. The safety matches or wax vesta matches must be packaged in separate inside containers. Package fusee matches in a steel drum (1A2), aluminum drum (1B2), steel jerrican (3A2), wooden box (4C1, 4C2), plywood box (4D), reconstituted wood box (4F), fiberboard box (4G), plywood drum (1D), or fiber drum (1G) with inside securely closed chipboard, fiberboard, wooden, or metal inner containers. Each inside packaging must not contain over 700 matches. Gross weight must not be over 27.2 kg (60 pounds) for fiberboard boxes or 45.4 kg (100 pounds) for all other outer packagings.

A8.15.3. Tightly pack safety matches (strike-on-box, book, and card) or wax vesta matches in securely closed inside containers then packed in a steel drum (1A2), aluminum drum (1B2), steel jerrican (3A2), wooden box (4C1, 4C2), plywood box (4D), reconstituted wood box (4F), fiberboard box (4G), plywood drum (1D), or fiber drum (1G). Safety matches may be packed in the same outside container with non hazardous materials.

A8.16. Pentaborane. Package in any DOT specification cylinder, except those specified for acetylene.

A8.17. Phosphorus, White or Yellow, Dry, or Under Water, or in Solution. The packaging requirements are:

A8.17.1. Phosphorus white or yellow, when dry, must be cast solid and shipped in containers as follows:

A8.17.1.1. Steel drums (1A2) not over a 115 L (30 gallons) capacity each.

A8.17.1.2. In projectiles or bombs without bursting elements.

A8.17.2. Pack phosphorus, white or yellow, when in water or solution, in:

A8.17.2.1. Wooden boxes (4C1, 4C2, 4D, or 4F) with inside soldered or hermetically-sealed metal cans placed inside another soldered or hermetically-sealed metal can.

A8.17.2.2. Wooden boxes (4C1, 4C2, 4D, or 4F) with inside water-tight metal cans containing not over .45 kg (1 pound) of phosphorus with screw-top closures.

A8.17.2.3. Steel drums (1A1 or 1A2). 1A1 drums must not exceed 250 L (66 gallons), and 1A2 drums must not exceed 114 L (30 gallon) capacity each.

A8.17.3. Pack white phosphorus igniters one each in a hermetically-sealed (soldered) or watertight metal can, sealed airtight and positively fastened. Pack no more than 25 metal cans in a wooden box (4C1, 4C2, 4D, or 4F).

A8.18. Smokeless Powder for Small Arms (100 pounds or less). The PSN "SMOKELESS POWDER FOR SMALL ARMS" is only valid for domestic movement. For international shipment you must use the PSN "POWDER, SMOKELESS" and package the material as required by the packaging paragraph for powder, smokeless. The complete package must be a type examined by the Bureau of Explosives, approved by the DOT, and meet A3.3.1. Not more than 45.4 kg (100 pounds) is allowed on the aircraft. Only combination packaging with inner packagings not exceeding 3.6 kg (8 pounds) net mass are authorized. Arrange and protect inner packagings to prevent simultaneous ignition of the contents.

A8.19. Batteries and Cells Containing Sodium.

- Ensure batteries and cells do not contain any hazardous material other than sodium, sulfur, or polysulfides.
- Do not offer batteries or cells for transportation at a temperature at which there is any liquid elemental sodium present in the battery or cell. Ensure the external battery temperature does not exceed 55 degrees C (130 degrees F).
- Ensure batteries are protected from external short circuit.

A8.19.1. Batteries must consist of cells secured within and fully enclosed by a metal casing. Ship unpackaged or in nonspecification protective packagings. UN specification containers are not required.

A8.19.2. Cells must consist of hermetically sealed metal casings that completely enclose the hazardous material. Pack cells with sufficient cushioning material to secure against movement; and to prevent contact between cells and between cells and the internal surfaces of the outer packaging. Package cells into one of the following outer packages meeting the PG II performance level:

- Steel (1A2), aluminum (1B2), plywood (1D), fiber (1G), or plastic (1H2) drum.
- Ordinary wood (4C1), sift-proof wood (4C2), plywood (4D), reconstituted wood (4F), fiberboard (4G), or plastic (4H2) box.

Attachment 9

CLASS 5--OXIDIZING MATERIALS AND ORGANIC PEROXIDES

A9.1. General Requirements. This attachment contains information concerning the packaging and general handling instructions for Class 5.1 (oxidizing material) and Class 5.2 (organic peroxides).

A9.2. General Handling Instructions. Store Class 5 materials in a cool, well-ventilated area away from moisture. Do not store near corrosives.

A9.3. Control and Emergency Temperature. Packaged items in Class 5.2 may require controlled temperature conditions during shipment. Table A9.1 lists the "control temperatures" for specific organic peroxide items (by technical name), when applicable, in column 6a.

- The control temperature is the temperature above which a material may not be offered for transportation.
- The emergency temperature is the temperature at which emergency procedures must be initiated due to imminent danger resulting from overheating of the shipment.
- Table A9.1 identifies emergency temperatures, when applicable, in column 6b. If column 6a or 6b is left blank, there are no control or emergency temperature requirements.
- Guidance for packaging material requiring temperature control during shipment is contained in DLAI 4145.21/TB MED284/NAVSUPINST 4610.31/AFR 167-9, *Preparation of Medical Materiel Requiring Freeze or Chill Environment for Shipment*.

A9.4. Organic Peroxides Table. Table A9.1, Organic Peroxides Table, specifies, by technical name, the organic peroxides authorized for transportation. An organic peroxide identified by technical name in table A9.1 must comply with all of the applicable provisions of the table. An organic peroxide not identified in table A9.1 by technical name or a new formulation of identified organic peroxides requires written approval from the DOT according to 49 CFR 173.128 before transportation. A description of the column headings of table A9.1 is as follows:

- **Technical Name.** The first column specifies the technical name. Use the technical name to determine the applicable UN identification number in column 2.
- **Identification Number.** The second column specifies the UN identification number for a corresponding technical name. Use the identification number to identify the PSN in table A4.1.
- **Concentration of Organic Peroxide.** The third column specifies the concentration (mass percent of organic peroxide) limitations, if any, in mixtures or solutions. The number listed identifies the amount of organic peroxide (by mass) that is authorized for a mixture or solution containing the organic peroxide listed in column 1. Limitations are given as minimums, maximums, or a range, as appropriate. A range includes the lower and upper limits (i.e., 53-100 means from and including 53 percent to and including 100 percent). It is the responsibility of the party producing the material for shipment (contractor or manufacturer) to develop the material within the safe concentration range specified in the table.
- **Concentration of Diluents.** The fourth column specifies the concentration (mass percent) of diluent type A (column 4a), diluent type B (column 4b) or inert solid (column 4c), that must be mixed with the organic peroxide, when required. It is the responsibility of the party producing the material for shipment (contractor or manufacturer) to comply with the safe concentration requirements specified in column 4.
- **Concentration of Water.** Column 5 specifies (in mass percent) the minimum amount of water required in the formulation. If the column is blank, there is no specified requirement for water content.
- **Control and Emergency Temperatures.** Column 6a specifies the control temperature and column 6b specifies the emergency temperature, when required. If a column is left blank, temperature controls are not required.

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| ORGANIC PEROXIDES | See A9.4 for instructions on use of this table. | | | | | | | | |
|---|---|---------------|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| n-BUTYL-4,4-DI-(TERTBUTYL-PEROXY)-VALERATE | 3106 | ≤52 | | | ≥48 | | | | |
| tert-BUTYL HYDROPEROXIDE | 3103 | >73≤90 | | | | ≥10 | | | |
| tert-BUTYL HYDROPEROXIDE | 3105 | ≤80 | ≥20 | | | | | | 3 |
| tert-BUTYL HYDROPEROXIDE | 3109 | ≤72 | | | | ≥28 | | | |
| tert-BUTYL HYDROPEROXIDE and di-tert-BUTYL PEROXIDE | 3103 | ≤82 ≥9 | | | | ≥7 | | | |
| tert-BUTYL MONOPEROXYMALEATE | 3102 | >52,≤100 | | | | | | | |
| tert-BUTYL MONOPEROXYMALEATE | 3103 | ≤52 | ≥48 | | | | | | |
| tert-BUTYL MONO-PEROXYMALEATE as a paste | 3108 | ≤42 | | | | | | | |
| tert-BUTYL MONO-PEROXYPHTHATE | 3102 | ≤100 | | | | | | | |
| tert-BUTYL PEROXYACETATE | 3101 | >52,≤77 | ≥23 | | | | | | |
| tert-BUTYL PEROXYACETATE | 3103 | ≤52 | ≥48 | | | | | | |
| tert-BUTYL PEROXYBENZOATE | 3103 | >77,≤100 | ≥22 | | | | | | |
| tert-BUTYL PEROXYBENZOATE | 3105 | >52, ≤77 | ≥23 | | | | | | 1 |
| tert-BUTYL PEROXYBENZOATE | 3106 | ≤52 | | | ≥48 | | | | |
| tert-BUTYL PEROXYCROTONATE | 3105 | ≤77 | ≥23 | | | | | | |
| tert-BUTYL PEROXYDIETHYL-ACETATE | 3113 | ≤100 | | | | | 20 | 25 | |

| ORGANIC PEROXIDES | See A9.4 for instructions on use of this table. | | | | | | | | |
|--|---|---------------|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| tert-BUTYL PEROXYDIETHYL ACETATE and tert-BUTYL PEROXYBENZOATE | 3105 | ≤33 ≤33 | ≥33 | | | | | | |
| tert-BUTYL PEROXY-2-ETHYLHEXANOATE | 3113 | >52,≤100 | | | | | 20 | 25 | |
| tert-BUTYL PEROXY-2-ETHYLHEXANOATE | 3117 | ≤52 | | ≥48 | | | 20 | 25 | |
| tert-BUTYL PEROXY-2-ETHYLHEXANOATE and 2,2-DI-(TERT-BUTYLPEROXY)BUTANE | 3115 | ≤31 ≤36 | | ≥33 | | | 35 | 40 | |
| tert-BUTYL PEROXY-2-ETHYLHEXANOATE and 2,2-DI-(TERT-BUTYLPEROXY)BUTANE | 3106 | ≤12 ≤14 | ≥14 | | ≥60 | | | | |
| tert-BUTYL PEROXYISOBUTYRATE | 3111 | >52,≤77 | | ≥23 | | | 15 | 20 | |
| tert-BUTYL PEROXYISOBUTYRATE | 3115 | ≤52 | | ≥48 | | | 15 | 20 | |
| tert-BUTYL PEROXY ISOPROPYL CARBONATE | 3103 | ≤77 | ≥23 | | | | | | |
| tert-BUTYL PEROXY-NEODECANOATE | 3115 | >77,≤100 | | | | | -5 | 5 | |
| tert-BUTYL PEROXY-NEODECANOATE | 3115 | ≤77 | | ≥23 | | | 0 | 10 | |
| 3-tert-BUTYLPEROXY-3-PHENYLPHTHALIDE | 3106 | ≤100 | | | | | | | |

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| ORGANIC PEROXIDES | See A9.4 for instructions on use of this table. | | | | | | | | |
|--|---|---------------|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| tert-BUTYL PEROXYPIVALATE | 3113 | >67,≤77 | ≥23 | | | | 0 | 10 | |
| tert-BUTYL PEROXYPIVALATE | 3115 | ≤67 | | ≥33 | | | 0 | 10 | |
| tert-BUTYLPEROXY STARYLCARBONATE | 3106 | ≤100 | | | | | | | |
| tert-BUTYL PEROXY-3,5,5-TRIMETHYLHEXANOATE | 3105 | ≤100 | | | | | | | |
| 3-CHLOROPEROXYBENZOIC ACID | 3102 | >57,≤86 | | | | ≥14 | | | |
| 3-CHLOROPEROXYBENZOIC ACID | 3106 | ≤57 | | | ≥3 | ≥40 | | | |
| CUMYL HYDROPEROXIDE | 3109 | ≤90 | ≥10 | | | | | | |
| CUMYL PEROXYNEODECANOATE | 3115 | ≤77 | | ≥23 | | | -10 | 0 | |
| CUMYL PEROXYPIVALATE | 3115 | ≤77 | | ≥23 | | | -5 | 5 | |
| CYCLOHEXANONE PEROXIDE(S) | 3104 | ≤91 | | | | ≥9 | | | |
| CYCLOHEXANONE PEROXIDE(S) as a paste | 3106 | ≤72 | | | | | | | 4,9 |
| CYCLOHEXANONE PEROXIDE(S) | 3105 | ≤72 | ≥28 | | | | | | 4 |
| CYCLOHEXANONE PEROXIDE(S) | EX-EMPT | ≤32 | | | ≥68 | | | | |
| DIACETONE ALCOHOL PEROXIDES | 3115 | ≤57 | | ≥26 | | ≥8 | | | 4 |
| DIACETYL PEROXIDE | 3115 | ≤27 | | ≥73 | | | | | 5 |
| DI-TERT-AMYL PEROXIDE | 3107 | ≤100 | | | | | | | |
| DIBENZOYL PEROXIDE | 3102 | >52,≤100 | | | ≥48 | | | | 2 |
| DIBENZOYL PEROXIDE | 3102 | >78,≤94 | | | | ≥6 | | | 2 |
| DIBENZOYL PEROXIDE | 3104 | ≤77 | | | | ≥23 | | | |

| ORGANIC PEROXIDES | See A9.4 for instructions on use of this table. | | | | | | | | |
|---|---|---------------|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| DIBENZOYL PEROXIDE | 3106 | ≤62 | | | ≥28 | ≥10 | | | |
| DIBENZOYL PEROXIDE as a paste | 3106 | >52,≤62 | | | | | | | 9 |
| DIBENZOYL PEROXIDE as a paste | 3108 | ≤52 | | | | | | | 9 |
| DIBENZOYL PEROXIDE | 3106 | >35,≤52 | | | ≥48 | | | | |
| DIBENZOYL PEROXIDE | EX-EMPT | ≤35 | | | ≥65 | | | | |
| DIBENZOYL PEROXYDICARBONATE | 3112 | ≤87 | | | | ≥13 | 25 | 30 | |
| DI-(4-tert-BUTYLCYCLOHEXYL) PEROXYDICARBONATE | 3114 | ≤100 | | | | | 30 | 35 | |
| DI-(4-tert-BUTYLCYCLOHEXYL) PEROXYDICARBONATE as a stable dispersion in water | 3119 | ≤42 | | | | | 30 | 35 | |
| DI-tert-BUTYL PEROXIDE | 3107 | ≤100 | | | | | | | |
| 2,2-DI-(tert-BUTYLPEROXY)BUTANE | 3103 | ≤52 | ≥48 | | | | | | |
| 1,1-DI-(tert-BUTYLPEROXY)-CYCLOHEXANE | 3101 | >80,≤100 | | | | | | | |
| 1,1-DI-(tert-BUTYLPEROXY)-CYCLOHEXANE | 3103 | >52,≤80 | ≥20 | | | | | | |
| 1,1-DI-(tert-BUTYLPEROXY)-CYCLOHEXANE | 3105 | ≤52 | ≥48 | | | | | | |
| 1,1-DI-(tert-BUTYLPEROXY)-CYCLOHEXANE | 3106 | ≤42 | ≥13 | | ≥45 | | | | |
| 1,1-DI-(tert-BUTYLPEROXY)-CYCLOHEXANE | 3107 | ≤27 | ≥36 | | | | | | 10 |

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| ORGANIC PEROXIDES | See A9.4 for instructions on use of this table. | | | | | | | | |
|---|---|---------------|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| 2,2-DI-(4,4-tert-BUTYLPER-OXYCYCLOHEXYL)PROPANE | 3106 | ≤42 | | | ≥58 | | | | |
| DI-N-BUTYL PEROXYDICARBONATE | 3115 | >27,≤52 | | ≥48 | | | -15 | -5 | |
| DI-N-BUTYL PEROXYDICARBONATE | 3117 | ≤27 | | ≥73 | | | -10 | 0 | |
| DI-SEC-BUTYL PEROXYDICARBONATE | 3113 | >52,≤100 | | | | | -20 | -10 | |
| DI-SEC-BUTYL PEROXYDICARBONATE | 3115 | ≤52 | | ≥48 | | | -15 | -5 | |
| DI-(2-tert-BUTYLPEROXYISO-PROPYL)-BENZENE(S) | 3106 | >42,≤100 | | | ≥57 | | | | |
| DI-(2-tert-BUTYLPEROXYISO-PROPYL)-BENZENE(S) | EX-EMPT | ≤42 | | | ≥58 | | | | |
| DI-(tert-BUTYLPEROXY)PHTHALATE | 3105 | >42,≤52 | ≥48 | | | | | | |
| DI-(tert-BUTYLPEROXY)PHTHALATE as a paste | 3106 | ≤52 | | | | | | | |
| DI-(tert-BUTYLPEROXY)PHTHALATE | 3107 | ≤42 | ≥58 | | | | | | |
| 2,2-DI-(tert-BUTYLPEROXY)-PROPANE | 3105 | ≤52 | ≥48 | | | | | | |
| 2,2-DI-(tert-BUTYLPEROXY)-PROPANE | 3106 | ≤42 | ≥13 | | ≥45 | | | | |
| 1,1-DI-(tert-BUTYLPEROXY)-3,3,5-TRIMETHYL CYCLOHEXANE | 3101 | >57,≤100 | | | | | | | |

| ORGANIC PEROXIDES | See A9.4 for instructions on use of this table. | | | | | | | | |
|---|---|---------------|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| 1,1-DI-(tert-BUTYLPEROXY)-3,3,5-TRIMETHYL CYCLOHEXANE | 3106 | ≤57 | | | ≥43 | | | | |
| 1,1-DI-(tert-BUTYLPEROXY)-3,3,5-TRIMETHYL CYCLOHEXANE | 3107 | ≤57 | ≥43 | | | | | | |
| DICETYL PEROXYDICARBONATE | 3116 | ≤100 | | | | | 20 | 25 | |
| DICETYL PEROXYDICARBONATE as a stable dispersion in water | 3119 | ≤42 | | | | | 30 | 35 | |
| DI-4-CHLOROBENZOYL PEROXIDE | 3102 | ≤77 | | | | ≥23 | | | |
| DI-4-CHLOROBENZOYL PEROXIDE as a paste | 3106 | ≤52 | | | | | | | |
| DI-4-CHLOROBENZOYL PEROXIDE | EX-EMPT | ≤32 | | | ≥68 | | | | |
| DICUMYL PEROXIDE | 3110 | >42,≤100 | | | ≤57 | | | | |
| DICUMYL PEROXIDE | EX-EMPT | ≤42 | | | ≥58 | | | | |
| DICYCLOHEXYL PEROXYDICARBONATE | 3112 | >91,≤100 | | | | | 5 | 10 | |
| DICYCLOHEXYL PEROXYDICARBONATE | 3114 | ≤91 | | | | ≥9 | 5 | 10 | |
| DIDECANOYL PEROXIDE | 3114 | ≤100 | | | | | 15 | 20 | |
| DI-2,4-DICHLOROBENZOYL PEROXIDE | 3102 | ≤77 | | | | ≥23 | | | |

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| ORGANIC PEROXIDES | See A9.4 for instructions on use of this table. | | | | | | | | |
|--|---|---------------|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| DI-2,4-DICHLOROBENZOYL PEROXIDE as a paste with silicon oil | 3106 | ≤52 | | | | | | | |
| DI-(2-ETHYLHEXYL) PEROXYDICARBONATE | 3113 | >77≤100 | | | | | -20 | -10 | |
| DI-(2-ETHYLHEXYL) PEROXYDICARBONATE | 3115 | ≤77 | | | | | -15 | -5 | |
| DI-(2-ETHYLHEXYL) PEROXYDICARBONATE as a stable dispersion in water | 3117 | ≤42 | | | | | -15 | -5 | |
| DI-(2-ETHYLHEXYL) PEROXYDICARBONATE as a stable dispersion in water (frozen) | 3117 | ≤42 | | | | | -15 | -5 | |
| DIETHYL PEROXYDICARBONATE | 3115 | ≤27 | | ≥73 | | | -10 | 0 | |
| 2,2-DIHYDROPEROXYPROPANE | 3102 | ≤27 | | | ≥73 | | | | |
| DI-(1-HYDROXYCYCLOHEXYL) PEROXIDE | 3106 | ≤100 | | | | | | | |
| DIISOBUTYRYL PEROXIDE | 3111 | >32,≤52 | | ≥48 | | | -20 | -10 | |
| DIISOBUTYRYL PEROXIDE | 3115 | ≤32 | | ≥68 | | | -20 | -10 | |
| DIISOPROPYL PEROXYDICARBONATE | 3112 | >52,≤100 | | | | | -15 | -5 | |
| DIISOPROPYL PEROXYDICARBONATE | 3115 | ≤52 | | ≥48 | | | -10 | 0 | |
| DIISOTRIDECYL PEROXYDICARBONATE | 3115 | ≤100 | | | | | -10 | 0 | |
| DILAULOYL PEROXIDE | 3106 | ≤100 | | | | | | | |

| ORGANIC PEROXIDES | See A9.4 for instructions on use of this table. | | | | | | | | |
|--|---|---------------|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| DILAUROYL PEROXIDE as a stable dispersion in water | 3109 | ≤42 | | | | | | | |
| DI-(2-METHYLBENZOYL)PEROXIDE | 3112 | ≤87 | | | | ≥13 | 30 | 35 | |
| 2,5-DIMETHYL-2,5-DI-(BENZOYL-PEROXY) HEXANE | 3102 | >82,<100 | | | | | | | |
| 2,5-DIMETHYL-2,5-DI-(BENZOYL-PEROXY) HEXANE | 3106 | ≤82 | | | ≥18 | | | | |
| 2,5-DIMETHYL-2,5-DI-(BENZOYL-PEROXY) HEXANE | 3104 | ≤82 | | | | ≥18 | | | |
| 2,5-DIMETHYL-2,5-DI-(tert-BUTYL-PEROXY)HEXANE | 3105 | >52,≤100 | | | | | | | |
| 2,5-DIMETHYL-2,5-DI-(tert-BUTYL-PEROXY)HEXANE | 3106 | ≤52 | | | ≥48 | | | | |
| 2,5-DIMETHYL-2,5-DI-(tert-BUTYL-PEROXY)HEXANE-3 | 3103 | >52,≤100 | | | | | | | |
| 2,5-DIMETHYL-2,5-DI-(tert-BUTYL-PEROXY)HEXANE-3 | 3106 | ≤52 | | | ≥48 | | | | |
| 2,5-DIMETHYL-2,5-DI-(2-ETHYLHEXANOYLPEROXY)HEXANE | 3115 | ≤100 | | | | | 20 | 25 | |
| 2,5-DIMETHYL-2,5-DIHYDROPEROXYHEXANE | 3104 | ≤82 | | | | ≥18 | | | |

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| ORGANIC PEROXIDES | See A9.4 for instructions on use of this table. | | | | | | | | |
|--|---|---------------|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| 2,5-DIMETHYL-2,5-DI-(3,5,5-TRI-METHYLHEXANOYL-PEROXY) HEXANE | 3105 | ≤77 | ≥23 | | | | | | |
| DIMYRISTYL PEROXYDICARBONATE | 3116 | ≤100 | | | | | 20 | 25 | |
| DIMYRISTYL PEROXYDICARBONATE as a stable dispersion in water | 3119 | ≤42 | | | | | 20 | 25 | |
| DI-N-NONANOYL PEROXIDE | 3116 | ≤100 | | | | | 0 | 10 | |
| DI-N-OCTANOYL PEROXIDE | 3114 | ≤100 | | | | | 10 | 15 | |
| DIPEROXY AZELAIC ACID | 3116 | ≤27 | | | ≥73 | | 35 | 40 | |
| DIPEROXY DODECANE DIACID | 3116 | >13,≤42 | | | ≥58 | | 40 | 45 | |
| DIPEROXY DODECANE DIACID | EX-EMPT | ≤13 | | | | | | | |
| DI-(2-PHENOXYETHYL) PEROXYDICARBONATE | 3102 | >85,≤100 | | | | | | | |
| DI-(2-PHENOXYETHYL) PEROXYDICARBONATE | 3106 | ≤85 | | | | ≥15 | | | |
| DIPROPIONYL PEROXIDE | 3117 | ≤27 | | ≥73 | | | 15 | 20 | |
| DI-N-PROPYL PEROXYDICARBONATE | 3113 | ≤100 | | | | | -25 | -15 | |
| DISTEARYL PEROXYDICARBONATE | 3106 | ≤87 | | | ≥13 | | | | |
| DISUCCINIC ACID PEROXIDE | 3102 | >72,≤100 | | | | | | | 7 |
| DISUCCINIC ACID PEROXIDE | 3116 | ≤72 | | | | ≥28 | 10 | 15 | 7 |

| ORGANIC PEROXIDES | See A9.4 for instructions on use of this table. | | | | | | | | |
|--|---|---------------|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| DI-(3,5,5-TRIMETHYL-1,2-DIOXO-LANYL-3) PEROXIDE as a paste | 3116 | ≤52 | | | | | 30 | 35 | 9 |
| DI-(3,5,5-TRIMETHYL-1,2-DIOXO-LANYL-3)PEROXIDE as a paste | 3116 | ≤52 | | | | | 30 | 33 | 9 |
| DI-(3,5,5-TRIMETHYLHEXANOYL) PEROXIDE | 3115 | ≤82 | ≥18 | | | | | | |
| ETHYL-3,3-DI-(tert-BUTYLPEROXY)-BUTYRATE | 3105 | ≤67 | ≥33 | | | | | | |
| ETHYL-3,3-DI-(tert-BUTYLPEROXY)-BUTYRATE | 3103 | >77,≤100 | | | | | | | |
| ETHYL-3,3-DI-(tert-BUTYLPEROXY)-BUTYRATE | 3105 | ≤77 | ≥23 | | | | | | |
| ETHYL-3,3-DI-(tert-AMYLPEROXY)-BUTYRATE | 3106 | ≤52 | | | ≥48 | | | | |
| 3,3,6,6,9,9-HEXAMETHYL-1,2,4,5-TETRAOXACYCLONONANE | 3102 | >52,≤100 | | | | | | | |
| 3,3,6,6,9,9-HEXAMETHYL-1,2,4,5-TETRAOXACYCLONONANE | 3105 | ≤52 | ≥48 | | | | | | |
| 3,3,6,6,9,9-HEXAMETHYL-1,2,4,5-TETRAOXACYCLONONANE | 3106 | ≤52 | | | ≥48 | | | | |

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| ORGANIC PEROXIDES | See A9.4 for instructions on use of this table. | | | | | | | | |
|---|---|---------------|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| ISOPROPYLCUMYL HYDROPEROXIDE | 3109 | ≤72 | ≥28 | | | | | | |
| p-METHYL HYDROPEROXIDE | 3105 | >55,≤100 | | | | | | | |
| p-METHYL HYDROPEROXIDE | 3113 | ≤55 | ≥45 | | | | | | |
| METHYLCYCLOHEXANONE PEROXIDE(S) | 3115 | ≤67 | | ≥33 | | | 35 | 40 | |
| METHYL ETHYL KETONE PEROXIDE(S) | 3101 | ≤52 | ≥48 | | | | | | 4 |
| METHYL ETHYL KETONE PEROXIDE(S) | 3105 | ≤45 | ≥55 | | | | | | 4 |
| METHYL ETHYL KETONE PEROXIDE(S) | 3107 | ≤40 | ≥60 | | | | | | 4,11 |
| METHYL ISOBUTYL KETONE PEROXIDE(S) | 3105 | ≤62 | ≥19 | | | | | | 4 |
| ORGANIC PEROXIDE, SOLID TEMPERATURE CONTROLLED | 3114 | | | | | | | | 6 |
| ORGANIC PEROXIDE, LIQUID, SAMPLE | 3103 | | | | | | | | 6 |
| ORGANIC PEROXIDE, LIQUID TEMPERATURE CONTROLLED | 3113 | | | | | | | | 6 |
| ORGANIC PEROXIDE, SOLID, SAMPLE | 3104 | | | | | | | | 6 |
| PEROXYACETIC ACID, TYPE D,STABILIZED | 3105 | ≤43 | | | | | | | 8 |
| PEROXYACETIC ACID, TYPE E,STABILIZED | 3107 | ≤43 | | | | | | | 8 |

| ORGANIC PEROXIDES | | See A9.4 for instructions on use of this table. | | | | | | | |
|--|------|---|------------------|------------------|------------------|--------------|-------------------|---------------------|-------|
| Technical Name | UN # | Concentration | Diluent Mass % A | Diluent Mass % B | Diluent Mass % 1 | Water Mass % | Control Temp (°C) | Emergency Temp (°C) | Notes |
| PEROXYACETIC ACID, TYPE F, STABILIZED | 3109 | ≤43 | | | | | | | 8 |
| PINANYL HYDROPEROXIDE | 3105 | >55, ≤100 | | | | | | | |
| PINANYL HYDROPEROXIDE | 3109 | ≤55 | ≥45 | | | | | | |
| TETRAHYDRONAPHTHYL HYDROPEROXIDE | 3106 | ≤100 | | | | | | | |
| 1,1,3,3-TETRAMETHYLBUTYL HYDROPEROXIDE | 3105 | ≤100 | | | | | | | |
| 1,1,3,3-TETRAMETHYLBUTYL PEROXY-2-ETHYLHEXANOATE | 3115 | ≤100 | | | | | 20 | 25 | |
| | 3115 | ≤37 | | ≥63 | | | -10 | 0 | |

Notes applicable to table A9.1.

NOTES:

1. Available oxygen must be less than 4.7 percent.
2. For concentration of less than 80 percent, Item 5 is authorized. For concentration of greater than 80 percent but less than 85 percent, Item 4 is authorized. For concentration of greater than 85 percent, maximum package quantity is Item 2.
3. The diluent may be replaced by di-tert-butyl peroxide.
4. Available oxygen must be less than or equal to 9 percent.
5. Only non-metallic packagings are authorized.
6. Samples may only be offered for transportation when all available data indicates that the sample is no more dangerous than an Organic Peroxide type C, and the sample is packaged in accordance with table A9.2 or A9.3, Item 2, in quantities less than (10 kg) 22 pounds per shipment, employing all required temperature controls.
7. Addition of water to this organic peroxide will decrease its thermal stability.
8. Mixtures with hydrogen peroxide, water and acid.
9. With Diluent type A, with or without water.
10. With greater than 3 percent (by mass) ethylbenzene.
11. With greater than 19 percent (by mass) methyl isobutyl ketone.

A9.5. Packaging Requirements for Class 5.2 Organic Peroxides. With the exception of organic peroxide samples, packaging requirements for packaging paragraphs does not specify Class 5.2 organic peroxides. Determine appropriate containers by using table A4.1 generic proper shipping names in conjunction with table A9.2 or table A9.3. Containers selected from tables A9.2 or A9.3 must pass PG II performance tests and must be UN marked. Table A9.2 applies to liquid organic peroxides. Table A9.3 applies to solid organic peroxides. To determine the packaging requirements for organic peroxides:

- Determine the applicable generic PSN.
- Locate the packaging reference (table and item number) for the generic PSN in column 8 of table A4.1. The technical name and associated table or item reference will be listed in lower case letters beneath the generic PSN entry. Select the table or item reference pertaining to the technical name, but use the generic PSN (with technical name in parenthesis) to certify the shipment. The item number is the last number in the packaging reference (i.e., table A9.2.1 is table A9.2, Item 1). Labels, special provisions, etc., specified for the generic PSN also apply to the technical names listed beneath it.
- Turn to table A9.2 or table A9.3 as specified by column 8 of table A4.1.
- Locate the quantity nearest to the quantity to be shipped. This number represents the maximum net quantity per package authorized. Lesser item numbers (quantities) may be used instead of the item number specified for the material. Quantities specified for greater item numbers will not be used. For example, if the packaging reference is table A9.3.4, item number 4 of table A9.3 represents the maximum net quantity of the material that can be shipped in one package. However, the lesser quantities listed for item numbers 1-3 could also be used; quantities listed for item numbers 5-8 could not be used for the material because the quantities exceed the maximum net quantity per package permitted for the material.
- Go across the row that contains the quantity to be shipped to identify the appropriate container (including applicable notes). Any container fitting the general container description in the table may be used if it has been tested to a PG II (or PG I) performance level.
- Column 8 of table A4.1 specifies the packaging requirements (table and item number) for organic peroxides. Table A9.2 specifies the type of packagings and the maximum net quantity per package authorized for liquid organic peroxides. Table A9.3 specifies the type of packaging and the maximum net quantity per package authorized for solid organic peroxides.

Table A9.2 Packaging For Liquid Organic Peroxides.

| PACKAGING FOR LIQUID ORGANIC PEROXIDES (See A9.5 for instructions on use of this table.) | | | | | | | | | |
|--|----------------|--------|-----------|--------|--------|--------|--------|--------|--------|
| Maximum Quantity or Net Mass Permitted per Container | | | | | | | | | |
| TYPE CONTAINERS AND MATERIALS | PACKAGING CODE | A9.2.1 | A9.2.2 | A9.2.3 | A9.2.4 | A9.2.5 | A9.2.6 | A9.2.7 | A9.3.8 |
| STEEL DRUM | 1A1 | | | | | | | 60L | 225L |
| STEEL DRUM (1) | 1A2 | | | | | | | 50Kg | 200Kg |
| ALUMINUM DRUM | 1B1 | | | | | | | 60L | 225L |
| FIBER DRUM | 1G | 0.5Kg | 0.5/ 10Kg | 5Kg | 5/25Kg | 25Kg | 50Kg | 50Kg | 200Kg |
| PLASTIC DRUM | 1H1 | 0.5L | 0.5L | 5L | 5L | 30L | 60L | 60L | 255L |
| PLASTIC JERRICAN | 3H1 | 0.5L | 0.5L | 5L | 5L | 30L | 60L | 60L | 60L |
| WOOD BOX (1) | 4C1 | 0.5Kg | 0.5/ 10Kg | 5Kg | 5/25Kg | 25Kg | 50Kg | 50Kg | 100Kg |
| PLYWOOD BOX (1) | 4D | 0.5Kg | 0.5/ 10Kg | 5Kg | 5/25Kg | 25Kg | 50Kg | 50Kg | 100Kg |
| FIBERBOARD BOX (1) | 4G | 0.5Kg | 0.5/ 10Kg | 5Kg | 5/25Kg | 25Kg | 50Kg | 50Kg | 100Kg |
| PLASTIC RECEPTACLE WITH OUTER STEEL DRUM | 6HA1 | | | | | | | 60L | 225L |
| PLASTIC RECEPTACLE WITH OUTER ALUMINUM DRUM | 6HB1 | | | | | | | 60L | 225L |
| PLASTIC RECEPTACLE WITH OUTER FIBER DRUM | 6HG1 | 0.5L | 0.5L | 5L | 5L | 30L | 60L | 60L | 225L |
| PLASTIC RECEPTACLE WITH OUTER FIBERBOARD BOX | 6HG2 | 0.5L | 0.5L | 5L | 5L | 30L | 60L | 60L | 60L |
| PLASTIC RECEPTACLE WITH OUTER PLASTIC DRUM | 6HH1 | 0.5L | 0.5L | 5L | 5L | 30L | 60L | 60L | 225L |
| PLASTIC RECEPTACLE WITH OUTER SOLID PLASTIC BOX | 6HH2 | 0.5L | 0.5L | 5L | 5L | 30L | 60L | 60L | 60L |

Notes applicable to table A9.2

NOTES:

1. Packaging only authorized as part of a combination packaging. Inner receptacles must be suitable for liquids.
2. For Items 1 through 6, combination packagings containing organic peroxide type B or C, only plastic bottles, plastic jars, glass bottles, or glass ampules may be used as inner packagings. However, glass may only be used for inner receptacles for Items 1 and 2.
3. Where two values are given (i.e. .5/10 kg), the first applies to the maximum net quantity per inner receptacle and the second applies to the maximum net quantity of the complete package.
4. If no entry for an item number appears in a specific row, then the type of packaging specified for the row is not authorized for the item number.

Table A9.3 Packaging For Solid Organic Peroxides.

| PACKAGING FOR SOLID ORGANIC PEROXIDES (See A9.5 for instructions on use of this table.) | | | | | | | | | |
|---|----------------|---------|-----------|---------|---------|---------|---------|---------|---------|
| Maximum Quantity or Net Mass Permitted per Container | | | | | | | | | |
| TYPE CONTAINERS AND MATERIALS | PACKAGING CODE | A.9.3.1 | A.9.3.2 | A.9.3.3 | A.9.3.4 | A.9.3.5 | A.9.3.6 | A.9.3.7 | A.9.3.8 |
| STEEL DRUM | 1A2 | | | | | | | 50Kg | 200Kg |
| ALUMINUM DRUM | 1B2 | | | | | | | 50Kg | 200Kg |
| FIBER DRUM | 1G | 0.5Kg | 0.5/ 10Kg | 5Kg | 5/25Kg | 25Kg | 50Kg | 50Kg | 200Kg |
| PLASTIC DRUM | 1H2 | 0.5Kg | 0.5/ 10Kg | 5Kg | 5/25Kg | 25Kg | 50Kg | 50Kg | 200Kg |
| WOOD BOX | 4C1 | 0.5Kg | 0.5/ 10Kg | 5Kg | 5/25Kg | 25Kg | 50Kg | 50Kg | 100Kg |
| PLYWOOD BOX | 4D | 0.5Kg | 0.5/ 10Kg | 5Kg | 5/25Kg | 25Kg | 50Kg | 50Kg | 100Kg |
| FIBERBOARD BOX | 4G | 0.5Kg | 0.5/ 10Kg | 5Kg | 5/25Kg | 25Kg | 50Kg | 50Kg | 100Kg |
| PLASTIC RECEPTACLE WITH OUTER STEEL DRUM | 6HA1 | | | | | | | 50Kg | 200Kg |
| PLASTIC RECEPTACLE WITH OUTER ALUMINUM DRUM | 6HB1 | | | | | | | 50Kg | 200Kg |
| PLASTIC RECEPTACLE WITH OUTER FIBER DRUM | 6HG1 | 0.5Kg | 0.5Kg | 5Kg | 5Kg | 25Kg | 50Kg | 50Kg | 200Kg |
| PLASTIC RECEPTACLE WITH OUTER FIBERBOARD BOX | 6HG2 | 0.5Kg | 0.5Kg | 5Kg | 5Kg | 25Kg | 50Kg | 50Kg | 75Kg |
| PLASTIC RECEPTACLE WITH OUTER PLASTIC DRUM | 6HH1 | 0.5Kg | 0.5Kg | 5Kg | 5Kg | 25Kg | 50Kg | 50Kg | 200Kg |
| PLASTIC RECEPTACLE WITH OUTER SOLID PLASTIC BOX | 6HH2 | 0.5Kg | 0.5Kg | 5Kg | 5Kg | 25Kg | 50Kg | 50Kg | 75Kg |

Notes applicable to table A9.3

NOTES:

1. For Items 1 through 6, combination packagings containing organic peroxide type B or C, only nonmetallic packagings are authorized. However, glass may only be used for inner receptacles for Items 1 and 2.
2. Where two values are given (i.e. .5/10 kg) the first applies to the maximum net quantity per inner receptacle and the second applies to the maximum net quantity of the complete package.
3. If no entry for an item number appears in a specific row, then the type of packaging in that row is not authorized for that item number.
4. If fire retardant partitions are used, the maximum net weight of the complete package for Item 2 may be 25 kg.

A9.6. Samples of Organic Peroxides. Samples of new organic peroxides or new formulations of identified organic peroxides for which complete test data is not available, and which are being transported for testing and evaluation, may be transported and assigned a PSN for organic peroxide, type C. Data available to the person offering the material for transportation must indicate that the sample would pose a threat no greater than that of an organic peroxide, type B, and that the control temperature, if any, is sufficiently low to prevent any dangerous decomposition and sufficiently high to prevent any dangerous phase separation. Packaging requirements are as follows:

- The sample must be packaged according to table A9.2. or table A9.3.
- The maximum quantity must not exceed 10 kg (22 pounds) per shipment.
- The PSN must be organic peroxide type C, liquid; organic peroxide type C, solid; organic peroxide type C, liquid, temperature controlled; or organic peroxide type C, solid, temperature controlled, as applicable.

A9.7. Packaging for Class 5.1 Liquids. Package in (see A3.3.5 for additional packaging requirements):

A9.7.1. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum other than steel or aluminum (1N1 or 1N2), with inside glass, earthenware, plastic, or metal receptacles.

A9.7.2. Plywood drum (1D), fiber drum (1G), or plastic drum (1H1 or 1H2), with inside glass, earthenware, plastic, or metal receptacles.

A9.7.3. Wooden barrel (2C2) with inside glass, earthenware, plastic, or metal receptacles. Not authorized for PG I material.

A9.7.4. Steel jerrican (3A1 or 3A2) or plastic jerrican (3H1 or 3H2) with inside glass, earthenware, plastic, or metal receptacles.

A9.7.5. Steel box (4A) or aluminum box (4B) with inside glass, earthenware, plastic, or metal receptacles.

A9.7.6. Natural wood box (4C1 or 4C2), plywood box (4D), or reconstituted wood box (4F), with inside glass, earthenware, plastic, or metal receptacles.

A9.7.7. Fiberboard box (4G) with inside glass, earthenware, plastic, or metal receptacles.

A9.7.8. Expanded plastic box (4H1) or solid plastic box (4H2) with inside glass, earthenware, plastic, or metal receptacles.

A9.7.9. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum other than steel or aluminum (1N1 or 1N2).

A9.7.10. Plastic drum (1H1 or 1H2).

A9.7.11. Wooden barrel (2C1). Not authorized for PG I material.

A9.7.12. Steel jerrican (3A1 or 3A2) or plastic jerrican (3H1 or 3H2).

A9.7.13. Single composite package comprised of a plastic receptacle in steel, aluminum, fiber, or plastic drum. (6HA1, 6HB1, 6HG1, or 6HH).

A9.7.14. Single, composite package comprised of a plastic receptacle in steel, aluminum, wooden, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, or 6HG2).

A9.7.15. Single, composite package comprised of glass, porcelain, or stoneware in steel, aluminum, or fiber drum (6PA1, 6PB1, or 6PG1).

A9.7.16. Single, composite package comprised of glass, porcelain, or stoneware, in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, or 6PG2).

A9.7.17. Single, composite package comprised of glass, porcelain, or stoneware in solid or expanded plastic packaging (6PH1 or 6PH2).

A9.7.18. Single, composite package comprised of a plastic receptacle in a plywood drum (6HD1). Not authorized for PG I material.

A9.7.19. DOT specification cylinders as prescribed for any compressed gas, except DOT 8 (acetylene) and DOT 3HT.

A9.8. Packaging for Class 5.1 Solids. Package in (see A3.3.5):

A9.8.1. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum other than steel or aluminum (1N1 or 1N2), with inside glass, earthenware, plastic, or metal receptacles.

A9.8.2. Plywood drum (1D), fiber drum (1G), or plastic drum (1H1 or 1H2), with inside glass, earthenware, plastic, or metal receptacles.

A9.8.3. Wooden Barrel (2C2), with inside glass, earthenware, plastic, or metal receptacles.

A9.8.4. Steel jerrican (3A1 or 3A2) or plastic jerrican (3H1 or 3H2) with inside glass, earthenware, plastic, or metal receptacles.

A9.8.5. Steel box (4A) or aluminum box (4B) with inside glass, earthenware, plastic, or metal receptacles.

A9.8.6. Natural wood box (4C1 or 4C2), plywood box (4D), or reconstituted wood box (4F), with inside glass, earthenware, plastic, or metal receptacles.

A9.8.7. Fiberboard box (4G) with inside glass, earthenware, plastic, or metal receptacles.

A9.8.8. Solid plastic box (4H2) with inside glass, earthenware, plastic, or metal receptacles.

A9.8.9. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum other than steel or aluminum (1N1 or 1N2).

A9.8.10. Plywood drum (1D). Not authorized for PG I material.

A9.8.11. Plastic drum (1H1 or 1H2).

A9.8.12. Fiber drum (1G).

A9.8.13. Wooden barrel (2C1 or 2C2). Not authorized for PG I material.

A9.8.14. Steel jerrican (3A1 or 3A2) or plastic jerrican (3H1 or 3H2).

A9.8.15. Steel box with liner (4A), or aluminum box with liner (4B).

A9.8.16. Steel box (4A) or aluminum box (4B). Not authorized for PG I material.

A9.8.17. Natural wood box, siftproof (4C2).

A9.8.18. Plywood box (4D), reconstituted wood box (4F), or natural wood box (4C1). Not authorized for PG I material.

A9.8.19. Fiberboard box (4G). Not authorized for PG I material.

A9.8.20. Expanded plastic box (4H1) or solid plastic box (4H2).

A9.8.21. Bag, woven plastic (5H1, 5H2, or 5H3); bag, plastic film (5H4); bag, textile (5L1, 5L2, or 5L3); bag, paper, multiwall, water-resistant (5M2). Not authorized for PG I material.

A9.8.22. Single, composite package comprised of a plastic receptacle in steel, aluminum, plywood, fiber, or plastic drum (6HA1, 6HB1, 6HD1, 6HG1, or 6HH).

A9.8.23. Single, composite package comprised of a plastic receptacle in steel, aluminum, wood, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, or 6HG2).

A9.8.24. Single, composite package comprised of glass, porcelain, or stoneware in steel, aluminum, plywood, or fiber drum (6PA1, 6PB1, 6PD1, or 6PG1).

A9.8.25. Single, composite package comprised of glass, porcelain, or stoneware, in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, or 6PG2).

A9.8.26. Single, composite package comprised of glass, porcelain, or stoneware in expanded or solid plastic packaging (6PH1 or 6PH2).

A9.9. Iodine Pentafluoride. Package in any DOT specification cylinder, except those specified for acetylene.

A9.10. Oxidizing Substances, Solid, Self-Heating, NOS; Oxidizing Substances, Solid, Flammable, NOS; Oxidizing Substances, Solid, Water Reactive, NOS; Oxygen Generators, Chemical. Ship according to a competent authority approval (CAA). See 2.5 for more information on CAAs.

★A9.11. Bromine Pentafluoride or Bromine Trifluoride.

A9.11.1. **Handling Instructions.** These items are extremely dangerous. Wear approved chemical safety mask and clothing when handling this material.

A9.11.2. **Packaging Requirements.** Package bromine pentafluoride or bromine trifluoride in specification cylinders, 3A150, 3AA150, 3B240, 3BN150, 3E1800, 4B240, 4BA240, or 4BW240. Seal each valve outlet by a threaded cap or a threaded plug. No cylinder may be equipped with any pressure relief device. Overpack specification 3E1800 cylinders in a strong wooden box.

Attachment 10

CLASS 6-- TOXIC (POISONOUS) MATERIALS AND INFECTIOUS SUBSTANCES

A10.1. General Requirements. This attachment contains information concerning the packaging and general handling instructions for Class 6.1 toxic material. The term “toxic” and “poisonous” are used synonymously in this manual.

A10.2. General Handling Instructions.

- Toxic material can react through the skin, respiratory tract, or gastrointestinal tract. In general, solid toxic material that is improperly packaged will present an ingestion hazard. Dust and mists result primarily in an inhalation hazard. Liquids may be ingested, inhaled as a vapor, or absorbed through the skin.
- Keep cool and away from direct rays of the sun and high temperature. Store away from sources of ignition and fire hazards. Avoid direct contact with the material. Storage areas must be plainly marked with the appropriate placards.
- Keep away from oxidizing materials.
- Make sure personnel exposed to leaking materials wear a protective mask or self-contained breathing apparatus (specific recommendations can be obtained from the medical services.)
- Store away from acids or acid fumes.

A10.3. Packaging for Certain Packing Group I Class 6.1 Toxic Materials.

A10.3.1. **Handling Instructions.** These items are extremely dangerous. Wear approved chemical safety mask and clothing when handling this material. See 2.9 for additional information.

A10.3.2. **Packaging Requirements.** Package in DOT specification 3A1800, 3AA1800, 3AL1800, 3D, 3E1800, and 33 cylinders meeting the requirements of A3.3.2. Specification 3A, 3AA, and 3AL cylinders may not exceed 57 kg (125 pounds) water capacity (nominal). Specification 3D and 33 cylinders may not exceed 127 kg (280 pounds) water capacity (nominal). Shipments of arsine or phosphine will not be accepted for transportation if packaged in a specification 3AL cylinder. Cylinders containing phosgene may not exceed a filling density of 125 percent (see A3.3.2.5). The cylinder may not contain more than 68 kg (150 pounds) of phosgene. Also, each filled cylinder must be tested for leakage before it is offered for transportation and must show absolutely no leakage. This test must consist of immersing the cylinder and valve, without the protection cap attached, in a bath of water at a temperature of approximately 66 degrees C (150 degrees F) for at least 30 minutes. During which time, frequent examinations must be made to identify any escape of gas. After the test has been accomplished the valve of the cylinder must not be loosened before the cylinder is offered for transportation, and must not be loosened during transportation.

A10.4. Bromoacetone, Methyl Bromide, Chloropicrin, and Methyl Bromide or Methyl Chloride Mixtures.

A10.4.1. **Handling Instructions.** These materials and mixtures are extremely dangerous poisons. Wear approved chemical safety mask and clothing when handling this material. See 2.9 for additional requirements.

A10.4.2. **Packaging Requirements.**

A10.4.2.1. Package bromoacetone in a wooden box (4C1, 4C2, 4D, or 4F) with an inner glass receptacle or tube in an hermetically-sealed metal receptacle in a corrugated fiberboard carton. A bottle may not contain over 500 g (17.6 ounces) of liquid and must be cushioned inside the can with at least 12.7 mm (0.5 inch) of absorbent material. The total amount of liquid in the outer box must not exceed 11 kg (24 pounds). The package must be tested to the PG I performance level.

A10.4.2.2. Package bromoacetone in DOT specification 3A, 3AA, 3B, 3C, 3E, 4A, 4B, 4BA, 4BW, or 4C cylinder with a water capacity (nominal) not exceeding 113 kg (250 pounds). All cylinders must meet the requirements of A3.3.2.

A10.4.2.3. Package methyl bromide, chloropicrin and methyl bromide mixtures, chloropicrin and methyl chloride mixtures, and chloropicrin mixtures charged with nonflammable, nonliquefied compressed gas in DOT specification 3A, 3AA, 3B, 3C, 3E, 4A, 4B, 4BA, 4BW, or 4C cylinder with a water capacity (nominal) not exceeding 113 kg (250 pounds). All cylinders must meet the requirements of A3.3.2.

A10.5. Packaging for Liquid Class 6.1 Materials. Package in (see also Atch 3):

- A10.5.1. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2) with inside glass, earthenware, plastic, or metal receptacles.
- A10.5.2. Plywood drum (1D), fiber drum (1G), or plastic drum (1H1 or 1H2), with inside glass, earthenware, plastic, or metal receptacles.
- A10.5.3. Wooden barrel (2C2), with inside glass, earthenware, plastic, or metal receptacles. Not authorized for PG I material.
- A10.5.4. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2), with inside glass, earthenware, plastic, or metal receptacles.
- A10.5.5. Steel box (4A) or aluminum box (4B) with inside glass, earthenware, plastic, or metal receptacles.
- A10.5.6. Natural wood box (4C1 or 4C2), plywood box (4D), or reconstituted wood box (4F), with inside glass, earthenware, plastic, or metal receptacles.
- A10.5.7. Fiberboard box (4G) with inside glass, earthenware, plastic, or metal receptacles.
- A10.5.8. Expanded plastic box (4H1) or solid plastic box (4H2) with inside glass, earthenware, plastic, or metal receptacles.
- A10.5.9. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2).
- A10.5.10. Plastic drum (1H1 or 1H2) or fiber drum (1G) with liner (only authorized for PG III material).
- A10.5.11. Wooden barrel (2C1). Not authorized for PG I material.
- A10.5.12. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2).
- A10.5.13. Single, composite package comprised of a plastic receptacle in steel, aluminum, fiber, or plastic drum (6HA1, 6HB1, 6HG1, or 6HH1).
- A10.5.14. Single, composite package comprised of a plastic receptacle in steel, aluminum, wooden, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, or 6HG2).
- A10.5.15. Single, composite package comprised of glass, porcelain, or stoneware in steel, aluminum, or fiber drum (6PA1, 6PB1, or 6PG1).
- A10.5.16. Single, composite package comprised of glass, porcelain, or stoneware, in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, or 6PG2).
- A10.5.17. Single, composite package comprised of glass, porcelain, or stoneware in solid or expanded plastic packaging (6PH1 or 6PH2).
- A10.5.18. Single, composite package comprised of a plastic receptacle in a plywood drum (6HD1). Not authorized for PG I material.
- A10.5.19. DOT specification cylinders as prescribed for any compressed gas, except DOT 8 (acetylene) and DOT 3HT.

A10.6. Packaging for Solid Class 6.1 Materials. Package in:

- A10.6.1. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum other than steel or aluminum (1N1 or 1N2), with inside glass, earthenware, plastic, or metal receptacles.
- A10.6.2. Plywood drum (1D), fiber drum (1G), or plastic drum (1H1 or 1H2), with inside glass, earthenware, plastic, or metal receptacles.
- A10.6.3. Wooden barrel (2C2), with inside glass, earthenware, plastic, or metal receptacles.
- A10.6.4. Steel jerrican (3A1 or 3A2) or plastic jerrican (3H1 or 3H2) with inside glass, earthenware, plastic, or metal receptacles.
- A10.6.5. Steel box (4A) or aluminum box (4B) with inside glass, earthenware, plastic, or metal receptacles.
- A10.6.6. Natural wood box (4C1 or 4C2), plywood box (4D), or reconstituted wood box (4F), with inside glass, earthenware, plastic, or metal receptacles.
- A10.6.7. Fiberboard box (4G) with inside glass, earthenware, plastic, or metal receptacles.
- A10.6.8. Solid plastic box (4H2) with inside glass, earthenware, plastic, or metal receptacles.
- A10.6.9. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum other than steel or aluminum (1N1 or 1N2).
- A10.6.10. Plywood drum (1D). Not authorized for PG I material.
- A10.6.11. Plastic drum (1H1 or 1H2).
- A10.6.12. Fiber drum (1G).
- A10.6.13. Wooden barrel (2C1 or 2C2). Not authorized for PG I material.
- A10.6.14. Steel jerrican (3A1 or 3A2) or plastic jerrican (3H1 or 3H2).

- A10.6.15. Steel box with liner (4A), or aluminum box with liner (4B).
- A10.6.16. Steel box (4A) or aluminum box (4B). Not authorized for PG I material.
- A10.6.17. Natural wood box sift-proof (4C2).
- A10.6.18. Plywood box (4D), reconstituted wood box (4F), or natural wood box (4C1.) Not authorized for PG I material.
- A10.6.19. Fiberboard box (4G). Not authorized for PG I material.
- A10.6.20. Expanded plastic box (4H1) or solid plastic box (4H2). Not authorized for PG I material.
- A10.6.21. Bag, woven plastic (5H1, 5H2, or 5H3); bag, plastic film (5H4); bag, textile (5L1, 5L2, or 5L3); bag, paper, multiwall, water-resistant (5M2). Not authorized for PG I material.
- A10.6.22. Single, composite package comprised of a plastic receptacle in steel, aluminum, plywood, fiber, or plastic drum (6HA1, 6HB1, 6HD1, 6HG1, or 6HH1).
- A10.6.23. Single, composite package comprised of a plastic receptacle in steel, aluminum, wood, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, or 6HG2).
- A10.6.24. Single, composite package comprised of glass, porcelain, or stoneware in steel, aluminum, plywood, or fiber drum (6PA1, 6PB1, 6PD1, or 6PG1).
- A10.6.25. Single, composite package comprised of glass, porcelain, or stoneware, in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, or 6PG2).
- A10.6.26. Single, composite package comprised of glass, porcelain, or stoneware in expanded or solid plastic packaging (6PH1 or 6PH2).

★A10.7. Class 6.1, PG I, Hazard Zone A and B (Poisonous by Inhalation).

A10.7.1. **Handling Instructions.** These items are extremely dangerous. Wear approved chemical safety mask and clothing when handling this material.

A10.7.2. **Packaging Requirements.** Package Class 6.1, PG I materials with an Inhalation Hazard (Hazard Zone A and B) as follows:

A10.7.2.1. In DOT specification cylinders as identified in 49 CFR, part 178, subpart C, except that specification 8, 8AL, and 39 cylinders are not authorized. Cylinders must also meet the requirements of A3.3.2.

A10.7.2.2. In an inner drum (1A1, 1B1, 1N1, 1H1, or 6HA1), then place in an outer drum (1A2 or 1H2). Both the inner and outer drum must be tested to the PG I performance level. The outer 1A2 drum must have a minimum thickness of 1.35 mm (0.053 inches). The outer 1H2 drum must have a minimum thickness of 6.30 mm (0.248 inches). The capacity of the inner drum must not exceed 220 L (58 gallons). The outer drum (1A2 or 1H2) must withstand a hydrostatic test pressure of 100kPa (15 psi). The inner drum must also meet the following requirements:

- Satisfactorily withstand a hydrostatic pressure test (as outlined in 49 CFR, paragraph 178.605) of 550 kPa (80 psig).
- Satisfactorily withstand a leakproofness test (as outlined in 49 CFR, paragraph 178.604) using an internal air pressure at 55 degrees C (131 degrees F) of at least twice the vapor pressure of the material to be packaged.
- Have screw-type closures that meet all the following requirements:
 - Closed and tightened to a torque as prescribed by the closure manufacturer, using a device that is capable of measuring torque.
 - Physically held in place by any means capable of preventing backoff or loosening of the closure by impact or vibration during transportation.
 - Provided with a cap seal that is properly applied according to the cap seal manufacturer's recommendations. The cap seal must be capable of withstanding an internal pressure of at least 100 kPa (15 psi).
- Meet the following minimum thickness requirements:
 - 1A1 and 1N1 drums with a capacity of less than or equal to 120 L (32 gallons) must have a minimum thickness of 1.3 mm (0.051 inches). 1B1 drums with a capacity of less than or equal to 120 L (32 gallons) must have a minimum thickness of 3.9 mm (0.154 inches).
 - 1A1 and 1N1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 1.7 mm (0.067 inches). 1B1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 4.7 mm (0.185 inches).

A10.7.2.2.1. Cushion the inner drum within the outer drum with a shock-mitigating, nonreactive material. There must be a minimum of 5.0 cm (2 inches) of cushioning material between the outer surface (side) of the inner drum

and the inner surface (side) of the outer drum, and at least 7.6 cm (3 inches) of cushioning material between the outer surface (top and bottom) of the inner drum and the inner surface (top and bottom) of the outer drum.

A10.7.2.3. Pack in an inner packaging system that consists of an impact-resistant receptacle of glass, earthenware, plastic, or metal, securely cushioned with a nonreactive absorbent material. The package must be packed within a leak-tight packaging of metal or plastic, then packed in a steel drum (1A2), aluminum drum (1B2), metal drum (other than steel or aluminum (1N2)), plywood drum (1D), fiber drum (1G), plastic drum (1H2), wooden barrel (2C2), steel jerrican (3A2), plastic jerrican (3H2), steel box (4A), aluminum box (4B), natural wood box (4C1 or 4C2), plywood box (4D), reconstituted wood box (4F), fiberboard box (4G), expanded plastic box (4H1), or solid plastic box (4H2). The capacity of the inner receptacle must not exceed 4 L (1 gallon). An inner receptacle that has a closure must have a closure that is held in place by any means capable of preventing backoff or loosening of the closure by impact or vibration during transportation. Both the inner packaging system and the outer container must each meet the test requirements of the PG I performance level independently. The total amount of liquid that can be packed in the outer container must not exceed 16 L (4 gallons).

A10.7.2.4. Pack in a metal drum (1A1, 1B1, or 1N1), or plastic drum (1H1), then placed in a metal drum (1A2 or 1H2), or a plastic receptacle with outer steel drum (6HA1). Both the inner and outer drum must be tested to the PG I performance level. The outer 1A2 drum must have a minimum thickness of 1.35 mm (0.053 inches). The outer 1H2 drum must have a minimum thickness of 6.30 mm (0.248 inches). The capacity of the inner drum (1A1, 1B1, 1N1, or 1H1) must not exceed 220 L (58 gallons). The outer drum (1A2 or 1H2) must withstand a hydrostatic test pressure of 100kPa (15 psi). This package is only authorized for Class 6.1, PG I, Hazard Zone B material. The inner drum must also meet the following requirements:

- Satisfactorily withstand a leakproofness test (as outlined in 49 CFR, paragraph 178.604) using an internal air pressure at 55 degrees C (131 degrees F) of at least twice the vapor pressure of the material to be packaged.
- Have screw-type closures that are:
 - Closed and tightened to a torque as prescribed by the closure manufacturer, using a device that is capable of measuring torque.
 - Physically held in place by any means capable of preventing backoff or loosening of the closure by impact or vibration during transportation.
 - Provided with a cap seal that is properly applied according to the cap seal manufacturer's recommendations. The cap seal must be capable of withstanding an internal pressure of at least 100 kPa (15 psi).
- Meet the following minimum thickness requirements:
 - 1A1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 0.69 mm (0.027 inches). 1B1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 2.79 mm (0.110 inches). 1H1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 1.14 mm (0.045 inches). 6HA1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 1.58 mm (0.0625 inches) for the inner plastic drum and a minimum thickness of 0.70 mm (0.027 inches) for the outer steel drum.
 - 1A1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 1.08 mm (0.043 inches). 1B1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 3.9 mm (0.154 inches). 1H1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 3.16 mm (0.125 inches). 6HA1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 1.58 mm (0.0625 inches) for the inner plastic drum and a minimum thickness of 0.96 mm (0.038 inches) for the outer steel drum.
 - 1A1 or 1N1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 1.35 mm (0.053 inches). 1B1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 4.7 mm (0.185 inches). 1H1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 3.16 mm (0.124 inches). 6HA1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 1.58 mm (0.0625 inches) for the inner plastic drum and a minimum thickness of 1.08 mm (0.43 inches) for the outer steel drum.

A10.7.2.4.1. Cushion the inner drum within the outer drum with a shock-mitigating, nonreactive material. There must be a minimum of 5.0 cm (2 inches) of cushioning material between the outer surface (side) of the inner drum and the inner surface (side) of the outer drum, and at least 7.6 cm (3 inches) of cushioning material between the outer surface (top and bottom) of the inner drum and the inner surface (top and bottom) of the outer drum.

A10.8. Tear Gas Candles. Any newly developed packaging must be approved by the DOT before initial transportation from the manufacturer. Package tear gas candles, tear gas grenades, and similar devices (with more than 2 percent tear gas substance by mass).

A10.8.1. Pack in a metal-strapped natural wood box (4C1 or 4C2), metal-strapped plywood box (4D), or metal-strapped reconstituted wood box (4F). Functioning elements not assembled in grenades or devices must be packed in a separate compartment within the box, packed in inner boxes, then placed inside the outer box, or packed in a separate outside wooden (4C1, 4C2, 4D, or 4F) box. Pack and cushion the elements so they cannot come into contact with each other or in contact with the walls of the box during transportation. No more than 50 items and 50 functioning elements can be packed in one outer container. The gross weight of the outer container must not exceed 35 kg (77 pounds). Tear gas devices can be shipped completely assembled provided the functioning elements are packed so that they cannot accidentally function. Package items completely assembled as specified in this paragraph.

A10.8.2. Pack in steel drum (1A2.) Pack functioning elements in a separate inner packaging or separate compartment. Pack no more than 24 items and 24 functioning elements in one outer drum. The gross weight of the outer container must not exceed 35 kg (77 pounds).

A10.8.3. Pack in inner containers meeting the DOT 2P or 2Q specification (inside nonrefillable metal containers), then packaged in a fiberboard box (4G). Place each inside container into fiberboard tubes with metal ends or a fiberboard box with suitable padding. Pack no more than 30 inner packagings in one outer fiberboard box. The gross weight must not exceed 16 kg (35 pounds).

★A10.9. Infectious Substances (Etiologic Agent). The following requirements apply to all shipments of infectious substances:

- Use inner packagings that consist of a watertight primary receptacle, then place in a watertight secondary packaging.
- Place absorbent material between the primary receptacle and the secondary packaging. If multiple primary receptacles are placed in a single secondary packaging they must be separated with enough absorbent material to make sure there is no contact between the primary receptacles. There must be sufficient absorbent material to absorb the entire contents of all primary receptacles.
- This inner packaging must then be placed in an outer packaging of adequate strength for its capacity, mass, and intended use.
- Each package for infectious substances must be capable of passing the tests specified in 49 CFR 178.609.
- Each package must be at least 100 mm (3.9 inches) in the smallest overall external dimensions.
- Each package of infectious substances must have an itemized list of the contents enclosed between the secondary packaging and the outer packaging.
- Whatever the intended temperature of shipment, the primary receptacle and the secondary packaging used for infectious substances must be capable of withstanding without leakage an internal pressure (which produces a pressure differential) of not less than 95 kPa (14 psi). Also, the primary receptacle and the secondary packaging must be capable of withstanding temperatures of -40 degrees C to +55 degrees C (-40 degrees F to +131 degrees F).
- The commander of the shipping agency can request a technical escort, security escort, military guard, other technically qualified personnel, or a knowledgeable representative of the shipper or recipient to accompany the shipment. If a knowledgeable representative of the shipper or recipient is used, they must be authorized by the Surgeon General, US Department of Health and Human Services, or the Administrator of the Agricultural Research Service, US Department of Agriculture. The commander may make this request if in their opinion inherent factors of public relations, security, economics, or expeditious handling indicates this to be in the best interest of the DoD.
- In addition to the requirements of this paragraph, the requirements of 42 CFR, Public Health, chapter 1, part 72 must be followed.

- Diagnostic specimens and biological products are not subject to the requirements of this manual if they do not contain any material that is or could be classified as an infectious substance.

A10.9.1. In addition to the bullet requirements identified above, package infectious substances as specified below. Exceptional cases, such as whole organs, may require special packaging. Guidance for packaging materiel that requires temperature control during shipment is contained in DLAI 4145.21/TB MED 284/NAVSUPINST 4610.31/AFR 167-9, Preparation of Medical Materiel Requiring Freeze or Chill Environment for Shipment.”

A10.9.1.1. Lyophilized substances. Primary receptacles must be flame-sealed glass ampoules or rubber stopped glass vials fitted with metal seals.

A10.9.1.2. Liquid or solid substances shipped at ambient temperatures or higher. Primary receptacles must be glass, metal, or plastic. Provide a positive means of ensuring a leak proof seal, such as a heat seal, skirted stopper, or metal crimp seal. If screw caps are used, they must be reinforced with adhesive tape.

A10.9.1.3. Liquid or solid substances shipped refrigerated or frozen (ice, prefrozen packs, or dry ice.) Place ice or dry ice outside the secondary packagings. Provide interior supports to secure the secondary packagings in their original position after the ice or dry ice has dissipated. If ice is used, the outer packaging must be leak proof. If dry ice is used, the outer packaging must permit the release of carbon dioxide gas.

A10.9.1.4. Liquid or solid substances shipped in liquid nitrogen. Primary receptacles must be plastic, capable of withstanding very low temperatures. The secondary packaging must also withstand very low temperatures and in most cases will need to be fitted over individual primary receptacles. All requirements for shipment of liquid nitrogen must also be met.

A10.9.2. **Damaged Packages.** Upon discovering damage to the package, which indicates damage to the primary container, the carrier must isolate the container and notify the Director, Center for Disease Control, 1600 Clifton Road NE, Atlanta GA 30333 (telephone number (404) 633-5313), and the shipper.

A10.10. Regulated Medical Waste. Package regulated medical waste in packaging that meet the PG II performance level. Additionally, ensure the packaging is:

- Rigid, leak resistant, and impervious to moisture.
- Of sufficient strength to prevent tearing or bursting under normal conditions of handling and use.
- Sealed to prevent leakage during transport.
- Puncture-resistant for sharps and sharps with residual fluids, break-resistant, and tightly lidded or stoppered for fluids in quantities greater than 20 cubic centimeters.

Attachment 11

CLASS 7--RADIOACTIVE MATERIALS

A11.1. General Requirements. This attachment contains information concerning the packaging and general handling instructions for Class 7 (Radioactive Material).

A11.2. General Handling Instructions. Handle radioactive material carefully to ensure there is no contamination of personnel or the transport vehicle. A person may not remain unnecessarily in the immediate vicinity of any package containing radioactive material.

A11.3. Activity Limits for Type A and Type B Packages:

- A Type A package must not contain a quantity of radioactivity greater than A_1 (for special form radioactive material) or A_2 (for normal form radioactive material) as listed in A11.5. Activity limits not listed in A11.5 are determined per 49 CFR 173.433.
- The limits on activity contained in a Type B, Type B(U), or Type B(M) package are those prescribed in A11.5 or in the applicable approval certificate of 49 CFR 173.471 or 173.473.

A11.4. Determining A_1 and A_2 Values for Radionuclides:

- For single radionuclides of known identity, the values of A_1 and A_2 are those given in A11.5. The values of A_1 and A_2 are also applicable for radionuclides contained in (a,n) or (h,n) neutron sources.
- For any single radionuclide of known identity, that is not listed in A11.5, the values of A_1 and A_2 must be determined according to 49 CFR 173.433.

A11.5. A_1 and A_2 Values for Radionuclides are shown in table A11.1 for domestic shipments, and Table A11.8 for international shipments.

Table A11.1. Table of A_1 and A_2 Values for Radionuclides.

| Symbol of Radionuclide | Element and Atomic Number | A_1 (TBq) (Special form) | A_1 (Ci) (Special form) | A_2 (TBq) (Other form) | A_2 (Ci) (Other form) | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|----------------------------|---------------------------|--------------------------|-------------------------|---------------------------|--------------------------|
| Ac-225 | Actinium (89) | 0.6 | 16.2 | 1×10^{-2} | 0.270 | 2.1×10^3 | 5.8×10^4 |
| Ac-227 | | 40 | 1080 | 2×10^{-5} | 5.41×10^{-4} | 2.7 | 7.2×10^1 |
| Ac-228 | | 0.6 | 16.2 | 0.4 | 10.8 | 8.4×10^4 | 2.2×10^6 |
| Ag-105 | Silver (47) | 2 | 54.1 | 2 | 54.1 | 1.1×10^3 | 3.0×10^4 |
| Ag-108m | | 0.6 | 16.2 | 0.6 | 16.2 | 9.7×10^{-1} | 2.6×10^1 |
| Ag-110m | | 0.4 | 10.8 | 0.4 | 10.8 | 1.8×10^2 | 4.7×10^3 |
| Ag-111 | | 0.6 | 16.2 | 0.5 | 13.5 | 5.8×10^3 | 1.6×10^5 |
| Al-26 | Aluminum (13) | 0.4 | 10.8 | 0.4 | 10.8 | 7.0×10^{-4} | 1.9×10^{-2} |
| Am-241 | Americium (95) | 2 | 54.1 | 2×10^{-4} | 5.41×10^{-3} | 1.3×10^{-1} | 3.4 |
| Am-242 | | 2 | 54.1 | 2×10^{-4} | 5.41×10^{-3} | 3.6×10^{-1} | 1.0×10^1 |
| Am-243 | | 2 | 54.1 | 2×10^{-4} | 5.41×10^{-3} | 7.4×10^{-3} | 2.0×10^{-1} |
| Ar-37 | Argon (18) | 40 | 1,080 | 40 | 1,080 | 3.7×10^3 | 9.9×10^4 |
| Ar-39 | | 20 | 541 | 20 | 541 | 1.3 | 3.4×10^1 |
| Ar-41 | | 0.6 | 16.2 | 0.6 | 16.2 | 1.5×10^6 | 4.2×10^7 |
| Ar-42 | | 0.2 | 5.41 | 0.2 | 5.41 | 9.6 | 2.6×10^2 |
| As | Arsenic (33) | 0.2 | 5.41 | 0.2 | 5.41 | 6.2×10^4 | 1.7×10^6 |
| As-73 | | 40 | 1,080 | 40 | 1,080 | 8.2×10^2 | 2.2×10^4 |
| As-74 | | 1 | 27.0 | 0.5 | 13.5 | 3.7×10^3 | 9.9×10^4 |
| As-76 | | 0.2 | 5.41 | 0.2 | 5.41 | 5.8×10^4 | 1.6×10^6 |
| As-77 | | 20 | 541 | 0.5 | 13.5 | 3.9×10^4 | 1.0×10^6 |
| At-211 | Astatine (85) | 30 | 811 | 2 | 54.1 | 76×10^4 | 2.1×10^6 |
| Au-193 | Gold (79) | 6 | 162 | 6 | 162 | 3.4×10^4 | 9.2×10^5 |
| Au-194 | | 1 | 27.1 | 1 | 27.0 | 15×10^4 | 4.1×10^5 |
| Au-195 | | 10 | 270 | 10 | 270 | 1.4×10^2 | 3.7×10^3 |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Au-196 | | 2 | 54.1 | 2 | 54.1 | 4.0 x 10 ³ | 1.1 x 10 ⁵ |
| Au-198 | | 3 | 81.1 | 0.5 | 13.5 | 9.0 x 10 ³ | 2.4 x 10 ⁵ |
| Au-199 | | 10 | 270 | 0.9 | 24.3 | 7.7 x 10 ³ | 2.1 x 10 ⁵ |
| Ba-131 | Barium (56) | 2 | 54.1 | 2 | 54.1 | 3.1 x 10 ³ | 8.4 x 10 ⁴ |
| Ba-133m | | 10 | 270 | 0.9 | 24.3 | 2.2 x 10 ⁴ | 6.1 x 10 ⁵ |
| Ba-133 | | 3 | 81.1 | 3 | 81.1 | 9.4 | 2.6 x 10 ² |
| Ba-140 | | 0.4 | 10.8 | 0.4 | 10.8 | 2.7 x 10 ³ | 7.3 |
| Be-7 | Beryllium (4) | 20 | 541 | 20 | 541 | 1.3 x 10 ⁴ | 3.5 x 10 ⁵ |
| Be-10 | | 20 | 541 | 0.5 | 13.5 | 8.3 x 10 ⁻⁴ | 2.2 x 10 ⁻² |
| Bi-205 | Bismuth (83) | 0.6 | 16.2 | 0.6 | 16.2 | 1.5 x 10 ³ | 4.2 x 10 ⁴ |
| Bi-206 | | 0.3 | 8.11 | 0.3 | 8.11 | 3.8 x 10 ³ | 1.0 x 10 ⁵ |
| Bi-207 | | 0.7 | 18.9 | 0.7 | 18.9 | 1.9 | 5.2 x 10 ¹ |
| Bi-210m | | 0.3 | 8.11 | 3 x 10 ⁻² | 0.811 | 2.1 x 10 ⁻⁵ | 5.7 x 10 ⁻⁴ |
| Bi-210 | | 0.6 | 16.2 | 0.5 | 13.5 | 4.6 x 10 ³ | 1.2 x 10 ⁵ |
| Bi-212 | | 0.3 | 8.11 | 0.3 | 8.11 | 5.4 x 10 ⁵ | 1.5 x 10 ⁷ |
| Bk-247 | Berkelium (97) | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 3.1 x 10 ⁻² | 1.0 |
| Bk-249 | | 40 | 1,080 | 8 x 10 ⁻² | 2.16 | 6.1 x 10 ¹ | 1.6 x 10 ³ |
| Br-76 | Bromine (35) | 0.3 | 8.11 | 0.3 | 8.11 | 9.4 x 10 ⁴ | 2.5 x 10 ⁶ |
| Br-77 | | 3 | 81.1 | 3 | 81.1 | 2.6 x 10 ⁴ | 7.1 x 10 ⁵ |
| Br-82 | | 0.4 | 10.8 | 0.4 | 10.8 | 4.0 x 10 ⁴ | 1.1 x 10 ⁶ |
| C-11 | Carbon (6) | 1 | 27 | 0.5 | 13.5 | 3.1 x 10 ⁷ | 8.4 x 10 ⁸ |
| C-14 | | 40 | 1,080 | 2 | 54.1 | 1.6 x 10 ⁻¹ | 4.5 |
| Ca-41 | Calcium (20) | 40 | 1,080 | 40 | 1,080 | 3.1 x 10 ⁻³ | 8.5 x 10 ⁻² |
| Ca-45 | | 40 | 1,080 | 0.9 | 24.3 | 6.6 x 10 ² | 1.8 x 10 ⁴ |
| Ca-47 | | 0.9 | 24.3 | 0.5 | 13.5 | 2.3 x 10 ⁴ | 6.1 x 10 ⁵ |
| Cd-109 | Cadmium (48) | 40 | 1,080 | 1 | 27.0 | 9.6 x 10 ¹ | 2.6 x 10 ³ |
| Cd-113 | | 20 | 541 | 9 x 10 ⁻² | 2.43 | 8.3 x 10 ⁴ | 2.2 x 10 ² |
| Cd-115m | | 0.3 | 8.11 | 0.3 | 8.11 | 9.4 x 10 ² | 2.5 x 10 ⁴ |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Cd-115 | | 4 | 108 | 0.5 | 13.5 | 1.9 x 10 ⁴ | 5.1 x 10 ⁵ |
| Ce-139 | Cerium (58) | 6 | 162 | 6 | 162 | 2.5 x 10 ²⁶ | .8 x 10 ³ |
| Ce-141 | | 10 | 270 | 0.5 | 13.5 | 1.1 x 10 ³ | 2.8 x 10 ⁴ |
| Ce-143 | | 0.6 | 16.2 | 0.5 | 13.5 | 2.5 x 10 ⁴ | 6.6 x 10 ⁵ |
| Ce-144 | | 0.2 | 5.41 | 0.2 | 5.41 | 1.2 x 10 ² | 3.2 x 10 ³ |
| Cf-248 | Californium (98) | 30 | 811 | 3 x 10 ³ | 8.11 x 10 ⁻² | 5.8 x 10 ¹ | 1.6 x 10 ³ |
| Cf-249 | | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 1.5 x 10 ⁻¹ | 4.1 |
| Cf-250 | | 5 | 135 | 5 x 10 ⁻⁴ | 1.35 x 10 ⁻² | 4.0 | 1.1 x 10 ² |
| Cf-251 | | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 5.9 x 10 ⁻² | 1.6 |
| Cf-252 | | 0.1 | 2.70 | 1 x 10 ⁻³ | 2.70 x 10 ⁻² | 2.0 x 10 ¹ | 5.4 x 10 ² |
| Cf-253 | | 40 | 1,080 | 6 x 10 ⁻² | 1.62 | 1.1 x 10 ³ | 2.9 x 10 ⁴ |
| Cf-254 | | 3 x 10 ⁻³ | 8.11 x 10 ⁻² | 6 x 10 ⁻² | 1.62 x 10 ⁻² | 3.1 x 10 ² | 8.5 x 10 ³ |
| Cl-36 | Chlorine (17) | 20 | 541 | 0.5 | 13.5 | 1.2 x 10 ⁻³ | 3.3 x 10 ⁻² |
| Cl-38 | | 0.2 | 5.41 | 0.2 | 5.41 | 4.9 x 10 ⁶ | 1.3 x 10 ⁸ |
| Cm-240 | Curium (96) | 40 | 1,080 | 2 x 10 ⁻² | 0.541 | 7.5 x 10 ² | 2.0 x 10 ⁴ |
| Cm-241 | | 2 | 54.1 | 0.9 | 24.3 | 6.1 x 10 ² | 1.7 x 10 ⁴ |
| Cm-242 | | 40 | 1,080 | 1 x 10 ⁻² | 0.270 | 1.2 x 10 ² | 3.3 x 10 ³ |
| Cm-243 | | 3 | 81.1 | 3 x 10 ⁻⁴ | 8.11 x 10 ⁻³ | 1.9 | 5.2 x 10 ¹ |
| Cm-244 | | 4 | 108 | 4 x 10 ⁻⁴ | 1.08 x 10 ⁻² | 3.0 | 8.1 x 10 ¹ |
| Cm-245 | | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 6.4 x 10 ⁻³ | 1.7 x 10 ⁻¹ |
| Cm-246 | | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 1.1 x 10 ⁻² | 3.1 x 10 ⁻¹ |
| Cm-247 | | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 3.4-6 | 9.3 x 10 ⁻⁵ |
| Cm-248 | | 4 x 10 ⁻² | 1.08 | 5 x 10 ⁻⁵ | 1.35 x 10 ⁻³ | 1.6 x 10 ⁻⁴ | 4.2 x 10 ⁻³ |
| Co-55 | Cobalt (27) | 0.5 | 13.5 | 0.5 | 13.5 | 1.1 x 10 ⁵ | 3.1 x 10 ⁶ |
| Co-56 | | 0.3 | 8.11 | 0.3 | 8.11 | 1.1 x 10 ³ | 3.0 x 10 ⁴ |
| Co-57 | | 8 | 216 | 8 | 216 | 3.1 x 10 ² | 8.4 x 10 ³ |
| Co-58m | | 40 | 1,080 | 40 | 1,080 | 2.2 x 10 ⁵ | 5.9 x 10 ⁶ |
| Co-58 | | 1 | 27.0 | 1 | 27.0 | 1.2 x 10 ³ | 3.2 x 10 ⁴ |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Co-60 | | 0.4 | 10.8 | 0.4 | 10.8 | 4.2 x 10 ¹ | 1.1 x 10 ³ |
| Cr-51 | Chromium (24) | 30 | 811 | 30 | 811 | 3.4 x 10 ³ | 9.2 x 10 ⁴ |
| Cs-129 | Cesium (55) | 4 | 108 | 4 | 108 | 2.8 x 10 ⁴ | 7.6 x 10 ⁵ |
| Cs-131 | | 40 | 1,080 | 40 | 1,080 | 3.8 x 10 ³ | 1.0 x 10 ⁵ |
| Cs-132 | | 1 | 27.0 | 1 | 27.0 | 5.7 x 10 ³ | 1.5 x 10 ⁵ |
| Cs-134m | | 40 | 1,080 | 9 | 243 | 3.0 x 10 ⁵ | 8.0 x 10 ⁶ |
| Cs-134 | | 0.6 | 16.2 | 0.5 | 13.5 | 4.8 x 10 ¹ | 1.3 x 10 ³ |
| Cs-135 | | 40 | 1,080 | 0.9 | 24.3 | 4.3 x 10 ⁻⁵ | 1.2 x 10 ⁻³ |
| Cs-136 | | 0.5 | 13.5 | 0.5 | 13.5 | 2.7 x 10 ³ | 7.3 x 10 ⁴ |
| Cs-137 | | 2 | 54.1 | 0.5 | 13.5 | 3.2 | 8.7 x 10 ¹ |
| Cu-64 | Copper (29) | 5 | 135 | 0.9 | 24.3 | 1.4 x 10 ⁵ | 3.9 x 10 ⁶ |
| Cu-67 | | 9 | 243 | 0.9 | 24.3 | 2.8 x 10 ⁴ | 7.6 x 10 ⁵ |
| Dy-159 | Dysprosium (66) | 20 | 541 | 20 | 541 | 2.1 x 10 ² | 5.7 x 10 ³ |
| Dy-165 | | 0.6 | 16.2 | 0.5 | 13.5 | 3.0 x 10 ⁵ | 8.2 x 10 ⁶ |
| Dy-166 | | 0.3 | 8.11 | 0.3 | 8.11 | 8.6 x 10 ³ | 2.3 x 10 ⁵ |
| Er-169 | Erbium (68) | 40 | 1,080 | 0.9 | 24.3 | 3.1 x 10 ³ | 8.3 x 10 ⁴ |
| Er-171 | | 0.6 | 16.2 | 0.5 | 13.5 | 9.0 x 10 ⁴ | 2.4 x 10 ⁶ |
| Es-253 | Einsteinium (99) | 200 | 5,400 | 2.1 x 10 ⁻² | 5.4 x 100 ⁻¹ | | |
| Es-254 | | 30 | 811 | 3 x 10 ⁻³ | 8.11 x 10 ⁻² | | |
| Es-254m | | 0.6 | 16.2 | 0.4 | 10.8 | | |
| Es-255 | | | | | | | |
| Eu-147 | Europium (63) | 2 | 54.1 | 2 | 54.1 | 1.4 x 10 ³ | 3.7 x 10 ⁴ |
| Eu-148 | | 0.5 | 13.5 | 0.5 | 13.5 | 6.0 x 10 ² | 1.6 x 10 ⁴ |
| Eu-149 | | 20 | 541 | 20 | 541 | 3.5 x 10 ² | 9.4 x 10 ³ |
| Eu-150 | | 0.7 | 18.9 | 0.7 | 18.9 | 6.1 x 10 ⁴ | 1.6 x 10 ⁶ |
| Eu-152m | | 0.6 | 16.2 | 0.5 | 13.5 | 8.2 x 10 ⁴ | 2.2 x 10 ⁶ |

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|------------------------|------------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Eu-152 | | 0.9 | 24.3 | 0.9 | 24.3 | 6.5 | 1.8 x 10 ² |
| Eu-154 | | 0.8 | 21.6 | 0.5 | 13.5 | 9.8 | 2.6 x 10 ² |
| Eu-155 | | 20 | 541 | 2 | 54.1 | 1.8 x 10 ¹ | 4.9 x 10 ² |
| Eu-156 | | 0.6 | 16.2 | 0.5 | 13.5 | 2.0 x 10 ³ | 5.5 x 10 ⁴ |
| F-18 | Fluorine (9) | 1 | 27.0 | 0.5 | 13.5 | 3.5 x 10 ⁶ | 9.5 x 10 ⁷ |
| Fe-52 | Iron (26) | 0.2 | 5.41 | 0.2 | 5.41 | 2.7 x 10 ⁵ | 7.3 x 10 ⁶ |
| Fe-55 | | 40 | 1,080 | 40 | 1,080 | 8.8 x 10 ¹ | 2.4 x 10 ³ |
| Fe-59 | | 0.8 | 21.6 | 0.8 | 21.6 | 1.8 x 10 ³ | 5.0 x 10 ⁴ |
| Fe-60 | | 40 | 1,080 | 0.2 | 5.41 | 7.4 x 10 ⁻⁴ | 2.0 x 10 ⁻² |
| Fm-255 | Fermium (100) | 40 | 1,080 | 0.8 | 21.6 | | |
| Fm-257 | | 10 | 270 | 8 x 10 ⁻³ | 21.6 x 10 ⁻¹ | | |
| Ga-67 | Gallium (31) | 6 | 162 | 6 | 162 | 2.2 x 10 ⁴ | 6.0 x 10 ⁵ |
| Ga-68 | | 0.3 | 8.11 | 0.3 | 8.11 | 1.5 x 10 ⁶ | 4.1 x 10 ⁷ |
| Ga-72 | | 0.4 | 10.8 | 0.4 | 10.8 | 1.1 x 10 ⁵ | 3.1 x 10 ⁶ |
| Gd-146 | Gadolinium (64) | 0.4 | 10.8 | 0.4 | 10.8 | 6.9 x 10 ² | 1.9 x 10 ⁴ |
| Gd-148 | | 3 | 81.1 | 3 x 10 ⁻⁴ | 8.11 x 10 ⁻³ | 1.2 | 3.2 x 10 ¹ |
| Gd-153 | | 10 | 270 | 5 | 135 | 1.3 x 10 ² | 3.5 x 10 ³ |
| Gd-159 | | 4 | 108 | 0.5 | 13.5 | 3.9 x 10 ⁴ | 1.1 x 10 ⁶ |
| Ge-68 | Germanium (32) | 0.3 | 8.11 | 0.3 | 8.11 | 2.6 x 10 ² | 7.1 x 10 ³ |
| Ge-71 | | 40 | 1,080 | 40 | 1,080 | 5.8 x 10 ³ | 1.6 x 10 ⁵ |
| Ge-77 | | 0.3 | 8.11 | 0.3 | 8.11 | 1.3 x 10 ⁵ | 3.6 x 10 ⁶ |
| H-3 | Hydrogen (1) (See T-Tritium) | | | | | | |
| Hf-172 | Hafnium (72) | 0.5 | 13.5 | 0.3 | 8.11 | 4.1 x 10 ¹ | 1.1 x 10 ³ |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Hf-175 | | 3 | 81.1 | 3 | 81.1 | 3.9 x 10 ² | 1.1 x 10 ⁴ |
| Hf-181 | | 2 | 54.1 | 0.9 | 24.3 | 6.3 x 10 ² | 1.7 x 10 ⁴ |
| Hf-182 | | 4 | 108 | 3 x 10 ⁻² | 0.811 | 8.1 x 10 ⁶ | 2.2 x 10 ⁻⁴ |
| Hg-194 | Mercury (80) | 1 | 27.0 | 1 | 27.0 | 1.3 x 10 ⁻¹ | 3.5 |
| Hg-195m | | 5 | 135 | 5 | 135 | 1.5 x 10 ⁴ | 4.0 x 10 ⁵ |
| Hg-197m | | 10 | 270 | 0.9 | 24.3 | 2.5 x 10 ⁴ | 6.7 x 10 ⁵ |
| Hg-197 | | 10 | 270 | 10 | 270 | 9.2 x 10 ³ | 2.5 x 10 ⁵ |
| Hg-203 | | 4 | 108 | 0.9 | 24.3 | 5.1 x 10 ² | 1.4 x 10 ⁴ |
| Ho-163 | Holmium (67) | 40 | 1,080 | 40 | 1,080 | 2.7 | 7.6 x 10 ¹ |
| Ho-166m | | 0.6 | 16.2 | 0.3 | 8.11 | 6.6 x 10 ⁻² | 1.8 |
| Ho-166 | | 0.3 | 8.11 | 0.3 | 8.11 | 2.6 x 10 ⁴ | 7.0 x 10 ⁵ |
| I-123 | Iodine (53) | 6 | 162 | 6 | 162 | 7.1 x 10 ⁴ | 1.9 x 10 ⁶ |
| I-124 | | 0.9 | 24.3 | 0.9 | 24.3 | 9.3 x 10 ³ | 2.5 x 10 ⁵ |
| I-125 | | 20 | 541 | 2 | 54.1 | 6.4 x 10 ² | 1.7 x 10 ⁴ |
| I-126 | | 2 | 54.1 | 0.9 | 24.3 | 2.9 x 10 ³ | 8.0 x 10 ⁴ |
| I-129 | | Unlimited | Unlimited | Unlimited | Unlimited | 6.5 x 10 ⁻⁶ | 1.8 x 10 ⁻⁴ |
| I-131 | | 3 | 81.1 | 0.5 | 13.5 | 4.6 x 10 ³ | 1.2 x 10 ⁵ |
| I-132 | Iodine (53) | 0.4 | 10.8 | 0.4 | 10.8 | 3.8 x 10 ⁵ | 1.0 x 10 ⁷ |
| I-133 | | 0.6 | 16.2 | 0.5 | 13.5 | 4.2 x 10 ⁴ | 1.1 x 10 ⁶ |
| I-134 | | 0.3 | 8.11 | 0.3 | 8.11 | 9.9 x 10 ⁵ | 2.7 x 10 ⁷ |
| I-135 | | 0.6 | 16.2 | 0.5 | 13.5 | 1.3 x 10 ⁵ | 3.5 x 10 ⁶ |
| In-111 | Indium (49) | 2 | 54.1 | 2 | 54.1 | 1.5 x 10 ⁴ | 4.2 x 10 ⁵ |
| In-113 | | 4 | 108 | 4 | 108 | 6.2 x 10 ⁵ | 1.7 x 10 ⁷ |
| In-114m | | 0.3 | 8.11 | 0.3 | 8.11 | 8.6 x 10 ² | 2.3 x 10 ⁴ |
| In-115m | | 6 | 162 | 0.9 | 24.3 | 2.2 x 10 ⁵ | 6.1 x 10 ⁶ |
| Ir-189 | Iridium (77) | 10 | 270 | 10 | 270 | 1.9 x 10 ³ | 5.2 x 10 ⁴ |
| Ir-190 | | 0.7 | 18.9 | 0.7 | 18.9 | 2.3 x 10 ³ | 6.2 x 10 ⁴ |
| Ir-192 | | 1 | 27.0 | 0.5 | 13.5 | 3.4 x 10 ² | 9.2 x 10 ³ |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Ir-193m | | 10 | 270 | 10 | 270 | 2.4 x 10 ³ | 6.4 x 10 ⁴ |
| Ir-194 | | 0.2 | 5.41 | 0.2 | 5.41 | 3.1 x 10 ⁴ | 8.4 x 10 ⁵ |
| K-40 | Potassium (19) | 0.6 | 16.2 | 0.6 | 16.2 | 2.4 x 10 ⁻⁷ | 6.4 x 10 ⁻⁶ |
| K-42 | | 0.2 | 5.41 | 0.2 | 5.41 | 2.2 x 10 ⁵ | 6.0 x 10 ⁶ |
| K-43 | | 1.0 | 27.0 | 0.5 | 13.5 | 1.2 x 10 ⁵ | 3.3 x 10 ⁶ |
| Kr-81 | Krypton (36) | 40 | 1,080 | 40 | 1,080 | 7.8 x 10 ⁻⁴ | 2.1 x 10 ⁻² |
| Kr-85m | | 6 | 162 | 6 | 162 | 3.0 x 10 ⁵ | 8.2 x 10 ⁶ |
| Kr-85 | | 20 | 541 | 10 | 270 | 1.5 x 10 ¹ | 3.9 x 10 ² |
| Kr-87 | | 0.2 | 5.41 | 0.2 | 5.41 | 1.0 x 10 ⁶ | 2.8 x 10 ⁷ |
| La-137 | Lanthanum (57) | 40 | 1,080 | 2 | 54.1 | 1.6 x 10 ⁻³ | 4.4 x 10 ⁻² |
| La-140 | | 0.4 | 10.8 | 0.4 | 10.8 | 2.1 x 10 ⁴ | 5.6 x 10 ⁵ |
| Lu-172 | Lutetium (71) | 0.5 | 13.5 | 0.5 | 13.5 | 4.2 x 10 ³ | 1.1 x 10 ⁵ |
| Lu-173 | | 8 | 216 | 8 | 216 | 5.6 x 10 ¹ | 1.5 x 10 ³ |
| Lu-174m | | 20 | 541 | 8 | 216 | 2.0 x 10 ² | 5.3 x 10 ³ |
| Lu-174 | | 8 | 216 | 4 | 108 | 2.3 x 10 ¹ | 6.2 x 10 ² |
| Lu-177 | | 30 | 811 | 0.9 | 24.3 | 4.1 x 10 ³ | 1.1 x 10 ⁵ |
| MFP | Mixed fission products | | | | | | |
| Mg-28 | Magnesium (12) | 0.2 | 5.41 | 0.2 | 5.41 | 2.0 x 10 ⁵ | 5.4 x 10 ⁶ |
| Mn-52 | Manganese (25) | 0.3 | 8.11 | 0.3 | 8.11 | 1.6 x 10 ⁴ | 4.4 x 10 ⁵ |
| Mn-53 | | Unlimited | Unlimited | Unlimited | Unlimited | 6.8 x 10 ⁻⁵ | 1.8 x 10 ⁻³ |
| Mn-54 | | 1 | 27.0 | 1 | 27.0 | 2.9 x 10 ² | 7.7 x 10 ³ |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Mn-56 | | 0.2 | 5.41 | 0.2 | 5.41 | 8.0 x 10 ⁵ | 2.2 x 10 ⁷ |
| Mo-93 | Molybdenum (42) | 40 | 1,080 | 7 | 189 | 4.1 x 10 ⁻² | 1.1 |
| Mo-99 | | 0.6 | 16.2 | 0.5 | 13.5 ^c | 1.8 x 10 ⁴ | 4.8 x 10 ⁵ |
| N-13 | Nitrogen (7) | 0.6 | 16.2 | 0.5 | 13.5 | 5.4 x 10 ⁷ | 1.5 x 10 ⁹ |
| Na-22 | Sodium (11) | 0.5 | 13.5 | 0.5 | 13.5 | 2.3 x 10 ² | 6.3 x 10 ³ |
| Na-24 | | 0.2 | 5.41 | 0.2 | 5.41 | 3.2 x 10 ⁵ | 8.7 x 10 ⁶ |
| Nb-92m | Niobium (41) | 0.7 | 18.9 | 0.7 | 18.9 | 5.2 x 10 ³ | 1.4 x 10 ⁵ |
| Nb-93m | | 40 | 1,080 | 6 | 162 | 8.8 | 2.4 x 10 ² |
| Nb94 | | 0.6 | 16.2 | 0.6 | 16.2 | 6.9 x 10 ⁻³ | 1.9 x 10 ⁻¹ |
| Nb95 | | 1 | 27.0 | 1 | 27.0 | 1.5 x 10 ³ | 3.9 x 10 ⁴ |
| Nb-97 | | 0.6 | 16.2 | 0.5 | 13.5 | 9.9 x 10 ⁵ | 2.7 x 10 ⁷ |
| Nd-147 | Neodymium (60) | 4 | 108 | 0.5 | 13.5 | 3.0 x 10 ³ | 8.1 x 10 ⁴ |
| Nd-149 | | 0.6 | 16.2 | 0.5 | 13.5 | 4.5 x 10 ⁵ | 1.2 x 10 ⁷ |
| Ni-59 | Nickel (28) | 40 | 1,080 | 40 | 1,080 | 3.0 x 10 ⁻³ | 8.0 x 10 ⁻² |
| Ni-63 | | 40 | 1,080 | 30 | 811 | 2.1 | 5.7 x 10 ¹ |
| Ni-65 | | 0.3 | 8.11 | 0.3 | 8.11 | 7.1 x 10 ⁵ | 1.9 x 10 ⁷ |
| Np-235 | Neptunium (93) | 40 | 1,080 | 40 | 1,080 | 5.2 x 10 ¹ | 1.4 x 10 ³ |
| Np-236 | | 7 | 189 | 1 x 10 ⁻³ | 2.70 x 10 ⁻² | 4.7 x 10 ⁻⁴ | 1.3 x 10 ⁻² |
| Np-237 | | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 2.6 x 10 ⁻⁵ | 7.1 x 10 ⁻⁴ |
| Np-239 | | 6 | 162 | 0.5 | 13.5 | 8.6 x 10 ³ | 2.8 x 10 ² |
| Os-185 | Osmium (76) | 1 | 27.0 | 1 | 27.0 | 2.8 x 10 ² | 7.5 x 10 ³ |
| Os-191m | | 40 | 1,080 | 40 | 1,080 | 4.6 x 10 ⁴ | 1.3 x 10 ⁶ |
| Os-191 | | 10 | 270 | 0.9 | 24.3 | 1.6 x 10 ³ | 4.4 x 10 ⁴ |
| Os-193 | | 0.6 | 16.2 | 0.5 | 13.5 | 2.0 x 10 ⁴ | 5.3 x 10 ⁵ |
| Os-194 | | 0.2 | 5.41 | 0.2 | 5.41 | 1.1 x 10 ¹ | 3.1 x 10 ² |

| Symbol of Radionuclide | Element and Atomic Number | A ₁ (TBq) (Special form) | A ₁ (Ci) (Special form) | A ₂ (TBq) (Other form) | A ₂ (Ci) (Other form) | Specific activity (TBq/g) | Specific activity (Ci/g) |
|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| P-32 | Phosphorus (15) | 0.3 | 8.11 | 0.3 | 8.11 | 1.1 x 10 ⁴ | 2.9 x 10 ⁵ |
| P-33 | | 40 | 1,080 | 0.9 | 24.3 | 5.8 x 10 ³ | 1.6 x 10 ⁵ |
| Pa-230 | Protactinium (91) | 2 | 54.1 | 0.1 | 2.70 | 1.2 x 10 ³ | 3.3 x 10 ⁴ |
| Pa-231 | | 0.6 | 16.2 | 6 x 10 ⁻⁵ | 1.62 x 10 ⁻³ | 1.7 x 10 ⁻³ | 4.7 x 10 ⁻² |
| Pa-233 | | 5 | 135 | 0.9 | 24.3 | 7.7 x 10 ² | 2.1 x 10 ⁴ |
| Pb-201 | Lead (82) | 1 | 27.0 | 1 | 27.0 | 6.2 x 10 ⁴ | 1.7 x 10 ⁶ |
| Pb-202 | | 40 | 1,080 | 2 | 54.1 | 1.2 x 10 ⁴ | 3.4 x 10 ⁻³ |
| Pb-203 | | 3 | 81.1 | 3 | 81.1 | 1.1 x 10 ⁴ | 3.0 x 10 ⁵ |
| Pb-205 | | Unlimited | Unlimited | Unlimited | Unlimited | 4.5 x 10 ⁻⁶ | 1.2 x 10 ⁻⁴ |
| Pb-210 | | 0.6 | 16.2 | 9 x 10 ⁻³ | 0.243 | 2.8 | 7.6 x 10 ¹ |
| Pb-212 | | 0.3 | 8.11 | 0.3 | 8.11 | 5.1 x 10 ⁴ | 1.4 x 10 ⁶ |
| Pd-103 | Palladium (46) | 40 | 1,080 | 40 | 1,080 | 2.8 x 10 ³ | 7.5 x 10 ⁴ |
| Pd-107 | | Unlimited | Unlimited | Unlimited | 1.9 x 10 ⁻⁵ | 5.1 x 10 ⁻⁴ | |
| Pd-109 | | 0.6 | 16.2 | 0.5 | 13.5 | 7.9 x 10 ⁴ | 2.1 x 10 ⁶ |
| Pm-143 | Promethium (61) | 3 | 81.1 | 3 | 81.1 | 1.3 x 10 ² | 3.4 x 10 ³ |
| Pm-144 | | 0.6 | 16.2 | 0.6 | 16.2 | 9.2 x 10 ¹ | 2.5 x 10 ³ |
| Pm-145 | | 30 | 811 | 7 | 189 | 5.2 | 1.4 x 10 ² |
| Pm-147 | | 40 | 1,080 | 0.9 | 24.3 | 3.4 x 10 ¹ | 9.3 x 10 ² |
| Pm-148 | | 0.5 | 13.5 | 0.5 | 13.5 | 7.9 x 10 ² | 2.1 x 10 ⁴ |
| Pm-149 | | 0.6 | 16.2 | 0.5 | 13.5 | 1.5 x 10 ⁴ | 4.0 x 10 ⁵ |
| Pm-151 | | 3 | 81.1 | 0.5 | 13.5 | 2.7 x 10 ⁴ | 7.3 x 10 ⁵ |
| Po-208 | Polonium (84) | 40 | 1,080 | 2 x 10 ⁻² | 0.541 | 2.2 x 10 ¹ | 5.9 x 10 ² |
| Po-209 | | 40 | 1,080 | 2 x 10 ⁻² | 0.542 | 6.2 x 10 ⁻¹ | 1.7 x 10 ¹ |
| Po-210 | | 40 | 1,080 | 2 x 10 ⁻² | 0.541 | 1.7 x 10 ² | 4.5 x 10 ³ |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Pr-142 | Praseodymium (59) | 0.3 | 5.41 | 0.2 | 5.41 | 4.3 x 10 ⁴ | 1.2 x 10 ⁶ |
| Pr-143 | | 4 | 108 | 0.5 | 13.5 | 2.5 x 10 ³ | 6.7 x 10 ⁴ |
| Pt-188 | Platinum (78) | 0.6 | 16.2 | 0.6 | 16.2 | 2.5 x 10 ³ | 6.8 x 10 ⁴ |
| Pt-191 | | 3 | 81.1 | 3 | 81.1 | 8.7 x 10 ³ | 2.4 x 10 ⁵ |
| Pt-193m | | 40 | 1,080 | 9 | 243 | 5.8 x 10 ³ | 1.6 x 10 ⁵ |
| Pt-193 | | 40 | 1,080 | 40 | 1,080 | 1.4 | 3.7 x 10 ¹ |
| Pt-195m | | 10 | 270 | 2 | 54.1 | 6.2 x 10 ³ | 1.7 x 10 ⁵ |
| Pt-197m | | 10 | 270 | 0.9 | 24.3 | 3.7 x 10 ⁵ | 1.0 x 10 ⁷ |
| Pt-197 | | 20 | 541 | 0.5 | 13.5 | 3.2 x 10 ⁴ | 8.7 x 10 ⁵ |
| Pu-236 | Plutonium (94) | 7 | 189 | 7 x 10 ⁻⁴ | 1.89 x 10 ⁻² | 2.0 x 10 ¹ | 5.3 x 10 ² |
| Pu-237 | | 20 | 541 | 20 | 541 | 4.5 x 10 ² | 1.2 x 10 ⁴ |
| Pu-238 | | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 6.3 x 10 ⁻¹ | 1.7 x 10 ¹ |
| Pu-239 | | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 2.3 x 10 ⁻³ | 6.2 x 10 ⁻² |
| Pu-240 | | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 8.4 x 10 ⁻³ | 2.3 x 10 ⁻¹ |
| Pu-241 | | 40 | 1,080 | 1 x 10 ⁻² | 0.270 | 3.8 | 1.0 x 10 ² |
| Pu-242 | | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 1.5 x 10 ⁻⁴ | 3.9 x 10 ⁻³ |
| Pu-244 | | 0.3 | 8.11 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 6.7 x 10 ⁻⁷ | 1.8 x 10 ⁻⁵ |
| Ra-223 | Radium (88) | 0.6 | 16.2 | 3 x 10 ⁻² | 0.811 | 1.9 x 10 ³ | 5.1 x 10 ⁴ |
| Ra-224 | | 0.3 | 8.11 | 6 x 10 ⁻² | 1.62 | 5.9 x 10 ³ | 1.6 x 10 ⁵ |
| Ra-225 | | 0.6 | 16.2 | 2 x 10 ⁻² | 0.541 | 1.5 x 10 ³ | 3.9 x 10 ⁴ |
| Ra-226 | | 0.3 | 8.11 | 2 x 10 ⁻² | 0.541 | 3.7 x 10 ⁻² | 1.0 |
| Ra-228 | | 0.6 | 16.2 | 4 x 10 ⁻² | 1.08 | 1.0 x 10 ¹ | 2.7 x 10 ² |
| Rb-81 | Rubidium (37) | 2 | 54.1 | 0.9 | 24.3 | 3.1 x 10 ⁵ | 8.4 x 10 ⁶ |
| Rb-83 | | 2 | 54.1 | 2 | 54.1 | 6.8 x 10 ² | 1.8 x 10 ⁴ |
| Rb-84 | | 1 | 27.0 | 0.9 | 24.3 | 1.8 x 10 ³ | 4.7 x 10 ⁴ |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Rb-86 | | 0.3 | 8.11 | 0.3 | 8.11 | 3.0 x 10 ³ | 8.1 x 10 ⁴ |
| Rb-87 | | Unlimited | Unlimited | Unlimited | Unlimited | 3.2 x 10 ⁻⁹ | 8.6 x 10 ⁻⁸ |
| Rb (natural) | | Unlimited | Unlimited | Unlimited | Unlimited | 6.7 x 10 ⁶ | 1.8 x 10 ⁸ |
| Re-183 | Rhenium (75) | 5 | 135 | 5 | 135 | 3.8 x 10 ² | 1.0 x 10 ⁴ |
| Re-184m | | 3 | 81.1 | 3 | 81.1 | 1.6 x 10 ² | 4.3 x 10 ³ |
| Re-184 | | 1 | 27.0 | 1 | 27.0 | 6.9 x 10 ² | 1.9 x 10 ⁴ |
| Re-186 | | 4 | 108 | 0.5 | 13.5 | 6.9 x 10 ³ | 1.9 x 10 ⁵ |
| Re-187 | | Unlimited | Unlimited | Unlimited | Unlimited | 1.4 x 10 ⁻⁹ | 3.8 x 10 ⁻⁸ |
| Re-188 | | 0.2 | 5.41 | 0.2 | 5.41 | 3.6 x 10 ⁴ | 9.8 x 10 ⁵ |
| Re-189 | | 4 | 108 | 0.5 | 13.5 | 2.5 x 10 ⁴ | 6.8 x 10 ⁵ |
| Re (natural) | | Unlimited | Unlimited | Unlimited | Unlimited | | 2.4 x 10 ⁸ |
| Rh-99 | Rhodium (45) | 2 | 54.1 | 2 | 54.1 | 3.0 x 10 ³ | 8.2 x 10 ⁴ |
| Rh-101 | | 4 | 108 | 4 | 108 | 4.1 x 10 ¹ | 1.1 x 10 ³ |
| Rh-102m | | 2 | 54.1 | 0.9 | 24.3 | 2.3 x 10 ² | 6.2 x 10 ³ |
| Rh-102 | | 0.5 | 13.5 | 0.5 | 13.5 | 4.5 x 10 ¹ | 1.2 x 10 ³ |
| Rh-103m | | 40 | 1,080 | 40 | 1,080 | 1.2 x 10 ⁶ | 3.3 x 10 ⁷ |
| Rh-105 | | 10 | 270 | 0.9 | 24.3 | 3.1 x 10 ⁴ | 8.4 x 10 ⁵ |
| Rn-222 | Radon (86) | 0.2 | 5.41 | 4 x 10 ⁻³ | 0.108 | 5.7 x 10 ³ | 1.5 x 10 ⁵ |
| Ru-97 | Ruthenium (44) | 4 | 108 | 4 | 108 | 1.7 x 10 ⁴ | 4.6 x 10 ⁵ |
| Ru-103 | | 2 | 54.1 | 0.9 | 24.3 | 1.2 x 10 ³ | 3.2 x 10 ⁴ |
| Ru-105 | | 0.6 | 16.2 | 0.5 | 13.5 | 2.5 x 10 ⁵ | 6.7 x 10 ⁶ |
| Ru-106 | | 0.2 | 5.41 | 0.2 | 5.41 | 1.2 x 10 ² | 3.3 x 10 ³ |
| S-35 | Sulphur (16) | 40 | 1,080 | 2 | 54.1 | 1.6 x 10 ³ | 4.3 x 10 ⁴ |
| Sb-122 | Antimony (51) | 0.3 | 8.11 | 0.3 | 8.11 | 1.5 x 10 ⁴ | 4.0 x 10 ⁵ |
| Sb-124 | | 0.6 | 16.2 | 0.5 | 13.5 | 6.5 x 10 ² | 1.7 x 10 ⁴ |
| Sb-125 | | 2 | 54.1 | 0.9 | 24.3 | 3.9 x 10 ¹ | 1.0 x 10 ³ |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Sb-126 | | 0.4 | 10.8 | 0.4 | 10.8 | 3.1 x 10 ³ | 8.4 x 10 ⁴ |
| Sc-44 | Scandium (21) | 0.5 | 13.5 | 0.5 | 13.5 | 6.7 x 10 ⁵ | 1.8 x 10 ⁷ |
| Sc-46 | | 0.5 | 13.5 | 0.5 | 13.5 | 1.3 x 10 ³ | 3.4 x 10 ⁴ |
| Sc-47 | | 9 | 243 | 0.9 | 24.3 | 3.1 x 10 ⁴ | 8.3 x 10 ⁵ |
| Sc-48 | | 0.3 | 8.11 | 0.3 | 8.11 | 5.5 x 10 ⁴ | 1.5 x 10 ⁴ |
| Se-75 | Selenium (34) | 3 | 81.1 | 3 | 81.1 | 5.4 x 10 ² | 1.5 x 10 ⁴ |
| Se-79 | | 40 | 1,080 | 2 | 54.1 | 2.6 x 10 ⁻³ | 7.0 x 10 ⁻² |
| Si-31 | Silicon (14) | 0.6 | 16.2 | 0.5 | 13.5 | 1.4 x 10 ⁶ | 3.9 x 10 ⁷ |
| Si-32 | | 40 | 10,800 | 0.2 | 5.41 | 3.9 | 1.1 x 10 ² |
| Sm-145 | Samarium (62) | 20 | 541 | 20 | 541 | 9.8 x 10 ¹ | 2.610 ³ |
| Sm-147 | | Unlimited | Unlimited | Unlimited | Unlimited | 8.510 ⁻¹⁰ | 2.310 ⁻⁸ |
| Sm-151 | | 40 | 1,080 | 4 | 108 | 9.710 ⁻¹ | 2.6 x 10 ¹ |
| Sm-153 | | 4 | 108 | 0.5 | 13.5 | 1.6 x 10 ⁴ | 4.4 x 10 ⁵ |
| Sn-113 | Tin (50) | 4 | 108 | 4 | 108 | 3.7 x 10 ² | 1.0 x 10 ⁴ |
| Sn-117m | | 6 | 162 | 2 | 54.1 | 3.0 x 10 ³ | 8.2 x 10 ⁴ |
| Sn-119m | | 40 | 1,080 | 40 | 1,080 | 1.4 x 10 ² | 3.7 x 10 ³ |
| Sn-121m | | 40 | 1,080 | 0.9 | 24.3 | 2.0 | 5.4 x 10 ¹ |
| Sn-123 | | 0.6 | 16.2 | 0.5 | 13.5 | 3.0 x 10 ² | 8.2 x 10 ³ |
| Sn-125 | | 0.2 | 5.41 | 0.2 | 5.41 | 4.0 x 10 ³ | 1.1 x 10 ⁵ |
| Sn-126 | | 0.3 | 8.11 | 0.3 | 8.11 | 1.010 ⁻³ | 2.810 ⁻² |
| Sr-82 | Strontium (38) | 0.2 | 5.41 | 0.2 | 5.41 | 2.3 x 10 ³ | 6.2 x 10 ⁴ |
| Sr-85m | | 5 | 135 | 5 | 135 | 1.2 x 10 ⁶ | 3.3 x 10 ⁷ |
| Sr-85 | | 2 | 54.1 | 2 | 54.1 | 8.8 x 10 ² | 2.4 x 10 ⁴ |
| Sr-87m | | 3 | 81.1 | 3 | 81.1 | 4.8 x 10 ⁵ | 1.3 x 10 ⁷ |
| Sr-89 | | 0.6 | 16.2 | 0.5 | 13.5 | 1.1 x 10 ³ | 2.9 x 10 ⁴ |
| Sr-90 | | 0.2 | 5.41 | 0.1 | 2.70 | 5.1 | 1.4 x 10 ² |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Sr-91 | | 0.3 | 8.11 | 0.3 | 8.11 | 1.3 x 10 ⁵ | 3.6 x 10 ⁶ |
| Sr-92 | | 0.8 | 21.6 | 0.5 | 13.5 | 4.7 x 10 ⁵ | 1.3 x 10 ⁷ |
| T | Tritium (1) | 40 | 1,080 | 40 | 1,080 | 3.6 x 10 ² | 9.7 x 10 ³ |
| Ta-178 | Tantalum (73) | 1 | 27.0 | 1 | 27.0 | 4.2 x 10 ⁶ | 1.1 x 10 ⁸ |
| Ta-179 | | 30 | 811 | 30 | 811 | 4.1 x 10 ¹ | 1.1 x 10 ³ |
| Ta-182 | | 0.8 | 21.6 | 0.5 | 13.5 | 2.3 x 10 ² | 6.2 x 10 ³ |
| Tb-157 | Terbium (65) | 40 | 1,080 | 10 | 270 | 5.610 ⁻¹ | 1.5 x 10 ¹ |
| Tb-158 | | 1 | 27.0 | 0.7 | 18.9 | 5.610 ⁻¹ | 1.5 x 10 ¹ |
| Tb-160 | | 0.9 | 24.3 | 0.5 | 13.5 | 4.2 x 10 ² | 1.1 x 10 ⁴ |
| Tc-95m | Technetium (43) | 2 | 54.1 | 2 | 54.1 | 8.3 x 10 ² | 2.2 x 10 ⁴ |
| Tc-96m | | 0.4 | 10.8 | 0.4 | 10.8 | 1.4 x 10 ⁶ | 3.8 x 10 ⁷ |
| Tc-96 | | 0.4 | 10.8 | 0.4 | 10.8 | 1.2 x 10 ⁴ | 3.2 x 10 ⁵ |
| Tc-97m | | 40 | 1,080 | 40 | 1,080 | 5.6 x 10 ² | 1.5 x 10 ⁴ |
| Tc-97 | | Unlimited | Unlimited | Unlimited | Unlimited | 5.2 x 10 ⁻² | 1.4 x 10 ⁻³ |
| Tc-98 | | 0.7 | 18.9 | 0.7 | 18.9 | 3.2 x 10 ⁻⁵ | 8.7 x 10 ⁻⁴ |
| Tc-99m | | 8 | 216 | 8 | 216 | 1.9 x 10 ⁵ | 5.3 x 10 ⁶ |
| Tc-99 | | 40 | 1,080 | 0.9 | 24.3 | 6.3 x 10 ⁻⁴ | 1.7 x 10 ⁻² |
| Te-118 | Tellurium (52) | 0.2 | 5.41 | 0.2 | 5.41 | 6.8 x 10 ³ | 1.8 x 10 ⁵ |
| Te-121m | | 5 | 135 | 5 | 135 | 2.6 x 10 ² | 7.0 x 10 ³ |
| Te-121 | | 2 | 54.1 | 2 | 54.1 | 2.4 x 10 ³ | 6.4 x 10 ⁴ |
| Te-123m | | 7 | 189 | 7 | 189 | 3.3 x 10 ² | 8.9 x 10 ³ |
| Te-125m | | 30 | 811 | 9 | 243 | 6.7 x 10 ² | 1.8 x 10 ⁴ |
| Te-127m | | 20 | 541 | 0.5 | 13.5 | 3.5 x 10 ² | 9.4 x 10 ³ |
| Te-127 | | 20 | 541 | 0.5 | 13.5 | 9.8 x 10 ⁴ | 2.6 x 10 ⁶ |
| Te-129m | | 0.6 | 16.2 | 0.5 | 13.5 | 1.1 x 10 ³ | 3.0 x 10 ⁴ |
| Te-129 | | 0.6 | 16.2 | 0.5 | 13.5 | 7.7 x 10 ⁵ | 2.1 x 10 ⁷ |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Te-131m | | 0.7 | 18.9 | 0.4 | 10.8 | 3.0 x 10 ⁴ | 8.0 x 10 ⁵ |
| Te-132 | | 0.4 | 10.8 | 0.4 | 10.8 | 1. x 10 ⁴ | 3.0 x 10 ⁵ |
| Th-227 | Thorium (90) | 9 | 243 | 1 x 10 ⁻² | 0.270 | 1.1 x 10 ³ | 3.1 x 10 ⁴ |
| Th-228 | | 0.3 | 8.11 | 4 x 10 ⁻⁴ | 1.08 x 10 ⁻² | 3.0 x 10 ¹ | 8.2 x 10 ² |
| Th-229 | | 0.3 | 8.11 | 3 x 10 ⁻⁵ | 8.11 x 10 ⁻⁴ | 7.9 x 10 ⁻³ | 2.1 x 10 ⁻¹ |
| Th-230 | | 2 | 54.1 | 2 x 10 ⁻⁴ | 5.41 x 10 ⁻³ | 7.6 x 10 ⁻⁴ | 2.1 x 10 ⁻² |
| Th-231 | | 40 | 1,080 | 0.9 | 24.3 | 2 x 10 ⁴ | 5.3 x 10 ⁵ |
| Th-232 | | Unlimited | Unlimited | Unlimited | Unlimited | 4.0 x 10 ⁻⁹ | 1.1 x 10 ⁻⁷ |
| Th-234 | | 0.2 | 5.41 | 0.2 | 5.41 | 8.6 x 10 ² | 2.3 x 10 ⁴ |
| Th (natural) | | Unlimited | Unlimited | Unlimited | Unlimited | 8.1 x 10 ⁻⁹ | 2.2 x 10 ⁻⁷ |
| Ti-44 | Titanium (22) | 0.5 | 13.5 | 0.2 | 5.41 | 6.4 | 1.7 x 10 ² |
| Tl-200 | Thallium (81) | 0.8 | 21.6 | 0.8 | 21.6 | 2.2 x 10 ⁴ | 6.0 x 10 ⁵ |
| Tl-201 | | 10 | 270 | 10 | 270 | 7.9 x 10 ³ | 2.1 x 10 ⁵ |
| Tl-202 | | 2 | 54.1 | 2 | 54.1 | 2.0 x 10 ³ | 5.3 x 10 ⁴ |
| Tl-204 | | 4 | 108 | 0.5 | 13.5 | 1.7 x 10 ¹ | 4.6 x 10 ² |
| Tm-167 | Thulium (69) | 7 | 189 | 7 | 189 | 3.1 x 10 ³ | 8.5 x 10 ⁴ |
| Tm-168 | | 0.8 | 21.6 | 0.8 | 21.6 | 3.1 x 10 ² | 8.3 x 10 ³ |
| Tm-170 | | 4 | 108 | 0.5 | 13.5 | 2.2 x 10 ² | 6.0 x 10 ³ |
| Tm-171 | | 40 | 1,080 | 10 | 270 | 4.0 x 10 ¹ | 1.1 x 10 ³ |
| U-230 | Uranium (92) | 40 | 1,080 | 1 x 10 ⁻² | 0.270 | 1.0 x 10 ³ | 2.7 x 10 ⁴ |
| U-232 | | 3 | 81.1 | 3 x 10 ⁻⁴ | 8.11 x 10 ⁻³ | 8.3 x 10 ⁻¹ | 2.2 x 10 ¹ |
| U-233 | | 10 | 270 | 1 x 10 ⁻³ | 2.70 x 10 ⁻² | 3.6 x 10 ⁻⁴ | 9.7 x 10 ⁻³ |
| U-234 | | 10 | 270 | 1 x 10 ⁻³ | 2.70 x 10 ⁻² | 2.3 x 10 ⁻⁴ | 6.2 x 10 ⁻³ |
| U-235 | | Unlimited | Unlimited | Unlimited | Unlimited | 8.0 x 10 ⁻⁸ | 2.2 x 10 ⁻⁶ |
| U-236 | | 10 | 270 | 1 x 10 ⁻³ | 2.70 x 10 ⁻² | 2.4 x 10 ⁻⁶ | 6.5 x 10 ⁻⁵ |

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|---------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| U-238 | | Unlimited | Unlimited | Unlimited | Unlimited | 1.2 x 10 ⁻⁸ | 3.4 x 10 ⁻⁷ |
| U (natural) | | Unlimited | Unlimited | Unlimited | Unlimited | | |
| U (enriched 5% or less) | | Unlimited | Unlimited | Unlimited | Unlimited | | |
| U (enriched more than 5%) | | 10 | 270 | 1 x 10 ⁻³ | 2.70 x 10 ⁻² | | |
| U (depleted) | | Unlimited | Unlimited | Unlimited | Unlimited | | |
| V-48 | Vanadium (23) | 0.3 | 8.11 | 0.3 | 8.11 | 6.3 x 10 ³ | 1.7 x 10 ⁵ |
| V-49 | | 40 | 1,080 | 40 | 1,080 | 3.0 x 10 ² | 8.1 x 10 ³ |
| W-178 | Tungsten (74) | 1 | 27.0 | 1 | 27.0 | 1.3 x 10 ⁻³ | 3.4 x 10 ⁴ |
| W-181 | | 30 | 811 | 30 | 811 | 2.2 x 10 ² | 6.0 x 10 ³ |
| W-185 | | 40 | 1,080 | 0.9 | 24.3 | 3.5 x 10 ² | 9.4 x 10 ³ |
| W-187 | | 2 | 54.1 | 0.5 | 13.5 | 2.6 x 10 ⁴ | 7.0 x 10 ⁵ |
| W-188 | | | | | | | |
| Xe-122 | Xenon (54) | 0.2 | 5.41 | 0.2 | 5.41 | 4.8 x 10 ⁴ | 1.3 x 10 ⁶ |
| Xe-123 | | 0.2 | 5.41 | 0.2 | 5.41 | 4.4 x 10 ⁵ | 1.2 x 10 ⁷ |
| Xe-127 | | 4 | 108 | 4 | 108 | 1.0 x 10 ³ | 2.8 x 10 ⁴ |
| Xe-131m | | 40 | 1,080 | 40 | 1,080 | 3.1 x 10 ³ | 8.4 x 10 ⁴ |
| Xe-133 | | 20 | 541 | 20 | 541 | 6.9 x 10 ³ | 1.9 x 10 ⁵ |
| Xe-135 | | 4 | 108 | 4 | 108 | 9.5 x 10 ⁴ | 2.6 x 10 ⁶ |
| Y-87 | Yttrium (39) | 2 | 54.1 | 2 | 54.1 | 1.7 x 10 ⁴ | 4.5 x 10 ⁵ |
| Y-88 | | 0.4 | 10.8 | 0.4 | 10.8 | 5.2 x 10 ² | 1.4 x 10 ⁴ |
| Y-90 | | 0.2 | 5.41 | 0.2 | 5.41 | 2.0 x 10 ⁴ | 5.4 x 10 ⁵ |
| Y-91m | | 2 | 54.1 | 2 | 54.1 | 1.5 x 10 ⁶ | 4.2 x 10 ⁷ |
| Y-91 | | 0.3 | 8.11 | 0.3 | 8.11 | 9.1 x 10 ² | 2.5 x 10 ⁴ |
| Y-92 | | 0.2 | 5.41 | 0.2 | 5.41 | 3.6 x 10 ⁵ | 9.6 x 10 ⁶ |
| Y-93 | | 0.2 | 5.41 | 0.2 | 5.41 | 1.2 x 10 ⁵ | 3.3 x 10 ⁶ |

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|------------------------|---------------------------|-------------------------------------|------------------------------------|-----------------------------------|----------------------------------|---------------------------|--------------------------|
| Yb-169 | Ytterbium (70) | 3 | 81.1 | 3 | 81.1 | 8.9 x 10 ² | 2.4 x 10 ⁴ |
| Yb-175 | | 30 | 811 | 0.9 | 24.3 | 6.6 x 10 ³ | 1.8 x 10 ⁵ |
| Zn-65 | Zinc (30) | 2 | 54.1 | 2 | 54.1 | 3.0 x 10 ² | 8.2 x 10 ³ |
| Zn-69m | | 2 | 54.1 | 0.5 | 13.5 | 1.2 x 10 ⁵ | 3.3 x 10 ⁶ |
| Zn-69 | | 4 | 108 | 0.5 | 13.5 | 1.8 x 10 ⁶ | 4.9 x 10 ⁷ |
| Zr-88 | Zirconium (40) | 3 | 81.1 | 3 | 81.1 | 6.6 x 10 ² | 1.8 x 10 ⁴ |
| Zr-93 | | 40 | 1,080 | 0.2 | 5.41 | 9.3 x 10 ⁻⁵ | 2.5 x 10 ⁻³ |
| Zr-95 | | 1 | 27.0 | 0.9 | 24.3 | 7.9 x 10 ² | 2.1 x 10 ⁴ |
| Zr-97 | | 0.3 | 8.11 | 0.3 | 8.11 | 7.1 x 10 ⁴ | 1.9 x 10 ⁶ |

NOTES:

1. The A₁ value is .74 TBq (20 curies) for americium and plutonium contained in Am-Be or Pu-Be neutron sources or in nuclear-powered pacemakers.
2. The values of A₁ and A₂ must be calculated according to the procedure specified in 49 CFR 173.433, taking into account the activity of the fission products and of the uranium-233 in addition to that of the thorium.
3. The values of A₁ and A₂ must be calculated according to the procedure specified in 49 CFR 173.433, taking into account the activity of the fission products and plutonium isotopes in addition to that of the uranium.

A11.6. Authorized Type A Packages. Use the following packages for shipment, if they do not contain quantities over A₁ or A₂ as appropriate:

A11.6.1. DOT 7A Type A General Packaging.

- Each shipper of a DOT 7A package must maintain on file for at least 1 year after the latest shipment complete documentation of tests and an engineering evaluation or comparative data showing that the construction methods, packaging design, and materials of construction comply with that specification. Unless otherwise required, the shipper is exempt from maintaining this documentation if it is maintained by the Inventory Control Point (national stock number managing activity).
- DOT 7A packaging designed according to the requirements of 49 CFR 178.350 in effect on 30 June are not authorized for shipment.
- Any other Type A packaging that also meets the applicable standards for fissile materials in 10 CFR Part 71 and authorized in 49 CFR 173.471.

A11.6.2. Any Type B, B(U), or B(M) packaging, authorized in A11.7.

A11.6.3. Any foreign-made packaging that meets the standards of IAEA "*Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6*" or IAEA "*Regulations for the Safe Transport of Radioactive Materials, No. TS-R-1*" and bears the marking "Type A" used for the import of radioactive materials. Such packaging may be used later for domestic and export shipments of radioactive materials only if the offeror obtains the applicable documentation specified in A11.6.1. The packaging must conform to the requirements of the country of origin (as indicated by the packaging marking) and the IAEA regulations applicable to Type A packaging.

A11.7. Authorized Type B Packages. Use the following packages for shipment of quantities over A₁ or A₂, as appropriate:

A11.7.1. Any Type B, Type B(U), or Type B(M) packaging that meets the applicable requirements in the regulations of the US Nuclear Regulatory Commission (10 CFR Part 71) and has been approved by that Commission may be shipped per 49 CFR 173.471.

A11.7.2. Any Type B, B(U) or B(M) packaging that meets the applicable requirements of the regulations of the International Atomic Energy Agency (IAEA) in its *Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6*, or or IAEA "*Regulations for the Safe Transport of Radioactive Materials, No. TS-R-1*" and for which the foreign competent authority certificate has been revalidated by DOT according to 49 CFR 173.473. Authorized only for export and import shipments.

A11.7.3. DOT 6M metal packaging, only for solid or gaseous radioactive materials that will not undergo pressure generating decomposition at temperatures up to 121 degrees C (250 degrees F) and do not generate more than 10 watts of radioactive decay heat.

A11.7.4. DOT 20WC, wooden protective jacket, when used with a single, snug-fitting inner DOT 2R. For liquid contents, the inner packaging must comply with 49 CFR 173.412. Not authorized for special form radioactive material.

A11.7.5. DOT 20WC, wooden protective jacket, with a single, snug-fitting inner Type A packaging that has a metal outer wall. Radioactive decay heat must not be over 100 watts. Authorized only for special form radioactive material.

A11.7.6. DOT 21WC, wooden protective overpack, with a single inner DOT 2R. Contents must be loaded within the inner packaging in a manner to prevent loose movement during transportation. The inner packaging must be securely positioned and centered within the overpack so that there will be no significant displacement of the inner packaging if subjected to the 9 meter (30 feet) drop test described in 10 CFR Part 71. Authorized only for special form radioactive material.

A11.8. Authorized Packaging-Fissile Materials.

A11.8.1. Except as provided in A3.3.7.8, package fissile materials containing not more than A₁ or A₂ (as appropriate) in:

A11.8.1.1. DOT 6L, metal packaging, for materials in A11.8.2.1.

A11.8.1.2. DOT 6M, metal packaging, for materials in A11.8.2.2.

A11.8.1.3. Any packaging listed in A11.6, limited to radioactive materials specified in 10 CFR Part 71, Subpart C.

A11.8.1.4. Any other Type A, Type B, Type B(U), or Type B(M) packaging for fissile radioactive materials that also meets the applicable standards for fissile materials in 10 CFR Part 71.

A11.8.1.5. Any other Type A, Type B, Type B(U), or Type B(M) packaging that also meets the applicable requirements for fissile material packaging in section V of the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6," or IAEA "Regulations for the Safe Transport of Radioactive Materials, No. TS-R-1" and for which the foreign competent authority certificate has been revalidated by the DOT according to 49 CFR 173.473. Authorized only for export and import shipments.

A11.8.1.6. A 208 L (55 gallon) steel drum (1A2), subject to the following conditions:

- Packaging must meet the PG I performance requirements.
- The quantity may not exceed 350 grams of uranium 235 in any nonpyrophoric form, enriched to any degree in the uranium 235 isotope.
- Each drum must have a minimum 18-gauge body and bottom head and 16-gauge removable top head with one or more corrugations in the cover near the periphery.
- Closures must conform to 49 CFR 178.352.
- At least four equally spaced 12 mm (0.5 inch) diameter vent holes must be provided on the sides of the drum near the top, each covered with weatherproof tape or equivalent device.
- Appropriate primary inner containment of the contents and sufficient packaging material, such as plastic or metal jars or cans, must be provided so that DOT 7A provisions are satisfied by the inner packaging.
- Each inner container must be capable of venting if subjected to the thermal test described in 10 CFR Part 71.
- Liquid contents must be packaged per 49 CFR 173.412.
- The maximum weight of contents including internal packaging must not be over 91 kgs (200 pounds) with fissile material content limited as shown in table A11.2:

A11.8.1.7. Any metal cylinder that meets the performance requirements of A11.6 and 49 CFR 178.350 for DOT 7A Type A packaging may be used for the transport of residual "heels" of enriched solid uranium hexafluoride without a protective overpack per table A11.3:

Table A11.2. Fissile Material Content and Transport Index for UN 1A2 Package.

| Maximum U-235 per Package (grams) | Minimum Transport Index per Package as Fissile Class II | Maximum Number of Packages Transported as a Fissile Material Controlled Shipment |
|-----------------------------------|---|--|
| 350 | 1.8 | 72 |
| 300 | 1.0 | 129 |
| 250 | 0.5 | 256 |
| 200 | 0.3 | 500 |
| 150 | 0.1 | 500 |
| 100 | 0.1 | 500 |
| 50 | Note 1 | Note 2 |

NOTES:

1. Transport index is limited by the external radiation levels.
2. Maximum number is limited by the total transport index.

Table A11.3. Allowable Content of Uranium Hexafluoride (UF₆) "Heels" in a Specification 7A Cylinder.

| Maximum Cylinder Diameter | | Cylinder Volume | | Maximum Uranium 235 Enrichment (Weight %) | Maximum "Heel" Weight Per Cylinder | | | |
|---------------------------|-------------|-----------------|------|---|------------------------------------|------|-------------|------|
| Inches | Centimeters | Cubic Feet | L | | UF ₆ | | Uranium 235 | |
| | | | | | kg | (lb) | kg | (lb) |
| 5 | 12.7 | 0.311 | 8.8 | 100.0 | 0.045 | 0.1 | 0.031 | 0.07 |
| 8 | 20.3 | 1.359 | 39 | 12.5 | 0.227 | 0.5 | .019 | 0.04 |
| 12 | 30.5 | 2.410 | 68 | 5.0 | 0.454 | 1.0 | .015 | 0.03 |
| 30 | 76 | 25.64 | 725 | 5.0 | 11.3 | 25 | .383 | 0.84 |
| 48 | 122 | 108.9 | 3084 | 4.5 | 22.7 | 50 | .690 | 1.52 |
| | | (10 ton) | | | | | | |
| 48 | 122 | 142.7 | 4041 | 4.5 | 22.7 | 50 | .690 | 1.52 |
| | | (14 ton) | | | | | | |

A11.8.1.8. DOT 20PF-1, 20PF-2, 20PF-3 or 21PF-1A, 21PF-1B, or 21PF-2 phenolic-foam insulated overpacks with snug fitting inner metal cylinders meeting all of the applicable requirements of A3.1, A3.3.7.1, A3.3.7.2, A11.18 and the following:

- Handling procedures and packaging criteria must comply with US Department of Energy Report Number ORO-651 or ANSI N14.1.
- Quantities of uranium hexafluoride are authorized as shown in table A11.6, with each package assigned a minimum transport index as also shown.

A11.8.2. Package fissile radioactive materials with radioactive content over A₁ or A₂ in either:

A11.8.2.1. DOT 6L Metal Packaging.

- Authorized only for uranium-235, plutonium-239, or plutonium-241, as metal oxide, or compounds that do not decompose at temperatures up to 149 degrees C (300 degrees F).
- Radioactive decay heat output must not be more than 5 watts.
- Radioactive materials in normal form must be packaged in one or more tightly-sealed metal cans or polyethylene bottles within a DOT 2R containment vessel.
- Authorized contents are limited per table A11.4:

Table A11.4. Authorized Contents in Kilograms (Kg) and Conditions for Specification 6L Packages.

| Uranium-235 | | Plutonium (Note 1) | | Minimum Fissile Transport Index | Maximum Number of Packages Transported as a Fissile Material Control Shipment |
|-----------------|--------------|--------------------|-------------|---------------------------------|---|
| H/X<=3 (Note 2) | 3 H/X<=10 | H/X<=10 | 10<=H/X<=20 | | |
| 14 | 3.6 (Note 3) | | | 1.3 | 80 |
| | | 2.5 | 2.4 | 1.8 | 50 |

NOTES:

1. Plutonium solutions are not authorized.
2. H/X is the ratio of hydrogen to fissile atoms in the inner containment with all sources of hydrogen in the containment considered.
3. Volume must not be over 3.6 liters.

A11.8.2.2. DOT 6M Metal Packaging. Authorized only for solid radioactive materials that do not decompose at temperatures up to 121 degrees C (250 degrees F). Radioactive decay heat output must not exceed 10 watts. Radioactive materials in other than special form must be packaged in one or more tightly-sealed metal cans or polyethylene bottles within a DOT specification 2R containment vessel.

- Limit packages of fissile material with a criticality TI equal to 0.0 to 1.6 kg of uranium 235; 0.9 kg of plutonium (except that due to the 10-watt thermal decay heat limitation, the limit for plutonium-238 is 0.02 kg); and 0.5 kg of uranium-233. The maximum ratio of hydrogen to fissile material must not be greater than three, including all of the sources of hydrogen within the DOT 2R containment vessel.
- Use table A11.5 to determine maximum quantities of fissile material and other restrictions for materials with a criticality TI if greater than 0.0. The minimum transport index to be assigned per package and, for fissile material, controlled shipments, the allowable number of similar packages per transport vehicle is shown in table A11.5. Where a maximum ratio of hydrogen to fissile material is specified in table A11.5, only the hydrogen interspersed with the fissile material has to be considered. For a uranium-233 shipment, the maximum inside diameter of the inner containment vessel must not be over 12.1 cm (4.75 inches). Where necessary, use a tight-fitting steel insert to reduce a larger diameter inner containment vessel specified in 49 CFR 178.354 to the 12 centimeters (4.75 inches) limit.

Table A11.5. Authorized Contents for Specification 6M Packages (note 1)

| Uranium-233 (note 5) | | | Uranium-235 (note 4 and 7) | | | Plutonium (note 2, 3, and 4) | | | Minimum Transport Index | Maximum Number of Packages Transported as a Fissile Material Control Shipment |
|-------------------------|------------|------------|-------------------------------|------------|------------|---------------------------------|-----------------|-----------------|-------------------------------|--|
| Metal or Alloy | Compounds | | Metal or Alloy | Compounds | | Metal or Alloy | Compounds | | | |
| | H/X = 0 | H/X <=3 | | H/X = 0 | H/X <=3 | | H/X = 0 | H/X <=3 | | |
| 0.5 | 0.5 | 0.5 | 1.6 | 1.6 | 1.6 | 0.9 (note 9) | 0.9 (note 9) | 0.9 (note 9) | 0 | NA |
| 3.6 | 4.4 | 2.9 | 7.2 | 7.6 | 5.3 | 3.1 | 4.1 | 3.4 | 0.1 | 1,250 |
| 4.2 (note 6) | 5.2 | 3.5 | 8.7 | 9.6 | 6.4 | 3.4 | 4.5 | 4.1 | 0.2 | 625 |
| 5.2 (note 6) | 6.8 | 4.5 | 11.2 | 13.9 | 8.3 | 4.2 | --- | 4.5 | 0.5 | 250 |
| --- | --- | --- | 13.5 | 16.0 | 10.1 | 4.5 | --- | --- | 1.0 | 125 |
| --- | --- | --- | --- | 26.0 | 16.1 | --- | --- | --- | 5.0 | 25 |
| --- | --- | --- | --- | 32.0 | 19.5 | --- | --- | --- | 10.0 | 12 |

NOTES:

1. Quantity in kg.
2. Minimum percentage of plutonium-240 is 5 weight percent.
3. 4.5 kilogram limitation of plutonium due to 10 watt decay heat limitation.
4. For a mixture of uranium-235 and plutonium, an equal amount of uranium-235 may be substituted for any portion of plutonium authorized.
5. Maximum inside diameter of Specification 2R containment vessel must not be greater than 12.1 cm (4.75 inch) see A11.8.2.
6. Granulated or powdered metal with any particle less than 8 mm (0.25 inch) in the smallest dimension is not authorized.
7. Except for material with a criticality TI of 0.0, the maximum permitted uranium-235 enrichment is 93.5 percent.
8. H/X is ratio of hydrogen to fissile atoms in the inner containment.
9. For Pu-238, the limit is 0.02 kg due to the 10 watt thermal decay heat limitation.

A11.8.2.3. Type B, Type B(U) or B(M) packaging that meets the standards for packaging of fissile materials in 10 CFR Part 71, and is approved by the US Nuclear Regulatory Commission per 49 CFR 173.471.

A11.8.2.4. Type B(U) or B(M) packaging that meets the applicable requirements for fissile radioactive materials in section V of the IAEA "*Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6*" or IAEA "*Regulations for the Safe Transport of Radioactive Materials, No. TS-R-1*" and for which the foreign competent authority certificate has been revalidated by the DOT according to 49 CFR 173.473. Authorized only for export and import shipments.

A11.8.2.5. DOT 20PF-1, 20PF-2, 20PF-3, 21PF-1A, or 21PF-1B phenolic-foam insulated overpacks with snug fitting inner metal cylinders meeting all of the applicable requirements of A3.1, A3.3.7.1, and A3.3.7.2, and the following:

- Handling procedures and packaging criteria must comply with US Department of Energy Report Number ORO-651 or ANSI Standard N14.1.
- Quantities of uranium hexafluoride are authorized as shown in table A11.6, with each package assigned a minimum transport index as also shown.

Table A11.6. Authorized Quantities of Uranium Hexafluoride (UF₆) as Fissile Class II.

| Protective Overpack Specification Number | Maximum Inner Cylinder Diameter | | Maximum Weight of UF ₆ Contents | | Maximum U ²³⁵ Enrichment (weight %) | Minimum Transport Index |
|--|---------------------------------|-------------|--|--------|--|-------------------------|
| | Centimeter | Inch | Kilograms | Pounds | | |
| 20PF-1 | 12.7 | 5 | 25 | 55 | 100.0 | 0.1 |
| 20PF-2 | 20.3 | 8 | 116 | 255 | 12.5 | 0.4 |
| 20PF-3 | 30.5 | 12 | 209 | 460 | 5.0 | 1.1 |
| 21PF-1A or 21PF-1B (Note 1) | 76 (Note 2) | 30 (Note 2) | 2,250 | 4,950 | 5.0 | 5.0 |
| 21PF-1A or 21PF-1B (Note 1) | 76 (Note 3) | 30 (Note 3) | 2,282 | 5,020 | 5.0 | 5.0 |
| 21PF-2 (Notes 1) | 76 (Note 2) | 30 (Note 2) | 2,250 | 4,950 | 5.0 | 5.0 |
| 21PF-2 (Note 1) | 76 (Note 3) | 30 (Note 3) | 2,282 | 5,020 | 5.0 | 5.0 |

NOTES:

1. For 76 cm cylinders, the maximum permitted H/U atomic ratio is 0.088.
2. Model 30A inner cylinder (reference: ORO-651).
3. Model 30B inner cylinder (reference: ORO-651).

A11.9. Authorized Packaging-Pyrophoric Radioactive Materials. Package pyrophoric radioactive materials in quantities not over A₂ per package in DOT Type A packagings constructed of materials that do not react nor be decomposed by the contents. Contents must be:

- In solid form and must not be fissile unless excepted by A3.3.7.9.
- Contained in sealed and corrosion resistant receptacles with positive closures (friction or slip-fit covers or stoppers are not authorized).
- Free of water and any contaminants that increase the reactivity of the material.
- Made inert to prevent self-ignition during transport by either:
 - Mixing with large volumes of inerting materials such as graphite or dry sand, or other suitable inerting material, or blended into a matrix of hardened concrete.
 - Filling the innermost receptacle with an appropriate inert gas or liquid.

A11.10. Authorized Packaging-Oxidizing Radioactive Materials. Package certain oxidizing radioactive materials, which are not fissile materials and not in quantities over A₂, in DOT Type A packaging. The requirements apply to the contents and packaging:

- Pack in suitable inside packagings of glass, metal, or compatible plastic.
- Suitably cushion with a material which will not react with the contents.
- Inner packaging and cushioning must be enclosed within an outside packaging of wood, metal, or plastic.
- The package must be capable of meeting the applicable test requirements of 49 CFR 173.465 without leakage of contents.
- The maximum quantity in any package must not be over 11.3 kg (25 pounds).

A11.11. Excepted Packages for Limited Quantities of Radioactive Materials. Radioactive materials whose activity per package is not over the limits specified in A11.15 are excepted from the specification packaging, marking, labeling and, if not a hazardous substance or a hazardous waste, shipping paper certification requirements if:

- The materials are packaged in strong, tight packages that will not leak any of the radioactive materials under normal transportation conditions. Packaging must meet the requirements of A3.3.7.1.
- The radiation level at any point on the external surface of the package is not over 0.005 mSv/h (0.5 mrem/h).
- The nonfixed (removable) radioactive surface contamination on the external surface of the package is not over the limits specified in A3.3.7.11.
- Except as provided in A11.16, the package does not contain more than 15 grams of uranium²³⁵.
- The material is otherwise prepared for shipment as specified in A11.12.

A11.12. Additional Requirements for Excepted Packages Containing Class 7 (Radioactive Materials).

- Certify excepted radioactive materials prepared for shipment under A11.11, A11.14, or A11.16 as being acceptable for transportation by having a notice enclosed in or on the package, included with the packing list, or otherwise forwarded with the package. This notice must include the name of the consignor or consignee and one of the following statements as appropriate:
 - "This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material, UN2910";
 - "This package conforms to the conditions and limitations specified in 49 CFR 173.424 for radioactive material, excepted package-instruments or articles, UN 2910";
 - "This package conforms to the conditions and limitations specified in 49 CFR 173.426 for radioactive material, excepted package-articles manufactured from natural or depleted uranium, or natural thorium, UN2910";
 - "This package conforms to the conditions and limitations specified in 49 CFR 173.428 for radioactive material, excepted package-empty package, UN2910".
- A limited quantity of radioactive material classed as Class 7 and prepared for shipment under provisions of A11.11, A11.13, A11.14, or A11.16 is not subject to the requirements of this manual except for A3.3.7.4, and incident reporting.
- Annotate the DD Form 1387 shipping label "Nonhazardous."

A11.13. Multiple Hazard Limited Quantity of Radioactive Materials. Except as provided in A11.13.2, when a limited quantity radioactive material meets the definition of another hazard class, it must be:

- Classed for the additional hazard.
- Packaged to conform to requirements specified in A11.11 or A11.14 as appropriate.
- Offered for transportation per requirements applicable to the hazard for which it is classed.

A11.13.1. When a limited quantity radioactive material meets the definition of Class 9 material, or is a combustible liquid in a packaging having a rated capacity of 110 gallons (416 L) or less, it must be:

- Classed as a radioactive material if the material is not a hazardous waste or hazardous substance.
- Classed as a Class 9 material if the material is a hazardous waste or hazardous substance.
- Packaged to conform to requirements specified in A11.11. or A11.14 as appropriate.
- Offered for transportation according to requirements applicable to the hazard for which it is classed.

A11.13.2. When a limited quantity radioactive material which is classed other than a radioactive material under provisions A11.13 or A11.13.1, it is excepted from requirements of A11.12.1, and attachment 17, if the entry "Limited quantity radioactive material" appears on the shipping paper in association with the basic description.

A11.14. Excepted Packages for Instruments and Articles. Instruments and manufactured articles (including clocks, electronic tubes, or apparatus) or similar devices having radioactive materials in gaseous or nondispersible solid form as a component part are excepted from the specification packaging, marking, labeling, and shipping paper certification requirements if:

- Each package meets the requirements of A3.3.7.1.
- The activity of the instrument or article is not over the applicable limit listed in table A11.7.

- The total activity per package is not over the applicable limit listed in table A11.7.
- The radiation level at 10 cm (4 inches) from any point on the external surface of any unpackaged instrument or article is not over 0.1 mSv/h (10 mrem/h).
- The radiation level at any point on the external surface of a package bearing the article or instrument is not over 0.005 mSv/h (0.5 mrem/h); or, for exclusive use domestic shipments, 0.02 mSv/h (2 mrem/h).
- The nonfixed (removable) radioactive surface contamination on the external surface of the package is not over the limits specified in A3.3.7.11.
- Except as provided in A11.16, the package does not contain more than 15 grams of uranium²³⁵.
- The instrument or article is otherwise prepared for shipment as specified in A11.12.

A11.15. Table of Activity Limits-Excepted Quantities and Articles. The limits that apply to instruments, articles, and limited quantities subject to exceptions under A11.12 and A11.14 are shown in table A11.7.

Table A11.7. Activity Limits for Limited Quantities Instruments and Articles.

| Nature of Contents | Instruments and Articles (note 1) | | Materials Package Limits |
|--|--|------------------------|--------------------------------------|
| | Limits for each instrument and article | Package Limits | |
| Solids | | | |
| Special Form | $10^{-2} A_1$ | A_1 | $10^{-3} A_1$ |
| Normal Form | $10^{-2} A_2$ | A_2 | $10^{-3} A_2$ |
| Liquids | | | |
| Tritiated Water: <0.0037 TBq/liter (0.1 Ci/L) 0.0037 TBq to 0.037 TBq/L (0.1 Ci to 1.0 Ci/L) >0.037 TBq/L (1.0 Ci/L) | | | 37 TBq (1000 Ci) 3.7 TBq (100 Ci) |
| Other Liquids | $10^{-3} A_2$ | $10^{-1} A_2$ | 0.037 TBq (1 Ci) $10^{-4} A_2$ |
| Gases | | | |
| Tritium (Note 2) | $2 \times 10^{-2} A_2$ | $2 \times 10^{-1} A_2$ | $2 \times 10^{-2} A_2$ |
| Special Form | $10^{-3} A_1$ | $10^{-2} A_1$ | $10^{-3} A_1$ |
| Normal Forms | $10^{-3} A_2$ | $10^{-2} A_2$ | $10^{-3} A_2$ |

NOTES:

1. For mixture of radionuclides see 49 CFR 173.433(b).
2. These values also apply to tritium in activated luminous paint and tritium absorbed on solid carriers.

A11.16. Excepted Articles Containing Natural Uranium or Thorium. Manufactured articles, in which the sole radioactive material content is natural or unirradiated depleted uranium or natural thorium, are excepted from the specification packaging, marking, labeling, and shipping paper certification requirements if:

- Each package meets the requirements of A3.3.7.1.
- The outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or other durable protective material.
- The conditions specified in A11.11 are met.
- The article is otherwise prepared for shipment as specified in A11.12.

A11.17. Transport Requirements for Low Specific Activity (LSA) Radioactive Materials and Surface Contaminated Objects (SCO). In addition to other applicable requirements, prepare LSA materials and SCO as follows:

- The external dose rate must not exceed an external radiation level of 10 mSv/h (1rem/h) at 3 meters from the unshielded material.
- LSA material or SCO that are or contain fissile material must meet all applicable requirements for fissile material.
- The nonfixed (removable) radioactive surface contamination on the external surface of the package is not over the limits specified in A3.3.7.11.
- Ensure external radiation levels comply with A3.3.7.2.
- Do not exceed 100 A₂ for SCO or LSA-II and LSA III, combustible solids and all liquids and gases.

A11.17.1. Pack in a DOT 7A Type A packaging.

A11.17.2. Pack in any Type B, B(U), or B(M), packaging meeting the requirements of 49 CFR 173.416.

A11.17.3. Pack in nonbulk industrial packaging (IP) as authorized in 49 CFR 173.427.

A11.18. Uranium Hexafluoride (fissile, fissile excepted, and nonfissile). Prepare this material for military air shipment according to 49 CFR 173.420.

Table A11.8. A₁ and A₂ Values for Radionuclides (International Shipments).

| Symbol of Radionuclide | Element and Atomic Number | A ₁ (TBq) (Special form) | A ₂ (TBq) (Other form) | Activity concentration for exempt material | Activity limit for an exempt consignment |
|------------------------|---------------------------|--|--------------------------------------|--|--|
| Ac-225 ^a | Actinium (89) | 0.8 | 0.006 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Ac-227 ^a | | 0.9 | 0.00009 | 1 x 10 ⁻¹ | 1 x 10 ³ |
| Ac-228 | | 0.6 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Ag-105 | Silver (47) | 2 | 2 | 1 x 10 ² | 1 x 10 ⁶ |
| Ag-108m ^a | | 0.7 | 0.7 | 1 x 10 ^{1b} | 1 x 10 ^{6b} |
| Ag-110m ^a | | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Ag-111 | | 2 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Al-26 | Aluminum (13) | 0.14 | 0.14 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Am-241 | Americium (95) | 10 | 0.001 | 1 x 10 ⁰ | 1 x 10 ⁴ |
| Am-242m ^a | | 10 | 0.001 | 1 x 10 ^{0b} | 1 x 10 ^{4b} |
| Am-243 ^a | | 5 | 0.001 | 1 x 10 ^{0b} | 1 x 10 ^{3b} |
| Ar-37 | Argon (18) | 40 | 40 | 1 x 10 ⁶ | 1 x 10 ⁸ |
| Ar-39 | | 40 | 20 | 1 x 10 ⁷ | 1 x 10 ⁴ |
| Ar-41 | | 0.3 | 0.3 | 1 x 10 ² | 1 x 10 ⁹ |
| As-72 | Arsenic (33) | 0.3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁵ |
| As-73 | | 40 | 40 | 1 x 10 ³ | 1 x 10 ⁷ |
| As-74 | | 1 | 0.9 | 1 x 10 ¹ | 1 x 10 ⁶ |
| As-76 | | 0.3 | 0.3 | 1 x 10 ² | 1 x 10 ⁵ |
| As-77 | | 20 | 0.7 | 1 x 10 ³ | 1 x 10 ⁶ |
| At-211 | Astatine (85) | 20 | 0.5 | 1 x 10 ³ | 1 x 10 ⁷ |
| Au-193 | Gold (79) | 7 | 2 | 1 x 10 ² | 1 x 10 ⁷ |
| Au-194 | | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Au-195 | | 10 | 6 | 1 x 10 ² | 1 x 10 ⁷ |
| Au-198 | | 1 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Au-199 | | 10 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Ba-131 ^a | Barium (56) | 2 | 2 | 1 x 10 ² | 1 x 10 ⁶ |
| Ba-133 | | 20 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Ba-133m | | 3 | 3 | 1 x 10 ² | 1 x 10 ⁶ |
| Ba-140 ^a | | 0.5 | 0.3 | 1 x 10 ^{1b} | 1 x 10 ^{5b} |
| Be-7 | Beryllium (4) | 20 | 20 | 1 x 10 ³ | 1 x 10 ⁷ |

| Symbol of Radionuclide | Element and Atomic Number | A ₁ (TBq) (Special form) | A ₂ (TBq) (Other form) | Activity concentration for exempt material | Activity limit for an exempt consignment |
|------------------------|---------------------------|--|--------------------------------------|--|--|
| Be-10 | | 40 | 0.6 | 1 x 10 ⁴ | 1 x 10 ⁶ |
| Bi-205 | Bismuth (83) | 0.7 | 0.7 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Bi-206 | | 0.3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Bi-207 | | 0.7 | 0.7 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Bi-210 | | 0.6 | 0.02 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Bi-210m ^a | | 1 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Bi-212 ^a | | 0.7 | 0.6 | 1 x 10 ^{1b} | 1 x 10 ^{5b} |
| Bk-247 | Berkelium (97) | 8 | 0.0008 | 1 x 10 ⁰ | 1 x 10 ⁴ |
| Bk-249 ^a | | 40 | 0.3 | 1 x 10 ³ | 1 x 10 ⁶ |
| Br-76 | Bromine (35) | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Br-77 | | 3 | 3 | 1 x 10 ² | 1 x 10 ⁶ |
| Br-82 | | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁶ |
| C-11 | Carbon (6) | 1 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| C-14 | | 40 | 3 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Ca-41 | Calcium (20) | Unlimited | Unlimited | 1 x 10 ⁵ | 1 x 10 ⁷ |
| Ca-45 | | 40 | 1 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Ca-47 ^a | | 3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Cd-109 | Cadmium (48) | 30 | 2 | 1 x 10 ⁴ | 1 x 10 ⁶ |
| Cd-113m | | 40 | 0.5 | 1 x 10 ³ | 1 x 10 ⁶ |
| Cd-115 ^a | | 0.5 | 0.5 | 1 x 10 ³ | 1 x 10 ⁶ |
| Cd-115m | | 3 | 0.4 | 1 x 10 ² | 1 x 10 ⁶ |
| Ce-139 | Cerium (58) | 7 | 2 | 1 x 10 ² | 1 x 10 ⁶ |
| Ce-141 | | 20 | 0.6 | 1 x 10 ² | 1 x 10 ⁷ |
| Ce-143 | | 0.9 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Ce-144 ^a | | 0.2 | 0.2 | 1 x 10 ^{2b} | 1 x 10 ^{5b} |
| Cf-248 | Californium (98) | 40 | 0.006 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Cf-249 | | 3 | 0.0008 | 1 x 10 ⁰ | 1 x 10 ³ |
| Cf-250 | | 20 | 0.002 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Cf-251 | | 7 | 0.0007 | 1 x 10 ⁰ | 1 x 10 ³ |
| Cf-252 | | 0.05 | 0.003 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Cf-253 ^a | | 40 | 0.04 | 1 x 10 ² | 1 x 10 ⁵ |
| Cf-254 | | 0.001 | 0.001 | 1 x 10 ⁰ | 1 x 10 ³ |
| Cl-36 | Chlorine (17) | 10 | 0.6 | 1 x 10 ⁴ | 1 x 10 ⁶ |
| Cl-38 | | 0.2 | 0.2 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Cm-240 | Curium (96) | 40 | 0.02 | 1 x 10 ² | 1 x 10 ⁵ |
| Cm-241 | | 2 | 1 | 1 x 10 ² | 1 x 10 ⁶ |
| Cm-242 | | 40 | 0.01 | 1 x 10 ² | 1 x 10 ⁵ |
| Cm-243 | | 9 | 0.001 | 1 x 10 ⁰ | 1 x 10 ⁴ |
| Cm-244 | | 20 | 0.002 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Cm-245 | | 9 | 0.0009 | 1 x 10 ⁰ | 1 x 10 ³ |
| Cm-246 | | 9 | 0.0009 | 1 x 10 ⁰ | 1 x 10 ³ |
| Cm-247 ^a | | 3 | 0.001 | 1 x 10 ⁰ | 1 x 10 ⁴ |
| Cm-248 | | 0.02 | 0.0003 | 1 x 10 ⁰ | 1 x 10 ³ |
| Co-55 | Cobalt (27) | 0.5 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Co-56 | | 0.3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁵ |

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|------------------------|---------------------------|--|--------------------------------------|--|--|
| Co-57 | | 10 | 10 | 1 x 10 ² | 1 x 10 ⁶ |
| Co-58m | | 40 | 40 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Co-58 | | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Co-60 | | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Cr-51 | Chromium (24) | 30 | 30 | 1 x 10 ³ | 1 x 10 ⁷ |
| Cs-129 | Cesium (55) | 4 | 4 | 1 x 10 ² | 1 x 10 ⁵ |
| Cs-131 | | 30 | 30 | 1 x 10 ³ | 1 x 10 ⁶ |
| Cs-132 | | 1 | 1 | 1 x 10 ³ | 1 x 10 ⁶ |
| Cs-134 | | 40 | 0.6 | 1 x 10 ³ | 1 x 10 ⁵ |
| Cs-134m | | 0.7 | 0.7 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Cs-135 | | 40 | 1 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Cs-136 | | 0.5 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Cs-137 ^a | | 2 | 0.6 | 1 x 10 ^{1b} | 1 x 10 ^{4b} |
| Cu-64 | Copper (29) | 6 | 1 | 1 x 10 ² | 1 x 10 ⁶ |
| Cu-67 | | 10 | 0.7 | 1 x 10 ² | 1 x 10 ⁶ |
| Dy-159 | Dysprosium (66) | 20 | 20 | 1 x 10 ³ | 1 x 10 ⁷ |
| Dy-165 | | 0.9 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Dy-166 ^a | | 0.9 | 0.3 | 1 x 10 ³ | 1 x 10 ⁶ |
| Er-169 | Erbium (68) | 40 | 1 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Er-171 | | 0.8 | 0.5 | 1 x 10 ² | 1 x 10 ⁶ |
| Eu-147 | Europium (63) | 2 | 2 | 1 x 10 ² | 1 x 10 ⁶ |
| Eu-148 | | 0.5 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Eu-149 | | 20 | 20 | 1 x 10 ² | 1 x 10 ⁷ |
| Eu-150 (short lived) | | 2 | 0.7 | 1 x 10 ³ | 1 x 10 ⁶ |
| Eu-150 (long lived) | | 0.7 | 0.7 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Eu-152 | | 0.8 | 0.8 | 1 x 10 ² | 1 x 10 ⁶ |
| Eu-152m | | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Eu-154 | | 0.9 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Eu-155 | | 20 | 3 | 1 x 10 ² | 1 x 10 ⁷ |
| Eu-156 | | 0.7 | 0.7 | 1 x 10 ¹ | 1 x 10 ⁶ |
| F-18 | Fluorine (9) | 1 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Fe-52 ^a | Iron (26) | 0.3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Fe-55 | | 40 | 40 | 1 x 10 ⁴ | 1 x 10 ⁶ |
| Fe-59 | | 0.9 | 0.9 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Fe-60 ^a | | 40 | 0.2 | 1 x 10 ² | 1 x 10 ⁵ |
| Ga-67 | Gallium (31) | 7 | 3 | 1 x 10 ² | 1 x 10 ⁶ |
| Ga-68 | | 0.5 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Ga-72 | | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Gd-146 | Gadolinium (64) | 0.5 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Gd-148 | | 20 | 0.002 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Gd-153 | | 10 | 9 | 1 x 10 ² | 1 x 10 ⁷ |
| Gd-159 | | 3 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Ge-68 | Germanium (32) | 0.5 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Ge-71 | | 40 | 40 | 1 x 10 ⁴ | 1 x 10 ⁸ |

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|------------------------|---------------------------|--|--------------------------------------|--|--|
| Ge-77 | | 0.3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Hf-172 ^a | Hafnium (72) | 0.6 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Hf-175 | | 3 | 3 | 1 x 10 ² | 1 x 10 ⁶ |
| Hf-181 | | 2 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Hf-182 | | Unlimited | Unlimited | 1 x 10 ² | 1 x 10 ⁶ |
| Hg-194 ^a | Mercury (80) | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Hg-195m ^a | | 3 | 0.7 | 1 x 10 ² | 1 x 10 ⁶ |
| Hg-197 | | 10 | 0.4 | 1 x 10 ² | 1 x 10 ⁶ |
| Hg-197m | | 20 | 10 | 1 x 10 ² | 1 x 10 ⁷ |
| Hg-203 | | 45 | 1 | 1 x 10 ² | 1 x 10 ⁵ |
| Ho-166 | Holmium (67) | 0.4 | 0.4 | 1 x 10 ³ | 1 x 10 ⁵ |
| Ho-166m | | 0.6 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁶ |
| I-123 | Iodine (53) | 6 | 3 | 1 x 10 ² | 1 x 10 ⁷ |
| I-124 | | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| I-125 | | 20 | 3 | 1 x 10 ³ | 1 x 10 ⁶ |
| I-126 | | 2 | 1 | 1 x 10 ² | 1 x 10 ⁶ |
| I-129 | | Unlimited | Unlimited | 1 x 10 ² | 1 x 10 ⁵ |
| I-131 | | 3 | 0.7 | 1 x 10 ² | 1 x 10 ⁶ |
| I-132 | | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁵ |
| I-133 | | 0.7 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| I-134 | | 0.3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁵ |
| I-135 ^a | | 0.6 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| In-111 | Indium (49) | 3 | 3 | 1 x 10 ² | 1 x 10 ⁶ |
| In-113m | | 4 | 2 | 1 x 10 ² | 1 x 10 ⁶ |
| In-114m ^a | | 10 | 0.5 | 1 x 10 ² | 1 x 10 ⁶ |
| In-115m | | 7 | 1 | 1 x 10 ² | 1 x 10 ⁶ |
| Ir-189 ^a | Iridium (77) | 10 | 10 | 1 x 10 ² | 1 x 10 ⁷ |
| Ir-190 | | 0.7 | 0.7 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Ir-192 | | 1 ^c | 0.6 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Ir-194 | | 0.3 | 0.3 | 1 x 10 ² | 1 x 10 ⁵ |
| K-40 | Potassium (19) | 0.9 | 0.9 | 1 x 10 ² | 1 x 10 ⁶ |
| K-42 | | 0.2 | 0.2 | 1 x 10 ² | 1 x 10 ⁶ |
| K-43 | | 0.7 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Kr-81 | Krypton (36) | 40 | 40 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Kr-85 | | 8 | 3 | 1 x 10 ³ | 1 x 10 ¹⁰ |
| Kr-85m | | 10 | 10 | 1 x 10 ⁵ | 1 x 10 ⁴ |
| Kr-87 | | 0.2 | 0.2 | 1 x 10 ² | 1 x 10 ⁹ |
| La-137 | Lanthanum (57) | 30 | 6 | 1 x 10 ³ | 1 x 10 ⁷ |
| La-140 | | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁵ |
| LSA | | Note 2 | Note 2 | | |
| Lu-172 | Lutetium (71) | 0.6 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Lu-173 | | 8 | 8 | 1 x 10 ² | 1 x 10 ⁷ |
| Lu-174 | | 20 | 10 | 1 x 10 ² | 1 x 10 ⁷ |
| Lu-174m | | 9 | 9 | 1 x 10 ² | 1 x 10 ⁷ |
| Lu-177 | | 30 | 0.7 | 1 x 10 ³ | 1 x 10 ⁷ |

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|------------------------|---------------------------|-------------------------------------|-----------------------------------|--|--|
| MFP | Mixed fission products | Note 1 | Note 1 | | |
| Mg-28 ^a | Magnesium (12) | 0.3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Mn-52 | Manganese (25) | 0.3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Mn-53 | | Unlimited | Unlimited | 1 x 10 ⁴ | 1 x 10 ⁹ |
| Mn-54 | | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Mn-56 | | 0.3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Mo-93 | Molybdenum (42) | 40 | 20 | 1 x 10 ³ | 1 x 10 ⁸ |
| Mo-99 ^a | | 1 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| N-13 | Nitrogen (7) | 0.9 | 0.6 | 1 x 10 ² | 1 x 10 ⁹ |
| Na-22 | Sodium (11) | 0.5 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Na-24 | | 0.2 | 0.2 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Nb-93m | Niobium (41) | 40 | 30 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Nb-94 | | 0.7 | 0.7 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Nb-95 | | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Nb-97 | | 0.9 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Nd-147 | Neodymium (60) | 6 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Nd-149 | | 0.6 | 0.5 | 1 x 10 ² | 1 x 10 ⁶ |
| Ni-59 | Nickel (28) | Unlimited | Unlimited | 1 x 10 ⁴ | 1 x 10 ⁸ |
| Ni-63 | | 40 | 30 | 1 x 10 ⁵ | 1 x 10 ⁸ |
| Ni-65 | | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Np-235 | Neptunium (93) | 40 | 40 | 1 x 10 ³ | 1 x 10 ⁷ |
| Np-236 (short lived) | | 20 | 2 | 1 x 10 ³ | 1 x 10 ⁷ |
| Np-236 (long lived) | | 9 | 0.02 | 1 x 10 ² | 1 x 10 ⁵ |
| Np-237 | | 20 | 0.002 | 1 x 10 ^{0b} | 1 x 10 ^{3b} |
| Np-239 | | 7 | 0.4 | 1 x 10 ² | 1 x 10 ⁷ |
| Os-185 | Osmium (76) | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Os-191 | | 40 | 30 | 1 x 10 ³ | 1 x 10 ⁷ |
| Os-191m | | 10 | 2 | 1 x 10 ² | 1 x 10 ⁷ |
| Os-193 | | 2 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Os-194 ^a | | 0.3 | 0.3 | 1 x 10 ² | 1 x 10 ⁵ |
| P-32 | Phosphorus (15) | 0.5 | 0.5 | 1 x 10 ³ | 1 x 10 ⁵ |
| P-33 | | 40 | 1 | 1 x 10 ⁵ | 1 x 10 ⁸ |
| Pa-230 ^a | Protactinium (91) | 2 | 0.07 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Pa-231 | | 4 | 0.0004 | 1 x 10 ⁰ | 1 x 10 ³ |
| Pa-233 | | 5 | 0.7 | 1 x 10 ² | 1 x 10 ⁷ |
| Pb-201 | Lead (82) | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Pb-202 | | 40 | 20 | 1 x 10 ³ | 1 x 10 ⁶ |
| Pb-203 | | 4 | 3 | 1 x 10 ² | 1 x 10 ⁶ |
| Pb-205 | | Unlimited | Unlimited | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Pb-210 ^a | | 1 | 0.05 | 1 x 10 ^{1b} | 1 x 10 ^{4b} |
| Pb-212 ^a | | 0.7 | 0.2 | 1 x 10 ^{1b} | 1 x 10 ^{5b} |

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|------------------------|---------------------------|-------------------------------------|-----------------------------------|--|--|
| Pd-103 | Palladium (46) | 40 | 40 | 1 x 10 ³ | 1 x 10 ⁸ |
| Pd-107 | | Unlimited | Unlimited | 1 x 10 ⁵ | 1 x 10 ⁸ |
| Pd-109 | | 2 | 0.5 | 1 x 10 ³ | 1 x 10 ⁶ |
| Pm-143 | Promethium (61) | 3 | 3 | 1 x 10 ² | 1 x 10 ⁶ |
| Pm-144 | | 0.7 | 0.7 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Pm-145 | | 30 | 10 | 1 x 10 ³ | 1 x 10 ⁷ |
| Pm-147 | | 40 | 2 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Pm-148m ^a | | 0.8 | 0.7 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Pm-149 | | 2 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Pm-151 | | 2 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Po-210 | Polonium (84) | 40 | 0.02 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Pr-142 | Praseodymium (59) | 0.4 | 0.4 | 1 x 10 ² | 1 x 10 ⁵ |
| Pr-143 | | 3 | 0.6 | 1 x 10 ⁴ | 1 x 10 ⁶ |
| Pt-188 ^a | Platinum (78) | 1 | 0.8 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Pt-191 | | 4 | 3 | 1 x 10 ² | 1 x 10 ⁶ |
| Pt-193 | | 40 | 0.5 | 1 x 10 ³ | 1 x 10 ⁷ |
| Pt-193 m | | 40 | 40 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Pt-195m | | 10 | 0.5 | 1 x 10 ² | 1 x 10 ⁶ |
| Pt-197 | | 10 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Pt-197m | | 20 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Pu-236 | Plutonium (94) | 30 | 0.003 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Pu-237 | | 20 | 20 | 1 x 10 ³ | 1 x 10 ⁷ |
| Pu-238 | | 10 | 0.001 | 1 x 10 ⁰ | 1 x 10 ⁴ |
| Pu-239 | | 10 | 0.001 | 1 x 10 ⁰ | 1 x 10 ⁴ |
| Pu-240 | | 10 | 0.001 | 1 x 10 ⁰ | 1 x 10 ³ |
| Pu-241 ^a | | 40 | 0.06 | 1 x 10 ² | 1 x 10 ⁵ |
| Pu-242 | | 10 | 0.001 | 1 x 10 ⁰ | 1 x 10 ⁴ |
| Pu-244 ^a | | 0.4 | 0.001 | 1 x 10 ⁰ | 1 x 10 ⁴ |
| Ra-223 ^a | Radium (88) | 0.4 | 0.007 | 1 x 10 ^{2b} | 1 x 10 ^{5b} |
| Ra-224 ^a | | 0.4 | 0.02 | 1 x 10 ^{1b} | 1 x 10 ^{5b} |
| Ra-225 ^a | | 0.2 | 0.004 | 1 x 10 ² | 1 x 10 ⁵ |
| Ra-226 ^a | | 0.2 | 0.003 | 1 x 10 ^{1b} | 1 x 10 ^{4b} |
| Ra-228 ^a | | 0.6 | 0.02 | 1 x 10 ^{1b} | 1 x 10 ^{5b} |
| Rb-81 | Rubidium (37) | 2 | 0.8 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Rb-83 ^a | | 2 | 2 | 1 x 10 ² | 1 x 10 ⁶ |
| Rb-84 | | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Rb-86 | | 0.5 | 0.5 | 1 x 10 ² | 1 x 10 ⁵ |
| Rb-87 | | Unlimited | Unlimited | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Rb (natural) | | Unlimited | Unlimited | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Re-184 | Rhenium (75) | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Re-184m | | 3 | 1 | 1 x 10 ² | 1 x 10 ⁶ |
| Re-186 | | 2 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Re-187 | | Unlimited | unlimited | 1 x 10 ⁶ | 1 x 10 ⁹ |
| Re-188 | | 0.4 | 0.4 | 1 x 10 ² | 1 x 10 ⁵ |

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|------------------------|---------------------------|--|--------------------------------------|--|--|
| Re-189 ^a | | 3 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Re (natural) | | Unlimited | Unlimited | 1 x 10 ⁶ | 1 x 10 ⁹ |
| Rh-99 | Rhodium (45) | 2 | 2 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Rh-101 | | 4 | 3 | 1 x 10 ² | 1 x 10 ⁷ |
| Rh-102 | | 0.5 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Rh-102m | | 2 | 2 | 1 x 10 ² | 1 x 10 ⁶ |
| Rh-103m | | 40 | 40 | 1 x 10 ⁴ | 1 x 10 ⁸ |
| Rh-105 | | 10 | 0.8 | 1 x 10 ² | 1 x 10 ⁷ |
| Rn-222 ^a | Radon (86) | 0.3 | 0.004 | 1 x 10 ^{1b} | 1 x 10 ^{8b} |
| Ru-97 | Ruthenium (44) | 5 | 5 | 1 x 10 ² | 1 x 10 ⁷ |
| Ru-103 ^a | | 2 | 2 | 1 x 10 ² | 1 x 10 ⁶ |
| Ru-105 | | 1 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Ru-106 ^a | | 0.2 | 0.2 | 1 x 10 ^{2b} | 1 x 10 ^{5b} |
| S-35 | Sulphur (16) | 40 | 3 | 1 x 10 ⁵ | 1 x 10 ⁸ |
| Sb-122 | Antimony (51) | 0.4 | 0.4 | 1 x 10 ² | 1 x 10 ⁴ |
| Sb-124 | | 0.6 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Sb-125 | | 2 | 1 | 1 x 10 ² | 1 x 10 ⁶ |
| Sb-126 | | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Sc-44 | Scandium (21) | 0.5 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Sc-46 | | 0.5 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Sc-47 | | 10 | 0.7 | 1 x 10 ² | 1 x 10 ⁶ |
| Sc-48 | | 0.3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁵ |
| SCO | | Note 3 | Note 3 | | |
| Se-75 | Selenium (34) | 3 | 3 | 1 x 10 ² | 1 x 10 ⁶ |
| Se-79 | | 40 | 2 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Si-31 | Silicon (14) | 0.6 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Si-32 | | 40 | 0.5 | 1 x 10 ³ | 1 x 10 ⁶ |
| Sm-145 | Samarium (62) | 10 | 10 | 1 x 10 ² | 1 x 10 ⁷ |
| Sm-147 | | Unlimited | Unlimited | 1 x 10 ¹ | 1 x 10 ⁴ |
| Sm-151 | | 40 | 10 | 1 x 10 ⁴ | 1 x 10 ⁸ |
| Sm-153 | | 9 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Sn-113 ^a | Tin (50) | 4 | 2 | 1 x 10 ³ | 1 x 10 ⁷ |
| Sn-117m | | 7 | 0.4 | 1 x 10 ² | 1 x 10 ⁶ |
| Sn-119m | | 40 | 30 | 1 x 10 ³ | 1 x 10 ⁷ |
| Sn-121m ^a | | 40 | 0.9 | 1 x 10 ³ | 1 x 10 ⁷ |
| Sn-123 | | 0.8 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Sn-125 | | 0.4 | 0.4 | 1 x 10 ² | 1 x 10 ⁵ |
| Sn-126 ^a | | 0.6 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Sr-82 ^a | Strontium (38) | 0.2 | 0.2 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Sr-85 | | 5 | 5 | 1 x 10 ² | 1 x 10 ⁷ |
| Sr-85m | | 2 | 2 | 1 x 10 ² | 1 x 10 ⁶ |
| Sr-87m | | 3 | 3 | 1 x 10 ² | 1 x 10 ⁶ |
| Sr-89 | | 0.6 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Sr-90 ^a | | 0.3 | 0.3 | 1 x 10 ^{2b} | 1 x 10 ^{4b} |
| Sr-91 ^a | | 0.3 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁵ |

| Symbol of Radionuclide | Element and Atomic Number | A ₁ (TBq) (Special form) | A ₂ (TBq) (Other form) | Activity concentration for exempt material | Activity limit for an exempt consignment |
|--|---------------------------|--|--------------------------------------|--|--|
| Sr-92 ^a | | 1 | 0.3 | 1 x 10 ¹ | 1 x 10 ⁶ |
| T (All Forms) | Tritium (1) | 40 | 40 | 1 x 10 ⁶ | 1 x 10 ⁹ |
| Ta-178 (long lived) | Tantalum (73) | 1 | 0.8 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Ta-179 | | 30 | 30 | 1 x 10 ³ | 1 x 10 ⁷ |
| Ta-182 | | 0.9 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Tb-157 | Terbium (65) | 40 | 40 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Tb-158 | | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Tb-160 | | 1 | 0.6 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Tc-95m ^a | Technetium (43) | 2 | 2 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Tc-96 | | 0.4 | 0.4 | 1 x 10 ³ | 1 x 10 ⁷ |
| Tc-96 m ^a | | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Tc-97 | | 40 | 1 | 1 x 10 ³ | 1 x 10 ⁷ |
| Tc-97 m | | Unlimited | Unlimited | 1 x 10 ³ | 1 x 10 ⁸ |
| Tc-98 | | 0.8 | 0.7 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Tc-99 | | 10 | 4 | 1 x 10 ² | 1 x 10 ⁷ |
| Tc-99 m | | 40 | 0.9 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| Te-121 | Tellurium (52) | 5 | 3 | 1 x 10 ² | 1 x 10 ⁵ |
| Te-121 m | | 2 | 2 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Te-123m | | 8 | 1 | 1 x 10 ² | 1 x 10 ⁷ |
| Te-125m | | 20 | 0.9 | 1 x 10 ³ | 1 x 10 ⁷ |
| Te-127 | | 20 | 0.5 | 1 x 10 ³ | 1 x 10 ⁷ |
| Te-127 m ^a | | 20 | 0.7 | 1 x 10 ³ | 1 x 10 ⁶ |
| Te-129 | | 0.8 | 0.4 | 1 x 10 ³ | 1 x 10 ⁶ |
| Te-129 m ^a | | 0.7 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Te-131m ^a | | 0.7 | 0.5 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Te-132 ^a | | 0.5 | 0.4 | 1 x 10 ² | 1 x 10 ⁷ |
| Th-227 | Thorium (90) | 10 | 0.005 | 1 x 10 ¹ | 1 x 10 ⁴ |
| Th-228 ^a | | 0.5 | 0.001 | 1 x 10 ^{0b} | 1 x 10 ^{4b} |
| Th-229 | | 5 | 0.0005 | 1 x 10 ^{0b} | 1 x 10 ^{3b} |
| Th-230 | | 10 | 0.001 | 1 x 10 ⁰ | 1 x 10 ⁴ |
| Th-231 | | 40 | 0.02 | 1 x 10 ³ | 1 x 10 ⁷ |
| Th-232 | | Unlimited | Unlimited | 1 x 10 ¹ | 1 x 10 ⁴ |
| Th-234 ^a | | 0.3 | 0.3 | 1 x 10 ^{3b} | 1 x 10 ^{5b} |
| Th (natural) | | Unlimited | Unlimited | 1 x 10 ^{0b} | 1 x 10 ^{3b} |
| Ti-44 ^a | Titanium (22) | 0.5 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁵ |
| Tl-200 | Thallium (81) | 0.9 | 0.9 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Tl-201 | | 10 | 4 | 1 x 10 ² | 1 x 10 ⁶ |
| Tl-202 | | 2 | 2 | 1 x 10 ² | 1 x 10 ⁶ |
| Tl-204 | | 10 | 0.7 | 1 x 10 ⁴ | 1 x 10 ⁴ |
| Tm-167 | Thulium (69) | 7 | 0.8 | 1 x 10 ² | 1 x 10 ⁶ |
| Tm-170 | | 3 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Tm-171 | | 40 | 40 | 1 x 10 ⁴ | 1 x 10 ⁸ |
| U-230 (fast lung absorption) ^{a, d} | Uranium (92) | 40 | 0.1 | 1 x 10 ^{1b} | 1 x 10 ^{5b} |

| Symbol of Radionuclide | Element and Atomic Number | A ₁ (TBq) (Special form) | A ₂ (TBq) (Other form) | Activity concentration for exempt material | Activity limit for an exempt consignment |
|---|---------------------------|-------------------------------------|-----------------------------------|--|--|
| U-230 (medium lung absorption) ^{a, e} | | 40 | 0.004 | 1 x 10 ¹ | 1 x 10 ⁴ |
| U-230 (slow lung absorption) ^{a, f} | | 30 | 0.003 | 1 x 10 ¹ | 1 x 10 ⁴ |
| U-232 (fast lung absorption) ^d | | 40 | 0.01 | 1 x 10 ^{0b} | 1 x 10 ^{3b} |
| U-232 (medium lung absorption) ^e | | 40 | 0.007 | 1 x 10 ¹ | 1 x 10 ⁴ |
| U-232 (slow lung absorption) ^f | | 10 | 0.001 | 1 x 10 ¹ | 1 x 10 ⁴ |
| U-233 (fast lung absorption) ^d | | 40 | 0.09 | 1 x 10 ¹ | 1 x 10 ⁴ |
| U-233 (medium lung absorption) ^e | | 40 | 0.02 | 1 x 10 ² | 1 x 10 ⁵ |
| U-233 (slow lung absorption) ^f | | 40 | 0.006 | 1 x 10 ¹ | 1 x 10 ⁵ |
| U-234 (fast lung absorption) ^d | | 40 | 0.09 | 1 x 10 ¹ | 1 x 10 ⁴ |
| U-234 (medium lung absorption) ^{e, f} | | 40 | 0.02 | 1 x 10 ² | 1 x 10 ⁵ |
| U-234 (slow lung absorption) ^f | | 40 | 0.006 | 1 x 10 ¹ | 1 x 10 ⁵ |
| U-235 (all lung absorption types) ^{a, d, e, f} | | Unlimited | Unlimited | 1 x 10 ^{1b} | 1 x 10 ^{4b} |
| U-236 (fast lung absorption) ^d | | Unlimited | Unlimited | 1 x 10 ¹ | 1 x 10 ⁴ |
| U-236 (medium lung absorption) ^e | | 40 | 0.02 | 1 x 10 ² | 1 x 10 ⁵ |
| U-236 (slow lung absorption) ^f | | 40 | 0.006 | 1 x 10 ¹ | 1 x 10 ⁴ |
| U-238 (all lung absorption types) ^{d, e, f} | | Unlimited | Unlimited | 1 x 10 ^{1b} | 1 x 10 ^{4b} |
| U (natural) | | Unlimited | Unlimited | 1 x 10 ^{0b} | 1 x 10 ^{3b} |
| U (enriched 20% or less) ^g | | Unlimited | Unlimited | 1 x 10 ⁰ | 1 x 10 ³ |
| U (depleted) | | Unlimited | Unlimited | 1 x 10 ⁰ | 1 x 10 ³ |
| V-48 | Vanadium (23) | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁵ |
| V-49 | | 40 | 40 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| W-178 | Tungsten (74) | 9 | 5 | 1 x 10 ¹ | 1 x 10 ⁶ |
| W-181 | | 30 | 30 | 1 x 10 ³ | 1 x 10 ⁷ |
| W-185 | | 40 | 0.8 | 1 x 10 ⁴ | 1 x 10 ⁷ |
| W-187 | | 2 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| W-188 ^a | | 0.4 | 0.3 | 1 x 10 ² | 1 x 10 ⁵ |
| Xe-122 ^a | Xenon (54) | 0.4 | 0.4 | 1 x 10 ² | 1 x 10 ⁹ |

| Symbol of Radionuclide | Element and Atomic Number | A ₁ (TBq) (Special form) | A ₂ (TBq) (Other form) | Activity concentration for exempt material | Activity limit for an exempt consignment |
|------------------------|---------------------------|-------------------------------------|-----------------------------------|--|--|
| Xe-123 | | 2 | 0.7 | 1 x 10 ² | 1 x 10 ⁹ |
| Xe-127 | | 4 | 2 | 1 x 10 ³ | 1 x 10 ⁵ |
| Xe-131m | | 40 | 40 | 1 x 10 ⁴ | 1 x 10 ⁴ |
| Xe-133 | | 20 | 10 | 1 x 10 ³ | 1 x 10 ⁴ |
| Xe-135 | | 3 | 2 | 1 x 10 ³ | 1 x 10 ¹⁰ |
| Y-87 ^a | Yttrium (39) | 1 | 1 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Y-88 | | 0.4 | 0.4 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Y-90 | | 0.3 | 0.3 | 1 x 10 ³ | 1 x 10 ⁵ |
| Y-91 | | 2 | 2 | 1 x 10 ² | 1 x 10 ⁶ |
| Y-91m | | 0.6 | 0.6 | 1 x 10 ³ | 1 x 10 ⁶ |
| Y-92 | | 0.2 | 0.2 | 1 x 10 ² | 1 x 10 ⁵ |
| Y-93 | | 0.3 | 0.3 | 1 x 10 ² | 1 x 10 ⁵ |
| Yb-169 | Ytterbium (70) | 4 | 1 | 1 x 10 ² | 1 x 10 ⁷ |
| Yb-175 | | 30 | 0.9 | 1 x 10 ³ | 1 x 10 ⁷ |
| Zn-65 | Zinc (30) | 2 | 2 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Zn-69 | | 3 | 0.6 | 1 x 10 ² | 1 x 10 ⁶ |
| Zn-69m | | 3 | 0.6 | 1 x 10 ⁴ | 1 x 10 ⁶ |
| Zr-88 | Zirconium (40) | 3 | 3 | 1 x 10 ² | 1 x 10 ⁶ |
| Zr-93 | | Unlimited | Unlimited | 1 x 10 ^{3b} | 1 x 10 ^{7b} |
| Zr-95 ^a | | 2 | 0.8 | 1 x 10 ¹ | 1 x 10 ⁶ |
| Zr-97 ^a | | 0.4 | 0.4 | 1 x 10 ^{1b} | 1 x 10 ^{5b} |

Notes:

^a A' and/or A² values include contributions from daughter nuclides with half-lives less than 10 days.

^b Parent nuclides and their progeny included in secular equilibrium are listed in the following:

- Sr-90 - Y-90
- Zr-93 - Nb-93m
- Zr-97 - Nb-97
- Ru-106 - Rh-106
- Cs-137 - Ba-137m
- Ce-134 - La-134
- Ce-144 - Pa-144
- Ba-140- La-140
- Bi-212 -Ta-208 (0.36), Po-212 (0.64)
- Pb-21 - Bi-210, Po-210
- Pb-212 - Bi-212, Ti-208 (0.36), Po-212 (0.64)
- Rn-220 - Po-216
- Rn-222 - Po-218, Pb-214, Bi-214, Po-214
- Ra-223 - Rn-219, Po-215, Pb-211, Bi-211, Tl-207
- Ra-224 - Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
- Ra-226 - Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
- Ra-228 - Ac-228
- Th-226 - Ra-222, Rn-218, Po-214
- Th-228 - Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
- Th-229 - Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209
- Th-nat - Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
- Th-234 - Pa-234m
- U-230 - Th-226, Ra-222, Rn-218, Po-214
- U-232 - Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
- U-235 - Th-231

U-238 - Th-234, Pa-234m

U-nat - Th-234, Pa-234m, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210

U-240 - Np-240m

Np-237- Pa-233

Am-242m - Am-242

Am-243 - Np-239

^c The quantity may be determined from a measurement of the rate of decay or a measurement of the radiation level at a prescribed distance from the source.

^d These values apply only to compounds of uranium that take the chemical form of UF_6 , UO_2F_2 and $UO_2(NO_3)_2$ in both normal and accident conditions of transport.

^e These values apply only to compounds of uranium that take the chemical form of UO_3 , UF_4 , UCl_4 and hexavalent compounds in both normal and accident conditions of transport.

^f These values apply to all compounds of uranium other than those specified in (d) and (e) above.

^g These values apply to unirradiated uranium only.

Note:

1. In Table A11.8, the symbols for the various radionuclides are styled thus "Ir-192". The alternative form of "192 Ir" is equally acceptable.
2. Tritium (T) is a synonym for the radionuclide Hydrogen-3.
3. For Mixed Fission Products values for A_1 and A_2 are calculated using the formula for mixtures.
4. For Low Specific Activity (LSA) material please consult IATA Dangerous Goods Regulation sections 10.3.5.1 through 10.3.5.4.
5. For Surface Contaminated Objects (SCO) please consult IATA Dangerous Goods Regulation sections 10.3.6.1 through 10.3.6.3.
6. Type A packages must not contain activities greater than the following values:
for special form radioactive material: A_1 ; or
for all other radioactive materials: A_2 .

Attachment 12

CLASS 8--CORROSIVE MATERIALS

A12.1. General Requirements. This attachment contains information concerning the packaging and general handling instructions for Class 8 (corrosive materials).

A12.2. General Handling Instructions for Corrosive Materials.

- Store corrosive materials in a cool, well ventilated area away from sources of heat and oxidizing agents.
- Both the vapor and the liquid are corrosive and irritating and cause burns to the body and damage to the aircraft.
- Properly placard the storage area.
- Ensure protective masks or respirators, rubber gloves, goggles, and other protective clothing as required are readily available.

A12.3. Packaging for Liquid Class 8 Materials. Package in (see also Atch 3):

A12.3.1. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2) with inside glass, earthenware, plastic, or metal receptacles.

A12.3.2. Plywood drum (1D), fiber drum (1G), or plastic drum (1H1 or 1H2), with inside glass, earthenware, plastic, or metal receptacles.

A12.3.3. Wooden barrel (2C2), with inside glass, earthenware, plastic, or metal receptacles. Not authorized for PG I material.

A12.3.4. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2), with inside glass, earthenware, plastic, or metal receptacles.

A12.3.5. Steel box (4A) or aluminum box (4B) with inside glass, earthenware, plastic, or metal receptacles.

A12.3.6. Natural wood box (4C1 or 4C2), plywood box (4D), or reconstituted wood box (4F), with inside glass, earthenware, plastic, or metal receptacles.

A12.3.7. Fiberboard box (4G) with inside glass, earthenware, plastic, or metal receptacles.

A12.3.8. Expanded plastic box (4H1) or solid plastic box (4H2) with inside glass, earthenware, plastic, or metal receptacles.

A12.3.9. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2).

A12.3.10. Plastic drum (1H1 or 1H2), fiber drum (1G) with liner (only authorized for PG III material) .

A12.3.11. Wooden barrel (2C1). Not authorized for PG I material.

A12.3.12. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2).

A12.3.13. Single, composite package comprised of a plastic receptacle in steel, aluminum, fiber, or plastic drum (6HA1, 6HB1, 6HG1, or 6HH1).

A12.3.14. Single, composite package comprised of a plastic receptacle in steel, aluminum, wooden, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, or 6HG2).

A12.3.15. Single, composite package comprised of glass, porcelain, or stoneware in steel, aluminum, or fiber drum (6PA1, 6PB1, or 6PG1).

A12.3.16. Single, composite package comprised of glass, porcelain, or stoneware, in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, or 6PG2).

A12.3.17. Single, composite package comprised of glass, porcelain, or stoneware in solid or expanded plastic packaging (6PH1 or 6PH2).

A12.3.18. Single, composite package comprised of a plastic receptacle in a plywood drum (6HD1.) Not authorized for PG I material.

A12.3.19. DOT specification cylinders as prescribed for any compressed gas, except DOT 8 (acetylene) and DOT 3HT.

A12.3.20. DS2 may be packaged in:

A12.3.20.1. Wooden box (4C1) or fiberboard box (4G) with inside original 1.3 L (1 1/3 quart) capacity containers. Arrange in snugly fitting cells not more than 12 per box. Place full box size pads against all inside faces of the box. Maximum gross weight is 45.4 kg (100 pounds).

A12.3.20.2. Wooden box (4C1) or fiberboard box (4G) with an inside 19 L (5 gallon) metal drum. Overpack DS2 containers that are not in good condition in metal drums. Cushion the cans with a minimum of 76 mm (3 inches) of vermiculite on all sides.

A12.4. Packaging for Solid Class 8 Materials. Package in:

A12.4.1. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2) with inside glass, earthenware, plastic, or metal receptacles.

A12.4.2. Plywood drum (1D), fiber drum (1G), or plastic drum (1H1 or 1H2), with inside glass, earthenware, plastic, or metal receptacles.

A12.4.3. Wooden barrel (2C2), with inside glass, earthenware, plastic, or metal receptacles.

A12.4.4. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2), with inside glass, earthenware, plastic, or metal receptacles.

A12.4.5. Steel box (4A) or aluminum box (4B) with inside glass, earthenware, plastic, or metal receptacles.

A12.4.6. Natural wood box (4C1 or 4C2), plywood box (4D), or reconstituted wood box (4F), with inside glass, earthenware, plastic, or metal receptacles.

A12.4.7. Fiberboard box (4G) with inside glass, earthenware, plastic, or metal receptacles.

A12.4.8. Solid plastic box (4H2) with inside glass, earthenware, plastic, or metal receptacles.

A12.4.9. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2).

A12.4.10. Plywood drum (1D). Not authorized for PG I material.

A12.4.11. Plastic drum (1H1 or 1H2).

A12.4.12. Fiber drum (1G).

A12.4.13. Wooden barrel (2C1 or 2C2). Not authorized for PG I material.

A12.4.14. Steel jerrican (3A1 or 3A2), aluminum jerrican (3B1 or 3B2), or plastic jerrican (3H1 or 3H2).

A12.4.15. Steel box with liner (4A), or aluminum box with liner (4B).

A12.4.16. Steel box (4A1), or aluminum box (4B1). Not authorized for PG I material.

A12.4.17. Natural wood box sift-proof (4C2).

A12.4.18. Plywood box (4D) or reconstituted wood box (4F). Natural wood box (4C1). Not authorized for PG I material.

A12.4.19. Fiberboard box (4G). Not authorized for PG I material.

A12.4.20. Expanded plastic box (4H1) or solid plastic box (4H2). Not authorized for PG I material.

A12.4.21. Bag, woven plastic (5H1, 5H2, or 5H3); bag, plastic film (5H4); bag, textile (5L1, 5L2, or 5L3); bag, paper, multiwall, water-resistant (5M2). Not authorized for PG I material.

A12.4.22. Single, composite package comprised of a plastic receptacle in steel, aluminum, plywood, fiber, or plastic drum (6HA1, 6HB1, 6HD1, 6HG1, or 6HH1).

A12.4.23. Single, composite package comprised of a plastic receptacle in steel, aluminum, wood, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, or 6HG2).

A12.4.24. Single, composite package comprised of glass, porcelain, or stoneware in steel, aluminum, plywood, or fiber drum (6PA1, 6PB1, 6PD1, or 6PG1).

A12.4.25. Single, composite package comprised of glass, porcelain, or stoneware, in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, or 6PG2).

A12.4.26. Single, composite package comprised of glass, porcelain, or stoneware in expanded or solid plastic packaging (6PH1 or 6PH2).

★A12.5. Batteries, Wet, Filled with Acid; Batteries, Wet, Filled with Alkali; or Batteries, Wet, Nonspillable.

- Completely protect against short circuit and securely cushion electric storage batteries containing electrolyte acid or alkali corrosive battery fluid within the outer container.
- Place batteries inside an acid-proof liner (not mandatory for nonspillable batteries), adequately sealed to prevent leakage in the event of a spill, within the outer container.
- Pack batteries so that the fill openings or vents, if any, are upward.
- Do not pack with other articles unless authorized by a specific packaging paragraph.

- However, batteries may be packed with portable searchlights, battery parts, or hydrometers, if properly cushioned and securely packed in a separate container.

A12.5.1. Packagings identified in this paragraph must meet PG II performance standards. The following specification packagings are authorized for batteries packed without other materials:

A12.5.1.1. Wooden box (4C1, 4C2, 4D, 4F).

A12.5.1.2. Fiberboard box (4G).

A12.5.1.3. Plywood (1D) or fiber (1G) drum.

A12.5.1.4. Plastic drum (1H2), plastic jerrican (3H2), or solid plastic box (4H2).

A12.5.2. Pack non-spillable batteries in strong outer packagings. To consider a battery non-spillable, it must withstand without leakage the vibration and pressure differential tests specified in 49 CFR 173.159(d). Batteries meeting the additional requirement of Special Provision A67 are considered dry, and are not subject to any other requirements of this manual.

A12.5.3. Package electrolyte, acid, or alkali corrosive battery fluid, packed with storage batteries wet or dry, in one of the following packagings:

A12.5.3.1. Wooden box (4C1, 4C2, 4D, 4F) with inside glass receptacles not over 4.0 L (1 gallon) capacity each. Maximum quantity per outside container is 8.0 L (2 gallons.) Cushion and separate the inside containers from batteries by a strong solid wooden partition.

A12.5.3.2. Wooden box (4C1, 4C2, 4D, 4F) with inside plastic bottles not over 1 L (1 quart) capacity each. Pack no more than 24 bottles, securely separated from storage batteries and filling kits in each package.

A12.5.3.3. Package dry storage batteries or battery charger devices in fiberboard boxes (4G) with inner receptacles containing battery fluid. Complete package must conform to PG II requirements. Pack no more than 12 inner receptacles in one outer box. Maximum authorized gross weight is 34 kg (75 pounds).

A12.5.4. The following nonspecification packagings are **authorized for domestic only** shipments of batteries packed without other materials:

A12.5.4.1. One to three batteries of not over 11.3 kg (25 pounds) each, packed in an outside box. Gross weight must not exceed 34 kg (75 pounds).

A12.5.4.2. A maximum of four batteries not over 7 kg (15 pounds) each may be packed in strong outside fiberboard or wooden boxes. They must be cushioned and packed to prevent short circuits. Gross weight must not be over 30 kg (65 pounds).

A12.5.4.3. A maximum of five batteries not over 4.5 kg (10 pounds) each may be packed in an outside fiberboard or wooden box. They must be securely cushioned and packed to prevent short circuits. Gross weight must not exceed 30 kg (65 pounds).

A12.5.4.4. Single batteries not over 34 kg (75 pounds) each, packed in five-sided slipcovers or in completely closed fiberboard boxes. Slipcovers and boxes must be of single or double-faced corrugated fiberboard of at least 91 kg (200 pounds) test strength. The slipcover or the fiberboard box must fit snugly and provide an inside top clearance of at least 1.3 cm (one-half inch) above battery terminals and filler caps with reinforcements in place. When assembled for shipment, the bottom edges of the slipcover may extend to the base of the battery and must not expose more than 25.4 mm (1 inch). The completed package (battery and box or slipcover) must be capable of withstanding a top-to-bottom compression test without damage to the battery terminals, cell covers, or filler caps.

A12.5.4.5. Single batteries exceeding 34 kg (75 lbs) each may be packed in completely closed fiberboard boxes. Boxes must be double-wall corrugated fiberboard of at least 181 kg (400 lbs) test, or solid fiberboard testing at least 181 kg (400 lbs). A box may have holes in its ends provided that the handholes will not materially weaken the box. Sides and ends of the box must not be less than 1.3 cm (0.5 inch); and cushioning must be excelsior pads, corrugated fiberboard, or other suitable cushioning material. Protect the bottom of the battery by a minimum of one excelsior or double-wall corrugated fiberboard pad. Protect the top of the battery by a wood frame, corrugated trays or scored sheets of corrugated fiberboard having minimum test of 91 kg (200 lbs), or other equally effective cushioning material. Ensure the top protection bears evenly on connectors and/or edges of the battery cover to facilitate stacking of batteries. No more than one battery may be placed in one box. The maximum authorized gross weight is 91 kg (200 lbs).

A12.5.4.6. Large electric storage batteries protected against short circuit and firmly secured to skids or pallets capable of withstanding the shocks normally incident to transportation. The height of the completed unit must not be greater than 1.5 times the width of the skid or pallet. The unit must weigh not less than 136 kg (300 lbs) gross and must not fail under a superimposed weight equal to two times the weight of the unit. If the weight of the unit is greater than 907 kg (2,000 lbs), it must not fail with a superimposed weight of 1814 kg (4,000 lbs). Battery

terminals must not be relied on to support any part of the superimposed weight. Each skid or pallet must be marked and labeled as required by attachments 14 and 15.

A12.5.5. Ship batteries, which are an integral component of tactical shelters, secured upright in authorized holders. Disconnect terminal leads and completely protect against short circuit.

★**A12.6. Bombs, Smoke, Nonexplosive.** Ship bombs, smoke, nonexplosive provided they are without ignition elements, bursting charges, detonating fuses, or other explosive components. Packaging must meet PG II performance standards. Package in an outer wooden box (4C1, 4C2, 4D, 4F) or plywood drum (1D).

★**A12.7. Chemical or First Aid Kits.** This description is intended for boxes, cases, etc., containing small amounts of various hazardous materials used for medical, analytical, or testing purposes. Mark containers in accordance with A14.4.7 and label in accordance with A15.4.5.

A12.7.1. Chemical kits shipped domestically as NA 1760 are excepted from specification packaging if the following requirements are met:

- The kit may contain only corrosive liquids.
- Liquid is contained in inner receptacles of not over 177 ml (6 fluid ounces) capacity each.
- Cushion the inside containers with sufficient absorbent cushioning material to completely absorb the contents of the individual containers, and protect from damage by other materials in the kit.
- The contents of the kit must be of such a nature and packed so there will be no possibility of the mixture of contents causing dangerous evolution of heat or gas.
- The kit must be a strong wooden or metal container or be packed in a strong wooden or metal container.

A12.7.2. Package chemical kits shipped domestically as NA 1760 and containing corrosive liquids in a fiberboard box (4G) with inner glass receptacles not over 1 L (1 quart) capacity each, securely cushioned and separated from other inside containers. The contents of the kit must be of such a nature and so packed that there will be no possibility of the mixture of contents causing dangerous evolution of heat or gas.

★**A12.8. Gallium.** Package gallium metal in semi-rigid plastic inside packaging of not more than a 2.5 kg (5.5 pound) net capacity each, then individually enclosed in a sealed bag of strong, leak-tight, and puncture-resistant material impervious to liquid gallium. Place the sealed bag in a wooden box (4C1, 4C2, 4D, or 4F), fiberboard box (4G), plastic box (4H1 or 4H2), fiber drum (1G), or steel drum (1A2) lined with a strong, leak-tight, and puncture resistant material impervious to liquid gallium. If necessary to keep in a solid state, enclose this packaging in a strong, water-resistant outer packaging that contains dry ice or other means of refrigeration. The refrigeration must be sufficient to maintain the gallium in a completely solid state during the entire anticipated time it will be in transportation to its destination. If a refrigerant is used, all packaging materials must be chemically and physically resistant to the refrigerant and must have impact resistance at the low temperatures of the refrigerant used. If dry ice is used, the outer package must permit the release of carbon dioxide gas. Packaging must meet PG I performance standards. Manufactured articles, each not containing more than 100 mg (0.0035 oz) of gallium and packaged so that the quantity per package does not exceed 1 g (0.35 oz) are not subject to any other requirements of this manual (see paragraph 1.10.3).

★**A12.9. Hydrogen Fluoride.** Package hydrogen fluoride (hydrofluoric acid, anhydrous) in cylinders, DOT 3, 3A, 3AA, 3B, 3BN, 3C, 3E, 4, 4A, 25, or 38; also DOT 4B, 4BA, 4BW, or 4C, if not brazed. Filling density must not exceed 85 percent of the water weight capacity of the cylinder. Cylinders used exclusively in this manner, may, instead of the periodic hydrostatic retest required by 49 CFR 173.34(e), be given a complete external visual inspection and so documented according to 49 CFR 173.163.

★**A12.10. Mercury (Metallic and Articles Containing Mercury).**

A12.10.1. **Handling Instructions.** Mercury is poisonous in liquid and vapor form and can be absorbed through the skin at room temperature. It is corrosive to aluminum and its alloys. It expands on freezing, and may crack glass containers.

A12.10.2. **Packaging Requirements.** Packaging must meet the PG I performance level. Pack inner containers with sufficient cushioning material to prevent breakage. Either the inner packaging or the outer packaging must have an inner liner or bags of strong leak-proof and puncture-resistant material, impervious to mercury, completely surrounding the contents and sealed which will prevent the escape of mercury from the package irrespective of its

position. Manufactured articles, each containing not more than 100 mg (0.0035 oz) of mercury and packaged so that the quantity of mercury per package does not exceed 1 g (0.0035 oz) are not subject to any other requirements of this manual (see paragraph 1.10.3). Package mercury as follows:

A12.10.2.1. In inner earthenware, glass, or suitable plastic receptacles containing not more than 3.5 kg (7.7 lbs), glass ampoules containing not more than 0.5 kg (1.1 lbs), or iron or steel quicksilver flasks containing not more than 35 kg (77 lbs) of mercury. Package in outer wooden box (4C1, 4C2, 4D, or 4F), fiberboard box (4G), plastic box (4H2), steel drum (1A2), plywood drum (1D), fiber drum (1G), or steel jerrican (3A2).

A12.10.2.2. Use welded steel bottles with inner vaulted bottoms as single packagings. The closure must be a bolt with a conical thread and the opening must not exceed 20 mm (0.79 inches). The maximum authorized net quantity is 35 kg (77 pounds).

A12.10.2.3. Specification packagings are not required for manufactured articles or apparatuses containing mercury when packaged as follows:

A12.10.2.3.1. Manufactured articles or apparatus of which metallic mercury is a component part (manometers, pumps, thermometers, switches, etc.), except as otherwise covered in A12.10. These items must be packaged in a strong outer packaging. The inner liner and cushioning requirements of A12.10.2 apply.

A12.10.2.3.2. Mercury switches and relays are excepted from this manual if they are of the totally enclosed leak-proof type in sealed metal or plastic units. Thermometers, switches, and relays each containing a total quantity of not more than 15 g (0.53 ounces) of mercury, are also excepted if installed as an integral part of a machine or apparatus and so fitted that damage or leakage of mercury is unlikely to occur under conditions normally incident to transport.

A12.10.2.4. Package electrons tubes, mercury vapor tubes, and similar tubes as follows:

A12.10.2.4.1. In strong outer packagings with all seams and joints sealed with self adhesive, pressure-sensitive tape that will prevent the escape of mercury from the package. The maximum net quantity is 450 g (15.9 ounces) of mercury per package.

A12.10.2.4.2. Package tubes with more than 450 g (15.9 ounces) of mercury in strong outer packagings having sealed inner liners or bags of strong leak-proof and puncture-resistant material impervious to mercury, completely surrounding the contents which will prevent the escape of mercury from the package irrespective of its position.

A12.10.2.4.3. Tubes which do not contain more than 5 g (0.2 ounces) of mercury each and that are packed in the manufacturer's original packaging. Maximum total net quantity is 30 g (1.1 ounces) of mercury per package.

A12.10.2.4.4. Tubes which are completely jacketed in sealed leak-proof metal cases and are packed in the manufacturer's original packaging.

A12.10.2.5. Mercurial barometers complying with A12.10.2.3.1, that are loaded and unloaded from an aircraft under the supervision of, and are accompanied in flight by a US weather official or a similar US agency official (for example, Air Weather Service personnel), are excepted from any other requirements of this manual.

★A12.11. Nitrating Acid Mixtures; Nitrating Acid Mixtures, Spent; or Nitric Acid. Do not package nitric acid exceeding 40 percent concentration with any other material. Package nitric acid as follows:

A12.11.1. Pack nitric acid in any concentration, which does not contain sulfuric acid or hydrochloric acid as impurities, in:

A12.11.1.1. Stainless steel drum (1A1). Do not ship containers weighing less than 85 percent of their original marked weight. Stainless steel used in drums must be at least 0.9 mm (.035 inches) for 55 L (15 gallon) nominal capacity, 1.2 mm (.047 inches) for 115 L (30 gallon) nominal capacity, and 1.5 mm (.059 inches) for 210 L (55 gallon) nominal capacity. Type 304 or other grades of equivalent corrosion-resistant steel in as-welded condition are authorized for nitric acid concentrations of up to and including 78 percent. In addition to the UN specification markings, the marking as specified in 49 CFR 173.158(b)(1) must be included on the drum. An example of this marking is: 304HT/1.9/2.7/TW55. For all other concentrations of nitric acid the following are authorized:

- Type 304 heat-treated (quenched in water at 1040 degrees C [1900 degrees F]).
- Stabilized type 347 in the as-welded condition.
- Stabilized type 347 stress-relieved (845-900 degrees C [1550-1650 degrees F]).
- Stabilized type 347 heat-treated (quenched in water at 1040 degrees C [1900 degrees F]).
- Other grades of equivalent corrosion resistance.

A12.11.1.2. Expanded plastic box (4H1), with inner glass receptacles not over 2.5 L (0.66 gallons) capacity each. Pack no more than four glass inner receptacles in one outer packaging.

A12.11.2. Pack nitric acid of 90 percent or greater concentration in a wooden box (4C1, 4C2, 4D, or 4F), with inner glass bottles not over 2.5 L (0.66 gallons) capacity each. The inside containers must be individually overpacked and cushioned in tightly closed metal containers, then packed in the outer container.

A12.11.3. Pack nitric acid, of 80 percent or greater concentration that does not contain sulfuric acid or hydrochloric acid as impurities, in an aluminum drum (1B1). Maximum quantity is 38 L (10 gallons).

A12.11.4. Package nitric acid of less than 90 percent concentration in a wooden box (4C1, 4C2, 4D, or 4F) or fiberboard box (4G) with inside glass bottles not over 2.5 L (0.66 gallons) capacity each.

A12.11.5. Package nitric acid of more than 70 percent concentration in outer wooden box (4C1, 4C2, 4D, or 4F), fiberboard box (4G), steel drum (1A2), aluminum drum (1B2), plastic drum (1H2), plywood drum (1D), fiber drum (1G), or plastic jerrican (3H2) with inside containers:

- Glass or earthenware containers not over 1 L (1 quart) capacity each
- Glass ampoules not over 0.5 L (1 pint) capacity each..

A12.11.6. Pack nitric acid of 70 percent or less concentration in outer wooden box (4C1, 4C2, 4D, or 4F), fiberboard box (4G), steel drum (1A2), aluminum drum (1B2), plastic drum (1H2), plywood drum (1D), fiber drum (1G), or plastic jerrican (3H2) with inside containers:

- Glass or earthenware not over 2.5 L (0.66 gal) capacity each
- Plastic not over 2.5 L (0.66 gal) capacity each further individually placed into tightly closed metal packaging
- Glass ampoules not over 0.5 L(0.1 gal) capacity each

A12.11.7. Pack nitric acid of 70 percent or less concentration in composite packaging (6PA1, 6PA2, 6PB1, 6PB2, 6PC, 6PD1, 6PH1, 6PH2). Composite packaging 6HH1 and 6HA1 meeting the compatibility requirements of 49 CFR 173.24(e) are also authorized.

A12.11.8. Pack nitric acid of 70 percent or less concentration in outer plastic box (4H1) with inside glass packaging containing not more than 2.5 L (0.66 gal) each.

★A12.12. Packaging for Class 8 Materials With an Inhalation Hazard (Hazard Zone A and B).

A12.12.1. **Handling Instructions.** These items are extremely dangerous. Wear approved chemical safety mask and clothing when handling this material. (Handling instruction only required for Hazard Zone A material).

A12.12.2. **Packaging Requirements.** Package Class 8 materials with an Inhalation Hazard (Hazard Zone A and B) as follows:

A12.12.2.1. In DOT cylinders as identified in 49 CFR, part 178, subpart C, except that specification 8, 8AL, and 39 cylinders are not authorized. Cylinders must also meet the requirements of A3.3.2.

A12.12.2.2. Packed in an inner drum (1A1, 1B1, 1N1, 1H1, or 6HA1), then placed in an outer drum (1A2 or 1H2). Both the inner and outer drum must be tested to the PG I performance level. The outer 1A2 drum must have a minimum thickness of 1.35 mm (0.053 inches). The outer 1H2 drum must have a minimum thickness of 6.30 mm (0.248 inches). The capacity of the inner drum must not exceed 220 L (58 gallons). The inner drum must also meet the following requirements:

- Satisfactorily withstand a hydrostatic pressure test (as outlined in 49 CFR, paragraph 178.605) of 550 kPa (80 psig).
- Satisfactorily withstand a leakproofness test (as outlined in 49 CFR, paragraph 178.604) using an internal air pressure at 55 degrees C (131 degrees F) of at least twice the vapor pressure of the material to be packaged.
- Have screw-type closures that meet all the following requirements:
 - Closed tightly to a torque as prescribed by the closure manufacturer, using a device that is capable of measuring torque.
 - Physically held in place by any means capable of preventing backoff or loosening of the closure by impact or vibration during transportation.
 - Provided with a cap seal that is properly applied according to the cap seal manufacturer's recommendations. The cap seal must be capable of withstanding an internal pressure of at least 100 kPa (15 psig).
- Meet the following minimum thickness requirements:
 - 1A1 and 1N1 drums with a capacity of less than or equal to 120 L (32 gallons) must have a minimum thickness of 1.3 mm (0.051 inches). 1B1 drums with a capacity of less than or equal to 120 L (32 gallons) must have a minimum thickness of 3.9 mm (0.154 inches).

- 1A1 and 1N1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 1.7 mm (0.067 inches). 1B1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 4.7 mm (0.185 inches).

A12.12.2.2.1. Cushion the inner drum within the outer drum with a shock-mitigating, nonreactive material. There must be a minimum of 5.0 cm (2 inches) of cushioning material between the outer surface (side) of the inner drum and the inner surface (side) of the outer drum, and at least 7.6 cm (3 inches) of cushioning material between the outer surface (top and bottom) of the inner drum and the inner surface (top and bottom) of the outer drum.

A12.12.2.3. Pack in an inner packaging system that consists of an impact-resistant receptacle of glass, earthenware, plastic, or metal securely cushioned with a nonreactive absorbent material. The package must be packed within a leak-tight packaging of metal or plastic, then packed in a steel drum (1A2), aluminum drum (1B2), metal drum other than steel or aluminum (1N2), plywood drum (1D), fiber drum (1G), plastic drum (1H2), wooden barrel (2C2), steel jerrican (3A2), plastic jerrican (3H2), steel box (4A), aluminum box (4B), natural wood box (4C1 or 4C2), plywood box (4D), reconstituted wood box (4F), fiberboard box (4G), expanded plastic box (4H1), or solid plastic box (4H2). The capacity of the inner receptacle must not exceed 4 L (1 gallon). An inner receptacle that has a closure must have a screw-type closure, which is held in place by any means capable of preventing backoff or loosening of the closure by impact or vibration during transportation. Both the inner packaging system and the outer container must each meet the test requirements of the PG I performance level independently. The total amount of liquid that can be packed in the outer container must not exceed 16 L (4 gallons).

A12.12.2.4. Pack in a metal drum (1A1, 1B1, or 1N1), or plastic drum (1H1), then placed in a metal drum (1A2 or 1H2), or a plastic receptacle with outer steel drum (6HA1). Both the inner and outer drum must be tested to the PG I performance level. The outer 1A2 drum must have a minimum thickness of 1.35 mm (0.053 inches.) The outer 1H2 drum must have a minimum thickness of 6.30 mm (0.248 inches). The capacity of the inner drum (1A1, 1B1, 1N1, or 1H1) must not exceed 220 L (58 gallons). This packaging is only authorized for Class 8, Hazard Zone B material. The inner drum must also meet the following requirements:

- Satisfactorily withstand a leakproofness test (as outlined in 49 CFR, paragraph 178.604) using an internal air pressure at 55 degrees C (131 degrees F) of at least twice the vapor pressure of the material to be packaged.
- Have screw-type closures that meet all the following requirements:
 - Closed and tightened to a torque as prescribed by the closure manufacturer, using a device that is capable of measuring torque.
 - Physically held in place by any means capable of preventing backoff or loosening of the closure by impact or vibration during transportation.
 - Provided with a cap seal that is properly applied according to the cap seal manufacturer's recommendations. The cap seal must be capable of withstanding an internal pressure of at least 100 kPa (15 psig).
- Meet the following minimum thickness requirements:
 - 1A1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 0.69 mm (0.027 inches). 1B1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 2.79 mm (0.110 inches). 1H1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 1.14 mm (0.045 inches). 6HA1 drums with a capacity of less than or equal to 30 L (7.9 gallons) must have a minimum thickness of 1.58 mm (0.0625 inches) for the inner plastic drum and a minimum thickness of 0.70 mm (0.027 inches) for the outer steel drum.
 - 1A1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 1.08 mm (0.043 inches). 1B1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 3.9 mm (0.154 inches). 1H1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 3.16 mm (0.124 inches). 6HA1 drums with a capacity greater than 30 L (7.9 gallons) but less than or equal to 120 L (32 gallons) must have a minimum thickness of 1.58 mm (0.0625 inches) for the inner plastic drum and a minimum thickness of 0.96 mm (0.038 inches) for the outer steel drum.
 - 1A1 or 1N1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 1.35 mm (0.053 inches). 1B1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 4.7 mm (0.185 inches). 1H1 drums with a capacity greater than 120 L (32

gallons) must have a minimum thickness of 3.16 mm (0.124 inches). 6HA1 drums with a capacity greater than 120 L (32 gallons) must have a minimum thickness of 1.58 mm (0.0625 inches) for the inner plastic drum and a minimum thickness of 1.08 mm (0.043 inches) for the outer steel drum.

A12.12.2.4.1. Cushion the inner drum within the outer drum with a shock-mitigating, nonreactive material. There must be a minimum of 5.0 cm (2 inches) of cushioning material between the outer surface (side) of the inner drum and the inner surface (side) of the outer drum, and at least 7.6 cm (3 inches) of cushioning material between the outer surface (top and bottom) of the inner drum and the inner surface (top and bottom) of the outer drum.

Attachment 13

CLASS 9--MISCELLANEOUS HAZARDOUS MATERIAL

A13.1. General Requirements. This attachment contains information concerning the packaging and general handling instructions for Class 9 (Miscellaneous Hazardous Materials).

A13.2. Handling Instructions.

A13.2.1. Class 9 material is generally considered less hazardous than other hazard classes due to the final form of the packaged material or item for transportation. However, Class 9 materials present a unique and equally hazardous situation during air transport. Personnel must exercise care when handling this material and ensure specific handling instructions located in the packaging paragraphs are observed.

A13.2.2. Do not use halon fire extinguishers to combat fires involving Lithium-Sulfur Dioxide (Li-SO₂), Lithium-Manganese Dioxide (Li-Mn O₂), or Lithium-Thionyl Chloride (Li-SoCl₂) batteries. Use a chemical or Class D fire extinguisher, or deluge area with water or CO₂ fire extinguisher to prevent spread of fire.

A13.3. Ammonium Nitrate Fertilizers; Aviation Regulated Liquid or Solid, NOS; Benzaldehyde; Dibromodifluoromethane (Difluorodibromomethane); Environmentally Hazardous Substances, NOS; Hazardous Waste, NOS; Other Regulated Substances; Polychlorinated Biphenyls (PCB); Zinc Dithionite, Zinc Hydrosulfite.

A13.3.1. Handling Instructions.

- Do not expose Dibromodifluoromethane to high temperature because, when it decomposes, toxic fumes are emitted. Store in a cool, ventilated area away from flame.
- Contains Otto Fuel II as a liquid propellant. In the event of a leak, avoid direct skin contact, ingestion, or inhalation of vapors. Vapors are toxic and may cause severe headache and nausea.

A13.3.2. Packaging (Liquid).

A13.3.2.1. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2) with inside glass, earthenware, plastic, or metal receptacles.

A13.3.2.2. Plywood drum (1D), fiber drum (1G), or plastic drum (1H1 or 1H2), with inside glass, earthenware, plastic, or metal receptacles.

A13.3.2.3. Wooden barrel (2C2), with inside glass, earthenware, plastic, or metal receptacles.

A13.3.2.4. Steel jerrican (3A1 or 3A2) or plastic jerrican (3H1 or 3H2), with inside glass, earthenware, plastic, or metal receptacles.

A13.3.2.5. Steel box (4A1 or 4A2) or aluminum box (4B1 or 4B2) with inside glass, earthenware, plastic, or metal receptacles.

A13.3.2.6. Natural wood box (4C1 or 4C2), plywood box (4D), or reconstituted wood box (4F), with inside glass, earthenware, plastic, or metal receptacles.

A13.3.2.7. Fiberboard box (4G) with inside glass, earthenware, plastic, or metal receptacles.

A13.3.2.8. Expanded plastic box (4H1) or solid plastic box (4H2) with inside glass, earthenware, plastic, or metal receptacles.

A13.3.2.9. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2).

A13.3.2.10. Plastic drum (1H1 or 1H2).

A13.3.2.11. Wooden barrel (2C1).

A13.3.2.12. Steel jerrican (3A1 or 3A2) or plastic jerrican (3H1 or 3H2).

A13.3.2.13. Single, composite package comprised of a plastic receptacle in steel, aluminum, fiber, or plastic drum (6HA1, 6HB1, 6HG1, or 6HH).

A13.3.2.14. Single, composite package comprised of a plastic receptacle in steel, aluminum, wooden, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, or 6HG2).

A13.3.2.15. Single, composite package comprised of glass, porcelain, or stoneware in steel, aluminum, or fiber drum (6PA1, 6PB1, or 6PG1).

A13.3.2.16. Single, composite package comprised of glass, porcelain, or stoneware, in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, or 6PG2).

A13.3.2.17. Single, composite package comprised of glass, porcelain, or stoneware in solid or expanded plastic packaging (6PH1 or 6PH2).

A13.3.2.18. Single, composite package comprised of a plastic receptacle in a plywood drum (6HD1).

A13.3.2.19. DOT specification cylinders as prescribed for any compressed gas, except DOT 8 (acetylene) and DOT 3HT.

A13.3.2.20. Fired exercise torpedoes or rockets, with no explosive components, containing Otto fuel II. Package in original or similar container authorized in attachment 5.

A13.3.3. Packaging (Solid).

A13.3.3.1. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2) with inside glass, earthenware, plastic, or metal receptacles pack in:

A13.3.3.2. Plywood drum (1D), fiber drum (1G), or plastic drum (1H1 or 1H2), with inside glass, earthenware, plastic, or metal receptacles.

A13.3.3.3. Wooden barrel (2C2), with inside glass, earthenware, plastic, or metal receptacles.

A13.3.3.4. Steel jerrican (3A1 or 3A2) or plastic jerrican (3H1 or 3H2), with inside glass, earthenware, plastic, or metal receptacles.

A13.3.3.5. Steel box (4A1 or 4A2) or aluminum box (4B1 or 4B2) with inside glass, earthenware, plastic, or metal receptacles.

A13.3.3.6. Natural wood box (4C1 or 4C2), plywood box (4D), or reconstituted wood box (4F), with inside glass, earthenware, plastic, or metal receptacles.

A13.3.3.7. Fiberboard box (4G) with inside glass, earthenware, plastic, or metal receptacles.

A13.3.3.8. Solid plastic box (4H2) with inside glass, earthenware, plastic, or metal receptacles.

A13.3.3.9. Steel drum (1A1 or 1A2), aluminum drum (1B1 or 1B2), or metal drum, other than steel or aluminum (1N1 or 1N2).

A13.3.3.10. Plywood drum (1D).

A13.3.3.11. Plastic drum (1H1 or 1H2).

A13.3.3.12. Fiber drum (1G).

A13.3.3.13. Wooden barrel (2C1 or 2C2).

A13.3.3.14. Steel jerrican (3A1 or 3A2) or plastic jerrican (3H1 or 3H2).

A13.3.3.15. Steel box (4A1), steel box with liner (4A2), or aluminum box with liner (4B2).

A13.3.3.16. Natural wood box (4C1), natural wood box, sift-proof (4C2.) Plywood box (4D) or reconstituted wood box (4F).

A13.3.3.17. Fiberboard box (4G).

A13.3.3.18. Expanded plastic box (4H1) or solid plastic box (4H2).

A13.3.3.19. Bag, woven plastic (5H1, 5H2, or 5H3); bag, plastic film (5H4); bag, textile (5L1, 5L2, or 5L3); bag, paper, multiwall, water-resistant (5M2).

A13.3.3.20. Single, composite package comprised of a plastic receptacle in steel, aluminum, plywood, fiber, or plastic drum (6HA1, 6HB1, 6HD1, 6HG1, or 6HH1).

A13.3.3.21. Single, composite package comprised of a plastic receptacle in steel, aluminum, wood, plywood, or fiberboard box (6HA2, 6HB2, 6HC, 6HD2, or 6HG2).

A13.3.3.22. Single, composite package comprised of glass, porcelain, or stoneware in steel, aluminum, plywood, or fiber drum (6PA1, 6PB1, 6PD1, or 6PG1).

A13.3.3.23. Single, composite package comprised of glass, porcelain, or stoneware, in steel, aluminum, wooden, or fiberboard box (6PA2, 6PB2, 6PC, or 6PG2).

A13.3.3.24. Single, composite package comprised of glass, porcelain, or stoneware in expanded or solid plastic packaging (6PH1 or 6PH2).

A13.3.4. PCB Transformers. Palletize and tightly seal large transformers (over 400kg [886 pounds]) with PCB to prevent leakage. Place a large sheet of polyethylene under the transformer and extend it at least one quarter of the way up its sides. Provide enough vermiculite to absorb any leakage. These type transformers are exempt from UN specification packaging requirements.

A13.4. Consumer Commodities. Ensure items shipped under this paragraph meet the definition of a consumer commodity (see attachment 1). Consumer commodities may only include substances of Class 2 (non-toxic aerosols only), Class 3 (Packing Group II or III only) and Division 6.1 (Packing Group III only) provided such substances do not have a subsidiary risk.

A13.4.1. **Inner Receptacle Requirements.**

- Limit Class 2 substances to aerosol products containing non-toxic solutions and compressed gases packed in inner non-refillable non-metal receptacles not exceeding 120 ml (4 Fl. oz) capacity each, or in inner non-refillable metal receptacles not exceeding 820 ml (28 Fl. oz) capacity each. Flammable aerosols must not exceed 500 ml (17 Fl. oz) capacity each. The following provisions apply to all aerosols under this paragraph:
 - The pressure in the aerosol must not exceed 1,500 kPa at 55°C (217 psi at 130°F) and each receptacle must be capable of withstanding without bursting a pressure of at least 1.5 times the equilibrium pressure of the contents at 55°C (130°F);
 - If the pressure in the aerosol exceeds 970 kPa at 55°C (160 psi at 130°F) but does not exceed 1105 kPa at 55°C (160 psi at 130°F), use an inner metal IP7, IP7A, or IP7B receptacle.
 - If the pressure in the aerosol exceeds 1,105 kPa at 55°C (160 psi at 130°F) but does not exceed 1245 kPa at 55°C (180 psi at 130°F), use an inner metal IP7A or IP7B receptacle.
 - If the pressure in the aerosol exceeds 1,245 kPa at 55°C (180 psi at 130°F), use an inner metal IP7B receptacle. IP.7B metal receptacles having a minimum burst pressure of 1,800 kPa may be equipped with an inner capsule charged with a non-flammable, non-toxic compressed gas to provide the propellant function. In this case, the pressures indicated above do not apply to the pressure within the capsule. The quantity of gas contained in the capsule must be so limited that the minimum burst pressure of the receptacle would not be exceeded if the entire gas content of the capsule were released into an aerosol.
 - The liquid content must not completely fill the closed receptacle at 55°C (130°F).
 - Each aerosol exceeding 120 ml (4 Fl. oz) capacity must have been heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55°C (130°F) without evidence of leakage, distortion or other defect.
 - Protect the valves by a cap or other suitable means during transport.
- For aerosols containing a biological or medical preparation that will be deteriorated by a heat test and which are non-toxic and non-flammable, packed in inner non-refillable receptacles not exceeding 575 ml (19.4 Fl. oz) capacity each, the following provisions apply:
 - The pressure in the aerosol must not exceed 970 kPa at 55° C (140.7 psi at 130°F).
 - The liquid contents must not completely fill the closed receptacle at 55° C (130°F).
 - One aerosol out of each lot of 500 or less, must be heated until the pressure in the aerosol is equivalent to the equilibrium pressure of the contents at 55° C (130°F) without evidence of leakage, distortion or other defect.
 - Protect the valves by a cap or other suitable means during transport.
- The following apply to Class 3 and Division 6.1 substances:
 - Inner packagings of Class 3 substances must not exceed 500 ml (17 Fl. oz).
 - Inner packagings of Division 6.1 substances must not exceed 500 ml (17 Fl. oz) for liquids and 500 g (18 oz) for solids.

A13.4.2. **Packaging Requirements.** Inner packagings must meet the requirements of A13.4.1. Tightly pack inner packagings in strong outer packagings. UN specification packaging is not required. Each completed package as prepared for shipment must not exceed a gross mass of 25 kg (55 lb).

- To prevent leakage during air transport, design and construct each packaging for changes in altitude and temperature.
- Packaging (including closures) in direct contact with dangerous goods must not contain substances that may react dangerously with the contents, form hazardous products or weaken the receptacles.
- Pack and cushion inner packagings that are breakable (such as earthenware, glass or brittle plastic) to prevent any breakage, leakage or movement within the outer packaging during transport. Provide absorbent material for glass or earthenware inner packagings in Class 2 or 3, or liquids of Division 6.1. Include sufficient cushioning material to absorb the liquid contents of the largest inner packaging contained in the outer package. Absorbent and cushioning material must not react dangerously with the contents of the inner packagings. Notwithstanding the above, absorbent material may not be required if the inner packagings are so protected that breakage and leakage of their contents from the outer packaging will not occur. These completed packagings must be capable of withstanding a 1.2 m (4 ft) drop on solid concrete in the position most likely to cause damage.
- Leave sufficient ullage (outage) when filling receptacles for liquids to ensure that neither leakage nor permanent distortion of the receptacle will occur as a result of an expansion of the liquid caused by

temperatures changes during transport. Leave a minimum ullage of 2%. Ensure the primary packaging (which may include composite packaging), for which retention of the liquid is a basic function is capable of withstanding without leakage, an internal pressure that produces a pressure differential of not less than 75 kPa (11 psi) or a pressure related to the vapor pressure of the liquid to be conveyed, whichever is the greater (see also A3.1.2).

- Secure stoppers, corks, or other such friction-type closures tightly and effectively in place by positive means. The design of the closure device should prevent incorrect or incomplete closure. Check to ensure the closure is completely and securely closed.

★A13.5. Motor Vehicles and Self-Propelled Units. The following requirements apply:

- Use service technical manuals to prepare items for shipment.
- Protect installed batteries to prevent short circuit and secure so that battery fluid will not leak. To secure the battery from short circuit, completely protect the terminal posts from contact (i.e., tape, rubber boots, etc.). When prepared in this manner, it is not required to disconnect the battery or remove it from the equipment.
- Securely fasten original installed equipment in properly configured and approved holders. Do not remove other hazardous materials from their packaging and store in the racks or containers of vehicles or equipment unless authorized by paragraph A5.4.
- Prepare the item to protect against leakage of fuel during loading, unloading, and transport. Drain and cap units if the unit is susceptible to fuel spills or leakage (see also attachment 28). Unless otherwise stated, purging is not required.
- Provide calibrated dip stick with any vehicle or engine powered support equipment without an operational fuel gauge if fuel level cannot be otherwise determined. If positive means is not available to accurately determine fuel level, drain or siphon the tank. The tank may be refilled to appropriate level (see paragraph 1.8) in the presence of an inspector.
- Drain fuel tanks of palletized units. Units palletized due to the aircraft's subfloor requirements may contain fuel in tank.
- Air-bag modules installed as a vehicle component are not subject to any other requirements of this manual.
- When fuel in tank is authorized below, ship only the minimum quantity consistent with operational requirements (see paragraph 1.8). The following fuel in tank requirements apply:

A13.5.1. Vehicles and self-propelled units may contain fuel in tank not to exceed one-half tank full. Ensure tanks are securely closed.

A13.5.2. Vehicles and self-propelled units may contain fuel in tank not to exceed three-fourths tank full when transported under the authority of paragraph 3.7. Ensure tanks are securely closed.

- Do not exceed one-half tank full for units loaded on the aircraft cargo ramp and units loaded aboard aircraft with a steep angle of ascent (i.e., KC-10, KC-135).
- Position units loaded on an aircraft cargo ramp with the fuel tank openings located on the high side of the ramp.

A13.5.3. Liquefied petroleum gas or compressed gas powered vehicles must have the gaseous fuel completely emptied from any non-DOT specification pressurized vessel (fuel tank), lines, and regulator. Ensure tanks are securely closed. Purging is not required.

A13.5.4. Liquefied petroleum gas or compressed gas powered vehicles containing a DOT specification cylinder as the gaseous fuel tank do not requiring draining. Comply with all requirements of Attachment 6 for the material and cylinder specification. Tightly close and secure cylinder shut off valve. Lines and regulator must be completely emptied of flammable gas and vapors.

A13.5.5. Boats and watercraft that are loaded on trailers or palletized must be drained to the greatest extent possible. Units prepared for airdrop and shipped under the authority of paragraph 3.7, may contain fuel in tank not to exceed three-quarters tank full.

A13.5.6. Prepare aircraft and helicopters for transportation according to the requirements of the respective aircraft's shipping manual.

- Remove all munitions and explosives, other than those installed as permanent-type aircraft equipment, according to the pertinent aircraft technical order and A5.3.

- Fasten batteries securely in the holder provided, with the terminals protected in such a manner as to prevent damage or short circuits. When batteries are removed and shipped with the aircraft, accomplish packaging and certification according to A12.5.
- Completely drain fuel tanks within wings when removed from the aircraft body. Purging is not required. When transported with the original aircraft body, consider all pieces as a single unit for identification on the Shipper's Declaration form.
- Transport fueled helicopters and aircraft with fuel in each tank not to exceed 150 gallons or three-fourths full, whichever amount is least. Do not exceed one-half tank full for units loaded on the aircraft cargo ramp. Fuel leakage must not occur during shipment. No special venting is required other than to maintain a normal aircraft ventilation during flight. Seal vents according to service technical directives. Load tanks to prevent fuel leakage when the loading configuration requires removal of external fuel tanks. When removed in this manner, the tanks are still considered a component of the aircraft or helicopter.

A13.5.7. Units drained, purged and containing no other hazardous material are nonhazardous for transportation. Fuel systems including carburetors, pumps, controls, and fuel tanks must be completely drained, purged, and sealed with appropriate pressure seal type plug and caps with gaskets and "O" rings. Prepare drained and purged aircraft and helicopters according to the appropriate technical directive. If the engine's entire fuel system is purged with MIL-O-6081 grade 1010 oil and sealed with appropriate pressure seal-type metal plugs or caps, gaskets, and O-rings, the item is considered unfueled. The requirements of A13.5.5 apply for installed components. Comply with 1.10.4.

★A13.6. Internal Combustion Engines and Support Equipment. Comply with the bullet requirements of A13.5. The following fuel in tank requirements apply:

A13.6.1. Completely drain engine-powered support equipment of fuel. Up to 500 ml (17 ounces) of fuel may be left in engine components and fuel lines provided all lines and fuel tanks are securely closed to prevent leakage of fuel.

A13.6.2. Engine-powered support equipment with large fuel systems that the shipper determines can not be drained to meet the requirements of A13.6.1 must be drained within the mechanical limits of the equipment to the extent no free standing liquid remains in the fuel tank, lines, or system.

A13.6.3. Wheeled-engine powered support equipment may contain up to one-half tank of fuel when transported under the authority of paragraph 3.7. Ship only the minimum quantity of fuel consistent with operational requirements. Ship the Hobart-86 with no more than one-quarter tank of fuel and load with filler neck facing forward. Ensure tanks are securely closed.

A13.6.4. Completely drain single axle equipment loaded with the tongue resting on the aircraft floor. The requirements of A13.6.1 or A13.6.2 apply depending on the type and size of equipment.

A13.6.5. Internal combustion engines that are damaged or inoperable and purging can not be accomplished, or proper purging facilities are unavailable must be drained to the maximum extent possible and install plugs, caps, and covers over all openings as required by technical directives. All other internal combustion engines must comply with A13.6.7.

A13.6.6. Ship the Aerial Bulk Fuel Delivery System (ABFDS) consisting of 3000 gallon bladders under the following conditions:

- Completely drain the bulk fuel bladders. Due to bladder construction there will be residual fuel remaining. Ensure bladders are drained as much as possible.
- Completely drain the pump module. No more than 500 ml (17 ounces) of fuel may be left in engine components.
- Securely close all vents and valves to prevent residual fuel leaks.
- When prepared in this manner, ABFDS may be stacked for shipment.

A13.6.7. Items drained, purged and containing no other hazardous material are nonhazardous for transportation. The following guidance applies:

- Internal combustion engines with or without fuel tanks attached are prepared for shipment and storage according to applicable technical directives. Fuel systems including carburetors, pumps, controls, and fuel tanks must be completely drained, purged, and sealed with appropriate pressure seal type plug and caps with gaskets and "O" rings. Comply with 1.10.4.
- Repairable fuel assemblies, fuel tanks, and cells that are drained, purged, and sealed according to the applicable technical directive. Comply with 1.10.4.

- All preserved and packed serviceable fuel assemblies, for example, carburetors, fuel pumps, filters, etc., that are drained and purged of all fuel. In addition, they must be sealed with proper caps, plugs, and covers according to the applicable technical directive. These items are not subject to any other requirements of this manual.
- New engines or engines overhauled by a maintenance depot and containing no other hazard, are not subject to any other requirements of this manual.

A13.6.8. Aircraft Engines. Use service technical manuals to prepare items for shipment. The following requirements apply:

A13.6.8.1. New aircraft engines or engines which are drained and purged according to the responsible technical manual, and containing no other hazardous material, are nonhazardous for transportation. Comply with 1.10.4.

A13.6.8.2. Inoperable or damaged engines that cannot be purged must be drained to the maximum extent possible. Install plugs, caps, and covers over all openings as required by technical directives.

A13.6.8.3. Engines that cannot be purged due to unavailability of proper purging facilities must be drained to the maximum extent possible. Install plugs, caps, and covers over all openings as required by technical directives.

A13.6.8.4. Prepare and completely drain engine as required by technical directive.

A13.6.9. Liquefied petroleum gas or compressed gas powered engines or equipment must have the gaseous fuel completely emptied from any non-DOT specification pressurized vessel (fuel tank), lines, and regulator. Ensure tanks are securely closed. Purging is not required.

A13.7. Battery Powered Equipment and Vehicles. Prepare items powered by wet cell or non-spillable batteries and shipped with the batteries installed as follows:

- Use service technical manuals to prepare items for shipment.
- Securely fasten battery in an upright position so that battery fluid will not leak. Remove the battery and ship according to A12.5 if the item is likely to be shipped in other than an upright position.
- Protect installed batteries to prevent short circuit. To secure the battery from short circuit, completely protect the terminal posts from contact (i.e., tape, rubber boots, etc.). When prepared in this manner, it is not required to disconnect the battery or remove it from the equipment.
- Securely fasten original installed equipment in properly configured and approved holders. Do not remove other hazardous materials from their packaging and store in the racks or containers of vehicles or equipment.
- Wheelchairs equipped with non-spillable batteries must have the batteries protected against short circuits and securely attached to the wheelchair or removed and boxed. Specification packaging is not required.
- Wheelchairs equipped with spillable batteries for carriage on aircraft in cargo compartments that can accommodate upright loading and storage of the wheelchairs must be secured in an upright position in the cargo compartment. Batteries must remain installed and be securely attached to the chair. Protect the terminals against short circuits. Wheelchairs must be deactivated by removing connections at battery terminals or by otherwise disconnecting their power source. Remove the battery and ship according to A12.5 if the item is likely to be shipped in other than an upright position.

★A13.8. Lithium Batteries and Cells. The following general requirements apply:

- No cell may contain more than 12 g (0.42 ounces) of lithium or lithium alloy and no battery may contain more than 500 grams (17.6 ounces).
- Each cell and battery must be equipped with an effective means of preventing external short circuit.
- Each cell and battery must incorporate a safety venting device or be designed in such a manner that will preclude a violent rupture under any condition incident to transportation, such as a dead short. Batteries containing cells or series of cells connected in parallel must be equipped with diodes to prevent reverse current flow.
- Cells and batteries must meet test requirements prescribed in 49 CFR 173.185(e)(9). Army-procured lithium batteries are manufactured according to MIL-B-49430 and meet the test requirements. These batteries are identified by the following battery numbers: BA-5093/U, BA-5112/U, BA-5372/U, BA-5513/U, BA-5557/U, BA-5567/U, BA-5588/U, BA-5590/U, BA-5598/U, BA-5599/U, BA-5600/U, BA-5800/U, BA-5847/U, BA-6598/U.
- Completely protect against short circuit and secure within the outer packaging or article.

A13.8.1. Used Batteries.

- Cells or batteries may not be offered for transportation or transported if any cell has been discharged to the extent that the open circuit voltage is less than two volts or is less than two-thirds of the voltage of the fully charged cell, whichever is less.
- Used batteries may be transported by military air as authorized by paragraph 3.8. Individually wrap batteries in nonconductive material and place in a strong outer container with at least one-inch of inert material surrounding each battery.

A13.8.2. New Batteries. Package cells and batteries in strong inner packagings containing not more than 500 grams of lithium or lithium alloy per inner packaging. Pack inner packaging inside an outer metal box (4A or 4B), wooden box (4C1, 4C2, 4D, or 4F), fiberboard box (4G), or solid plastic box (4H2), fiber drum (1G), metal drum (1A2 or 1B2), plywood drum (1D), plastic jerrican (3H2), or metal jerrican (3A2 or 3B2). Packaging must meet PG II performance level.

A13.8.3. Batteries Contained in or Packed with Equipment.

- Pack equipment with installed lithium batteries in a strong waterproof outer packaging or in an outer packaging made waterproof through the use of a liner (unless the equipment is made waterproof by nature of its construction). Secure the equipment within the outer packaging to prevent movement, short circuit, or accidental operation during transport. UN specification packaging is not required.
- Cells and batteries packed with equipment must be packed in inner packagings as identified above in paragraph A13.8.2. Secure to prevent movement and short circuits. Do not pack more than 5 kg of cells or batteries with each item of equipment.
- The requirements of A13.8.1 apply to equipment containing used batteries. The shipper must verify the battery is above the acceptable voltage discharge level (not required when transporting under the authority of paragraph 3.8).

A13.8.4. Non-Regulated Lithium Batteries. Lithium batteries are not subject to any other requirements of this manual if they meet the following:

- Each cell with a liquid cathode may contain no more than 0.5 g (.02 ounces) of lithium or lithium alloy, and each cell of a solid cathode may contain no more than 1.0 g (.04 ounces) of lithium or lithium alloy.
- Each battery with a solid cathode must contain a total quantity of no more than 2 g (.07 ounces) of lithium or lithium alloy, and each battery with a liquid cathode must contain a total quantity of no more than 1.0 g (.04 ounces) of lithium or lithium alloy.
- Each cell or battery containing a liquid cathode must be hermetically sealed.
- Cells must be separated to prevent short circuit. Batteries must be separated to prevent short circuit and must be packed in strong outside containers, except when installed in electronic devices.
- If a liquid cathode battery contains more than 0.5 g (.02 ounces) of lithium or lithium alloy, or a solid cathode battery contains more than 1.0 g (.04 ounces) of lithium or lithium alloy, it may not contain a liquid or gas that is a hazardous material unless the liquid or gas, if free, would be completely absorbed or neutralized by other material in the battery.
- Batteries meeting the lithium quantity and testing requirements specified in 49 CFR 173.185©.

★A13.9. Carbon Dioxide, Solid (Dry Ice).

A13.9.1. Handling Instructions. Dry ice is extremely cold and will damage human tissue on contact. Store only in well ventilated areas. Never store in hermetically or tightly sealed containers. To minimize carbon dioxide concentration within the aircraft during ground operations, open the cargo/access doors and emergency escape hatches for maximum ventilation.

A13.9.2. Properties of Carbon Dioxide, Solid. At temperatures above -78.5 degrees C (-109.3 degrees F) dry ice will sublime and release carbon dioxide fumes. If the carbon dioxide concentration in the aircraft is over 0.5 percent, crewmembers may suffer shortness of breath. Carbon dioxide concentrations of 3.0 percent are endurable from 1/2 to 1 hour. Concentrations of 5.0 percent are dangerous from 1/2 to 1 hour and concentrations of 9.0 percent are fatal from 5 to 10 minutes. Carbon dioxide is heavier than air; therefore, the highest concentration is at or near floor level. Caution crewmembers against lying on the cargo compartment floor or remaining in the cargo compartment for a prolonged period. If symptoms of overexposure are noted, the use of oxygen and increased ventilation should provide rapid relief.

A13.9.3. Dry Ice Limitations.

- Seat passengers forward of and separate by the greatest distance possible (minimum one full pallet position) from dry ice.
- Passenger and crewmembers will not occupy the same pallet position as dry ice.
- Do not carry dry ice in any upper deck compartment.
- Vent the aircraft cargo compartment to the greatest extent possible allowed by the flight profile and environmental conditions.
- Quantity limits specified in this paragraph apply to all personnel, other than aircrew members, who occupy the cargo compartment with dry ice.

A13.9.3.1. **Pressurized Aircraft.** For pressurized aircraft, the amount of dry ice that can be safely shipped by air regardless of the type container used depends on the sublimation rate of the ice, the volume of the aircraft, and the number of air changes per hour. To minimize the sublimation rate, use insulated containers surrounded with insulating blankets and tarpaulin during shipment to the greatest extent possible. To determine the amount of dry ice that can be safely shipped by air, use the formula in figure A13.1.

A13.9.3.2. **Aircraft on Minimum Air Changes.** When aircraft is on minimum air changes per hour, safe loads are drastically reduced. When the aircraft is on the ground longer than 45 minutes, recalculate the safe quantity using new numbers of air changes per hour. Maximum quantities are shown in figure A13.2.

Figure A13.1. Formula For Determining Dry Ice Limitations.

| |
|---|
| $X = \frac{VA(0.47)}{32.3}$ |
| <p>Where:</p> <p>V= Volume of aircraft</p> <p>A= Air changes per hour</p> <p>X= Maximum dry ice loading in pounds</p> |

Figure A13.2. Dry Ice Limitations When Aircraft is on Minimum Air Changes.

| Aircraft | Maximum Amount | |
|---------------------|--------------------------------------|--------------|
| Type | in Pounds | Kilograms |
| C-130 | 600 | 272 |
| C-135 | 200 | 91 |
| C-141B (See Note 1) | 3,430 | 1,556 |
| C-17 (See Note 2) | 3,430 High Flow 1,880 Normal Flow | 1,556 853 |

NOTE 1: 1,020 pounds (463 kg) with personnel.

NOTE 2: Indicates the maximum amount for operating with both air conditioning packs with no passengers in the cargo compartment. Limitation with passengers in the cargo compartment is set at 1,040 pounds (471 kg).

A13.9.3.3. **Non-pressurized Aircraft.** For non-pressurized aircraft, the amount of dry ice that can be safely shipped by air depends upon the sublimation rate and ventilation of the aircraft. To minimize the sublimation rate, use insulated containers surrounded with insulating blankets and tarpaulins. The aircraft must have maximum ventilation during the shipment. Under these conditions 1652.6 kg (3,644 pounds) of dry ice can be shipped on a C-141 aircraft. With unpressurized cargo compartment, the quantity of dry ice that can be transported is unlimited if the fumes are vented overboard the aircraft.

A13.9.3.4. **C-5 Aircraft.** Dry ice may be carried in the C-5A cargo compartment under the following aircraft operating conditions:

- During cruise (mach 0.5 and up) and altitudes up to 9144 m (30,000 feet), a safe load of dry ice is 2131.5 kg (4700 pounds.) During cruise (mach 0.6 and up) and altitudes above 9144 m (30,000 feet), a safe load is 1415 kg (3120 pounds.) The Environmental Control System (ECS) must be operated with "both" air-

conditioning units on, a "Normal" flow setting on the flow control valve, and the "Intermediate" setting on the alternative air valve.

- During non-pressurized flight up to 3048 m (10,000 feet), a safe load is 2948 kg (6500 pounds.) The auxiliary vent valve must be open for this condition.
- During ground operations with one auxiliary power unit (air turbine motor at idle), a safe operating load is 1338 kg (2950 pounds). The auxiliary vent valve must be open for this condition.

A13.9.3.5. **KC-10 Aircraft.** Dry ice may be carried in the KC-10 cargo compartment under the following aircraft operating conditions:

- No environmental curtain (27 pallet all-cargo configuration.) A safe load of dry ice is 1041 kg (2,295 pounds) with "both" air conditioning packs operating. This weight is reduced to 567.5 kg (1,251 pounds) when "one" air conditioning pack is operating. If "one" air conditioning pack is lost in flight, then accomplish emergency procedures for cabin. Turn Cargo Smoke Light on per KC-10 flight manual T.O. 1C-10(K)A-1, Section II. Include "Smoke Source is not Accessible" portion of procedure except do not put cabin pressure control in manual and do not depressurize cabin.
- Environmental curtain at station 615: A safe load of dry ice is 808 kg (1,782 pounds) with "both" air conditioning packs operating. This weight is reduced to 439.5 kg (969 pounds) when "one" air conditioning pack is operating.
- Environmental curtain at station 879: a safe load of dry ice is 546 kg (1,204 pounds) with "both" air conditioning packs operating. This weight is reduced to 296 kg (653 pounds) when "one" air conditioning pack is operating.
- Environmental curtain at station 615 or 879: If "one" air conditioning pack is lost in flight, then accomplish emergency procedures for cabin, turn cargo smoke light on, mixed passenger and cargo configuration per KC-10 flight manual T.O 1C-10(k) A-1, section II, except do not initiate firefighting procedures.
- During cargo loading, the following procedures apply to minimize carbon dioxide concentration:
 - Ensure APU is running and "both" air conditioning packs are operating.
 - Open number 4 passenger service door for additional ventilation.
 - Open all air inlets in the aerial refueling operators station and close aerial refueling operators hatch.
 - Ensure environmental curtain is closed before flight.

A13.9.3.6. **AMC Contract Aircraft.** Do not transport more than 200 kg (440 lbs) of dry ice in a cargo compartment of AMC contract aircraft without prior approval from HQ AMC/DONC.

A13.9.4. **Packaging Requirements.** Wrap in Kraft paper, secure with tape, and pack in fiberboard boxes, polystyrene foam containers or other suitable packaging designed and constructed to permit the release of carbon dioxide gas and to prevent a build-up of pressure that could rupture the packaging. UN specification packaging is not required. Packagings must meet the general requirements of A3.1.

★A13.10. **Magnetized Material.**

A13.10.1. **Handling Instructions.** Do not store magnetic materials suitable for military airlift closer than 4.6 m (15 feet) to compass sensing devices or other devices unduly affected by magnetic fields.

A13.10.2. **Packaging Requirements.** Shield magnetic materials (MIL-S-4473) when required to reduce magnetic field strength to not greater than 5.25 milligauss or two degrees deviation of a magnetic compass at a distance of 15 feet (4.6 m). Ensure that meters used to measure the magnetic field are properly operational, and whenever possible, that the item be measured by two different devices. Provide blocking and bracing as required. Additional packaging details are included in TO 00-25-251. Package magnetic tubes individually in compliance with MIL-E-75. Package magnetically susceptible items to make sure that the distance between the magnetic surface and outside of the innermost container is no less than the protective distance required, and in no instance less than 102 mm (4 inches). UN specification packaging is not required. Magnetic material that has a magnetic field strength greater than 0.00525 gauss at 4.6m (15 feet) is forbidden for air movement.

★A13.11. **Life-Saving Appliances.** Life-saving appliances, self-inflating or nonself-inflating, include (but are not limited to) life raft kits, life vest kits, survival kit assemblies, ejection seats, non-ejection seats, and parachutes that contain small quantities of hazardous material that are required as part of the survival equipment. Kit contents may include, but are not limited to, flammable items (fire starter and matches), ammunition items (cartridges and shells), pyrotechnics (signal flares), and nonflammable compressed gas cylinders (carbon dioxide and breathing oxygen).

A13.11.1. **Handling Instructions.** Store in cool, well-ventilated areas away from fire hazards and sources of heat or ignition. Do not drop or rough handle.

A13.11.2. **Packaging Requirements:**

A13.11.2.1. Pack kits in weather-resistant fiberboard or other securely closed strong outer container. Pack hazardous materials contained in the kit in inner packaging that is adequate to prevent accidental activation. Suitably cushion the inner packagings to prevent movement. Packagings must meet the general requirements of A3.1. UN specification packaging is not required.

A13.11.2.2. **Individually assigned kit hand carried by a crewmember.**

- This paragraph applies only to support operations involving recovery of inoperable aircraft or return of a flight crewmember as a passenger to maintain accountability of an individually assigned kit. For unit deployments see paragraph 3.4.2 or transport as palletized cargo according to A13.11.2.1. This does not apply to contract passenger or commercial aircraft.
- Package life-saving appliances in a strong outer container or A-3 bag. The requirements of A13.11.2.1 for inner packing and cushioning apply.
- Individual assigned kits may be handcarried by crew members. Crew members must inform the Air Terminal Operations Center, when transporting life-saving appliances in this manner. Items will be stored as directed by the transporting aircraft commander.
- When prepared and handcarried according to this paragraph, the marking and labeling requirements of Attachments 14 and 15 do not apply. Shipper's Declaration certification is required.

★A13.12. **Dangerous Goods in Apparatus or Machinery.** Apply this description only to apparatus or machinery containing hazardous material as an integral component of the item. This description may also be used for items that are normally a part of an end item or required to serve an operational function, but are removed and shipped separately (i.e., fuel tanks or bladders). Do not use this description for items in which a PSN already exists in table A4.1.

- Apparatus or machinery may only contain hazardous materials permitted as limited quantities under A19.3.
- If more than one hazardous material is present, the material must not be capable of reacting dangerously together.
- The total net quantity of hazardous materials contained in one package must not exceed the following:
 - 1 kg (2.2 lbs) for solids
 - 500 ml (17 ounces) for liquids
 - 0.5 kg (1.1 lbs) for Class 2.2 gases
- Secure or cushion receptacles containing hazardous material to prevent breakage or leakage and to control movement within the item during transport. Cushioning material must not react dangerously with or have protective properties adversely affected by any leakage.
- Ensure that, in the event of damage to receptacles, no leakage of the hazardous material from the apparatus or machinery is possible. A leak-proof liner is required for articles that are completely drained of liquid but not purged. All openings and lines must be capped or sealed according to applicable technical directives.
- Class 2.2 gases must be in authorized cylinders according to attachment 6.
- Pack in strong outer packagings unless the receptacles containing the hazardous material are adequately protected by the construction of the apparatus or machinery. UN specification packaging is not required.

A13.13. General Packaging Requirements for Class 9 Materials. Generally, all inside containers for Class 9 and ORM-D packages must meet the requirements of attachment 3 and this paragraph. Provide enough outage for packagings of 208 L (55 gallon) capacity or less, so that the packaging will not be liquid full at 54 degrees C (130 degrees F.) Make sure that when a liquid or solid has an absolute vapor pressure over 110 kPa (16 psi) at 38 degrees C (100 degrees F) the primary packaging is capable of withstanding the inside vapor pressure at 54 degrees C (130 degrees F) without leakage. Package any Class 9 or ORM-D material that may cause a hazard in transportation due to its reaction with water in either an inner or outer waterproof packaging. ORM-D classification is only authorized for domestic shipments. International shipments must not be transported under the classification "ORM-D."

A13.13.1. Use any appropriate non-bulk packaging that meets the requirements of attachment 3 to ship liquid or solid Class 9 material. UN specification packaging is not required.

A13.13.2. Package material classified as ORM-D for domestic shipment as follows:

- Pack flammable liquids:

- In inside metal containers each having a rated capacity of 1 L (1 quart) or less, or other inside containers each having a rated capacity of 0.5 L (1 pint) or less, packed in strong outside packagings.
- In inside containers, each having a rated capacity of 4 L (1 gallon) or less, packed in strong outside packagings. This provision only applies if the flash point of the material is 23 degrees C (73 degrees F) or higher.
- Package flammable solids, except for charcoal briquettes, in inside containers having a net weight of 0.5 kg (1 pound) each or less. Pack inside containers in strong outside packagings having a net weight of 11.3 kg (25 pounds) each or less. See A3.3.8 for commercial form charcoal briquettes.
- Package flammable compressed gases:
 - In inside containers, each having a water capacity of 118 ml, 7.22 cubic inches or less (4 fluid ounces or less.) Pack inside containers in strong outside packagings.
 - In inside metal containers charged with a solution of materials and compressed gas or gases that are nonpoisonous, meeting all of the following:
 - The capacity must not exceed 27.2 fluid ounces (50 cubic inches).
 - The pressure in the container must not exceed 1242 kPa (180 psig) at 54 degrees C (130 degrees F). If the pressure is greater than 966 kPa (140 psig) at 130 degrees F (54 degrees C) but not over 160 psig (1104 kPa) at 54 degrees C (130 degrees F), a specification DOT 2P inside metal container must be used. If the pressure exceeds 1104 kPa (160 psig) at 54 degrees C (130 degrees F), an inside IP.7, IP.7A, or IP.7B metal container must be used. In any event, the metal container must be capable of withstanding, without bursting, a pressure of 1 1/2 times the equilibrium pressure of the contents at 54 degrees C (130 degrees F).
 - The liquid content of the material and gas must not completely fill the container at 54 degrees C (130 degrees F).
 - Pack the containers in strong outside packagings.
 - Each completed container filled for shipment must have been heated until the pressure in the container is equivalent to the equilibrium pressure of the content at 54 degrees C (130 degrees F). There must not be evidence of leakage, distortion, or other defect to the containers.

★**A13.14. Air Bag Inflators, Air Bag Modules, Seat-belt Pretensioners, and Seat-Belt Modules.** Item classification as Class 9 or Division 2.2 must be approved by DOT according to 49 CFR 173.166. Package in an outer:

- Fiberboard (4G), wooden (4C1 or 4C2), reconstituted wood (4F), or solid plastic box (4H2) box.
- Steel (1A2), aluminum (1B2), fiber (1G), or plastic (1H2) drum.
- Steel (3A2) or plastic (3H2) jerrican.

A13.15. Asbestos (Hydrated Mineral Silicates.) Asbestos blue, brown, or white, includes any of the following hydrated mineral silicates: chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, actinolite asbestos, and every product containing any of these materials. Asbestos that is immersed or fixed in a natural or artificial binder material (such as cement, plastic, asphalt, resins, or mineral ore) and manufactured products containing asbestos are not subject to this paragraph. Asbestos must be loaded, handled, unloaded, and any contamination of aircraft removed in such a manner that will minimize occupational exposure to airborne particles released incident to transportation. Packaging must meet the general packaging requirements of A3.1. UN specification packaging is not required. Package asbestos in:

A13.15.1. Rigid, leak tight packaging such as metal, plastic, or fiber drums.

A13.15.2. Bags or other nonrigid packaging that are dust and sift-proof. The packages must be palletized and unitized by methods such as shrink-wrapping in plastic or wrapping in fiberboard secured by strapping.

A13.15.3. Bags or other nonrigid packaging that are dust and sift-proof in strong outside fiberboard or wooden boxes.

★**A13.16. Polymeric Beads, Expandable and Plastic Molding Compound.** Pack polymeric beads or granules, expandable, evolving flammable vapor and plastic molding compound in dough, sheet or extruded rope form, evolving flammable vapor in wood (4C1 or 4C2), plywood (4D), fiberboard (4G), or reconstituted wood (4F) boxes, plywood drum (1D) or fiber drums (1G) with sealed inner plastic liners. Vapor tight metal or plastic drums (1A1, 1A2, 1B1, 1B2, 1H1 or 1H2) may also be used.

★A13.17. **Chemical or First Aid Kits.** This description is intended for boxes, cases, ect., containing small amounts of various hazardous materials used for medical, analytical, or testing purposes.

- The PG assigned to the kit as a whole must be the most stringent PG assigned to any individual substance in the kit.
- The contents of the kit must be of such a nature and so packed that there will be no possibility of the mixture of contents causing dangerous evolution of heat or gas.
- The only hazardous materials authorized in the kits are substances authorized as limited quantities according to A19.3.2, and excepted quantities according to A19.2, provided the inner packaging requirements of A19.2.3 are met.

A13.17.1. Package as follows:

- In inner receptacles of no more than 250 mL (8.5 fluid ounces) for liquids or 250 g (9 ounces) for solids.
- The total quantity of hazardous material in any one kit must not exceed 1 L (1 quart) for liquids or 1 kg (2.2 pounds) for solids.
- Protect inner receptacles from other materials in the kit and pack in one of the following outer packagings:
 - Wood (4C1 or 4C2), plywood (4D), or reconstituted wood (4F) box.
 - Expanded plastic (4H1) or solid plastic (4H2) box.
 - Fiberboard (4G) box.
 - Steel (4A) or Aluminum (4B) box.

A13.17.2. Package limited quantities or hazardous material in Chemical or First Aid Kits as follows:

- In inner receptacles of no more than 30 ml for liquids or 100 g for solids. The total quantity of hazardous materials in any one kit must not exceed 1 kg.
- Protect inner receptacles from other material in the kit and package in strong outer packaging. UN specification packaging is not required.

★A13.18. **Polystyrene Beads, Expandable, Evolving Flammable Vapors.** Pack polystyrene beads or granules, expandable, evolving flammable vapor and plastic molding compound in dough, sheet or extruded rope form, evolving flammable vapor in wood (4C1 or 4C2), plywood (4D), fiberboard (4G), or reconstituted wood (4F) boxes or fiber drums (1G) with sealed inner plastic liners. Vapor tight metal or plastic drums (1A1, 1A2, 1B1, 1B2, 1H1 or 1H2) may also be used.

Attachment 14

MARKING HAZARDOUS MATERIALS

A14.1. General Requirements. Mark hazardous materials according to MIL-STD-129 *Marking for Shipment and Storage* and this manual. Labels may be used to meet marking requirements to the extent they meet all application, placement, size, legibility, and durability requirements for marking.

A14.2. United Nations (UN) Packaging Specification Markings. UN specification markings are mandatory for all packages of hazardous materials unless exempted by 1.7 or a separate approval. A description of the codes and sequence of information contained in the UN specification marking is identified in figure A14.1. A sample of how the UN specification markings look is in figure A14.2 and figure A14.3.

- **Grandfathered Items.** Containers packaged before January 1, 1990 may be shipped internationally by military air without the UN specification markings. Annotate the shipping papers with the words, "Government-owned goods packaged before January 1, 1990."

Figure A14.1. UN Specification Marking Codes and Sequence of Instruction.

| | |
|--------|---|
| U N | The symbol used to certify that the packaging complies with United Nations recommendations. For embossed metal packagings the capital "UN" can be applied as the symbol. |
| 4G | This is a two to four position code. The first position indicates the type of packaging and will be one of the following numbers: 1 = Drum 2 = Wooden barrel 3 = Jerrican 4 = Box 5 = Bag 6 = Composite packaging 7 = Pressure receptacle The second position indicates the type of material that the container is made of. For composite packagings, two capital letters (second and third positions) will be used to indicate the type of materials. The first letter indicates the material of the inner receptacle and the second letter indicates the material of the outer packaging. For combination packagings, only the code for the outer packaging will be used. The following letters indicate the type of materials: A = Steel (all types and surface treatments) B = Aluminum C = Natural wood D = Plywood F = Reconstituted wood G = Fiberboard H = Plastic materials L = Textile M = Paper, multi-wall N = Metal (other than steel or aluminum) P = Glass, porcelain, or stoneware The third position (fourth position for composite packagings) will be a number indicating the category of packaging within the same type (i.e., 1A1 [non-removable head steel drum], 1A2 [removable head steel drum], 6HG1 [plastic receptacle with outer fiber drum] 6HG2 [plastic receptacle with outer fiberboard box]). |

Figure A14.1. Continued.

| | |
|-------------------|--|
| | The following special codes may follow the packaging type code: |
| V | Special packaging meeting the tests specified in 49 CFR 178.601(g)(2). |
| W | Packaging of the same type as specified by the UN requirements, but not meeting the same general construction requirements. The transport of such packagings is subject to written approval from the competent authority. For approval see 49 CFR 178.601(h). |
| X1.4 or X15 | Identified first is the PG the configuration has been successfully tested too. X is used for PG I. Y is used for PG II. Z is used for PG III. Items of a lesser (less hazardous) PG may be packaged in a packaging that has been tested to a higher PG provided the requirements of the test report are complied with. For single packagings, the relative density, rounded off to the first decimal will follow the PG, for which the container has been tested. This may be omitted when the relative density does not exceed 1.2. For packagings intended to contain solids or inner packagings, the PG will be followed by the maximum gross weight, in kilograms, that the packaging configuration has been tested. |
| 100 or S | For single packagings intended to contain liquids, the next marking indicates the maximum test pressure, in kPa, rounded off to the nearest 10 kPa which the container was tested (hydraulic test). For packagings intended to contain solids or inner packagings, use the letter "S." For air shipment of packagings intended to contain inner packagings, see A3.2.1. Also, if the inner packaging is plastic ensure the requirements of A3.1.2 are met. The last two digits of the year during which the packaging was manufactured. Packagings of types 1H1, 1H2, 3H1, and 3H2 must also be marked with the month of manufacture. The month of manufacture may be marked on the packaging in a different place than the UN specification packaging marking. The country authorizing the allocation of the mark. |
| *** | The symbol of the party responsible for ensuring that the UN requirements have been met. The symbol must be registered with the US DOT, Office of Hazardous Materials Transportation. In place of a symbol, the in-the-clear name of the party responsible for ensuring the UN requirements have been met can be used. The Department of Defense uses the symbol "DoD." Reconditioned packagings must be marked to indicate they have been properly reconditioned. This marking must be applied near the initial marking and must replace the country and symbol of the party responsible for ensuring the UN requirements have been met, or be in addition to the initial marking. After reconditioning a packaging, the reconditioner must apply the following markings in sequence: |
| USA | The country in which the reconditioning was conducted. |
| *** | The name or registered symbol of the reconditioner. |
| 93 | The year the packaging was reconditioned. |
| R | Enter the letter "R." |
| L | Enter the letter "L" for every packaging successfully passing the leakproofness test. |

Figure A14.2. Sample of UN Non-bulk Specification Packaging Marking for Solids.

Example of a Single or Combination Marking:

| | | | | | | | |
|--------|----|---|---|-----|---|---|--------------|
| a | b | c | d | e | f | g | h |
| u n | 4G | / | Y | 7.4 | / | S | /99/USA /DOD |

(a) The United Nations Symbol
(b) Type of Packaging Code
(c) Packing Group:
X = PG I, II and III
Y = PG II and III
Z = PG III Only
(d) Maximum Gross Mass (In Kilograms)
(e) Letter "S" , Solid or Inner Packagings
(f) Year of Manufacture or assembly
(g) State (Country) authorizing mark
(h) Symbol of Manufacturer/Certifier

Figure 14.3. Sample of UN Non-bulk Specification Packaging Marking for Liquids.

Example of marking for single packaging to contain liquid:

| | | | | | | | |
|--------|-----|---|---|-----|---|--------|------------|
| a | b | c | d | e | f | g | h |
| u n | 1A1 | / | Y | 1.3 | / | 95 /99 | /USA / DOD |

(a) The United Nations Symbol
(b) Type of Packaging Code
(c) Packing Group:
X = PG I, II and III
Y = PG II and III
Z = PG III Only
(d) Relative Density
(Show if >1.2)
(e) Test Pressure (in Kilopascals)
PG I-not less than 250 kPa
PG II & III-not less than 95 kPa
(f) Year of Manufacture or assembly
(g) State (Country) authorizing mark
(h) Symbol of Manufacturer/Certifier

A14.3. General Hazard Communication and Handling Markings.

A14.3.1. **Proper Shipping Name and Identification Number.** Unless otherwise specified, mark all packages containing hazardous materials with the PSN and identification number shown in the alphabetical listing of items in table A4.1.

- Mark the appropriate technical name in parenthesis following the proper shipping name when required by A4.2.2.
- Secondary hazards do not require marking.
- Do not use abbreviations (except "w" (with), "w/o" (without), and "ORM" [other regulated material]).

A14.3.2. **Hazardous Substance.** Mark all packages containing a hazardous substance with the letter "RQ" in association with the PSN. If the PSN does not identify the hazardous substance by name, mark one of the following descriptions on the package, in parentheses, in association with the PSN:

- The technical name of the hazardous substance.
- The waste stream number.
- The letters "EPA" followed by the word "ignitability," "corrosivity," "reactivity," or "EP toxicity," as appropriate, or the corresponding "D" number, as appropriate.

A14.3.3. **Hazardous Waste.** Mark hazardous waste shipments according to this manual, 49 CFR 172, 40 CFR 262.32, and MIL-STD-129.

A14.3.4. **Inhalation Hazard.** Mark each package containing any material that is poisonous by inhalation "Inhalation Hazard." The marking is not required if the words "INHALATION HAZARD" appear on the label.

A14.3.5. **Exemptions and COEs.** Mark each package authorized by a DOT Exemption or a COE with exemption or COE number.

★A14.3.6. **Air Eligible Marking.**

- Mark the outer container of a combination package containing liquid hazardous material "Air Eligible" to verify the inner containers meet internal pressure requirements of A3.2.1.
- Mark "Air Eligible" on outer containers used to meet pressure requirements of A3.2.3, if air eligibility is not already identified by the POP marking.

★A14.3.7. **Orientation Marking (This Side Up).** Pack inside containers used to ship liquid hazardous material within a combination packaging or overpack with filling holes up.

- Mark with orientation arrows meeting the requirements of 49 CFR 172.312 on two opposite sides of the package and ensure the arrows point in the correct upright direction. Orientation labels may be used to meet this marking requirement. The lettering "THIS SIDE UP", "THIS END UP" or "UP" may be used in conjunction with orientation labels.
- This requirement does not apply to materials in inside metal cans of the nonrefillable type with spun-in head and base without replaceable caps or other closing device, liquids contained in manufactured articles which are leak-tight in all orientations, and packages with hermetically-sealed inner packagings.

A14.3.8. **Inner Packagings Comply with Prescribed Specifications.** Mark the outer container "INNER PACKAGES COMPLY WITH PRESCRIBED SPECIFICATIONS" when:

- Overpacking prescribed UN specification containers for consolidation or handling purposes (see 1.13).
- This statement may be used in place of the statement required by A14.4.2.

A14.3.9. **Chemically Contaminated Cargo.** Mark chemically contaminated cargo shipped under the authority of 3.9 with the words, "Contaminated - Do Not Open." Apply by any means that is visible and legible.

A14.3.10. **Dangerous Goods in Machinery or Apparatus.** For items shipped under the PSN "Dangerous Goods in Machinery" or "Dangerous Goods in Apparatus" mark the PSN and UN number on the machinery, apparatus, or packaging (unless exempted by A14.4.8).

★A14.3.11. **Unitized Cargo.** Identical hazardous materials unitized on a warehouse pallet or skid must have at least one package with the UN specification markings exposed on the outside of the unit load (unless exempt by paragraph 1.7).

A14.4. Marking Requirements Applicable to Class.

★A14.4.1. **Class 1.**

- Mark packages of explosives with an EX number or National Stock Number (as listed in the Joint Hazard Classification System) for each explosive. This does not apply if the explosive has an interim hazard

classification issued according to A3.3.1.2. The EX number is an explosive classification approval number, it is not the same as a DOT-Exemption number.

- Mark packages of explosives containing liquids on the top with words "THIS SIDE UP."
- When explosives are installed according to A5.3, mark the following statement near each explosive device: "WARNING - EXPLOSIVE DEVICE EMBEDDED IN ***" (***) identifies location of device; i.e., window, door, frame, etc).
- Explosives authorized by this manual to be shipped unpacked, must display the PSN and UN number. That marking may be on the item, its cradle, or handling, storage, or launching device. This marking is not required for items hand-carried (see 3.4.2), unpackaged for airdrop (see A5.4.1), or secured in a tactical vehicle or equipment (see A5.4.2).
- For palletized unit loads, a marking board may be used when positioning of marking on individual containers prevents the PSN or UN number from being visible. A marking board may also be used to identify current PSN and UN number for those items "Grandfathered" according to paragraph 1.7.2 with individual packages marked with hazard communication information no longer in table A4.1. As a minimum, position two marking boards at opposite sides of the pallet.

A14.4.2. **Class 2.**

- For ethylene oxide prepared and certified according to A6.13.4, mark the top head of the drum "THIS END UP."
- Mark fire extinguishers prepared and certified according to A6.8.3 to indicate year of test and "MEETS DOT REQUIREMENTS." The words "This extinguisher meets all requirements of 49 CFR 173.306" may be displayed in place of "MEETS DOT REQUIREMENTS" on extinguishers manufactured before January 1, 1976.
- Each outside container of cryogenic liquids prepared and certified according to A6.11 must have arrows to indicate upright position and must be marked "KEEP UPRIGHT" and "DO NOT DROP." Hydrogen, cryogenic liquid must meet the marking requirements in 49 CFR 178.57-20. The total rate of venting in standard cubic feet per hour (SCFH) must be marked on the top head or valve protection band in letters at least one-half inch high as follows "VENT RATE**SCFH" (with the asterisks replaced by the number representing the total rate of venting, in SCFH).
- For nitric oxide prepared and certified according to A6.20 and the DOT 3A, 3AA, 3AL, or 3E1800 cylinders are overpacked, mark the outer wooden box "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS."
- For compressed gases prepared and certified according to A6.3, mark the outside packaging "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS".
- Refrigerant gases or engine-starting fluid prepared and certified according to A6.5.5 and A6.5.6, mark the outside shipping container "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS."

A14.4.3. **Class 3.** When shipping flammable liquids, mark the shipping container with the flash point.

A14.4.4. **Class 5.** For bromine pentafluoride or bromine trifluoride prepared and certified according to A9.11 using a DOT 3E1800 cylinder, mark the outside container "INSIDE CONTAINERS COMPLY WITH PRESCRIBED SPECIFICATIONS."

A14.4.5. **Class 6.**

- Permanently mark outside plastic containers used for toxic (poisonous materials), by embossment or other durable means, with the word "POISON" in letters of at least 6.3 mm (1/4 inch) in height. Additional text or symbols may be included in the marking. The marking must be located within 15 cm (6 inches) of the packaging's closure.
- Mark the packages of infectious substances with:
 - The United Nations packaging symbol
 - The text "CLASS 6.2"
 - The last two digits of the year of manufacture of the packaging
 - The State authorizing the allocation of the mark (i.e., USA)
 - The name or registered symbol of the manufacturer

A14.4.6. **Class 7.**

- Mark each package of radioactive materials over 50 kg (110 pounds) to show the gross weight.

- Mark each package of radioactive material that meets the requirements for Type A or Type B packaging on the outside of the package in letters at least 13mm (1/2 inch) high, with the words "TYPE A" or "TYPE B," as appropriate. Do not mark a package that does not meet these requirements. Mark each package of radioactive materials destined for overseas shipment "USA."
- For limited quantities prepared and certified according to A11.11, the outside of the inner packaging or if there is no inner packaging, mark the outside of the packaging itself "Radioactive."
- Mark each Type B, Type B(U), or Type B(M) outer packaging with a trefoil radiation symbol meeting the requirements of 49 CFR Appendix B to Part 172.

A14.4.7. **Class 8.** Mark the outer container of chemical kits prepared and certified according to A12.7 "CHEMICAL KITS" or "FIRST AID KITS" as applicable.

A14.4.8. **Class 9.**

- Wheelchairs for which the battery is removed and boxed for shipment according to A13.7, mark the outer container containing the battery "THIS SIDE UP." This applies any time a battery is authorized to be removed from its holder, boxed, and shipped with equipment.
- Unless packaged, crated, or otherwise enclosed to prevent ready identification, the marking of the article or equipment of Class 9 with the proper shipping name and identification number is not required.

A14.4.9. **Limited Quantities.** Mark packages used for dangerous goods in limited quantities "Limited Quantity" or "LTD QTY."

★A14.4.10. **Consumer Commodity and ORM Markings.** Plainly, durably, and legibly mark each package containing a hazardous material meeting the definition of Consumer Commodities and classified as ORM-D with either "ORM-D" or "ORM-D-AIR". Place the marking on at least one side or end immediately following or below the PSN within a rectangle that is approximately 6.3 mm (1/4 inch) larger on each side than the ORM designation. Use the ORM designation for domestic shipments only.

A14.5. Consumer Product Warnings. An article, package, or container may bear a manufacturer's consumer warning symbol or statement. Presence of such a symbol or statement does not necessarily mean the article or contents meets the classification criteria as a hazardous material for military air transportation. Reference DoD 6050.5, *Hazardous Material Information System* or the product's Material Safety Data Sheet if hazard classification information is needed.

Attachment 15

LABELING HAZARDOUS MATERIALS

A15.1. General Requirements. Unless otherwise specified in this manual, apply the appropriate labels to the outside container of packages containing hazardous materials.

- Use labels meeting the commercial color and specifications outlined in 49 CFR 172.411 through 172.450, ICAO Technical Instructions or IATA Dangerous Goods Regulation. Do not use labels that are easily confused by their use, shape, and color, with the standard labels prescribed.
- Labels must be diamond-shaped with each side at least 10 cm (4 inches) long and have a solid line border 6.3 mm (0.25 inches) from the edge.
- The hazard class and division number must be at least 6.3 mm (0.25 inches) and not greater than 12.7 mm (0.5 inches). The label text must be at least 7.6 mm (0.3 inches) and will be in capitalized Roman letters.
- It is the shipping activity's responsibility to establish procedures to locally fund for and procure hazardous material labels and commercial forms.
- Secondary hazards do not require labels.

A15.2. Hazard Labels.

- Place on the outer packaging a primary hazard label and a subsidiary risk label based on the hazard classification/subsidiary risk provided in columns 3 and 6 of table A4.1. Include the hazard class or division number in the bottom corner of the label(s). Labels that do not have the class or division number preprinted may be stamped or overprinted with the appropriate hazard class/division number in the bottom corner of the label.
 - For explosives, include the division number and compatibility group letter. Ensure the compatibility group letter is a capitalized Roman letter.
 - For Division 5.1 oxidizers and Division 5.2 organic peroxides, include the division number in the bottom corner of the label.
- Attach labels to the part of the package bearing the PSN if package size is adequate.
- Do not place labels over any identifying data on the container. Remove or obliterate any irrelevant labeling already on the packaging.
- When hazardous materials having different classes are packed in the same packaging or outside container, the outside container must be labeled as required for each material (including subsidiary risks). If the primary hazard or subsidiary risk label of another component already adequately identifies a primary or subsidiary risk, it is not required to repeat this warning by applying another label.
- When hazardous materials are palletized on a 463L or warehouse pallet, ensure the label is clearly visible.
- Position hazardous cargo loaded in the back of a vehicle so the labels are clearly visible, or apply the labels for each hazard loaded in the back of the vehicle to a marker board that is clearly visible.
- Label each Limited Quantity package for each dangerous good contained in the package.
- Excepted Quantities container only requires a completed "Dangerous Goods in Excepted Quantities" label attached to the container.
- Label hazardous waste with the appropriate hazard label and properly completed hazardous waste label.
- For items shipped under the PSN "Dangerous Goods in Machinery" or "Dangerous Goods in Apparatus" apply primary and subsidiary risk hazard labels for each hazard contained therein on the machinery, apparatus, or packaging (unless exempted by A15.4.6). Apply Package Orientation (This Way Up) labels to opposite vertical sides when required to ensure liquid hazardous materials remain in their intended orientation.
- Do not apply hazard labels to a package containing material that is not regulated.

A15.3. Handling Labels.

- Apply a "Cargo Aircraft Only" label on packagings not permitted on passenger aircraft as identified in column 7 of table A4.1. The "Cargo Aircraft Only" label is not required on cargo shipped according to chapter 3 (see attachment 17 for certification).
- Apply the "Cargo Aircraft Only" label on packagings shipped according to Chapter 3 if diverted as identified in paragraph 3.11.

- Apply a "Magnetized Material" label on packages containing magnetized material. An additional Class 9 label is not required.
- Apply an "Empty" label when the packaging meets the requirements of 1.10. Any container or cylinder shipped as empty must have the previously applied hazard labels removed, obliterated, destroyed, or completely covered by the "EMPTY" label.

A15.4. General Requirements Applicable to Hazard Classes.

★A15.4.1. Class 2.

- For packages containing oxygen, compressed; or oxygen, refrigerated liquid, a label with the word "OXYGEN" may be used in place of a label with the word "OXIDIZER," if the letter size and color are the same as those required for oxidizer. Alternatively, an "OXYGEN" label may be used in place of the "NONFLAMMABLE GAS" and "OXIDIZER" labels required in table A4.1.
- Recoil mechanisms or artillery gun mounts prepared and certified according to A6.6.8, must have a nonflammable compressed gas label applied to each exterior container. However, when shipped as an integral part of the complete weapon system, the nonflammable compressed gas label may be on the weapon or its exterior cover.

A15.4.2. **Class 3.** All flammable liquids, whose vapor pressure (Reid test) is more than 110 kPa (16 psi) at 38 degrees C (100 degrees F), must have a "white bung label," 76 x 127 mm (3 by 5 inches), affixed near the bung or closure of the container.

★A15.4.3. Class 6.

- Label PG I or II material with either a "TOXIC" or "TOXIC INHALATION HAZARD" label as appropriate.
- Label hazard zone A or B material with a "TOXIC INHALATION HAZARD" label.
- Material classified as an infectious substance, that also meets the definition of a Class 2.3 toxic material or a radioactive material, must also be labeled with a "TOXIC GAS" (or INHALATION HAZARD) label or "RADIOACTIVE" label as appropriate.
- For PG III material, the "Keep Away from Food" label may be used for domestic shipments.

A15.4.4. Class 7.

- Label each package of radioactive materials, unless excepted by attachment 11. The proper label to affix to a package of radioactive material is based on the radiation level at the surface of the package and the transport index. The proper category of label is determined according to table A15.1. Apply the highest category label required for any of the two determining conditions. Radioactive white-I is the lowest category and radioactive yellow-III is the highest. For example: a package with a transport index of 0.8 and a maximum surface radiation level of 0.6 mSv/h (60 mrem/h) must bear a radioactive yellow-III label (see table A15.1.)

Table A15.1. Radioactive Label Requirements. (See Note 1)

| Transport Index (TI) | Maximum Radiation Level at any Point on the External Surface | Label Category |
|---|--|----------------|
| 0 (see Note 1) | Less than or equal to 0.005 mSv/h (0.5 mrem/h) | white-I |
| More than 0 but not more than 1 (see Note 2) | More than 0.005 mSv/h (0.5 mrem/h) but less than or equal to 0.5 mSv/h (50 mrem/h) | yellow-II |
| More than 1 but not more than 10 | More than 0.5 mSv/h (50 mrem/h) but less than or equal to 2 mSv/h (200 mrem/h) | yellow-III |

NOTE 1: The category of label must be shown in Key 17 of the Shipper's Declaration for Dangerous Goods form and must also be applied to radioactive materials packages. Any package containing a "highway route controlled quantity" must be labeled as radioactive yellow-III.

NOTE 2: If the measured TI is not greater than 0.05, the value quoted may be zero.

- Label each package containing a radioactive material that also meets the definition of one or more additional hazards, as required by this attachment for the radioactive material and for each additional hazard. For example:
 - Label solid nitrates of uranium or thorium, "RADIOACTIVE" and "OXIDIZER."

- Label nitric acid solution of radioactive material "RADIOACTIVE" and "CORROSIVE."
- Each package requiring a "RADIOACTIVE" label must have two of these labels affixed to opposite sides of the package. Enter the following information in the blank spaces by legible printing (manual or mechanical), using a durable weather resistant means of marking:
 - **"Contents."** The name of the radionuclides as taken from the listing of radionuclides in table A11.1. Symbols that conform to established radiation protection terminology are authorized, (i.e., ^{99}Mo , ^{60}Co , etc). For mixtures of radionuclides, list the most restrictive radionuclides, on the basis of radiotoxicity, as space on the label allows. If an overpack is used to consolidate individual packages, this entry may state "MIXED" unless each inside package contains the same radionuclides.
 - **"Activity."** Express units in appropriate international units of Becquerals (Bq) or Terabecquerals (Tbq). The customary units, i.e., curies (Ci), millicuries (mCi), or microcuries (uCi) may be included in parenthesis following the international units. Abbreviations are authorized. For a fissile material, the weight in grams or kilograms of the fissile radioisotope also may be inserted. If an overpack is used to consolidate individual packages, this entry must be determined by adding together the number of curies of the radioactive materials packages contained in the overpack.
 - **"Transport Index."** See attachment 1. If an overpack is used to consolidate individual packages, determine this entry by adding together the transport indexes of the radioactive materials packages contained in the overpack. The transport index of the overpack must not exceed 3.0 for passenger-carrying aircraft shipments, or 10.0 for cargo only aircraft shipments (see attachment 22).

A15.4.5. **Class 8.**

- Batteries prepared and certified according to A12.5 must have a "Package Orientation" labels indicating the upright position (top) of the container.
- Label Chemical or First Aid Kits prepared in accordance with A12.7 with the primary hazard label and any subsidiary risk labels applicable to each individual hazard within the kit.

A15.4.6. **Class 9.**

- Equipment or articles of Class 9 do not require a label unless packaged, crated, or otherwise enclosed to prevent ready identification.
- Certify items containing both limited quantity radioactive and magnetic characteristics to the radioactive material. Although limited quantity radioactive material is exempt from labeling, a magnetic material label must be applied to the shipping container.

Attachment 16**AREA PLACARDING**

A16.1. General Requirements. Placard the area surrounding aircraft transporting any hazardous materials when parked according to table A16.1 or Service directives. If Service directives do not contain specific procedures for placarding, use the following guidance:

- Use placards that meet the general design, size, and color specifications of 49 CFR 172.519.
- For explosives, fire and chemical hazard symbols specified in DoD 6055.9-STD may be used in place of placards.
- Conspicuously display placards at the front, rear, and both sides of the aircraft unless emergency response access is restricted. Then post placards at entry points.
- Park aircraft transporting DoD Class 1.1, 1.2, and 1.3 explosives and any material identified as Inhalation hazard zone A in a remote area. Placarding is still required for these materials when parked in a designated restricted, posted, and traffic controlled parking or loading and unloading area.
- Park aircraft transporting all other types of hazardous materials in a placarded area. However, placarding is not required for these materials when parked in a designated restricted, posted, and traffic controlled parking or loading and unloading area.

A16.2. Responsibility for Placards.

- Military hosts are responsible for placarding at military bases.
- At nonmilitary airfields, the agency delivering cargo to the aircraft, or off loading cargo is responsible for making arrangements with the airport manager for identifying the cargo, isolating parking and loading, placarding, firefighting, and disaster response. Arrangements for using en route nonmilitary airfields is the responsibility of the activity having operational control of the aircraft.
- It is the shipping activity's responsibility to establish procedures to locally procure and fund for hazardous material placards.
- A description of the placards is shown in table A16.1.

Table A16.1. Placard Requirements. (see notes)

| Area Placards Required for Parked Aircraft Containing Hazardous Cargo | |
|--|---------------------------|
| Hazard Class or Division (any quantity) | Type of Placard |
| 1.1 | EXPLOSIVES 1.1 |
| 1.2 | EXPLOSIVES 1.2 |
| 1.3 | EXPLOSIVES 1.3 |
| 2.3 | POISON GAS |
| 4.3 | DANGEROUS WHEN WET |
| 5.2 (Organic peroxide, Type B, liquid or solid temperature controlled) | ORGANIC PEROXIDE |
| 6.1 (Inhalation hazard Zone A or B) | POISON INHALATION HAZARD |
| 7 (Radioactive yellow-III label only) | RADIOACTIVE |
| Hazard Class or Division (1,001 pounds or more gross weight) | Type of Placard |
| 1.4 | EXPLOSIVES 1.4 |
| 1.5 | EXPLOSIVES 1.5 |
| 1.6 | EXPLOSIVES 1.6 |
| 2.1 | FLAMMABLE GAS |
| 2.2 | NONFLAMMABLE GAS |
| 3 | FLAMMABLE |
| 4.1 | FLAMMABLE SOLID |
| 4.2 | SPONTANEOUSLY COMBUSTIBLE |
| 5.1 | OXIDIZER |
| 5.2 (Other than organic peroxide, Type B, liquid or solid, temperature controlled) | ORGANIC PEROXIDE |
| 6.1 (other than inhalation hazard, Zone A or B) | POISON |
| 6.2 | none required |
| 8 | CORROSIVE |

NOTES:

1. The quantity limitation will be the total gross weight of the packages comprising the shipment or different shipments of the same classification. When cargo contains two or more hazardous articles (other than explosives 1.1, 1.2, and 1.3) which are compatible (see attachment 18), combine the gross weight and quantity for this purpose.
2. Use the explosive placard representing highest hazard. For example, if the area contains both Class 1.1 and 1.2, use the Explosive 1.1 placard.
3. A “DANGEROUS” placard may be used in place of separate placards for two or more categories of hazardous materials (other than those requiring placard for any quantity) when the aggregate gross weight exceeds 454 kg (1000 lbs.). When 1000 kg (2205 lbs.) of one category of material is loaded, use specified placard for that material.

Attachment 17

CERTIFYING HAZARDOUS MATERIALS

★**A17.1. Shipper's Certification.** Unless specifically exempted in this manual, the shipping activity must complete a shipper's certification according to this attachment for all military air shipments of hazardous materials.

A17.1.1. Certifying Official.

- A qualified Preparer must accomplish the Shipper's Declaration for Dangerous Goods form.
- When transportation personnel are required to certify an item that requires special preparation, the item specialist or preparing activity will provide documentation indicating that the item is prepared properly for air shipment. Develop local procedures to determine acceptable documentation.

A17.1.2. Certification Reference. Certify hazardous materials to a packaging reference in this manual. Hazardous material may be certified to the ICAO Technical Instruction, IATA Dangerous Good Regulation, or Title 49 CFR under the following conditions:

- Comply with all requirements of the certifying document.
- Do not exceed the passenger quantity limitations of the certifying document. If the passenger quantity limitations of the certifying document are exceeded or the material is forbidden on passenger aircraft, then the shipment must be certified to this manual.
- Comply with requirements in Attachment 20 for absorbent material in combination packages containing liquid hazardous materials.
- Include handling instructions identified in this manual for specific proper shipping names on the certification form in the "Additional Handling Information" block.
- Certify vehicles and support equipment to this manual.
- Certify compressed gas cylinders to this manual.
- See A17.2.6 for multiple mode shipments.

A17.2. Shipper's Declaration for Dangerous Goods Certification.

A17.2.1. Forms Required. Complete shipper's certification on the "Shipper's Declaration for Dangerous Goods" standard commercial form. Two styles of the commercial form may be used. One style is designed with the "Nature and Quantity of Dangerous Goods" section left open for continuous printing. The other style is designed in a columnar format with the "Nature and Quantity of Dangerous Goods" section blocked and formatted with headings specifying each key entry (figure A17.3). It is the shipping activity's responsibility to establish procedures to locally procure and fund for the Shipper's Declaration for Dangerous Goods form.

- Obtain the form through the procurement system from commercial vendors specializing in hazardous material transportation supplies.
- The form may be locally produced depending on local capabilities and economic feasibility.
- The form must meet the format, size, and color specifications outlined in the IATA Dangerous Goods Regulation, Section 8-Documentation.

A17.2.2. Copies Required. Complete and sign at least three Shipper's Declaration for Dangerous Goods forms.

- Attach one certification form to the copy of the manifest that is placed on the aircraft.
- Attach one certification form to the originating station file manifest. Intransit or enroute terminals may reproduce (photocopy) the Shipper's Declaration for Dangerous Goods form for their station file if required.
- Place one certification form in a waterproof envelope and attach to the number one piece of the shipment.
- The three original forms used to offer hazardous material for military air transportation must have the vertical red hatch border and certifying official's signature. Carbon signaturers are acceptable.
- Additional copies may be forwarded with the shipment. Vertical red hatch border is not required for any additional copies.

A17.2.3. Form Completion. Complete the Shipper's Declaration for Dangerous Goods form either manually (hand printed) or mechanically (typewriter, computer, etc.). The form may be completed by a combination of manual and mechanical means, as required, providing all entries are clear and legible. However, when possible, the shipping activity should complete the form entirely manually or entirely mechanically. Incorrect punctuation or entries that touch column separating lines on the form is not justification for frustrating hazardous cargo.

- The certifying official may make pen and ink changes to any key. Someone other than the certifying official may make pen and ink changes to Keys 1 (only to the telephone number and not to the address), 2, 3, 5, 8, 9, and 19 without

affecting the certification. Personnel making a change to any key must sign above the change. All entries must be durable, clear, and legible on all copies. Shipments may be frustrated if any entry on the form is not clear and legible. If the Shipper's Declaration for Dangerous Goods form is rejected, the correction must be accomplished as described in this paragraph or an entirely new form must be completed and presented to the shipping activity.

- Leave blank any key that does not require an entry (i.e., Key 15 when there is no subsidiary risk).
- If the Shipper's Declaration for Dangerous Goods does not contain sufficient space in any one key to accommodate all of the required information, use an additional Shipper's Declaration as an extension page. Each page must show the page number and total number of pages (Key 4). All pages must have the vertical red hatch border.
- For packages containing items with different proper shipping names, prepare individual Shipper's Declarations for Dangerous Goods for each different PSN in the overpack, consolidated, or stowed load. This is required for military airlift, regardless of the certification document used. See A17.3 for exceptions related to Chapter 3 operations.
- Only one Shipper's Declaration for Dangerous Goods is required when shipments involve a single item with multiple hazards. Certify to the primary or highest hazard. All additional hazards will be identified by PSN, hazard class, and net quantity in "Additional Handling Information" (Key 19). Additionally, the same form may be used for one or more items with the same PSN and identical hazards. If shipping a kit consisting of more than one container, enter in key 19 the statement: "contained in kit piece number ***" (replace "***" with the piece number which contains the hazardous material).

A17.2.4. Not Enough Copies or No Copies. In instances where there are not enough copies of the Shipper's Declaration for Dangerous Goods, a certified "true copy" may be placed with the station file manifest. When making a true copy:

- Annotate all the information verbatim from the original Shipper's Declaration for Dangerous Goods.
- Use the information in the signature block from the original form and annotate it on the true copy, (i.e., John Doe, 2 Oct 90). On the reverse side of the form, type or clearly print the words "True Copy" and the name of the individual who is certifying the form to be a true copy. This official must sign the form in longhand above the typed or printed name. The individual preparing a "true copy" need not be qualified according to A25.3 to certify the Shipper's Declaration for Dangerous Goods is a true copy.

A17.2.5. Split Shipments. When a shipment is split according to procedures identified in DoD 4500.32R, the following guidance applies:

- Someone other than the certifying official may change key 5 and key 16 entry for number of packages only. The individual making the change must sign above it.
- All other entries in key 16 (i.e., type of packaging and net quantity) will only be changed by the certifying official.
- Prepare a "true copy" according to A17.2.4. The original shipper's certification form will accompany the aircraft manifest with the first shipment. Attach a split shipment "true copy" to aircraft manifest and station manifest for subsequent shipments. Each Shipper's Declaration must reflect the correct TCN and number of packages.
- Enter statement, "Shipment split at XXX (use Air terminal three letter code) IAW DoD 4500.32R" on reverse side of all Shipper's Declaration forms.

A17.2.6. Multiple Mode Shipments. Shipments certified to the ICAO, IATA, or 49 CFR that do not exceed the passenger quantity limitations of the certifying document may use the same Shipper's Declaration for Dangerous Goods for both the commercial and military segments of air transport. Include any information required by A17.1. For shipments that exceed the passenger quantity limitations of the ICAO, IATA, or 49 CFR:

- Complete a Shipper's Declaration for Dangerous Goods according to the ICAO, IATA, or 49 CFR for the commercial segment and a separate Shipper's Declaration for Dangerous Goods according to this manual for the military segment.
- Place copies of the Shipper's Declaration for Dangerous Goods needed for subsequent movement in a waterproof envelope on the number one piece of the shipment.
- DoD aerial port personnel will remove the copies of the Shipper's Declaration for Dangerous Goods from the waterproof envelope and obliterate the "cargo aircraft only" label if not required for military transport.

A17.2.7. Classified Information. If the information to be entered on the Shipper's Declaration is classified, the following procedures apply:

- Complete the signed original in detail, including essential classified data, and attach to the manifest that is placed on the aircraft. Once the classified information is applied, the Shipper's Declaration for Dangerous Goods must carry the same classification as the highest classification of the entered information.
- The manifest on the aircraft must carry the same classification as the classified information until the classified Shipper's Declaration for Dangerous Goods is detached and handled according to applicable security regulations.

- Complete the station file copy in detail except for the classified information. Enter the following statement in "Additional Handling Information" (Key 19): "See aircraft commander's copy of Shipper's Declaration for Dangerous Goods for complete information."

★A17.3. **Exceptions for Chapter 3 Operations.** Except as specified below, prepare the Shipper's Declaration for Dangerous Goods according to this manual for tactical or contingency operations.

- **Key 1.** Show the address of the station where the cargo was certified and the telephone number of the certifier's assigned unit.
- **Key 2 and Key 9.** Show worldwide mobility.
- **Key 5.** Show the mobility transportation control number (TCN). Develop the TCN according to DoD 4500.32-R, *Military Standard Transportation and Movement Procedures*.
- **Key 7.** Although the label is not required on the cargo, Key 7 must have the "Passenger and Cargo Aircraft" block deleted if the material is cargo aircraft only.
- Complete and sign at least two copies of the Shipper's Declaration for Dangerous Goods Form. Attach one form to the copy of the manifest that is placed on the aircraft and one copy to the originating station file manifest.
- A single Shipper's Declaration for Dangerous Goods may be used to identify and certify more than one type of hazardous material. All hazardous material certified on a single form must be considered a single shipment and controlled by one mobility TCN (only if authorized by DoD 4500.32-R).
- Certification is not required for hand-carried hazardous materials authorized according to paragraph 3.4.2.

A17.4. Certification Requirements for Specific Items.

★A17.4.1. Class 1.

- For captured ammunition and ammunition with unknown characteristics shipped according to A5.5, include in key 17 the reference to A5.5 and the applicable packaging paragraph from table A4.1 (for example, "A5.5/A5.59"). Include a copy of the EOD safety certification. Comply with A17.2.7 for classified information.
- Identify any munition or ordnance item containing OTTO Fuel II as a propellant with the following entry in Key 19: "Contains Otto Fuel II as a liquid propellant. In the event of a leak, avoid direct skin contact, ingestion, or inhalation of vapors. Vapors are toxic and may cause severe headache and nausea."
- Identify fired exercise torpedoes or rockets, no longer containing explosive components, with OTTO Fuel II residue remaining as "Environmentally Hazardous Substance Liquid, N.O.S. (OTTO Fuel II)" and prepare according to A13.3.2.20.
- For air drop explosives in authorized packaging, cite appropriate packaging reference from Attachment 5. Explosives that are removed from authorized packaging and configured on airdrop parachute platforms, cite A5.4.1 as packaging reference. When explosives are removed from authorized packaging and secured or stored in racks or containers of tactical equipment or vehicles according to applicable technical directives cite A5.4.2.
- When packaging requirements are included as part of a classification of explosives approval, cite A5.6 in Key 17. A copy of the classification approval must accompany the shipment.
- Use the DoD Joint Hazard Classification System (JHCS) to complete certification information. This does not apply to explosives issued an interim hazard classification according to A3.3.1.2.

★A17.4.2. Class 2.

- **Cryogenic Liquids.** For cryogenic liquids prepared according to A6.11 provide venting instructions in Key 19. This is not required if venting procedures are provided in a separate instruction accompanying the shipment. Include the location and description of the vent valve. If the cylinder is empty and purged, venting is not required; comply with paragraph 1.10.4. For regulated cylinders, include one of the following statements for venting the unit:
 - "Vent container to outside of aircraft."
 - "Container is excepted from venting."
- **Fire Extinguishers.** Fire extinguishers removed from an authorized holder of a vehicle or equipment being airdropped do not require separate certification. Identify as a secondary hazard of the vehicle or equipment. Package the fire extinguisher in a strong outer container. This only applies to the fire extinguisher that is assigned as an installed component of the vehicle or equipment. Package and certify spare/stowed cylinders according to this manual.

★A17.4.3. Class 9.

A17.4.3.1. Engines Internal Combustion, Fuel Devices, Vehicles, and Other Equipment.

- For items prepared according to A13.5 or A13.6, identify the primary hazard Class 9 description in keys 11-14. In key 19 show:

- The PSN, hazard class, and net quantity of flammable fuel, and any other additional hazards. When an item is completely drained (but not purged) so that the quantity of fuel does not exceed 500 ml (17 ounces), the shipper's estimate of the quantity of fuel remaining in the unit may be entered.
- The name and quantity of any non-hazardous fuel in vehicles or equipment tanks.
- Include the statement "non-hazardous battery installed" if applicable.
- Reference to the technical directive used to prepare the item for military air shipment is not required.
- Identify jerricans secured in permanently configured and approved holders of vehicles or equipment as a secondary hazard in Key 19 of the Shipper's Declaration form (see Figure A17.1, Key 19). A separate certification is not required. Fuel quantity limits are restricted for the DOT 5L jerrican (see paragraph 3.7).
- Drained and purged repairable engines and fuel devices prepared according to A13.5.6 and A13.6.7 are not hazardous for transportation. Follow procedures specified in 1.10.4.
- Certification is not required for movement of wheelchairs with patients.
- Dual-powered vehicles (designed to operate on both flammable liquid and gas) must meet the requirements of A13.5 for each fuel tank. Describe as "Vehicle, Flammable Liquid Powered".
- Describe vehicles fueled with a combustible liquid (flashpoint greater than 60.5 degrees C) as "Vehicle, Flammable Liquid Powered".

A17.4.3.2. **Life-Saving Appliances.** For life-saving appliances, Class 9, prepared according to A13.11, show:

- A specific description and the number of the items packaged for shipment in Key 16. For example; "1 wooden box x 3 self-inflating life vests".
- The PSN, hazard class and net quantity of each hazardous component within the shipping container in Key 19.

★A17.4.3.3. **Dry Ice.** When dry ice is used as a refrigerant for another hazardous material, identify the dry ice as a secondary hazard by PSN, hazard class, and net quantity in Key 19 of the Shipper's Declaration form. Ensure packaging meets the requirements of A13.9.

★A17.4.4. **Competent Authority Approvals (CAA).** If the shipment is packaged and transported under the authority of a CAA, cite the CAA number in Key 17. Annotate the shipping papers, "PACKAGING AUTHORIZED BY COMPETENT AUTHORITY OF THE UNITED STATES OF AMERICA (USA)." If the CAA is from a country other than the USA, that country must be annotated in place of USA on the shipping papers. A copy of the CAA must accompany the shipment.

★A17.4.5. **Empty Packaging.** Packagings considered empty according to 1.10 do not require a Shipper's Declaration for Dangerous Goods form. Follow procedures specified in 1.10.4.

A17.4.6. **Excepted Quantities.** A Shipper's Declaration for Dangerous Goods is not required for excepted quantities prepared according to A19.2. Annotate the shipping papers "Dangerous Goods in Excepted Quantities." See A15.2 for labeling requirements.

A17.4.7. **Grandfathered Shipments.** Certify grandfathered munitions shipments according to the applicable paragraph in Attachment 27.

★A17.5. **Completing the Shipper's Declaration for Dangerous Goods.** Use figure A17.1 for detailed instructions on accomplishing the shipper's certification form for nonradioactive and radioactive shipments. Use figure A17.2 to determine if a Shipper's Declaration for Dangerous Goods is required for radioactive shipments.

- For forms with the "Nature and Quantity of Dangerous Goods" in columnar format, enter information in the appropriate column.
- For forms with the "Nature and Quantity of Dangerous Goods" open for continuous printing, use two oblique strokes, i.e. "//", to separate sequences of information or place each sequence on a separate line. Separate information within a sequence with a comma. See Figure A17.3 to identify separation of each sequence.

Figure A17.1. Step-by step Instructions for Completing Shipper's Declaration for Dangerous Goods form.

| |
|---|
| <p>Key 1. Shipper. Enter the address and telephone number where the hazardous material was certified.</p> <p>Key 2. Consignee. Enter the six-digit Department of Defense Activity Address Code (DODAAC) and/or the in-the-clear geographical location of the ultimate consignee (if known.) For shipments of infectious substances, enter also the name and telephone number of a responsible person for contact in an emergency.</p> |
|---|

Key 3. Air Waybill No. The aircraft manifest number to which the Shipper's Declaration for Dangerous Goods will be attached may be entered in this key. This number need not be entered by the shipper. It may be entered by the accepting operator at the time it is assigned. This key may also be left blank.

Key 4. Page...of...Pages. Enter the page number and total number of pages of the Shipper's Declaration for Dangerous Goods form. Enter "Page 1 of 1 Pages" or leave blank if there are no extension pages.

Key 5. Shipper's Reference Number. Enter the 17-character transportation control number (TCN).

Key 6. Optional Block. Unit cargo identification information may be entered. This key may also be left blank.

Key 7. Shipment Within Passenger Aircraft and Cargo Aircraft Limitations.

If the shipment is acceptable for movement on both passenger and cargo aircraft, delete "Cargo Aircraft Only."

If the shipment is allowed on cargo aircraft only, delete "Passengers and Cargo Aircraft."

Key 8. Airport of Departure. Enter the three-digit Port of Embarkation (POE) and/or the in-the-clear geographical location of the airport of departure.

Key 9. Airport of Destination. Enter the three-digit Port of Debarkation (POD) and/or the in-the-clear geographical location of the airport of destination.

Key 10. Shipment Type.

- Delete "Radioactive" if the shipment contains no radioactive material.
- Delete "Nonradioactive" if the shipment contains radioactive material.

Key 11. Proper Shipping Name. Enter the PSN as it appears in table A4.1. Enter the following information, if applicable, in association with the basic description:

- Technical name, in parentheses, when required by attachment 4.
- The letters "RQ" preceding the PSN for a hazardous substance (see A4.5).
- The word "TOXIC" for a liquid or solid Class 6.1 PG I or II material if the PSN or hazard class does not identify by name the material as toxic.
- For materials which are toxic (poisonous) by inhalation, enter the words "TOXIC-INHALATION HAZARD" and "ZONE A", "ZONE B", "ZONE C", or "ZONE D" for gases, or "ZONE A" or "ZONE B" for liquids, as appropriate. The word "TOXIC" need not be repeated if it is already identified in the PSN. Enter "INHALATION HAZARD" and the appropriate zone.
- The word "Waste" preceding the PSN for a hazardous material that is a hazardous waste.

Key 12. Class and Division. Enter the hazard class and division number given in column 3 of table A4.1.

- For Class 1 material, include the compatibility group letter.
- For Class 1 material, enter either the Inhabited Building Distance (IBD) or Subdivision if assigned in the DoD Joint Hazard Classification System (JHCS) or classification approval document (i.e., "IBD: (18)" or "Subdivision: 1.2.1").
- For a single item with more than one hazard, enter the hazard class number of the item's primary hazard.

Key 13. UN, NA, OR ID No. Enter the United Nations (UN), North American (NA), or identification number (ID) given in column 4 of table A4.1. Include the UN, NA, or ID prefix and the number.

Key 14. Packing Group. Enter the application Packing Group (PG) given in column 5 of table A4.1.

Key 15. Subsidiary Risk. Enter the subsidiary risk if given in column 6 of table A4.1.

Key 16. Quantity and Type of Packing.

- Nonradioactive shipments enter:
 - The number of packages (of same type and content) and their type of packaging.
 - Type of packaging listed in this key is the authorized packaging identified in the packaging paragraph. Identify the type of packaging by specification code or text description of the outer packaging. For example: fiberboard box or 4G; metal drum or 1A2; DOT 3A or cylinder.
 - For specifically named self-propelled vehicle and mechanical apparatus enter nomenclature or basic description of the item (i.e., truck, generator, etc.).
- The weight, volume, or other applicable measure of the actual hazardous material (per package).
 - Do not include any nonhazardous content of the shipment.
 - Enter the net quantity in metric measurement units. The equivalent English unit of measure may be entered in parenthesis immediately following the metric unit.
 - Show the quantity immediately following the number and type of package (i.e., 2 wooden boxes x 4.5 kg (10 pounds); 1 4G x 5 L (1.3 gallons)).
 - For explosives enter the "Net Explosive Weight (NEW)" in metric weight per package or per warehouse pallet or skid (i.e., 3 wooden boxes x 120 kg (264.6 pounds) NEW; 5 metal boxes x 200 kg (441 pounds) NEW). Entry of pounds in association with metric weight is preferred but not required.
 - Express in kilograms (pounds), not pounds per square inch, the quantity of compressed gas unless otherwise specified in this instruction. When certifying to A6.3 "Small Receptacles Containing Compressed Gases," A6.8 "Fire Extinguishers," A6.10 "Cigarette Lighter or Other Similar Devices Charged with Fuel," and A13.4 "Consumer Commodity" (Aerosols) other units of measure; (i.e., fluid ounces, gallons, or ounces) are specified and may be shown on this form. See also A26.4.
 - When an overpack is used for handling purposes, enter the words "Overpack Used". Identify the number of overpacks if more than one is used.
 - For magnetized material, enter the number and type of packaging. No entry for net quantity is required. Weight or size of container is optional.
- Radioactive shipments enter:
 - Name or symbol of the radionuclide in the material.
 - Description of the physical and chemical form of the material, if it is not in special form (generic chemical description is acceptable for chemical form). If special form, enter "Special Form."
 - The number of packages (of same type and content), the type of package, and the activity contained in each package in terms of Becquerel or Terabecquerel. The equivalent customary unit of measure (i.e., Ci, mCi, or uCi) may be included in parenthesis.

Key 17. Packaging Instructions.

- Nonradioactive shipments enter:
 - The packaging paragraph used to prepare the material for shipment.
 - If the packaging has been approved by a DOT-Exemption, CAA, COE, or waiver cite the approval number (i.e., AFMC 24-204-96-09; COE NA-84-505; DOT-E 3849; etc.)
 - If a UN packaging specification certified package is overpacked to meet air eligibility requirements, cite A3.2.3 and the applicable packaging paragraph for the material. Cite the applicable packaging paragraph for the material when packing inner containers into a 1A2 drum to meet air eligible and UN specification configuration requirements.
- Radioactive shipments enter (see figure A17.2, steps 5 and 6 for assistance):
 - Packaging paragraph used to prepare the material for shipment.
 - Category of the package (i.e., "white-I," "yellow-II," or "yellow-III").

- The transport index, preceded by the prefix "Ti", assigned each package having a "Radioactive Yellow-II" or "Radioactive Yellow-III" label and dimensions of each package (including dimensional units).
- The fissile class. If the package is exempt enter the words "Fissile Exempt."

Key 18. Authorization.

- Nonradioactive shipments enter:
 - When applicable, enter the words "Limited Quantity" or "LTD. QTY."
- Radioactive shipments enter Approval Identification Markings (if relevant). List the package identification markings of any of the documents listed below issued by a competent authority. Include the words "attached" to indicate that the documents are attached to the declaration form.
 - Special form approval certificate.
 - Type B package design approval certificate.
 - Type B(M) package shipment approval certificate.
 - Fissile material package design approval certificate.
 - Fissile material package shipment approval certificate.
 - Special arrangement approval certificate.
 - Any similar documents.

Key 19. Additional Handling Information. Enter:

- The PSN, hazard class, and net quantity of each secondary hazard for items with multiple hazards.
- Handling instructions, when specified by a packaging paragraph. Only enter if the handling instruction applies to the material being shipped.
- The name and quantity of non-hazardous fuel contained in tanks of vehicles or equipment. Include statement "non-hazardous battery installed" if applicable.
- The number, type of container, and quantity of fuel per container when transported in permanently configured and approved holders on vehicles or equipment (i.e., 4 jerricans X 11 liters).
- The 24-hour Emergency Response number for the hazardous material listed on the Shipper's Declaration for Dangerous Goods. Enter the words "EMERGENCY CONTACT:" followed by the number. See 2.8 for Emergency Response numbers used by DoD activities.
- The control and emergency temperatures for temperature controlled Class 5.2 materials.

Key 20. Name/Title of Signatory. Enter the name and title of the official signing the form.**Key 21. Place and Date.** Enter the place and date the material was certified (i.e., Hill AFB, 1 Jan 97).**Key 22. Signature.** The official who certifies that the shipment complies with the requirements of this instruction must sign the form in longhand.

Figure A17.2. Determining Certification Requirements for Class 7.

Step 1. Determine the radionuclide and type of package. Turn to A11.4. Find the radionuclide, its name, and the maximum radioactive quantity (Ci) that can be shipped in a type A package. If a type B container is required, go to Step 3.

Step 2. Determine if a Shipper's Declaration for Dangerous Goods is Required. Turn to table A11.7. Determine the maximum quantity that can be shipped as a limited quantity. This amount will be a fraction of the quantity listed in table A11.1. If the item is a limited quantity, a Shipper's Declaration for Dangerous Goods is not required, but you must comply with A11.11, A11.12, A11.13, or 11.14. Go to Step 3 if the material is not a limited quantity.

Step 3. Enter the Information Required in Key 16. Make a note of the transport index, but do not enter it in Key 16.

Step 4. Determine the Proper Shipping Name (PSN). Select the applicable PSN from table A4.1. Complete the appropriate keys using the information found in table A4.1, columns 2 through 4. Do not complete Key 17 at this point. Make a note of all the basic paragraphs listed in column 8.

Step 5. Select the Packaging Paragraph. Determine the correct packaging paragraph from the list you made in Step 4 based on the type of package used (type A or type B). Determine the paragraph based on the particular container used. Enter this information as the first entry in Key 17.

Step 6. Determine the Label Requirements. Use the transport index, the surface reading, and fissile class, if appropriate, to determine the labels required by Attachment 15. Enter the label required as the category of package entry in Key 17, immediately following the packaging paragraph. Enter the transport index and any remaining information required to complete Key 17.

Step 7. Complete the Remaining Keys of the Shipper's Declaration for Dangerous Goods. Step-by-step instructions for completing the Shipper's Declaration for Radioactive Material are identified in figure A17.1.

Figure A17.3. Completed Samples of the Shipper's Declaration for Dangerous Goods.

| SHIPPER'S DECLARATION FOR DANGEROUS GOODS | | | | | | | | | | | |
|--|--|---------------------|--|-----------------------------------|---|------------------------------|---------------------|--|-------------------------------|--|---|
| Shipper Key 1 | Air Waybill No. Key 3 Page of Pages Key 4 Shipper's Reference Number (optional) Key 5 | | | | | | | | | | |
| Consignee Key 2 | (Company logo, name and address optional) Key 6 | | | | | | | | | | |
| <i>Two completed and signed copies of this Declaration must be handed to the operator</i> | | | | | | | | | | | |
| <table border="1"> <tr> <th colspan="2">TRANSPORT DETAILS</th> </tr> <tr> <td>This shipment is within the limitations prescribed for (delete non-applicable) Key 7</td> <td>Airport of Departure Key 8</td> </tr> <tr> <td> <table border="1"> <tr> <td>PASSENGER AND CARGO AIRCRAFT</td> <td>CARGO AIRCRAFT ONLY</td> </tr> </table> </td> <td></td> </tr> <tr> <td>Airport of Destination: Key 9</td> <td>Shipment type: (delete non-applicable) NON-RADIOACTIVE RADIOACTIVE Key 10</td> </tr> </table> | TRANSPORT DETAILS | | This shipment is within the limitations prescribed for (delete non-applicable) Key 7 | Airport of Departure Key 8 | <table border="1"> <tr> <td>PASSENGER AND CARGO AIRCRAFT</td> <td>CARGO AIRCRAFT ONLY</td> </tr> </table> | PASSENGER AND CARGO AIRCRAFT | CARGO AIRCRAFT ONLY | | Airport of Destination: Key 9 | Shipment type: (delete non-applicable) NON-RADIOACTIVE RADIOACTIVE Key 10 | <p>WARNING</p> <p>Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.</p> |
| TRANSPORT DETAILS | | | | | | | | | | | |
| This shipment is within the limitations prescribed for (delete non-applicable) Key 7 | Airport of Departure Key 8 | | | | | | | | | | |
| <table border="1"> <tr> <td>PASSENGER AND CARGO AIRCRAFT</td> <td>CARGO AIRCRAFT ONLY</td> </tr> </table> | PASSENGER AND CARGO AIRCRAFT | CARGO AIRCRAFT ONLY | | | | | | | | | |
| PASSENGER AND CARGO AIRCRAFT | CARGO AIRCRAFT ONLY | | | | | | | | | | |
| Airport of Destination: Key 9 | Shipment type: (delete non-applicable) NON-RADIOACTIVE RADIOACTIVE Key 10 | | | | | | | | | | |
| <p>NATURE AND QUANTITY OF DANGEROUS GOODS</p> <p><i>Proper Shipping Name, Class or Division, UN Number or Identification Number, Packing Group (if required), number of packages, and all other required information.</i></p> <p>Keys 11, 12, 13, 14, 15 // 16 // 17 // 18</p> | | | | | | | | | | | |
| <p>Additional Handling Information</p> <p>Key 19</p> | | | | | | | | | | | |
| <p>I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.</p> | <p>Name/Title of Signatory Key 20</p> <p>Place and Date Key 21</p> <p>Signature (see warning above) Key 22</p> | | | | | | | | | | |

Figure A17.3. Continued

| Shipper <div style="text-align: center; font-weight: bold; font-size: 1.2em;">Key 1</div> | Air Waybill No Key 3 Page of Pages Key 4 Shipper's Reference Number Key 5 <small>(optional)</small> | | | | | | | | | | | | | | | | |
|---|--|----------------------|---|-------------------|------------------------------|-------------------|------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Consignee <div style="text-align: center; font-weight: bold; font-size: 1.2em;">Key 2</div> | (Company logo, name and address optional) <div style="text-align: center; font-weight: bold; font-size: 1.2em;">Key 6</div> | | | | | | | | | | | | | | | | |
| Two completed and signed copies of this Declaration must be handed to the operator | | | | | | | | | | | | | | | | | |
| TRANSPORT DETAILS This shipment is within the limitations prescribed for <small>(delete non-applicable)</small> Key 7 <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">PASSENGER AND CARGO AIRCRAFT</td> <td style="width: 50%; text-align: center;">CARGO AIRCRAFT ONLY</td> </tr> </table> | PASSENGER AND CARGO AIRCRAFT | CARGO AIRCRAFT ONLY | Airport of Departure <div style="text-align: center; font-weight: bold; font-size: 1.2em;">Key 8</div> | | | | | | | | | | | | | | |
| PASSENGER AND CARGO AIRCRAFT | CARGO AIRCRAFT ONLY | | | | | | | | | | | | | | | | |
| Airport of Destination Key 9 | WARNING Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent. Shipment type <small>(delete non-applicable)</small> <input type="checkbox"/> NON-RADIOACTIVE <input type="checkbox"/> RADIOACTIVE Key 10 | | | | | | | | | | | | | | | | |
| NATURE AND QUANTITY OF DANGEROUS GOODS | | | | | | | | | | | | | | | | | |
| Dangerous Goods Identification | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Proper Shipping Name</th> <th style="width: 5%;">Class or Division</th> <th style="width: 5%;">UN or ID No.</th> <th style="width: 5%;">Pack- ing Group</th> <th style="width: 5%;">Subsi- diary Risk</th> <th style="width: 15%;">Quantity and type of packing</th> <th style="width: 5%;">Packing Inst.</th> <th style="width: 10%;">Authorization</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: middle;">Key 11</td> <td style="text-align: center; vertical-align: middle;">Key 12</td> <td style="text-align: center; vertical-align: middle;">Key 13</td> <td style="text-align: center; vertical-align: middle;">Key 14</td> <td style="text-align: center; vertical-align: middle;">Key 15</td> <td style="text-align: center; vertical-align: middle;">Key 16</td> <td style="text-align: center; vertical-align: middle;">Key 17</td> <td style="text-align: center; vertical-align: middle;">Key 18</td> </tr> </tbody> </table> | | Proper Shipping Name | Class or Division | UN or ID No. | Pack- ing Group | Subsi- diary Risk | Quantity and type of packing | Packing Inst. | Authorization | Key 11 | Key 12 | Key 13 | Key 14 | Key 15 | Key 16 | Key 17 | Key 18 |
| Proper Shipping Name | Class or Division | UN or ID No. | Pack- ing Group | Subsi- diary Risk | Quantity and type of packing | Packing Inst. | Authorization | | | | | | | | | | |
| Key 11 | Key 12 | Key 13 | Key 14 | Key 15 | Key 16 | Key 17 | Key 18 | | | | | | | | | | |
| Additional Handling Information <div style="text-align: center; font-weight: bold; font-size: 1.2em;">Key 19</div> | | | | | | | | | | | | | | | | | |
| I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. | Name/Title of Signatory Key 20 Place and Date Key 21 Signature <small>(see warning above)</small> Key 22 | | | | | | | | | | | | | | | | |

Figure A17.3. Continued.

SHIPPER'S DECLARATION FOR DANGEROUS GOODS

| | | |
|---|----------------------------------|--|
| Shipper Traffic Management Office 5200 Patterson Avenue Kelly AFB TX 78241 (210)925-9999 | | Air Waybill No. Page 1 of 1 Pages Shipper's Reference Number 2059511302XXX <i>(optional)</i> |
| Consignee 645 ABW Wright-Patterson AFB OH 45433 | | (Company logo, name and address optional) |
| Two completed and signed copies of this Declaration must be handed to the operator | | WARNING Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent. |
| TRANSPORT DETAILS This shipment is within the limitations prescribed for: <i>(delete non-applicable)</i> | | |
| PASSENGER AND CARGO AIRCRAFT | AIRCRAFT AIRCRAFT AIRCRAFT | Airport of Departure Kelly AFB, TX |
| Airport of Destination: Wright-Patterson AFB, OH | | Shipment type: <i>(delete non-applicable)</i> NON-RADIOACTIVE RADIOACTIVE |
| NATURE AND QUANTITY OF DANGEROUS GOODS Proper Shipping Name, Class or Division, UN Number or Identification Number, Packing Group (if required), number of packages, and all other required information. | | |
| PAINT, 3, UN1263, III// ONE FIBERBOARD BOX X 7.5L// A19.3// LTD QTY | | |
| Additional Handling Information FP: 38 DEG C | | |
| 24 hr. Emergency Contact Tel. No. (800) 851-8061 | | |
| I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. | | Name/Title of Signatory MSgt M. Ferguson, Supervisor Place and Date Kelly AFB, TX; 1 Oct 99 Signature <i>(see warning above)</i> |

Figure A17.3.Continued.

SHIPPER'S DECLARATION FOR DANGEROUS GOODS

| | | | |
|---|-------------------------------------|--|-------------------------------------|
| Shipper Traffic Management Office 1000 Chidlaw Road Elmendorf AFB, AK 99506 (907) 552-0000 | | Air Waybill No. Page 1 of 1 Pages Shipper's Reference Number FB500011703122XXX <i>(optional)</i> | |
| Consignee TMO Hill AFB, UT 84056 | | (Company logo, name and address optional) | |
| Two completed and signed copies of this Declaration must be handed to the operator | | WARNING Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent. | |
| TRANSPORT DETAILS | | | |
| This shipment is within the limitations prescribed for: <i>(delete non-applicable)</i> | | Airport of Departure EDF Elmendorf AFB, AK | |
| PASSENGER AND CARGO AIRCRAFT | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Airport of Destination: Hill AFB, UT | | Shipment type: <i>(delete non-applicable)</i> NON-RADIOACTIVE <input checked="" type="checkbox"/> RADIOACTIVE <input checked="" type="checkbox"/> | |
| NATURE AND QUANTITY OF DANGEROUS GOODS <i>Proper Shipping Name, Class or Division, UN Number or Identification Number, Packing Group (if required), number of packages, and all other required information.</i> | | | |
| MERCURY CONTAINED IN MANUFACTURED ARTICLES, 8, UN2809, I// ONE FIBERBOARD BOX X 15 GRAMS// A12.10.2.4.1 | | | |
| Additional Handling Information Mercury, metallic is a silver, white, odorless, liquid metal. Mercury is poisonous in liquid and vapor form and can be absorbed through the skin at room temperature. It is corrosive to aluminum and its alloys. It expands on freezing and may crack glass containers. 24 hr. Emergency Contact Tel. No. (800) 851-8061 | | | |
| I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. | | Name/Title of Signatory D. Meade, Foreman Place and Date Elmendorf AFB AK, 6 Jul 99 Signature <i>(see warning above)</i> | |

Attachment 18

COMPATABILITY

A18.1. General Requirements. Do not load packages containing hazardous materials that might react dangerously with one another or transport in a position that would allow interaction between the material in the event of leakage. Segregation requirements for hazardous material on military aircraft are identified in tables A18.1 and A18.2.

- Table A18.1 details segregation requirements for all hazardous materials.
- Table A18.2 specifies compatibility requirements for Class 1.
- A18.4 specifies compatibility requirements for tactical and contingency operations under the authority of chapter 3.

★A18.2. Segregation Requirements for All Hazardous Materials. Table A18.1 indicates the explosives and other hazardous materials that must not be loaded, transported, or stored together.

- Only the primary hazard class or division are considered for compatibility, subsidiary-risk and secondary hazards are not considered.
- The absence of any hazard class or a blank space in the table indicates that no restrictions apply.
- The letter "X" at an intersection of horizontal and vertical columns indicates that these articles must not be loaded or stored together. For example, in table A18.1, Class 3 flammable liquids, must not be loaded, transported, or stored with Class 1.1.
- The letter "O" at an intersection of horizontal and vertical columns indicates that these articles must not be loaded, transported, or stored together unless separated by a distance of 2.2 m (88 inches) in all directions. For example, in table A18.1, Class 8 corrosive liquids, must not be loaded, transported, or stored with Class 4.1 flammable solids unless separated by 2.2 m (88 inches) in all directions.
- The "*" at an intersection of horizontal and vertical columns indicates that segregation among different Class 1 materials is identified in table A18.2.
- Be sure to check notes for compatibility.

A18.3. Segregation Requirements for Class 1 Materials. Table A18.2 identifies Class 1 materials that must not be loaded, transported, or stored together.

- A blank space in the table indicates that no restrictions apply.
- The letter "X" at an intersection of horizontal and vertical columns shows that these articles must not be loaded or stored together. For example, do not load or store Class 1.2C with Class 1.2H.
- Unless otherwise authorized, do not pack explosives in the same outside container with other articles. Explosives of the same compatibility group or authorized combination of compatibility groups but a different class number may be packed together, provided that the whole package is treated as though its entire contents were comprised of the lower class number (higher hazard). For example, treat a mixed package of Class 1.2D explosives and Class 1.4D explosives as Class 1.2D explosives. However, when Class 1.5D is packed together with Class 1.2D, treat the whole package as Class 1.1D (for compatibility).
- Incompatible explosives may be packed together when approved according to TB 700-2/NAVORDINST 8020.8B/TO 11A-1-47/DLAR 8220.1, *DoD Explosive Hazard Classification Procedures* or 2.3.2.
- Be sure to check notes for compatibility.

A18.4. Compatibility for Chapter 3. This paragraph prescribes compatibility exceptions for tactical or contingency operations according to 3.6.1. The requirements of tables A18.1 and A18.2 may be deviated from when transporting cargo under the authority of Chapter 3, consistent with operational requirements. Normally incompatible hazardous materials may be transported on the same aircraft when separated to the maximum extent possible. Compatibility waivers are not required. The following restrictions are mandatory:

- Explosives in compatibility groups A, J, K, and L can only be shipped with material in compatibility group S and Class 9.
- Fissile class III radioactive materials (Class 7) cannot be loaded, transported, or stored on the same aircraft with any other hazardous material.
- Class 1.1, 1.2, and 1.3 cannot be shipped with any Inhalation hazard zone A material .
- Class 1.1, 1.2, and 1.3 cannot be shipped with Class 6.1 poisonous liquids, PG I.
- Cyanides or cyanide mixtures (Class 6.1) cannot be loaded, transported, or stored with any corrosive Class 8 material.
-

★Table A18.1. Segregation Table for Hazardous Materials.

| Class or Division Note 7 | Notes | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 2.1 | 2.2 | 2.3 Gas Zone A | 2.3 Gas Other than Zone A | 3 | 4.1 | 4.2 | 4.3 | 5.1 | 5.2 | 6.1 Liquid PG I Zone A | 7 | 8 Liquid Only |
|--------------------------|-----------------------|--------|-----|-----|-----|-----|-----|-----|-----|----------------|---------------------------|---|-----|-----|-----|-----|-----|------------------------|--------|-----------------|
| Notes | | 1 6 | | | | | | 9 | | | | | | | | 1 | | 4 | 2 3 | 4, 5 6, 7, 8 |
| 1.1 and 1.2 | 1 6 | * | * | * | * | * | * | X | | X | X | X | X | X | X | X | X | X | X | X |
| 1.3 | | * | * | * | * | * | * | X | | X | X | X | X | X | X | X | X | X | X | X |
| 1.4 | | * | * | * | * | * | * | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.5 | | * | * | * | * | * | * | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.6 | | * | * | * | * | * | * | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.1 | 9 | X | X | 0 | 0 | 0 | 0 | | | X | 0 | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.2 | | | | | | | | | | | | | | | | | | | | |
| 2.3 Zone A | | X | X | 0 | 0 | 0 | 0 | X | | | | X | X | X | X | X | X | | | X |
| 2.3 Other than Zone A | | X | X | 0 | 0 | 0 | 0 | 0 | | | | 0 | 0 | 0 | 0 | 0 | 0 | | | 0 |
| 3 | | X | X | 0 | 0 | 0 | 0 | | | X | 0 | | 0 | 0 | 0 | 0 | 0 | X | | |
| 4.1 | | X | X | | | | | | | X | 0 | 0 | | | | | | X | | 0 |
| 4.2 | | X | X | 0 | 0 | 0 | 0 | | | X | 0 | 0 | | | | | | X | | X |
| 4.3 | | X | X | | | | | 0 | | X | 0 | 0 | | | | | | X | | X |
| 5.1 | 1 | X | X | | | | | 0 | | X | 0 | 0 | | | | | | X | | 0 |
| 5.2 | | X | X | | | | | 0 | | X | 0 | 0 | | | | | | X | | 0 |
| 6.1 Liquid PG I Zone A | 4 | X | X | 0 | 0 | 0 | 0 | | | | | X | X | X | X | X | X | | | X |
| 7 | 2 3 | X | X | | | | | 0 | | | | | | | | | | | | |
| 8 Liquid Only | 4 5 6 7 8 | X | X | 0 | 0 | 0 | 0 | | | X | 0 | | 0 | X | X | 0 | 0 | X | | |

NOTES:

1. Ammonium nitrate fertilizer may be loaded, transported, or stored with Class 1.1 materials.
2. Do not load, transport, or store fissile class III radioactive material (Class 7) on the same aircraft with any other hazardous material.
3. Normal uranium, depleted uranium, and thorium metal in solid form radioactive materials (Class 7) may be loaded and transported with Class 1.1, 1.2, and 1.5 (explosives).
4. Do not load, transport, or store cyanides or cyanide mixtures (Class 6.1) with any Class 8 materials.
5. Separate nitric acid (Class 8) in carboys by 2.2 m (88 inches) in all directions from other corrosives materials in carboys when loaded on the same aircraft.
6. Do not load, transport, or store charged electric storage batteries (Class 8) on the same aircraft with any Class 1.1 or 1.2.
7. Ship the following materials with each other and with all other hazardous materials without compatibility restrictions (ensure compliance with notes 4, 5, and 6):
 - Class 6.1 toxic solids and liquids (other than PG I, zone A)
 - Class 8 solids
 - Class 9 (including ORM-D)
 - Excepted Quantities
 - Containers or articles drained but not purged containing 500 ml (17 oz) or less of Class 3
8. Class 8 corrosive liquids must not be loaded above Class 4 (flammable solid) material or Class 5 (oxidizing) material.
9. Class 2.1 aerosol cans may be shipped with other incompatible items when separated in all directions by a minimum of 88 inches.

Table A18.2. Compatibility Table for Class 1 (Explosive) Materials.

| Compatibility Group | A | B | C | D | E | F | G | H | J | K | L | N | S |
|---------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NOTES | | | | | | | | | | | | | |
| A | | X | X | X | X | X | X | X | X | X | X | X | X |
| B 1, 2, | X | | X | X | X | X | X | X | X | X | X | X | |
| C | X | X | | | | X | X | X | X | X | X | | |
| D | X | X | | | | X | X | X | X | X | X | | |
| E | X | X | | | | X | X | X | X | X | X | | |
| F 3 | X | X | X | X | X | | X | X | X | X | X | X | |
| G 4, 5, 7 | X | X | X | X | X | X | | X | X | X | X | X | |
| H | X | X | X | X | X | X | X | | X | X | X | X | |
| J | X | X | X | X | X | X | X | X | | X | X | X | |
| K | X | X | X | X | X | X | X | X | X | | X | X | |
| L 6 | X | X | X | X | X | X | X | X | X | X | | X | X |
| N | X | X | | | | X | X | X | X | X | X | | |
| S 7 | X | | | | | | | | | | X | | |

NOTES:

1. Group "B" explosives UN 0255, 0257, UN0267, and UN0361 may be loaded and transported with groups "C," "D," and "E" explosives.
2. Group "B" explosives packaged in an EOD MK 663, MOD O container may be loaded and transported with groups "C" through "H" and group "S" explosives.
3. Group "F" explosives UN 0292 may be loaded and transported with groups "C," "D," and "E" explosives.
4. Group "G" explosives UN 0019, UN 0300, UN 0301, and UN 0325 may be loaded and transported with all other explosives compatible with group "S" explosives.
5. Group "G" explosives UN 0009, UN 0018, UN 0314, UN 0315, UN 0317, UN 0319, and UN 0320 may be transported with groups "C," "D," and "E" explosives.
6. Group "L" explosives must only be loaded and transported with an identical item.
7. Class 1.1 and 1.2 explosives may not be packed with the following explosives: UN 0333, UN 0334, UN 0335, UN 0336, and UN 0337.

A18.5. Classification Codes and Compatibility Groups of Explosives. The classification code for an explosive consists of the class number followed by the compatibility group letter. Compatibility group letters are used to specify the controls required for transportation and storage and to prevent the additional hazard that might occur if certain types of explosives are transported or stored together. All explosives entering the Defense Transportation System must be assigned a final or interim hazard classification according to A3.3.1.2. Compatibility groups and classification codes for the various types of explosive substances and articles are identified in tables A18.3.

Table A18.3. Classification Codes.

| Description of Substances or Article to be Classified | Compatibility Group | Classification Code |
|--|---------------------|------------------------------|
| Primary explosive substance | A | 1.1A |
| Article containing a primary explosive substance and not containing two or more effective protective features | B | 1.1B 1.2B 1.4B |
| Propellant explosive substance or other deflagrating explosive substance or article containing such explosive substance | C | 1.1C 1.2C 1.3C 1.4C |
| Secondary detonating explosive substances or black powder or article containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or article containing a primary explosive substance and containing two or more effective protective features | D | 1.1D 1.2D 1.4D 1.5D |
| Article containing a secondary detonating explosive substance, without means of initiation, with a propelling charge (other than one containing flammable liquid or hypergolic liquid) | E | 1.1E 1.2E 1.4E |
| Article containing a secondary detonating explosive substance with its means of initiation, with a propelling charge (other than one containing flammable liquid or hypergolic liquid) or without propelling charge. | F | 1.1F 1.2F 1.3F 1.4F |
| Pyrotechnic substance or article containing a pyrotechnic substance, or article containing both an explosive substance and illuminating, incendiary, tear-producing or smoke producing substance (other than a water-activated article or one containing white phosphorus, phosphide or flammable liquid or gel or hypergolic liquid). | G | 1.1G 1.2G 1.3G 1.4G |
| Article containing both an explosive and white phosphorus | H | 1.2H 1.3H |
| Article containing both an explosive substance and flammable liquid or gel | J | 1.1J 1.2J 1.3J |
| Article containing both an explosive substance and a toxic chemical agent | K | 1.2K 1.3K |
| Explosive substance or article containing an explosive substance and presenting a special risk (e.g., due to water-activation or presence of hypergolic liquids phosphides or pyrophoric substances) needing isolation of each type. | L | 1.1L 1.2L 1.3L |

| Description of Substances or Article to be Classified | Compatibility Group | Classification Code |
|---|----------------------------|----------------------------|
| Articles containing only extremely insensitive detonating substances | N | 1.6N |
| Substance or article so packed or designed that any hazardous effects arising from accidental functioning are limited to the extent that they do not significantly hinder or prohibit fire fighting or other emergency response efforts in the immediate vicinity of the package. | S | 1.4S |

Attachment 19**EXCEPTED AND LIMITED QUANTITIES**

★**A19.1. Quantities.** Excepted and limited quantities are authorized on military aircraft according to 2.7. These small quantities of hazardous materials are exempted from certain requirements of this manual as identified in this attachment. The provisions in this attachment do not apply to radioactive materials. See Attachment 11 for requirements applicable to radioactive material in accepted packaging or limited quantity of material.

A19.2. Excepted Quantities. Small quantities of hazardous materials are exempt from the specification packaging, marking, labeling, certification and compatibility requirements of this manual if the provisions of this paragraph are met.

A19.2.1. Do not ship the following material as an excepted quantity:

- Class 1 material.
- Class 2, division 2.1 and 2.3; or division 2.2 material having a subsidiary risk.
- Material having a primary or subsidiary risk of Class 4 in PG I.
- Class 4.1 self-reactive material.
- Material having a primary or subsidiary risk of Class 5 in PG I.
- Material having a primary or subsidiary risk of Class 6.1, in PG I, by reason of inhalation toxicity.
- Class 6.2 material.
- Class 7 material.
- Material having a primary or secondary risk of Class 8 in PG I, UN2803 and UN2809.
- Magnetized material (Class 9).
- Hazardous material contained within a device that is a component part of an otherwise nonhazardous item (except for temperature sensing devices) such as mercury switches in electrical equipment. Prepare the hazardous material according to the requirements for the hazard. If the material is not regulated as a hazardous material, ship the item as general cargo.
- Material identified as "Cargo Aircraft Only" in table A4.1.

A19.2.2. **Maximum Net Quantity for Excepted Quantities.** The maximum net quantity of hazardous material that is allowed in each inner packaging and the total net quantity allowed in each outer packaging are given in table A19.1. Refer to A19.2.1 to determine if the material qualifies for the excepted quantities provision and that table A19.1 is applicable. If the quantity limitations of table A19.1 are exceeded, the excepted quantity provision must not be used and the material must be prepared according to the requirements for the individual material.

★Table A19.1. Quantity Limits for Inner and Outer Packaging.

| Class of Primary or Subsidiary Risk | Packing Group | Quantity Limits | |
|-------------------------------------|-----------------------------|--|---|
| | | Inner Packagings | Outer Packagings |
| 2.2 | See (note 1) and (note 2) | See (note 1) and (note 2) | See (note 1) and (note 2) |
| 3 | Packing Group I, II and III | 30 mL | PG I – 300 mL PG II – 500 mL PG III – 1 L |
| 4 | Packing Group II and III | 30 mL or 30 g | PG II – 500 g or 500 mL PG III – 1 kg or 1 L |
| 5 (note 3) | Packing Group II and III | 30 mL or 30 g | 30 mL or 30 g |
| 6 | Packing Group I, II and III | PG I – 1g or 1 mL PG II – 1g or 1 mL PG III – 30g or 30 mL | PG I – 300g or 300 mL PG II – 500g or 500 mL PG III – 1 kg or 1 L |
| 8 | Packing Group II and III | 30 mL or 30 g | PG II – 500 g or 500 mL PG III – 1 kg or 1 L |
| 9 (note 4) | Not Applicable | 30 mL or 30 g | PG II – 500 g or 500 mL PG III – 1 kg or 1 L |

NOTES:

1. Packing groups are not used for this hazard class.
2. For inner packaging, the quantity contained in each receptacle must not exceed a water capacity of 30 ml. For outer packaging, the sum of the water capacities of all the inner packaging must not exceed 1 L.
3. For Class 5.2, PG II, the maximum total net quantity allowed in the outer packaging is 500 g or 250 ml.
4. For Class 9 material, if no PG is given in table A4.1, PG II quantities must be used.

A19.2.3. **Inner Packaging.** Each inner packaging must be plastic (with a minimum thickness of 0.2 mm), glass, earthenware, or metal. The inner packaging must not react with, or be decomposed by, the material contained therein.

A19.2.4. **Closures.** Closures must be held securely, tightly, and effectively in place with tape, self-shrink plastic, wire, or other positive means.

A19.2.5. **Liquids.** Liquids must not completely fill inner packaging at a temperature of 55 C (130 F).

A19.2.6. **Intermediate Packaging.** Securely pack each inner packaging in an intermediate packaging with cushioning material. The intermediate packaging must completely contain the contents in case of breakage or leakage, regardless of packaging orientation. For liquid hazardous material, the intermediate packaging must contain sufficient absorbent cushioning material to absorb the entire contents of the inner packaging.

A19.2.7. **Outer Packaging.** Securely pack the intermediate packaging in a strong, rigid, outer packaging (i.e., fiberboard, wood).

A19.2.8. **Overpacks.** Overpacks may be used and may contain packages of nonhazardous material. All material in the same outer packaging and overpack must be compatible.

A19.2.9. **Dimensions of Outer Package.** Two of three outside dimensions of the outer package must measure at least 100 mm (4 inches). If the outer package is in the shape of a cylinder, it must have a minimum height and diameter of 100 mm (4 inches) each.

A19.2.10. **Other Hazardous Materials and Materials in Excepted Quantities.** A package containing hazardous material in excepted quantities must not contain other hazardous material that are regulated by this manual (requires a Shipper's Declaration for Dangerous Goods).

A19.2.11. **Different Materials in One Outer Packaging.** When different hazardous materials are contained in one outer packaging, use the formula listed below to determine the quantities that can be included in one outer

packaging. The quantities of different hazardous materials contained in each outer packaging must be such that "Q" is less than or equal to 1.0, "Q" is calculated using the formula:

$$n_1/M_1 + n_2/M_2 + n_3/M_3 \dots = Q$$

(n₁, n₂, etc. is the actual net quantity of each different hazardous material. M₁, M₂, etc. is the maximum net quantity permitted for the material and packing group in the outer packaging according to table A19.1.)

For example:

- There are 15 inner packages at 20 ml each of Class 3, PG II, and 5 inner packages at 30 ml each of Class 8, PG II in one outer packaging: 300 ml/500 ml + 150 ml/500 ml = 0.6 + 0.3 = 0.9. The result is less than 1.0, so the material can be shipped in one outer packaging.
- There are 5 inner packages at 30 ml each of Class 3, PG II, and 15 inner packages at 30 g each of Class 8, PG II in one outer packaging: 150 ml/500 ml + 450 g/500 g = 0.3 + 0.9 = 1.2. The result is greater than 1.0, so the item can not be shipped in one outer packaging.

A19.2.12. Package Performance Tests. The complete package (inner plus outer packaging), must be capable of withstanding the test specified in A19.2.12.1 without breakage or leakage of the inner packaging and without significant reduction in effectiveness. Tests must be carried out on the packaging prepared as for transport. Inner receptacles must contain at least 95 percent of their capacity for solids and 98 percent of their capacity for liquids. The material to be transported in the packaging may be replaced by another material, except where this would invalidate the results of the tests. When another material is substituted for a solid, the material must have the same physical characteristics (i.e., mass, grain size) as the material to be shipped. When another material is substituted in the drop test for liquids, its relative density (specific gravity) and viscosity shall be similar to the material to be shipped.

A19.2.12.1. For packaging with six sides (i.e., fiberboard box), the following free drops onto a solid, unyielding, flat, and horizontal surface from 1.8 m (6 ft) is required. Each test may be performed on different but identical containers.

- One drop flat on the bottom.
- One drop flat on the top.
- One drop flat on the long side.
- One drop flat on the short side.
- One drop on a corner at the junction of three intersecting edges.

A19.2.12.2. For cylindrical packaging, the following free drops onto a solid, unyielding flat and horizontal surface from 1.8 m (6 ft) is required:

- One drop diagonally on chime or circumferential seam edge.
- One drop on the weakest part (i.e., a closure) not tested by the first drop.

A19.2.12.3. A force applied to the top surface for a duration of 24 hours, equivalent to the weight of identical packages if stacked to a height of 3 m (10 ft), including the test sample.

★A19.3. Dangerous Goods in Limited Quantities. Limited quantities may be certified to this paragraph or to the most current ICAO Technical Instructions or IATA Dangerous Goods Regulation. Comply with all requirements of the document used including the inner packaging and outer packaging quantity limits. Pack limited quantities in good quality combination packagings using only the inner and outer packaging combinations authorized. The packagings must also meet the general packaging requirements of attachment 3. Single packagings, including composite packagings, are not permitted. The gross weight of a "limited quantity" package must not exceed 30 Kg (66 pounds). Quantity limits must not exceed the amounts authorized by table A19.2. If all the requirements of this paragraph and the quantity limits of table A19.2 are met, the combination packaging need not meet (or be marked) with the UN packaging specification requirements.

A19.3.1. Dangerous Goods not Permitted in Limited Quantities:

- Materials forbidden in table A4.1.
- Materials identified as "Cargo Aircraft Only" in table A4.1.
- All materials in PG I.
- Class 1 and 7 materials.
- Class 2.3 and 6.2.
- Class 2.1 materials (other than aerosols).
- Refrigerated liquefied gases.

- Class 4.1 self-reactive substances.
- Class 4.2 or any material with a subsidiary risk of 4.2.
- Materials with UN numbers of 2794, 2795, 2803, 2809 or 3028.
- Class 9 materials except those specifically authorized in A19.3.2.

A19.3.2. Dangerous Goods Permitted in Limited Quantities:

- Aerosols of Class 2.1 and 2.2.
- Gases of Class 2.2 without a subsidiary risk (excluding refrigerated liquefied gases).
- Class 3 (excluding PG I).
Class 4.1 (excluding PG I and Class 4.1 self-reactive substances).
- Class 4.3 solids only (excluding PG I).
- Class 5.1 (excluding PG I).
- Class 5.2 only when contained in a "Polyester Resin Kit (UN 3269)," Chemical Kit (NA 1760)" or "First Aid Kit (" (excluding PG I).
- Class 6.1 (excluding PG I).
- Class 8 (excluding PG I, UN2794, UN2795, UN2803, UN2809 and UN3028).
- Only the following items of Class 9: Ammonium Nitrate Fertilizers (UN2071), Benzaldehyde (UN1990), Environmentally Hazardous Substance Solid N.O.S. (UN3077), Environmentally Hazardous Substance Liquid N.O.S. (UN3082), Chemical Kit or First Aid Kit (UN3316) and Dibromodifluoromethane (UN1941).

A19.3.3. Different Dangerous Goods in Limited Quantities in one Package. When different dangerous goods in limited quantities are packed together in one outer packaging, the quantities must be as follows:

A19.3.3.1. Class 3 and 8, and Class 4.1, 4.3 (solid), 5.1, 5.2, and 6.1 must not exceed the lowest net quantity per package (of the most restrictive single material in the package) as listed in table A19.2. For calculation purposes, when a package contains both liquid and solids, convert the quantities for the liquids into kilograms in order to determine that the permitted maximum net quantity per package has not been exceeded. The "Q" value formula is not applicable for limited quantities.

A19.3.3.2. Class 2 and 9, when packed without any other dangerous goods, the gross weight of the package must not exceed 30 Kg (66 pounds).

A19.3.3.3. Class 2 and 9, when packed with other dangerous goods, must meet the requirements of A19.3.3.2. In addition, the maximum net quantity of all the other dangerous goods (other than class 2 and 9) must not exceed the requirements of A19.3.3.1.

A19.3.4. Package Performance Tests. Limited quantity packages must meet the following test requirements:

- The package, as prepared for transport, must be capable of withstanding a 1.2 m (4 ft) drop test onto a rigid, nonresilient, flat, horizontal surface, in a position most likely to cause the most damage. After the test, the package must not show any damage that is likely to affect safety during transport and there must be no leakage from the inner packagings.
- Each package offered for transport must be capable of withstanding a force applied to the top surface of the package (for a duration of 24 hours) equivalent to the total weight of identical packages if stacked to a height of 3 m (9.8 ft). The stack height includes the test sample. There cannot be any significant reduction in the package's effectiveness and there cannot be any breakage or leakage of any inner packaging.

Table A19.2. Maximum Quantities - Classes 2 – 9.

| Class or Division | Packing Group | Physical State | Inner Packaging | Per Package |
|-------------------|---------------|----------------|-----------------|-------------|
| 2 | -- | Gas (note 1) | 120 mL (note 2) | 30 kg G |
| 3 | II | Liquid | 500 mL | 1 L |
| | III | Liquid | 5 L | 10 L |
| 4.1 | II | Solid | 500 g | 5 kg |
| | III | Solid | 1 kg | 10 kg |
| 4.3 | II | Solid | 500 g | 5 kg |
| | III | Solid | 1 kg | 10 kg |
| 5.1 | II | Liquid | 100 mL | 500 mL |
| | II | Solid | 500 g | 2.5 kg |
| | III | Liquid | 500 mL | 1 L |
| | III | Solid | 1 kg | 10 kg |
| 5.2 | -- | Liquid | 30 mL | 500 mL |
| | -- | Solid | 100 g | 1 kg |
| 6.1 | II | Liquid | 100 mL | 1 L |
| | II | Solid | 500 g | 1 kg |
| | III | Liquid | 500 mL | 2 L |
| | III | Solid | 1 kg | 10 kg |
| 8 | II | Liquid | 100 mL | 500 mL |
| | II | Solid | 500 g | 5 kg |
| | III | Liquid | 500 mL | 1 L |
| | III | Solid | 1 kg | 5 kg |
| 9 | III | Liquid/Solid | 5 L | 30 kg G |

NOTES:

1. For gases, the quantity is the water capacity of the inner packaging.
2. Aerosols containing only a nontoxic substance or substances in inner nonrefillable metal or plastic receptacles, the capacity of the inner packaging must not exceed 1000 mL (34 fl oz).

Attachment 20

ABSORBENT CUSHIONING REQUIREMENTS

A20.1. Absorbent Material General Requirements. For combination packagings, use cushioning materials suitable for the absorption of liquid hazardous materials in the event of leakage from the primary receptacle. Ensure cushioning materials used are satisfactory in all respects. Ensure the material is not capable of reacting adversely with the contents of the package and is noncombustible. Do not use asbestos. The following requirements apply to the use of absorbent cushioning material for combination packagings:

- Use absorbent cushioning material to package liquids in PG I and II.
 - Each package containing a liquid in PG I must include sufficient cushioning material to absorb the entire contents of the inner containers.
 - Each package containing a liquid in PG II must include sufficient cushioning material to absorb the contents of any one inner container. If the inner containers vary in size, include sufficient cushioning material to absorb the contents of the inner receptacle containing the greatest quantity of liquid.
 - Absorbent cushioning material is not required for:
 - Paint in PG II
 - Liquids in PG III
 - Consumer Commodities (if inner receptacles are other than glass or earthenware)
- When overpacking containers of liquids that do not meet pressure requirements into containers that meet the pressure requirement, use absorbent cushioning material as stipulated above.
- When absorbent cushioning material is required and the outer packaging is not liquid-tight, use a means of containing the liquid in the event of leakage. This may take the form of a leak-proof liner, plastic bag, or other equally efficient means of containment. When securely closed polyethylene (4-mil minimum) bags are used to contain the cushioning and hazardous liquid, the bags must be of sufficient size to form a liner for the exterior container, or a bag for the interior container.
- When overpacking individual packagings that already meet air-eligibility requirements use enough cushioning material to secure and position the packagings against damage. The cushioning material, absorbent or nonabsorbent, must completely fill any void space in the container.
- Absorbent cushioning material is not required for containers that have met the UN packaging specification test requirements (including the hydrostatic pressure test) as a single packaging.

A20.2. Determining the Amount Required. Use table A20.1 as a guide to determine the amount of vermiculite or diatomaceous earth required for overpacking and cushioning liquid hazardous materials. Other equivalent cushioning materials may be used to meet A20.1 requirements.

- The amounts identified in table A20.1 are the minimum requirements. When exact quantities of cushioning materials are not found in table A20.1, make an approximation based on quantities listed.
- When placing cushioning materials into the container, consider settling of the cushioning materials during transportation. Use enough cushioning material to compensate for any settling that may occur.
- When the applicable test report identifies an amount larger than table A20.1, use the amount identified in the test report.

Table A20.1. Absorbent Material Requirements in Inches.

| | A | B | C | D | E |
|----------------------------|---------------------------|---|------------------------------|-------------------------------|------------------------------|
| R U L E | If quantity is | Then to ship use: Vermiculite, Type 1, Grade 3 (fine), or Type 1, Grade 4 (super fine) | | Diatomaceous Earth | |
| | | Centimeters (inches) | | Centimeters (inches) | |
| | | On sides | On top and bottom | On sides | On top and bottom |
| 1 | .50 L (1 pt) | 2.54 cm (1.0) | 3.81 cm (1.5) | 5.08 cm (2.0) | 11.43 cm (4.5) |
| 2 | 1.0 L (1 qt) | 2.54 cm (1.0) | 5.08 cm (2.0) | 5.08 cm (2.0) | 13.97 cm (5.5) |
| 3 | 3.8 L (1 gal) | 3.81 cm (1.5) | 6.35 cm (2.5) | 10.16 cm (4.0) | 15.24 cm (6.0) |
| 4 | 7.6 L (2 gals) | 5.08 cm (2.0) | 10.16 cm (4.0) | 11.43 cm (4.5) | 24.13 cm (9.5) |
| 5 | 19.0 L (5 gals) | 7.62 cm (3.0) | 15.24 cm (6.0) | 15.24 cm (6.0) | 34.29 cm (13.5) |
| 6 | 24.6 L (6.5 gals) | 8.89 cm (3.5) | 16.51 cm (6.5) | 17.78 cm (7.0) | 36.83 cm (14.5) |
| 7 | 49.3 L (13 gals) | 10.16 cm (4.0) | 19.05 cm (7.5) | 20.32 cm (8.0) | 39.37 cm (15.5) |
| 8 | 56.8 L (15 gals) | 11.43 cm (4.5) | 20.32 cm (8.0) | 24.13 cm (9.5) | 45.74 cm (18.0) |

Attachment 21

BRIEFING AGENCY REQUIREMENTS

A21.1. Briefing Agency. This attachment outlines the information that the briefing agency is required to provide to the aircraft commander (or designated representative) according to 1.2.9.

A21.2. Informational Requirements. The briefing agency must advise the aircraft commander (or designated representative) of:

- The PSN, hazard class, identification number, and PG prescribed in this manual for each hazardous material aboard the aircraft.
- The total quantity in weight or volume.
- The location of the hazardous item in the aircraft.
- Net explosive weight (NEW) of Class 1.1, 1.2, and 1.3 explosives, or of Class 1.4, 1.5, and 1.6 explosives when required.
- The requirement for escorts, couriers, and protective equipment.
- The number of passengers permitted aboard the aircraft.
- The procedures to use in an emergency.
- All cargo being carried under the terms of a DOT exemption, a DoD certification of equivalency (COE), a CAA, or a waiver.

A21.3. Notification Statements. The briefing agency must include the statements identified below on the hazardous cargo manifest when transporting hazardous materials on aircraft. Apply these statements by programmed wording, rubber stamps, or typewriter.

- **Air terminal inspection certification statement:** "ALL HAZARDOUS MATERIALS COVERED BY THIS MANIFEST HAVE BEEN INSPECTED AND FOUND TO BE PACKAGED IN THE PROPER OUTSIDE CONTAINER, FREE OF VISIBLE DAMAGE AND LEAKS, AND IS PROPERLY CERTIFIED." (Air terminal representative signature).
- **Aircrew briefing certification statement:** "I HAVE BEEN BRIEFED ACCORDING TO AFJMAN 24-204, PARAGRAPH 1.2.9, ON HAZARDOUS CARGO COVERED BY THIS MANIFEST." (Aircraft crewmember signature)

A21.4. Post Briefing Responsibilities. After receiving the briefing, the aircraft commander (or designated representative) will:

- Sign the cargo manifest.
- Return the signed copy, with the attached Shipper's Declaration for Dangerous Goods to the terminal record-keeping activity for retention.
- When crew changes occur, terminal personnel will brief the oncoming aircraft commander or designated representatives required by A21.2. The briefing must cover all hazardous materials (onload and throughload).
- For throughload hazardous cargo, the oncoming aircraft commander (or designated representative) signs a copy of the throughload manifest indicating that the briefing has been received.
- Keep the manifest, reflecting the certification for a hazardous cargo briefing, according to current files, maintenance, and disposition instructions.

Attachment 22**PASSENGER MOVEMENT ON AIRCRAFT TRANSPORTING HAZARDOUS MATERIALS**

A22.1. Passenger Eligibility. Table A4.1, column 7 provides passenger eligibility codes that identify passenger movement restrictions with hazardous materials.

- Use table 4.1 and table A4.2 to determine passenger movement eligibility with a specific material.
- Do not move passengers with cargo coded as "Cargo Aircraft Only" unless exempted by this manual. Obtain a passenger deviation when required by this attachment.
- Aircraft transporting personnel with hazardous materials must be equipped with serviceable oxygen equipment and oxygen supply for all personnel. Supplemental oxygen is not required when transporting Air, refrigerated liquid; and Engines, internal combustion..

A22.1.1. Passenger Deviations. Move passengers with hazardous materials coded as "Cargo Aircraft Only" consistent with operational requirements. Prevent exposure of passengers to the hazardous material. A deviation authorizing the movement of passengers with cargo aircraft only material is granted only for exceptional cases.

- Contact the MAJCOM, number Air Force, or Service having operational control of the aircraft for passenger deviations.
- When a deviation has been approved, type, print, or stamps on all copies of the passenger manifest the following information: "AUTHORITY TO MOVE PASSENGERS WITH CARGO AIRCRAFT ONLY CODED MATERIAL IS APPROVED. DEVIATION NUMBER:_____."
- Separate passengers from the hazardous cargo.
- An aircrew member must provide surveillance to ensure passengers are safe and maintain a maximum distance from the hazardous cargo.
- Deviations are not required for:
 - Guards.
 - Couriers.
 - Technical escorts responsible for cargo.
 - Crew chiefs and maintenance personnel assigned to support the aircraft transporting the hazardous material.
- DoD duty passengers transported with material coded P4 in column 7 of table A4.1.

A22.1.2. Radioactive Material Passenger Restrictions.

- Packages with a radioactive yellow II or radioactive yellow III label may not be transported on passenger aircraft unless:
 - The transport index is not over 1.0 for a package required to be labeled radioactive yellow II.
 - The transport index is not over 3.0 for a package required to be labeled radioactive yellow III.
- Radioactive material requiring a label must be separated from personnel and passengers by the greatest distance possible. Radioactive yellow II and yellow III material must be separated by a minimum of 2 pallet positions (176 in) at all times while on the aircraft. If the total transport index of all packages on the aircraft exceeds 50, the separation distance between the surfaces of the radioactive materials packages and the surfaces bounding the space occupied by persons or animals must be at least 9 meters (30 feet).
- Do not offer Type B(M) packages for transportation on passenger-carrying aircraft.
- Except as provided in A11.12, no person may carry any radioactive material other than a radioactive material intended for use in, or incident to, research, medical diagnosis, or treatment aboard a passenger aircraft.

A22.2. Carriage of Hazardous Materials by Passengers. Passengers must not carry hazardous materials on military aircraft. The exceptions listed below are not subject to any other requirements of this manual (nonregulated) when carried by a crewmember or passenger.

- Material in aerosol containers not exceeding 473.1 ml (16 fluid ounces) or 2.205 kg (1 pound) per container when carried in crewmember or passenger baggage (including carry-on baggage), unless they are classified as poisonous or irritating material. The total quantity of the excepted articles carried by any crewmember or passenger in carry-on or checked baggage must not exceed 2136 g or 2217.8 ml (75 net weight ounces and fluid ounces).

- Oxygen, or any hazardous material used for the generation of oxygen, carried for medical use by a passenger on a military aircraft must be an approved cylinder as listed in attachment 6. Comply with 14 CFR 121.574 or 135.91 for DoD contracted civilian passenger aircraft.
- For human beings or animals with an implanted medical device, such as a heart pacemaker, that contains radioactive material or with radio-pharmaceuticals, that have been injected or ingested.
- Carbon dioxide gas cylinders worn by passengers for the operation of mechanical limbs. Spare cylinders of a similar size for the same purpose, in sufficient quantities to ensure an adequate supply for the duration of the journey are authorized in carry-on and checked baggage.
- Catalytic hair curlers containing hydrocarbon gas carried in carry-on or checked baggage. The safety cover must be securely fitted over the heating element. Gas refills are not permitted. Not more than one curler per person is authorized.
- Alcoholic beverages not exceeding 70 percent by volume, when packed in receptacles of less than 5 L may be in carry-on or checked baggage.
- Dry ice, in quantities not exceeding 2 kg (4.4 lbs.) per passenger when used to pack perishables in carry-on or checked baggage, provided the package permits the release of carbon dioxide gas.
- Safety matches or a lighter carried by an individual for use by the individual. However, lighters containing unabsorbed liquid fuel (other than liquefied gas), lighter fuel and lighter refills are not permitted on one's person or in checked or carry-on baggage.
- Securely boxed, cartridges for sporting purposes (in Class 1.4S), in quantities not exceeding 5 kg (11 lbs.) gross weight per passenger may be in checked baggage for personnel use, excluding ammunition with explosive or incendiary projectiles. Do not combine allowances for more than one passenger into one or more packages. This approval does not authorize the carriage of military issue ammunition in personal baggage.
- Wheelchairs or other battery-powered mobility devices with spillable or nonspillable batteries, provided that the battery is disconnected, battery terminals are insulated to prevent accidental short circuits and the battery is securely attached to the wheelchair or mobility device may be carried in checked baggage. Load and store batteries attached to these devices with their filling holes upright.
- A mercurial barometer carried by a representative of a government weather bureau or other similar official agency may be in carry-on baggage. However, package the barometer in a strong outer packaging, having a sealed inner liner or a bag of strong leak proof and puncture resistant material impervious to mercury, which will prevent the escape of mercury from the package irrespective of its position.
- One small carbon dioxide cylinder fitted into a self-inflating life jacket plus one spare cartridge may be carried in carry-on and checked baggage. However, the life jackets cannot contain any explosives, pyrotechnic, or flammable devices.
- Heat producing articles such as underwater torches (diving lamps) and soldering irons may be in carry-on baggage.
- Scuba diving tanks containing not more than 25 pounds per square inch at 21 degrees C (70 degrees F) may be shipped as checked baggage. A tag or label must be affixed to the tank by a dive shop or licensed individual to indicate service was performed.

Attachment 23**USE OF CONTRACT AIR CARRIERS**

A23.1. Contract Air Carriers. Commercial airlift of military hazardous materials utilizing contract air carriers is authorized according to Department of Transportation Exemptions (DOT-E) 7573 and 9232, and this manual.

A23.2. DOT-E 7573. The DoD is authorized to transport hazardous materials via AMC commercial contract cargo aircraft under the authority of DOT-E 7573 according to the following conditions:

- The pilot in charge is notified in writing that the exemption is being used and a copy of DOT-E 7573 must accompany the shipment. See attachment 21 for the statement required on the hazardous cargo manifest and briefing requirements.
- Hazardous material shipments are in complete compliance with this manual.
- Segregation compatibility requirements of tables A18.1 and A18.2 apply.
- Ensure compliance with all other requirements of the exemption.

A23.3. DOT-E 9232. DOT-E 9232 applies only under the following conditions:

- During a declared national emergency.
- In defense crisis conditions which require the activation of any state of the Civil Reserve Air Fleet (CRAF) program, or the use of foreign-flag aircraft made available to the United States Government (USG) pursuant to formal security agreements between the USG and the involved foreign government.
- During rapid deployment of US Armed Forces.
- The following special provisions also apply:
 - A copy of the exemption must accompany the shipment. Notify the pilot in command, in writing, that the exemption is being exercised.
 - Include a summary of hazardous materials on the cargo manifest.
 - Hazardous material shipments are in complete compliance with this manual.
 - The troop commander must identify to the aircraft commander (or designated representative) in writing, any individual issue of hazardous materials that are included in rucksacks or field packs, which are not already included on the cargo manifest. Identify hazardous materials by PSN, hazard class, UN identification number, PG, and net quantity.
 - Load hazardous materials only in the cargo compartment of passenger carrying aircraft. Hazardous materials (including small arms ammunition) are not authorized in the passenger compartment.
 - Do not remove hazardous materials from required packaging and place in equipment or vehicle racks and containers.
 - Agreement signed by the airfield operator in advance of the operation that includes, as a minimum, an emergency response plan. HQ AMC/DO maintains agreements.

A23.4. Use of Passenger Carrying Aircraft. When requirements dictate movement of hazardous materials on passenger contract aircraft, ensure the material is prepared according to 49 CFR 100-199. Type and quantity of material authorized will be according to 49 CFR 172.101 for passenger carrying aircraft.

Attachment 24

SPECIAL CARGO REQUIREMENTS

A24.1. Material Requiring SAAM Airlift. This attachment identifies requirements for technical escorts and other extensive protective measures for extremely hazardous materials. The provisions of this attachment apply to the following shipments:

- Material identified in table A4.1 as Special Provision 1 (SP1) which include, but are not limited to, Class 6.1, PG 1, hazard zone A and Class 2.3 hazard zone A toxic material.
- Class 1, compatibility group K.
- Fissile Class III Radioactive Material.
- Infectious substances (etiologic agent) and biological research material requiring a technical escort for safety concerns.

★A24.2. Transportation Requirements.

- Transport the materials identified in A24.1 by Special Assignment Airlift Mission (SAAM) only. Process SAAM requests, cargo clearance, and appropriate confirmations according to AFR 76-38/AR 59-8/OPNAVINST 4630.18E/MCO 4630.6D/DLAR 4540.9.
- When Class 6.1, PG I, hazard zone A and Class 2.3, hazard zone A toxic materials are shipped by air, the consignor is required to furnish or ensure availability of:
 - Complete protective clothing and equipment for all aircrew members.
 - Qualified technical escort personnel, applicable decontamination and detection equipment or supplies, and suitable first-aid equipment or supplies to cope with leaking containers during airlift.
- Fissile class III shipments must incorporate transportation controls that are performed by the shipper or carrier, as appropriate, to provide nuclear criticality safety, and protect against loading, storing, or transporting that shipment with any other fissile material.
- Transport Fissile class III shipments in an aircraft:
 - Assigned to the exclusive use of the shipper with a specific restriction for the exclusive use to be provided in the appropriate arrangements between shipper and carrier and with instructions to that effect issued with the shipping papers.
 - That does not contain other packages of radioactive material requiring one of the labels prescribed in attachment 15.
- Liquids with a mist Inhalation Zone A, PG I hazard, less than 5 L per package, and solids with a toxic Inhalation hazard Zone A, PG I hazard, less than 15 kg per package, may be transported by other than a SAAM with approval of Service focal point according to paragraph 2.3.1. Passenger prohibition code "P2" applies.

A24.3. Technical Escorts. Furnish technical escorts when service regulations (or cargo clearance arrangements) require it, or when the shipping activity's medical or flight safety personnel dictate. The shipping activity must initiate action to furnish the qualified personnel, when they are required. They must also furnish technical escorts or other personnel to accompany shipments of infectious substances (etiologic agents) or plant quarantine materials per A10.9. When the shipping activity is required to furnish qualified personnel, it will also initiate action to furnish all required protective clothing and equipment for crew members, in addition to the appropriate decontamination detection and emergency first-aid equipment. The escort has complete jurisdiction over the cargo as it pertains to normal security, safety, protection of personnel, repair, and disposal of containers. However, in the following situations, escort authorities are primarily technical advisors, and are subordinate to:

- The aircraft commander in matters of flight operations and safety.
- The base installation commander in matters affecting the safety and mission of the command.

A24.4. Shipping Documents for Infectious Substances (Etiologic Agents). An etiologic agent and plant quarantine material shipment record must accompany all shipments of infectious substances (etiologic agents) transported under the provisions of this attachment. The consignor (shipper) must prepare this record.

- If the shipping document is classified, it must be in the custody of the technical escort or other qualified personnel accompanying the shipment. In the absence of accompanying personnel, and if the document is

not classified, the shipper will place the original and one copy in the outermost container of the number one package.

- On receipt at the receiving installation, a record of the shipment's condition should be made under "Remarks." Two copies of the completed form should be forwarded directly to the Commanding Officer, US Army, Fort Detrick, Frederick MD 21701-5000, Attn: (1) Transportation Officer, and (2) Liaison Officer (USPHS). This creates a permanent record file that is in compliance with agreements between DoD and the Department of Health and Human Services; and also between DoD and the Department of Agriculture.
- The agency receiving the shipment is responsible for forwarding the report indicated above within 2 hours of receipt.

A24.5. Aircrew Jettison Criteria. For cargo consisting of Class 6.1, PG I, hazard zone A toxic material; Class 2.3, hazard zone A toxic material; infectious substances; biological agents; or radioactive material (other than excepted quantities), the jettison criteria are as follows:

- Must not be jettisoned over land.
- May not be jettisoned over water unless the cargo, in addition to size criteria, weighs at least 1.6 g/cm^3 (100 lbs./ft^3) to ensure sinking. Also, the cargo must be jettisoned at least 19.3 kilometers (12 miles) offshore, and preferably beyond a shelf, in water 100 fathoms (600 ft) or more in depth. The aircraft commander is given a predeparture briefing on acceptable jettisoning locations based on the above criteria. When cargo is jettisoned to decrease weight, jettison all other cargo before hazardous cargo.
- When cargo is leaking and is beyond control of the escort to repair or neutralize, the escort must inform the aircraft commander. The decision of jettisoning will rest with the aircraft commander. In this instance, the commander may jettison the cargo over water without regard to weight or depth criteria.
- When the cargo weighs less than 1.6 g/cm^3 (100 lb./ft^3) or when size of cargo would not permit inflight jettisoning, model of aircraft selected for overwater missions must be based on two-engine performance from equal time point (ETP) to destination. Aircraft performance is based on aircraft remaining airborne when all cargo except the hazardous cargo is jettisoned.

Attachment 25

HAZARDOUS MATERIALS INITIAL AND REFRESHER TRAINING

A25.1. Training General Requirements. This attachment identifies the hazardous material training required by paragraph 1.3. Commanders assign hazardous material workers into one of four functional groups. Training requirements are based on functional group. This approach provides basic hazardous materials training applicable to all personnel at the first level. Trainers then provide more detailed training to supplement the basic level of training based on specific job responsibilities.

★A25.2. Training for Noncertifying Officials. Train individuals according to the following general areas of responsibility. Unless otherwise required by Service/Agency directives, training may be performed locally. Trainers should develop training specific to the individuals hazardous material duties. The courses listed are suggested DoD courses that may be used to satisfy the applicable level of training. Telephone contact numbers are listed the first time the training location is identified. Commercial or other government sources may also be used for training other than Preparer level to the extent it satisfies the required level of training.

- **Handlers.** Trainers ensure training covers basic hazardous material familiarization, awareness, and communication requirements. This includes hazard classification, marking, labeling, placarding, documentation, compatibility, and safety (including emergency response information). Training will also include handling and job (function) specific requirements.
 - HAZMAT Familiarization and Safety in Transportation, 49 CFR Subpart H; Computer Based Training, U.S. Army Defense Ammunition Center, McAlester OK 76544. Telephone DSN 956-8961/8931 or commercial (918) 420-8961/8931.
 - Hazardous Materials Handling, SMPT-5, Accredited Off-Campus Instruction (AOICI), Satellite Education Network (SEN), or Correspondence, School of Military Packaging Technology, Aberdeen Proving Ground MD 210005-5001. Telephone DSN 298-5185 or commercial (410) 278-5185.
 - Transportation of Hazardous Material for Supervisors, A822-0014, Navy Supply Corps School, Athens GA 30606. Telephone DSN 588-7207/7215 or commercial (706) 354-7207/7215.
 - Storage and Handling of Hazardous Materials (R511), DLA Center for Training, Education, and Development (DCTED), 380 Morrison Road, Columbus, OH 43213-1430. Telephone DSN 850-5986 or commercial (614) 692-5986/ (800) 458-7903/ E-mail: INFO@dpcso.dla.mil.
 - Triennial Storage and Handling of Hazardous Material Recurrent (R611), DLA Center for Training, Education, and Development (DCTED), 380 Morrison Road, Columbus, OH 43213-1430. Telephone DSN 850-5986 or commercial (614) 692-5986 / (800) 458-7903 / E-mail: INFO@dpcso.dla.mil.
 - Hazardous Materials Handlers, CBT ST10, Air Mobility Warfare Center, Air Transportation Division, AMWC/WCOTF, 5656 Texas Ave FT Dix, AIN NJ 08640-7400. Telephone DSN 944-4377.
- **Packers.** Packers, who do not certify, must work closely with the preparer (certifier) and must not close (seal) the container until the preparer (certifier) has validated the packaging. Trainers ensure that packers are knowledgeable in all aspects of handlers requirements with additional emphasis in hazardous materials packaging requirements.
 - DoD POP Program (R530 and R630-Refresher), Defense Distribution Center, DDC-TO, 2001 Mission Drive, New Cumberland, PA 17070-5000. Telephone DSN 977-8238/8353 or commercial (717) 770-8238/8353. Web Available at: <http://www.ddc.dla.mil>.
- **Inspectors.** In addition to handlers requirements, trainers ensure that inspectors are knowledgeable in the use of commercial and military hazardous materials documents, and shipping papers. Inspectors should be familiar with appropriate packaging specifications.
 - Hazardous Materials Airlift Inspector Course (L3AZR2T000-008 - Initial (Resident) or L4AZT2T000-011 - Initial (Mobile)), 345 TRS/TTTD, Lackland AFB TX 78236-5427. Telephone DSN 473-4917 or commercial (210) 671-4917.
 - Hazardous Materials Inspector (Exportable) (L6AZS2T000-000), 345 TRS/TTTD, Lackland AFB TX, 78236-5427, Telephone DSN 473-4885 or commercial (210) 671-4885.

- Transportation of Hazardous Material for Supervisors, A822-0014, Navy Supply Corps School, Athens GA 30606.

★**A25.3. Training for Certifying Officials.** Preparers (certifying officials), as defined in 1.2.3, are authorized to accomplish the Shipper's Declaration for Dangerous Goods certification according to 1.2.8. Supervisors must consult DoD Catalog 5010.16-c *Defense Management Education and Training* to select the most appropriate course for the individual based on course prerequisites. Train preparers based on one of the following function specific requirements:

A25.3.1. Preparers. Personnel whose primary duty is preparing and certifying all types of hazardous materials shipments on a daily basis. Trainers should evaluate individual needs to ensure sufficient packaging knowledge or provide additional packaging training if required. The courses identified below are authorized only if developed and administered according to the most recent Interservice Training Review Organization Task Group on Hazardous Materials Training Memorandum of Understanding (MOU). The MOU is developed jointly with each school and Service/DLA policy focal point to ensure standard and adequate Preparer level training for DoD personnel. Any deviation from the MOU invalidates the course and is not authorized as acceptable training under this manual. These individuals must have satisfactorily completed one of the qualifying courses:

A25.3.1.1. Initial Training Courses. Personnel identified in A25.3.1 must satisfactorily complete one of the initial training courses identified below as a prerequisite to certifying the Shipper's Declaration for Dangerous Goods for airlift of hazardous cargo.

- Hazardous Material Preparer Course (L3AZR2T000 005, Resident or L4AZT2T000 005, On Site), 345 TRS/TTTD, Lackland AFB TX 78236-5427.
- Technical Transportation of Hazardous Materials (AMMO-62, Resident or AMMO-62OS On Site), U.S. Army Defense Ammunition Center and School, McAlester OK 76544.
- Installation Traffic Management of Hazardous Materials (Initial) (AMMO-41) (Resident), U.S. Army Defense Ammunition Center, McAlester OK 76544. Telephone DSN 956-8961/8931 or commercial (918) 420-8961/8931.
- Defense Packaging of Hazardous Materials for Transportation, 8B-F7(JT), Resident and On Site, School of Military Packaging Technology (SMPT), Aberdeen Proving Ground MD 21005-5001.
- Transportation of Hazardous Material-Basic (A-822-0012), Navy Supply Corps School, Athens, GA 30606-5520. Telephone DSN 588-7215 or commercial (706) 354-7215/7240.

A25.3.1.2. Refresher Training Courses. Personnel, who have previously completed one of the courses specified in A25.3.1.1, must satisfy the 24-month refresher training requirement of A25.4 by completing one of the following courses:

- Hazardous Material Preparer Refresher (Exportable) (L6AZS2T000 001), 345 TRS/TTTD, Lackland AFB TX 78236-5427. This course approved for Air Force and DLA activities only.
- General Transportation of Hazardous Materials (AMMO-37, Resident or AMMO-37OS, On Site), U.S. Army Defense Ammunition Center, McAlester OK 76544. Telephone DSN 956-8961/8931 or commercial (918) 420-8961/8931.
- Defense (Refresher) Packaging of Hazardous Materials for Transportation, 8B-F35 (JT) Resident and On Site, School of Military Packaging Technology (SMPT), Aberdeen Proving Grounds MD 21005-5001.
- Transportation of Hazardous Material-Recertification (A-822-0011), Navy Supply Corps School, Athens GA 30606-5520.

A25.3.2. Preparers (Technical Specialist). Technical specialists are personnel trained and qualified to prepare for shipment only those hazardous materials within their specialty (such as, vehicle maintenance personnel are technical specialists for vehicles). Technical specialists may only sign the Shipper's Declaration for Dangerous Goods form as a certifying official on items they are technically qualified to maintain and prepare for shipment. For the purposes of this manual, a technical specialist will:

- Be designated by the Commander.
- Be authorized to certify those items within the technical specialty, unique to the unit or activity's requirement.
- Be trained in packaging, preparation, marking, labeling, certification, and all other aspects of this manual relevant to the specific hazardous materials within the individual's specialty.
- This authorization applies to tactical or contingency operations and channel (non-Chapter 3) movement.

- Training for completion of the shipper's certification must be conducted by a qualified Preparer as identified in A25.3.1.
- Air Force activities use the "Hazardous Material Technical Specialist Instructional Guidance" training material to develop and administer a local technical specialist training program. Contact your MAJCOM transportation office for guidance and the AFMC LSO/LOP HAZMAT web site to obtain a copy of the material.
- Training is available for medical personnel who manage, package, certify or prepare laboratory samples and specimens for transport by any mode.
 - Transport of Biomedical Material Course (Initial or Refresher), U. S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), Aberdeen Proving Ground, MD 21010-5403. Telephone DSN 584-5228/3651 or commercial (410) 436-5228/3651.

★A25.4. Training Frequency. All hazardous material personnel must receive initial training and subsequent refresher training at 24-month intervals. This applies to all levels (i.e., Handlers, Packers, Inspectors, and Preparers) of required training. Train individuals based on functional group requirements.

- Each Service or major command (MAJCOM) may grant an extension to this qualification expiration date for a period not to exceed 60 calendar days during which eligible personnel must receive training.
- Each Service or MAJCOM may grant successive 60-day extensions to a person's qualification expiration date for long-term tactical or contingency operations. In this instance, personnel extended past their initial 60-day extension may only certify hazardous materials moved according to the tactical or contingency operation. Once personnel return to normal duty, train each person as specified in this attachment.
- Each Service or MAJCOM is responsible for management of the extension authority and may establish more stringent training frequencies to enhance training requirements.

A25.5. Training Records. Test all hazardous material personnel and maintain a record of the training provided. Maintain and dispose of records according to an approved Records Disposition Schedule. As a minimum, maintain the record for as long as the person works for the DoD as a hazardous material employee and for 90 days after separation from the DoD. This record must indicate the following:

- Name of person who received the training.
- Date training took place.
- A description, copy, or location of training materials used to train the person.
- The name and address of the person who provided the training.
- Certification statement of completion of training and testing.

A25.6. Certification Under Combat Conditions. An aircraft commander (or representative designated by the commander) may accept a hazardous materials shipment under a combat situation without regard to the above training.

A25.7. Non-DoD Personnel Certifying Hazardous Material Shipments. Non-DoD personnel preparing hazardous materials for transportation by military air must do so according to this manual. DoD does not require non-DoD personnel to complete the training courses specified in this attachment. However, these individuals must meet the requirements of Title 49 CFR Part 172 Subpart H *Training* for all employees having responsibility for preparing hazardous materials for shipment. Training must include function specific duties related to military air transportation. Non-DoD personnel who desire the training outlined in this attachment must contact their contract administration office.

Attachment 26

TABLE OF EQUIVALENTS AND NET QUANTITY OF GAS CONVERSION FORMULAE

A26.1. Metrics. Figure A26.1 provides a list of metric prefixes.

Figure A26.1. Metric Prefixes.

| | | | |
|-------|----------------|-------|-------------------|
| Deci | 0.1 | Deca | 10 |
| Centi | 0.01 | Hecto | 100 |
| Milli | 0.001 | Kilo | 1,000 |
| Micro | 0.000001 | Mega | 1,000,000 |
| Nano | 0.000000001 | Giga | 1,000,000,000 |
| Pico | 0.000000000001 | Tera | 1,000,000,000,000 |

A26.2. Miscellaneous Conversions. Figure A26.2 provides a list of general miscellaneous conversions for use with this manual.

Figure A26.2. Miscellaneous Conversions.

| <u>VOLUME:</u> | | <u>WEIGHT:</u> | |
|----------------|--|----------------------------------|---|
| 1 liter | 0.264 gallon, quarts, 61.025 inches, 33.815 fluid ounces | 1 gram | 0.03527 ounces, 0.0022 pounds avoirdupois |
| 1 cubic foot | 28.32 liters, gallons, 1728 inches cubic | 1 kilogram | 2.205 pounds, 35.274 ounces |
| 1 cubic meter | 1000 liters, 35.31 feet, 264.2 gallons cubic | 1 pound | 0.4536 kg |
| 1 milliliter | 0.0338 oz | 1 ounce | 28.35 gram |
| 1 gallon | 3.785 l | <u>PRESSURE:</u> | |
| 1 oz | 29.57 ml | 1 pound per square inch | 6.895 kilopascal |
| <u>LENGTH:</u> | | 1 kilopascal | 0.145 psi |
| 1 centimeter | 0.3937 inches | <u>RADIOACTIVE ACTIVITY:</u> | |
| 1 meter | 3.28 feet, 39.37 inches | 1 TBq | 27 Ci |
| 1 inch | 2.54 cm, 25.4 mm | 1 Sv/hr | 100 rem/hr |
| 1 foot | 0.3048 m | 1 rem/hr | 0.01 Sv/hr |
| 1 millimeter | 0.03937 in | | |
| <u>VOLUME</u> | | | |
| 1 newton | 101.97 gram force | | |

A26.3. Temperature Conversion. Use figure A26.3 to convert temperatures between Celsius and Fahrenheit.

Figure A26.3. Temperature Conversion Formulae.

| |
|--|
| $C = (F-32) \text{ times } 5/9$ $F = (C \text{ times } 9/5) + 32$ $K = C + 273$ <p>C = degrees Celsius F = degrees Fahrenheit, K = degrees Kelvin (absolute)</p> |
|--|

A26.4. Net Quantity of Gas Conversion Formulae. Use figure A26.4 to determine the net hazard of a compressed gas by converting PSI of a cylinder into pounds. Use figure A26.5 to determine the molecular weight or specific gravity required to complete the formula.

Figure A26.4. Net Quantity of Gas Conversion Formulae.

| | |
|-------------|---|
| Formula (1) | $P = 0.00512 \times A \times B \times C$ |
| | or |
| Formula (2) | $P = .0001744 \times A \times B \times M$ |
| where: | P= weight of gas in pounds |
| | A= pressure in pounds per square inch |
| | B= volume of cylinder in cubic feet |
| | C= specific gravity of the gas |
| | M= molecular weight of the gas molecule |

NOTE: Use Formula (1) for calculation using the specific gravity value. Use Formula (2) for calculation using the molecular weight value.

A26.4.1. Example for Determining Net Quantity of Gas. The following information is known or determined by examination of the cylinder. Measure the cylinder's height from the external base to the valve seat. Measure the external diameter (width). Assume the cylinder does not cone at the top.

- **Example 1.**

Tank measurements:

Height: 50 inches

Diameter: 9 inches

Diameter = 2 x (radius)

R (inches) = 9/2 = 4.5

Tank contents: CO₂

Internal Pressure: 900 psi

Tank Volume

$$V = \pi r^2 h$$

$$V = \pi (4.5 \text{ inches})^2 \times (50 \text{ inches})$$

$$= \{3181 \text{ inches}\}^3 \times \{1/1728 \text{ (Ft}^3/\text{inches}^3)\}$$

$$V = 1.841 \text{ Ft}^3$$

$$P (\text{pounds of gas}) = 0.00512 \times A \times B \times C$$

$$= \{0.00512 \text{ in}^2/\text{Ft}^3\} \times \{900 \text{ psi}\} \times \{1.841 \text{ Ft}^3\} \times \{1.516\}$$

$$P = 12.9 \text{ pounds}$$

- **Example 2.**

Tank measurements:

Height: 40 inches

Diameter: 12 inches

Diameter = 2 x (radius)

R (inches) = 12/2 = 6

Tank contents: C₂H₂

Internal Pressure: 500 psi

Tank Volume

$$V = \pi r^2 h$$

$$V = \pi (6 \text{ inches})^2 \times (40 \text{ inches})$$

$$= \{4524 \text{ inches}^3\} \times \{1/1728 \text{ (Ft}^3/\text{inches}^3)\}$$

$$V = 2.618 \text{ Ft}^3$$

$$P (\text{pounds of gas}) = 0.00512 \times A \times B \times C$$

$$= \{0.00512 \text{ in}^2/\text{Ft}^3\} \times \{500 \text{ psi}\} \times \{2.618 \text{ Ft}^3\} \times \{0.897\}$$

$$P = 6.01 \text{ pounds}$$

- **Example 3.**

Tank measurements:

Height: 50 inches

Diameter: 9 inches

Diameter = 2 x (radius)

R (inches) = 9/2 = 4.5

Tank contents: CO₂

Internal Pressure: 900 psi

Tank Volume

$$V = \pi r^2 h$$

$$V = \pi (4.5 \text{ inches})^2 \times (50 \text{ inches})$$

$$= \{3181 \text{ inches}^3\} \times \{1/1728 \text{ (Ft}^3/\text{inches}^3)\}$$

$$V = 1.841 \text{ Ft}^3$$

$$P = 0.0001744 \times A \times B \times M$$

$$= 0.0001744 \times (900 \text{ psi}) \times (1.841 \text{ Ft}^3) \times (44.00)$$

$$P = 12.7 \text{ pounds}$$

- **Example 4.**

Tank measurements:

Height: 40 inches

Diameter: 12 inches

Diameter = 2 x (radius)

R (inches) = 12/2 = 6

Tank contents: C₂H₂

Internal Pressure: 500 psi

Tank Volume

$$V = \pi r^2 h$$

$$V = \pi (6 \text{ inches})^2 \times (40 \text{ inches})$$

$$= \{4524 \text{ inches}^3\} \times \{1/1728 \text{ (Ft}^3/\text{inches}^3)\}$$

$$V = 2.618 \text{ Ft}^3$$

$$P = 0.0001744 \times A \times B \times C$$

$$= 0.0001744 \times (500 \text{ psi}) \times (2.618 \text{ Ft}^3) \times (26.00)$$

$$P = 5.94 \text{ pounds}$$

A26.5. Properties of Common Gases. Figure A26.5 is a list of the molecular weight and specific gravity of common gases.

Figure A26.5. Properties of Common Gases.

| GAS | SYMBOL | MOLECULAR WEIGHT | SPECIFIC GRAVITY |
|-------------------|-------------------------------|-------------------------|-------------------------|
| Helium | He | 4.00 | 0.138 |
| Argon | A | 40.00 | 1.377 |
| Air | - | 29.00 | 1.000 |
| Oxygen | O ₂ | 32.00 | 1.103 |
| Nitrogen | N ₂ | 28.00 | 0.966 |
| Hydrogen | H ₂ | 2.00 | 0.0695 |
| Nitric Oxide | NO | 30.00 | 1.034 |
| Carbon Monoxide | CO | 28.00 | 0.965 |
| Hydrochloric Acid | HCl | 36.50 | 1.256 |
| Steam | H ₂ O | 18.00 | 0.623 |
| Carbon Dioxide | CO ₂ | 44.00 | 1.516 |
| Nitrous Oxide | N ₂ O | 44.00 | 1.518 |
| Sulfur Dioxide | SO ₂ | 64.00 | 2.208 |
| Ammonia | NH ₃ | 17.00 | 0.587 |
| Acetylene | C ₂ H ₂ | 26.00 | 0.897 |
| Methyl Chloride | CH ₂ Cl | 50.50 | 1.738 |
| Methane | Ch ₄ | 16.00 | 0.553 |
| Ethylene | C2H ₄ | 28.00 | 0.967 |

Attachment 27

★ PREPARING EXPLOSIVES PACKAGED PRIOR TO 1 JANUARY 1990

A27.1. General Requirements. Use this attachment to verify existing packaging which is exempt from UN specification packaging requirements according to Paragraph 1.7.2. The methods of packaging described in this attachment were authorized by 49CFR and in effect on 31 December 1989.

- See Attachment 17 for certification requirements.
- Use Proper Shipping Names identified in Table A4.1 in place of DOT names described in this attachment.
- See Attachment 5 for special and general handling instructions.
- Comply with Attachment 24 for ammunition or explosives which are packed in freon for safety during movement or which contain toxic substances previously described as a "Class A Poison."
- Unstable, condemned, or deteriorated explosives will not be shipped by military air. Unserviceable explosives may be shipped if otherwise safe for transportation.
- See Attachments 14 and 15 for marking and labeling requirements.
- Shipping Papers must be annotated, "Government owned goods packaged prior to 1 January 1990."
- Damaged or unserviceable packaging will not be shipped by military air. Repackage explosives according to current guidance in Attachment 5.
- See Table A27.1 for an explosive or ammunition cross reference. In this table, column 1 contains a list of explosive/ammunition with column 2 giving the paragraph from AFR 71-4 and column 3 identifying the paragraph for that item in this manual.
- See Table A27.2 for DOT/Military specification container cross reference.

Table A27.1. Explosive/Ammunition Cross Reference.

| Name of Explosive or Ammunition | AFR 71-4 Paragraph | AFJMAN 24-204 Paragraph |
|--|---------------------------|--------------------------------|
| Actuating Cartridges, Explosive, Fire Extinguisher or Actuating Cartridge, Explosive, Valve | 5-32 | A27.16 |
| Ammunition for Cannon (with Empty Projectiles; with Inert Loaded Projectiles; with Solid Projectile; without Projectiles; with Tear Gas Projectiles, Class B Explosives; with Explosives Projectiles; with Gas Projectiles; with Illumination Projectiles; with Incendiary Projectiles; with Smoke Projectiles and with Tear Gas Projectiles, Class A Explosives | 5-10 | A27-2 |
| Ammunition for Small Arms with Incendiary Projectiles and Ammunition for Small Arms with Explosives Projectiles | 5-11 | A27.3 |
| Black Powder and Low Explosives | 5-13 | A27.4 |
| Blasting Agent NOS | 5-63 | A27.31 |
| Cartridge, Practice Ammunition | 5-62 | A27.30 |
| Common Fireworks, Signal Flares, Hand Signal Devices, Smoke Signals, Smoke Candles, Smoke Grenades, Smoke Pots, and Very Signal Cartridges | 5-23 | A27.9 |
| Cord, Detonating; Fuse, Mild Detonating, Metal Clad; and Flexible Linear Shaped Charges, Metal Clad | 5-24 | A27-10 |
| Detonating, Fuzes, Class C Explosives | 5-27 | A27.11 |
| Detonating Fuzes, Class A Explosives; Booster, Explosive; Burster, Explosive and Supplementary Charges, Explosive | 5-17 | A27.6 |
| Detonating Primers, Class A Explosives and Detonating Primers, Class C Explosives | 5-28 | A27.12 |
| Detonators, Class A Explosives and Detonators, Class C Explosives | 5-14 | A27.5 |
| Explosive Bomb; Explosive Mine; Explosive Projectile; Explosive Torpedo; Grenade, Hand, Explosive; and Grenade, Rifle, Explosive | 5-29 | A27.13 |

| Name of Explosive or Ammunition | AFR 71-4 Paragraph | AFJMAN 24-204 Paragraph |
|---|--------------------|-------------------------|
| Explosive Cable Cutters; Explosive Power Device, Class C; Explosive Release Device, or Starter Cartridges, Jet Engine, Class C Explosive | 5-30 | A27.14 |
| Explosive Power Device, Class B | 5-56 | A27.28 |
| Explosive Rivets | 5-31 | A27.15 |
| Fuze, Combination; Fuze, Percussion; Fuze, Time; Fuze, Tracer; or Tracer | 5-22 | A27.8 |
| High Explosives | 5-34 | A27.18 |
| High Explosives, Liquids | 5-35 | A27.18.1 |
| High Explosives With Liquid Explosive Ingredients | 5-36 | A27.18.2 |
| High Explosives With No Liquid Explosive Ingredient and Propellant Explosives, Class A | 5-37 | A27.18.3 |
| High Explosives With No Liquid Explosive Ingredient Nor Any Chlorate | 5-38 | A27.18.4 – A27.18.12 |
| Igniter Cord | 5-39 | A27.19 |
| Initiating Explosive (Diazodinitrophenol or Lead Monoitroresorcinate) | 5-40 | A27.20.1 |
| Initiating Explosive (Guanyl Nitrosomino Guanylidene Hydrazine) | 5-41 | A27.20.2 |
| Initiating Explosive (Lead Azide Dextrinated Type Only) | 5-42 | A27.20.3 |
| Initiating Explosive (Lead Styphnate (Lead Trinitrosorcinate) or Barium Styphnate, Monohydrate) | 5-43 | A27.20.4 |
| Initiating Explosive (Nitro Mannite) | 5-44 | A27.20.5 |
| Initiating Explosive (Nitrosoguanadine) | 5-45 | A27.20.6 |
| Initiating Explosive (Pentaerythrite Tetranitrate) | 5-46 | A27.20.7 |
| Initiating Explosive (Tetrazene) | 5-47 | A27.20.8 |
| Initiating Explosive (Fulminate of Mercury) | 5-48 | A27.20.9 |
| Oil Well Cartridges | 5-64 | A27.32 |
| Propellant Explosives, Solid or Liquid (Class A or B Explosives) | 5-51 | A27.24 |
| Railway Torpedoes | 5-33.a.(6) | A27.23 |
| Rocket Ammunition with (Inert Loaded Projectiles, Solid Projectiles, Empty Projectiles, Explosive Projectiles, Gas Projectiles, Smoke Projectiles, Incendiary Projectiles, or Illuminating Projectiles) | 5-52 | A27.25 |
| Rocket Engine (Liquid), Class B Explosives | 5-61 | A27.29 |
| Rocket Motors; Jet Thrust Units; Igniters, Rocket Motors, Igniters, Rocket Motors; Igniters, Jet Thrust; Igniters, Ramjet Engine (Class B explosives) or Starter Cartridge, Jet Engine | 5-50 | A27.22 |
| Rocket Motors; Jet Thirst Units; Igniters, Rocket Motors; or Igniters, Jet Thrust (Class A Explosives) | 5-49 | A27.21 |
| Small Arms Ammunition and Small arms Ammunition, Tear Gas Cartridges | 5-53 | A27.26 |
| Small Arms Primer; Cannon Primer; Combination Primer; Percussion Cap; Grenades Empty, Primed | 5-18 | A27.7 |
| Special Fireworks | 5-33 | A27.17 |
| Toy Caps | 5-54 | A27.27 |

A27.2. Ammunition for Cannon (with Empty Projectiles; with Inert Loaded Projectiles; with Solid Projectile; without Projectiles; with Tear Gas Projectiles, Class B Explosives; with Explosives Projectiles; with Gas Projectiles; with Illumination Projectiles; with Incendiary Projectiles; with Smoke Projectiles and with Tear Gas Projectiles, Class A Explosives. Package in strong wooden or metal containers, or plastic containers approved by military specifications or drawings.

A27.3. Ammunition for Small Arms with Incendiary Projectiles and Ammunition for Small Arms with Explosives Projectiles. Package in strong wooden or metal containers approved by military specifications or drawings not to exceed 175 pounds gross weight.

A27.4. Black Powder and Low Explosives.

A27.4.1. Metal kegs, DOT 1, not less than 7 inches long. Net weight not less than 6 ¼ pounds and no more than 150 pounds.

A27.4.2. Wooden boxes, DOT 14, 15A, 16A, or 19B with inside fiber or metal containers, not over 1 ½ pound capacity each, or cotton bags at least 4-ounce cotton duck not over 25-pounds capacity each. The maximum gross weight must be 140 pounds for DOT 14 and 200 pounds for DOT 15A, 16A, or 19B wooden boxes.

A27.4.3. Wooden boxes, DOT 14, 15A, 16A, or 19B with inside cylindrical fiber cartridge not over 5 inches in diameter nor over 18 inches long, with fiber at least 0.05 inch thick paraffined on outer surface, with joints securely glued or cemented, or strong paraffined paper cartridges not over 12 inches long authorized only for compressed pellets (cylindrical block) seven-eighths of an inch or more in diameter. Boxes must be completely lined with strong paraffined paper, or other suitable waterproofed material, without joints or other openings at the bottom or sides. Authorized gross weight must not be over 75 pounds.

A27.4.4. Fiberboard boxes, DOT 12H, 23F, or 23H, with inside cylindrical fiber cartridges not over 5 inches in diameter nor over 18 inches long, with fiber at least 0.05 inch thick paraffined on outer surface with joints securely glued or cemented, or strong paraffined paper cartridges not over 12 inches long authorized only for compressed pellets (cylindrical block) seven-eighths of an inch or more in diameter. Authorized gross weight must not be over 65 pounds.

A27.4.5. Black Powder (not low explosive), in addition to containers specified above, may be shipped in the following specification containers:

A27.4.5.1. Wooden boxes, DOT 14, 15A, 16A, or 19B with inside cloth or paper bags not over 25 pounds net weight. The completed shipping package must be capable of withstanding a drop of 4 feet without rupture of inner or outer containers. The completed package must not contain more than 50 pounds net weight of black powder.

A27.4.5.2. Fiberboard boxes, DOT 12H, 23F, or 23H with inside cloth, paper, or securely closed polyethylene bags constructed of material not less than 0.004 inch thick. The maximum net weight must not exceed 25 pounds for cloth or paper bags and 50 pounds for polyethylene bags. Inside fiber or metal containers not over 1 pound net capacity each may be used, provided the completed shipping package is capable of withstanding a drop of 4 feet without rupture of the inner or outer containers. The tubes of the box may be eliminated and a single tube as specified in DOT 23F may be substituted. The completed package must not contain more than 50 pounds net weight of black powder.

A27.4.6. Black pellet powder, primed with the electric squib, secured inside the coaxial hole of the pellet powder (with loose ends of the wire of the squib effectively short-circuited) may be shipped in wooden boxes, DOT 14, 15A, 16A, or 19B with inside strong paraffined paper cartridges not over 12 inches long, and authorized only for compressed pellets (cylindrical block) seven-eighths of an inch or more in diameter. Boxes must be lined as prescribed for cylindrical fiber cartridges. Gross weight must not be over 65 pounds.

A27.4.7. Low explosives (not black powder), in addition to the containers specified, may be shipped in the following specification containers:

A27.4.7.1. Wooden boxes, DOT 14, 15A, 16A, or 19B with strong paper bags not over 25 pounds capacity. Gross weight of DOT 15A or 16A boxes must not be over 200 pounds. Gross weight of DOT 14 box must not be over 140 pounds.

A27.4.7.2. Fiberboard boxes. DOT 12H, 23F, 23H, with inside strong paper bags not over 25 pounds capacity. Gross weight must not be over 65 pounds.

A27.4.7.3. Wooden boxes, DOT 15A or 19B, lined with paper, DOT 2L. Authorized for rods or cylinders not less than five-eighths of an inch in diameter.

A27.5. Detonators, Class A Explosives and Detonators, Class C Explosives. Detonators must fit snugly in strong inside packaging and must be snugly overpacked in outside containers as specified in A27.5.1 and A27.5.2 below.

- For devices containing no more than 10 grams of explosives (excluding ignition and delay charges):
 - No more than 50 devices may be packed in one inside packaging and no more than 500 devices may be packed in one outside packaging.
 - The gross weight of the completed package must not be over 150 pounds or the gross weight permitted by the specification for the outside packaging used, whichever is less.

- For detonators that are blasting caps (including percussion activated) or delay connectors in metal tubes, the packaging must be as specified below. Also:
- Open ends of any device must be covered with an appropriate cushioning material.
 - Inside packaging must fit snugly in intermediate packagings consisting of cartons or wrappings made of paper, plastic, or pasteboard.
 - Intermediate packagings must be separated from the outside packaging by at least 1 inch of cushioning material.
- For devices containing no more than 3 grams of explosives (excluding ignition and delay charges):
 - No more than 110 devices may be packed in one inside packaging; and,
 - No more than 5,000 devices may be packed in one outside packaging.
- Detonators that are electric blasting caps, delay connectors in plastic sheaths, or blasting caps with empty plastic tubing containing no more than 3 grams of explosives (excluding ignition and delay charges) must be packed with no more than 100 devices in one inside receptacle and no more than 1,000 devices in one outer container.
- Detonators that are blasting caps with safety fuse, blasting caps with metal clad mild detonating cord, blasting caps with detonating cord, or blasting caps with shock tubes are not required to be attached to the safety fuse, metal clad mild detonating cord, detonating cord, or shock tube, and inside packagings are not required if the packagings configuration restricts freedom of movement of the caps and protects them from impact forces. Quantity limitations do not apply to Detonators, Class C Explosives. Container weight limitations do apply.

A27.5.1. Wooden boxes DOT 14, 15A, 16A, or 19B.

A27.5.2. Fiberboard boxes DOT 12H, 23F, or 23H.

A27.6. Detonating Fuzes, Class A Explosives; Booster, Explosive; Burster, Explosive and Supplementary Charges, Explosive. Package in well secured strong tight wooden or metal boxes approved by military specifications or drawings.

- The gross weight of an outer package containing detonating fuzes, Class A, must not exceed 190 pounds.
- Boosters, bursters, and supplementary charges, without detonators, when shipped separately, must not exceed 300 pounds gross weight.
- A fuze with any radioactive component must also meet requirements of Attachment 11.

A27.7. Small Arms Primer; Cannon Primer; Combination Primer; Percussion Cap; Grenades Empty, Primed.

A27.7.1. Package primers (cannon, combination, and small arms), percussion caps, and empty grenades, primed, in strong, tight outside wooden boxes with special provisions for securing the individual packages against movement within the exterior containers.

A27.7.2. Package empty cartridge cases, primed, in strong, tight outside wooden or fiberboard boxes or in DOT21C fiber drums. Each drum must be constructed to the specification requirements for a drum containing at least 250 pounds net weight. Each drum having a metal top or bottom must have a protective corrugated paperboard pad inserted between the contents and the metal.

A27.7.3. Small arms primers containing anvils must be packed in:

A27.7.3.1. Cellular Inside Packages. Packages with partitions separating the layers and columns of the primers so that the explosion of a portion of the primers in the completed shipping packages do not cause the explosion of all primers. They also must be packed in outside containers as stated in A26.7.1. or in fiberboard boxes, DOT 12B, equipped with a corrugated fiberboard liner. The bursting test of the liner must be equal to or over that of the box. The exception is that a liner is not required for a full telescopic style box that may be closed with pressure sensitive tape as specified for DOT 12B. Not more than 5,000 primers may be packed in one outside fiberboard box.

A27.7.3.2. Fiberboard boxes, DOT 23H. Each box must be full depth telescopic style, with top section having extended end flaps and bottom section having extended side flaps, set up without glued or stapled joints. The full height inside perimeter liner, top and bottom pads must be made of doublewall corrugated fiberboard. Hand-holes not more than 4 inches by 1 inch, horizontal with top score line are authorized in the ends of boxes. Package primers in cellular inside packages with partitions separating the layers and columns to form a tight fitting pack in the outside container. Do not pack more than 50,000 primers in one outside box.

A27.7.4. Small arms primers and percussion caps may be packed with nonexplosive and nonflammable articles, or with small arms ammunition as provided in A26.27. Small arms primers may be included with propellant explosive (solid), class B, in the same outside container as provided in A26.24.2. The weight of the small arms primers or percussion caps must not exceed 5 pounds per shipping container. Percussion caps must be packaged in metal or

other inside boxes. Do not pack more than 500 caps in inside boxes. The construction of the cap or packaging, and the kind and quantity of explosives in each, is such that the explosion of a part of the caps in the completed package does not cause the explosion of all the caps. Package percussion caps in fiberboard boxes, DOT 12B, also:

A27.7.4.1. Do not pack more than 100 caps each in inside metal cans. Not more than 10 metal cans each must then be overpacked in a chipboard box. Pack no more than five chipboard boxes in the 12B fiberboard box. The completed package must be such that an explosion of a part of the caps will not cause the explosion of all the caps.

A27.7.4.2. Pack no more than 100 caps each in inside plastic cans. The plastic cans must then be packed in a chipboard box with not more than eight such chipboard boxes tightly packed in the DOT 12B fiberboard box. The completed package must be such that an explosion of part of the caps will not cause the explosion of all of the caps. The gross weight of one outside package must not be more than 150 pounds.

A27.8. Fuze, Combination; Fuze, Percussion; Fuze, Time; Fuze, Tracer; or Tracer. Package in strong, tight, outside wooden boxes, triple-wall fiberboard boxes, or DOT 23F fiberboard boxes. Special provisions must be made for securing individual packages of fuzes or tracers against movement in the box. The gross weight of each wooden or fiberboard box must not be more than 150 pounds. The gross weight of each DOT 23F fiberboard box must not be over 65 pounds.

A27.9. Common Fireworks, Signal Flares, Hand Signal Devices, Smoke Signals, Smoke Candles, Smoke Grenades, Smoke Pots, and Very Signal Cartridges must be packaged as follows:

A27.9.1. Wooden boxes, DOT 15A, 16A, 19A, or 19B. The gross weight must not be over 100 pounds, however, a gross weight of 500 pounds is authorized for wooden boxes with very signal cartridges only.

A27.9.2. Fiberboard boxes, DOT 12B. The gross weight of fiberboard boxes must not be over 65 pounds.

A27.9.3. Watertight, aluminum drums, 8 inches in diameter, having a rubber gasket and a positive closure. These are authorized only for smoke pots.

A27.9.4. Smoke signals may be packed two each in a Navy-designated preformed polystyrene container banded with pressure-sensitive tape. Pallet loads must have a 2-foot high, ¼-inch plywood border around the lower portion of the load. Each polystyrene case may be overwrapped in a heat-sealed polystyrene bag. The minimum thickness of the bag must be 0.006 inch. Eighteen such containers may be consolidated in a MIL-B-43096, type II, class 2, wirebound wooden box. Each face of the box must be lined with PPP-F-320, type W6C or equal fiberboard.

A27.9.5. Fireworks, such as sparklers, with match tip or head, or similar igniting point or surface, must have each individual tip, head, or similar ignition point or surface entirely covered and securely protected against accidental contact or friction. Except as otherwise specified above, the gross weight of one outside package containing common fireworks must not be over 100 pounds.

A27.10. Cord, Detonating; Fuse, Mild Detonating, Metal Clad; and Flexible Linear Shaped Charges, Metal Clad. Package in wooden or fiberboard boxes or shipping containers approved by military specification or drawings.

A27.11. Detonating, Fuzes, Class C Explosives. Packaging requirements:

A27.11.1. Package in fiberboard boxes, DOT 12H, with or without liners, with well-secured inside paperboard cartons. Suitable filler or lining materials must be used to prevent movement in the box.

A27.11.2. In well-secured, strong, tight outside wooden or metal boxes approved by military specification or drawing. The gross weight of the outside wooden or metal box must not be over 190 pounds.

A27.12. Detonating Primers, Class A Explosives and Detonating Primers, Class C Explosives. Packaging requirements:

A27.12.1. Wooden boxes, DOT 14, 15A, 16A, or 19B, or fiberboard boxes DOT 12H, 23F, or 23H.

A27.12.2. Shipping containers approved by military specification or drawing.

A27.13. Explosive Bomb; Explosive Mine; Explosive Projectile; Explosive Torpedo; Grenade, Hand, Explosive; and Grenade, Rifle, Explosive. Packaging requirements:

A27.13.1. Pack and secure explosive bombs, mines, projectiles, torpedoes, or grenades in strong wooden or metal boxes, except as provided in (2) below.

A27.13.2. Explosive bombs, mines, projectiles, torpedoes, over 90 pounds in weight, and explosive projectiles of not less than 4 ½ inches in diameter, may be shipped unboxed if securely fastened to pallets or securely blocked and braced.

A27.13.3. Pack and secure bombs, grenades, or projectiles containing gas, smoke, or incendiary charges and bursting charges in strong wooden or metal boxes.

- The gross weight of a box containing more than one grenade or mine must not be over 250 pounds.
- The gross weight of a shipping container with more than one explosive bomb, warhead, or projectile must not be over 1,400 pounds.

A27.13.4. Package XM47, XM42, XM42E1, and SX54 mine-dispensing subsystem and XM2, XM12, XM12E1, XM12E2/E3, and XM17 canisters in wooden or metal containers. The following special shipping procedures apply:

- Wooden containers must not be stacked more than three high with a minimum of 3 feet of space above the top containers. Containers must be positioned in aircraft to allow a minimum of 2 feet of space in front of the container inspection door. Tiedown of containers must be such that access to inspection door is not denied (nets are not considered an obstruction); and
- Gross weight of wooden container must not be over 675 pounds.

A27.13.5. BLU 50/B bomblets are packaged in specially designed fiberboard lined plywood boxes. Inside containers consist of ten each bomblets in snug fitting, preformed polyurethane cushioning in a heat-sealed barrier bag.

A27.13.6. Explosive mines may be packaged in metal drums, PA 16, with 14 inside can assemblies with perforated tops, a preformed packing and two base assemblies. Drums must be filled with liquid freon. Two liquid level sight gauges must be located in the top half of the drum for visual monitoring of the liquid level.

A27.13.7. Explosive mines may be packaged in metal drums, PA 17, with inside preformed packing designed to hold mines below liquid freon level. Drums must be filled with liquid freon. Two liquid level sight gauges must be located in the top half of the drums for visual monitoring of the liquid level.

A27.13.8. Package CDU-4/B (SM41E1), CDE-5/B (XM40ES), CDU-10 (XM40ES/SM44) and CDU-14/B (XM64) in wooden boxes approved by military specification or drawing. CDUs must be filled with liquid freon and level electrically monitored.

A27.13.9. Explosive bomb, further described as 7.2 inch projector charge, may be shipped assembled to a 40-by 48 inch steel pallet having a gross weight of approximately 2,000 pounds.

A27.13.10. Package explosive bombs, CBU-55/B, containing explosive components and fuel (ethylene oxide) in a CNU-120/E container.

A27.13.11. Package explosive bombs, CBU-55/B, without fuel, in a CNU-120/E container.

A27.13.12. Explosive bombs, CBU-33/A, may be packed in plastic containers CNU-104/E conforming to MIL-P-22748A, class A, grade 6. Loaded containers must not be over 1,200 pounds gross weight.

A27.14. Explosive Cable Cutters; Explosive Power Device, Class C; Explosive Release Device, or Starter Cartridges, Jet Engine, Class C Explosive. Packaging Requirements:

A27.14.1. Fiberboard boxes, DOT 12H, 23F, or 23H. The maximum gross weight must not be over 65 pounds.

A27.14.2. Wooden or metal boxes must be approved by military specification or drawings. Starter cartridges, jet engine, must have igniter wires short-circuited when packed for shipment.

A27.15. Explosive Rivets. Package explosive rivets, containing not more than 375 milligrams of explosive composition each, in unit containers or paperboard. Pack the unit containers or paperboard in strong wooden, fiberboard or metal containers approved by military specification or drawings.

A27.16. Actuating Cartridges, Explosive, Fire Extinguisher or Actuating Cartridge, Explosive, Valve. Package in strong wooden or fiberboard boxes.

A27.17. Special Fireworks. Packaging Requirements:

A27.17.1. Wooden boxes, DOT 15A, 15B, 16A, 19A, or 19B. The maximum gross weight must not be over 500 pounds.

A27.17.2. Fiberboard boxes, DOT 12B. The maximum gross weight must not be over 65 pounds. Illuminating projectiles and aeroplane flares are not permitted in DOT 12B boxes.

A27.17.3. Package flash or spreader cartridges with not more than 72 grains of flash powder in inside fiberboard cartons or tin cans containing not over six cartridges. Pack no more than 150 inside containers in outside DOT 15A, 16A, 19A, or 19B wooden boxes or DOT 12B fiberboard boxes.

A27.17.4. Package assembled flash cartridge consisting of a paper cartridge shell, small arms primer, and flash composition in inside cartons. The flash composition in the one-piece assembled and ready for firing flash cartridge must not be over 180 grains. Do not pack more than 12 cartridges each in the inside cartons. A maximum of 12

inside cartons may be packed in DOT 15A, 15B, 16A, 19A, or 19B wooden boxes or DOT 12B fiberboard boxes. Flash cartridges, in quantities not over 5 pounds, packaged in small interior wooden boxes, may be packed with nonexplosive, nonflammable, and noncorrosive items.

A27.17.5. Unit pack no more than six flash sheets in an inside container. Intermediate pack no more than 12 unit packages in a pasteboard box or carton and packed in a DOT 15A, 16A, 19A, or 19B wooden box or DOT 12B fiberboard box. The gross weight of wooden boxes must not be over 150 pounds. The gross weight of fiberboard boxes must not be over 65 pounds.

A27.17.6. Package photographic flash powder in specification containers as specified in A26.17.3, except the inside container must be strong enough to hold up to 2 ounces each of contents. If bottles are used, each bottle must be packed in a securely closed fiber mailing tube with metal ends. Not more than forty eight 2-ounce bottles may be packed in an exterior wooden box. When packed in units not over 1-ounce each without bottles in similar fiber mailing tubes and exterior wooden boxes, the gross weight of each exterior box must not be over 150 pounds. The gross weight of exterior fiberboard boxes must not be over 65 pounds.

A27.17.7. Package toy torpedoes in wooden boxes, DOT 15A, 15B, 16A, 19A, 19B, or fiberboard boxes DOT 12B containers. Not more than 20 one-quarter gross cartons totaling not more than five gross of toy torpedoes are authorized per fiberboard box. The gross weight of a fiberboard box must not be over 35 pounds. The gross weight of a wooden box must not be over 65 pounds.

- Do not pack toy torpedoes of any kind with other fireworks.
- Pack toy torpedoes containing a cap in sawdust in inside paper or cardboard cartons. The size of the carton must not be less than 4 cubic inches for each grain of explosive.
- Pack toy torpedoes containing a mixture of potassium chlorate, black antimony, and sulfur, in an inner container containing not more than 36 torpedoes. The capacity of this inner container must be at least 105 cubic inches, and it must be divided into 12 equal compartments. All vacant space inside the container must be filled with sawdust or fine shavings.

A27.17.8. Ship distress signals may be packed in outside DOT 12 fiberboard boxes provided:

- They are packed in inside metal containers. These containers must be made from at least 24 gauge sheet iron or other metal of equal strength.
- The inner container is closed by positive means (not friction).
- Inside containers completely fill the outside container.
- The gross weight is not over 95 pounds.

A27.17.9. Marine location markers (eight each) and aircraft flares (two each) may be packed two each in a Navy-designed, preformed polystyrene container banded with pressure-sensitive tape. Pallet loads must have 2-feet high, ¼-inch plywood border around the lower portion of the load. Polystyrene case may be overwrapped in heat sealed polyethylene bag .006 inch thickness minimum. Consolidate 18 such containers in a wirebound wood box MIL-B-43096, type II, class 2, lined top, bottom and sides with fiberboard, PPP-F-320, grade W6c or equal.

A27.17.10. Illuminating projectiles, incendiary projectiles, and smoke projectiles over 90 pounds in weight each, or of not less than 4 ½ inches in diameter, may be palletized. Securely block and brace the palletized load according to methods prescribed by the responsible military department. A shipment container is not required.

A27.17.11. Illuminating projectiles, incendiary projectiles, and smoke projectiles less than 4 ½ inches in diameter may be shipped without being boxed, when palletized and securely blocked and braced with methods prescribed by the responsible military department.

A27.17.12. MK27 Mod O guided missile flares or MK28-3 target flares may be packed in MK2 Mod O metal boxes.

A27.17.13. Practice or exercise warheads containing polytechnics may be shipped two each in a metal box (MK34, Mod O) with a gross weight over 65 pounds.

A27.17.14. Flares may be packed in flame-retardent polystyrene cases. The polystyrene cases must be shipped palletized, covered with plywood or wirebound sheathing secured with steel strapping.

A27.18. High Explosives.

- High explosives, consisting of a liquid mixed with an absorbent material, must have the absorbent (wood pulp or similar material) in sufficient quantity and be of satisfactory quality, and properly dried at the time of mixing. Nitrate of soda must be dried at the time of mixing to less than 1 percent of moisture; and the ingredients must be uniformly mixed so that the liquid will remain thoroughly absorbed under the most unfavorable atmospheric conditions incident to transportation.
- High explosives containing nitroglycerin or other liquid explosive ingredients must be uniformly mixed with an absorbent material and a satisfactory antacid. The antacid must be in sufficient quantity to have the

neutralizing power of an amount of magnesium carbonate equal to 1 percent of the nitroglycerin or other liquid explosive ingredient.

- High explosive cartridges consist of a column of explosives completely enclosed in a shell made of strong paper or polyethylene or a combination of paper and polyethylene, treated so that it will not absorb the liquid ingredient of the explosive.
- High explosive packaged bags made of strong paper of equally efficient material so treated or of such nature that it will not absorb the liquid ingredient of the explosive.
- High explosives packed in boxes which must be lined with strong, paraffined paper or other suitable material. The lining must be without joints or other openings or with cemented joints at the bottom, ends, or sides of the boxes. For explosives with liquid ingredients, the lining must be impervious to such ingredients and also to water. Box covers must be protected from contact with explosives by lining paper or other suitable material.
- Gelatine explosives in cartridges or bags must also have dry fine wood pulp or sawdust at least $\frac{1}{4}$ of an inch in depth spread over the bottom of the box or the bottom of the box may have a full area pad formed of an absorptive cellulose sheet which has a nitroglycerin absorptive value equivalent to sawdust as specified. Similar materials are required in boxes for packing all non-gelatinous types of explosives containing 30 percent or more of liquid explosive ingredient.
- Except for high explosive (gelatin dynamite) in cartridges, all cartridges of high explosives exceeding 4 inches in length and containing more than 10 percent of a liquid explosive ingredient must be placed horizontally in boxes. Pack bags with their filling holes up.
- Prevent movement of high explosives contained in cartridges and bags within the boxes by sufficiently tight packing.
- High explosive (dynamite), except gelatin dynamite, packed in bags or in cartridges over 2 inches in diameter and containing not more than 30 percent liquid explosive ingredients may be packed in outside containers without sawdust and without lining paper, provided each inside or outside container is siftproof and is treated to prevent penetration by the commodity with which the container is filled for shipping.

A27.18.1. Liquid High Explosives Must Be Packed In DOT 15L wooden boxes and DOT 15M wooden boxes. The inside metal containers in the DOT 15M containers cannot contain more than 10 quarts of liquid explosives each.

A27.18.2. High Explosives with Liquid Explosive Ingredients.

A27.18.2.1. Package high explosives (dynamite) containing no more than 30 percent liquid explosive ingredients in the following specification containers.

A27.18.2.1.1. Fiberboard boxes, DOT 23G, with no more than one cartridge in each box. The gross weight of the boxes must not be over 65 pounds.

A27.18.2.1.2. Wooden boxes, DOT 14, 15A, 16A, 19B or fiberboard boxes, DOT 12H, 23F, or 23H with inside containers, which must be cartridges or bags. Inside cartridges must not be more than 12 inches in diameter by 36 inches in length or 50 pounds gross weight. Inside bags not over 50 pounds must be securely closed to prevent leakage of contents. The gross weight of wooden boxes must not be over 75 pounds and the gross weight of fiberboard boxes must not be more than 65 pounds.

A27.18.2.1.3. Fiberboard boxes, DOT 23F or 23H, having one inside 26-gauge metal container, measuring not over 8 inches in diameter and 31 inches in length, containing high explosives (ammonium dynamite core) surrounded by a blasting agent. Gross weight must not be more than 65 pounds.

A27.18.2.2. High explosives (dynamite) containing 10 percent or less of a liquid ingredient must be prepared for shipment as follows:

A27.18.2.2.1. Packed in DOT 14, 15A, 16A, or 19B wooden boxes or in DOT 12H, 23F, or 23H fiberboard boxes. The gross weight must not be more than 140 pounds.

A27.18.2.2.2. Fiberboard boxes, DOT 23G, with no more than one cartridge in each box. The gross weight of the box must not exceed 65 pounds.

A27.18.2.3. Pack high explosives (dynamite) containing more than 30 percent liquid explosive ingredients in specification containers as follows:

A27.18.2.3.1. Wooden boxes (maximum gross weight 75 pounds), DOT 14, 15A, 16A, or 19B or fiberboard boxes, DOT 12H, 23F, or 23H, with inside containers that consist of:

- Cartridges not over 4 inches in diameter and not over 8 inches in length.
- Cartridges having a diameter of 4 to 5 inches and between 8 and 10 inches in length must be redipped in melted paraffin or equivalent material.

- Two or more cartridges that must be redipped because of their size must be enclosed in another strong paper shell to form a completed cartridge not more than 30 inches in length. The resulting cartridge must be dipped in melted paraffin or equivalent.
- The gross weight of wooden boxes must not be more than 75 pounds and the gross weight of fiberboard boxes must not be more than 65 pounds.

A27.18.2.3.2. In wooden or fiberboard specification boxes as prescribed in A26.18.2.3.1. Inside containers may be paper or polyethylene bags meeting the following conditions:

- Paper bags:
 - Must be paraffined two-ply paper not over 12 ½ pounds capacity, securely closed by folding the tops and securing the fold by tape.
 - Must insert no more than two such bags into another two-ply paper bag that must be securely closed and dipped in paraffin after closing.
- Polyethylene bags:
 - Must not be less than 0.0004 inches in thickness and no more than 12 ½ pounds capacity each.
 - Must not be more than two such securely closed bags packed in an intermediate polyethylene or paper bag. Securely close the polyethylene or paper bag and pack in polyethylene lined outside fiberboard boxes.
- The gross weight of wooden boxes must not be over 75 pounds, and the gross weight of fiberboard boxes must not be over 65 pounds.

A27.18.2.4. High explosives (gelatin dynamite and blasting gelatin) packed in specification containers as follows:

A27.18.2.4.1. Fiberboard boxes, DOT 23G, with no more than one cartridge in each box. Gross weight of boxes must not be over 65 pounds.

A27.18.2.4.2. Wooden boxes, DOT 14, 15A, 16A, or 19B or fiberboard boxes, DOT 12H, 23F, or 23H with inside cartridges or bags. The cartridges must not be more than 12 inches in diameter by 36 inches in length or 50 pounds in weight. Bags not completely sealed against leakage must be packed with filling holes up. The gross weight for wooden boxes must not be over 75 pounds, and the gross weight of fiberboard boxes must not be over 65 pounds.

A27.18.2.4.3. High explosives (straight gelatin dynamite of 80 percent strength and over and blasting gelatin) are packed in cartridges, or in bulk in outside boxes. When packed in bulk, boxes must be double lined throughout with paper and packed in wooden boxes, DOT 14, 15A, 16A, or 19B or 23 H. Pack DOT 23G fiberboard boxes in an outer container consisting of at least seven-ply heavy kraft paper. Two 3-mil polyethylene bags, one within the other, may be used in place of the double-lining paper when a DOT 12H is the outside container. Not more than one such double bag may be packed in DOT 12H fiberboard box. The gross weight of wooden boxes must not be more than 75 pounds and the gross weight of fiberboard boxes must not be over 65 pounds.

A27.18.3. High explosives with no liquid explosive ingredient and propellant explosives, class A. Packaging requirements:

A27.18.3.1. Wooden boxes, DOT 14, 15A, 16A, or 19B. The gross weight must not be more than 140 pounds.

A27.18.3.2. Fiberboard boxes, DOT 12H, 23F, or 23H. The gross weight must not be more than 65 pounds.

A27.18.3.3. Boxes must have an inside polyethylene bag having a minimum thickness of 6 mils, or must be lined with strong paraffined paper or other authorized material, DOT 2L. When such explosives contain over 5 percent moisture, boxes with handholes are not authorized.

A27.18.3.4. Outside boxes. When such explosives are in combination cartridges, consisting of a column of explosive with core of dynamite, they may be shipped when packed in outside boxes. The gross weight must not be over 65 pounds. The column of explosives must be completely enclosed in waterproofed cloth or waterproofed paper, and must not be more than 6 inches in diameter, 2 inches in length, or 25 pounds gross weight.

A27.18.3.5. Fiberboard boxes, DOT 23G. Gross weight of the box must not be over 65 pounds.

- The high explosives sensitiveness to percussion must not be greater than that measured by the blow delivered by an 8 pound weight dropping from a distance of 7 inches on a compressed pellet of the explosive 0.03 inch thick and 0.2 inch diameter. The compressed pellet is confined rigidly between hard steel surfaces as in standard Impact Testing Apparatus of the Bureau of Explosives during the test. Pack the high explosives in cartridges when their sensitiveness is greater than the limit prescribed herein. Such explosives, when dry, may be packed in strong siftproof cloth or paper bags of capacity not be over 25 pounds.

A27.18.4. High explosives with no liquid explosive ingredient nor any chlorate. Pack in one of the following outer containers:

- When high explosives contain over 5 percent moisture, the box must have an inside securely closed polyethylene bag having a minimum thickness of 6 mil; or the box must have a DOT 2L lining. Polyethylene is authorized only for materials that do not react with or cause decomposition of the plastic.

- When high explosives are in combination cartridges, consisting of a column of explosives with a core of dynamite, they may be packed in exterior containers with 65 pounds as the maximum gross weight. Completely enclose the column of explosives in waterproofed cloth or strong waterproofed paper, not more than 6 inches in diameter, 20 inches in length, or a gross weight of 25 pounds.
- Sensitiveness to percussion is not greater than that measured by the blow delivered by an 8-pound weight, dropping from a distance of 7 inches, or compressed pellet of the explosive 0.03-inch thick and 0.20-inch diameter, confined rigidly between hard steel surfaces as in the Standard Impact Testing Apparatus of the Bureau of Explosives. The requirement of packaging in cartridges, bags, or metal containers does not apply to plastic-bonded explosives. Pack and cushion to prevent movement of individual pieces within the outside shipping container. Pack in cartridges when their sensitiveness is greater than the limit prescribed in this section. Such explosives, when dry may be packed in strong siftproof bags, securely closed to prevent leakage, or in metal containers of capacity not over 60 pounds.

A27.18.4.1. Wooden boxes, DOT 14, 15A, 16A, or 19B. Gross weight must not be over 140 pounds. Wooden boxes, having inside metal containers that are tightly and securely closed, may be equipped with handholes in each end that must not be more than 1- by 4-inches and centered laterally not nearer than 1 5/8 inches from top edge of box.

A27.18.4.2. Fiberboard boxes, DOT 12H, 23F, 23G, or 23H. Gross weight must not be over 65 pounds.

A27.18.4.3. Metal drums (single-trip) DOT 17H or 37A having a minimum 0.003-inch thick polyethylene liner. Authorized only for Ammonium Perchlorate with particle size of 5 to 15 micrometers. Maximum capacity is 30 gallons.

A27.18.5. Amatol consisting of 80 percent ammonium nitrate and 20 percent Trinitrotoluene, Ammonium Picrate, Nitroguanidine, Nitrourea, Urea Nitrate, Picric Acid, Tetryl, Trinitroresorcinal, Trinitrotoluene, Pentolite, Cyclotrimethyltrinitramine (desensitized), and Soda Amatol, in dry condition, may be shipped in containers with the following specifications:

A27.18.5.1. Those described in A26.18.4.

A27.18.5.2. Wooden boxes, DOT 14, 15A, 16A, or 19B, with strong paper or cloth bags of capacity not over 50 pounds, packed with filling holes up.

A27.18.5.3. Fiber drums, DOT 21C. Net weight not over 200 pounds.

A27.18.6. Trinitrotoluene and Pentolite in dry condition.

A27.18.6.1. Packed in containers described in A26.18.4.

A27.18.6.2. Packed in containers described in A26.18.5.

A27.18.6.3. Wooden boxes, DOT 14, 15A, 16A, 19B, or with strong paper or cloth bags of capacity not over 100 pounds, packed with filling holes up.

A27.18.6.4. Wooden boxes, DOT 14, 15A, 16A, or 19B, with strong siftproof liners, DOT 2L.

A27.18.6.5. Fiber drums, DOT 21C. Net weight must not be over 200 pounds.

A27.18.6.6. The following materials may be shipped dry, in quantity not more than 4 ounces in one outside package for medical purposes or as reagents, as drugs, medicines, or chemicals without other restriction, when in securely closed bottles or jars properly cushioned to prevent breakage:

- Ammonium picrate
- Dipicrylamine
- Dipicryl sulfide
- Dinitrophenylhydrazine
- Nitroguanidine
- Picramide
- Picric acid
- Picryl chloride
- Trinitroanisole
- Trinitrobenzene
- Trinitrobenzoic acid
- Trinitro-m-cresol
- Trinitronaphthalene
- Trinitroresorcinol
- Trinitrotoluene
- Urea nitrate
- Triaminotrinitrobenzene
- Trichlortrinitrobenzene and

- Hexanitrostilbene

A27.18.7. Ammonium Picrate, Picric Acid, Urea Nitrate, Trinitrobenzene, Trinitroresorcinol, Trinitrotoluene, Cyclotrimethylenetrinitramine, Cyclotetra-methylenetetranitramine, Pentaerythrite Tetranitrate (desensitized), or Trinitrobenzoic Acid when wet with not less than 10 pounds of water to each 90 pounds of dry material must be shipped in containers to comply with the following specifications:

A27.18.7.1. Metal barrels or drums, DOT 5B, or fiber drums, DOT 2C. Authorized only for Cyclotrimethylenetrinitramine or Cyclotetra-methylenetetranitramine, wet with not less than 10 pounds of water to each 90 pounds of dry material in inside containers which must be bags made of at least 10-ounce cotton duck rubber or rubberized cloth, and securely closed. The dry weight of Cyclotrimethylenetrinitramine or Cyclotetra-methylenetetranitramine in one metal barrel or drum must not be more than 300 pounds and not more than 225 pounds in fiber drums. These bags containing the Cyclotrimethylenetrinitramine or Cyclotetra-methylenetetranitramine each must then be placed in a rubber bag, rubberized cloth bag, or bag made of suitable watertight material that must be securely closed and then placed in the drum. If shipment of cyclotrimethylenetrinitramine is to take place at a time freezing weather is anticipated, it must be wet with a mixture of denatured ethyl alcohol or other suitable antifreeze and water of such proportions that freezing will not occur in transit.

A27.18.7.2. Fiber drum, DOT 21C, with inside polyethylene bag having 0.004 inch minimum thickness and liquid tight closure. Net weight must not be over 200 pounds. Authorized only for wet desensitized Pentaerythrite Tetranitrate.

A27.18.8. Amatol when cast or compressed in a solid block or column, in addition to containers prescribed in A26.18.5 may be shipped in metal drums, DOT 13A, not over 90 pounds gross weight.

A27.18.9. Pack nitrocellulose in wooden boxes complying with DOT 14, 15A, 16A, or 19B, with inside packages that must be:

- Wrapped in strong paraffined paper or suitable sparkproof material, when containing not more than 1 pound each of dry, uncompressed nitrocellulose. Completed outside package must not contain more than 10 pounds of dry nitrocellulose.
- Wrapped in strong paraffined paper when containing compressed sticks or blocks of dry nitrocellulose. Gross weight must not be over 75 pounds.

A27.18.10. Shaped charges, commercial, having exposed lined conical cavities that are covered will be paired together with the cavities facing each other and with one or more pairs in a fiber tube, or so arranged that the conical cavities of the shaped charges at the ends of the column face toward the center of the tube. The shaped charges in the fiber tubes must fit snugly with no excess space in the outside containers. Shaped charges, commercial, must be packed in specification containers as follows:

A27.18.10.1. Wooden boxes, DOT 14, 15A, 16A, or 19B; gross weight must not be over 140 pounds.

A27.18.10.2. Fiberboard boxes, DOT 12H, 23F, or 23H; gross weight must not be over 65 pounds.

A27.18.10.3. Fiberboard boxes, DOT 12B; at least 275 pounds test double-wall corrugated fiberboard, with double-faced corrugated lining board having minimum test of 200 pounds. Individual charges of explosives must be packed in inside securely closed, waterproof plastic containers, or in securely closed waterproof container having metal ends. Inside individual containers must be separated by means of double-faced corrugated fiberboard partitions of material not less than 175 pounds (Mullen or Cady). Gross weight must not be over 65 pounds.

A27.18.10.4. Specially designed Navy steel cylindrical containers possessing a shock mitigation system. One each charge, to a container: four containers properly strapped or banded to a pallet.

A27.18.11. Cyclotrimethylenetrinitramine (RDX) (desensitized) in pellet form, dry may also be packed in specification containers as follows:

A27.18.11.1. Wooden box, DOT 15A or 19B, for pellets $\frac{1}{4}$ of an inch or less in diameter. Pellets must be packed in a slide-type fiber container with perforated fillers. All openings of the container must be securely closed with pressure-sensitive tape. Inside containers must be cushioned with at least 2 inches of sawdust between inner and outer containers. No inside container may contain more than $\frac{1}{2}$ pound net weight of explosive composition, and not more than 10 pounds of net weight explosive composition must be packed in one outside box.

A27.18.11.2. Wooden box, DOT 15A or 19B, for pellets exceeding $\frac{1}{4}$ inch in diameter. Pellets must be packed in a fiber tube with positive closures at both ends, and must be packed in a fiber container having not more than $\frac{1}{2}$ pound net weight of explosive composition. Inside containers must be cushioned with at least 2 inches of sawdust between inner and outer containers. Not more than 10 pounds of net weight of explosive composition must be packed in one outside container.

A27.18.12. Conversion kits, containing Comp. A-3 pellets, must be packed eight each to a fiberboard lined, metal ammunition components box, MK2. Kit components and separately packaged pellets must be securely nested within fiberboard separators in inside fiberboard boxes.

A27.19. Igniter Cord. Pack in strong, tight, outside fiberboard boxes or drums, wooden boxes, or metal containers.

A27.20. Initiating Explosive.

A27.20.1. Diazodinitrophenol or Lead Mononitrosorcinic acid. Packaged wet with not less than 40 percent by weight of water in:

A27.20.1.1. Metal barrels or drums, DOT 5 or 5B, with inside bags made of at least 10-ounce cotton duck, rubber, or rubberized cloth, which must be securely closed. The dry weight of Diazodinitrophenol in one container must not be more than 220 pounds, and the dry weight of lead Mononitrosorcinic acid in one container must not be over 100 pounds. The bags containing Diazodinitrophenol must be placed in a rubber bag, rubberized cloth bag, or bag made of suitable watertight material, and then placed in the barrel or drum. Any empty space in the outside bag must be filled with water, and this bag securely closed. Sufficient outage in the outside container must be allowed to prevent rupturing of the container in freezing weather, or a mixture of denatured alcohol and water may be used to prevent freezing in transit.

A27.20.1.2. Fiber drums, DOT 21C, not over 30-gallon capacity of at least 9-ply construction having in addition, a sheet of steel having a minimum base box of 75 pounds, not less than .008-inch thick, wound between the fifth and sixth plies. The inside ply of kraft paper must be laminated on each side with polyethylene to form a waterproof lining. The bottom head must be of fiber, metal covered on the outside, and must be attached to the body to form a watertight joint.

- Lead Mononitrosorcinic acid must only be packed wet, with not less than 40 percent by weight of water, and must be contained in at least two tightly sealed polyethylene bags of at least 0.004-inch thickness; this unit must then be placed in a tightly closed polyethylene bag of at least 0.004-inch thickness, and this assembly must be placed within a 0.006-inch thickness polyethylene (or other suitable plastic bag) completely filled with water and tightly closed. The 0.006-inch plastic bag must be of such a size as to completely fill the outside shipping container. The dry weight of lead Mononitrosorcinic acid only in one outside container must not be more than 100 pounds.

A27.20.2. Guanyl Nitrosomino Guanylidene Hydrazine. Packed wet with not less than 30 percent by weight of water in metal barrels or drums, DOT 5 or 5B, with inside containers which must be a bag made of 4-ounce duck. Inside the bag, and over the Guanyl Nitrosamino Guanylidene Hydrazine, there must be placed a cap of the same fabric, of the same diameter as the bag. The cap must be securely tied and placed in a strong grain bag and securely tied. The dry weight of Guanyl Nitrosamino Guanylidene Hydrazine in one container must not be over 75 pounds. The bag and contents must be packed in the center of the wooden barrel or keg, metal barrel or drum, and must be entirely surrounded by not less than 3 inches of well packed sawdust saturated with water. The wooden barrel or keg, or metal barrel or drum, must be lined with a heavy close-fitting jute bag, closed by secure sewing to prevent escape of sawdust. The barrel, keg, or drum must be inspected carefully and all leaks stopped. If freezing temperature is anticipated during shipment, use a mixture of denatured ethyl alcohol and water of such proportions that freezing will not occur during transit.

A27.20.3. Lead Azide (dextrinated type or otherwise prepared to effectively control grain size). Packed wet with not less than 20 percent by weight of water. Containers, packaging, and procedures are the same as prescribed in A26.20.2. except that the dry weight of Lead Azide in one container must not be over 150 pounds. The same freezing precautions apply.

A27.20.4. Lead Styphnate (Lead Trinitrosorcinic acid) or Barium Styphnate, Monohydrate. Packed wet with not less than 20 percent by weight of water in metal barrels or drums, DOT 5, 5B, or 17H with inside containers that must be a bag of rubber or rubberized cloth.

- The Lead Styphnate or Barium Styphnate, Monohydrate within this bag should be divided into a number of smaller packages. There must be a cap of the same material and of the same diameter as the bag over the Lead Styphnate and inside the bag.
- The dry weight of Lead Styphnate or Barium Styphnate, Monohydrate in one outer container must not be over 150 pounds. The bag and contents must be packed in the center of the metal barrel or drum, and must be entirely surrounded by not less than 3 inches of well packed sawdust saturated with water.
- The metal barrel or drum must be lined with a heavy, close-fitting, jute bag closed by secure sewing to prevent escape of sawdust. The barrel or drum must be inspected carefully and all leaks stopped.

- If freezing temperature is anticipated during shipment, use a mixture of denatured ethyl alcohol and water of such proportions that freezing will not occur during transit.

A27.20.5. Nitro Mannite. Packed wet, with not less than 40 percent by weight or water container and packaging procedures are the same as A26.20.1. except that the dry weight of Nitro mannite in one container must not be over 100 pounds. The same freezing precautions apply.

A27.20.6. Nitrosoguanadine. Packed wet with not less than 10 percent by weight of water in metal barrels or drums, DOT 5, 5B, or 17H with inside strong cloth bag. The dry weight of Nitrosoguanidine in one container must not be over 75 pounds.

A27.20.7. Pentaerythrite Tetranitrate. Packed wet with not less than 40 percent by weight of water. Container and packaging procedures are outlined in A26.20.1. Except that the dry weight of Pentaerythrite Tetranitrate in one container must not be over 300 pounds. The same freezing precautions apply.

A27.20.8. Tetrazene. Packed wet with not less than 30 percent by weight of water. Container and packaging are the same as A26.20.2. The dry weight in one container must not be more than 75 pounds. The same freezing precautions apply.

A27.20.9. Fulminate of Mercury. Packed wet with not less than 25 percent by weight of water in DOT 5, 5B, or 17H metal drums or barrels with inside bag made of 4-ounce duck.

- Inside the bag and over the Fulminate, there must be placed a cap of the same fabric and of the same diameter as the bag. The bag must be securely tied and placed in a strong grain bag. This grain bag must also be securely tied.
- The dry weight of Fulminate in one container must not be over 150 pounds. Pack the bag and contents in the center of the wooden barrel, keg, or drum, entirely surrounded by not less than 3 inches of well-packed sawdust saturated with water.
- The barrel or drum must be lined with a heavy, close fitting jute bag closed by secure sewing to prevent escape of sawdust. Inspect the barrel or drum carefully, to stop all leaks.
- If shipment of Fulminate of Mercury is to take place at a time that freezing weather is to be anticipated, use a mixture of denatured ethyl alcohol and water of such proportions that freezing will not occur in transit.

A27.21. Rocket motors; Jet Thirst Units; Igniters, Rocket Motors; or Igniters, Jet Thrust (Class A Explosives). Package in:

A27.21.1. Wooden boxes or wooden boxes fiberboard lined, DOT 14, 15A, 15E, 16A, or 19B.

A27.21.2. Metal Containers, MIL-D-6054 or other metal containers approved by the DOT.

- Igniters or igniter components may be shipped in the same outside container with the rocket motor or jet thrust unit if separately packed in unit package (metal can, fiberboard box, etc).
- Rocket motors must be shipped in nonpropulsive state. When military air shipment of a rocket motor in a propulsive state is required, the shipper must obtain written approval from hazard classification authority listed in TB 700-2/NAVSEAINST 8020.8B/T.O. 11A-1-47/DLAR 8220.1, DoD Explosive Hazard Classification Procedures.

A27.22. Rocket Motors; Jet Thrust Units; Igniters, Rocket Motors, Igniters, Rocket Motors; Igniters, Jet Thrust; Igniters, Ramjet Engine (Class B explosives) or Starter Cartridge, Jet Engine. Package requirements:

A27.22.1. Wooden boxes or wooden boxes fiberboard lined, DOT 14, 15A, 15E, 16A, or 19B. Packages containing igniters, ramjet engines must not be over 500 pounds gross weight.

A27.22.2. Wooden boxes, DOT 15B, authorized only for igniters, jet thrust (jato) class B or igniters, rocket motor igniters, ramjet engine, class B explosive. Packages containing igniters, ramjet engine must not be over 500 pounds gross weight.

A27.22.3. Service-designated and NAVAIR/NAVSEA-approved wood or metal containers identified by Ordinance Requirement (OR), MIL-STD, or other appropriate container document, and a letter container designated, such as MK and MOD or CNU numbers.

A27.22.4. MIL-D-6054 drums (MS 63052) with specially designated interior blocking and bracing. Authorized for jet thrust units, class B explosives only.

A27.22.5. LAU-10/A Launcher, using unit load adapter MK58, MOD 1 and palletized with WR-54/115C, which consists of 16 units per shipment of rocket motors, class B explosives.

A27.22.6. MK4 metal container with properly designed interior mounting or blocking supports. Authorized for packed one each M77A1 rocket.

A27.22.7. Fiberboard box, DOT 23F, authorized for Igniters, Jet Thrust (jato), Class B, Igniters, Rocket Motor, Class B, or Starter Cartridges, Jet Engine, Class B only which must be packed in tightly closed inside fiberboard

boxes, at least 200 pound test (Mullen or Cady), or metal containers. Starter Cartridges, Jet Engine, must have igniter wires short-circuited when packed for shipment.

A27.22.8. Wooden boxes, specification MIL-B-2427, Grade A, Style 4, Type II, containing eight igniters packed one each in inside hermetically sealed metal containers.

- Igniters or igniter components may be shipped in the same container with jet thrust units. When approved by military specifications or drawings.
- Rocket motors must be nonpropulsive in shipment. When military air shipment of a rocket motor in a propulsive state is required, the shipper must obtain written approval from hazard classification authority listed in TB 70-2/NAVSEAINST 8020.3/T.O. 11A-1-47/DLAR 8220.1, DoD Explosive Hazard Classification Procedures.

A27.23. Railway Torpedoes. Packaging Requirements:

A27.23.1. Wooden boxes, DOT 15A, 15B, 16A, 19A, or 19B are authorized; however, the net weight in wooden boxes must not be over 125 pounds.

A27.23.2. Fiberboard boxes, DOT 12H, 23F, or 23H are authorized; however, the gross weight must not be over 65 pounds.

A27.23.3. Fiberboard boxes, DOT 12B, with inside cartons are authorized. The inside cartons must not contain over 72 track torpedoes each. The gross weight of the exterior fiberboard box must not be over 65 pounds.

A27.23.4. Fiberboard boxes, DOT 12B, without inside containers may be used for not more than 50 track torpedoes provided the smallest dimension of the box is at least 6 inches.

A27.24. Propellant Explosives, Solid or Liquid (Class A or B Explosives). Package Requirements:

A27.24.1. Tight metal cases in tight wooden boxes free from loose knots and cracks, or tight metal containers. Gross weight must not be over 200 pounds.

A27.24.2. Wooden boxes, DOT 14, 15A, or 19B metal lined DOT 2F. Gross weight must not be over 200 pounds.

A27.24.3. Wooden boxes, DOT 14, 15A, 19B, or fiberboard boxes, DOT specifications 23F, or 23H, with inside cloth or paper bags of capacity must not be over 25 pounds net weight. Each bag must be capable of withstanding, when filled, at least 2 drops on end from a height of 4 feet without breaking or sifting of contents. Net weight of contents in outside container must not be over 50 pounds.

A27.24.4. Wooden boxes, DOT 14, 15A, 15B, 15C, 19B, or fiberboard boxes, DOT 12B, or 23H, with inside containers that must be DOT 13 metal kegs. Fiberboard boxes must contain not more than six metal kegs not over 5 pounds net weight each in one outside containers. Gross weight of wooden boxes must not be over 200 pounds, and fiberboard boxes must not be more than 65 pounds.

A27.24.5. Wooden boxes, DOT 14, 15A, 15B, 15C, or 19B fiberboard boxes, DOT 23F or 23H, with inside strong metal containers. A maximum of four inside containers must not be more than 25 pounds each. Gross weight of fiberboard boxes must not be more than 65 pounds.

A27.24.6. Fiber drums, DOT 21C. Drums having wooden heads must contain a strong sift-proof liner. Authorized net weight not over 265 pounds.

A27.24.7. Wooden boxes, DOT 14, 15A, 16A, or 19B not lined, authorized only for grains not less than 1 inch in diameter or 3 inches in length, provided such grains are tightly packed and are coated with a protective material. Gross weight must not be over 200 pounds.

A27.24.8. Other wooden boxes and fiberboard boxes approved by the military services may be used instead of DOT specification containers.

A27.24.9. Wooden boxes, DOT 14, 15A, 15B, 19B, or fiberboard boxes, DOT 12H, 23F, or 23H with inside fiber or metal containers of not more than a 1 ½ pound capacity each. Gross weight of wooden boxes must not be over 200 pounds, and fiberboard boxes must not weigh over 65 pounds.

A27.24.10. Conversion kits, containing Propellant Explosives, Class A, are packed eight each to a fiberboard lined, metal ammunition components box, MK2. Kit components and separately packaged pellets must be securely nested within fiberboard separators.

A27.24.11. Fiberboard boxes, DOT 12H, 23G, or 23H with inside securely closed polyethylene bags having a minimum wall thickness of 6 mils.

A27.24.11.1. Propellant Explosives (Smokeless Powder for Cannon or Small Arms) in water, must be packed in containers to comply with the following specifications:

A27.24.11.2. Metal barrels or drums, DOT 5, 5A, 5B, 6B, or 6C.

A27.24.11.3. Wooden boxes, DOT 15A or 19B, metal lined DOT 2F.

A27.24.12. Pack Propellant Explosives (liquid) in specific containers as follows:

A27.24.12.1. Wooden boxes or wooden boxes fiberboard lined, DOT 15A, 15B, or 15E, with inside polyethylene bottles having taped screw cap closures, not over 1-gallon capacity each. Each bottle must be entirely contained within a polyethylene or other suitable plastic bag formed of material not less than 0.004-inch thickness, with ends securely closed. Each bottle in the plastic bag must be enclosed in a tight metal container, and be surrounded on all sides with at least 2 inches of incombustible cushioning material. Cans in the outside box must also be cushioned from each other and the sides, top, and bottom of the container.

A27.24.12.2. Metal barrels or drums, DOT 5B, 6B, 6C, 6D, or 17C, with inside polyethylene, DOT 2S, container packed inside a strong, tight metal drum and securely closed, or inside glass-lined aluminum carboy not over a 12-gallon capacity. Inside steel or glass-lined carboy must be surrounded on all sides with at least 2 inches of incombustible absorbent cushioning material uniformly distributed. Polyethylene containers are authorized only for liquids that do not react dangerously with plastic or result in container failure.

- Containers must not be entirely filled; sufficient interior space must be left vacant to prevent leakage or distortion of containers due to expansion of the contents from increased temperatures during transit.

A27.24.13. Propellant Explosives (solid) with small arms primers, must be packed as follows:

A27.24.13.1. Inside containers must be tightly closed metal cans or fiber containers, not over 1-pound each or not containing more than one-grain of propellant (not exceeding 5 pounds each). The inside container must be packed to prevent movement within the outside container.

A27.24.13.2. Not more than 1,000 small arms packed as prescribed in A26.7.3. may be included in one outside shipping container with solid propellant explosives. The inside container must be packed to prevent movement within outside container.

A27.24.13.3. Wooden boxes, DOT 15A, 15B, 15C, or 19B.

A27.24.13.4. Fiberboard boxes, DOT 12B, 23F, or 23H. Not more than 10 pounds of propellant explosives may be shipped in one outside container.

A27.24.14. Document destroyer with starter must be packaged as follows:

A27.24.14.1. Metal or fiber drums with inside containers and items consisting of five 20-pound packages of sodium nitrate in kraft bags lined with polyethylene; 2 pounds of sodium nitrate, 0.2-0.4 percent Anticaking Tricalcium Phosphate, and 2 pounds of sugar mixed with ¼ pound of charcoal in kraft bags lined with polyethylene; Two Igniter Incendiary M-25 consisting of the M-201A1 fuse adapted to the M-1 fire starter approximately 1 inch in diameter by 2 ½ inches high cellulose acetate body filled with petroleum jell; one 24-inch two mesh wire screen; safety matches. Net weight of contents must not be more than 120 pounds.

A27.24.14.2. Metal drums (Army drawing D-4 11-34) with inside fiber drums and items consisting of sodium nitrate, a 2-inch tube filled with charcoal, sodium nitrate, and sugar. The inside drum is positioned to form a 2-inch annulus which is filled with sodium nitrate.

A27.25. Rocket Ammunition with (Inert Loaded Projectiles, Solid Projectiles, Empty Projectiles, Explosive Projectiles, Gas Projectiles, Smoke Projectiles, Incendiary Projectiles, or Illuminating Projectiles). Pack in strong wooden or metal containers or aluminum containers approved by military specification or drawings.

A27.26. Small Arms Ammunition and Small arms Ammunition, Tear Gas Cartridges. Pack in pasteboard or other inside boxes, or in partitions designed to fit snugly in the outside container, or pack in metal clips. The partitions and metal clips must be designed to protect the primers from accidental damage. The inside boxes, partitions, and metal clips must be packed in securely closed strong outside wooden or fiberboard boxes or metal containers. Blank industrial power load cartridges may be packed in bulk in securely closed fiberboard boxes.

A27.27. Toy Caps. Toy caps must not contain more than an average of ¼ grain of explosive composition per cap, and must be packed in inside packages constructed of paperboard not less than 0.013-inch thick, or metal not less than 0.008-inch thick, or noncombustible plastic not less than 0.015-inch thick. The material must provide a complete enclosure, and the minimum dimensions of each side or end of such package must be not less than 1/8 of an inch in height.

- The number of caps in an inside package must be limited so that not more than 10 grains of explosive composition is packed into 1 cubic inch of space, and not more than 17.5 grains of explosive composition of toy caps is packed in any inside container.

A27.27.1. Pack Toy Caps In:

A27.27.1.1. Wooden boxes, DOT 15A, 15B, 16A, 19A, or 19B. Gross weight must not be over 150 pounds.

A27.27.1.2. Fiberboard boxes, DOT 12B. Gross weight must not be over 65 pounds.

A27.27.1.3. Wooden boxes in good condition, and weighing not more than 100 pounds gross.

A27.28. Explosive Power Device, Class B. Packing requirements:

- A27.28.1. Wooden boxes or wooden boxes, fiberboard lined, DOT 14, 15A, 15E, 16A, or 19B.
- A27.28.2. Containers authorized by military specification or drawings.

A27.29. Rocket Engine (Liquid), Class B Explosives. Pack in strong, airtight metal containers approved by military specification or drawings. Follow handling instructions and special requirements in A5.74.

A27.30. Cartridge, Practice Ammunition. Pack in inside boxes, partitions, or metal clips to protect primers from accidental firing, then place in:

- A27.30.1. A strong wooden box closed by strapping.
- A27.30.2. A fiberboard box closed by strapping or taping.
- A27.30.3. A metal container.

A27.31. Blasting Agent NOS. Packaging Requirements:

- A27.31.1. Rigid packages (for example, boxes and drums), prepared as for shipment, must be capable of withstanding a 4-foot drop onto solid concrete so as to strike the most vulnerable point on the package without rupture of any loss of contents.
- A27.31.2. Nonrigid packages (for example, tubes and bags), prepared as for shipment, must be capable of withstanding three 4-foot drops onto solid concrete without rupture of any loss of content.

A27.32. Oil Well Cartridges. Pack so that explosive composition is not over 20 grains per cubic inch of space in the following shipping containers:

- A27.32.1. Wooden boxes, DOT 15A, 15B, 16A, 19A, or 19B. Gross weight must not exceed 150 pounds.
- A27.32.2. Fiberboard box, DOT 15B. Gross weight must not exceed 65 pounds.

Table 27.2 DOT/Military Specification Cross Reference.

| DOT Specification | Military/Federal Specification | Description |
|-------------------|--|---|
| 1A | None | Boxed carboys |
| 2C | PPP-B-636, Type CF-DW, 275 | Inside containers, corrugated fiberboard carton |
| 2F | PPP-C-96 | Inside metal container and liner |
| 2L | None | Lining for boxes |
| 2S | MIL-D-40030, Styles A and B | Polyethylene containers |
| 5 | PPP-P-704, Type I, Class 7 and 10 | Steel barrels or drums |
| 5B | PPP-P-704, Type I, Class 4; Type III, Class 7 and 8; PPP-D-729, Type 1, Class A and B | Steel barrels or drums |
| 6B | PPP-D-736, Type III and IV | Steel barrels or drums |
| 6C | None | Steel barrels or drums |
| 6D | PPP-C-1337, Type I, Class 3 and 4, Type II | Cylindrical steel overpack, straight sided for inside plastic container |
| 12B | PPP-B-636, Type CF or SF, V3c | Fiberboard boxes |
| 12H | PPP-B-636, Type CF, V3c, Style FTC | Fiberboard boxes |
| 13 | None | Metal kegs |
| 13A | None | Metal drums |
| 14 | None | Wooden boxes, nailed |
| 15A | PPP-B-621, Styles 1, 2, 2 ½, 6, and 7, MIL-B-2427, Types I, II, III. MIL-B-48024, Type I and II. | Wooden boxes, nailed. |
| 15B | PPP-B-621, Style 1, 2, 2 ½, 6, and 7. MIL-B-2427, Type I, II, III. MIL-B-48024, Type I and II | Wooden boxes, nailed |
| 15C | PPP-B-621, Style 1, 2, 2 ½, 6, and 7. MIL-B-2427, Type I, II, III. MIL-B- | Wooden boxes, nailed |

| DOT Specification | Military/Federal Specification | Description |
|-------------------|--|--|
| | 48024, Type I and II. | |
| 15E | None | Wooden boxes, fiberboard lined |
| 15L | None | Wooden boxes with inside containers for desensitized liquid explosives |
| 15M | None | Wooden boxes, metal lined, with inside containers for desensitized liquid explosives |
| 16A | PPP-B-585; MIL-B-46506 | Plywood or wooden boxes, wirebound |
| 17C | PPP-P-704, Type I, Class 4 and 9; Type II, Class 10 and 11. PPP-D-736, Type V and VI | Steel drums |
| 17H | PPP-D-729, Type IV; PPP-D-705, Type V; PPP-P-704, Type II, Class 7 | Steel barrels or drums |
| 19A | PPP-B-601; MIL-B-48024 | Wooden boxes, glued plywood, cleated |
| 19B | None | Wooden boxes, glued plywood, nailed |
| 21C | None | Fiber drum |
| 23F | PPP-B-636, Type CF and SF | Fiberboard boxes |
| 23G | None | Special cylindrical fiberboard box for high explosives. |
| 23H | PPP-B-636, Type SF | Fiberboard boxes |
| 37A | PPP-P-704, Type II, Class 1,3,5,8, and 9; Type III, Class 1,3, and 6; MIL-D-13901 | Steel drums |

Attachment 28

★INSPECTION PROCEDURES

A28.1. Inspection General Requirements. Inspect hazardous materials before entering into the military airlift system. The inspection will ensure hazardous materials are properly prepared and documented. Follow the guidelines in this attachment when inspecting hazardous materials, including opening an external container to inspect the internal packagings.

A28.1.1. Originating Shipping Activities. This activity must prevent entry of improper shipments into the transportation system. Establish a quality control program that ensures packing, marking, labeling, and certifying of hazardous materials comply with this manual and safety of airlift criteria.

- Inspect each package to ensure the packaging is correct and in good condition.
- Open exterior containers if there is physical evidence to support suspected damage of the inner receptacles or if the external markings do not correspond to the type of container. Reseal opened containers according to the applicable test report or special packaging instruction (SPI).
- Provide calibrated dip-stick with any vehicle or wheel engine-powered support equipment without an operational fuel gauge containing fuel-in-tank. Not required if the item is drained and purged or drained to 500 ml (17 oz) or less of residual fuel.
- Check shipper's certification for overall accuracy including correct packaging paragraph.
- Immediately remove damaged or improperly prepared packages from the transportation system.
- Periodically inspect cylinders or spheres to ensure they have been retested and marked as required by 49 CFR 173.34(e) and DLAR 4145.25/AR 700-68/NAVSUPINST 4440.128/MCO 10330.2B/ AFR 67-12, *Storage and Handling of Compressed Gases and Cylinders*. Do not offer for transportation any cylinder or sphere not meeting this requirement.

A28.1.2. Inspectors Other Than Originating Shipping Activity. Establish an inspection program to prevent improperly prepared hazardous material from entering the transportation system.

- As a minimum, visually inspect all exterior containers and equipment for damage or leakage. Reject packages showing evidence of leakage (moisture or staining) or other suspected damage until corrective action is taken to make sure the item is safe for air shipment (see paragraph 1.9).
- Remove improperly prepared or damaged containers from the transportation system and advise the shipper to immediately coordinate corrective action. Properly store suspect packages containing explosive material pending repair or disposition.
- Use accurate fuel gauges, calibrated dip-sticks or other positive means to determine the amount of fuel-in-tank for vehicles and equipment. If positive means is not available, drain and refill fuel tank to appropriate level in the presence of an inspector.
- Review all Shipper's Declarations for Dangerous Goods for accuracy. Make sure special instructions and warning labels are complete and being followed.
- Enter "Inspected by (followed by name and location of inspector)" in key 6 of the Shipper's Declaration form.
- Do not violate compatibility requirements (attachment 18) in the consolidation or makeup of cargo loads (see 3.6.1 for tactical, contingency or emergency airlift).
- Prepare **SF 361, Transportation Discrepancy Report**, according to DoD 4500.9-R, DTR, Part II, or **SF 364, Supply Discrepancy Report**, according to DLAI 4140.55/AR 735-11-2/SECNAVINST 4355.18A/AFJMAN 23-215 (or equivalent reporting means as designated by the Service Focal Points and coordinated with HQ AMC).
- The Tanker Airlift Control Element (TALCE), Departure Airfield Control Group (DACG), or Mission Support Element/Team (MSE/MST) or Cargo Deployment Function (CDF) provides qualified inspectors for the mobility movement inspection function during tactical or contingency deployments, redeployments, and exercises (see 1.2.6).

A28.2. Inspection Packaging Procedures. Design inspection procedures to validate safety of the shipment. Do not physically damage the package or perform any function that adversely affects the integrity or original performance capability of the packaging.

A28.2.1. Packaging Areas of Emphasis. As a minimum, inspection will address the following areas:

A28.2.1.1. Single Packaging.

- Drum ullage.
- External visual condition and serviceability. Dents or corrosion at chime or seam, or dents causing paint chipping is considered damaged and must be removed from the transportation system.
- External package marking and labeling. Verify UN specification code (including package type and gross weight), air-eligible, hazard and handling markings/labels.

A28.2.1.2. Combination Packaging.

- Inner receptacle orientation.
- Inner receptacle ullage.
- Inner receptacle secondary closure.
- Absorbent cushioning material.
- Leak-proof liner (covering item or lining outer container).
- Air-eligible.
- External package markings including UN specification code, air-eligible, hazard and handling marking/labels, orientation markings for combination packagings and drums used as overpacks.

A28.2.1.3. Vehicles and Equipment.

- Fuel gauges operative or dip-stick available.
- Fuel in tank quantity, including verifying presence of additional fuel tanks.
- Fuel leaks.
- Battery terminal posts protected against short circuit.
- Fire extinguishers secured in properly configured and approved holders.
- Spare fuel and secondary loads properly identified, packaged, stowed, and restrained.

A28.2.2. Packaging Opening and Closing. The following instructions provide acceptable procedures for opening external containers to inspect the internal packaging configuration. Comply with these procedures to maintain the performance capability of the package and the original shipper's certification. Noncompliance with any of these procedures constitutes repacking and requires a new certification.

A28.2.2.1. Fiberboard box opening.

- Cut original tape along seam using a shallow blade knife. Do not tear tape.
- If adhesive sealed on inside box flaps or the flaps are stitched/stapled (not closed by tape) opening will damage packaging components.

A28.2.2.2. Fiberboard box closure.

- Apply new tape over the existing tape using same method as original.
- Use only ASTM D 5486, Type I, Class 2 (film backed, pressure-sensitive adhesive, weather resistant) tape to reclose package.
- Ends of sealing tape must extend over the original tape a minimum of one-inch adhering to the fiberboard on the ends of the package.
- Use three-inch wide tape or two strips of two-inch wide tape.
- Ensure surface is clean and dry before applying tape and box flaps meet squarely.
- Do not cover markings or labels with tape.
- When reclosed using these procedures a new shipper's certification is not required. Based on DoD testing the packaging is considered returned to original condition and is not considered repacking.
- If adhesive sealed on inside box flaps or flaps are stitched/stapled (not closed by tape) then reclosure is considered repacking and requires a new shipper's certification.

A28.2.2.3. Wood box opening.

- Opening causes damage to packaging material.
- To reduce damage to wood material, use a nail puller to remove nails.
- Do not pry open wood box panels using crowbars, etc.

A28.2.2.4. Wood box closure.

- Do not close by nailing through existing holes.
- Must replace damaged components. Ensure to use prescribed materials and specifications required by the applicable test report, special packaging instruction, or drawing.
- Replacing packaging material components is considered repacking and requires a new shipper's certification.

A28.2.2.5. Drum opening.

- Only open drums used as a combination package or overpack. Do not open drums used as a single package for liquid hazardous material.

A28.2.2.6. Drum closure.

- Replace old gaskets with new gaskets and seals. Old gaskets will "set" and will not reseal properly.
- Use the torque and closing instructions required by the applicable test report.
- Reclosure of drum is considered repacking and requires new shipper's certification.

A28.2.2.7. Overpacks.

- Outside packaging used as an "Overpack" (for ease of handling) may be opened for inspection of contents. Follow inspection guidance for specific opening and closing of inside shipping containers according to A28.2.2.
- Close overpacks in a similar manner as received. A new shipper's declaration is not required.

A28.2.2.8. Non-Specification (strong outside) Packaging.

- Non-specification packaging may be opened for inspection.
- Close non-specification packaging in a similar manner as received. A new shipper's declaration is not required.

A28.2.3. Inner package inspection.

- Perform visual inspection. Do not rearrange inner packaging contents or configuration.
- Do not cut wraps or barrier material.
- Any change to the inner configuration is considered repacking and requires a new shipper's certification.

A28.2.4. Exceptions to inspection. Some item packaging requires specialized training for opening, interior inspection, and closure. Only individuals trained and qualified in these specialized areas are authorized to open the following packagings:

- Radioactive material.
- Class 1 (ammunition and explosives).
- Etiological Agents or Infectious Substances.
- Pressurized metal shipping containers or drums.
- Material identified as "inhalation hazard".

A28.3. Equipment Fuel Leakers. The shipper is responsible for ensuring the maximum allowable fuel-in-tank is not exceeded, the amount of fuel is necessary to meet operational requirements for mission readiness, and the equipment is prepared properly to prevent leakage. Measure fuel quantity on a level surface. The following items are considered fuel leakers and must be drained of fuel for approved Chapter 3 and non-Chapter 3 movements. Purging is not required.

- MC-1A and MC-2A compressors. The MC-1A model 2MC-1A, T.O. 34Y1-56-71, part number 66950, NSN 4310-01-060-0642 is not considered a leaker and may be shipped with fuel-in-tank according to Chapter 3. Identify the item nomenclature on the Shipper's Declaration form as "2MC-1A". Units must stencil "2MC-1A" on the item.
- MA-3 air conditioner.
- H-1 heater.
- The USCSMK Boston Whaler boat. The United States Navy Patrol Boat Light (PBL) is not considered a leaker and may be shipped with fuel-in-tank as authorized according to this manual.
- The USMC River Assault Craft (RAC).
- All commercial support equipment.

A28.4. Inspection Checklist. Inspection activities will establish a program that standardizes the local inspection process and ensures continuous level of quality. Figure A28.1 provides a suggested checklist to use during the inspection process.

Figure A 28.1. Hazmat Inspection Checklist

| HAZMAT INSPECTION AND ACCEPTANCE CHECKLIST | | | TCN |
|---|------------------------|--|---|
| INSPECTION VALIDATION | | | |
| THE SHIPMENT HAS BEEN INSPECTED AND | | COMPLIES WITH ALL REGULATORY REQUIREMENTS | DOES NOT COMPLY WITH ALL REGULATORY REQUIREMENTS AS INDICATED |
| DATE (YYYYMMDD) | INSPECTED BY (NAME) | DATE (YYYYMMDD) | CORRECTED BY (NAME) |
| DATE (YYYYMMDD) | RE-INSPECTED BY (NAME) | CORRECTIVE ACTIONS CHECKED. SHIPMENT COMPLIES WITH ALL REGULATORY REQUIREMENTS. | |
| ENTER "X" TO IDENTIFY NONCOMPLIANCE. USE COMMENTS BLOCK TO PROVIDE ADDITIONAL DETAILS. CIRCLE "X" WHEN CORRECTIVE ACTION IS COMPLETED. SIGN INSPECTION VALIDATION BLOCK AND ATTACH TO SHIPPER'S DECLARATION FIELD WITH STATION MANIFEST. THOSE ITEMS THAT APPLY ONLY TO RADIOACTIVE MATERIAL ARE IDENTIFIED BY AN "R." ADDITIONAL CHECKPOINTS ON THE REVERSE. | | | |
| SHIPPER'S DECLARATION | | PACKAGING - OUTER | |
| 1. THREE ORIGINAL DOCUMENTS FOR EACH PROPER SHIPPING NAME (PSN) UNDER A SINGLE TCN | | 39. CONTAINER SERVICEABLE; DAMAGE, LEAKAGE, OR LOSS OF CONTENTS | |
| 2. SHIPPERS ADDRESS AND PHONE NUMBER | | 40. APPROVED OUTER CONTAINER (IF REQUIRED) | |
| 3. CONSIGNEE DODAAC OR ADDRESS (OR WORLDWIDE MOBILITY) | | 41. PACKAGING PERMITTED BY PACKAGING REFERENCE | |
| 4. TRANSPORTATION CONTROL NUMBER (TCN) | | 42. OTHER | |
| 5. AIRPORT OF DEPARTURE AND DESTINATION (OR WORLDWIDE MOBILITY) | | IF APPLICABLE | |
| 6. NAME AND TITLE OF PREPARER WITH SIGNATURE | | 43. ULLAGE | |
| 7. PLACE AND DATE MATERIAL CERTIFIED | | 44. UN SPECIFICATION CONTAINER MATCHES CORRESPONDING PACKING GROUP | |
| 8. PEN AND INK CHANGES SIGNED | | 45. GROSS WEIGHT OF PACKAGE IS EQUAL TO OR LESS THAN TESTED WEIGHT INDICATED AS PART OF UN SPECIFICATION MARKING | |
| 9. EMERGENCY RESPONSE NUMBER | | 46. SINGLE PACKAGE (CONTAINING A LIQUID) TESTED PRESSURE (KPA) AGREES WITH CONTAINER REQUIREMENTS | |
| 10. OTHER | | 47. OTHER | |
| CARGO IDENTIFICATION (NATURE & QUANTITY OF HAZMAT) | | PACKAGING - INNER (IF INSPECTED AND APPLICABLE) | |
| 11. IDENTIFIES WHETHER PACKED WITHIN PASSENGER OR CARGO AIRCRAFT ONLY LIMITATIONS | | 48. ABSORBENT MATERIAL | |
| 12. IDENTIFIES RADIOACTIVE OR NONRADIOACTIVE SHIPMENT | | 49. LEAK OR ACID PROOF LINER | |
| 13. PSN (WITH TECHNICAL NAME IF IDENTIFIED BY "**") | | 50. INNER RECEPTACLE ORIENTATION | |
| 14. PRIMARY HAZARD CLASS OR DIVISION (COMPATIBILITY GROUP FOR EXPLOSIVES) | | 51. SECONDARY CLOSURE | |
| 15. IDENTIFICATION NUMBER (UN, ID, OR NA) | | 52. OTHER | |
| 16. PACKAGING GROUP (PG) IF APPLICABLE | | MARKING | |
| 17. SUBSIDIARY RISK CLASS OR DIVISION, IF ASSIGNED | | 53. PSN AND UN, ID, OR NA NUMBER (FOR MULTIPLE ITEMS IN OVERPACK, EACH HAZARD IS IDENTIFIED) | |
| 18. NUMBER AND TYPE OF PACKAGES | | IF APPLICABLE | |
| 19. NET QUANTITY PER PACKAGE (METRIC UNLESS EXCEPTED) | | 54. UN SPECIFICATION MARKING | |
| 20. R-ACTIVITY PER PACKAGE GIVEN IN BECQUEREL SYSTEM | | 55. "RQ" | |
| 21. R-NAME AND SYMBOL OF MATERIAL | | 56. "WASTE" | |
| 22. R-MATERIAL PHYSICAL AND CHEMICAL FORM | | 57. "INHALATION HAZARD" (NOT REQUIRED IF PART OF LABEL) | |
| 23. PACKAGING PARAGRAPH (FROM ATTACHMENTS 5-13) | | 58. "AIR ELIGIBLE" (IF COMBINATION PACKAGE CONTAINS A LIQUID) | |
| 24. A3.2.3 USED WHEN UN SPECIFICATION TESTED PACKAGE IS OVERPACKED TO MEET AIR REQUIREMENTS | | 59. "INNER (INSIDE) PACKAGE (CONTAINER) COMPLIES WITH PRESCRIBED SPECIFICATIONS" USED WHEN SHIPPER'S DECLARATION STATES "OVERPACK USED" OR WHEN OTHERWISE REQUIRED | |
| 25. DOT-E, COE, CAA, OR OTHER APPROVED DOCUMENT USED AS CERTIFICATION REFERENCE (COPY ACCOMPANIES SHIPMENT) | | 60. "ORIENTATION" ARROWS AND "THIS END (SIDE) UP" COMBINATION PACKAGES CONTAINING LIQUIDS OR PACKAGES CONTAINING WET CELL BATTERIES | |
| 26. 49 CFR, IATA, OR ICAO REFERENCE USED AS CERTIFICATION REFERENCE (IF MEETING PASSENGER RESTRICTIONS) | | 61. "LIMITED QUANTITY" OR "LTD QTY" | |
| 27. R-CATEGORY OF RADIOACTIVE PACKAGE | | 62. FLASHPOINT (FOR FLAMMABLE LIQUIDS) | |
| 28. R-TRANSPORT INDEX | | 63. "ORM-D" OR "ORM-D AIR" FOR DOMESTIC ONLY SHIPMENT OF PSN "CONSUMER COMMODITY" (NOT IDENTIFIED AS A CLASS 9) | |
| IF APPLICABLE | | 64. DOT-E NUMBER (WHEN USED AS CERTIFICATION REFERENCE) | |
| 29. "RQ" IDENTIFIES A PSN AS A HAZARDOUS SUBSTANCE | | 65. COE NUMBER (WHEN USED AS CERTIFICATION REFERENCE) | |
| 30. "WASTE" IS MARKED OR LABELED ON PACKAGE | | 66. CAA NUMBER (IF REQUIRED BY CAA) | |
| 31. "TOXIC" IF NOT INCLUDED AS PART OF DIVISION 6.1 (PG I OR PG II) PSN | | 67. OTHER | |
| 32. "INHALATION HAZARD (ZONE)" IF MATERIAL MEETS THIS DEFINITION | | LABELING | |
| 33. "OVERPACK USED" IF OVERPACKED | | 68. PRIMARY RISK LABEL | |
| 34. "LIMITED QUANTITY" OR "LTD QTY" | | 69. R-RADIOACTIVE MATERIAL LABELS ON OPPOSITE SIDES OF | |
| | | IF APPLICABLE | |
| 35. CRYOGENICS VENTING REQUIREMENTS | | 70. SUBSIDIARY RISK LABELS | |
| 36. SECONDARY HAZARD PSN, CLASS, CLASS OR DIVISION AND NET QUANTITY | | 71. "CARGO AIRCRAFT ONLY" (IF SO IDENTIFIED ON THE SHIPPER'S DECLARATION, NOT MANDATORY FOR CHAPTER 3) | |
| 37. HANDLING INSTRUCTIONS | | 72. "MAGNETIZED MATERIAL" (IF ITEM MEETS DEFINITION) | |
| 38. OTHER | | 73. "EMPTY" (IF ITEM MEETS DEFINITION) | |
| | | 74. OTHER | |

Figure A28.1. Continued.

| VEHICLES AND EQUIPMENT | |
|---|---|
| <i>USE DD FORM 2133 AS CHECKLIST FOR CHAPTER 3 OPERATIONS</i> | |
| | 75. FUEL GAUGE OPERATIVE OR DIP STICK AVAILABLE |
| | 76. VEHICLES AND SELF-PROPELLED EQUIPMENT WITH FUEL QTY NOT EXCEEDING ½ TANK CAPACITY <i>(DRAINED IF PALLETIZED UNLESS MEETING SUBFLOOR REQUIREMENTS)</i> |
| | 77. SUPPORT EQUIPMENT DRAINED |
| | 78. NO EXISTING FUEL LEAKS |
| | 79. ALL ADDITIONAL HAZARDS IDENTIFIED <i>(SEE BLOCK 37)</i> |
| | 80. SECONDARY LOADS CERTIFIED, PACKAGED, AND MARKED |
| | 81. BULK FLAMMABLE LIQUID FUEL TANKS DRAINED OR PURGED AS REQUIRED |
| | 82. SPARE FUEL IN AUTHORIZED CONTAINERS |
| | 83. DISCONNECTED BATTERY POSTS PROTECTED |
| | 84. FIRE EXTINGUISHERS IN APPROVED HOLDER |
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