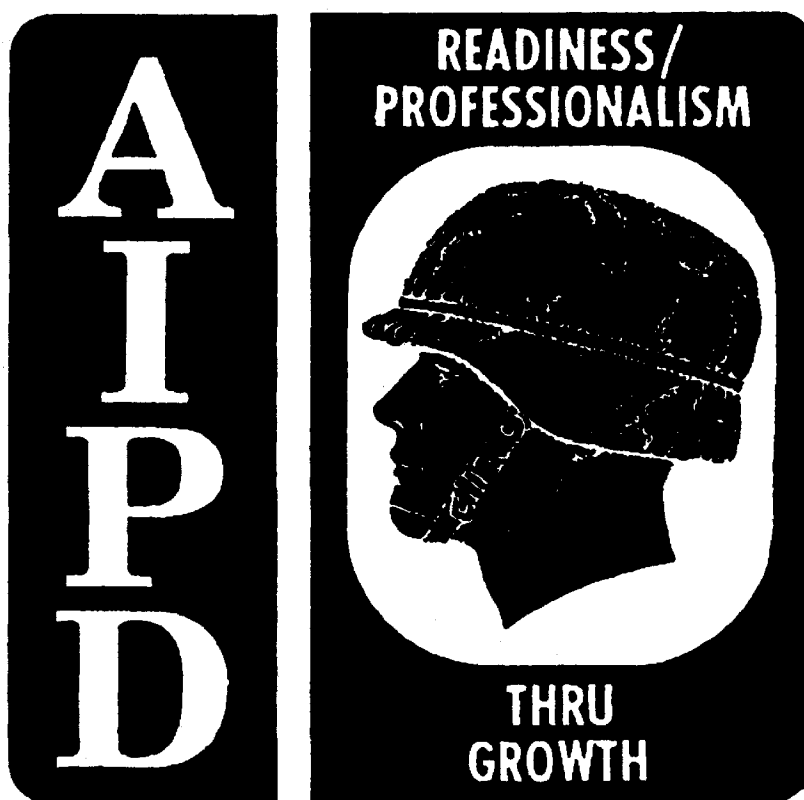


SUBCOURSE
MM0163

EDITION
A

**AMMUNITION SUPPLY POINT (ASP)
QUANTITY-DISTANCE AND COMPATIBILITY**



THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT

ARMY CORRESPONDENCE COURSE PROGRAM

AMMUNITION SUPPLY POINT (ASP) QUANTITY-DISTANCE AND COMPATIBILITY

Subcourse Number MM0163

EDITION A

United States Army Ordnance Missile and Munitions Center and School
Fort Lee, Virginia 23801-1809

4 Credit Hours

Edition Date: September 1992

SUBCOURSE OVERVIEW

This subcourse is designed to teach you to identify the procedures used to segregate Class V items into their correct field storage categories, then to apply the quantity-distance tables.

There are no prerequisites for this subcourse.

This subcourse reflects the doctrine which was current at the time it was prepared. In your own work situation, always refer to the latest official publications.

Unless otherwise stated, the masculine gender of singular pronouns is used to refer to both men and women.

TERMINAL LEARNING OBJECTIVE

ACTION: Identify procedures to separate and store conventional Class V materials by their correct field storage category and quantity-distance safety requirements.

CONDITION: You will have access to extracts of TM 9-1300-206, SC 1305/30-IL, and SC 1340/98-IL.

STANDARD: To demonstrate competency of this task, you must achieve a minimum of 70 % on the subcourse examination.

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LESSON

ASP QUANTITY-DISTANCE AND COMPATIBILITY

MQS II Critical Task: 03-4010.01-0002

OVERVIEW

LESSON DESCRIPTION:

In this lesson you will learn to identify procedures used to segregate Class V items in accordance with field storage categories and quantity-distance tables.

TERMINAL LEARNING OBJECTIVE:

ACTION: Identify correct field storage categories and quantity-distance safety requirements.

CONDITION: You will be given extracts of TM 9-1300-206, SC 1305/30-IL, and SC 1340/98-IL.

STANDARD: Identification of correct field storage categories and quantity-distance safety requirements will be in accordance with TM 9-1300-206, SC 1305/30-IL, SC 1340/98-IL, and FM 9-13.

REFERENCES: The material contained in this lesson was derived from the following publications: TM 9-1300-206, SC 1305/30-IL, SC 1340/98-IL, and FM 9-13.

INTRODUCTION

The purpose of field storage is to provide ammunition to Army tactical units. Unlike permanent magazine storage, ammunition assets in field storage are most often stored on the ground on unimproved surfaces. Munitions are placed in storage categories separated from each other by appropriate minimum field storage quantity-distances (QD). The quantity-distances are based on total gross tonnage per individual storage unit (stack/field storage unit).

Field storage in a Theater of Operation (TO) follows as nearly as possible the principles for storage in the Continental United States (CONUS). Such conditions as mobility requirements, scarce facilities, or enemy air power vary a great deal in theaters of operation. Thus the ideal of CONUS storage, including safety, sometimes cannot be fully met or maintained. Even so, explosives and ammunition may be satisfactorily and safely stored in the theater if CONUS regulations are adapted to field conditions. The areas where field storage is likely to be used are: Theater Storage Area (TSA), Corps Storage Area (CSA), and Ammunition Supply Points (ASP). This lesson will focus only on QD and compatibility functions at the ASP.

To define the operation of an ASP, we need to highlight the roles of this facility in the ammunition structure. In general, ASPs should be located so that they are within a reasonable support distance from

the combat troops being supported. Storage sites should be located close to the main supply route (MSR) and supported units to allow easy access. The distance to supported units will be minimized within security constraints.

ASPs are in the Corps forward area. They provide direct support to the combat division, or portions of the division. ASPs must store approximately a one- to three-day supply of ammunition to meet routine, surge, and emergency requirements for supported units. The tonnage stored varies depending upon the types of units supported. Based on their mission, forward ASPs are usually temporary. This means ammunition is not stored in a permanent ammunition storage facility.

ASP sites are preferably arranged into three storage sections in order to provide dispersion. This arrangement also expedites the handling, receipt, and issue of materiel, and facilitates inventory and segregation. Operation in each section should be rotated daily, if practical. Each section should be capable of storing approximately 500 tons of explosives and ammunition.

PART A- FIELD STORAGE CATEGORIES

1. Safe field storage often becomes difficult because the amount of land available is restricted, or components of complete rounds have to be stored in stacks adjacent to each other. Thus, field storage categories were developed to make it easier to render speedy, yet safe service to units that the ASP will be supporting.

2. Field storage categories (FSC).

a. General.

(1) Storage categories are the principal groups into which Class V materiel is segregated for storage in a field environment.

(2) These groups are based on the following considerations:

(a) Desirability of storing components of complete rounds (separate loading) in adjacent stacks (complete round concept).

(b) Hazards involved with the munition, such as propagation of explosion, range of fragments, spread of fire, and chemical contamination.

(3) Items having comparable storage risks are grouped together in the same category.

(4) Quantity per storage location by category (stack and field storage unit) is based on gross weight, with the exception of net explosive weight (NEW) for modular storage.

(5) There are seven storage categories (A thru G) for conventional ammunition.

(6) Small arms cartridges (except bulk-packed tracer and incendiary) may be stored with any field storage category.

b. Identification of types of ammunition assigned to each category.

(1) Calibers/sizes within each category.

(2) Representative DODIC's within each category.

c. Specific storage categories are defined in Figure 1 below.

Category A	Includes fixed and semifixed artillery ammunition, except incendiary and chemical.
Category B	Includes propelling charges, fuzes, primers, flash reducers, and separate loading artillery projectiles, including HE and AP but excluding incendiary chemical projectiles.
Category C	Includes mortar ammunition and hand grenades, except incendiary and chemical.
Category D	Includes pyrotechnics and chemical ammunition of all types, including chemical filled rockets; gas, smoke, and incendiary bombs; gas and smoke artillery ammunition; incendiary and chemical grenades; smoke pots; VX-filled mines; bulk packed incendiaries; and small arms tracer cartridges.
Category E	Includes all demolition explosives, antitank, and antipersonnel mines (except VX loaded) and components such as blasting caps, fire devices, detonating cord, and safety fuses.
Category F	Includes rockets, rocket motors, guided missiles, and rifle grenades, except chemical.
Category G	Includes items of Air Force Class V supply: all unfuzed high-explosive bombs, aircraft mines, aircraft torpedoes, and fragmentation bombs, plus the fuzes and/or primer-detonators for the above items, and fragmentation bomb clusters, fuzed or unfuzed. The remainder of Air Force Class V items must be stored in other applicable categories.

Figure 1. Field storage categories

NOTE: Lesson learned concerning the storage of small-arms ammunition. Field experience has shown that it is a good "operational call" to place small arms ammunition at those FSU's containing each type of munitions comprising the stockage objective. For example, when a 155mm unit requires issue of complete rounds, they will also require machine gun ammunition. Why not, within the FSUs storing Category B, position assets of caliber .50 ammunition? This procedure will reduce issue time to the user, and allow for a "one stop issue point".

NOTE: Refer to the stockage list (Figure 2) to complete the following review. The first item is a 7.62mm Ball Cartridge. Remember-small arms ammunition can be stored with any category of ammunition. If you look at the stockage list and you do not know what a certain item is (to classify it), refer to TM 9-1300-206.

REVIEW

1. Fill in the FSCs for these 2 items:
 - a. 1315-00-498-6406-C276 Ctg, 81mm Smk, WP, w/fuze, PD, M524A6.
 - b. 1340-00-935-9257-H490, Rocket, High Explosive, 2.75 inch, MK40, MOD 3.
2. Which two items on the stockage list in Figure 2, page 4 (excluding small arms ammunition) can be stored together?

ANSWERS TO REVIEW

1. a. Category D.
b. Category F.
2. The antipersonnel mine (1345-00-710-6946) and the demolition charge (1375-00-028-5148), can be stored together because both items are in Category E. Also, the 7.62mm Ball ammunition can be stored with any other item because it is small arms ammunition.

PART B - COMPUTING THE TONNAGE TO BE STORED

1. The determination of how much ammunition is to be placed in an ASP is based on what would be needed by supported units at the outbreak of a war. Normally a one- to three-day resupply, this allotment's authorization is sent from higher headquarters in the form of a stockage list (Figure 2). The stockage list usually provides the national stock number (NSN), nomenclature, and number of rounds the ASP will be required to store. How and where that ammunition is to be stored in an ASP begins by determining the total short tons* of the allotment (also called the gross tonnage).

*Long tons are 2,240 pounds per ton -- difficult to use in calculations. For this reason short tons (2000 pounds) are used in ammunition storage.

NSN	DODIC	NOMEMCLATURE	ROUNDS
1305-00-449-8055	A131	Ctg, 7.62mm Ball, M80 Linked	7,689,600
1310-00-143-7021	B632	Ctg, 60mm HE, with Fuze, PD, M252	250,000
1315-00-498-6406	C276	Ctg. 81mm Smoke, WP, with fuze, PD, M54A6	99,000
1330-00-028-5890	G970	Grenade, Rifle, Heat, with Fuze, M211	64,000
1345-00-710-6946	K143	Mine, Antipersonnel, M18A1	48,000
1375-00-028-5148	M038	Charge, Demolition Block, M5A1, 2 1/2 lb, Composition C-4	480,000

Figure 2. Sample stockage list

The procedure for computing total short tons of all the items on a stockage list is as follows:

- Step 1: Obtain the data for rounds per package, packages per pallet, and weight per pallet for each item on the stockage list. This data is found in the DOD Consolidated Ammunition Catalog in Part VII (Packaging Data); or applicable Supply Catalog (SC) Identification List (IL), Section IV, Storage & Packaging Data, in the appropriate Federal Supply Class (FSC) Group 13 Ammunition and Explosives. See Figure 3 for an example of the DOD Consolidated Catalog; See Figure 4 for an example of SC 1305/30-IL. The example used below is taken from the first line of the stockage list in Figure 2.

Step 2: Divide the number of rounds required by the stockage list by the number of rounds per package (QTY Per Ship Cont). This figure will provide the number of packages.

7,680,000	+	800	= 9,600
Number of Rounds		Rounds per Package	Packages

NOTE: If you are working with PALLETIZED ammunition, use the information under the heading PALLET DATA and PALLET DIMENSIONS. In this lesson we will only use information for loose boxes, under PACKAGE DATA.

Step 3: Divide the total number of packages by the number of packages per pallet (SC/PT). This figure will provide the number of pallets.

9,600	+	40	= 240
Packages		Packages per Pallet	Pallets

NOTE: In field conditions, when you complete the gross tonnage of items of ammunition you will need: (1) a stockage list, (2) SC 1305/ 30-IL or SC 1340/98-IL or DOD Consolidated Ammunition Catalog and; (3) pen and paper.

Step 4: Multiply the number of pallets by weight per pallet (PLT WT). This gives the total weight of all pallets.

240	x	3181	= 763,440 Pounds
Pallets		Weight per Pallet	Total Weight in Pounds

Step 5: Divide the total weight of all pallets by 2,000 pounds. This provides the total gross tonnage for the first line item of the stockage list in Figure 2.

763,440	÷	2,000	= 381.72
Total Weight in Pounds		Short Ton in Pounds	Total Weight in Short Tons

The other line items of the stockage list are then computed the same way. All the weights added up are the total of short tons of the items that the ASP will be required to store. This tonnage will be used with field storage categories (discussed below) to compute QD.

2. Preparing a storage plan for an ASP involves several steps, all of which must be accomplished. The first step is to compute the tonnage. Next, the storage categories of the ammunition to be stored are determined. The QDs are figured and finally, the storage system is selected. These collective actions then provide the necessary information for the actual plan to be drawn. It should be noted, however, that the primary focus of this lesson is on ASP QD and storage compatibility. This focus is merely on a couple of vital elements in formulating a storage plan. Other subcourses and lessons will address the tasks necessary to prepare and implement a storage plan.

REVIEW

Compute the gross tonnage for the second item on the stockage list in Figure 2. Use the data from Figure 4, page 7, and the step-by-step formula, as previously discussed, if necessary.

INDEX NO.	NSN	PACKAGE REF NUMBER	ITEM NEW TRANS STORAGE W/F-S/B	QTY PER SHIP CONT	SHIP CONT WT	SHIPPING CONTAINER DIMENSIONS				ITEMS PER PALLET	SC / PT	PLT WT	PALLET DIMENSIONS			
						LENGTH	WIDTH	HEIGHT	DIA CUBE				LENGTH	WIDTH	HEIGHT	CUBE
000722	1305-00-882-5677	X7553747	.0028000	920	49.2	14.50	12.75	8.37	.9	44160	48	2455	51.00	43.50	39.00	50.1
	1305-00-882-5677			920	49.2	14.50	12.75	8.37	.9							
	1305-00-882-5677		.0007000	920	49.2	14.50	12.75	8.37	.9							
00734	1305-00-892-2330	X10521861	.0068000	800	77.7	17.50	11.50	8.12	.9	32000	40	3181	46.00	35.00	46.12	43.0
	1305-00-892-2330			800	77.7	17.50	11.50	8.12	.9							
	1305-00-892-2330		.0017000	800	77.7	17.50	11.50	8.12	.9							
00735	1305-00-892-2335	X10521861	.0066300	800	77.7	17.50	11.50	8.12	.9	32000	40	3178	46.00	35.00	46.12	43.0
	1305-00-892-2335			800	77.7	17.50	11.50	8.12	.9							
	1305-00-892-2335		.0016575	800	77.7	17.50	11.50	8.12	.9							
00736	1305-00-892-2526	X8596134	.0007800	2000	115.0	14.50	12.75	8.38	.9	72000	36	3280	80.60			.20
	1305-00-892-2526			2000	115.0	14.50	12.75	8.38	.9							
	1305-00-892-2526		.0001950	2000	115.0	14.50	12.75	8.38	.9							

Figure 3. Example of the DOD Consolidated Ammunition Catalog

ANSWERS TO REVIEW

Step 1/2:	250,000	+	10	= 25,000
	Number of Rounds		Rounds per Package	Packages
Step 3:	25,000	+	25	= 1,000
	Number of Packages		Packages per Pallet	Number of Pallets
Step 4:	1,000	x	1350	= 1,350,000
	Number of Pallets		Weight per Pallet	Total Weight in Pounds
Step 5:	1,350,000	+	2,000	= 675
	Total Weight in Pounds		Short Ton in Pounds	Total Weight in Short Tons

NOTE: The answer is 675 short tons. This is the gross tonnage for the second item on the stockage list in Figure 2.

PART C - QUANTITY-DISTANCE REQUIREMENTS

1. Quantity-distance terminology. There are some terms that need to be explained before the procedure for determining QD is given. Those terms are storage layout terms: sections, FSUs, stacks, barricades, and distance.

ASPs are ideally broken down into three sections, each with its own network of roads. This dispersion of the ammunition minimizes loss in case of fire, accidental explosion, or enemy action.

FSUs are subdivisions of a section. They should store ammunition items of similar storage risks. Although there must be at least two stacks in an FSU, the total depends, to a great extent, on the

ACT CD	NATIONAL STOCK NUMBER (NSN)	PACKAGE DATA							PALLET DATA							VOL IN CF	PKG PER PLT	
		DODIC	LENGTH IN	WIDTH IN	HEIGHT IN	WEIGHT LBS	VOL IN CF	RDS/ PKG	WT OF EXPLOY ROUND	UNIT WT CD	OT MKG	OD COMPAT	LENGTH IN	WIDTH IN	HEIGHT IN			WEIGHT LBS
	1305002571090	A143	000.0	00.0	00.0	0000	00.0	0800	0000.00	G	DC	1BEN	000.0	00.0	00.0	0000	00.0	00
	1305008922330	A143	017.4	11.5	08.1	0074	00.8	0800	0000.00	G	DC	1BEN	046.0	51.0	38.0	3852	51.0	00
	1305008824211	A145	000.0	00.0	00.0	0000	00.0	0840	0000.00	G	DC	1BEN	000.0	00.0	00.0	0000	00.0	48
	1310009983455	B537	000.0	00.0	00.0	0000	00.0	0040	0000.21	P	DD	1A00	000.0	00.0	00.0	0000	00.0	00
	1310002433769	B538	017.8	12.3	08.3	0052	01.0	0032	0096.76	M	DG	1N00	040.0	49.0	47.0	2160	53.0	40
	1310009686230	B538	000.0	00.0	00.0	0000	00.0	0032	0000.0	P	DG	1N00	000.0	00.0	00.0	0000	00.0	00
	1310001436898	B632	000.0	00.0	00.0	0000	00.0	0008	0000.42	P	AB	4E00	000.0	00.0	00.0	0000	00.0	00
	1310001437021	B632	017.8	14.1	08.2	0050	01.1	0010	0000.42	P	AB	4E00	040.0	48.0	47.0	1350	25.0	25
	1310001809874	B632	000.0	00.0	00.0	0000	00.0	0009	0000.42	P	AB	4E00	000.0	00.0	00.0	0000	00.0	00
	1315002419275	C276	000.0	00.0	00.0	0000	00.0	0000	0000.00	P	AG	5000	000.0	00.0	00.0	0000	00.0	00
	1315004886408	C276	026.1	13.9	06.6	0051	01.4	0003	0000.03	P	AG	5A00	041.0	26.0	45.0	0998	27.0	18
	1315004886408	C276	026.1	13.9	06.6	0051	01.4	0003	0000.03	P	AG	5A00	041.0	26.0	45.0	0998	27.0	18

Figure 4. Example of SC 1305/30-IL

ammunition and the terrain of the ASP (Figure 5). Each FSU should store only one field storage category. This makes the computation of QD much easier, and greatly enhances the safety of stored munitions.

NOTE: Look at the ASP map below. This ASP layout has 3 sections, 10 FSUs, and 30 stacks (in the map, every storage location is a stack.)

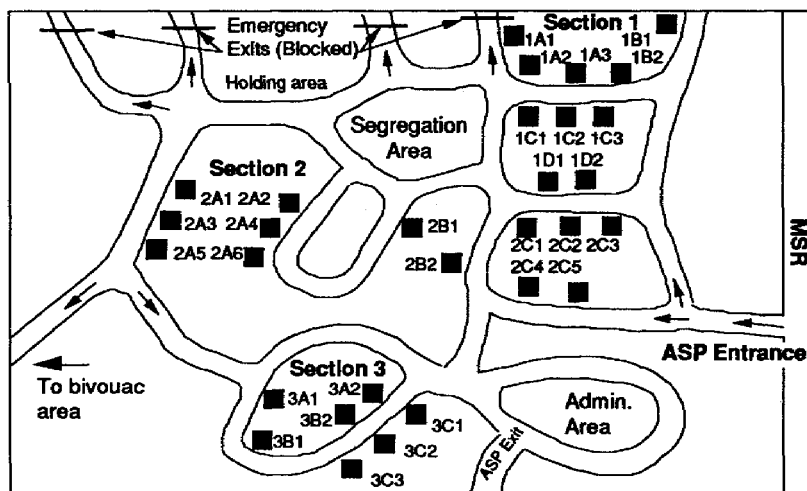


Figure 5. Example of an ASP layout showing storage location codes

-REMEMBER-

- All the stacks of a section begin with the number of the section.
 - Storage locations (such as 1A1, 1A2, and 1A3 in Section 1) represent one FSU, because they are all in Section 1 and FSU A, and three different stacks.
 - It takes at least 2 stacks to make an FSU.
2. Determining quantity-distance requirements: Quantity-Distance (QD) is the minimum distance that must be maintained between different FSCs of ammunition. QD also is the minimum distance between ammunition storage sites and other work areas, inhabited areas, roadways, and any area that could be damaged by fire or explosion. QDs are measurements between stored munitions in an ASP. The more hazardous the ammunition, the farther away it must be separated.
 3. Field storage quantity-distance objectives.
 - a. The objective of field storage QD is to provide for the dispersion of ammunition and explosives to minimize their loss due to fire, accidental explosion, and enemy action.
 - b. Each type of ammunition should be stored in a minimum of two widely separated FSUs to prevent the loss of contents of any one FSU from seriously handicapping military operations by loss of the entire supply of any item.
 4. Types of field storage distance used. See Figure 6.

- a. Interstack -the minimum distance between the closest edges of adjacent stacks. This is designed to prevent propagation of detonation from blast pressures.
- b. Inter-FSU -the distance between the nearest edge of the nearest stacks in adjacent FSUs. This distance is designed to prevent the spread of fire.
- c. Intercategory -the minimum safety distance between FSUs of different field storage categories.

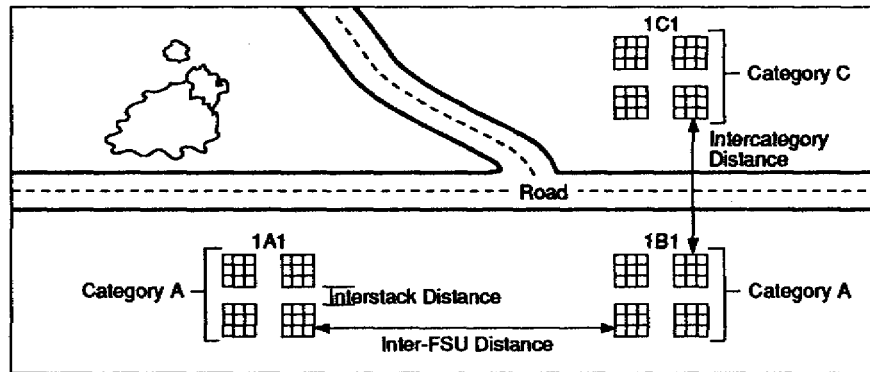


Figure 6. Field storage distances

- 5. Optimum safety distance: The optimum safety distance is the limit inside of which, physical or structural damage from blast or missiles will be serious. These distances should be considered when locating ammunition facilities near:
 - a. Fuel dumps and other storage facilities.
 - b. Airfields.
 - c. Hospitals.
 - d. Permanent radio transmitters.
 - e. Inhabited areas.
 - f. Headquarters.
 - g. Railroads.
 - h. Highways.

REVIEW

Fill in the answer to each question.

- 1. What is the storage location for ammunition stored in Section 2, FSU B, Stack 1? (Figure 5).
- 2. What is the storage location for ammunition stored in Section 3, FSU C, Stack 2? (Figure 5).
- 3. What is quantity-distance?

ANSWERS TO REVIEW

1. 2B1 is the storage location.
 2. 3C2 is the storage location.
 3. Minimum distance that must be maintained between different FSCs of ammunition.
6. Quantity-distance for field storage categories.
- a. With tonnage computed and field storage categories resolved, QDs can be determined by using Table 4-4 of TM 9-1300-206 (see subcourse Figure 7). This table provides the minimum allowable distances to meet QD requirements for field storage. Using this table, depending on space available and terrain, a preliminary determination of FSU and stack placement can be made.
 - b. The following examples will help familiarize you with the use of Table 4-4.

Example 1. Twenty tons of 1315-C445 (105mm high explosive semifixed artillery cartridges) are tentatively planned to be stored in one stack. It is necessary for planning to find three things: the maximum gross tons per stack; the gross tons allowable per FSU; and the minimum allowable distance between stacks barricaded, stacks unbarricaded, FSU unbarricaded, and categories.

First, the category of semifixed ammunition must be determined (see Figure 1, page 3). Since these cartridges are high explosive and not incendiary or chemical, they fall into Category A.

Next, use the table in Figure 7. The Category A section in the extract shows that if a stack of Category A ammunition is under 10 tons, the top line is used; for 10 tons up to 20 tons (what the example is), the second line is used. The second line shows the following planning factors:

- Twenty tons is the maximum allowable gross tons per stack.
- The maximum allowable gross tons per FSU is 400 tons.
- The minimum allowable distance between unbarricaded stacks is 50 feet.
- The minimum allowable distance between barricaded stacks is 40 feet.
- The minimum allowable distance between unbarricaded FSUs is 300 feet.
- The minimum allowable distance between categories is 750 feet.

This information can now be used to place stacks and FSUs in a section or in sections, depending on terrain, allowable distances, and what else needs to be stored.

Example 2. Determine the minimum distance in feet required between Category B and Category D ammunition. Look at the table in Figure 7. Categories A, B, and D use the same table for field storage. The minimum distance is 750 feet.

Example 3. Determine how many feet are required between Categories E and A. Look at the table in Figure 7. Category A requires 750 feet, but Category E requires 900 feet. Minimum distance is 900 feet because, for safety reasons, the greater distance is always used.

Category A, B, or D					
Gross tons per stack	Gross tons per FSU	Minimum distance in feet between			
		Stacks unbarri- caded	Stacks barrica- daded	FSU unbarri- caded	Categories
Less than 10...	400	40	30	300	750
10-20 maximum	400	50	40	300	750
NOTE 1: If desirable, fixed and semifixed smoke ammunition, except WP, may be stored in category A.					
NOTE 2: The minimum distance between a stack of propelling charges and any other stack must be 100 feet whether barricaded or unbarri- caded.					
Category C					
Gross tons per stack	Gross tons per FSU	Minimum distance in feet between			
		Stacks unbarri- caded	Stacks barrica- daded	FSU unbarri- caded	Categories
Less than 10...	300	75	60	300	900
10-30 maximum	300	105	75	300	900
NOTE: Whenever storage space is limited, category C ammunition may be combined with category E.					
Category E					
Gross tons per stack	Gross tons per FSU	Minimum distance in feet between			
		Stacks unbarri- caded	Stacks barrica- daded	FSU unbarri- caded	Categories
Less than 5...	50	75	60	300	900
5-10 maximum	50	105	75	300	900
Category F					
Gross tons per stack	Stacks barrica- daded and unbarri- caded	Gross tons per FSU	Minimum distance in feet between		
			FSU unbarri- caded	FSU barrica- daded	Categories
The maximum allowable gross weight per stack will be 20 tons.	See Note below	20	200	75	1500
		30	230	90	1500
		40	265	99	1500
		50	295	101	1500
		60	330	120	1500
		80	390	135	1500
		100	455	150	1500
NOTE: The minimum distance between barricaded stacks will be 75 feet. The minimum distance between unbarri- caded stacks will be 150 feet.					
Category G Class V					
Gross tons per FSU	Minimum distance in feet between				
	FSU unbarri- caded	FSU barrica- daded	Categories		
20	200	75	1500		
30	230	90	1500		
40	265	99	1500		
50	299	101	1500		
60	330	120	1500		
80	390	135	1500		
100	455	150	1500		
NOTE: Under normal conditions, the Department of the Air Force will store and issue all Air Force Class V supplies; however, depot commanders should always be prepared to handle these supplies in emergencies.					

Figure 7. Table 4-4 of TM 9-1300-206

Example 4. Determine the minimum separation distance required between two unbarricaded stacks. One is a 10-ton stack of propelling charges. The other is a 50-ton stack of fuzes. Both of these items are Category B. The table in Figure 7 shows the unbarricaded stacks of Category B require at least 50 feet between stacks. But Note 2 says that there must be at least 100 feet between propelling charges and any other stacks, whether barricaded or unbarricaded. The minimum separation distance is 100 feet because the greater distance is always used.

QDs will determine how far apart stacks, FSUs, and categories of the system chosen must be spaced. They may necessitate enlarging the total area used for storage.

- c. Now that you know how the layout of an ammunition storage area is planned, you will learn to compute QD requirements. To compute QD requirements for an item of ammunition, follow these steps:

Step 1: Determine the gross tonnage and FSC for the item.

Let's say the item is FSC "C" with a gross tonnage of 841.5 tons.

Step 2: Divide the gross tonnage of the item by 3. You do this so that the item can be stored in all 3 sections of the ASP.

$$841.5 \quad + \quad 3 \quad = 280.5$$

This means you will have 280.5 tons of the item in each section.

Step 3: Look at Figure 8. Go to Category C. Look at the first column, under "Gross Tons Per Stack." You can see that you are allowed a maximum of 30 tons per stack.

Divide 280.5 by 30. The answer is 9.35.

This means that with 280.5 tons per section, you will have to have approximately 10 stacks of the item per section.

Step 4: Look at the next column, under "Gross Tons Per FSU." You can see that the maximum allowable tonnage per FSU is 300 tons. With 280.5 tons in each section, you can store all of the stacks in one FSU.

Go over this one more time.

- You have a total of 841.5 tons to store.
- Divide this into thirds (divide 841.5 by 3) so you can store the item evenly in each of the 3 sections.
- This will mean 280.5 tons will be stored in each section.
- Since the maximum tons per FSU is 300 tons, all of the ammunition can be stored in one FSU in each of the 3 sections.

- d. To enhance skills learned in the step-by-step procedures above, use Figure 8 when working the review.

REVIEW

Use Figure 8 to answer these questions. Given an item in FSC "E" and a gross tonnage of 212 tons:

1. How many tons will be stored in Section 1?
2. How many tons will be stored in Section 3?
3. What is the maximum tonnage per FSU?
4. How many FSUs are required per section?
5. How many stacks will there be per FSU?

Category A, B, or D					
Gross tons per stack	Gross tons per FSU	Minimum distance in feet between			
		Stacks unbarricaded	Stacks barricaded	FSU unbarricaded	Categories
Less than 10...	400	40	30	300	750
10-20 maximum	400	50	40	300	750
NOTE 1: If desirable, fixed and semifixed smoke ammunition, except WP, may be stored in category A. NOTE 2: The minimum distance between a stack of propelling charges and any other stack must be 100 feet whether First barricaded or unbarricaded.					
Category C					
Gross tons per stack	Gross tons per FSU	Minimum distance in feet between			
		Stacks unbarricaded	Stacks barricaded	FSU unbarricaded	Categories
Less than 10...	300	75	60	300	900
10-30 maximum	300	105	75	300	900
NOTE: Whenever storage space is limited, category C ammunition may be combined with category E.					
Category E					
Gross tons per stack	Gross tons per FSU	Minimum distance in feet between			
		Stacks unbarricaded	Stacks barricaded	FSU unbarricaded	Categories
Less than 5...	50	75	60	300	900
5-10 maximum	50	105	75	300	900
Maximum Tonnage Per FSU is 300					
Category F					
Gross tons per stack	Stacks barricaded and unbarricaded	Gross tons per FSU	Minimum distance in feet between		
			FSU unbarricaded	FSU barricaded	Categories
The maximum allowable gross weight per stack will be 20 tons.	See Note below	20	200	75	1500
		30	230	90	1500
		40	265	99	1500
		50	299	101	1500
		60	330	120	1500
		80	390	135	1500
100	455	150	1500		
NOTE: The minimum distance between barricaded stacks will be 75 feet. The minimum distance between unbarricaded stacks will be 150 feet.					
Category G Class V					
Gross tons per FSU	Minimum distance in feet between			Categories	
	FSU unbarricaded	FSU barricaded			
20	200	75	1500		
30	230	90	1500		
40	265	99	1500		
50	299	101	1500		
60	330	120	1500		
80	390	135	1500		
100	455	150	1500		
NOTE: Under normal conditions, the Department of the Air Force will store and issue all Air Force Class V supplies; however, depot commanders should always be prepared to handle these supplies in emergencies.					

Figure 8. Table 4-4 of TM 9-1300-206

ANSWERS TO REVIEW

1. 70.67, because $212 \div 3 = 70.67$.
2. 70.67; there will be 70.67 tons stored in each section.
3. 50 tons.
4. 2.
5. 5, because 50 (gross tons per FSU) divided by 10 (gross tons per stack) = 5 . You will have to limit all FSUs to 5 stacks.
 - e. Now that you know how to establish the "quantity" at a storage site, you will learn how to establish the "distance." Some "distances" you must establish are:
 - (1) Q-D between stacks of ammunition.
 - (2) Q-D between FSUs.
 - (3) Q-D between FSCs.
 - (4) Q-D between ammunition and inhabited buildings.

You also use Table 4-4 of TM 9-1300-206 to find the "distance" you must have. You will be dealing with unbarricaded or barricaded distances. Look at Figure 9. If you had stacks containing 8 tons of category B munitions, they would have to be separated by at least 40 feet.

For example: If you had unbarricaded stacks containing 4 tons of Category E munitions, how far would they have to be separated? See Table 4-4, Figure 9. See category E, unbarricaded stacks. You will see the distance must be 75 feet.

If you had 280 tons in barricaded FSUs of Category C munitions, how far would they have to be separated? Look under Category C, unbarricaded FSUs. You will see the FSUs must be separated by 300 feet.

What is the minimum distance between propelling charges and any other stack of ammunition? Note 2 under Category A, B, or D says that the minimum distance between a stack of propelling charges and any other stack must be 100 feet.

You have completed the lesson. You will now work a Practice Exercise to use the knowledge you gained in the lesson.

Unbarricaded		Category A, B, or D		Distance		Unbarricaded	
Gross tons per stack	Gross tons per FSU	Minimum distance in feet between				Categories	
		Stacks unbarricaded	Stacks barricaded	FSU unbarricaded			
Less than 10...	400	40	30	300	750		
10-20 maximum	400	50	40	300	750		
NOTE 1: If desirable, fixed and semifixed smoke ammunition, except WP, may be stored in category A.							
NOTE 2: The minimum distance between a stack of propelling charges and any other stack must be 100 feet whether barricaded or unbarricaded.							
Note 2							
		Category C					
Gross tons per stack	Gross tons per FSU	Minimum distance in feet between				Categories	
		Stacks unbarricaded	Stacks barricaded	FSU unbarricaded			
Less than 10...	300	75	60	300	900		
10-30 maximum	300	105	75	300	900		
NOTE: Whenever storage space is limited, category C ammunition may be combined with category E.							
30 Tons Maximum							
		Category E					
Gross tons per stack	Gross tons per FSU	Minimum distance in feet between				Categories	
		Stacks unbarricaded	Stacks barricaded	FSU unbarricaded			
Less than 5...	50	75	60	300	900		
5-10 maximum	50	105	75	300	900		
Maximum Tonnage Per FSU is 300							
		Category F					
Gross tons per stack	Stacks barricaded and unbarricaded	Gross tons per FSU	Minimum distance in feet between			Categories	
			FSU unbarricaded	FSU barricaded			
The maximum allowable gross weight per stack will be 20 tons.	See Note below	20	200	75	1500		
		30	230	90	1500		
		40	265	99	1500		
		50	295	101	1500		
		60	330	120	1500		
		80	390	135	1500		
		100	455	150	1500		
NOTE: The minimum distance between barricaded stacks will be 75 feet. The minimum distance between unbarricaded stacks will be 150 feet.							
		Category G Class V					
Gross tons per FSU	Minimum distance in feet between			Categories			
	FSU unbarricaded	FSU barricaded					
20	200	75	1500				
30	230	90	1500				
40	265	99	1500				
50	299	101	1500				
60	330	120	1500				
80	390	135	1500				
100	455	150	1500				
NOTE: Under normal conditions, the Department of the Air Force will store and issue all Air Force Class V supplies; however, depot commanders should always be prepared to handle these supplies in emergencies.							

Figure 9. Table 4-4 of TM 9-1300-206

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PRACTICE EXERCISE

The following items will test your grasp of the material covered in this lesson. There is only one correct answer for each item. When you complete the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, study again that part of the lesson which contains the portion involved.

1. What is quantity-distance?
 - A. Minimum allowable distance which must be maintained between known quantities of different FSCs of ammunition.
 - B. Maximum allowable distance which must be maintained between known quantities of different FSCs of ammunition.
 - C. Allowable safety distance between storage locations and ammunition maintenance facilities.
 - D. Allowable safety distance between ammunition stocks and administrative areas.
2. What are the subdivisions within a field ammunition storage location?
 - A. FSUs, stacks, and bunkers.
 - B. Sections, FSUs, and stacks.
 - C. Sections, FSUs, and areas.
 - D. FSUs, FSCs, and ASPs.
3. The amount and type of ammunition to be stocked in an ASP is based upon which criteria?
 - A. On the ammunition needed by supported units for the first five to seven days of a war.
 - B. On the TOE stockage list of supported units.
 - C. On the ammunition needed by supported units for the first one to three days of a war.
 - D. On the TDA stockage list of supported units.
4. What field storage category contains 7.62mm ball ammunition?
 - A. Category C.
 - B. Category B.
 - C. Category A.
 - D. Any category.
5. What is the minimum distance for Category F ammunition stored 40 tons in each of two barricaded FSUs?
 - A. 99 feet.
 - B. 265 feet.
 - C. 40 feet.
 - D. 1,500 feet.
6. There are how many storage categories for conventional ammunition?
 - A. 9.
 - B. 8.
 - C. 7.
 - D. 6.

**PRACTICE EXERCISE
ANSWER KEY AND FEEDBACK**

<u>Item</u>	<u>Correct Answer and Feedback</u>
1.	A. Minimum allowable distance which must be maintained between different FSCs of ammunition. Quantity-Distance (QD) is the minimum distance that must be maintained between different FSCs of ammunition (page 8, para 2).
2.	B. Sections, FSUs, and stacks. ASPs are ideally broken down into three sections ...FSUs are subdivisions of a section ...there must be at least two stacks in an FSU (page 6, para 1).
3.	C. On the ammunition needed by supported units for the first one to three days of war. ASPs must store approximately a one- to three-day supply of ammunition to meet routine, surge, and emergency requirements for supported units (page 2, Introduction).
4.	D. Any category. Small arms cartridges (except bulk-packed tracer and incendiary) may be stored with any field storage category (page 2, para 2.a.(6)).
5.	A. 99 feet. (page 13, Figure 8).
6.	C. 7. There are seven storage categories (A thru G) for conventional ammunition (page 2, para 2.a.(5)).