

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

INSPECTION AND TEST OF AIR AND OTHER
GAS COMPRESSORS

Headquarters, Department of the Army, Washington, D. C.

17 March 1989

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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•This technical bulletin supersedes TB 43-0151, 24 August 1984.

Section I. INTRODUCTION

1. Purpose and Scope. This bulletin prescribes the inspection requirements and criteria for testing air and gas compressors up to 6000 psi (421.8 kg/sq cm) and designates the standard testing equipment (on liquid oxygen generating and charging plants, this applies only to the air compressor and air compressor accessories). This bulletin does not apply to special purpose installed systems. This bulletin is also not applicable to airbrake, air conditioners, compressed gas cylinders, or paint and insecticide systems. Inspections and tests described herein are supplementary to the prescribed preventive maintenance services performed by the using unit.

2. Use. This bulletin is to be used as a guide by qualified maintenance personnel in the periodic testing of air and gas compressors and accessories. The inspections and tests prescribed in this bulletin shall be accomplished by the appropriate using units and/or Direct Support Facilities. Recommend requirements in paragraph 3, except for checking operation of the Safety Valve, be performed by Unit Maintenance, and requirements in paragraphs 4 and 5 be performed by Direct Support Maintenance.

Section II. TEST INTERVALS AND REQUIREMENTS

3. Low Pressure Compressors (Below 500 psi (35.1 kg/sq cm)). Inspect and test at 12 month intervals or at any time a malfunction or erratic operation indicates the need (a through d below).

a. Make a detailed visual inspection of the entire unit. Particular attention should be given to the exterior conditions of the receiver, gages, unloaders, relief devices, fittings, valves, hoses, etc.

b. Install a calibrated gage on the receiver discharge shutoff valve. Suggest a Dial Pressure Gage, NSN 6685-00-063-9708 or equal.

c. Operate the compressor and check the operational gages for accuracy by comparing the pressure reading to the calibrated gage pressure reading (para 7 c). Check the operation of all valves and ensure proper operation of the unloader (para 7 b). Check the operation of the safety valve (para 4 f(4) through (13)). Utilize the above calibrated gage for the gage requirements in paragraph 4 f(5).

d. Components of the low pressure compressors shall not be removed during tests unless they are found to be defective. If removal of components or accessories is required, they shall be tested in accordance with paragraph 7 below.

4. High Pressure Compressors (501-6000 psi (35.2-421.8 kg/sq cm)).

a. The following critical components shall be removed from the compressors and tested at 12 month intervals or at any time a malfunction or erratic operation indicates the need:

- (1) All safety valves and pressure release devices.
- (2) All pressure gages.
- (3) High pressure service hoses exceeding 500 psi (35.1 kg/sq cm).

- b. Perform all tests in accordance with instructions furnished in the manufacture's manual for the test bench (para 8 a). Operation, Maintenance, Overhaul and parts list manual relative to the test bench cannot be obtained through AG Publications channels but must be requisitioned through normal supply channels.

WARNING

Compressors having over 501 psi (35.2 kg/sq cm) discharge pressure shall be tested at least 300 feet (91.5 m) from unbarricaded critical equipment or inhabited buildings. Unprotected personnel shall be at least 300 feet (91.5 m) from test site.

- c. Equipment required is as follows:

(1) Test benches (Section III).

(2) A barricade or equivalent protection for the inspector during the over pressure period of the test.

- d. Prior to performing the test specified in b above, all safety valves and other protective devices such as rupture disks and vacuum valves, where used, shall be visually checked to determine the physical condition of these items and to ensure that air through the discharge headers and outlets is not restricted by corrosion or other foreign material. If possible, all unloading devices shall be manually tripped during this inspection.

- e. A service hose in storage, intended for use at a pressure exceeding 501 psi (35.2 kg/sq cm), shall be considered as having a maximum total life of 5 years. All hoses with a test date older than 12 months shall be forwarded to the nearest maintenance activity which has a testing facility for retest prior to issue or return to stock. Hose that fails the test shall be disposed of immediately.

- f. The periods for inspection referred to above are applicable to compressors in operation with normal shutdown intervals. If the compressor is out of service for an extended interval, the effect of this change in condition may be considered in revising the date of the next inspection. The compressor shall be given an operational test as a unit at the time of issue from the depot if it has been out of service for a continuous period of one year or more and shall be operationally tested by direct support prior to issue to troop units. After issue, all compressors (501-6000 psi (35.2-421.8 kg/sq cm)) shall be tested annually by the appropriate direct support activity in accordance with the following:

(1) Perform all tests as specified in a and b above. Reinstall the tested components.

- (2) Make a detailed visual inspection of the entire unit. Particular attention shall be given to the exterior condition of receivers, intercoolers, aftercoolers, gages, unloaders, relief devices, fitting, valves, hoses, etc.

(3) Operate the compressor and check for proper operation of all gages and valves and ensure that the unloader operates properly. Observe and record the time, temperature, and gage readings through the normal operating pressure range.

(4) Relieve the pressure; plug, block off, or disconnect the supply line to the unloader.

(5) Extend the service hose; attach and extend an extra strength hose, gage, and valve to a protected position. Securely anchor the hose, valve and gage.

(6) Clear the area of personnel.

(7) Open all line valves to and on the extended hose and operate the compressor.

(8) Take a protected position (c(2) above) and close the valve on the extended line. Observe and record the gage reading at which the final stage safety valve operates.

(a) If an intermediate stage safety valve operates before the final stage safety valve, open the hose valve, relieve the pressure, stop the compressor, replace the intermediate safety valve, and repeat the test.

(b) If a final stage valve fails to operate at 110 percent of the normal operating pressure, open the hose valve, relieve the pressure, stop the compressor, replace the final stage safety valve, and repeat the test.

(9) Open the hose valve to relieve the pressure on the unit.

(10) Stop the compressor.

(11) Remove the extra strength hose, gage, and valve.

(12) Remove the plug; replace, unblock, or reconnect the unloader.

(13) Visually inspect and operate the compressor, check for proper operation of all gages, and ensure that the unloader operates properly. Observe and record the time, temperature, and gage readings through the normal operating range.

5. Hydrostatic Test.

a. All air and gas receivers (excluding compressed gas cylinders) subject to a working pressure in excess of 501 psi (35.2 kg./sq cm) shall be subjected to a hydrostatic pressure test, which at every point in the receiver is at least equal to 150 percent the maximum working pressure. Receivers in use shall be given a hydrostatic test every 24 months or at any time a receiver shows evidence of bad dents, corroded areas, leakage, or other conditions that indicate weakness which might render the receiver unsafe. To perform the test, disconnect the receiver from the inlet and outlet connections and install a pressure gage between the receiver and the liquid pump. All safety devices shall be removed

and the connections plugged. The highest connection of the receiver (in the position in which it is to be tested) shall be used to purge possible air pockets while the receiver is filling with liquid. Before applying pressure, the equipment shall be inspected to see that all low pressure filling lines and other appurtenances that should not be subjected to the test pressure have been disconnected. Following the application of the hydrostatic pressure test, an inspection shall be made to all joints and connections. This inspection will be made at a pressure not less than two-thirds of the test pressure. Receivers which indicate any leakage shall be repaired or replaced.

b. The intercooler and aftercooler on air compressors installed in liquid oxygen generating and charging plants shall be given a hydrostatic test semiannually in accordance with the procedure given (a above) for receivers.

c. Receiver with less than 500 psi (35.1 kg/sq cm) working pressure do not require a hydrostatic test every 24 months. A hydrostatic test (150 percent of working pressure) is only required if inspection reveals evidence of bad dents, corroded areas, leaking or other conditions that indicate the receiver may be unsafe.

6. Records. When practical, preventive maintenance services and technical inspections shall be scheduled to correspond with test requirements. Scheduling and accomplishment of inspections and tests shall be recorded on DD Form 314 (Preventive Maintenance Schedule and Records) in accordance with DA Pam 738-750. Specific results of tests, as required, may be entered in the remarks block of the DD Form 314.

7. Standards. Components and accessories will be tested to conform to the following standards:

a. Safety valves shall be set and sealed to operate at 110 percent of normal operating pressure for the appropriate stage.

b. The unloader shall be set and sealed to unload at not more than 5 percent over the normal operating pressure of the final compressor stage.

c. Pressure gages shall not vary more than 2 percent of the rated operating pressure for a minimum of one minute without showing defects (i.e., leaks, unequal expansion, cuts, or breaks).

d. The high pressure hose must withstand 125 percent of rated operating pressure for a minimum of one minute, without showing defects (i.e., leaks, unequal expansion, cuts or breaks), and tagged with the date it was tested.

e. All parts tested, safety valves, and unloaders shall be set and sealed using circular lead seal attached to copper wire. Safety valves and unloaders that do not have provisions for sealing shall be sealed with type III, Class I pressure sensitive tape conforming to specification PPP-T-60. Any available color and size may be utilized (7510 class).

f. When equipment has been inspected or tested, a stencil or metal tag shall be applied as follows: INSPECTED/TESTED IAW TB 43-0151 on (date) NEXT INSP/TEST DUE (date).

Section III. SPECIAL TEST BENCHES

8. Description.

a. Pressure testing of critical parts, components, and accessories shall be conducted with Test Bench, 0-6000 psi, Model AP-16, NSN 4940-00-771-6999; Test Bench, 0-6000 psi, Model 3231; or Test Bench, 0-6000 psi, Model 3231A, NSN 4940-00-771-6999.

b. A standard commercial cylinder of water pumped nitrogen, NSN 6830-01-0289402, for full cylinders or NSN 8120-00-985-7275 for empty cylinders, is required for the operation of the test bench. It is not furnished and must be requisitioned separately.

c. Extended service hose, NSN 4720-00-022-1016 is not a part of the test benches but can be requisitioned separately.

d. All components are mounted on the bench or carried in the drawers. No external connections are required, so the test bench may be transported and operated at compressor sites.

e. Gage, Pressure, Dial Indicating, NSN 6685-00-063-9708 must be procured by using units in order to comply with paragraph 3 of this TB.

CAUTION

The safety shield furnished with the test bench is required for safe operation of the bench.

9. Supply Information.

a. The test bench repair parts and miscellaneous accessories may be requisitioned through normal supply channels.

b. When economical, local procurement of repair parts and miscellaneous accessories is authorized by AR 710-2.

10. References.

a. AR 710-2.

b. DA Pam 738-750.

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN. II
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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 328.08 feet
 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigrams = .035 ounce
 1 dekagram = 10 grams = .35 ounce
 1 hectogram = 10 dekagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46 pounds
 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	To	Multiply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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