

METRIC

MIL-STD-40008(AT)

10 September 1991

SUPERSEDING

(see 6.3)

## MILITARY STANDARD

PNEUMATIC PRESSURE TESTING PARTS WITH PERMANENT  
JOINTS: WELDS, BRAZES, AND RIVETS (METRIC)



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### FOREWORD

1. This military standard is approved for use by the U.S. Army Tank-Automotive Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

2. Beneficial Comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Tank-Automotive Command, ATTN: AMSTA-GDS, Warren, MI 48397-5000, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

3. This military standard establishes the requirements for pneumatic pressure testing parts with permanent joints, such as, welds, brazes, and rivets for assembly leaks.

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### 1. SCOPE

1.1 Scope. This standard covers various processes for permanently joining metal parts and leakage test procedures for same.

1.2 Purpose. The requirements in this standard are intended to be used to detect leakages in parts which have been permanently joined by one or more of the processes specified herein and which have been designed to withstand leakage under proof stress limits.

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## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

## SPECIFICATIONS

## MILITARY

MIL-W-6858 - Welding, Resistance: Spot and Seam.

## STANDARDS

## MILITARY

MIL-STD-1759 - Rivets and Rivet Type Fasteners Preferred for Design, Listing of.  
 MIL-STD-1892 - Welding, Arc and Oxyfuel Gas, Process and Requirements for.  
 MIL-STD-1896 - Joints, Brazed, Inspection of.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Navy Publishing and Printing Service Office, Code NPM M/F DODSSP, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

## AMERICAN WELDING SOCIETY (AWS)

AWS A2.4 - Symbols for Welding and Nondestructive Testing.  
 AWS A3.0 - Welding Terms and Definitions.

(Application for copies should be addressed to the American Welding Society, Inc., 550 N. W. LeJeune Road, P.O. Box 351040, Miami, Florida 33135.)

## AMERICAN SOCIETY FOR METALS

Volume 11, Metals Handbook, Eight Edition "Leak Testing"

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(Application for copies should be addressed to the American Society for Metals, Metals Park, Ohio 44073.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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## 3. DEFINITIONS

3.1 Pneumatic pressure testing. The application of a specified internal air pressure to a sealed assembly at a pressure level sufficient to ensure a leak free assembly within the specified design requirements.

3.2 Proof stress. The design requirement specified on the drawing or in the specification representing the hydraulic pressure a vessel should withstand to assure its ability to tolerate service loads.

3.3 Welded and brazed assemblies. Definitions of welding and brazing and drawing symbols used in conjunction with this standard shall conform to AWS A2.4 and AWS A3.0 respectively.

3.4 Riveted joints. The mechanical joining of two or more members of an assembly by means of metal rivets, the unheaded end being upset after the rivet is in place. Rivet and rivet fastener types are specified in MIL-STD-1759.

3.5 Gaskets. That part of a riveted assembly formed of metallic or nonmetallic material that interfaces the metal parts to effect a leak tight joint. The gasket material is specified in the drawing or specification with the material dependent on the environment encountered, the gasket location, and its construction.

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## 4. GENERAL REQUIREMENTS

4.1 General. This section covers the requirements of various types of joining and leak detection processes used to permanently join metal parts, surface preparation procedures, and acceptance/rejection criteria.

4.2 Joining processes. The permanent type metal joining processes covered in this standard are as follows:

<u>Process</u>	<u>Acronym</u>
a. Arc welding:	- AW
1. Gas metal arc welding, manual or automatic	- GMAW
2. Gas tungsten arc welding, manual or automatic	- MA or AU
3. Submerged arc welding	- GTAW
	- MA or AU
	- SAW
b. Brazing:	- B
1. Furnace brazing	- FB
2. Induction brazing	- IB
3. Torch brazing	- TB
c. Resistance welding:	- RW
1. Resistance seam welding	- RSEW
d. Riveting: All types	- N/A

4.3 Leak detection processes. The types of leak detection processes referred to herein are:

- a. Submergence testing
- b. Acoustic testing
- c. Air decay
- d. Gas detection

4.4 Welded, brazed, and riveted assemblies.

4.4.1 Arc welded (AW) assemblies. Arc welded assemblies shall conform to MIL-STD-1892 and to the applicable drawing and specification requirements.

4.4.2 Brazed (B) joints. Subassemblies or component parts of compatible ferrous or nonferrous materials shall meet the inspection requirements of MIL-STD-1896 and the drawing and specification requirements.

4.4.3 Resistance welded (RW) assemblies. Resistance welded assemblies shall conform to the roll seam welding requirements of MIL-W-6858 and to the applicable drawing and specification requirement.

4.5 Riveted joints. Riveted assemblies shall be gasketed and jointed to meet the applicable drawing or specification requirements.



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4.6 Preparation procedure. Unless otherwise specified in the applicable drawing or specification for a specific part, the following procedure shall be as followed:

- a. Before pressure testing, all welding, brazing, or riveting and all applicable stress relieving shall have been performed on the part.
- b. Parts shall have clean surfaces and be free from loose particles.
- c. Any operation which may remove metal from any surface shall be done before final pressure tests.
- d. Parts shall be tested and accepted before any surface treatment operation.
- e. The pneumatic pressure test system shall be designed to ensure that a dead-end pneumatic circuit is formed.
- f. Testing pressures and allowable leakage shall be as specified in the applicable drawing or specification.

4.7 Acceptance/rejection criteria. Parts which satisfy the leakage of the applicable part drawing and applicable specification are acceptable. Parts which leak in excess of the allowable drawing or specification requirements shall be rejected.

4.8 Rework. Those parts approved for rework by the acquisitioning authority shall be repaired by approved repair procedures and subjected to retesting.

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## 5. DETAILED REQUIREMENTS

5.1 Test methods. Inspection by pneumatic pressure testing shall be as specified in the applicable drawing or specification using one or more of the test methods specified herein.

5.1.1 Submergence testing. This test procedure is accomplished by pressurizing the sealed vessel and immersing it in water or some other suitable liquid. The formation of bubbles occurs if leakage is present. Normal sensitivity is 0.101 kilopascal-cubic centimeter (kPa-cc) per second ( $10^{-3}$  standard atmosphere-cubic centimeter (atm-cc) per second).

5.1.2 Acoustic testing. Turbulent flow of a pressurized gas through a leak produces sound of sonic and ultrasonic frequencies. Large leaks can be detected with the ear, stethoscopes, or microphones. Smaller leaks may be detected with ultrasonic probes operating in the range of 35 to 60 kilohertz. Such detectors can detect leaks of 1.01 kPa-cc per second ( $10^{-2}$  atm-cc per second).

5.1.3 Air decay. A leak detection procedure generally applied to large heavy gage stamped assemblies or to large cast assemblies capable of withstanding high pneumatic pressures. After pressurization described in the applicable drawing or specification, the loss of pressure versus the specified time determines acceptability.

5.1.4 Gas detection. Pneumatic testing systems also utilize numerous gas leak detectors that react to a specific gas or a group of gases. A listing and an explanatory description of these methods can be found in Volume 11 of the Metals Handbook, Eighth Edition.

5.2 Surface treatment. Parts which are to be surface treated shall be tested and accepted before the surface treatment operation.

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## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The procedures covered in this standard are intended to ensure vessels of specified leak tight requirements are pneumatic pressure tested using the leak detection processes detailed herein.

6.2 Issue of DODISS. When this standard is used in acquisition, the applicable issue of the DODISS must be cited in the solicitation (see 2.1.1 and 2.2).

6.3 Supersession. This standard supersedes Textron Lycoming Division, Stratford, Connecticut, Specification E2002A, dated 26 April 1982.

6.4 Subject term (key word) listing.

Acoustic testing  
Air decay  
Arc welding  
Brazing  
Gas detection  
Gaskets  
Pneumatic pressure testing  
Surface treatment  
Resistance welding  
Riveting  
Submergence testing

Custodian:  
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Preparing activity:  
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