

INCH POUND

MIL-DTL-7905H
06 October 2003
SUPERSEDING
MIL-C-7905G
24 August 1990

DETAIL SPECIFICATION

CYLINDERS, STEEL, COMPRESSED GAS, NON-SHATTERABLE, SEAMLESS, 1800 PSI AND 2100 PSI

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the requirements for 1800 pounds per square inch (psi) and 2100 psi compressed gas storage, non-shatterable, steel cylinders of seamless construction.

1.2 Classification. The cylinders are of the following types and classes, as specified by the applicable part number (see 6.2).

1.2.1 Types. The types of cylinders are as follows:

- Type A - Internal taper thread
- Type B - External thread
- Type C - Internal straight thread

1.2.2 Classes. The classes of cylinders are as follows:

- Class 1 - 1800 psi/12,400 kilopascals (kPa) rated pressure
- Class 2 - 2100 psi/14,500 kPa rated pressure

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 , 4, or 5 of this

Comments, suggestions, or questions on this document should be addressed to: Commander, Naval Air Warfare Center Aircraft Division, Code 414100B120-3, Highway 547, Lakehurst, NJ 08733-5100 or emailed to Thomas.Omara@navy.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at www.dodssp.daps.mil.

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specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

FEDERAL SPECIFICATIONS

| | | |
|-----------|---|---|
| BB-A-1034 | - | Compressed Air, Breathing (Inactive for new design) |
| TT-C-490 | - | Chemical Conversion Coatings and Pretreatments for Ferrous Surfaces (Base for Organic Coatings) |
| TT-P-1757 | - | Primer Coating, Alkyd Base, One Component |

FEDERAL STANDARDS

| | | |
|-------------|---|---------------------------------------|
| FED-STD-595 | - | Colors Used in Government Procurement |
|-------------|---|---------------------------------------|

COMMERCIAL ITEM DESCRIPTIONS

| | | |
|-----------|---|--|
| A-A-3165 | - | Lacquer, Gloss for Aircraft Use |
| A-A-58092 | - | Tape, Antiseize, Polytetrafluoroethylene |
| A-A-59503 | - | Nitrogen, Technical |

DEPARTMENT OF DEFENSE SPECIFICATIONS

| | | |
|---------------|---|---|
| MIL-PRF-27210 | - | Oxygen, Aviator's Breathing, Liquid and Gas |
|---------------|---|---|

DEPARTMENT OF DEFENSE STANDARDS

| | | |
|----------------|---|--|
| MIL-STD-129 | - | Military Marking for Shipment and Storage |
| MIL-STD-130 | - | Identification Marking of U.S. Military Property |
| MIL-STD-1916 | - | DoD Preferred Methods for Acceptance of Product |
| MIL-STD-2073-1 | - | DoD Standard Practice for Military Packaging |
| MS26545 | - | Cylinders, Steel, Compressed Gas, Non-Shatterable, Seamless, 1800 PSI and 2100 PSI (Inactive for new design) |

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(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or www.dodssp.daps.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Bldg 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

CODE OF FEDERAL REGULATIONS

DEPARTMENT OF TRANSPORTATION

49 CFR 173.301 - General Requirements for Shipment of Compressed Gases in Cylinders and Spherical Pressure Vessels

(Copies of this document are available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402 or www.access.gpo.gov.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AEROSPACE INDUSTRIES ASSOCIATION (AIA)

NAS847 - Caps and Plugs, Protective, Dust and Moisture Seal (DoD adopted)

(Copies of this document are available from www.aia-aerospace.org/pubs or from the Aerospace Industries Association, 1000 Wilson Blvd., Suite 1700, Arlington, VA 22209-3901.)

COMPRESSED GAS ASSOCIATION (CGA)

Pamphlet C-1 - Methods for Hydrostatic Testing of Compressed Gas Cylinders

(Copies of this document are available from www.cganet.com or the Compressed Gas Association, 4221 Walney Road, Fifth Floor, Chantilly, VA 20151-2923.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE-AS13591 - Cleaning Methods and Procedures for Breathing Oxygen Equipment (DoD adopted)

(Copies of this document are available from www.sae.org or the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

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2.4 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.

3. REQUIREMENTS

3.1 Qualification. The cylinders furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.3).

3.2 Design and construction. The design and construction of the cylinders shall be in accordance with the applicable part number of MS26545, as specified in the contract or order (see 6.2). Cylinders shall be fabricated to form seamless construction and shall have been subjected to the initial permanent volumetric expansion test within 18 months prior to delivery.

3.2.1 Wire Wrapping.

3.2.1.1 U.S. Army/U.S. Air Force. If wire wrapping is used, the cylinder shall be identified as having wire wrapping in accordance with MS26545.

3.2.1.2 Naval Air Systems Command. Wire wrapping shall be not acceptable.

3.2.2 Neck. Shrink rings or supporting collars shall not be used for strengthening the neck of the cylinder.

3.2.3 Closure. Unless otherwise specified, the threaded port of each cylinder shall be closed by a metal, removable, threaded plug or cap conforming to NAS847 to protect the threads and prevent entrance of foreign matter or moisture.

3.3 Performance.

3.3.1 Visual examination and dimensional check.

3.3.1.1 Visual examination. When visually examined as specified in 4.6.1.1, the cylinders shall conform to the requirements of this specification. Table I shall be used to classify and enumerate the defects.

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TABLE I. Classification of defects for visual examination of the cylinder.

| Defects | Critical | Minor |
|---|----------|-------|
| Incorrect outlet configuration | X | |
| Incorrect or defective threads | X | |
| Incorrect, incomplete, or faulty finish | | X |
| Incorrect type or class | X | |
| Flaw in material <u>1/</u> | X | |
| Incorrect or incomplete marking | | X |
| Incorrect color | | X |
| Loose particles inside the cylinder | X | |
| Rust or scale | X | |
| Irregularities in the internal surface greater than 1/16 inch | X | |
| Existence of any foreign material, solid or liquid | X | |

1/ Cracks in the spun sections of cylinders, such as those caused by changes in temperature during the spinning process, shall be accepted. There shall be no cracks in the cylindrical section of the cylinder wall.

3.3.1.2 Dimensional check. When dimensionally checked as specified in 4.6.1.2, the cylinders shall conform to the requirements of MS26545.

3.3.2 Cleanliness (oxygen cylinders).

3.3.2.1 Non-Volatile residue. When tested as specified in 4.6.2.1, the residue from the solvent used for the rinse shall not exceed that of the clean solvent by more than 0.0015 grams per square foot of part surface area.

3.3.2.2 Particulate test. When tested as specified in 4.6.2.2, the solvent rinse shall not contain greater than 5 particles between 100 and 175 micrometers (um) per 100 milliliters (ml) of solvent and no particles larger than 175 um.

3.3.2.3 Halogen test. When tested as specified in 4.6.2.3, there shall be no evidence of cleaning compound residue.

3.3.3 Leakage.

3.3.3.1 Procedure I. When tested as specified in 4.6.3.1, the cylinders shall meet the leakage requirements of DOT 3A or 3AA contained in 49 CFR 173.301 (see 2.2.2).

3.3.3.2 Procedure II. When tested as specified in 4.6.3.2, the cylinders shall not show any evidence of gas bubbles after 2 minutes of submergence.

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3.3.4 Permanent volumetric expansion. When tested as specified in 4.6.4, the cylinders shall not have a permanent volumetric expansion greater than 10 percent of the total volumetric expansion.

3.3.5 Burst pressure. When tested as specified in 4.6.5, class 1 cylinders shall not burst at a pressure less than 4,500 psi (31,027 kPa) and class 2 cylinders shall not burst at a pressure less than 5,250 psi (36,199 kPa). Failure of cylinders shall occur in a ductile manner.

3.3.6 Endurance. When tested as specified in 4.6.6, the cylinders shall not show any evidence of material failure.

3.3.7 Flattening. When tested as specified in 4.6.7, the cylinders shall not show any evidence of cracking when examined visually without any magnification.

3.3.8 Macrostructure defects. When tested as specified in 4.6.8, the cylinders shall not show any evidence of abnormal segregation, pipes, cracks, seams, or abnormal change in structure from the surface to the center.

3.3.9 Fragmentation resistance.

3.3.9.1 Procedure I. When tested as specified in 4.6.9.1, the cylinders shall remain in one piece. If wire wrapping is used, the wire wrapping may come loose from the cylinder.

3.3.9.2 Procedure II. When tested as specified in 4.6.9.2, the cylinders shall be allowed to separate into two pieces for oxygen or air charged cylinders and four pieces for carbon dioxide charged cylinders. The projected area of any piece shall be not less than 2.0 square inches. The cylinder shall exhibit no evidence of shattering into small irregular pieces or splinters. If wire wrapping is used, the wire wrapping is allowed to come loose from the cylinder.

3.4 Weight. The weight of the cylinder shall be not greater than the values specified in MS26545.

3.5 Interchangeability. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable.

3.6 Color. The color of the cylinder shall be in accordance with the applicable color number of FED-STD-595 as specified in MS26545.

3.7 Finish. The external and internal surface shall be cleaned in accordance with TT-C-490, Method I or VI. The internal surface of cylinders fabricated of material other than corrosion-resistant steel shall be treated in accordance with TT-C-490, Type I. The external finish of all cylinders shall not crack, chip, or scale during normal service life or under extreme

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environmental conditions. The paint system shall be in accordance with local air pollution requirements. Extreme caution shall be exercised to prevent contamination during painting.

3.8 Cylinder identification. The cylinders shall be marked for identification in accordance with MIL-STD-130.

3.8.1 Stamped markings. The cylinders shall be permanently and legibly marked using metal stamping on the shoulder, head, or neck. The markings shall be at least ¼ inch high and shall consist of the following:

- a. The service pressure rating in units of pounds per square inch (psi) and kilopascals (kPa), 1800 psi (12,400 kPa) or 2100 psi (14,500 kPa).
- b. Applicable (MS) part number.
- c. Manufacturer's symbol or CAGE (Commercial and Government Entity) Code.
- d. Serial number.
- e. Date of permanent volumetric expansion test (month and year and identifying symbol in accordance with DOT requirements). Test dates listed to allow addition of subsequent dates.

3.8.2 Additional markings. The following additional markings shall be applied by stencilling or clear pressure sensitive decal in two places diametrically opposite of each other.

- a. The name of the gas.
- b. The service pressure rating in units of pounds per square inch (psi) and kilopascals (kPa), 1800 psi (12,400 kPa) or 2100 psi (14,500 kPa). (NOT APPLICABLE FOR CARBON DIOXIDE CYLINDERS)

The size of the markings and the space between each row of markings shall be a minimum of 0.12 times the outer diameter of the cylinder.

3.9 Unit/container markings. Each unit and shipping container shall be marked in accordance with MIL-STD-129. In addition, the following precautionary marking shall be required on each unit package and shipping container:

CAUTION

DO NOT ALLOW PETROLEUM CONTAMINANTS OF ANY KIND
TO BE USED/STORED ON OR ABOUT THESE CYLINDERS.

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3.10 Workmanship. The cylinders shall be uniform in quality and shall be free from irregularities or defects which could adversely affect safety, performance, reliability, or durability.

4. VERIFICATION

4.1 Classification of inspection. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 Qualification inspection. Qualification inspection shall consist of the examinations and tests specified in Table II.

TABLE II. Qualification inspection.

| Inspection | Requirement Paragraph(s) | Test Method Paragraph(s) |
|--------------------------------|---------------------------------------|--------------------------------------|
| Visual examination | 3.3.1.1 | 4.6.1.1 |
| Dimensional examination | 3.3.1.2 | 4.6.1.2 |
| Cleanliness (oxygen cylinders) | 3.3.2.1, 3.3.2.2, 3.3.3.3 | 4.6.2.1, 4.6.2.2, 4.6.2.3 |
| Leakage (procedure II) | 3.3.3.2 | 4.6.3.2 |
| Permanent volumetric expansion | 3.3.4 | 4.6.4 |
| Burst pressure | 3.3.5 | 4.6.5 |
| Endurance | 3.3.6 | 4.6.6 |
| Flattening | 3.3.7 | 4.6.7 |
| Macrostructure | 3.3.8 | 4.6.8 |
| Fragmentation resistance | 3.3.9.1, or 3.3.9.2, as applicable | 4.6.9.1 or 4.6.9.2, as applicable |

4.2.1 Qualification samples. Qualification samples shall consist of the following:

- a. Nine cylinders of each type (part number) for which qualification testing has been authorized.
- b. Two sets of manufacturer's drawings.
- c. When applicable, certification from the original manufacturer that the distributor requesting qualification status is authorized to distribute the item, or to rebrand and distribute the item, as applicable.

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- d. A statement of certification from Department of Transportation approved laboratory (with supporting data) that the cylinders meet DOT 3A or 3AA requirements contained in 49 CFR 173.301 (see 2.2.2).

Samples shall be forwarded to a test facility set forth in the letter of authorization to submit samples (see 6.3). The samples shall be plainly identified by securely attached, durable tags marked with the following information:

Sample submitted by (name) (date) for qualification inspection in accordance with the requirements of MIL-DTL-7905 and number under authorization (reference authorizing letter and number (see 6.3)).

4.3 Conformance inspection. Conformance inspection shall consist of the examinations and tests specified in Table III (listed sequence mandatory). The sampling and inspection levels and acceptance criteria shall conform to MIL-STD-1916.

TABLE III. Conformance inspection.

| Inspection | Method | Sample Size | Acceptance Criteria |
|--|---------------------------|--|--|
| Visual examination (See classification of defects) | 4.6.1.1 | a. Every cylinder for critical defects. b. Inspection Level II for minor defects. | a. Reject all units with any critical defects. b. An acceptable quality level of 2.5 defects per hundred units for minor defects. |
| Dimensions | 4.6.1.2 | Inspection Level S-2 <u>1/</u> | Acceptance number zero, rejection number 1. |
| Leakage (procedures I or II) | 4.6.3.1 and 4.6.3.2 | Every cylinder. | Reject all defective units. |
| Permanent volumetric expansion | 4.6.4 | Every cylinder. | Reject all defective units. |
| Cleanliness (oxygen cylinders) | 4.6.2.1, 4.6.2.2, 4.6.2.3 | Inspection Level S-3 <u>1/</u> | Acceptance number zero, rejection number 1. |
| Burst pressure <u>2/</u> | 4.6.5 | Inspection Level S-1 <u>1/</u> | Acceptance number zero, rejection number 1. |

1/ The sample size shall be based only on the applicable sample size code letter corresponding to the specified inspection level of MIL-STD-1916.

2/ This is a destructive test (see 6.2).

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4.4 Sampling.4.4.1 Inspection lot.

4.4.1.1 Cylinder. An inspection lot size shall be expressed in units of one cylinder of the same size, made under the same conditions and from the same materials and components. The sample unit shall be one cylinder.

4.4.1.2 Sampling for tests and examinations of cylinders. The sample size, acceptance criteria, tests, and examinations required for the cylinders shall be as specified in Table III.

4.5 Test conditions.

4.5.1 Gas. Unless otherwise specified, the gas used in testing the cylinders shall be oxygen conforming to MIL-PRF-27210, Type I, or nitrogen conforming to A-A-59503, Type I, Class I, Grade B, or air conforming to BB-A-1034.

4.5.2 Temperature and pressure. Unless otherwise specified, tests shall be conducted at local ambient temperature and barometric pressure. Test instruments shall be calibrated or adjusted according to their required usage in conducting individual tests. The temperature and barometric pressure shall be recorded at the time of inspection and, when required, the test results shall be corrected to normal temperature and pressure (NTP) conditions. NTP conditions are 70 °F (21.1 °C) and 29.92 inches of mercury (101.3 kPa).

4.5.3 Antiseize tape. To prevent damage to the cylinder threads or valves, male pipe threads of fittings installed in cylinders during tests shall be properly coated with antiseize tape conforming to A-A-58092 before being installed in the cylinder. The tape shall be applied according to instructions specified in A-A-58092. Tape shall be prevented from entering the inside of fittings.

4.5.4 Wire wrapping. If wire wrapping is used, all tests, except fragmentation resistance (see 4.6.9), shall be performed without wire wrapping.

4.6 Inspection methods.4.6.1 Visual examination and dimensional check.

4.6.1.1 Visual examination. Every cylinder shall be visually examined for conformance to the requirements of 3.3.1.1.

4.6.1.2 Dimensional check. The cylinders shall be dimensionally checked for conformance to the requirements of 3.3.1.2.

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4.6.2 Cleanliness (oxygen cylinders). The cleanliness test shall consist of the non-volatile residue test (see 4.6.2.1), particulate test (see 4.6.2.2), and the halogen test (see 4.6.2.3).

4.6.2.1 Non-volatile residue test.

4.6.2.1.1 Preparation of cylinder. A clean plug shall be placed in the outlet of the cylinder undergoing test. The surface around the plug and the cylinder outlet shall be cleaned with an oxygen-safe cleaning compound, then dried using a clean lint-free cloth.

4.6.2.1.2 Procedure. Non-volatile residue shall be determined in accordance with SAE-AS13591 and the following:

- a. Internal area of the cylinder shall be the basis for determining the quantity of cleaning compound required.
- b. The plugged cylinder shall be agitated a minimum of 10 minutes in a manner that completely wets the inner walls with the cleaning compound.
- c. Particulate content shall be determined in accordance with 4.6.2.2.
- d. Non-volatile residue shall be in conformance with 3.3.2.1.

4.6.2.2 Particulate test. Upon successful completion of the test specified in 4.6.2.1, examine the remaining one half of the solvent used for the rinse of particles. To determine the particle content, filter the solvent through a 1.2 micro millipore membrane filter and inspect the filter surface for conformance to the requirements of 3.3.2.2. Upon successful completion of this test, the cylinders shall be subjected to the test specified in 4.6.2.3.

4.6.2.3 Halogen test. Upon successful completion of the test specified in 4.6.2.2, the cylinders shall be tested to detect any solvent residue. A Halogen or Halide detector, having a minimum sensitivity of not less than 3×10^{-4} standard cubic centimeters per second, shall be used for this test. The cylinders shall meet the requirements of 3.3.2.3.

4.6.3 Leakage.

4.6.3.1 Procedure I. The cylinder shall be tested for leakage as specified in the leakage test of DOT 3A or 3AA, as applicable. The cylinder shall meet the requirements specified in 3.3.3.1.

4.6.3.2 Procedure II. The cylinder shall be charged to its design (class requirement) rated pressure with a +50/-0 psig (+345/-0 kPa) tolerance. With this pressure maintained, the cylinder shall be submerged in water for 2 minutes. All parts of the cylinder shall be covered with at least 1 inch (25.4 mm) of water. The cylinder shall meet the requirements specified in 3.3.3.2.

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4.6.4 Permanent volumetric expansion. Permanent volumetric expansion of the cylinder shall be determined as specified in the hydrostatic test of Pamphlet C-1 of the Compressed Gas Association. The cylinder shall meet the requirements specified in 3.3.4. The cylinder shall have passed this test within 18 months prior to delivery.

4.6.5 Burst pressure. The cylinders shall be hydrostatically pressurized at a rate that is not greater than 25,000 psi (172,370 kPa) per minute to a maximum pressure of 95.24 percent of the minimum burst pressure specified in 3.3.5 for class 1 and class 2 cylinders. The cylinders shall be pressurized for three minutes. The pressure shall then be increased to destruction at a rate that is not greater than 12,000 psi (82,735 kPa) per minutes and the burst pressure recorded. The cylinders shall meet the requirements of 3.3.5.

4.6.6 Endurance test. The cylinders shall be hydrostatically pressurized to their rated pressures (see 1.2.2) ± 50 psig (± 345 kPa) and the pressure released to obtain an internal pressure of 50 ± 50 psig (345 ± 345 kPa). This shall constitute one cycle. The charging and discharging shall be repeated for 20,000 cycles. The cylinders shall meet the requirements of 3.3.6. The cylinders shall then be subjected to and pass the permanent volumetric expansion test.

4.6.7 Flattening. The cylinder shall be flattened to six times the wall thickness between wedge-shaped knife edges with a 60-degree (1.05 rad) included angle and rounded to a $\frac{1}{2}$ inch (13 millimeters (mm)) radius. The knife edge shall be applied perpendicularly to the longitudinal axis of the cylinder at the center of the cylinder. The cylinder shall meet the requirements of 3.3.7.

4.6.8 Macrostructure (deep acid etch). Longitudinal sections from the cylinder shall be etched in an aqueous solution containing 50 percent hydrochloric acid by volume and maintained at a temperature of $160^{\circ} \pm 10^{\circ}$ F ($71^{\circ} \pm 5^{\circ}$ C) to show the presence of defects. The sections shall then be visually examined by a metallographist and shall meet the requirements specified in 3.3.8.

4.6.9 Fragmentation resistance. Oxygen shall be the charging gas for oxygen cylinders, carbon dioxide for charging carbon dioxide cylinders, and air for charging cylinders of other usages, see 4.5.1.

4.6.9.1 Procedure I. Cylinders greater than 2.5 inches in diameter shall be subjected to gunfire under the following conditions:

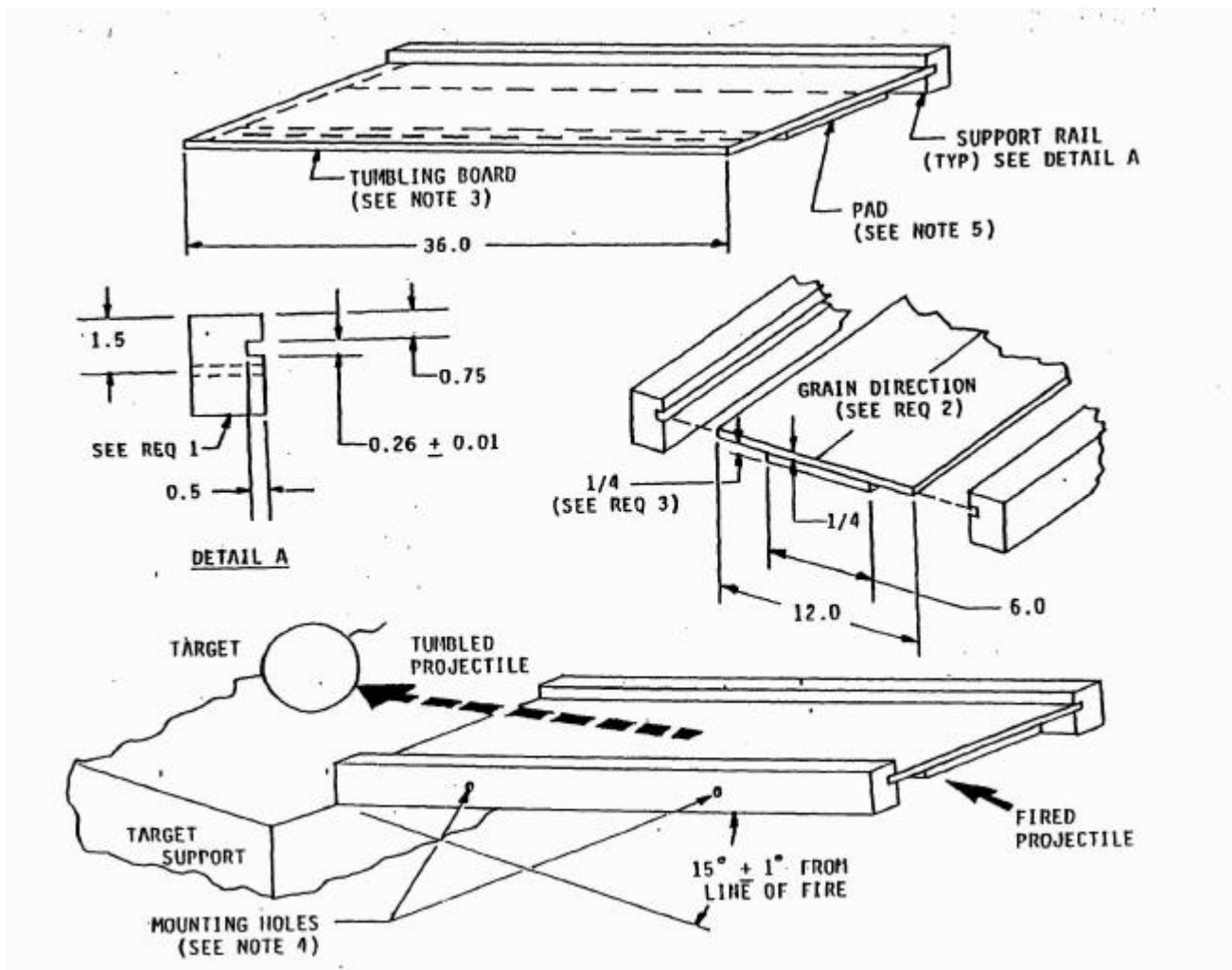
- a. The cylinder shall be charged to rated service pressure (carbon dioxide cylinders shall be charged to rated capacity) at gun range ambient air temperature.
- b. The cylinder may be supported but not constrained.
- c. The ammunition shall be 0.50 caliber M-2, armor-piercing.

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- d. The range shall be 50 yards (45.7 meters) maximum.
- e. The various cylinders taken for test shall be tested, each progressively, in a different position. The cylinder positions shall be as follows:
 - (1) With the longitudinal axis of the cylinder normal to the line of fire.
 - (2) With the longitudinal axis of the cylinder 45 degrees (0.785 rad) from normal toward the gun position.
 - (3) With the longitudinal axis of the cylinder parallel to the line of fire with inlet port face away from the gun position.
- f. All shots shall be tumbled. A suggested method for projectile tumbling is shown on figure 1.
- g. The tumbled projectile shall have a minimum velocity of 2,600 ft/sec (792 meters/sec) at the point of impact with the cylinder.
- h. The minimum size entry hole made by the tumbled projectile shall be one-half inch by one and one-half inch (13mm by 38mm).
- i. Verify that the projectile trajectory and tumble are satisfactory. This may be determined by the location and visual appearance of a hole made by the passage of the projectile through vertically suspended sheets of paper at the target area.

The cylinders shall meet the requirements specified in 3.3.9.1.

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REQUIREMENTS:

1. Lumber, 2x3 - finish size
2. Board, plywood-grade, A-A, exterior type, 3 ply
3. Sheet, rubber-styrene-butadiene (SBR), 55 ± 5 durometer (Shore A)

Notes:

1. Dimensions in inches
2. Tolerance: decimals ± 0.1 , fractions $\pm 1/64$
3. Tumbling board may be moved in the support rails for repeated firings
4. Mounting holes method used to support tumbling board is optional, however, the board shall be rigidly mounted.
5. Pad shall be cemented to entire length of tumbling board using a commercial contact cement.

Figure 1. Projectile tumbling method.

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4.6.9.2 Procedure II. Cylinders 2.5 inches or less in diameter shall be subjected to gunfire under the following conditions.

- a. The cylinder shall be charged to its rated service pressure (carbon dioxide cylinders shall be charged to rated capacity) at gun range ambient air temperature.
- b. The cylinder may be supported but not constrained.
- c. The ammunition shall be 0.30 caliber armor piercing, with a muzzle velocity of 2800 ± 100 feet/sec (853 ± 30 meters/sec).
- d. The range shall be approximately 20 yards (18.3m).
- e. Shots shall not be tumbled.
- f. The various units taken for tests shall be positioned as indicated in 4.6.9.1e.

The cylinders shall meet the requirements specified in 3.3.9.2.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

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 cylinders covered by this specification are intended for use in storing compressed gas, such as air, aviator's breathing oxygen and liquefied carbon dioxide. These cylinders must pass a fragmentation test and thus considered military unique.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification, including amendments.

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- b. Applicable part number (see 1.2 and 3.2).
- c. Cylinders subjected to destructive tests (see Table III) should not be shipped or considered part of the contract or order.
- d. Packaging (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in the applicable Qualified Products List QPL No. 7905 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Commander, Naval Air Systems Command, Code 4.6.3.2, 48110 Shaw Road, Bldg 2187, Patuxent River, MD 20670.

6.3.1 Drawings. When requested, the manufacturer should submit engineering drawings and inspection reports in accordance with SD-6, Provisions Governing Qualification. SD-6 may be viewed or downloaded at www.assist.daps.dla.mil/quicksearch/.

6.4 Subject term (key word) listing.

Trichlorotrifluoroethane

6.5 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - AV
Navy - AS
Air Force - 11

Preparing activity:

Navy -AS
(Project 1660-0829)

Review activities:

Air Force - 71

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at www.dodssp.daps.mil.