INCH-POUND

MIL-PRF-38201D
18 December 1998
SUPERSEDING
MIL-V-38201C
30 July 1970

PERFORMANCE SPECIFICATION

VALVE, FILLER, LIQUID OXYGEN, FEMALE, CRU-59/E

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

1. SCOPE

1.1 Scope. This specification covers one type of CRU-59/E female liquid oxygen filler valve.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are cited in sections 3 and 4 of this specification. This section does not include documents 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 these lists, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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).

Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this document should be addressed to: Resources & Logistics Services Division, SA-ALC/TILDD, 485 Quentin Roosevelt Rd., Kelly AFB, Texas 78241-6425, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

SPECIFICATIONS

FEDERAL

BB-N-411	-	Nitrogen, Technical

DEPARTMENT OF DEFENSE

MIL-PRF-25961	-	Valve, Fill-Buildup-Vent, Liquid Oxygen Converter, CRU-50/A
MIL-PRF-27210	-	Oxygen, Aviator's Breathing, Liquid and Gas
MIL-S-7742	-	Screw Threads, Standard, Optimum Selected Series: General Specification for

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-810	-	Environmental Test Methods and Engineering Guidelines
MIL-HDBK-781	-	Reliability Tests Methods, Plans, and Environments for engineering Development, Qualification, and production.

(Unless otherwise indicated, copies of the above specifications standards and handbooks are available from the Defense Automated Printing Service, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following document form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted by the DoD 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 SOCIETY FOR QUALITY CONTROL (ASQC)

ANSI/ASQC Z1.4	-	Sampling Procedures and Tables for Inspection by Attributes (DoD-adopted)

(Application for copies should be addressed to American Society for Quality, 611 E. Wisconsin Ave., Milwaukee, WI 53202-4606, or to the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

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 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle cost.

3.3 Materials. All materials shall be suitably treated to resist corrosion due to electrolytic decomposition and any other atmospheric conditions that may be encountered during operational use or storage. The use of toxic chemicals, hazardous substances, or ozone depleting chemicals, (ODCs) shall be avoided, whenever feasible.

3.3.1 Aluminum and aluminum alloys. Aluminum and aluminum alloys, if used, shall be anodized (see 6.4) or have an alternate coating with equivalent characteristics (see 6.2).

3.4 Design. The CRU-59/E valve shall provide a positive leak-tight connection with a CRU-50/A valve conforming to MIL-PRF-25961 for use in filling a liquid oxygen converter from a liquid oxygen charging cart. The valve shall contain a poppet (see 6.5) that is normally seated, preventing a flow through the valve, and shall be automatically unseated when two valves are completely connected. Complete connection of the two valves shall require a two-phase operation. The valves shall be connected mechanically without flow through the valves in the primary phase. The secondary phase shall incorporate suitable actuation by one of the valves, to allow the flow of liquid oxygen. Disconnection shall not be necessary to cease flow. Suitable means, such as reverse rotation shall be incorporated to stop flow. If rotation is used, the amount required to actuate or cease flow shall not exceed 100 degrees. When the two valves are completely disconnected, the valve shall automatically return to its neutral position ready for reconnection. The valve used for interface and testing of the CRU-59E valve shall be the CRU-50/A valve conforming to MIL-PRF-25961 previously qualified under the applicable Qualified Products List.

3.4.1 Valve sealing. The mating of the valves shall form an effective leaktight connection which shall resist inadvertent disconnection due to the minor shocks and jars associated with filling operations.

3.4.2 Internal seals. The internal seals of the valve assembly shall be designed in such a manner that the entrapment of liquid oxygen cannot take place between screw threads, if used, and sealing surfaces.

3.4.3 Closures. All openings of the valve shall be closeable with plugs, caps, or similar devices that shall prevent dust and any foreign matter from entering the valve when not in use.

3.4.3.1 Valve cap. A cap shall be provided for the outlet end of the valve. The valve shall have an external gripping surface. The cap shall be attached to the valve housing while allowing installation and removal of the cap. The attachment shall have a minimum breaking strength of 130 pounds, shall be non-sparking, and shall turn freely to minimize kinking.

3.5 Orientation. The valve shall operate while oriented in any position.

3.6 Interface. The valve shall be as defined by figure 1 and shall conform to the envelope dimensions shown in figure 2.

3.6.1 Screw threads. Screw threads, if used on the valve, shall conform to MIL-S-7742 or any other commercially acceptable thread standard. If screw threads are used in assembling the valve they shall be securely locked by lockwashers, locknuts, or any other low temperature oxygen compatible means.

3.6.2 Weight. The total weight of the valve assembly shall not exceed three pounds (lbs).

3.6.3 Engagement pins. The valve designs shall incorporate engagement pins similar to those shown on figure 2. The pins shall interface with the CRU-50/A valve assembly.

3.7 Performance.

3.7.1 Leakage (CRU-59/E valve only). Leakage of the valve shall not exceed 0.05 liters per minute (lpm) when the valve is disconnected and a gaseous pressure of 50 lbs per square inch gauge (psig) is applied to the inlet connection.

3.7.2 Leakage (primary connection). Combined leakage of the valves shall not exceed 0.05 lpm when the valve is primarily connected and a gaseous pressure of 50 lbs psig is applied to the inlet connection.

3.7.3 Leakage (complete connection, liquid). There shall be no visual evidence of leakage from a completely connected valve when a flow of test liquid is applied to the CRU-59/E valve inlet under a pressure of 30 psig.

3.7.3.1 Leakage (complete connection, gaseous). Leakage from a completely connected valve shall not exceed 0.05 lpm when subjected to a gaseous pressure of 50 psig applied to the inlet connection of the CRU-59/E valve.

3.7.4 Flow rate. Flow rate from the CRU-50/A valve shall be greater than 40 lpm when a maximum pressure of 3 psig is applied to the inlet of the CRU-59/E valve.

3.7.5 Simulated aircraft-mounted converter filling. There shall be no leakage from a completely connected valve mounted in a horizontal or vertical position when a flow of test liquid under a minimum pressure of 30 psig at the valve inlet is passed through both valves.

3.7.6 Connection, disconnection torque. The torque required to make the connection and disconnection of the CRU-59/E and CRU-50/A valves shall be between 20 and 85 inch pounds.

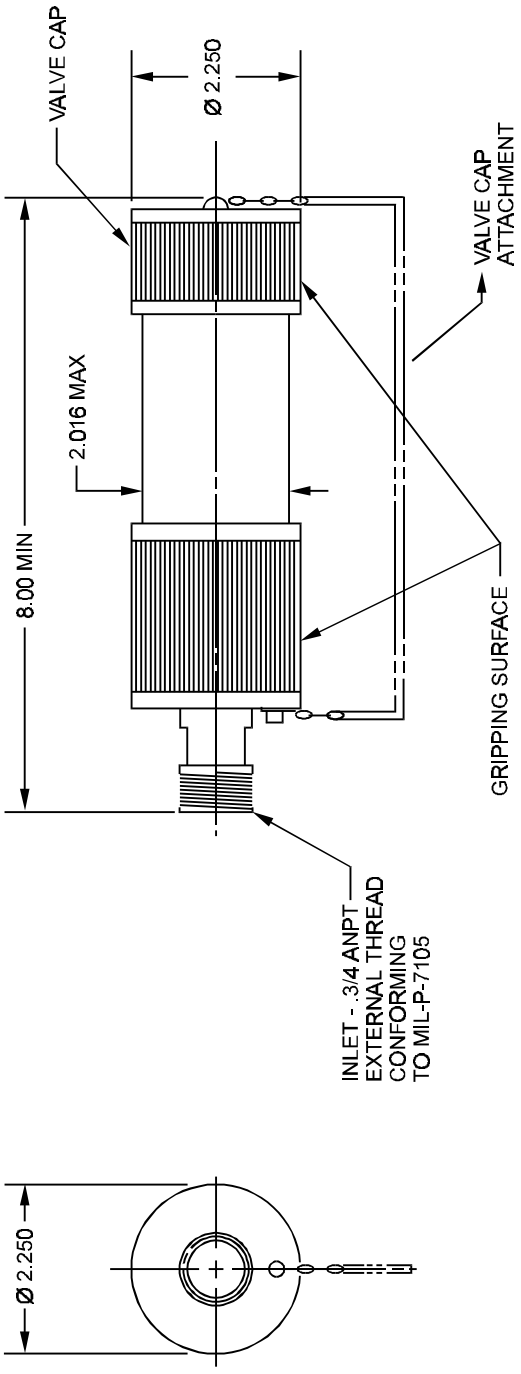


FIGURE 1. Valve.

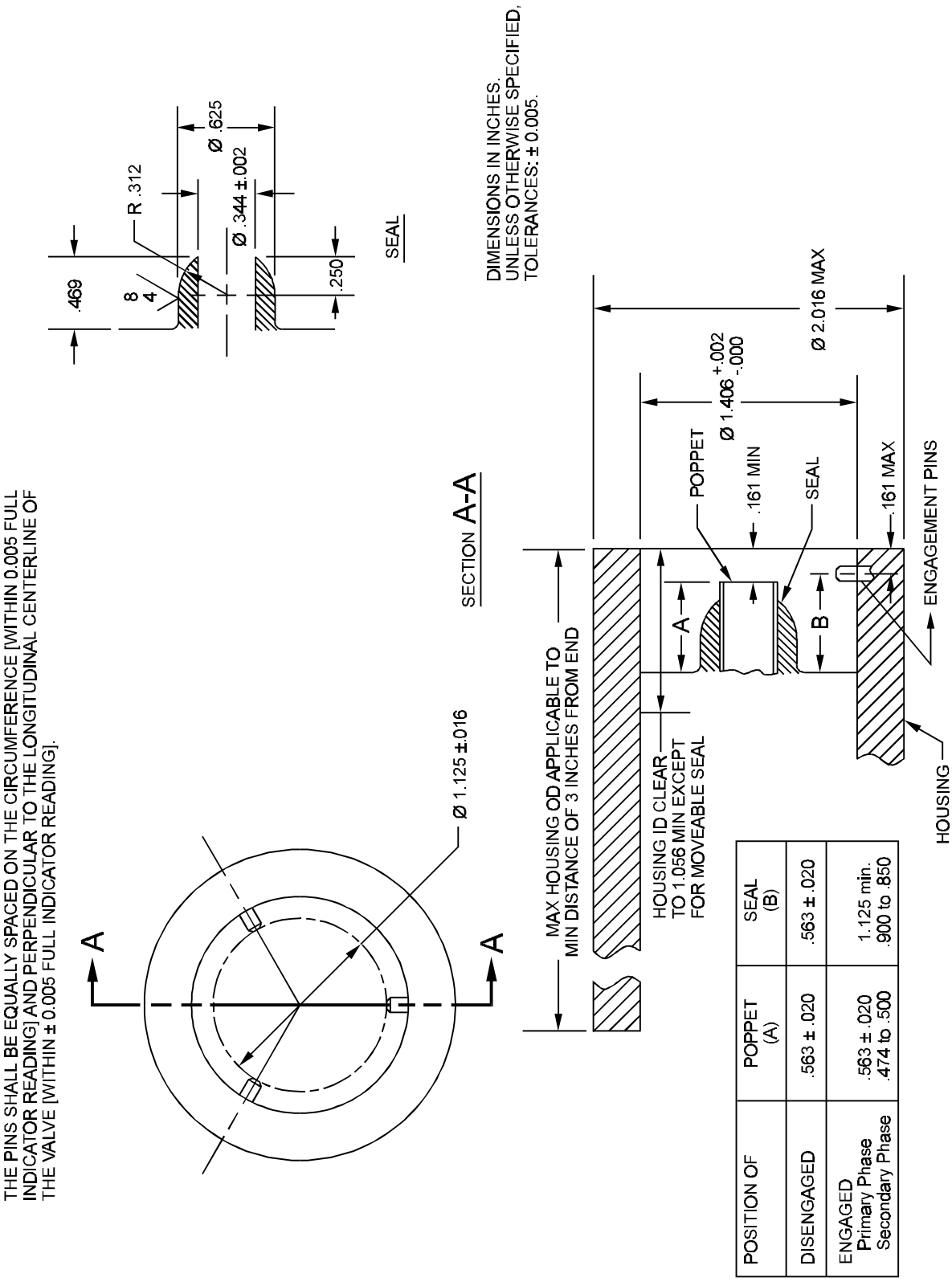


FIGURE 2. Female fill valve seal.

3.8 Environmental conditions. The valve shall operate and not show evidence of damage, such as cracks, permanent corrosion, deformation, leaks, or other flaws, during or after exposure to the following conditions:

a. Exposure to temperatures ranging from –65 to +160 °F.
b. Vibration incident to service use.
c. Shock incident to service use.

3.9 Reliability. The valve shall have a specified mean cycles between failures (MCBF) of not less than 700 cycles at the 90 percent lower confidence limit.

3.10 Item identification. A nameplate, permanently and legibly marked, shall be securely attached or stamped in a conspicuous place on the valve, but shall not interfere with the operation of the valve. The information required is as follows:

Nomenclature
Applicable Military Specification
Design Activity, CAGE Code
Manufacturer's I.D. (If different from design activity)
Contract or Purchase Order
Serial number (if assigned)

The acquisition documents may require additional information.

3.10.1 Warning label. A white, non-conductive label with a red-lettered statement shall be permanently affixed to the valve and shall contain the following information:

CAUTION
USE TWO-STEP PROCEDURE

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

3.12 Cleaning. See MIL-STD-1330 and MIL-STD-1359 for guidance on proven cleaning methods and verifications. Visible inspections are typically conducted using white light and ultraviolet light to detect particulate and some types of hydrocarbons. The non-volatile residue (NVR) test in MIL-STD-1359 may be used to baseline the hydrocarbon verification at an acceptable contamination level; however, other cleaning and verification methods that do not contain class I and II ODC solvents should be used for production.

4. VERIFICATION

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

a. First article inspection (see 4.2).

b. Conformance inspection (see 4.3).

4.2 First article inspection. When specified by the procuring activity (see 6.2), one valve assembly shall be subjected to all the inspections and tests in 4.6 and 4.7.

4.2.1 Reliability test. One preproduction sample, after passing all other inspections, shall be tested for reliability as specified in 4.9.

4.3 Conformance inspection. Conformance inspection shall include tests in 4.3.1 and 4.3.2.

4.3.1 Individual tests. Each valve shall be subjected to the following tests and examination:

a. Examination of product (see 4.6)

b. Leakage (CRU-59/E) (see 4.7.1)

c. Leakage (complete connection) (see 4.7.3)

4.3.2 Sampling inspection. Samples of liquid oxygen valves shall be selected from a lot of completed inflation devices in accordance with inspection Level II of ANSI/ASQC Z1.4, or equivalent, and subjected to the following tests:

a. Leakage (primary connection) (see 4.7.2)

b. Flow rate (see 4.7.4)

c. Simulated aircraft-mounted converter filling (see 4.7.5)

d. Connection, disconnection torque (see 4.7.6)

e. Reliability (see 4.9)

4.4 Requirements cross-reference matrix. Table I provides a cross-reference matrix of the section 3 requirements tested or verified in the paragraphs below.

TABLE I. Requirements cross-reference matrix.

REQUIREMENT	VERIFICATION	REQUIREMENT	VERIFICATION
3.2	4.6	3.7.1	4.7.1
3.3	4.6	3.7.2	4.7.2
3.3.1	4.6	3.7.3	4.7.3
3.4	4.6	3.7.4	4.7.4
3.4.1	4.7.3	3.7.5	4.7.5
3.4.2	4.7.5	3.7.6	4.7.6
3.4.3	4.6	3.8a	4.8.1, 4.8.2
3.4.3.1	4.6	3.8b	4.8.3
3.5	4.7.5	3.8c	4.8.4
3.6	4.6	3.9	4.9
3.6.1	4.6	3.10	4.6
3.6.2	4.6	3.11	4.6
3.6.3	4.6		

4.5 Test conditions. Unless otherwise specified, all inspections shall be performed under ambient conditions, i.e., atmospheric pressure of 28 to 32 inches of mercury, temperature of 59 to 95 °F, and relative humidity of not more than 80%. If conditions change during a test, the test shall be suspended and appropriate corrections applied before resuming the test. Unless otherwise indicated in the test procedures, test sample temperature conditioning shall be at least one hour longer than that required for the sample to reach thermal equilibrium.

4.5.1 Test medium. Unless otherwise specified, the test medium shall be oxygen conforming to MIL-PRF-27210, liquid and gas, or nitrogen conforming to BB-N-411, liquid and gas, Class 1, Grade B. The units shall be purged prior to each phase of the test program using gaseous nitrogen conforming to BB-N-411, (Type 1) Class 1, Grade B.

4.6 Examination of product. Each valve shall be carefully examined to determine conformance with respect to materials, interface, design, identification, and interchangeability.

4.7 Tests.

4.7.1 Leakage (CRU-59/E valve only). With the valve, tested as specified in 4.7.3." disconnected, a gaseous pressure of 50 psig shall be applied to the inlet connection for at least 1 minute. The gas leakage from the valve shall not exceed 0.05 lpm. The poppet (see 6.5) shall be unseated 3 times prior to this test.

4.7.2 Leakage (primary connection). With the valve mechanically connected to a valve conforming to MIL-PRF-25961 and with the mechanism that unseats the poppets in the seated position, a gaseous pressure of 50 psig shall be applied to the inlet connection of the CRU-59/E valve for at least 1 minute. With the pressure applied, the combined leakage from the CRU-59/E valve and the outlet of the valve conforming to MIL-PRF-25961 shall not exceed 0.05 lpm. The poppet seal shall be unseated 3 times prior to this test.

4.7.3 Leakage (complete connection). The CRU-59/E valve shall be attached to a liquid oxygen supply source at 30 psig. A CRU-50/A valve (MIL-PRF-25961) shall be fitted to a 300 psig working pressure LOX converter in a simulated aircraft manner. The converter shall be partially filled and shall be at operating pressure. With the valve completely connected (poppets unseated) to the CRU-50/A valve. A flow of test liquid under a pressure of 30 psig measured at the valve inlet shall be passed through the two valves for at least 10 minutes. During this test, the valves shall be disconnected and reconnected at least three times. Under all conditions of test liquid flow and disconnections, there shall be no visual evidence of leakage of test liquid from either the poppet or interior areas, as evidenced by any liquid flow. The CRU-59/E valve shall then be subjected to the tests of paragraph 4.7.1.

4.7.4 Flow rate. The valve shall be completely connected (poppets unseated) to a CRU-59/A valve and a flowmeter shall be connected to the outlet of the valve by means of a 3/8 inch tube. A maximum pressure of 3 psig shall be applied to the inlet of the CRU-59/E valve and flow from the CRU-59/A valve shall be greater than 40 lpm.

4.7.5 Simulated aircraft-mounted converter filling. The valve shall be connected to a valve conforming to MIL-PRF-25961 that is mounted in a horizontal position as shown in figure 3. A flow of test liquid under a minimum pressure of 30 psig at the valve inlet shall be passed through both valves. There shall be no evidence of test liquid leakage from the valve or from the mating surfaces. This test shall be repeated with the MIL-PRF-25961 valve mounted in a vertical position with the inlet of the CRU-59/E valve down. During both of these tests the valves shall be disconnected and visually inspected for entrapment of liquid between mating surfaces and leakage.

4.7.6 Connection, disconnection torque. The CRU-59/E valve shall be completely connected (poppets unseated) to a CRU-59A valve and then completely disconnected. The torque required to make this connection and disconnection shall not exceed 85 inch-pounds nor be less than 20 inch-pounds.

4.8 Environmental tests.

4.8.1 High temperature exposure. The valve shall be exposed to a temperature of 160 ± 5 °F for a minimum of four hours. While exposed to this temperature, the valve assembly shall be subjected to and pass the examination and tests of paragraphs 4.7.1, 4.7.2, and 4.7.3. The valve assembly shall be removed from the chamber and immediately subjected to the test in paragraph 4.7.5.

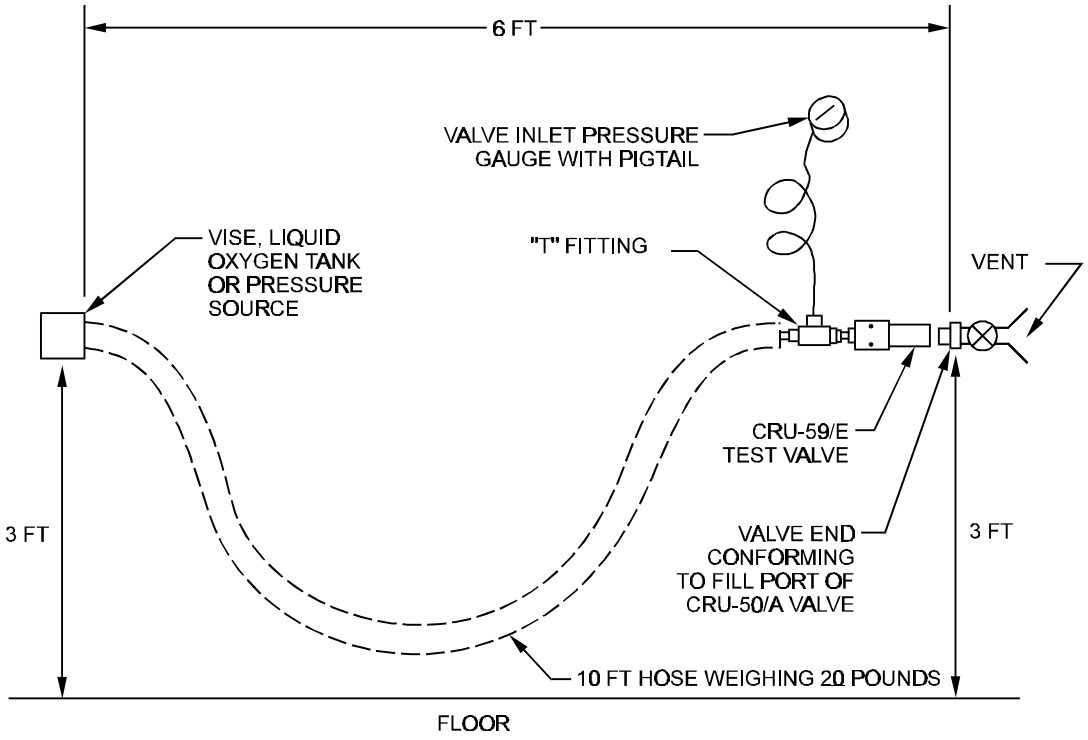
4.8.2 Low temperature exposure. The valve shall be exposed to a temperature of -65 ± 5 °F for a minimum of four hours. While exposed to this temperature, the valve assembly shall be subjected to and pass the examination and tests of paragraphs 4.7.1, 4.7.2, and 4.7.3. The valve assembly shall be removed from the chamber and immediately subjected to the test in paragraph 4.7.5.

4.8.3 Vibration. The valve assembly with cap shall be tested in accordance with MIL-STD-810, Method 514, test procedure I, category 10. At the conclusion of these tests, the tests in paragraphs 4.7.1, 4.7.2, 4.7.3, 4.7.4, 4.7.5, and 4.7.6 shall be performed.

4.8.4 Shock. The valve assembly with cap shall be tested in accordance with MIL-STD-810, Method 516, procedure I. At the conclusion of these tests, the tests in paragraphs 4.7.1, 4.7.2, 4.7.3, 4.7.4, 4.7.5 and 4.7.6 shall be performed.

4.9 Reliability. The valve shall be subjected to cycles of connection and disconnection to a mating valve conforming to MIL-PRF-25961, using the test setup similar to the one shown in figure 3. A cycle shall consist of complete connection (poppet unseated) including: venting of the CRU-50/A valve from 300 psig, flow of test liquid through the mated valves, and disconnection (valves separated). The assembly shall be subjected to the tests specified in paragraphs 4.7.1, 4.7.3, 4.7.5, and 4.7.6 every 700 cycles during the reliability test, to determine if a failure has occurred. A valve assembly failing any of these tests shall have failed the reliability test. In addition, any failure of the valve to mate properly or any fracture of components shall constitute a test failure. No parts shall be replaced during the reliability testing as preventive maintenance. Acceptance shall be based on the accept-reject criteria of test plan I of MIL-HDBK-781, as well as recording, data handling, and reporting procedures.

4.10 Pressure Actuation. A CRU-50/A valve shall have the buildup and gas ports connected to a 450 psig gaseous pressure source. The vent and fill outlet ports shall be open. Upon connection with the CRU-59/E valve, the CRU-50/A shall vent the 450 psig pressure.



THIS ILLUSTRATION IS FOR REFERENCE ONLY

FIGURE 3. Simulated aircraft-mounted converter filling.

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 materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department or Defense Agency 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 which may be helpful, but is not mandatory.)

6.1 Intended use. The valve is intended to be used with a storage and servicing liquid oxygen tank to fill aircraft-mounted converters with liquid oxygen.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of this specification.

b. Issue of the DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2).

c. When first article inspection is required (see 3.1).

d. The requirement for the vendor to identify proposed coatings if aluminum or aluminum alloys are used and anodization is not to be used (see 3.3.1).

e. Item identification (see 3.10).

f. Packaging requirements (see 5.1).

g. Data required.

6.3 Anodizing. MIL-A-8625, Type I or II has been used successfully in previous procurements as a guide for anodizing aluminum and aluminum alloys, if used.

6.4 Valve poppet. The term "poppet" in this specification is defined as the valve opening and closing (or sealing) mechanism, and is not to be construed to mean only the spring-loaded poppet type of valve. Tests requiring unseating or seating of the poppet should also be interpreted to mean opening or closing of the sealing mechanism, if the valve is not of the traditional spring-loaded poppet type of valve.

6.5 Environmental testing. Test methods are specified in MIL-STD-810E.

6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

6.7. Subject term (key word) listing.

Valve assembly
Valve cap
Liquid oxygen
Charging cart
LOX

Custodians:
Air Force - 99
Army - GL

Review activities:
Air Force - 11

Preparing Activity:
Air Force - 82

(Project No. 3655-9998)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-PRF-38201D	2. DOCUMENT DATE (YYMMDD)

3. DOCUMENT TITLE
Valve, Filler, Liquid Oxygen, Female, CRU-59/E

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. Organization	
c. ADDRESS *(Include zip code)*	d. TELEPHONE *(Include Area Code)* (1) Commercial (2) DSN *(if applicable)*	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME	b. TELEPHONE *(Include Area Code)*	
SA-ALC/TILDD	(1) Commercial 210-925-6314	(2) DSN 945-6314
c. ADDRESS *(Include Zip Code)* 485 Quentin Roosevelt Rd. Kelly AFB, Texas 78241-6425	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 DSN 289-2340	