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MILITARY SPECIFICATION

CONNECTOR, OXYGEN MASK TO REGULATOR CRU-60/P

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

1. SCOPE

1.1 Scope. This specification covers one type of connector for connecting aircraft-panel-mounted oxygen regulator delivery tube and emergency oxygen cylinder assemblies to the oxygen demand breathing mask. The connector is designated Type CRU-60/P.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 listed in the issue of the Department of Defense Index for Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

BB-A-1034	Compressed Air, Breathing
BB-N-411	Nitrogen, technical

MILITARY

MIL-P-116	Preservation, Methods Of
MIL-C-5040	Cord, Fibrous, Nylon
MIL-W-6858	Welding, Resistance, Spot and Seam
MIL-S-7742	Screw Threads, Standard, Optimum Selected Series, General Specification For
MIL-A-8625	Anodic Coatings, For Aluminum And Aluminum Alloys
MIL-O-27210	Oxygen, Aviator's Breathing, Liquid And Gas
MIL-T-31000	Technical Data Packages, General Specification For

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

AMSC N/A FSC 1660

STANDARDS

FEDERAL

FED-STD-595	Colors Used In Government Procurement
FED-STD-601	Rubber: Sampling And Testing

MILITARY

MIL-STD-130	U.S. Military Property, Identification Marking Of
MIL-STD-470	Maintainability Program For Systems and Equipments
MIL-STD-471	Maintainability Verification/Demonstration/Evaluation
MIL-STD-756	Reliability Modeling And Prediction
MIL-STD-781	Reliability Testing For Engineering Development, Qualification, And Production
MIL-STD-889	Dissimilar Metals
MIL-STD-970	Standards and Specifications, Order of Precedence for the Selection of
MIL-STD-2175	Castings, Classification And Inspection of
MIL-STD-2219	Fusion Welding For Aerospace Applications
MS22055	Hose Assemblies-Oxygen Breathing Connector To Regulator
MS22058	Connector, Oxygen Hose To Regulator
MS27796	Connector-Bayonet, Three Pin, Oxygen Mask
MS21964	Valve Assembly, Emergency Oxygen Cylinder

(Unless otherwise indicated, copies of federal and military specifications, and standards are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Ave, Philadelphia, PA 19111-5094)

2.1.2 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 are those cited in the solicitation.

DRAWINGS

AIR FORCE

44A23992	Check-Oxygen Emergency Cylinder, To Demand Mask, Adapter
44A23994	Sleeve-Oxygen Emergency Cylinder, To Demand Mask, Adapter
45A19096	Gasket-Coupling, Connector, Oxygen
45A19097	Coupling-Connector, Oxygen
45A19099	Washer-Sleeve, Connector, Oxygen
56A3696	Gasket-Connector, Oxygen
57B3623	Ring-Retaining, Demand Mask To Regulator Tube Internal
57B3657	Plate-Mounting Oxygen Mask To Regulator, Female Assembly Of

(Applications for copies should be addressed to SA-ALC/TILDD, Kelly AFB, TX 78241-5000)

2.1.2 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 are those cited in the solicitation.

794-0858	Cleaning and Marking Instructions for Life Support Oxygen Breathing Devices and Components

(Applications for copies should be addressed to SA-ALC/LGTPL, Kelly AFB, TX 78241-5000)

2.2 Non-Government publication. The following document forms 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 Society Of Mechanical Engineers (ASME)

ASME B 46.1	Surface Texture (Surface Roughness, Waviness And Lay)

(Application for copies should be addressed to the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017)

American Society For Testing And Materials (ASTM)

ASTM B633	Standard Specification For Electrodeposited Coatings Of Zinc On Iron And Steel
ASTM D1149	Standard Test Method For Rubber Deterioration - Surface Ozone Cracking In A Chamber
ASTM D1974	Standard Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Shipping Containers
ASTM F104	Standard Classification System For Nonmetallic Gasket Materials
ASTM D5118/D5118M	Standard Practice for Fabrication of Fiberboard Shipping Boxes

(Application for copies should be addressed to the American Society For Testing Materials, 1916 Race St, Philadelphia, PA 19103-1187)

Society of Automotive Engineers

SAE AMS 2417	Nickel Zinc Alloy Plating

(Application for copies should be addressed to the Society Of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also 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 (except for related associated detail specifications, specification sheets, or MS standards), the text of this documents 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 connector furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time set for opening of bids (see 4.4 and 6.3).

3.2 Selection of specification and standards. Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-970.

3.3 Metals. Metals shall be of the corrosion-resistant type or suitably treated to resist corrosion due to fuels, salt spray, or any atmospheric conditions likely to be met in storage or normal service.

3.3.1 Dissimilar metals. Unless suitably protected against electrolytic corrosion, dissimilar metals shall not be used in intimate contact with each other. Dissimilar metals are defined in MIL-STD-889.

3.3.2 Nonmagnetic materials. Except where magnetic materials offer definite advantages, nonmagnetic materials shall be used for all components.

3.3.3 Nonmetallic materials. The use of nonmetallic materials shall require the approval of the procuring activity for the specific application involved.

3.3.3.1 Neoprene rubber. Neoprene rubber that has been formulated and processed to meet the requirements of this specification shall be used for any connector tubing. It shall be smooth and free of flash, foreign materials, tackiness, odors, or any other imperfections. The material shall have the following properties:

a. Tensile strength - 1500 psi min.

b. Tear resistance - 230 pounds per inch.

c. Ozone resistance.

d. Brittle point - (-40° F min).

3.3.4 Fungus-resistant materials. Materials that are not susceptible to fungus attack shall be used to the greatest extent possible. If materials that are susceptible to fungus attack are used, they shall be treated with a fungicidal agent.

3.3.4.1 Reclaimed materials. The use of reclaimed materials shall be encouraged to the maximum extent possible.

3.3.5 Protective treatment. If materials that are subject to deterioration when exposed to climatic and environmental conditions likely to occur during service usage are used in the construction of the connector, they shall be protected against such deterioration in a manner that will in no way prevent compliance with the performance requirements of this specification. The use of any protective coating that will crack, chip or scale with age or extreme climatic or environmental conditions shall be avoided.

3.3.5.1 Anodizing. All aluminum parts shall be anodized in accordance with type II, class 2, color black, of MIL-A-8625. All exposed parts shall be processed after anodizing with a potassium dichromate seal.

3.3.5.2 Nickel zinc plating. Unless made of corrosion resisting steel, all steel parts shall be protected in accordance with AMS 2417 or ASTM B633. Cadmium coating or plating shall not be used, as it is a toxic material unacceptable for use in an oxygen breathing system.

3.3.6 Weight. The materials used in the construction of the components of the connector shall be made of the lightest possible materials consistent with configuration, strength, and all other requirements specified herein.

3.3.7 Elastomers. All elastomers shall be free from foreign agents that might cause objectionable odors. All elastomers used in the construction of the connector shall have been manufactured not more than 12 months before the date the connector is manufactured. If there is sufficient area, the cure date (quarter and year) shall be stamped in 0.1875 inch figures on the elastomer component. Cure dates and age limitations shall not apply to silicone.

3.4 Design. The design of the connector shall conform to figures 1 through 7. The aircraft supply port, see figure 7, shall be designed to flex or swivel, with respect to the connector housing, see figure 2, to facilitate separation of the mating connection assembly MS22058-2 when it is subjected to angular forces up to 180° to the longitudinal axis of the connector.

3.4.1 Aircraft supply port. The aircraft supply port of the connector shall have a restrictor valve that will permit the user to breathe normally up through the connector when the restrictor valve is inserted into a connector conforming to MS22058. The restrictor valve shall be guided internally to prevent tilting of the valve mechanism. The guide shall not cause jamming of the valve. The valve actuator shall be positively locked to the restrictor valve. When disconnected, the valve shall permit inhalation, but a noticeable resistance shall be introduced to indicate that disconnection has occurred. The body of the connector shall contain a spring-loaded relief valve that is adjusted to allow oxygen from the bailout cylinder to escape whenever the mask pressure exceeds a pressure equal to 12 inches of water more than ambient pressure. The relief valve may vent small flows before the mask pressure reaches 12 inches of water more than ambient pressure. Two slots located on opposite sides of the supply connector shall accommodate the valve actuator (see figure 7). The length of the slots shall be determined by the travel of the valve. The male end housing shall be an all metal one piece construction.

3.4.2 Bailout supply attachment. The side bailout supply attachment shall be designed to engage the type MS21964-20 connector and shall contain a check valve that conforms to figure 2. The bailout supply port shall be installed on the connector so that it can be rotated freely and does not leak. A locking mechanism within the connector housing shall provide positive means for retaining the attachment on the connector. Rotation of the connector shall not create or cause shavings within the housing.

3.4.3 Alignment. The alignment of fitting and mating surfaces shall be accurate to a degree that will permit the proper functioning of the unit in the environmental conditions expected to be encountered during the service life of the unit.

3.5 Construction. The connector shall be constructed so that no parts will become loose in service. It shall be built to withstand the strains, jars, vibrations, and any other conditions incident to shipment, storage installation and service.

3.5.1 Dovetail mounting flange. The connector shall have a male dovetail flange conforming to figures 1, 2, 3, and 4. The flange shall have a manual lock and release that shall be readily accessible for use.

3.5.2 Omni-directional aircraft supply port. If neoprene-rubber tubing is used to connect the aircraft supply port to the connector housing, it shall be constructed as specified (see 3.5.2.1).

3.5.2.1 Neoprene-rubber tubing. The tubing shall be constructed of neoprene rubber that will meet the performance requirements specified herein. The tubing shall be attached at each end by a hose clamp conforming to Scott Aviation Part No 266-632 or equal. To limit the stretch of the tube, a nylon cord, 100 pound test type IA in accordance with MIL-C-5040 shall be used inside the tube between the hose end fittings. The cord shall be designed to prevent gouging or cutting of the tube or excessive wear of the cord or the cord attachments points. When the aircraft supply connector is subjected to lateral or torsional movement, the tubing shall not crimp, collapse, or be pinched between the cord and the supply port or connector body. The flexible cord inside the tube shall be attached to the body and aircraft supply port in such a manner to permit easy removal and replacement of the hose without special tools.

3.5.2.2. Neoprene rubber cover. A neoprene rubber cover, 0.625 inches wide, made of the same material as the hose shall be installed over the clamp at the connector housing of the tubing. The rubber covers shall have a tight fit to prevent slippage.

3.5.3 Welding. Welding shall be accomplished in accordance with either MIL-W-6858 or MIL-STD-2219 or both and shall be carefully performed to insure that all welded joints have proper penetration, proper bead, and proper strength.

3.5.4 Lubrication. Permanent type lubrication that will last the expected life of the connector and that meets the approval of the procuring activity shall be used.

3.5.4.1 Cleanliness. Parts of the connector that come in contact with oxygen shall be entirely free from oil, grease, or any other combustible materials. Lubrications used in the components of the connector that might be subject to exposure to oxygen shall be of the type approved by the Air Force for this purpose.

3.5.5 Castings. Castings shall be of high quality, clean, sound, and free of holes, porosity, cracks, and any other defects. Castings shall be designed and inspected in accordance with MIL-STD-2175

3.5.6 Threads. Unless otherwise specified straight threads conforming to National Fine Thread Series, Class 2 (NF-2) or Unified Thread Series, Class 2A or 2B of MIL-S-7742 shall be used.

3.5.7 Screw assemblies. Assembly screws and bolts shall be tight. Tight shall be defined to mean that the screw or bolt cannot be appreciably tightened further without damage or injury to the screw, bolt, or screw threads.

3.5.8 Installation of threaded parts. All threaded parts shall be positively installed by self-locking nuts, or any other approved methods so that the threaded parts will not work loose in service.

3.5.9 Soldering and brazing. Soldering and brazing shall be carefully performed to insure that all joints have proper penetration, proper bead, and proper strength.

3.6 Performance.

3.6.1 Disconnection force. The mating connector conforming to MS22058 shall disconnect from the aircraft supply port when loads of 12 to 20 pounds are applied in any random direction up to 180° to the longitudinal axis (see 4.6.2 and 4.6.2.1).

3.6.2 Leakage - room temperature. When subjected to an internal pressure of 5 psi, leakage of the connector shall not exceed 0.01 liter per minute (LPM) at room temperature (see 4.6.3).

3.6.3 Relief valve setting. With oxygen applied to the mask end of the connector, the developed pressures within the connector shall be less than 12 inches of water at a flow of 2.5 LPM, between 11 and 15 inches of water at a flow of 12 LPM, and between 12 and 18 inches of water at a flow of 50 LPM (see 4.6.4).

3.6.4 Flow through bailout supply attachment. A minimum flow of 17 LPM shall be obtained through the bailout supply attachment when a fitting conforming to MS21964-20 is attached and a pressure of 12 $\pm$1 inches of water is applied within the connector housing (see 4.6.5).

3.6.5 Pressure drop through connector. With the valve actuator located at the bottom of the slots and pressure or suction applied to the connector to obtain a flow of 15 LPM from the regulator to the mask end, the pressure drop through the connector shall be in the range of 4 to 6 inches of water (see 4.6.6).

3.6.6 Leakage - extreme temperature. When an internal pressure of 1 psi is applied to the connector in the range of 160° $\pm$2° F to -65° $\pm$2° F, total leakage of the connector shall not exceed 0.01 LPM (see 4.6.7).

3.6.7 Pressure drop through connector with jig. With the connector connected to a jig, with the valve actuator located at the top of the slots, and with pressure applied to the jig to obtain flows in the range of 0 to 135 LPM from the regulator end to the mask end, the pressure drop through the assembly shall not exceed the values specified in table I (see 4.6.8).

3.6.7.1 Pressure drop through flexed connector. The performance specified (see 3.6.7) shall be repeated at the 135 LPM flow while the connector is subjected to torsional and bending forces. The pressure drop through the connector shall not exceed 1.6 and 2.0 inches of water, respectively, when subjected to the torsional and bending forces (see 4.6.8.1).

3.6.8 Structural. When a moment of 500 pound-inches is applied to the bailout supply, the connector shall not break nor become disassembled, and no mating surfaces shall be damaged (see 4.6.9).

3.6.9 Pull test. The mounting flange of the connector shall withstand, without damage or separation, the application of a longitudinal axial pull in the direction of the aircraft supply port of not less than 200 pounds for five seconds. The aircraft supply port shall be tested similarly to 100 pounds (see 4.6.10).

3.6.10 Tightness of threaded ports. All ports which are threaded into the connector housing or bailout supply port elbow shall withstand 20 pound-inches of torsional loads for not less than 1 minute without loosening any threads (see 4.6.11).

3.6.11 Reliability. The connector shall have a minimum Mean-Time-Between-Failure (MTBF) of 870 hours at a (single tailed) confidence level of 0.90 (to provide a minimum reliability of 0.98 for a mission length of 16.0 hours) (see 4.6.12).

3.6.11.1 Longevity. The connector shall have a minimum operating life span (equipment longevity as defined in MIL-STD-756) of not less than 2,700 hours before wearout failures occur or the equipment consistently fails to meet the specified MTBF index. Parts requiring replacement within this period of time, and the normal operating period of such parts, shall be reported by the contractor to the procuring activity (see 4.6.18).

3.6.11.2 Maintainability. The total mean active maintenance downtime, as defined in MIL-STD-470, in the maintenance of the connector shall be the minimum possible as determined by maintainability verification as defined herein (see 4.6.17).

3.6.12 Disconnect life. After 1000 insertions and disconnections, the disconnection force shall be within the range of 12 to 20 pounds and shall not have increased or decreased more than 10% of the original disconnection force. The restrictor valve shall close completely during each disconnection (see 4.6.13).

3.6.13 Low temperature exposure. After continuous exposure for 48 hours to a temperature of -85° ±5°F, the connector shall pass the tests specified (see 4.6.14).

3.6.14 High temperature exposure. After continuous exposure for 7 hours to a temperature of 160° F, the connector shall pass the tests specified (see 4.6.15).

3.6.15 Drop tests. After the connector has been subjected to 50 random free falls, all parts of the connector shall still be intact and the connector shall then pass the tests specified (see 4.6.16). Damage to the hose end of the connector should be disregarded.

3.6.16 Submerged liquid. The final assembled connector shall be tested for leaks in a submerged liquid prior to delivery. Total leakage in excess of 0.01 LPM shall be cause for rejection (see 4.6.19).

3.6.17 Odor. The connectors shall have no objectionable odors (see 4.6.20).

3.7 Part numbering of interchangeable parts. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The item identification and part number requirements of MIL-T-31000 shall govern the manufacturer's part numbers and changes thereto.

3.8 Weight. The weight of the complete connector shall not exceed 7.0 ounces.

3.9 Color. The color of the tube shall be aviation black conforming to Color No. 37038 of FED-STD-595. Hose clamps shall be unpainted, and unless otherwise specified, the color of the remainder of the connector shall be black.

3.10 Identification of product. In addition to any special marking required by the contractor or order, unit packages, intermediate packages and shipping containers shall be marked in accordance with the requirements of MIL-STD-130 (see 6.2).

3.11 Workmanship. The connector shall be made in accordance with the best shop practices for this type of equipment. The connector shall be free from burrs, sharp edges, rough grinding marks, uneven surfaces caused by forming operations, and any other defects. Particular attention shall be paid to accuracy of dimensions, radii fillets, marking of assemblies, thoroughness of welding, brazing, swaging, soldering, alignment of parts, and tightness of assembly screws and bolts. All interior and exterior surfaces of the connector shall be smooth and consistent with the other requirements of this specification

3.11.1 Cleaning. The connector shall be thoroughly cleaned. All oils and foreign materials that might adversely affect the operation of the connector shall be removed during and after final assembly.

3.11.2 Protection. The connector shall be protected against the entry of foreign materials.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of know defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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

a. Qualification inspection (see 4.4)

b. Quality conformance inspection (see 4.5).

4.3 Inspection conditions.

4.3.1 Atmospheric conditions. Unless otherwise specified, all tests required by this specification shall be made at an atmospheric pressure of 28 to 32 inches of mercury, at a temperature of $77^0 \pm 18^0$ F degrees, and at a relative humidity of 80% or less. When tests are made with atmospheric pressure or temperature substantially different from these values, proper allowance shall be made for the change in instrument reading.

4.3.2 Gas. The gas used in testing the connectors shall be oxygen conforming to type I of MIL-O-27210, nitrogen conforming to BB-N-411, type I, class 1, grade B, or compressed air conforming to BB-A-1034, compressed source II, grade B. The water content shall be 0.2 milligrams per liter at dew point -65°F or 26.3 parts per million. If nitrogen or air is used, appropriate density correction factors shall be applied to the flowmeter and to the performance of the connector.

4.3.3 Inspection attitude. Unless otherwise specified, the connector shall be inspected in the normal operating attitude.

4.4 Qualification inspection.

4.4.1 Qualification inspection. Qualification inspection shall consist of all tests specified (see 4.6).

4.4.2 Test report for the qualifying activity. The contractor shall furnish 3 copies of a test report to the qualifying activity. The test report shall contain detailed statements, identified by the applicable paragraph number of this specification, of compliance or noncompliance with each requirement of this specification (see 6.3).

4.4.3 Test samples for the qualifying activity. The contractor shall furnish 4 connectors to the qualifying activity. The connectors tested by the contractor may be submitted. The test samples shall be identified with the manufacturer's part number and such information as specified by the qualifying activity .

4. 4.3.1 Neoprene rubber test sample. The supplier shall submit sample units of four 6 by 6 by 0. 075 inch slabs identical in composition and cure to the connector hose.

4.5 Quality conformance inspection. Quality conformance inspection shall consist of:

a. Individual inspection (see 4.5.1)

b. Sampling inspection (see 4.5~2)

4.5.1 Individual inspection. Each connector shall be subjected to the following inspections as specified (see 4.6).

a. Examination of product (see 4.6.1)

b. Disconnection force (0°, 45°, and 90° to normal axis) (see 4.6.2)

c. Leakage-room temperature (see 4.6.3)

d. Relief valve setting (see 4.6.4)

e. Flow through bailout supply attachment (see 4.6.5)

f. Pressure drop through connector (see 4.6.6)

g. Submerged liquid test (see 4.6.19)

4.5.2 Sampling inspection.

4.5.2.1 Lot. A lot shall consist of 1,000 connectors, or fraction thereof, manufactured under essentially the same conditions and submitted for inspection at substantially the same time.

4.5.2.2. Sampling plan. Four connectors shall be selected at random from each lot, or fraction thereof, and shall be subjected to the following inspection as specified (see 4.6):

a. Leakage - extreme temperature (see 4.6.7)

b. Pressure drop through connector with jig (see 4.6.8)

c. Structural (see 4.6.9)

d. Pull test (see 4.6.10)

e. Tightness of threaded ports (see 4.6.11)

f. Disconnect life (see 4.6.13)

g. Preservation, packaging and packing (see 4.6.25)

h. Odor (see 4.6.20)

4.5.2.2.1 Rejection and reinspection. When one or more items from a lot fail to meet the specification, acceptance of all items in the lot shall be withheld until the extent and cause of failure have been determined. The contractor shall explain fully to the Government representative the cause of failure and the action taken to preclude recurrence. After correction, all of the sampling tests shall be repeated.

4.5.2.2.2 Individual inspection may continue. For production reasons, individual tests or other sampling plans may be continued pending the investigation of a sampling test failure. But final acceptance of the entire lot or lots produced later shall not be made until it is determined that all items meet all the requirements of the specification.

4.5.3 Defects in items already accepted. The investigation of a test failure could indicate that defects may exist in items already accepted. If so, the contractor shall fully advise the procuring activity of all the defects likely to be found and the method of correcting them.

4.6 Methods of inspection.

4.6.1 Examination of product. Each connector shall be visually examined to determine conformance with this specification with respect to materials, workmanship, finish, markings, and tightness or locking of threaded parts. There shall be no evidence of cuts, nicks or holes in the connector hose.

4.6.2 Disconnection force (0°, 45° and 90° to the normal axis). A jig that is acceptable to the procuring activity and that has the internal dimensions of the connector specified on MS22058 shall be used for this test. Forces sufficient to disconnect the jig from the aircraft supply port shall be applied at 0°, 45° and 90° to the normal axis of the aircraft supply port. This test shall be performed three times, the angles shall be measured in three randomly selected planes. The force required to effect disconnection shall be as specified (see 3.6.1).

4.6.2.1 Disconnection force (180° to normal axis). The inspection specified (see 4.6.2) shall be repeated using a force sufficient to disconnect the jig from the aircraft supply port at an angle of 180° to the normal axis of the aircraft supply port. This test shall be performed three times, and the angles shall be measured in three planes randomly selected. The force required to effect disconnection shall be as specified (see 3.6.1).

4.6.3 Leakage - room temperature. A jig that is acceptable to the procuring activity and that has the internal dimensions of the connector specified on MS22058 shall be used for this test. The mask connection port shall be blocked by the insertion of a blanked-off bayonet connector externally conforming to MS27796. An internal pressure of 5 psi at normal room temperature shall be applied to the connector while it is subjected to a pull of 1.5 to 2 pounds applied to cause disconnection. The leakage shall be as specified (see 3.6.2), in excess of that shall be cause for rejection.

4.6.4 Relief valve setting. Pressure shall be applied to the oxygen-mask end of the connector. At a flow of 2.5 LPM, the developed pressure shall be as specified (see 3.6.3). At a flow of 12 LPM, the developed pressure shall be as specified (see 3.6.3). At a flow of 50 LPM, the developed pressure shall be as specified (see 3.6.3). A piezometer ring located 1.50 to 2.50 inches from the mask end of the connector shall be used to read pressure.

4.6.5 Flow through bailout supply attachment. The aircraft supply connector shall be capped, and a fitting conforming to MS21964-20 shall be attached to the bailout supply attachment. Oxygen shall be applied to the mask connector port and a pressure of 12 ±1 inch of water shall be applied within the housing. The flow measured through the bailout supply attachment shall be as specified (see 3.6.4).

4.6.6 Pressure drop through connector. With the valve actuator located at the bottom of the slots, pressure or suction shall be applied to the connector to obtain a flow of 15 LPM from the regulator end to the mask end. The pressure drop through the connector shall be as specified (see 3.6.5). The pressure tap shall be a piezometer ring located approximately 2 inches from the end of the connector. The tap shall be located on the mask side if suction is used and on the regulator side if pressure is used. The flow duct shall be constructed to assure a straight flow for at least 6 inches immediately after leaving the connector if suction is used or for at least 6 inches immediately before entering the connector if pressure is used. The connector housing shall be mounted in a vertical position and its location shall permit free flow into the connector if suction is used and free flow out of the connector if pressure is used.

4.6.7 Leakage - extreme temperature. A jig that is acceptable to the procuring activity shall be used for this test. An internal pressure of 1 psi shall be applied in the temperature range of 160° ±2°F to -65° ±2° F. The mask connection port shall be blocked by the insertion of a blanked-off bayonet connector externally conforming to MS27796. The leakage shall be as specified (see 3.6.6), in excess of that shall be cause for rejection. No pull shall be applied during this test.

4.6.8 Pressure drop through connector with jig. The connector shall be connected to a jig having the internal dimensions shown on MS22058. With the valve actuator located at the top of the slots, pressure shall be applied to the jig to obtain flows in the range of 0 to 135 LPM from the regulator end to the mask end. The pressure drop through the assembly shall be measured by a piezometer ring located 2 inches from the applicable end of the connector. For use of the peizometer ring (see 4.6.6). Pressure drops through the assembly in excess of the values specified (see 3.6.7), shall be cause for rejection.

4.6.8.1 Pressure drop through flexed connector. The test specified (see 4.6.8) shall be repeated, using a flow of 135 LPH and adding a hose assembly conforming to MS22055B36 to the aircraft oxygen supply port of the connector. The distal end of the hose shall be twisted 360 degrees in each direction about its longitudinal axis, and the pressure drop through the connector shall be as specified (see 3.6.7.1) when the connector assembly is subjected to the maximum twists. With the longitudinal axis of the connector horizontal and with hose assembly MS22055B36 unsupported, the pressure drop through the connector shall be as specified (see 3.6.7.1).

4.6.9 Structural. While the bailout port is rotated through two each complete alternating rotations in the connector, a moment as specified (see 3.6.8) shall be applied to the bailout supply in the direction shown on Figure 2. There shall be no flaking of materials, breakage of parts, or displacement of the retaining ring from its groove.

4.6.10 Pull test. The connector shall be mounted in a mounting flange conforming to 57B3657. The mounting flange of the connector shall be subjected to a longitudinal axial pull as specified (see 3.6.9), without damage or separation. The aircraft supply port shall be tested similarly as specified (see 3.6.9). Upon completion of the test, the connector shall be subjected to and meet the tests specified (see 4.5.1).

4.6.11 Tightness of threaded ports. All ports which are threaded into the connector housing or the bailout supply port elbow shall be subjected to a torsional load as specified (see 3.6.10). Loosening of the threads during this inspection shall be cause for rejection.

4.6.12 Reliability. At room temperature, four connectors shall be subjected to simulated breathing cycles at a rate of between 10 and 20 breathing cycles per minute. Cyclic breathing of the connectors shall be accomplished with peak flow rates of 30 LPN, inhalation and exhalation, with the restrictor valve in the open position. During 20 percent of the time the connectors are subjected to breathing cycles, they shall be vibrated at a frequency ranging from 500 to 2,500 cycles per minute, at a double amplitude of not less than 0.018 inch nor more than 0.020 inch. The connector shall be vibrated alternately on each of the three axis for 6 hours on each axis. At least

once every 24 hours of the breathing cycle test, each connector shall be subjected to and shall meet the inspections specified (see 4.6.3, 4.6.4, and 4.6.6). No parts shall be replaced as preventive maintenance during reliability testing. Four connectors shall be tested by the contractor for reliability in accordance with MIL-STD-781 and two of the four connectors shall be continued through a longevity test in accordance with MIL-STD-781 and 4.6.8. Duration of the reliability test (MTBF Demonstration) shall not be less than three times the specified MTBF on each item. If more than seven failures are experienced during the test, the sample has failed and will be rejected. A failure is defined as the occurrence of any condition which will interfere with meeting the performance levels specified herein. Recording, data handling, and reporting procedures shall be in accordance with MIL-STD-756.

4.6.13 Disconnect life. A jig having the internal dimensions specified in MS22058 shall be used for this test, and the internal dimensions of the jig shall not change during this test. The mating connector MS22058 shall be inserted and disconnected from the aircraft supply port at the rate of approximately 1 cycle per second until 1000 cycles have been completed. The separation forces shall be applied at 45° alternating angles to the connector centerline. At the beginning of the test, the average pounds of pull of 5 readings taken at 5 second intervals shall be determined; this average shall be within the range specified (see 3.6.12). At the conclusion of 1000 cycles, the average pounds of pull of 5 readings at 5 second intervals shall be determined; this average reading shall be within ±10% of the original average. The disconnection force shall be within the range specified (see 3.6.12), after 1000 insertions. The restrictor valve shall fully close during each disconnection. Failure of the restrictor valve to close completely during each disconnection shall be cause for rejection. After this test the connector shall be subjected to the tests specified (see 4.5.1).

4.6.14 Low temperature exposure. The connector shall be subjected continuously for 48 hours to a temperature -85° ±5° F. This exposure shall be at nonoperating conditions, such as ambient pressure and zero flow rate. After the 48 hour period of exposure, the connector shall be stabilized to room temperature and shall be subjected to the tests specified (see 4.5.1).

4.6.15 High temperature exposure. The connector shall be subjected continuously for 7 hours to a temperature of not less than 160° F. This exposure shall be at nonoperating conditions, such as ambient pressure and zero flow rate. After the 7 hour period of exposure the connector shall be stabilized to room temperature and shall be subjected to the tests specified (see 4.5.1).

4.6.16 Drop tests. The connector shall be subjected to 50 random free falls from a height of 2 feet to a concrete slab or a similar firm surface. The connector shall be visually inspected, and all parts of the connector shall still be intact. Damage to the hose end of the connector shall be disregarded. After the conclusion of this test, the connector shall be subjected to the tests specified (see 4.6.3, 4.6.4, and 4.6.6).

4.6.17 Maintainability verification. Verification of the maintainability requirements of the connector shall be in accordance with MIL-STD-470 and MIL-STD-471 demonstrating a MTTR of 15 minutes, with 90% of all maintenance action to require less than 30 minutes. Recording, data handling and reporting procedures shall be in accordance with MIL-STD-470.

4.6.18 Longevity verification. Verification of the longevity requirements of the connector shall be in accordance with MIL-STD-756. In accordance with the concepts projected in MIL-STD-756, if more than four failures occur during the last half (six MTBFs equivalent) of the reliability test, all failure data will be submitted to the procuring agency for evaluation for possible wearout failures. Evidence of wearout failures shall be the criteria for rejection of the sample. Recording, data handling and reporting procedures shall be in accordance with MIL-STD-756.

4.6.19 Submerged liquid. The final assembled connector shall be tested for leaks at 5 psi in a submerged liquid prior to delivery. The leakage shall be as specified (see 3.6.16).

4.6.20 Odor. Gaseous oxygen shall be allowed to pass through the assembled connector at a rate not greater than 10 LPM for one minute. A test of smell shall be conducted in a manner that shall prevent exterior odors from influencing the test. If 2 out of 6 persons judge the hose to have an objectionable odor the connector will be unacceptable (see 3.6.17).

4.6.21 Tensile strength. Testing shall be in accordance with FED-STD-601, Method 4111, Die III.

4.6.22 Tear resistance. Testing shall be in accordance with FED-STD-601, Method 4211, Die B.

4.6.23 Ozone resistance. Two neoprene test slabs, 6 by 6 by 0.075 inches, shall be tested for ozone resistance with apparatus in accordance with ASTM D1149. The test slabs shall be elongated 20%, placed in an ozone free atmosphere for 24 hours, then placed in the ozone chamber. The chamber shall be adjusted to 100° $\pm$2°F and to give an exposure of ozone concentration of 120 $\pm$10 parts by volume of ozone per million parts by volume of air. The air ozone velocity in the chamber shall be at least 2 feet per second. The material shall be exposed to these conditions for one hour. The test slabs shall be examined under 10X magnification. There shall be no evidence of checking, cracking, or other damage.

4.6.24 Brittle point. Testing shall be in accordance with FED-STD-601, Method 5311.

4.6.25 Inspection of packaging. Except when commercial packaging is specified, the sampling and inspection of the preservation and interior package marking shall be in accordance with groups A and B quality conformance inspection requirements of MIL-P-116. The sampling and inspection of the packing for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specification shown in section 5. The inspection of marking for shipment and storage shall be in accordance with MIL-STD-129. The inspection of commercial packaging shall be as specified in the contract (see 6.2).

5. PACKAGING

5.1 Preservation. Preservation shall be level A (see 6.2).

5.1.1 Levels A.

5.1.1.1 Cleaning. Connectors shall be cleaned in accordance with Cleaning and Marking Instructions, 794-0858.

5.1.1.2 Drying. Connectors shall be dried in accordance with Cleaning and Marking Instructions, 794-0858.

5.1.1.3 Preservative application. Preservative shall not be used.

5.1.1.4 Unit packs. Unless otherwise specified by the contracting activity connectors shall be packaged in Quantity Unit Pack of one each. Each connector shall be preserved in accordance with MIL-P-116, submethod IC-1.

5.2 Packing. Packing shall be level B, or C as specified (see 6.2).

5.2.1 Level B. Connectors preserved as specified (see 5.1.1), shall be packed in containers in accordance with ASTM D5118/D5118M, weather-resistant, unless otherwise specified by the contracting activity. Containers shall be of uniform shape and size and contain identical quantities. The container closure shall be in accordance with ASTM D1974.

5.2.2 Level C. Connectors preserved as specified (see 5.1.1), shall be packed in shipping containers in accordance with ASTM D5118/D5118M, Class Domestic Box, that will afford adequate protection against damage during direct shipment from the supply source to the first receiving activity. The container closure shall be in accordance with ASTM D1974.

5.3 Marking. All unit and shipping containers shall be marked in accordance with MIL-STD-129. In addition, the precautionary marking in Cleaning and Marking Instructions, 794-0858, shall appear on the unit and shipping container.

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 connector covered by this specification is intended for use in connecting oxygen masks and emergency oxygen supplies to regulator delivery tubes.

6.2 Acquisition requirements. Acquisition documents must specify the following:

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

b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).

c. Special markings (see 3.10).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) Should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

Reference Paragraph	DID Number	DID Title
4.4.2	DI-NDTI-80809	Test/Inspection Reports

The above DID's were those cleared as of the date of this specification. The current issue of DOD 5010-12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 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 Qualified Products List QPL 38271 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 purchase orders for the products covered by this specification. The activity responsible for the Qualified Products List is SA-ALC/TILDD, 485 Quinten Roosevelt Rd, Kelly AFB, TX 78241-6425, and information pertaining to qualification of products may be obtained from that activity.

6.6 Subject term (key word) listing.

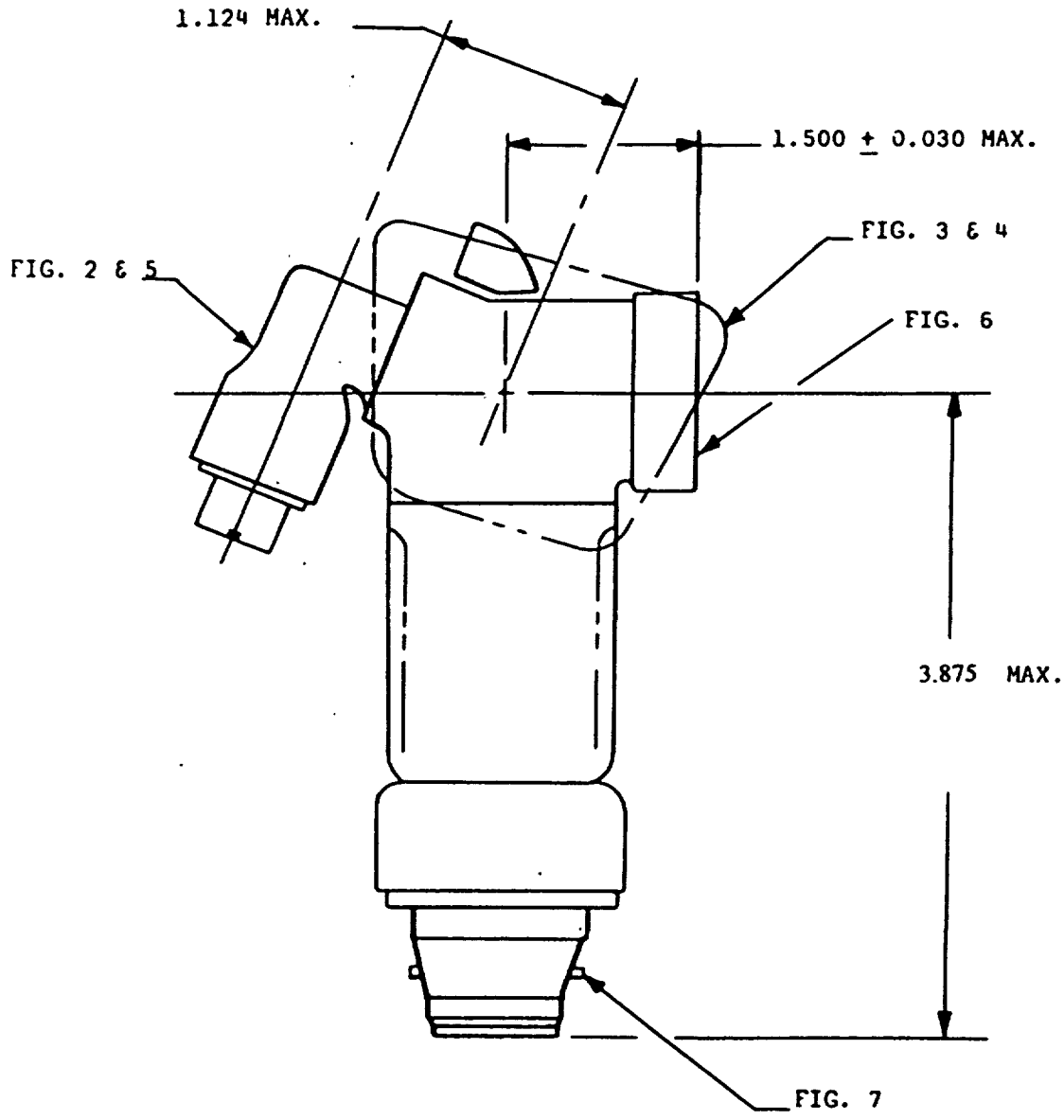
Aircraft port
Bailout
Bayonet
Casting
Elastomers
Flange
Mounting plate

Neoprene
Supply port
Threads
Welding

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 extensiveness of the changes.

TABLE I. Pressure drop in assembly

Flow of Oxygen (LPH)	Pressure Drop (Inches of Water)
135	1.40
90	0.60
70	0.36
50	0.18
30	0.06



DIMENSIONS ARE INCHES

FIGURE 1. Connector, oxygen mask to regulator, type CRU-60/P

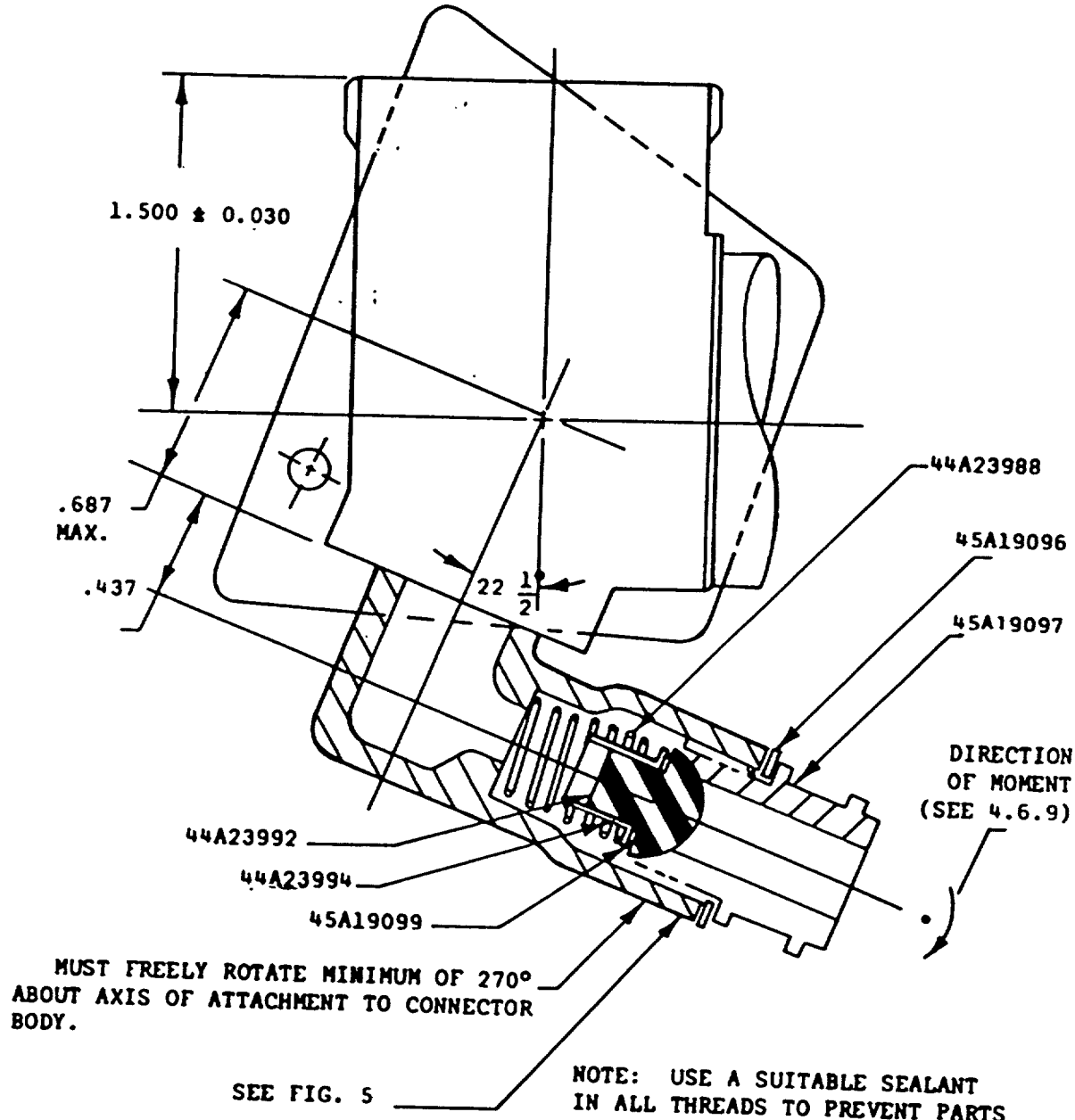


FIGURE 2. Connector housing assembly

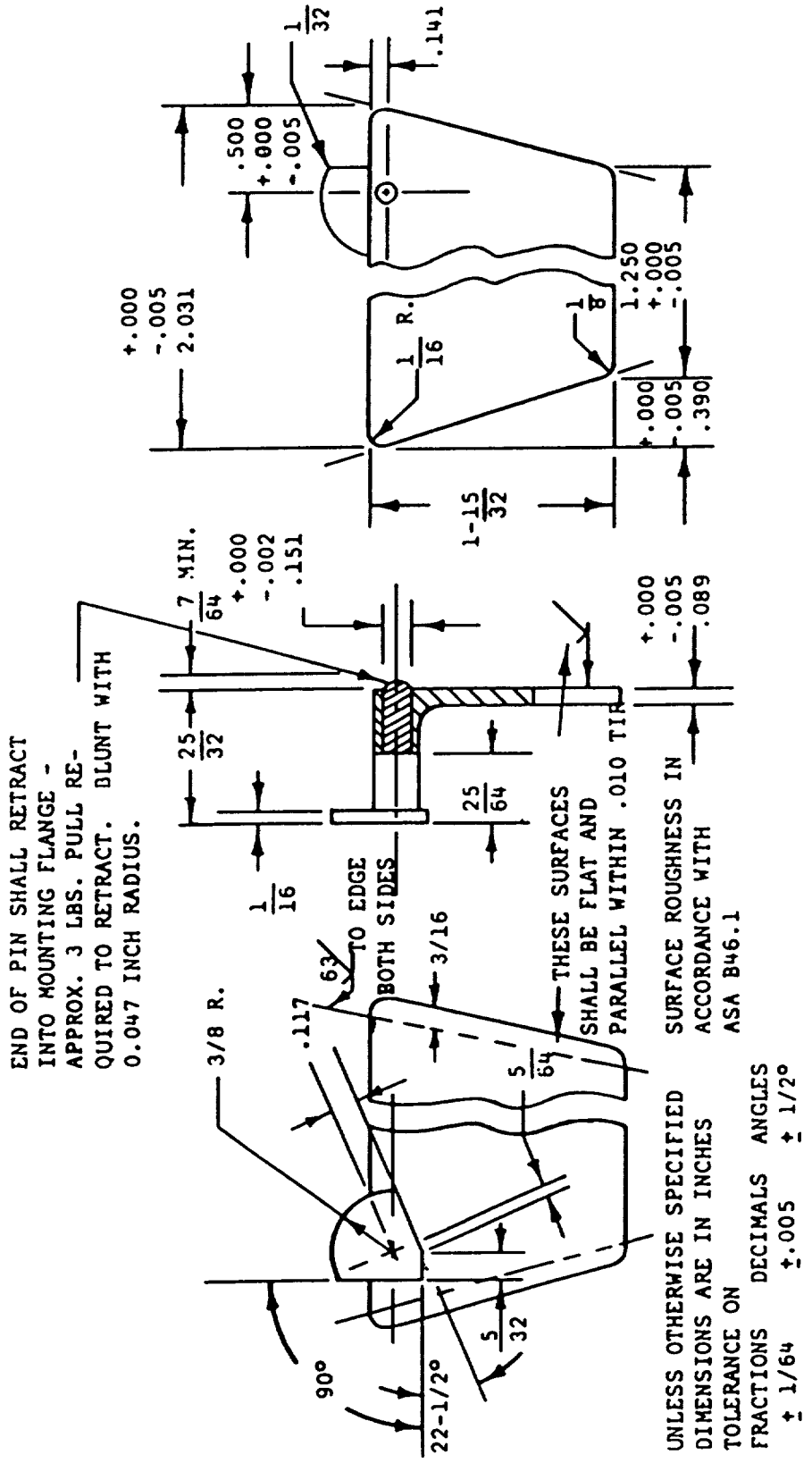
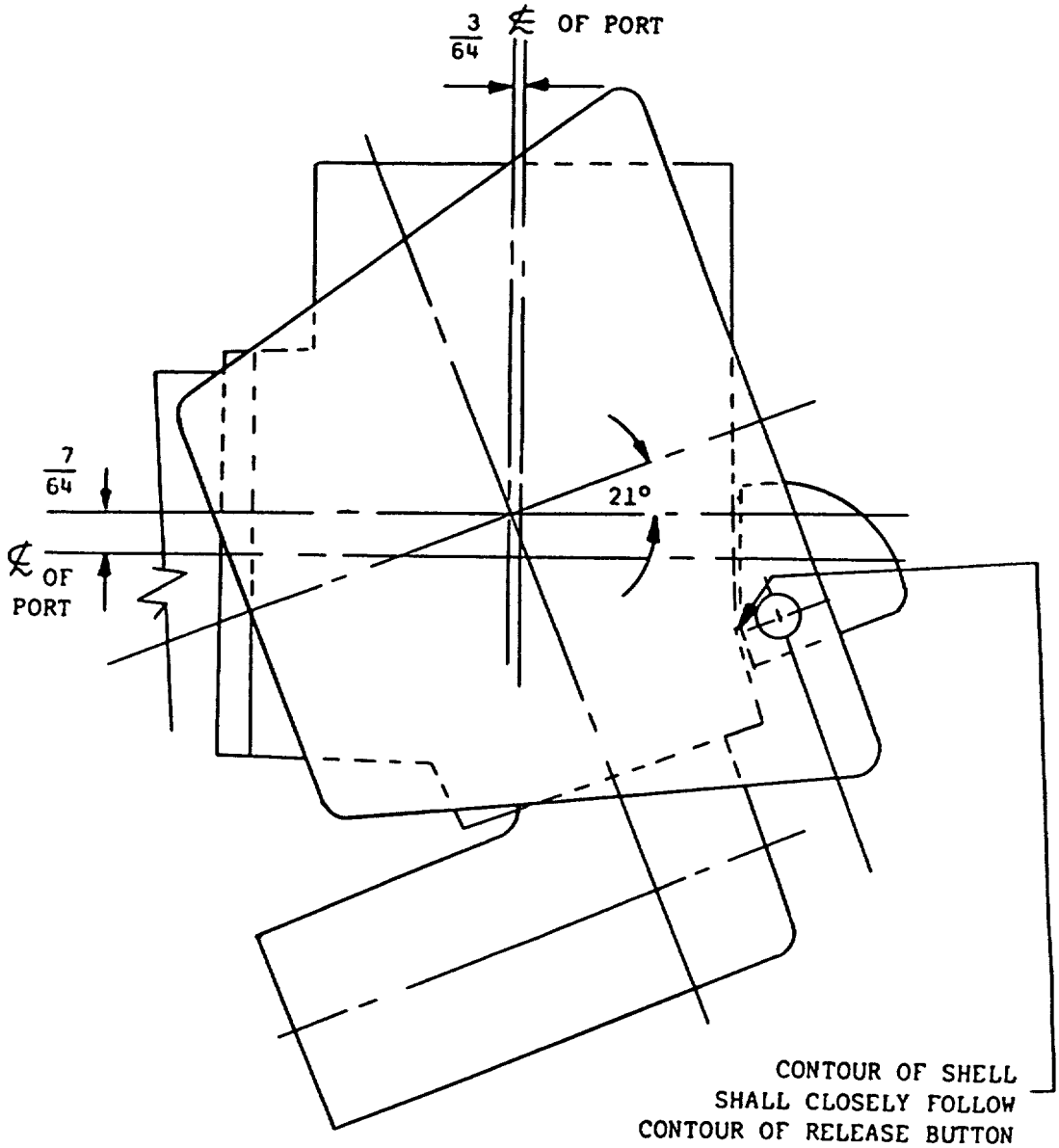


FIGURE 3. Critical dimensions - mounting flange and locking pin



UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCE ON
FRACTIONS
± 1/64

ANGLES
± 1/2°

FIGURE 4. Plate location

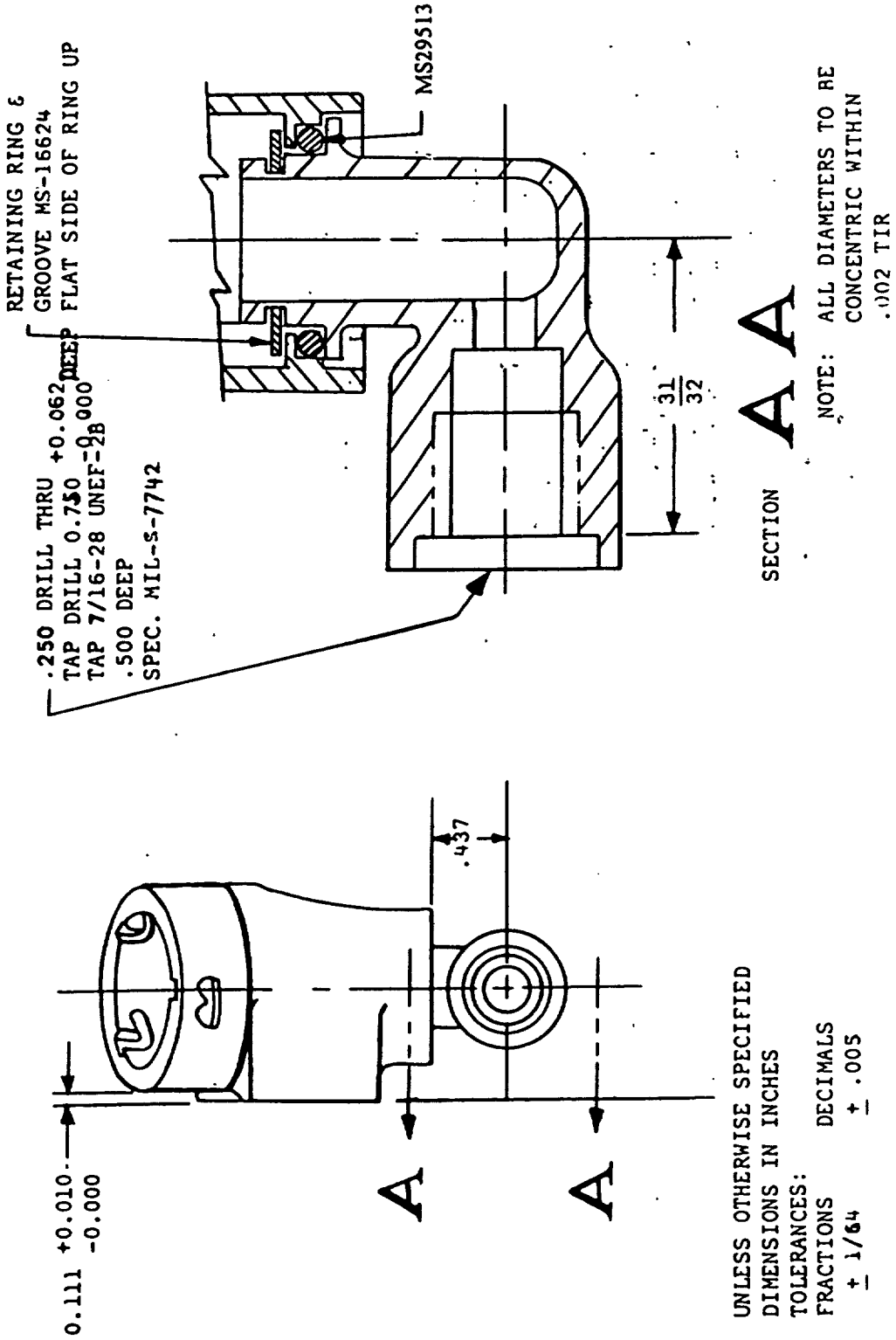
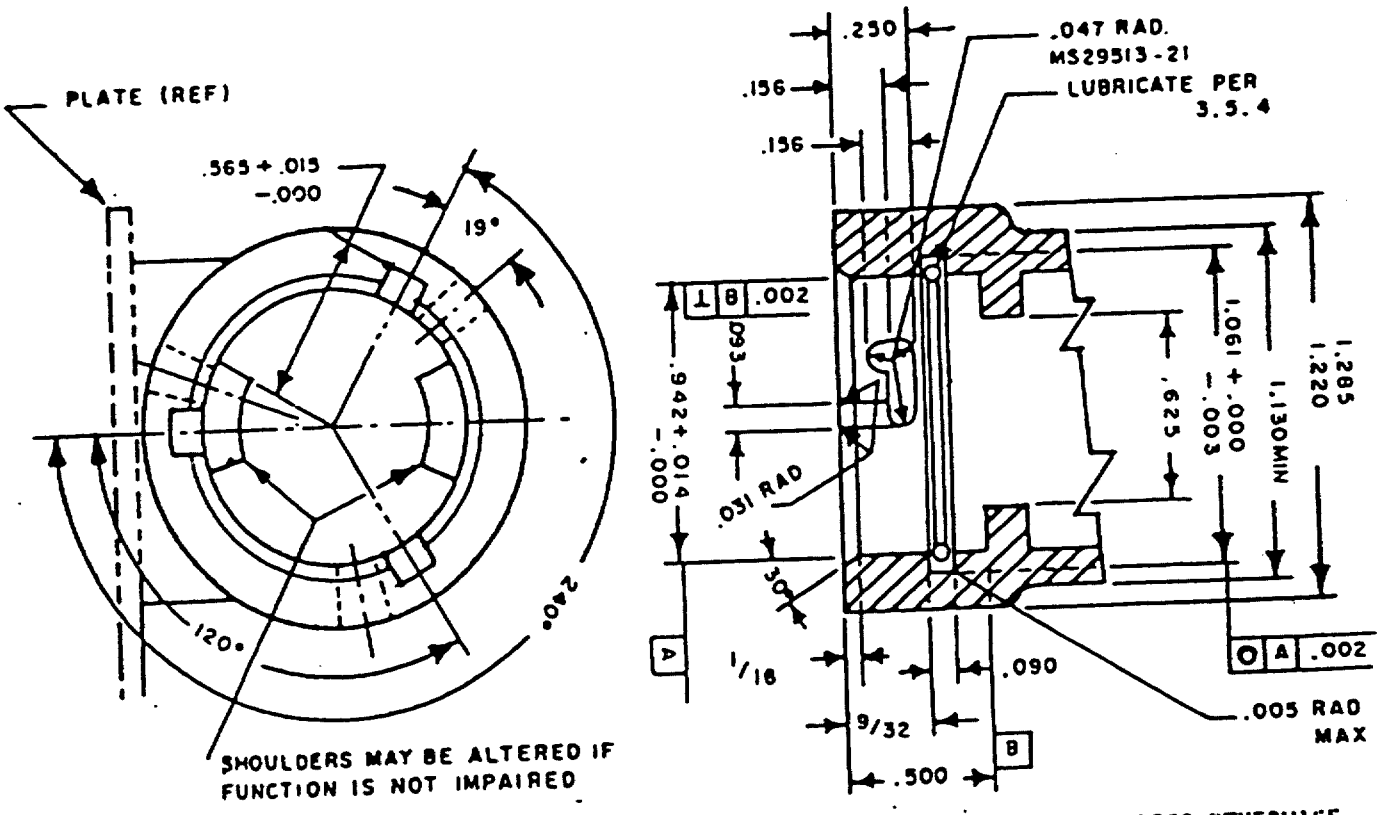


FIGURE 5. Bailout supply port



UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCE

FRACTION	DECIMALS	ANGLES
±1/64	± .005	±1/2°

EDGES AND FILLETS RADII .010 UNLESS OTHERWISE SPECIFIED.
THE MASK PORT SHALL MATE PROPERLY WITH MS27796.
"O" RING GROOVE FINISH:
SIDES 63 MACHINE FINISH
BOTTOM 32 PER ASA B46.1

FIGURE 6. Mask port

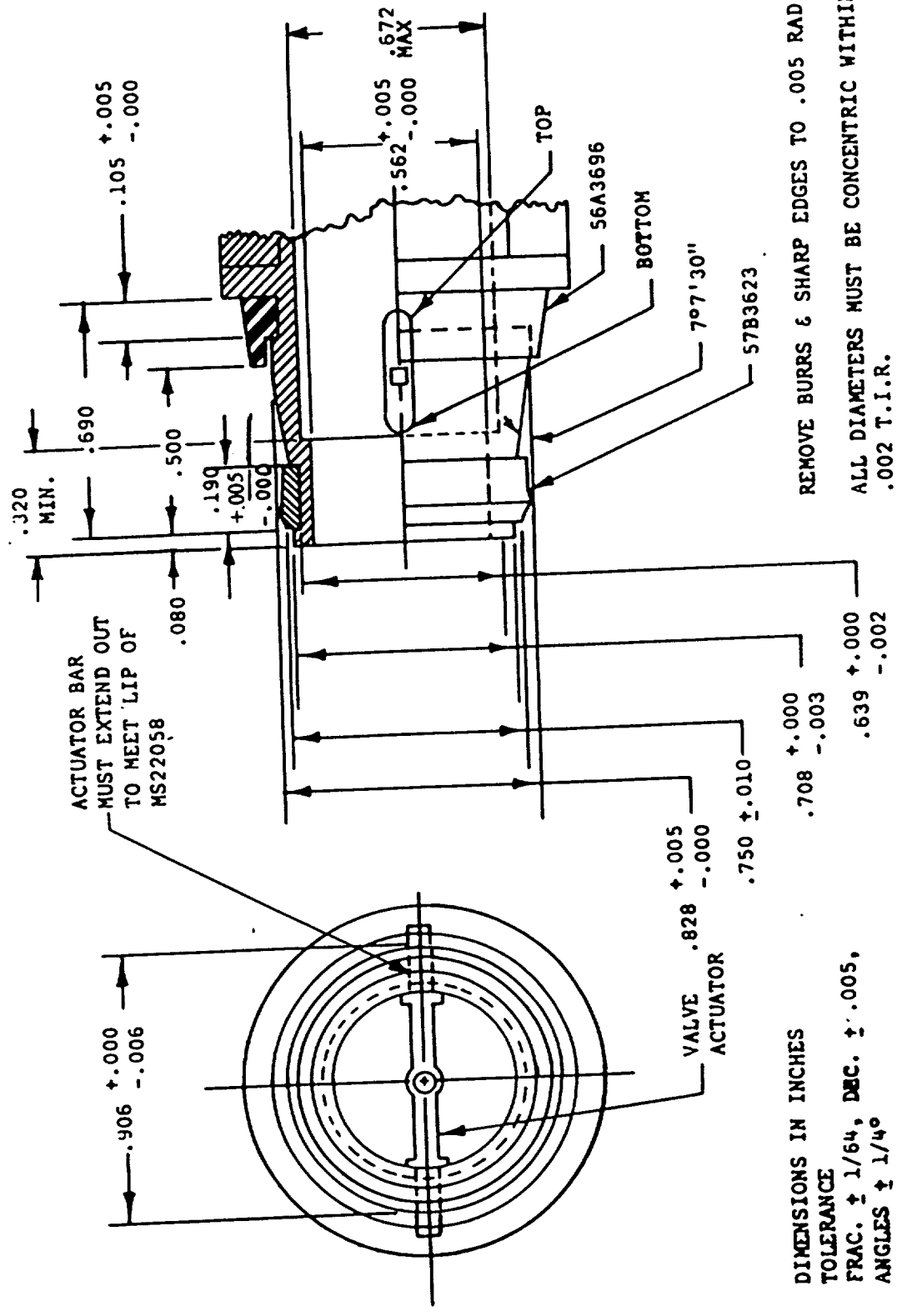


FIGURE 7. Aircraft supply port

Custodian:
Air Force - 99

Reviewers:
Air Force - 11

Preparing activity:
Air Force - 82

Agent:
Air Force - 99

(Project No 1660-F659)