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MILITARY SPECIFICATION

PURGING KIT, CONVERTER SYSTEM, LIQUID OXYGEN, KMU-78/E

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 a liquid-oxygen, converter system purging kit, designated KMU-78/E.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

W-C-596/142	Connector, Male Inlet, Electrical, General Purpose, Grounding, 2 Pole, 3 Wire, 20 Amperes, 125 Volts, 50/60 Hertz
BB-A-1034	Air, Compressed, For Breathing Purposes
BB-N-411	Nitrogen, Technical
PPP-B-601	Boxes , Wood, Cleated Plywood
PPP-B-636	Box, Shipping, Fiberboard

MILITARY

MIL-P-116	Preservation, Methods of
DOD-D-1000	Drawings, Engineering And Associated Lists
MIL-C-5756	Cable And Wire, Power, Electric; Portable
MIL-P-27210	Oxygen, Aviator's Breathing, Liquid And Gas

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Oklahoma City air Logistics Center/MMEDO, Tinker AFB OK 73145-5990 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 1730

MIL-T-27730	Tape, Antiseize, Tetrafluoroethylene, With Dispenser
MIL-V-38201	Valve, Filler, Liquid Oxygen Female CRU-59/E

STANDARDS

MILITARY

MIL-STD-129	Marking For Shipment And Storage
MIL-STD-130	Identification Marking Of U.S. Military Property
MIL-STD-143	Standards And Specifications, Order Of Precedence For The Selection Of
MIL-STD-808	Finishes, Materials And Processes For Corrosion Prevention And Control In Support Equipment
MIL-STD-810	Environmental Test Methods
MIL-STD-889	Dissimilar Metals
MS21344	Fittings - Installation Of Flared Tube, Straight Threaded Connectors, Design Standard For
MS25306	Switch, Toggle, Positive Break, Environmentally Sealed, Screw Terminal, Single Pole, .469 Mounting Bushing, 25 Amperes
MS28760	Fitting End, Attachable, Hydraulic And Pneumatic High Pressure Hose (3000 PSI) Flared Tube
MS33656	Fitting End, Standard Dimensions For Flared Tube Connection And Gasket Seal

"2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation."

Air Force-Navy Aeronautical

AN816	Adapter, Straight, Pipe To Tube
AN824	Tee-Flared Tube
AN911	Nipple, Pipe

(Copies of specifications, standards, handbooks, drawings, publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity)

2.2 Other publication. The following documnent(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the document which are indicated as DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

National Board of Fire Underwriters

Pamphlet 70	National Electrical Code - Electric Wiring and Apparatus

(Copies of the NBFU pamphlet may be obtained upon application to the National Fire Protection Association, 85 Johns Street, New York 38, New York; 22 West Adams Street, Chicago 6, Illinois; or 465 California Street, San Francisco 4, California.)

American Society for Testing of Materials
ASTM-D-3951-82 Packaging, Commercial- 29 Jan 82

(Applications for copies should be addressed to : ASTM, 1916 Race St, Philadelphia, PA 19103).

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of Precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has be obtained.

3. REQUIREMENTS

3.1 First Article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.4 and 6.3).

3.2 Components. The purging kit shall consist of the following major components:

Item name	See requirement
a. Heat Exchanger Assy	3.7.1
b. Hose Assy	3.7.2
c. Filler Valve	3.7.3
d. Carrying Case	3.7.4

3.3 Selection of specifications and standards. Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143.

3.4 Materials.

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

3.4.2 Combustible materials. Materials that are combustible, deteriorate easily, or are otherwise adversely affected by continued use with oxygen heated to 250°F at 500 psig shall not be used in intimate contact with the flowing gas. Thermal insulating materials shall be free from combustible bonding agents. The purging unit, excluding carrying case, shall be of corrosion resistant, or suitably treated, metal construction except for electrical insulating materials, pressure seals, or other parts where proper functioning precludes the use of metals.

3.4.3 Dissimilar metals. Unless protected against electrolytic corrosion, dissimilar metals shall not be used In intimate contact with each other. However, metal plating or metal spraying of dissimilar base metals to provide similar or

suitable abutting surfaces will be permitted. The use of dissimilar metals separated by an insulating material will also be permitted. Dissimilar metals are defined in MIL-STD-889.

3.4.4 Reclaimed materials. The use of reclaimed materials shall be encouraged to the maximum extent possible without jeopardizing the integrity of the item.

3.5 Design and construction. The purging unit shall be so designed and constructed that no parts will work loose in service. The purging unit shall withstand the strains, jars, vibrations, and other conditions incident to shipping, storage, installation, and service.

3.5.1 Heating element and exchanger. The heating element and heat exchanger shall be so designed that either can be replaced as separate components.

3.5.2 Reliability. The purging unit shall he designed to meet the requirements of 3.7.1.

3.5.3 Maintainability. The purging unit shall be designed and constructed as specified herein and to provide the following:

a. Minimum number of parts consistent with reliability and performance specified herein.

b. Minimum amount of training and time necessary for assembly, disassembly, location of trouble sources, and maintenance including servicing. Where practical, parts and components shall be located or positioned for rapid and simple inspection and recognition of excessive wear or potential failure.

c. Permit adjustments, servicing, replacement of parts and components, and other maintenance with minimum disturbance to other equipment parts or components. Parts and components shall be located for ample and rapid access unless performance or reliability will be appreciably degraded by the accessible location. If engineering reasoning or data determines that in performing maintenance, physical or visual interference between items cannot be avoided, where practical, the item predicted to require the most maintenance shall be located for best accessibility.

d. The manufacturer shall be prepared to provide all technical data required to operate, repair and functionally test the assembly, including an illustrated parts breakdown of the assembly.

e. The manufacturer shall be prepared to provide replacement parts for the assembly when needed to accomplish repairs.

f. Maintenance with general purpose tools and equipment normally available commercially. Use of specific purpose tools and equipment shall be subject to contracting activity approval.

g. Minimum number of tools required for maintenance by design practices such as reducing the variety of bolthead sizes to the practicable minimum.

3.5.4 Configuration. The configuration of the purge kit shall be in accordance with Figure 1.

3.5.5 Power requirements. The purging unit shall be designed to operate on not more than 1500 watts electrical power supplied at 115 ± 5V, 60 or 400 cycles, single phase.

3.5.6 Explosion proofing. The purging unit shall incorporate provisions to preclude the initiation of an explosion when exposed to class 1, group D atmospheres and operated in class 1, division 2 hazardous locations as defined by Pamphlet 70.

3.5.7 Design pressures. The heat exchanger assembly and hose assembly shall be designed to withstand working pressures up to 500 psig and shall show no leakage or deformation when subjected to a proof pressure of 1,000 psig. Neither assembly shall burst at less than 2,000 psig.

3.5.8 Safety. No electrical components and wiring shall be exposed to the flowing oxygen gas. The heating element shall not be directly exposed to the flowing oxygen gas without a sealed protective sheath that will prevent a failure from providing an ignition source. Heating elements within a heat exchange medium and not in direct contact with oxygen, do not require a sheath.

3.6 Performance.

3.6.1 Purge kit. The purge kit shall be assembled, connected, and instrumented per Figure 3. Inlet oxygen shall be applied at any pressure between 40 and 100 psig. Electrical power shall be applied at 115 ± 5 V, 60 or 400 cycles, single phase. The purging unit shall control effluent oxygen to within the following conditions at an ambient temperature of 30°F:

a. A minimum flow rate of 300 Standard Liters Per Minute (SLPM) at 100 psig. Flow shall not exceed 400 SLPM.

b. A minimum flow rate of 100 SLPM at 40 psig.

c. A temperature of 250 to +0 °F at any flow condition from 0 SLPM to -30 the maximum obtained at 100 psig.

3.6.1.1 Standard gas. For the purpose of this specification, standard gas is defined as dry air, oxygen, or nitrogen at 760 mm Hg pressure and 70° F. Oxygen shall be per MIL-0-27210; Nitrogen per BB-N-411 Type 1 Class 1, Grade B; air per BB-A-1034 Source 1 Grade A or Source II Grade C.

3.6.1.2 Hot purging. The assembly shall be designed to provide a safe means of hot purging both liquid and gaseous systems and accessory items using a prime inlet Source of Grade 1 aviators breathing oxygen per MIL-0-27210.

3.6.2 Gas temperature and flow rate. When operated in any ambient temperature from -30 to +125°F, the gas temperature and flow rate at the inlet to the filler valve, shall reach specified conditions in a time not to exceed 10 minutes after power is first applied. No component shall be damaged by interruption of gas flow with specified electrical power applied for periods up to and including 8 hours.

3.7 Details of components.

3.7.1 Heat exchanger assembly. As a minimum the heat exchanger assembly shall consist of a heating element or elements, thermostatic controls, a protective outer

enclosure, an inner enclosure, an on-off toggle switch, a heater indicator light, a power on indicator light, inlet and outlet connections, thermal fuse and a power cable. The heat exchanger assembly shall be designed for at least 2000 hours of operation.

3.7.1.1 Thermostatic controls. The thermostatic controls of the assembly shall not be preset during manufacture and will be adjustable after assembly to a maximum of 250° F. Adjustments shall be for the purpose of calibration. Controls are not to be located in such a way to encourage adjustment except during calibration.

3.7.1.2 Inner enclosure. An inner enclosure shall be provided around the heater chamber. It shall be inside the outer enclosure and be separated from it in such a way that free air passage is permitted between the inner and outer enclosures.

3.7.1.3 Outer enclosure. A protective outer enclosure shall be provided around the heater chamber and inner enclosure in such a manner as to permit safe handling of the heat exchanger assembly during operation and to permit free air passage between the inner enclosure and the outer enclosure. A fixed position handle shall be provided on the outer enclosure.

3.7.1.4 On-off switch. An MS25306-222 on-off switch shall be mounted on the base of the outer enclosure. The power cable specified in 3.7.1.8 shall be direct wired to the switch and heater chamber.

3.7.1.5 Indicator lights. A neon lamp indicator light shall be mounted on the outer enclosure near the on-off toggle switch and shall be so connected that the lamp will light only when power is applied to the heating element. The lamp shall be mounted behind a faceted green lens. The lamp shall incorporate a series resistor small enough to insure that the operator may readily discern that the lamp is lit under bright sunlight conditions but large enough to insure an average rated life of 2,000 hours or more of operation. A red "power on" indicator light shall also be provided to the above requirements except that it shall show when the power is on and not cycle with the heating element. The two lights shall be clearly marked. At the discretion of the manufacturer, the lamps and lenses may be mounted on the heater chamber with a corresponding opening provided on the outer enclosure.

3.7.1.6 Inlet and outlet connections. MS33656-5 heat exchanger inlet and outlet connection shall be provided.

3.7.1.7 Thermal fuse. A thermal fuse shall be provided as a part of the heat exchanger assembly to prevent overheating of the unit in the event of thermostat malfunction. The thermal fuse shall be set at a predetermined value above the operating temperature of the heat exchanger assembly and acting as a back-up safety device. A resetable breaker is desirable. However, a fuse, readily accessible for inspection and replacement is acceptable.

3.7.1.8 Power cable. The purging unit shall be equipped with a 20 foot, three wire power cable conforming to MIL-C-5756. The wire shall be size 18 or heavier. One wire of the cable shall be securely grounded to the heat exchanger assembly. The free end of the cable shall be equipped with a UP121M plug connector conforming to W-C-596/142. Substitute power cable or plug must be approved by the contracting activity.

3.7.1.9 Heat exchanger assembly weight. The complete heat exchanger assembly, including power cable, 6 Inch hose, and MIL-V-38201 valve shall not exceed 15 pounds.

3.7.2 Hose assembly. A flexible metal hose assembly, approximately 6 inches in length, shall be provided. The hose assembly shall be designed for connection from the outlet of the heat exchanger assembly to the inlet of the filler valve.

3.7.2.1 Hose assembly components. The hose assembly shall consist of the following components assembled by silver brazing:

a. Corrugated hose. The flexible pressure carrying hose shall be helically or annularly corrugated from corrosion resistant seamless, or welded and redrawn steel tubing.

b. Braided outer covering. The corrugated hose shall be reinforced with one or more layers of corrosion resistant steel wire braid.

c. End fittings. Each end of the hose assembly shall incorporate an MS28760-5 stainless steel adapter, as applicable, to the swivel nut and nipple, except that the nipple hex shall be optional.

3.7.2.2 Working pressures. The hose assembly shall be designed to withstand the working pressures specified herein without leakage or defamation.

3.7.2.3 Supporting capability. The hose assembly shall be capable of supporting a 15 pound weight without deformation or collapse and without any sign of cracking or splitting of any seam or junction when mounted as shown on figure 5, position 2.

3.7.3 Filler valve. The purging kit shall incorporate a female half filler valve for connection to the male half filler valve at the aircraft liquid oxygen inlet. The female half filler valve shall be similar to the valve conforming to MIL-V-38201 except that component parts may be modified to reduce the overall length, excluding inlet connection, to not less than 4 inches. Parts shall be modified and pressure seals added as necessary to insure that the poppet in the aircraft half of the filler valve is positively held in the open position and no more than 0.02 liter per minute standard gas leakage occurs when the two halves are connected and subjected to the operating pressures specified herein. The filler valve inlet connection shall conform to MS33656-5.

3.7.4 Carrying case. A carrying case shall be provided to store and transport an accessory kit and the heat exchanger assembly, hose assembly of up to 18 inches in length, and filler valve. The case need be designed for only an installed hose length of 6 inches. Longer hoses will be stored unassembled. A hinged lid, handle, and lid hasps shall be provided to hold the other kit components firmly in position when subjected to a blow on the corner of the carrying case equivalent to dropping the complete kit from a height of 5 feet onto a concrete surface. The clips or fasteners shall be such that the components are easily removable without the use of handtools. The carrying case shall be so constructed that the contents are protected and receive no damage from the 5 foot drop.

3.7.5 Weight. The weight of the purging kit shall not exceed 25 pounds. The purging kit is to consist of the heat exchanger assembly, 6 inch hose, MIL-V-38201 valve, carrying case, all padding, and retainers.

3.7.6 Caps and plugs. The heat exchanger assembly shall be provided with caps or plugs. All caps and plugs shall be permanently attached to the particular component by means of a beaded chain.

3.7.7 Antiseize and sealing procedures. Threaded pipe connections shall be sealed by an application of antiseize, tape per MIL-T-27730. The tape shall be applied to the male pipe threads prior to assembly. The tape shall not be wound on the first two pipe threads nor the mating female threads.

3.8 Part numbering of interchangeable parts. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The drawing number requirements of DOD-D-1000 shall govern changes in the manufacturer's part number,

3.9 Finishes and protective coatings. All exposed q etal parts and surfaces shall be cleaned, treated, and finished as specified in MIL-STD-808. When more than one finish process is permitted by MIL-STD-808 for a part or surface, the most applicable finish process shall be determined by the contractor unless otherwise specified herein. Final film color designation DG shall apply.

3.10 Operating instructions plate. An operating instruction plate shall be permanently attached to the underside of the carrying case lid. The plate shall bear the information, sketch, and instructions required to safely and efficiently operate the purge unit. The instruction plate shall be of anodized aluminum with the information photographically reproduced and embedded in the anodic coating. The lettering shall be white on a black background. Purge procedures shall not be given but, simply unit operating instructions.

3.11 Identification of product. Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130. The nameplate shall be located on the outside of the carrying case lid and shall be anodized aluminum with the information photographically reproduced and embedded in the anodic coating. The lettering shall be white on a black background.

3.12 Workmanship. The purging unit, including all components, shall be fabricated and finished in a thoroughly workmanlike manner. Particular attention shall be given to freedom from blemishes, defects, burrs and sharp edges; accuracy of dimensions, radii of fillets, and marking legibility; thoroughness of welding, brazing, soldering, painting, and riveting; alignment of parts and tightness of assembly screws, bolts and cleaning.

3.13 Cleaning. All surfaces intended to contact the flowing oxygen gas shall be thoroughly cleaned to remove dirt, grease, soldering, brazing, or welding flux or any other foreign material that could present a safety hazard on exposure to oxygen at temperatures up to 300°F and pressures up to 500 psig. Cleaning as appropriate, shall be accomplished before, during, and after assembly. The cleaning method or methods shall be at the discretion of the manufacturer, but shall be in accordance with highest commercial standards for oxygen equipment.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. The supplier is responsible for the performance of all inspection requirements specified herein. Except as otherwise

specified, the supplier may utilize his own or any other inpection facilities and services acceptable to the Government. Records of inspection and tests shall be prepared, maintained, and made available to the Government as specified in the contract or order. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

"4.4.1 Responsibility for compliance. All items must 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 assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material."

4.2 Classification of tests. The inspection and testing of the purging unit shall be classified as follows:

a. First article tests . . . . . See 4.4

b. Quality conformance tests . . . . . See 4.5

4.3 Test conditions.

4.3.1 Pressures and temperatures. Test equipment used to measure pressure and temperatures shall be accurate to within ±2 percent of actual values of pressure and temperature specified.

4.3.2 Flow rates. Test equipment used to measure flow rates shall be accurate to within ± 3 percent of actual values based on SLPM.

4.3.3 Other measurements. Any other measurements necessary for indication of compliance or noncompliance to test provisions specified herein shall be accurate to within at least ± 1 percent of the quantity being measured.

4.4 First articles.

4.4.1 First article test sample. The contractor shall subject one complete purging unit to the first article tests specified in 4.4.4 except the burst pressure test. An additional heat exchanger assembly shall be subjected to the burst pressure test specified in 4.6.3.

4.4.2 First article test report. After the contractor completes the first article test, a first article test report shall be prepared.

4.4.3 First article test sample submission. Along with the first article test report, the contractor shall supply the sample unit to the contracting activity upon request in contracting document.

4.4.4 First article tests. The first article tests shall consist of all tests described under 4.6.

4.5 Quality conformance tests. Quality conformance testing shall consist of the individual tests described under 4.5.1.

4.5.1 Individual test. Each purging unit shall be subjected to the following tests:

a. Examination of product . . . . . See 4.6.1

b. Proof pressure test . . . . . See 4.6.2

c. Performance test (short method).See 4.6.4

4.6 Test methods.

4.6.1 Examination of product. The purging unit shall be inspected to determine compliance with the requirements specified herein with respect to the following. Evidence of noncompliance shall be cause for rejection.

a. Configuration compliance to design (See 3.5.5)

b. Proper use of polytetrafluoroethylene tape on pipe threaded joints.

c. Weight of heat exchanger assembly.

d. Weight of complete purging unit.

e. Length, wire size, and plug connector for power cable.

f. Operating instruction and identification marking plates.

g. Materials.

h. Workmanship.

i. Identification.

4.6.2 Proof pressure test. The heat exchanger assembly and a pressure sensing device shall be assembled as shown on Figure 4 and clean, dry, oil free air, nitrogen, or oxygen at 1,000 psig pressure shall be applied to the system. The pressure source shall then be removed leaving the system at 1,000 psig as indicated by the pressure sensing device. The system shall be allowed to stand in this condition. Leakage shall not exceed 1 cubic centimeter per minute pressure loss to be computed from system volume.

4.6.3 Burst pressure test. The heat exchanger assembly, and a pressure sensing device shall be assembled as shown on Figure 5. Hydrostatic pressurize until rupture occurs. A rupture at less than 2,000 psi shall be cause for rejection.

4.6.4 Performance test (short method). The purging unit and other components as shown on Figure 3 shall be assembled and instrumented. Clean, dry, oil free air, nitrogen, or oxygen at 100 ± 5 psig shall be applied to the heat exchanger inlet, 115 ± 5V, 60 or 400 cycle, single phase power shall be applied to the power cable and the toggle switch turned on. Flow rate, outlet temperature, inlet pressure, clasped time, and applied wattage shall be measured for at least 20 minutes starting with the first application of power to the heating element. The time required for the heating element to reach thermostatic cutoff temperature shall also be recorded. This

condition shall be evidenced by the extinguishing of the heater indicator light and a sharp drop in wattage. With pressure still applied to the heat exchanger inlet, the flow shall be shutoff downstream from the connected filler valve, allowing the outlet pressure to build up. Evidence of any of the following conditions shall constitute test failure and cause for rejection:

a. An elapsed time of more than 10 minutes for the heating element to thermostatically cut off.

b. A maximum power drain of more than 1500 watts.

c. An effluent gas temperature of less than 220°F after 10 minutes from first application of power to the heating element.

d. An outlet temperature of more than 250°F at any time after first application of power to the heating element.

e. An effluent flow rate of less than 300 or more than 400 liters of standard gas per minute.

f. Failure of the heater indicator light to cycle on and off coincident with application and removal of power at the heating element.

4.6.5 Performance test (long method). The performance test shall consist of eight 5 hour runs conducted with heat exchanger gas inlet pressures and ambient temperatures according to Table I. The inlet gas temperature shall be controlled to within 5°F of the specified ambient temperature throughout each run. In addition to maintaining the specified ambient temperature throughout each run, all unit components, excluding carrying case, shall be soaked at the specified ambient temperature for at least 4 hours before starting the run. The purging unit components shall be assembled and instrumented as shown on Figure 3. The 115 ± 5V, 60 or 400 cycle single phase power shall be applied to the power cable and the-toggle switch turned on. Flow rate, inlet, outlet, and surrounding ambient temperatures, inlet pressures, elapsed time, and applied wattage shall be measured throughout each run. The elapsed time at which the heating element reaches each thermostatic cut-off and cut–in temperature shall also be recorded. This condition shall be evidenced by the extinguishing or lighting of the heater indicator light and a corresponding sharp drop or increase in wattage. Once every hour during each 5 hour run, the gas inlet pressure shall be reduced to 0 psig for a period of 5 minutes and then restored. The electrical power shall not be removed during this period. Any of the following conditions observed during the course of any test run shall constitute test failure and cause for rejection:

a. An elapsed time of more than 10 minutes for the heating element to reach the specified temperature and thermostatically cut off. An elapsed time of 30 minutes will be allowed for runs one and two.

b. A maximum power drain of more than 1500 watts.

c. An effluent gas temperature of less than 220°F within 10 minutes from first application of power to the heating element except that during runs 1 and 2 at -30°F ambient , the limits are 220°F within 30 minutes.

d. An outlet temperature of more than 250°F.

e. An effluent flow rate outside the ranges indicated In Table I in SLPM.

f. Failure of heater indicator light to cycle on an off coincident with application and removal of power at the heating element.

TABLE I. Performance test (long method).

Run No.	Inlet press Pl-psig	Ambient temp - °F	Effluent flow SLPM
1	40 ±2	-30 ±5	100-400
2	100 ±5	-30 ±5	300-400
3	40 ±2	70 ±5	100-400
4	100 ±5	70 ±5	300-400
5	40 ±2	70 ±5	100-400
6	100 ±5	70 ±5	300-400
7	40 ±2	125 ±5	100-400
8	100 ±5	125 ±5	300-400

4.6.6 Drop test. The complete purging kit with case, shall be raised to a height of 5 feet above a concrete surface and dropped in such manner that one corner of the case squarely contacts the concrete surface. The test shall be repeated by dropping the unit on the corner diametrically opposite to the corner that originally contracted the surface. The unit shall then be opened and examined. If any of the unit components have come loose from their retaining clips or fasteners, or if any of the components other than the carrying case have been damaged, or if the carrying case is incapable of containing and restraining the contents, the unit shall be rejected.

4.6.7 Explosion proofing test. The heat exchanger assembly shall be subjected to explosion proofing in accordance with Procedure I of MIL-STD 810 to determine compliance with 3.5.7.

4.6.8 Heat exchanger endurance test. The heat exchanger assembly power cable shall be connected to a source of 115 ± 5V, 60 or 400 cycle power and the toggle switch turned on. Air, oxygen, or nitrogen at any suitable pressure shall be intermittently applied to the heat exchanger inlet causing the thermostatic controls to cycle the heater on and off as in normal operation but with a greater than normal frequency of cycling. The heat exchanger assembly shall be operated in this manner for at least 60,000 on-off cycles of the thermostatic controls, after which the assembly shall be subjected to the test specified in 4.6.6.

4.6.9 No flow test. The purging unit components shall be assembled and instrumented as shown on Figure 3. Clean, dry, oxygen at 500 ± 5 psig, shall be applied to the heat exchanger inlet, 115 ± 5V, 60 or 400 cycle single phase power shall be applied to the power cable and the toggle switch turned on. The unit shall be operated for 20 minutes at rated conditions to establish stabilization. The time required for the heating element to reach thermostatic cutoff temperature shall be recorded. With pressure still applied to the heat exchanger inlet, with power supplied to the unit and the toggle switch remaining in the on position, the flow shall be shut off downstream from the filler valve for 8 hours. Evidence of damage, malfunction or overheating shall constitute test failure and cause for rejection.

4.6.10 Noncompliance. If a sample fails to pass group C or D inspection, the manufacturer shall notify the qualifying ac vity and the cognizant inspection activity of such failure and take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured with essentially the same materials and processes, and which are considered subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action, acceptable to the qualifying activity has been taken. After the corrective action has been taken, group C or D inspection shall be repeated on additional sample units (all tests and examinations, or the test which the original sample failed, at the option of the qualifying activity). Groups A and B inspection may be reinstituted; however, final acceptance and shipment shall be withheld until the group C or D inspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure shall be furnished to the cognizant inspection activity and the qualifying activity.

4.7 Inspection of the preservation, packaging, packing, and marking for shipment and storage. Sample items or packs and the inspection of the preservation, packaging, packing, and marking or shipment and storage shall be in accordance with the requirements of section 5, or the documents specified therein.

5. PACKAGING

5.1 Preservation and packaging. Preservation and packaging shall be level A or C as specified.

5.1.1 Level A. Unless otherwise specified, each purging kit shall be preserved in accordance with Method IA-14 of Specification MIL-P-116.

5.1.1.1 Cleaning. The purging kit component parts that come in contact with high purity oxygen shall be cleaned for oxygen service in accordance with industry practice according to applicable cleaning processes of MIL-P-116. Petroleum and other flammable solvents shall not be used.

5.1.1.2 Drying. The components shall be thoroughly dried with filtered oil free air or nitrogen. Component parts of the purging kit that do not contact high purity oxygen shall be cleaned and dried in accordance with the applicable processes and procedures of MIL-P-116.

5.1.1.3 Preservation application. Not applicable.

5.1.1.4 Unit packaging. Unless otherwise specified by the contracting activity, each purging kit shall be packaged method 1A-14. The carrying case will be utilized as the inner container. Prior to inserting the encased purging kit into the bag all sharp or other irregular shaped surfaces shall be cushioned as required to prevent rupture of the bag. The outer container shall conform to PPP-636.

5.1.2 Level C. Component parts of the purging kit which contact high purity oxygen shall be cleaned and dried in the same manner as specified for level A. Component parts that do not contact highpurity oxygen shall be preserved and packaged in accordance with the contractor’s commercial practice.

5.2 Packing. Packing shall be level A, B, C, or Industrial as specified.

5.2.1 Level A. Purging Kit packaged as specified in 5.1.1 shall be packed in shipping containers conforming to PPP-B-601, Styles A or B, Class overseas unless otherwise specified by the contracting activity. Insofar as practical, exterior shipping container shall be of uniform shape, size, minimum tare and cube consistent with the protection required.

5.2.2 Level B. Purging Kit packaged as specified in 5.1.1 shall be packed in shipping containers conforming to PPP-B-636, class weather-resistant, unless otherwise specified by the contracting procuring activity. Other requirements as specified in 5.2.1 apply.

5.2.3 Level C. Packing shall be applied which affords adequate protection during domestic shipment from the supply source to the first receiving activity. This level shall conform to applicable carrier rules and regulations.

5.2.4 Industrial. The Purging Kit shall be packed in accordance with ASTM-D-3951-82.

5.3 Marking. In addition to any other markings required by the contract or order (see 6.2), interior and exterior containers shall be marked in accordance with MIL-STD-129.

5.3.1 Precautionary marking. The following precautionary marking shall appear on each package:

CAUTION: DO NOT ALLOW CONTAMINATES OF ANY KIND TO BE USED ON OR ABOUT THE PURGING KIT.

6. NOTES

6.1 Intended use. The purging unit is intended for use in conjunction with a low pressure gaseous servicing trailer and a mobile or fixed source of 115V 60 or 400 cycle electrical power to flush aircraft liquid oxygen converter systems with heated oxygen gas in order to remove moisture and other contaminants from the system.

6.2 Ordering data. Contracting documents should specify the following:

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

b. Applicable levels of preservation and packaging, and packing (see section 5).

c. When special shipment marking is required (see 5.3).

6.3 First article. When first article inspection is required, the item should be a first article sample or may be a standard production item from the contractors inventory. The first article shall consist of one complete assembly and one additional heat exchanger assembly. A first article test report shall be prepared. The contracting officer will include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. The contracting activity reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government. Bidders

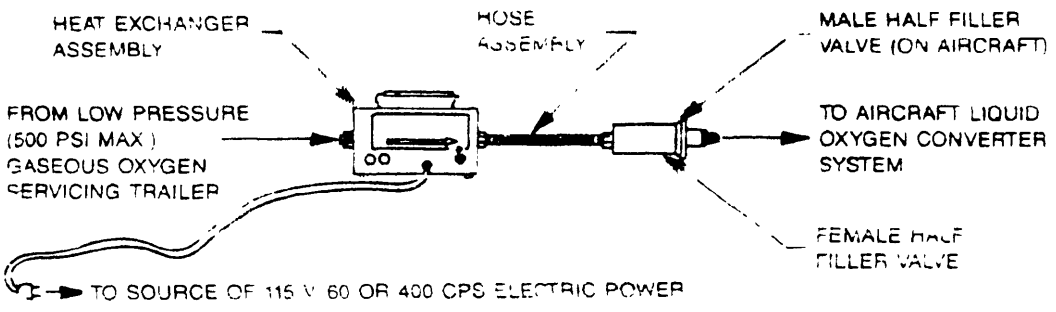
offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Waiver of first article inspection does not relieve the contractor of meeting the quality conformance requirements.

Custodian:
Air Force-99

Preparing activity:
Air Force-71

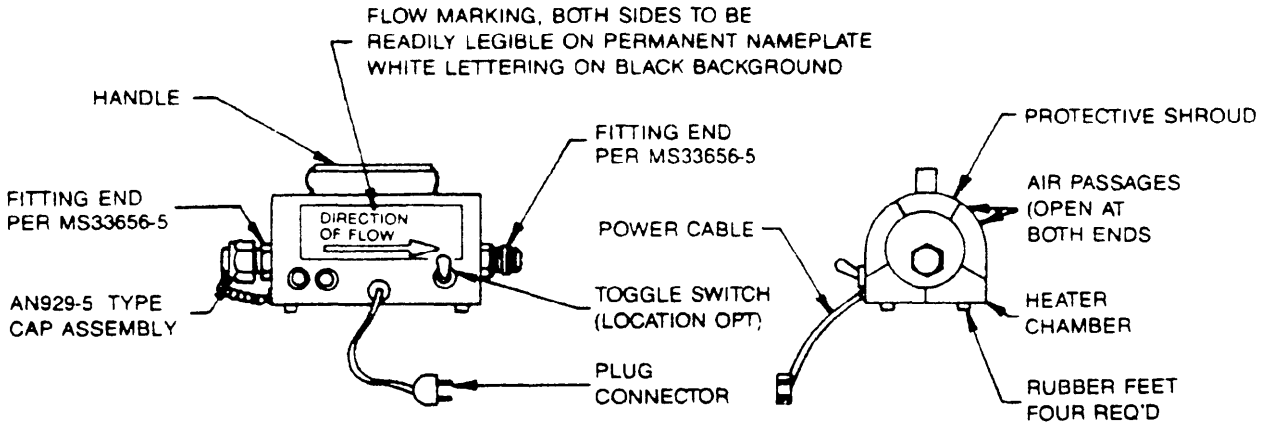
Review activity:
Air Force-82

Project number:
1730-F286

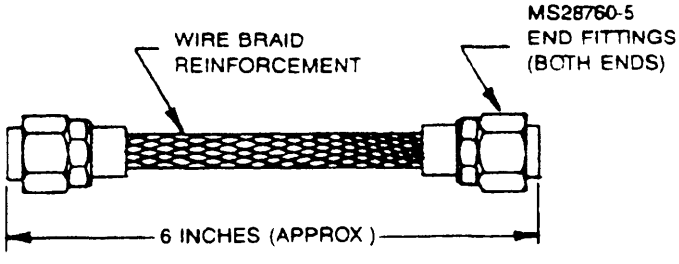


OPERATING SCHEMATIC

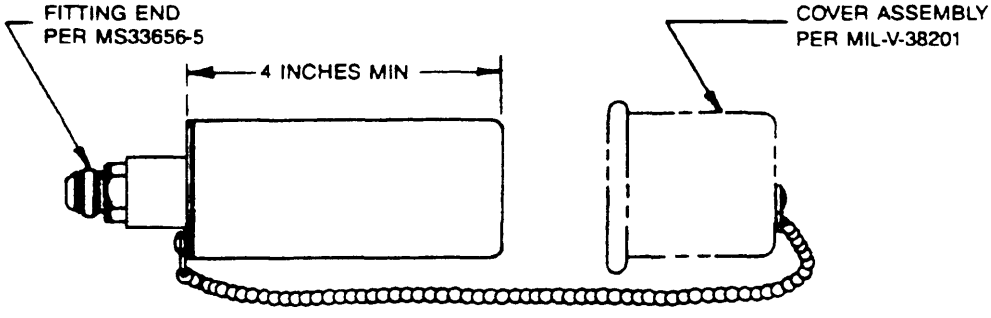
FIGURE 1 Configuration of purging unit



HEAT EXCHANGER DETAILS

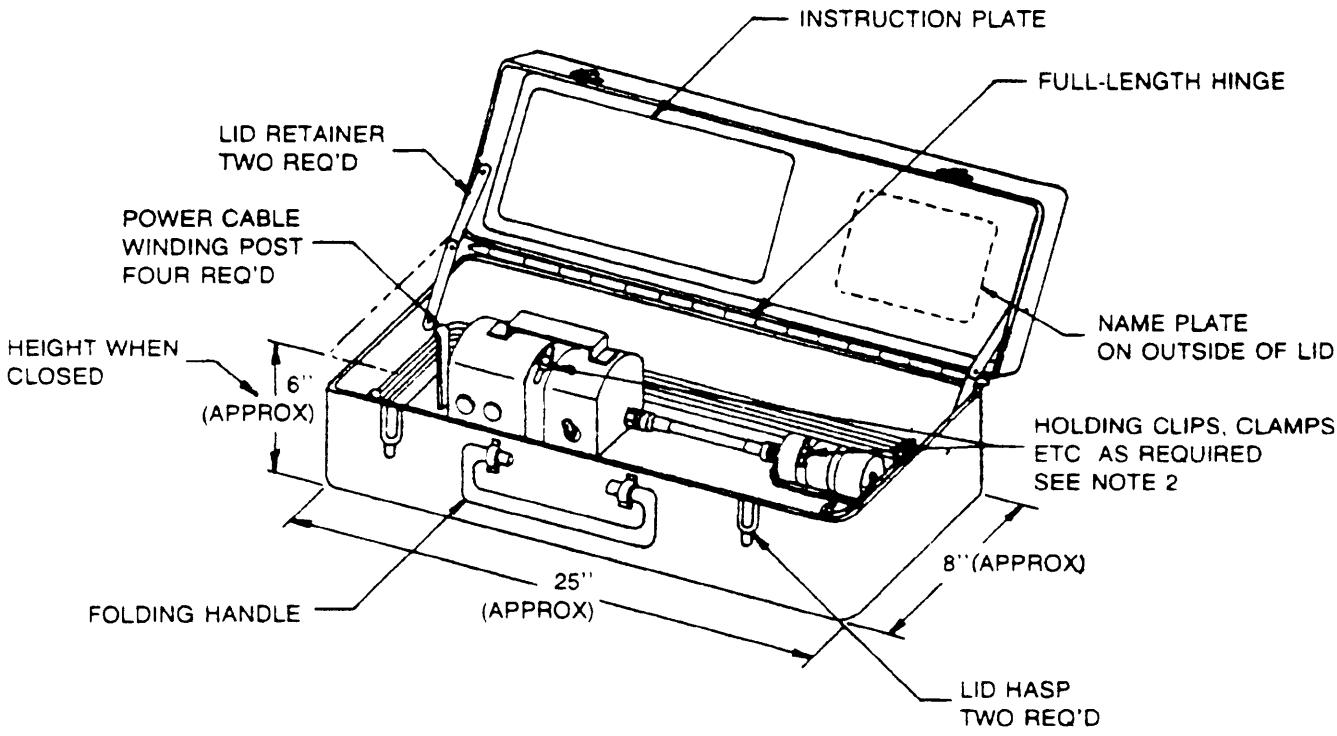


HOSE ASSEMBLY DETAILS



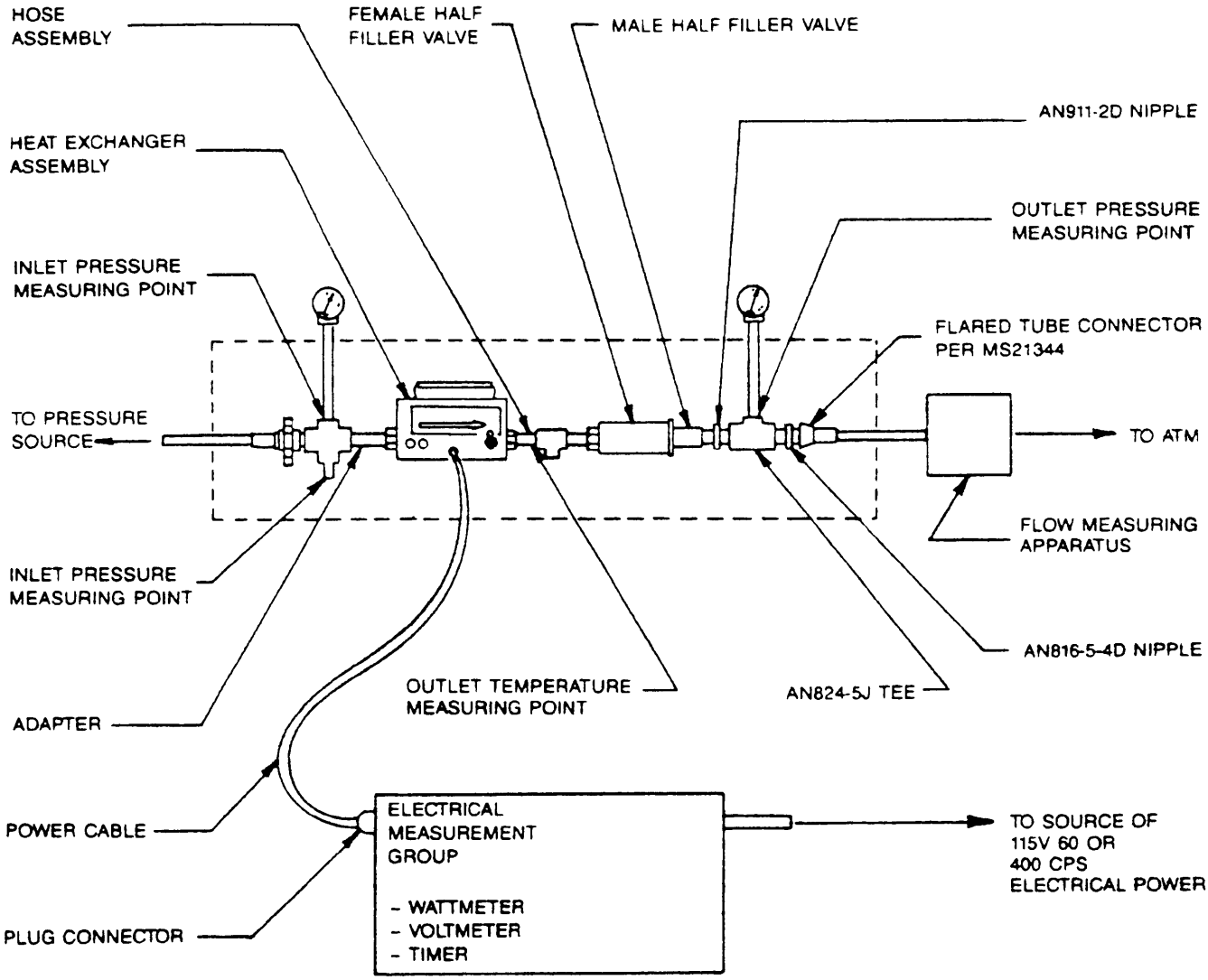
FILLER VALVE DETAILS

FIGURE 1. Configuration of purging unit
(Continuation)



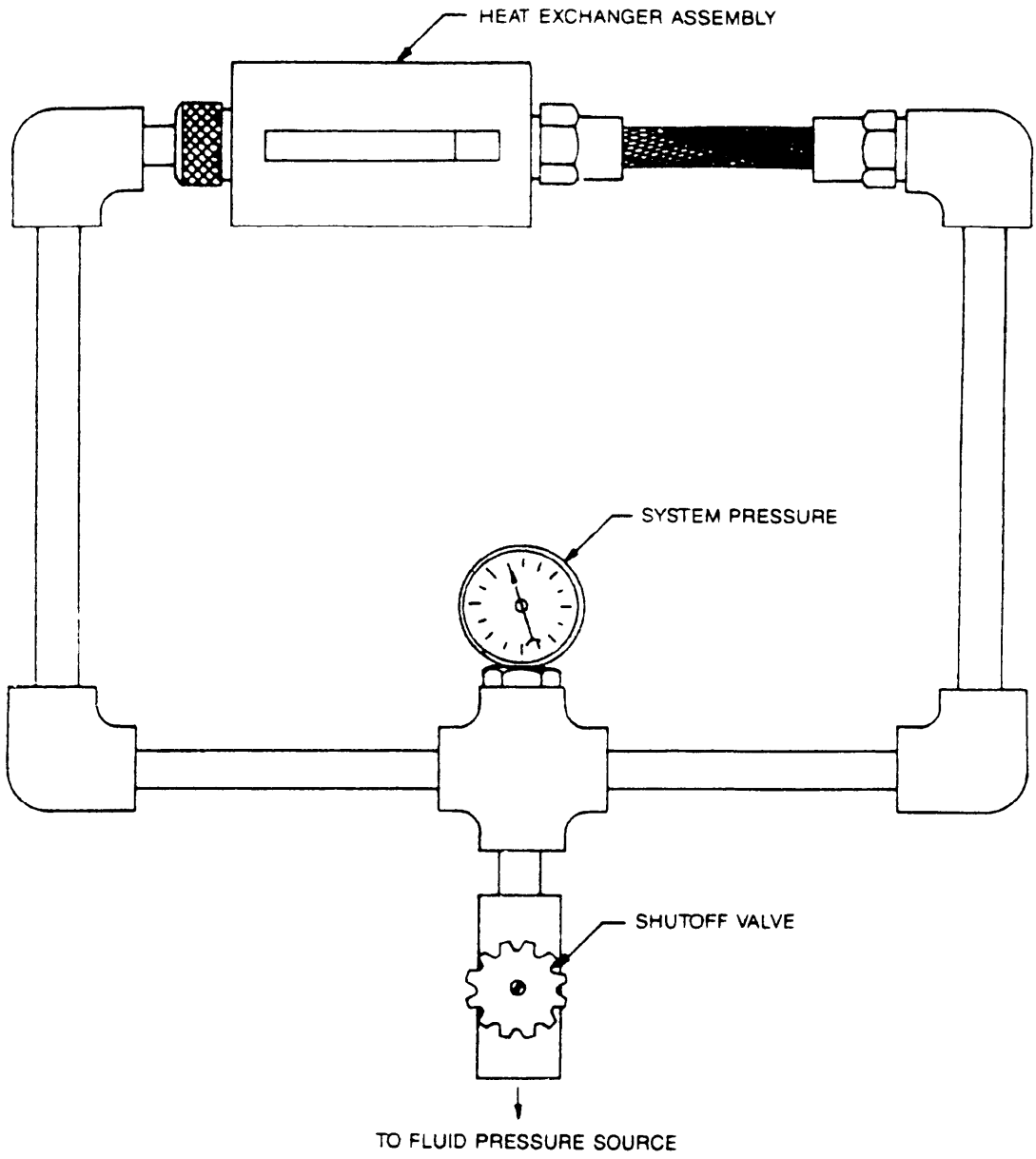
NOTES:
1. Carrying case is to accommodate operating components in assembled condition.
2. Method of retaining components in case optional.
3. Dimensions in inches.
4. A method of retaining an optional hose of up to 18 inches length shall be provided, hose longer than 6 inches need not be stored assembled.

FIGURE 2. Carrying case details.



NOTE:
For performance tests at other than normal room temperature all components shown within dashed outline shall be exposed to the extreme temperature

FIGURE 3. Performance test arrangement



NOTE:
Variations to the above arrangement will be permitted provided that both ends of the heat exchanger assembly and the hose assembly are subjected to the required pressure for the required period

FIGURE 4 Proof and burst pressure test arrangement

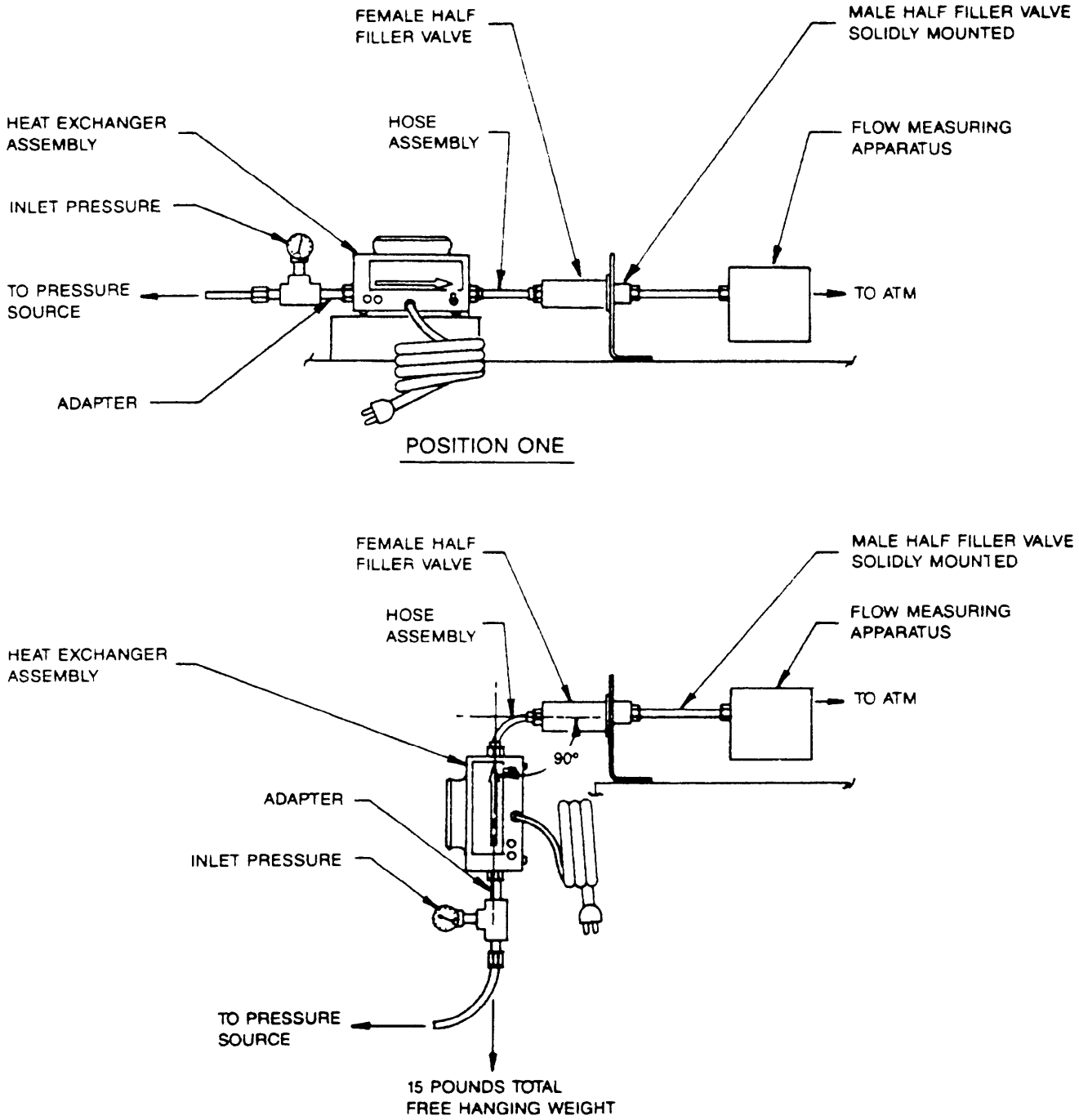


FIGURE 5. Hose assembly strength test arrangement

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b. ADDRESS *(Street, City, State, ZIP Code)*	☐ VENDOR ☐ USER ☐ MANUFACTURER ☐ OTHER *(Specify)* _____

5. PROBLEM AREAS

a. Paragraph Number and Wording

b. Recommended Wording

c. Reason/Rationale for Recommendation

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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