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26 September 1967
SUPERSEDING
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3 May 1962

MILITARY SPECIFICATION

PURGING UNIT, AIR, LIQUID OXYGEN STORAGE TANKS GSU-62/M

1. SCOPE

1.1 This specification covers a liquid-oxygen storage tank air purging unit, designated GSU-62/M.

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

SPECIFICATIONS

Federal

CC-M-641	Motor, Alternating Current (Integral Horsepower, 200 HP And Smaller)
NN-P-530	Plywood, Flat Panel
TT-E-489	Enamel, Alkyd Gloss, (For Exterior And Interior Surfaces)
TT-P-664	Primer, Coating, Synthetic, Rust-Inhibiting, Lacquer-Resisting
TT-W-572	Wood-Preservative; Water-Repellent

Military

MIL-C-104	Crates, Wood; Lumber And Plywood Sheathed, Nailed And Bolted
MIL-P-116	Preservation, Methods Of
MIL-D-1000	Drawings, Engineering And Associated Lists
MIL-T-5542	Thread Compound, Antiseize And Sealing, Oxygen Systems
MIL-C-5756	Cable And Wire, Power, Electric, Portable
MIL-I-6866	Inspection, Penetrant Method Of
MIL-I-6868	Inspection Process, Magnetic Particle

MIL-M-8090	Mobility Requirements, Ground Support Equipment, General Specification For
MIL-A-8421	Air Transportability Requirements, General Specification For
MIL-S-8512	Support Equipment, Aeronautical, Special, General Specification For The Design Of
MIL-C-8638	Cleaning Compound; Oxygen Systems
MIL-E-16298	Electric Machines Having Rotating Parts And Associated Repair Parts; Packaging Of

STANDARDS

Military

MIL-STD-129	Marking For Shipment And Storage
MIL-STD-130	Identification Marking Of US Military Property
MIL-STD-143	Specifications And Standards, Order Of Precedence For The Selection Of
MIL-STD-281	Automobile, Trucks, Truck-Tractors, Trailers And Trailer Dollies; Preservation And Packaging Of
MIL-STD-470	Maintainability Program Requirements, (For Systems And Equipment)
MIL-STD-808	Finishes, Protective And Codes For Finishing Schemes For Ground And Ground Support Equipment
MIL-STD-810	Environmental Test Methods For Aerospace And Ground Equipment
MIL-STD-826	Electromagnetic Interference Test Requirements And Test Methods
MIL-STD-831	Test Reports, Preparation Of
MIL-STD-1186	Cushioning, Anchoring, Bracing, Blocking And Waterproofing; With Appropriate Test Methods

DRAWINGS

Ordnance Corps

C8987830	Assembly, LOX Coupling, Male Half, All Sizes

Air Force

48B7796	Ring Assembly - Tie Down 10,000 Lb.
55C6182	Connectors - 440 Volt/416 Volt Power Cable

PUBLICATION

Air Force-Navy Aeronautical Bulletin

166 Colors, List Of Standard Aircraft Glossy

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Fire Protection Association

Pamphlet 70 National Electrical Code

(Copies of the NFPA pamphlet may be obtained upon application to the National Fire Protection Association, 60 Batterymarch Street, Boston 10, Massachusetts.)

American Society of Mechanical Engineers

PTC-19.5:4 Supplement On Instruments And Apparatus: Part 5, Chapter 4, Flow Measurement By Means Of Standardized Nozzles And Orifice Plates

(Copies of ASME power test code may be obtained upon application to the American Society of Mechanical Engineers, 29 West 39th Street, New York 18, New York.)

3. REQUIREMENTS

3.1 Preproduction. This specification makes provision for preproduction testing.

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

Item Name	See Requirement
a. Blower	3.8.1
b. Power unit	3.8.2
c. Heater	3.8.3
d. Servicing hose	3.8.4
e. Instrument and control panel	3.8.5
f. Controls, instruments, and accessories	3.8.6
g. Cabinet	3.8.7

3.3 General specification. The requirements of MIL-S-8512 apply as requirements of this specification with the exceptions and additions specified herein. When the two specifications conflict, this specification shall govern.

3.4 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.

3.5 Materials.

3.5.1 Fungus-proof materials. Materials that are nutrients for fungi shall not be used where practical to avoid them. Where used and not hermetically sealed, they shall be compounded or treated as necessary to insure against fungus attack. Fungicidal treatment will not be necessary for materials used in a hermetically sealed enclosure.

3.5.2 Gasket and insulating materials. Plastic, rubber-like, rubber, or similar gasket and insulating materials shall be compounded to insure their suitability for the intended application and, where applicable, their resistance to hydrocarbons or low temperatures.

3.5.3 Packings, gaskets, seals, and other nonmetallic components shall be suitable for use under the conditions specified in 3.7.

3.5.4 Metals. Wherever practicable, lightweight metals shall be used in the construction of the purging unit.

3.5.5 Combustible materials. Readily combustible materials shall not be used in the purging unit.

3.5.6 Metallic surfaces. Metallic surfaces of the purging unit that contact the purging air shall be fabricated from aluminum, brass, copper, or stainless steel.

3.5.7 Lubricants. The purging unit shall be designed to fully comply with the requirements specified herein, using only Government specification lubricants.

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

3.6.1 Reliability. The purging unit shall have a mean-time-between-failures (MTBF) of not less than 435 hours with a minimum reliability of 94 percent for a 24-hour mission at a confidence factor of 0.90. (See 6.3.3 and 6.3.4)

3.6.2 Endurance. The purging unit shall be designed and constructed to provide satisfactory operation for 1,000 hours at rated capacity and pressure between overhauls. (See 4.6.7)

3.6.3 Maintainability. The purging unit design and construction shall provide for compliance with the maintainability requirements specified in MIL-STD-470.

3.6.3.1 To the maximum practicable extent, maintainability provisions shall incorporate features insuring operating clearance for facilitating maintenance and servicing at low ambient temperatures by personnel wearing heavy gloves or mittens and handicapped by bulky clothing and footgear.

3.6.3.2 Intricate locking devices, controls, and threaded fastenings that can be easily overtorqued by personnel lacking feel through thick gloves or numbness shall be avoided where possible.

3.6.4 Operating supplies. The purging unit shall be designed to perform as specified herein when operated with electric power having the characteristics specified in 3.8.2.1.1. It shall require no operating supplies other than electric power and replacement parts.

3.6.5 Mobility. The purging unit shall be designed to meet the general requirements of MIL-M-8090 and those specified for type II, group C mobility.

3.6.6 Controls. The purging unit shall be equipped with all controls necessary to permit ready starting, stopping, and speed regulation.

3.6.7 Protective covers. Cover plates, gaskets, and fittings necessary for the protection of contained apparatus during operation, storage, or shipment shall be provided.

3.6.8 Operation and maintenance tools. No special tools, other than common handtools and those tools normally available in motor shops, shall be required for proper operation, maintenance, and repair of the purging unit.

3.6.9 Hoisting and tiedown provision. Tiedowns in accordance with MIL-A-8421 shall be provided and, where practicable, shall serve as both tiedown and hoisting provisions. The hoisting provisions shall be capable of withstanding a vertical acceleration of 3g. The hoisting and tiedown provisions shall include four or more tiedown ring assemblies conforming to Drawing 48B7796.

3.6.10 Acceleration forces. The purging unit shall be constructed to withstand the acceleration forces specified in MIL-A-8421 for flight and taxiing and emergency landing loads.

3.6.11 Lubrication. Wherever practicable, permanently lubricated components, or components not requiring lubrication, shall be used in the design of the purging unit. Grease and oil seals shall be designed and located to provide maximum accessibility for inspection and replacement.

3.6.12 Parts subject to wear. The purging unit shall be designed to provide for lubrication of all parts subject to wear. Wherever practicable, such parts shall be designed and constructed to be readily renewable. All grease fittings and other lubrication points shall be located to be readily accessible. (See 3.14.5)

3.6.13 Common parts. The purging unit shall be designed to provide for the maximum practicable interchangeability of hardware and fastening devices by

using the minimum number of types and sizes of bolts, screws, nuts, washers, and other common hardware.

3.6.14 Covers or plates. Covers or plates that must be removed for component adjustments or for component or part removal shall be equipped with substantial quick-disconnect fittings.

3.6.15 Tubing, lines, and electrical wiring. All tubing, lines, and electrical wiring shall be located in protected positions, securely fastened to framework or body structures, and provided with protective sleeves, grommets, or similar devices at each point where they pass through members, except where a through-the-frame-type connector is provided.

3.6.16 Piping. The piping between the blower and the servicing hose shall be at least 1 inch inside diameter and shall terminate at the exterior of the unit in a 1 inch standard external pipe thread.

3.6.16.1 Pipe thread compound. Pipe thread compound, conforming to MIL-T-5542; thin, nonadhesive-backed, polytetrafluoroethylene tape; or other pipe thread sealing material, specifically approved by the procuring activity, shall be applied to threads prior to assembly of all pipe-threaded fittings.

3.6.17 Air flow. The flow of air during the purging operation shall be as shown on Figure 1.

3.7 Performance.

3.7.1 Flow rate. At an ambient temperature of -65° Fahrenheit (F) and standard atmospheric pressure, the purging unit shall be capable of continuously delivering air at a minimum rate of 6 pounds per minute (pm) with a discharge pressure of not less than 5 pounds per square inch gage (psig) measured at the discharge end of the servicing hose specified under 3.8.4. The unit shall be capable of operating against a discharge pressure of 0 to 5 psig, measured at the discharge end of the servicing hose, throughout the ambient temperature range of -65° to +130°F. (See 4.3.3.3 and 4.6.6)

3.7.2 Outlet temperature. The purging unit shall be capable of maintaining an outlet temperature at the discharge end, of 350° ±10°F when operating in ambient temperatures ranging from -65° to +130°F with the flow rate specified in 3.7.1. In addition, the unit shall be capable of achieving an outlet temperature of 350° ±10°F within 10 minutes after activation at an ambient temperature of -65°F.

3.7.3 Operating time. The purging unit shall be capable of continuous operation under any of the conditions specified in 3.7.1 and 3.7.2, for periods of not less than 24 hours without requiring shutdown for servicing, maintenance, or repairs.

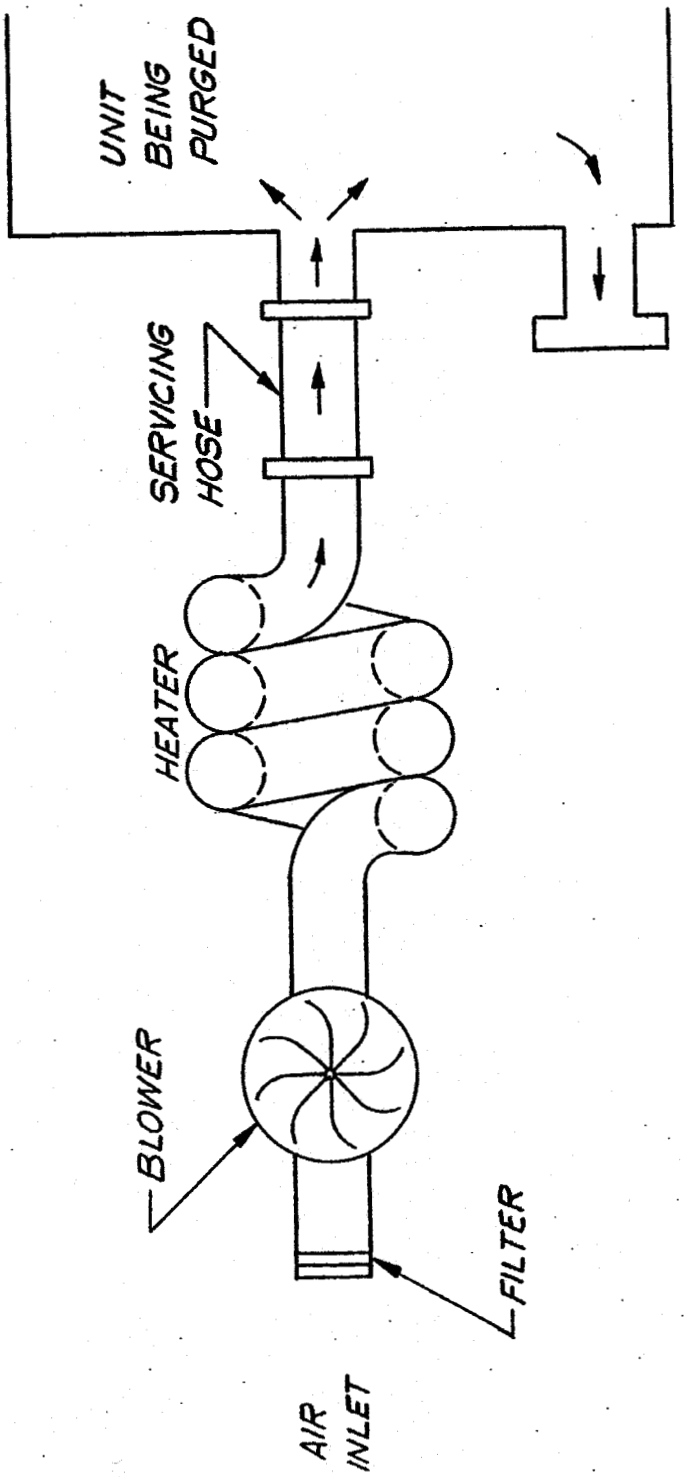


FIGURE 1. FLOW DIAGRAM

3.7.4 Environmental conditions. The purging unit shall withstand the following environmental conditions without detrimental effect to subsequent operation:

a. Storage in ambient temperatures ranging from -80° to +160°F. (See 4.6.8.1.1)

b. Operation in ambient temperatures ranging from -65° to +130°F. (See 4.6.8.1.2)

c. Relative humidity up to 95 percent at a temperature of 130°F. (See 4.6.8.3)

d. Fungus growth as encountered in tropical and subtropical climates. (See 4.6.8.4)

e. Exposure to salt atmosphere as encountered in coastal areas. (See 4.6.8.5)

f. Rainfall as encountered in any locale. (See 4.6.8.6)

g. Sand and dust particles as encountered in desert areas. (See 4.6.8.7)

3.8 Details of components.

3.8.1 Blower. The blower shall be a rotary or centrifugal-type unit capable of delivering oil-free air (see 6.3.2) to the heater consistent with the requirements of 3.7.1. The components of the blower requiring oil such as bearings, gears, et cetera, shall be separated from the compression chamber of the assembly to insure delivery of oil-free air to the heating unit.

3.8.1.1 Electric drive motor and power transmission coupling. The blower shall be driven by the electric motor and power transmission assembly specified in 3.8.2.2 and 3.8.2.2.3, respectively. If practicable, direct drive shall be used.

3.8.1.2 Cooling system. The blower shall have an air-cooled system if necessary to maintain the blower components at suitable operating temperatures under all environmental conditions specified herein.

3.8.1.3 Blower lubricant. The blower shall be capable of complying with the oil-free requirement of 3.8.1 when operated with conventional hydrocarbon lubricants.

3.8.2 Power unit.

3.8.2.1 Electrical equipment. Electrically powered equipment shall be of the explosion-proof type designed for use in group D atmospheres and class 1, division 2 hazardous locations in accordance with Pamphlet 70. Electrically powered equipment shall be designed, constructed, and installed in accordance with the National Electrical Manufacturer's Association standards and Pamphlet 70.

3.8.2.1.1 Electric power supply. Electrically powered equipment shall operate to insure performance in accordance with the requirements specified herein when the purging unit is supplied with either 220 volt (v) ±10 percent or 440v ±10 percent, 3-phase, 60 ±5 cycles alternating current (ac) without overheating or damage. All electrically powered equipment shall operate from the purging unit electric supply either directly or through transformers, without requiring electrical generating equipment or batteries as part of the purging unit. The electrical equipment shall be connected for operation from a 440v power supply when the purging unit is delivered.

3.8.2.1.2 Control voltage. The voltage of electrical power used at all manually actuated pushbutton stations and switches and used to actuate all electrically operated control devices employed in controlling the purging unit, shall not exceed 120v. The phase reversal switch, specified in 3.8.6.1.1.1, shall be specifically exempted from the above requirement.

3.8.2.1.3 Voltage conversion. The purging unit electrical components shall be constructed and installed to facilitate changing from one voltage range to the other with the least practical amount of disturbance and alteration to components and connections.

3.8.2.1.4 Conversion accessories. Overload heater strips and other items needed to connect the equipment for use on 220v power shall be provided with the purging unit. They shall be stored in the electrical control enclosures adjacent to where they will be used.

3.8.2.2 Electric motor. The electric motor shall conform to CC-M-641.

3.8.2.2.1 Motor size. The electric motor size shall be such that the driven load will not exceed the continuous-duty rating of the motor when the purging unit is operated under the conditions specified herein.

3.8.2.2.2 Motor rating. The electric motor shall be constructed to operate continuously, without damage, under the conditions specified in 3.8.2.1.

3.8.2.2.3 Power transmission system. The power transmission system shall consist of a v-belt and belt-tightening arrangement of a direct-drive assembly. Direct drive shall be used, if practicable.

3.8.2.2.4 Electric power supply system. The electric power supply system shall consist of a power supply cable, and a power supply control for use when the power cable is connected into the Air Force grid-duct system.

3.8.2.2.5 Power supply cable. The power supply cable shall be a 50-foot length of six-conductor, heavy-duty, flexible, electric cable conforming to MIL-C-5756. Conductors L_1, L_2, L_3, and N shall be of a size that will insure a voltage drop across the power supply cable of not in excess of 1v when the tank purging unit is operating at maximum load and the power cable is connected to a 440v power source. Conductors C_1 and C_2 shall not be smaller than Number 12 American Wire Gauge (AWG). Conductor identification shall be in accordance

with Drawing 55C6182. The purging unit end of the power supply cable shall be permanently connected into the purging unit electrical power input terminal box. Conductors L_1, L_2, L_3, and N at the free end of the power cable shall be equipped with heavy-duty terminal lugs. Each conductor at the free end of the power supply cable shall be identified by color coding and by permanently attached bands with the conductor identification permanently imprinted thereon so that no doubt can exist concerning which conductor is being handled.

3.8.2.2.6 Power supply control. The power supply control shall consist of a two-pole, single-throw, on-off switch and a 48v red indicator light. The switch shall be so wired that one pole will connect conductors C_1 and C_2 when the switch is in the ON position, and so that the second pole will connect one contact of the 48v red indicator light to C_2. The other contact of the red indicator light shall be permanently connected to conductor N, so that the light will burn when the switch is in the ON position and the purging unit is connected into the Air Force grid-duct system.

3.8.2.2.6.1 Mounting. The power supply control switch and the indicator light shall be mounted adjacent to each other in a readily visible and accesible location on the purging unit control panel.

3.8.2.2.7 Electrical power supply system installation. The electrical power supply system shall be so installed that conductors L_1, L_2, and L_3 carry the phase currents and so that conductor N acts as a ground for the purging unit. All electrical components of the purging unit shall be so bonded to conductor N that when the power supply cable is connected to a power supply and conductor N is grounded, all parts of the purging unit will remain at ground potential in the event of insulation failure on one of the three hot conductors.

3.8.3 Heater. The heater shall consist of a series of electric heating elements designed to heat the air leaving the blower specified in 3.8.1 when connected to the power supply specified in 3.8.2.1.1. The heater shall be thermostatically controlled to insure maintaining the outlet temperature of the purging unit at 350° ±10°F throughout the complete purging operation.

3.8.3.1 The electric heating elements shall be designed and located within the housing assembly in such a manner that maximum heat transfer between the elements and the purging air will occur. The heating unit shall have an overall efficiency of power transfer from the heating coil to the purging air of not less than 85 percent.

3.8.3.2 The heating unit shall be completely encased by a layer of insulation to insure minimum loss of heat to the surrounding medium. The insulation shall be so placed that the elements of the heating unit are readily accessible for removal and periodic maintenance.

3.8.4 Servicing hose. The materials used in the servicing hose shall be sound, of uniform quantity and condition, and free of defects that may adversely affect the appearance, strength, endurance, or wear resistance of the finished assembly. They shall be resistant to deterioration or corrosion,

fungus growth, penetration or absorption of moisture, oil vapor, carbon dioxide, or any other breathing oxygen contaminant. The materials shall not emit toxic or unpleasant odors, smoke, or fumes under the conditions specified herein.

3.8.4.1 The servicing hose shall have an inside diameter of not less than 1 inch and shall be not less than 10 feet in length. The hose shall be so designed and constructed that it will not decrease in length more than 2 percent nor increase in length more than 3 percent after exposure to any of the conditions specified herein. The inside diameter shall not decrease more than 2 percent nor increase more than 3 percent after exposure to any of the conditions specified herein.

3.8.4.2 Jacket. A scuff-resistant jacket shall be provided around the servicing hose and shall be fabricated of dacron or an equivalent material having a moisture-absorption resistance quality equal to that of dacron. If necessary, materials used in lieu of dacron may be treated with a moisture-resistant compound to meet this requirement. The material used for the outermost jacket shall be of a type that will not soil clothing during normal use.

3.8.4.3 The servicing hose shall limit the temperature drop of the purging air flowing through the hose to a maximum of 50°F under the conditions specified in 3.7.1 and 3.7.2.

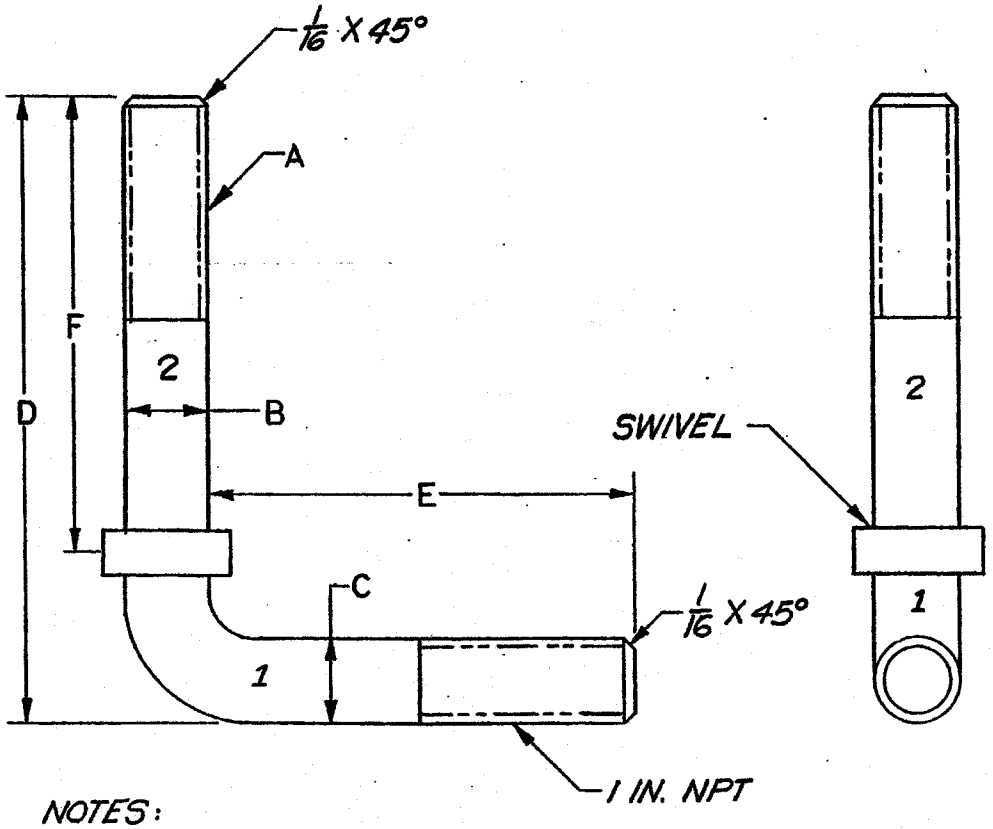
3.8.4.4 Bend radius. The minimum bend radius of the servicing hose shall not exceed 10 inches as measured to the centerline of the hose. The bend radius shall be applicable to any hose in any ambient temperature from -65° to +130°F. (See 4.6.9)

3.8.4.5 End fittings. The hose shall be provided with fittings for each end capable of connecting to the piping specified in 3.6.16.

3.8.4.6 Special adapters. Special adapters shall be provided for attachment of the servicing hose to the vent line of the tank to be purged and the purging kit. The adapters shall be as shown on Figure 2.

3.8.5 Instrument and control panel. The control panel shall be of sufficient size for installation of the instruments and controls needed in normal operation, servicing and maintenance of the purging unit. It shall be so installed on the purging unit that all instruments, controls, et cetera, mounted thereon will be readily visible and accessible to an operator standing on the ground in front of the control panel. Wherever practicable, instruments that must be monitored in making a control adjustment shall be so located that an operator or maintenance man can simultaneously make the control adjustment and see and adequately read the related instruments. All items on the control panel shall be permanently and legibly marked.

3.8.5.1 Illumination. The instrument and control panel shall be illuminated by a manually operated white light.



NOTES:

(1) PART 1 SHALL BE REMOVABLE FROM PART 2.

(2) ONE PART 1 SHALL BE USED FOR ALL THREE PART 2 SIZES

TANK SIZE	A	B	C	D	E	F
50 GAL.	1 IN NPT	1	1	7	5	4.5
500 GAL.	1 1/2 IN NPT	1 1/2	1	7	5	4.5
2000 GAL.	2 IN. NPT	2	1	7	5	4.5

FIGURE 2 ADAPTERS

3.8.5.2 Protection. The control panel shall be protected by a panel or door when the purging unit is not in use. The control panel shall, in addition, be so mounted or recessed into the cabinet assembly that it will be shielded from rain, snow, et cetera, when the door or panel is open.

3.8.6 Controls, instruments, and accessories. Automatic and manual controls, instruments, fittings, safety devices, and accessories needed for safe and efficient operation of the purging unit shall be provided on the instrument and control panel.

3.8.6.1 Controls. Manually operated controls used in normal operation of the purging unit shall be located in positions readily visible and accessible to the operator. Insofar as possible, the manual controls needed for normal operation of the purging unit shall be limited to start and stop buttons.

3.8.6.1.1 Electric controls. Heavy-duty, magnetically operated contactors, overload protection devices, and undervoltage protection devices of applicable power-handling capacity shall be provided for each electric motor. Heavy-duty switches or controls and overload protection devices shall be provided for all other electrically operated components.

3.8.6.1.1.1 Phase sequence and blower rotation safety. A pressure switch shall be located in the discharge line of the blower to prevent motor and heater operation in event the phase sequence is incorrect or the blower fails to rotate. The switch shall be designed to close when subjected to the pressure imposed when operating the unit with zero static pressure at the discharge end of the servicing hose. A time delay relay shall be provided to permit operation of the blower motor long enough to establish pressure and thereby enable start-up of the unit. A switch shall be provided to change phase sequence to secure proper motor rotation without necessitating rewiring or changing connections.

3.8.6.1.2 Temperature gages. The purging unit shall be provided with two temperature gages conforming to the requirements of the paragraph of MIL-S-8512 entitled Temperature Gages.

3.8.6.1.2.1 The gages shall be graduated over approximately 270° of the dial face to include temperatures of 50° through 450°F with figure markings for at least every 50°F and line markings for each 5°F.

3.8.6.1.2.2 One gage shall be used to read the outlet temperature of the air leaving the heater and shall be located on the control panel and the other shall be used to read the outlet temperature of the system being purged.

3.8.6.1.2.2.1 Provisions shall be made to insure that the gage connection on the system being purged is firmly affixed when the gage is in use and easy to remove when the purging operation has been completed. The attachments for the gage to the system being purged shall be stored in the purging unit cabinet in a readily accessible location. The attachments shall be easily adaptable for use with the 1 inch male oxygen coupling half assemblies as shown on Drawing C8987830.

3.8.6.1.3 Lubricant level sight glasses. Each liquid lubricant reservoir or sump, provided on the purging unit components, shall be equipped with an oil level sight glass or level indicator securely mounted in a protected position where it will be readily visible to operating and maintenance personnel. Lubricant level sight glasses shall be shatterproof and shall be long enough to permit attending personnel to accurately determine the lubricating fluid level in relation to its normal recommended position.

3.8.6.1.4 Pressure relief device. The unit shall be provided with a pressure relief device to prevent overloading of the motor or damage to the airflow passage by inadvertent blocking of the unit discharge. The pressure relief device shall be located between the heater thermostat specified in 3.8.3 and the servicing hose specified in 3.8.4.

3.8.6.2 Protective caps. Protective caps shall be provided to prevent moisture and other foreign material from entering the purging unit during storage and transportation. If the servicing line must be removed from the purging unit for convenient storage, caps shall be provided for both ends of the hose. If it will not be necessary to remove the line for storage, one cap to close the servicing end of the line will be sufficient.

3.8.6.2.1 In the event the design of the purging unit is such that moisture and other foreign materials cannot enter the purging unit, a protective cap need not be provided.

3.8.6.3 Air filter. The air intake to the blower shall be protected by an integral removable, permanent-type, washable filter, capable of arresting all particles 40 microns or larger. The filter shall be at least 1 inch thick and shall have a discharge surface area of at least 1 square foot.

3.8.6.4 Overheat control. The purging unit shall be provided with a control that will automatically stop the blower and the heater when the temperature of the air discharged from the unit reaches 400° ±10°F. (See 4.6.7.1)

3.8.7 Cabinet. A sturdy metal cabinet for containing and providing protection for the purging unit components, accessories, controls, and instruments shall be fabricated, as a unitized assembly, on the undercarriage, consisting of the axles, wheels, towbar, et cetera. The cabinet shall be so constructed that it, or applicable sections, can be readily removed from the purging unit to facilitate maintenance on or removal of components.

3.8.7.1 Configuration. The cabinet shall be designed and constructed to protect the items installed within from adverse weather. The top of the cabinet and the tops of all protuberances therefrom shall be shaped and slanted to resist the retention of rain, snow, or sleet, if the retention thereof could result in permanent damage to the unit. Panels designed to open for operating the purging unit shall be given particular attention in this respect so that snow or ice cannot lodge thereon in such a manner as to prevent ready access or actuation.

3.8.7.2 Size. The cabinet shall be of sufficient size to provide access to purging unit components for maintenance and repair. Space shall be provided for storing the servicing line within the cabinet when not in use.

3.8.7.3 Access doors. The cabinet shall include sufficient access doors to provide adequate ventilation during operation and to provide ready access to all components for maintenance or repair while they are installed within the cabinet.

3.8.7.3.1 All access doors shall be equipped with continuous hinges on one edge and shall be provided with latches for holding them securely in the closed position. Means shall be provided for securing them in the open position if such is necessary during operation. Access door latches shall be constructed to permit operation by personnel wearing heavy gloves.

3.9 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-D-1000 shall govern the manufacturer's part numbers and changes thereto.

3.10 Electromagnetic interference. The electrical components that are an integral part of the purging unit shall be designed and assembled using the latest suppression techniques so that the unit in its final configuration meets the conducted and radiated limits of MIL-STD-826.

3.11 Dimensions. The overall dimensions of the purging unit shall not exceed the following when all access openings are closed:

a.	Length	78 inches
b.	Width	54 inches
c.	Height	48 inches

3.12 Weight. The weight of the purging unit shall not exceed 1,500 pounds.

3.13 Finishes and protective coatings.

3.13.1 Surfaces contacting purging air. Metallic surfaces, parts, fittings, et cetera, of the purging unit that will be in contact with the purging air shall be thoroughly cleaned with a nonflammable solvent, such as trichloroethylene, to remove particles, oil, grease, and other foreign material. No other cleaning, priming, or painting with organic materials shall be performed on these surfaces.

3.13.2 Exposed parts and surfaces. All exposed parts and surfaces, except parts and surfaces that contact the purging air, 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.

3.13.2.1 Final film color designation DG (yellow) shall apply to exterior parts and surfaces of the enclosing cabinet.

3.13.2.2 Final film color designation WL (green) shall apply to interior parts and surfaces of the enclosing cabinet.

3.13.2.3 Final film color designation YL (gray) shall apply to control panels, equipment items, and mounting parts installed inside the cabinet.

3.14 Operational marking.

3.14.1 Control marking. All valves, gages, controls, and indicators used in operation of the purging unit shall be identified by securely attached nameplates of such composition that exposure to oil, dirt, light, et cetera, will not cause them to fade or become eradicated. The use of tags will not be acceptable.

3.14.2 Operating instructions. Brief and easily readable operating and precautionary instructions shall be permanently affixed in a readily accessible and protected location. The instructions shall be so located that they can be easily read by the operator under normal operating conditions. The instructions shall be clear, concise, and adequate to enable operation of the purging unit without damage to the equipment or injury to personnel. Instruction panels shall be made from sheet aluminum or sheet zinc of not less than 0.050 inch thickness, anodized or etched to produce raised markings with a black or dark color background, and with a raised border of not less than 1/4 inch.

3.14.3 Electrical wiring diagram. A complete electrical wiring diagram, detailing the electrical systems, shall be permanently affixed in a readily accessible and protected location. The wiring diagram shall be of adequate size for clear readability and shall be made from sheet aluminum or sheet zinc of not less than 0.050 inch thickness, anodized or etched to produce raised markings with a black or dark color background and with a raised border of not less than 1/4 inch.

3.14.3.1 Voltage conversion instructions. Complete and readily understandable directions for converting from one supply voltage to the other shall be either incorporated into the electrical wiring diagram or shown on a separate instruction plate adjacent to it. A separate conversion instruction plate shall be made from sheet aluminum or sheet zinc of not less than 0.050 inch thickness, anodized or etched to produce raised markings with a black or other dark color background and with a border of not less than 1/4 inch.

3.14.4 Lifting instruction plate. An instruction plate containing all information necessary for transportation personnel to rig a safe lifting sling from common cable and spreader bar components and to safely lift the purging unit with a 3g acceleration, shall be securely attached to the outside of the purging unit near the transportation data plate. This lifting instruction plate shall be of the same material and prepared in the same manner as the transportation data plate.

3.14.5 Lubrication points. Each lubrication point shall be identified by a filled-in circle of approximately 2-inch diameter around the lubrication point. The circle shall be painted on the equipment with insignia red enamel conforming to TT-E-489. The color shall be color 509 conforming to Bulletin 166. Lubricant filler caps shall be painted with the same enamel.

3.14.6 Instrument color marking. The indicating scale of each instrument (pressure gage, temperature indicator, et cetera) used for normal operation and control of the purging unit shall be permanently and plainly marked with green and red to show the proper operating and the other-than-proper-operating or danger ranges, respectively.

3.15 Identification of product. Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130.

3.15.1 Nameplate location. The purging unit nameplate shall be securely attached to the outside of the assembly in a visible location near the instrument and control panel.

3.16 Workmanship. The purging unit, including all parts and accessories 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; marking of parts and assemblies; thoroughness of welding, brazing, soldering, painting, wiring, and riveting; alignment of parts; and tightness of assembly screws and bolts, cleaning, et cetera.

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

3.16.2 Locking devices. Where practicable, all screws, pins, bolts, et cetera, shall be equipped with locking devices. Safety wire, self-locking nuts, cotter pins, lockwashers, et cetera, will be acceptable. Lockwashers shall be secured to bolts or screws. Cotter pins shall be fabricated from corrosion-resistant steel or other corrosion-resistant material.

3.16.3 Riveting. Riveting operations shall be performed to insure that the rivets are tight and satisfactorily headed.

3.16.4 Cleaning. The purging unit shall be thorougly cleaned to remove dirt; excess soldering, brazing, and welding flux; welding slag; loose, spattered, or excess solder; metal chips; and other foreign material before, during, and after assembly.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspection set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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

a.	Preproduction testing	See 4.4
b.	Acceptance tests	See 4.5

4.3 Test conditions.

4.3.1 Apparatus. Insofar as practicable, apparatus used in conjunction with the testing, specified herein, shall be of laboratory precision type and shall be calibrated at intervals properly spaced to insure continued laboratory accuracy.

4.3.2 Tools. Special tools and field equipment shall be used to the maximum practicable extent during testing. Use of these tools shall be sufficient to determine their usefulness. Instances where the special tools furnished are inadequate shall be recorded in detail.

4.3.3 Instrumentation.

4.3.3.1 Pressures. Barometric pressures shall be measured by means of a properly calibrated mercurial barometer.

4.3.3.2 Temperatures. Temperatures shall be measured by means of appropriately located thermometers or thermocouples used with suitably calibrated potentiometers. Temperatures shall be expressed in degrees Fahrenheit.

4.3.3.3 Airflow. Airflow for free-air displacement tests shall be measured with standardized nozzles or orifices as specified in ASME Code 19.5:4. The rate of airflow shall be expressed in terms of pounds per minute.

4.3.4 Tolerances.

4.3.4.1 Data on airflow rates shall be accurate to within 2 percent.

4.3.4.2 Data on temperatures shall be accurate to within ±2°F.

4.3.4.3 Data on electrical voltage and amperage shall be accurate to within 1 percent.

4.3.4.4 Dry-bulb and wet-bulb temperatures shall be accurate to within ±2°F.

4.3.5 Inspections, servicings, and adjustments. Inspections, servicings, and adjustments shall be performed as specified by the operating and maintenance instruction handbook, unless such instructions are contrary to those necessary for compliance with the requirements specified herein. Throughout the endurance testing, these inspections, servicings, and adjustments shall be performed during planned stops at 24-hour intervals. Shutdown times shall not exceed 1 hour. Oil may be changed at 120-hour intervals and added as required.

4.3.6 Observations. During the progress of all tests, such characteristics as smoothness of operation, vibrations, ease of control, freedom from leaks, ease of handling, and the operation of auxiliary equipment shall be observed to determine whether the purging unit complies with all requirements specified herein.

4.3.7 Preparation for test. The purging unit shall be prepared for test by assembling, adjusting, and servicing as specified in the operating and maintenance instruction handbook.

4.3.8 Test data.

4.3.8.1 Operational data. Operational data shall be recorded at intervals not to exceed 15 minutes in performance demonstrations and other short duration runs and at intervals not to exceed 30 minutes during the operational periods of the endurance testing. Data recorded shall include the following:

a. Power supply

(1) Voltage
(2) Amperage

b. Purging unit

(1) Unit outlet temperature
(2) Airflow, leaving unit (cubic feet per minute of air and other gases measured under the inlet temperature and pressure conditions)

c. Hours in continuous use (hours)

d. Ambient temperature (degrees F).

4.3.8.2 Pyschrometric data. Wet and dry-bulb temperature readings shall be recorded at intervals not to exceed 4 hours during operation.

4.3.8.3 Barometric pressure. The barometric pressure shall be recorded at intervals not to exceed 4 hours operation.

4.3.9 Test time. Intervals of test time less than 5 hours terminated by a parts failure shall not be credited to the endurance test.

4.3.10 Preliminary run-in. The nature and extent of run-in shall be determined by the manufacturer and shall be performed prior to the testing specified herein. All necessary adjustments, other than normal control adjustments, shall be made during this run-in and shall remain undisturbed thereafter.

4.4 Preproduction testing.

4.4.1 Preproduction test sample. The preproduction test sample shall consist of one purging unit representative of the production equipment. It shall be tested at a site selected by the contractor under the supervision of the procuring activity. (See 6.2)

4.4.1.1 Items to accompany the preproduction sample. When items are submitted for test, they shall be accompanied by the applicable bill of materials and manufacturer's drawings, complete operating instructions, and adequate spare gaskets, locking devices, seals, et cetera, to provide replacements thay may be necessary for the disassemblies and reassemblies required during the testing specified herein.

4.4.2 Preproduction test report. After the preproduction tests are completed, a test report prepared in accordance with MIL-STD-831 shall be supplied to the procuring activity.

4.4.2.1 Reliability and maintainability information. The following information shall be submitted as an attachment accompanying the preproduction test report or shall be included as part of the report:

a. A complete summary of the data resulting from the maintainability verification studies required by 4.6.16.

b. All failures, maintenance, servicing, irregular operations, and other similar events of the testing shall be identified by a brief description of the action and by the accumulated operating hours, cycles, or position in the test procedures, as appropriate. Test conditions, during the failures or irregular operations identified, shall be included.

c. A description of the engineering reasoning behind, and of any tests conducted to determine assignable causes for, all failures and irregular operations identified.

d. A description of the engineering reasoning behind any corrections made, to be made on production items, or proposed to be made, and the predicted effectiveness of these corrections to improve reliability, operability, maintainability, and usefulness.

e. Test activity or contractor comments on features that make unduly difficult or repetitive any maintenance, servicing, or adjustments that were performed or that are anticipated in field use.

f. Test activity or contractor comments on features that, if modified, should improve the usefulness, reliability, or maintainability of the item.

g. Test activity or contractor comments on field conditions or procedures to be avoided or cultivated to increase the reliability, maintainability, and useful life of the item.

h. The man-hours (±5 percent of actual experienced) required for each maintenance or servicing action performed during the tests. A brief description of the qualifications and experience of the personnel involved shall be included and shall be adequate to allow comparison to the personnel anticipated to be assigned for similar fieldwork.

i. Estimates of the man-hours anticipated for other servicing and maintenance actions anticipated in field use. A brief description of the qualifications and skills required to accomplish these servicing and maintenance actions shall be included.

j. References to other documents that have supplied or will supply any of the above information to the procuring activity.

4.4.3 Preproduction tests. The preproduction tests shall consist of all the tests described under 4.6. Failure of the preproduction sample to pass any of these tests shall be cause for rejection.

4.5 Acceptance tests. The acceptance tests shall consist of the following:

a.	Individual tests	See 4.5.1
b.	Sampling plan and test	See 4.5.2

4.5.1 Individual tests. Each purging unit shall be subjected to the following tests as described under 4.6. Failure to pass any of these tests shall be cause for rejection:

a.	Examination of product	See 4.6.1
b.	Mechanical inspection	See 4.6.2
c.	Functional check	See 4.6.3
d.	Operational check	See 4.6.4

4.5.2 Sampling plan and test.

4.5.2.1 Sampling plan. One purging unit shall be selected at random from every fifty or fraction thereof produced and subjected to the test specified in 4.6.6. Failure to pass this test shall be cause for rejection. The requirements of 4.7 will then apply.

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 materials, workmanship, and marking.

4.6.2 Mechanical inspection. A mechanical inspection shall be made of all components of the purging unit. All pertinent data concerning condition, defects of manufacture, damage in transit (if transported prior to test), and damage through use prior to test shall be recorded. This inspection shall include servicing of the purging unit for use.

4.6.3 Functional check. All mechanical parts of the purging unit shall be checked for free and proper functioning.

4.6.4 Operational check. The purging unit shall be subjected to and shall satisfactorily complete the following test before acceptance and shall exhibit no malfunctions, leaks, excessive vibration, or other adverse operational characteristics.

4.6.4.1 Individual proof running. The purging unit shall undergo an operational proof run time of not less than 24 hours. The proof time shall be recorded at intervals not to exceed 15 minutes throughout the operation. The purging unit shall be operated in ambient conditions.

4.6.4.1.1 Upon completion of the operational check, the purging unit shall be inspected and shall exhibit no permanent deformation of any components. Any malfunction or deformation noted during this inspection shall be recorded in detail on test data sheets.

4.6.5 Initial teardown inspection. Prior to further testing, the blower used for testing shall be disassembled and inspected. All wearing parts and all parts subjected to high stresses in operation shall be accurately measured. Ferrous parts shall be subjected to magnetic particles inspection in accordance with MIL-I-6868, and nonmagnetic parts shall be inspected with fluorescent penetrant (black light) in accordance with MIL-I-6866 for comparison with like inspections to be performed after completion of the tests. The blower shall be reassembled and subjected to the remainder of the tests.

4.6.6 Flow rate and ultimate temperature. The purging unit shall be operated at rated speed until the number of pounds of air the unit delivers at ambient conditions has been determined. The airflow rate shall be measured in accordance with 4.3.3.3 with the purging unit discharging air against a backpressure of 5 psig. The value obtained shall be extrapolated to -65°F ambient to determine compliance with the requirements specified in 3.7.1. The outlet temperature shall be determined during this test and shall be as specified in 3.7.2. The duration of this test shall be not less than 2 hours.

4.6.7 Endurance. The purging unit shall be subjected to an endurance test of not less than 1,000 hours of operation with the outlet temperature being maintained at 350° ±10°F and the flow and pressure consistent with the requirements of 3.7.1. The inlet air to the blower shall be checked for hydrocarbon concentration with a hydrocarbon analyzer approved by the procuring activity. The discharge air from the blower shall also be checked

for hydrocarbon content and shall be no more than indicated on the inlet side, when the instruments are operating at maximum sensitivity. This test shall be performed at the beginning of the endurance test and each 250 hours during the test. The endurance test times shall be accumulated by continuous operation at rated speed without shutdown except as specified in 4.3.5. Shutdown times longer than 1 hour shall be recorded in detail on the test data sheets. Any discrepancies in the equipment shall be recorded in detail on the test data sheets.

4.6.7.1 Overheat control. At the beginning and at each 100-hour interval of the endurance test, operation of the overheat control shall be verified. The temperature control thermostat shall be manually overridden and the cutout temperature of the overheat control shall be determined. Failure of the control to operate within the limits specified in 3.8.6.4 shall be considered cause for rejection.

4.6.8 Environmental testing. The purging unit shall be subjected to the following environmental tests conducted in accordance with the specified procedures of MIL-STD-810.

4.6.8.1 Low temperature.

4.6.8.1.1 Low temperature exposure. The purging unit shall be exposed to, but not operated in, an ambient temperature of -80° ±5°F for not less than 48 hours. Upon completion of this exposure, the purging unit shall be inspected for operability, distortion, cracking, differential contraction, embrittlement, and other detrimental effects on nonmetallic materials.

4.6.8.1.2 Low temperature start and operations. Immediately following the test specified in 4.6.8.1.1, the purging unit shall be exposed to an ambient temperature of -65° ±5°F for not less than 24 hours. The purging unit shall then be started in accordance with the manufacturer's instructions and operated under this ambient temperature, for not less than 2 hours. Within 10 minutes after the unit has been started, the outlet temperature shall be recorded and shall be not less than 350° ±10°F. This 350° temperature shall be maintained throughout the remainder of the test and shall not vary more than ±10°F. The outlet temperature and airflow rate shall be recorded at intervals not to exceed 15 minutes throughout this operation and shall be in compliance with the requirements specified in 3.7.1 and 3.7.2. During the 2-hour test, the temperature drop shall be measured from one end to the other end of the servicing hose; and if it exceeds the limit specified in 3.8.4.3, the hose shall be considered to have failed the test.

4.6.8.1.3 Upon completion of the low-temperature tests, the purging unit shall be permitted to reach normal ambient temperature and shall then be examined for damage. The hose shall be dimensionally checked and compared with the data recorded in 4.6.1. The dimensions shall not have increased more than as specified in 3.8.4.1 or the hose shall be considered to have failed the test.

4.6.8.2 High temperature.

4.6.8.2.1 High temperature exposure. The purging unit shall be exposed to high temperature in accordance with method 501.1, procedure I, MIL-STD-810.

4.6.8.2.2 High temperature operation. The purging unit shall be exposed to an ambient temperature of 125° ±5°F for not less than 48 hours. The relative humidity shall be raised to not less than 85 percent during this period. Upon completion of the exposure and while still at the specified temperature and relative humidity, the purging unit upper surface shall be exposed to radiant energy of 100 to 120 watts per square foot for not less than 4 hours. The wave length of the radiant energy shall be as required under the sunshine tests of MIL-STD-810. Upon completion of the 4-hour exposure and while still remaining in the specified ambient conditions and being subjected to the specified radiant energy, the unit shall be started and operated for not less than 2 hours. After the maximum outlet of 350° ±10°F has been reached, it shall be maintained throughout the remainder of the operating time. The outlet temperature and airflow rate shall be recorded at intervals not to exceed 15 minutes throughout this operation.

4.6.8.2.3 Upon completion of the high temperature tests, the purging unit shall be permitted to cool to normal ambient temperature and shall then be examined for damage. The servicing hose shall be dimensionally checked and compared with the data recorded in 4.6.1. The dimensions shall not have increased more than as specified in 3.8.4.1 or the hose shall be considered to have failed the test.

4.6.8.3 Humidity. The purging unit shall be subjected to, but not operated in, humidity in accordance with the procedure specified.

4.6.8.4 Fungus. Components containing fungus nutrient materials shall be exposed to fungus in accordance with the procedure specified.

4.6.8.5 Salt-fog. The purging unit shall be exposed to, but not operated in, salt-fog in accordance with the procedure specified.

4.6.8.6 Rain. The purging unit shall be exposed to, but not operated in, rain in accordance with the procedure specified.

4.6.8.7 Sand and dust. The purging unit shall be exposed to, but not operated in, sand and dust in accordance with the procedure specified.

4.6.9 Bend radius. The servicing hose shall be exposed to an ambient temperature of -65° ±5°F for not less than 24 hours. At the conclusion of this 24-hour period, the hose shall be bent around a 10-inch mandrel until one-half of the mandrel is covered by the hose. The hose shall then be twisted 180 degrees and bent around the mandrel in the same manner. The hose shall then be inspected and shall show no evidence of permanent deformation or damage. The temperature shall be raised to 130° ±5°F and the hose resubjected to the bend test.

4.6.10 Servicing and maintenance. All normal preventive maintenance and servicing operations specified in the operating and maintenance instruction handbook shall be performed to determine their adequacy, ease of accomplishment, and accessibility of parts and assemblies for performance of same. Insofar as practicable, these tests shall be conducted as part of the normal preventive maintenance, servicing, and inspections performed in accomplishing the testing specified herein. Interferences or obstructions to servicing or preventive maintenance shall be recorded in detail on the test data sheets.

4.6.11 Mobility. The purging unit shall be subjected to the general tests of MIL-M-8090 and to those specified for type II mobility items. After each test, the purging unit shall be inspected for misalignment, distortion, and defects and operated to determine that the unit was not adversely affected by the test.

4.6.12 Acceleration loadings. The purging unit shall be secured by the fittings specified in 3.6.9 and subjected to acceleration tests in accordance with MIL-A-8421. Upon completion of the flight and taxiing loads test (3g), the purging unit shall be operated to insure that the unit was not damaged.

4.6.12.1 Hoisting provisions. It shall be demonstrated that the tiedowns will withstand a vertical acceleration of 3g.

4.6.13 Electromagnetic interference. The purging unit shall be tested for conducted and radiated interference in its final configuration, under simulated field conditions, in accordance with MIL-STD-826. The antenna shall be located in the direction of the greatest radiation.

4.6.14 Final teardown inspection. The blower shall be disassembled as specified in 4.6.5 and a critical inspection made of all components to determine their operability and any damage or undue wear encountered during the testing.

4.6.14.1 The measurements recorded as specified in 4.6.5 shall be repeated for comparison with the data recorded prior to testing. Wear or distortion that exceeds the limits established by the manufacturer for new parts shall be cause for considering the affected parts as having failed to satisfactorily pass the tests.

4.6.14.2 Ferrous parts shall be resubjected to magnetic particle inspection (magnaflux) in accordance with MIL-I-6868 and shall exhibit no indications of damage attributable to the tests or they shall be considered as having failed the tests. Grind checks and subsurface indications of laps, seams, or other forging defects noted before the test and have not increased in size shall not be cause for rejection.

4.6.14.3 Nonmagnetic casting, forgings, and other operating parts shall be subjected to inspection with fluorescent penetrant (black light) in accordance with MIL-I-6866, and shall exhibit no cracks or other defects; or they shall be considered to have failed the tests.

4.6.15 Reliability demonstration and test. Satisfactory completion of all tests specified herein demonstrates compliance with the quantitative reliability requirements of this specification.

4.6.16 Maintainability verification. Verification of compliance with the maintainability requirements specified in 3.6.3 shall be accomplished by performing and reporting on the studies specified in MIL-STD-470.

4.7 Rejection and retest. When an item selected from a production run fails to meet the specification, no items still on hand or later produced shall be accepted until the extent and cause of failure have been determined and appropriately corrected. The contractor shall explain to the Government representative the cause of failure and the action taken to preclude recurrence. After correction, all of the tests shall be repeated.

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

4.7.2 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.

4.7.3 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 for shipment and storage shall be in accordance with the requirements of Section 5, or the documents specified therein.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. Preservation and packaging shall be level A or C. (See 6.2)

5.1.1 Level A.

5.1.1.1 Cleaning. Component parts of the purging unit which when in operation could transfer contaminants into oxygen storage tanks shall be cleaned with compound conforming to MIL-C-8638 or equal and be thoroughly dried with hot oil-free air or nitrogen. Immediately after cleaning, the air inlet and outlet shall be sealed as specified in Section 3. Other component parts shall be cleaned and dried in accordance with MIL-P-116.

5.1.1.2 Electrical components. The electric motors, controls and other electrical equipment shall be preserved and packaged in accordance with MIL-E-16298, alternate method.

5.1.1.3 Lubrication and preservative application. All machined bearing surfaces of the purging unit which are normally lubricated for operation shall be lubricated with the operational lubricants. Other unpainted ferrous metal surfaces shall be preserved Method I in accordance with MIL-P-116.

5.1.1.4 Belts. Belts shall be removed and secured to the purging unit with tape or other suitable means. All unpainted parts of pulleys shall be coated with compound conforming to TT-P-664.

5.1.1.5 Trailer. The trailer chassis shall be preserved and packaged in accordance with MIL-STD-281.

5.1.2 Level C. The purging units shall be cleaned, preserved and packaged in a manner which affords adequate protection against corrosion, deterioration and physical damage during shipment from the supply source to the first receiving activity. This level may conform to the supplier's commercial practice provided the latter meets the requirement of this level.

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

5.2.1 Level A. Each purging unit shall be packed in a crate conforming to MIL-C-104, type I, class 2. Plywood shall conform to NN-P-530, grade C-D, and treated with wood preservative, water repellent conforming to TT-W-572.

5.2.2 Level B. Each purging unit shall be packed in a crate conforming to MIL-C-104, type I, class 1. Plywood shall conform to NN-P-530, grade C-D.

5.2.3 Level C. The purging units shall be packed in a manner which affords adequate protection against damage during direct domestic shipment from the supply source to first receiving activity. This level shall conform to applicable carrier rules and regulations and may be the supplier's commercial practice, provided the latter meets the requirement of this level.

5.3 Physical protection. Anchoring, blocking, bracing, and cushioning shall be in accordance with MIL-STD-1186.

5.4 Marking. In addition to any marking specified in the contract or order, interior units and exterior shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The GSU-62/M purging unit is intended primarily for use in purging liquid-oxygen storage and transfer tanks.

6.2 Ordering data. Procurement documents should specify the following:

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

b. Number of preproduction samples and the point of inspection. (See 4.4.1)

c. Selection of applicable levels of preservation, packaging and packing required. (See 5.1 and 5.2)

6.3 Definitions. For the purpose of this specification, the following definitions will apply:

6.3.1 Ambient condition. Ambient conditions are the dry-bulb temperature, wet-bulb temperature, and the relative humidity of the atmospheric air surrounding and in the vicinity of the purging unit, but unaffected by any heat emanating from the unit itself.

6.3.2 Oil-free. Oil-free means an increase of the total hydrocarbon concentration of 1 part per million or less between inlet and discharge air.

6.3.3 Reliability. Reliability is defined as the probability of performing a specified function under given conditions without failure for a specified period of time. Recognizing that, in general, the rate of failure of equipment is fairly constant throughout the life of the equipment, the probability of nonfailure over an operating time interval decreases exponentially as a function of the length of the interval, during which time is a constant failure rate, and can be expressed as follows:

Confidence level: 90 percent

$$\text{MTBF} = \frac{\text{Total test time}}{2.3}$$

$$\text{Reliability} = e^{-x} \text{ where } x = \frac{\text{Mission time}}{\text{MTBF}}$$

The $2.3 = \frac{4.61}{2}$ is based on the constant for the Poisson/Chi squared distribution, assuming an exponential (2° freedom) distribution even though the failure rate for the test time is zero.

6.3.4 Mean-time-between-failures. The mean life or mean-time-between-failures is the arithmetical mean (average) of the operating time between failures.

6.4 Identification of changes. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

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