

INCH-POUND

MIL-P-3230H
8 March 1994
SUPERSEDING
MIL-P-3230G
9 June 1987

MILITARY SPECIFICATION
PUMPING ASSEMBLY, FLAMMABLE LIQUID,
BULK TRANSFER, CENTRIFUGAL, 50 GPM AT 100 FEET TOTAL HEAD,
DIESEL-ENGINE-DRIVEN

1. SCOPE

1.1 Scope. This specification covers a portable, diesel engine-driven, self-priming, flammable liquid, bulk transfer, centrifugal, 50 gallons per minute (gpm) at 100 feet total head pumping assembly. The unit contains a noise enclosure.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

FEDERAL

P-D-680	- Dry Cleaning and Degreasing Solvent.
VV-F-800	- Fuel Oil, Diesel.
WW-C-440	- Clamps, Hose, (Low Pressure).
PPP-B-601	- Boxes, Wood, Cleated-Plywood.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US ARMY BELVOIR RDE CTR, ATTN SATBE TSE, 10101 GRIDLEY RD STE 104, FT BELVOIR VA 22060-5818 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 4320

DISTRIBUTION STATEMENT A. Approved for public release, distribution is unlimited.

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MILITARY

- MIL-P-116 - Preservation, Methods of.
- MIL-H-370 - Hoses and Hose Assemblies, Rubber, Liquid Fuel, Non-Collapsible.
- MIL-P-514 - Plates, Identification, Instruction and Marking, Blank.
- MIL-T-704 - Treatment and Painting of Materiel.
- MIL-L-2104 - Oil, Lubricating, Internal Combustion Engine.
- MIL-T-5624 - Turbine Fuel, Aviation, Grades JP-4 and JP-5.
- MIL-S-7916 - Sealing Compound, Thread and Gasket, Fuel, Oil, and Water Resistant.
- MIL-E-10062 - Engines; Preparation for Shipment and Storage of.
- MIL-G-10924 - Grease, Automotive and Artillery.
- MIL-H-11588 - Hose Assemblies, Rubber, Synthetic, Liquid Petroleum Fuels, Dispensing Collapsible.
- MIL-P-14105 - Paint, Heat Resisting (for Steel Surfaces).
- DOD-G-24508 - Grease, High Performance, Multi-purpose (Metric).
- MIL-C-46168 - Coating, Aliphatic, Polyurethane, Chemical Agent Resistant.
- MIL-C-53039 - Coating, Aliphatic, Polyurethane, Single Component, Chemical Agent Resistant.
- MIL-T-81533 - 1-1-1, Trichloroethane (Methyl Chloroform) Inhibited, Vapor Degreasing.
- MIL-T-83133 - Turbine Fuel, Aviation, Kerosene Type, Grade JP-8.

STANDARDS

FEDERAL

- FED-STD-H28 - Screw-Thread Standards for Federal Service.
- FED-STD-595 - Colors used in Government Procurement.

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- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-130 - Identification Marking of US Military Property.
- MIL-STD-810 - Environmental Test Methods.
- MIL-STD-1472 - Human Engineering Design Criteria for Military Systems, Equipment and Facilities.
- MIL-STD-1474 - Noise Limits for Military Materiel.

(Unless otherwise indicated, copies of federal and military specifications and standards are available from the STDZN DCMNT ORDER DESK, BLDG 4D, 700 ROBBINS AVE, PHILADELPHIA PA 19111-5094.)

2.1.2 Government drawings. The following drawing forms a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

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DRAWINGS

TA13229E9445 - Pumping Assembly, Flammable Liquid, Bulk Transfer, Centrifugal, 50 GPM-100 Ft Total Head, Diesel-Engine-Driven.

(Copies of drawings required by contractors in connection with specific acquisition functions should be obtained from USA BELVOIR RDE CTR, ATTN SATBE-FSH, 10101 GRIDLEY RD, STE 104, FT BELVOIR VA 22060-5818.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A 666 - Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar.
D 3951 - Standard Practice for Commercial Packaging.
D 3953 - Strapping, Flat Steel, and Seals.

(Application for copies should be addressed to: AMERCN SCTY & MTRLs, 1916 RACE STRET, PHILADELPHIA PA 19103.)

HYDRAULIC INSTITUTE

Rating Standards and Test Code Standards.

(Application for copies should be addressed to: HYDRIC INST, 14600 DETROIT AVE, 712 LAKEWOOD CTR N, CLEVELAND OH 44107.)

SOCIETY OF AUTOMOTIVE ENGINEERS, INC (SAE)

J429 - Mechanical and Material Requirements for External Threaded Fasteners.

(Application for copies should be addressed to: SCTY OF AUTOMTV ENGRS, INC, 400 CMNWLTH DR, WARRENDALE PA 15096.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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3. REQUIREMENTS

3.1 Description. The pumping assembly shall consist of a diesel engine driven centrifugal self-priming pump with one 1-1/2 inch discharge port and one 1-1/2 inch suction port and all the necessary accessories, connections and storage boxes in accordance with TA13229E9445 and as specified herein. The pumping assembly accessories and connections shall be contained in two aluminum storage boxes. The pump-engine assembly shall be contained in a permanent noise enclosure. When full, neither of the accessory boxes shall weigh more than 147 pounds. The pump-engine assembly with noise enclosure shall weigh 147 pounds or less. The pump-engine assembly with noise enclosure shall hereinafter be called pump assembly.

3.1.1 Drawings. The drawings forming a part of this specification are end product drawings. No deviation from the prescribed dimensions or tolerances is permissible without prior approval of the contracting officer. Where tolerances could cumulatively result in incorrect fits, the contractor shall provide tolerances within those prescribed on the drawings to insure correct fit, assembly, and operation of the pumping assemblies. Any data (e.g., shop drawings, layouts, flow sheets, processing procedures, etc.) prepared by the contractor or obtained from a vendor to support fabrication and manufacture of the production item shall be made available, upon request, for inspection by the contracting officer or designated representative.

3.2 First article. Unless otherwise specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.3.

3.3 Material. Material shall be as specified on the applicable drawings.

3.3.1 Recovered materials. For the purpose of this requirement, recovered materials are those materials which have been collected from solid waste and reprocessed to become a source of raw materials, as distinguished from virgin raw materials. The components, pieces and parts incorporated in the pumping assembly practicable, provided the pumping assembly produced meets all other requirements of this specification. Used, rebuilt or remanufactured components, pieces and parts shall not be incorporated in the pumping assembly.

3.3.2 Cadmium plating. Except for grade 5B and grade 8B bolts, cadmium plating shall not be used.

3.4 Threads. Threads shall be in accordance with FED-STD-H28. Threads on all screw fittings shall be coated with sealing compound conforming to MIL-S-7916. When cleaning threads per MIL-S-7916, use dry cleaning solvent P-D-680, type III, in lieu of MIL-T-81533.

3.5 Environmental conditions.

3.5.1 Operating temperature. The pumping assembly shall perform as specified in any ambient temperature from + 125 to -25 °F (+52 to -32 °C).

3.5.2 Storage temperature. The pumping assembly shall not be damaged in any ambient temperature from + 160 to -65 °F (+71 to -54 °C).

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3.5.3 Vibration. The pumping assembly shall be capable of withstanding vibration stresses without permanent damage, deformation, or performance degradation when tested as specified in 4.5.2.5.

3.5.4 Shock. The pump assembly in its transit condition and prepared for field use, shall be capable of withstanding the shocks normally induced by loading and unloading when tested as specified in 4.5.2.6.

3.6 Safety. The pumping assembly shall incorporate the system safety requirements. These requirements shall be applicable to, but not be limited to, all belts, guards, pulleys, shafts, flywheels, and other moving parts. Such parts shall be guarded when such parts are exposed to contact by personnel or otherwise create a hazard. All hot surfaces, including exhaust pipes, exposed to contact by personnel, or which create a fire hazard, shall be fully guarded or insulated. The fuel tank shall be located in a manner which will not allow spills or overflows to run on the engine exhaust pipes, or electrical equipment. All points requiring lubrication during operation shall have fittings located or guarded so as to be accessible without hazardous exposure to personnel performing these operations. Live parts or wiring and electrical equipment shall be guarded to protect all persons and objects from electrical shock hazard. Non-current carrying metal parts shall be grounded. Exhaust gases shall be directed away from the area used by the operator during starting and stopping the engine.

3.7 Human engineering. Any changes to the pumping assembly shall comply with the design criteria of MIL-STD-1472. Special design emphasis shall be given to MIL-STD-1472, 4 (General Requirements), 5.1 (Control/Display Integration), 5.2 (Visual Displays), 5.4 (Controls), 5.5 (Labeling), 5.9 (Design for Maintainer), and 5.13 (Hazards and Safety), as applicable.

3.8 Noise limits. The noise level at the operator's position and occasionally occupied positions shall not exceed Category D of MIL-STD-1474. The operator's position shall be defined to be 18 inches from the control panel. Occasionally occupied areas of the pumping assembly shall be defined to be anywhere within 1 meter from the perimeter of the pumping assembly at locations other than the operator's position. Noise hazard caution signs shall be provided in accordance with MIL-STD-1474, 4.2, when applicable (see 6.6).

3.8.1 Noise enclosure. The pump-engine assembly shall be contained in a permanent noise enclosure as specified by the applicable drawings and as stated herein. All components of the assembly used by the operator shall be easily accessible without removal of the enclosure and without the use of tools of any kind. Accessible components shall include the starting system, the throttle control assembly, the fuel fill port, the pump case drain port, the pump priming port, the suction and discharge connections, the air cleaner, and the engine oil dipstick. The throttle control assembly shall be accessible without causing the pump assembly to exceed the required noise level while operating at full load. The noise-enclosure shall be removable to allow for required field maintenance and shall include external provisions for carrying the pump assembly. Quick release latches and appropriate handles for ease of removal shall be used. If noise reducing insulation is used within the enclosure, it shall be non-combustible and shall not absorb fuel and oil. All exposed surfaces of the insulation shall be protected by a perforated metal covering.

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3.9 Reliability. The specified Mean-Time-Between-Failure (MTBF) shall be 140 hours when the pumping assembly is tested as specified in 4.5.2.10.

3.10 Maintenance ratio. The pumping assembly shall have a maintenance ratio of not more than 0.06. Maintenance ratio is defined as the ratio of the total active maintenance man-hours required (scheduled and unscheduled) to the total operating time. Man-hours for repair of replaced components and scheduled before-and-after operation checks are excluded. A maintenance schedule shall be furnished prior to the start of any testing.

3.11 Pump. The pump shall be as specified on the drawings. The pump shall conform to the performance requirements specified in 3.15 and shall have the following characteristics:

- a. Intake opening: 2-inch national pipe thread (NPT) female (at top of pump housing), furnished with 2-inch by 1-1/2 inch NPT brass bushing.
- b. Discharge opening: 2-inch NPT female (at top of pump housing), furnished with 2-inch by 1-1/2 inch NPT brass bushing.
- c. Pump inlet shall not include nor require a suction check valve to retain to priming liquid.
- d. Clean out and drain plug.

3.12 Hose assemblies.

3.12.1 Hose, suction. Suction hose shall conform to MIL-H-370, type II. The hose size and fittings shall be as specified on the applicable drawings.

3.12.2 Hose, discharge. Discharge hose shall conform to MIL-H-11588, type III except the hose clamps shall conform to WW-C-440, type H, and shall be fabricated from corrosion resistant steel conforming to ASTM A 666, class 316, 1/4 hard. Two clamps shall be used for each fitting. The hose size and fittings shall be as specified on the applicable drawings.

3.12.3 Attachment of coupling halves to hoses. The ends of all wires within the suction and discharge hoses shall be securely bonded to the coupling half with not less than 0.5 inch of each wire in contact with the coupling half. There shall be no break in electrical continuity when tested as specified in 4.5.2.12. All suction and discharge hose lines shall have each coupling attached securely by a minimum of two hose clamps.

3.12.4 Couplings. The couplings shall be as specified on the applicable drawings.

3.13 Performance.

3.13.1 Pumping assembly capacity. The pumping assembly shall be capable of delivering liquid hydrocarbon fuels having a specific gravity of 0.75 at a rate of not less than 50 gpm against a total dynamic head of 100 feet.

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3.13.2 Pump priming. The pump shall prime itself automatically after initial filling of the case and deliver not less than the rated flow of 50 gpm in not more than 2 minutes, when operating at a static suction lift equivalent to 10 feet at sea level and atmospheric conditions of 29.92 inches of mercury and using water with a specific weight of 62.3 pounds per cubic foot at +68 °F (+20 °C).

3.14 Hydrostatic pressure. The pump shall be capable of withstanding a hydrostatic pressure of 80 pounds per square inch (psi) without leakage, rupture, or distortion.

3.15 Diesel engine. The diesel engine shall be as specified on the applicable drawings. All engine accessories shall be furnished by or approved by the engine manufacturer for this application. The engine shall be capable of operation at rated capacity using fuel meeting the requirements of VV-F-800 (grades DFA, DF-1, DF-2), MIL-T-5624 (grade JP-5) and MIL-T-83133 (grade JP-8).

3.15.1 Fuel system. A fuel tank shall be furnished. The capacity of the tank shall be sufficient for not less than 2.5 hours of continuous operation at the rated load. The tank shall be provided with a hand-operated fuel shutoff valve attached directly to the tank and a sight tube fuel gage mounted on the tank. The shutoff valve shall be provided with a double ended arrow showing direction of valve operation which is labeled at each end to indicate the functional result (i.e., on, off, etc.). The fuel tank outlet shall be not less than 0.50 inch above the bottom of the tank. The fuel line shall be 0.3125 inch outside diameter (od) and shall be provided with a 3-way selector valve and a 0.50 inch 20-20 SAE flared fitting for connection to an auxiliary fuel supply. A corrosion-resisting circular metal face-plate shall be mounted on the fuel selector valve and shall be marked "OFF" "UNIT TANK" and "AUXILIARY".

3.15.2 Manual engine controls. Manual engine controls shall include as a minimum a fuel priming lever, manual shutdown, and manual throttle. The controls shall be clearly and permanently labeled according to function and operation.

3.15.3 Spark arrestor. The engine shall be furnished with a spark arresting muffler.

3.16 Lubricants. The lubricants for the engine crankcase shall be as specified by the engine manufacturer. All other lubricants shall be as follows:

Lubricating Oil:	MIL-L-2104
Grease:	MIL-G-10924 and DOD-G-24508

3.17 Identification marking. The pumping assembly shall be identified in accordance with MIL-STD-130. The marking shall be applied to the pumping assembly on plates conforming to MIL-P-514, type I, style I, composition C, of type I, grade A, class 1 material. The plates shall be attached by screws, bolts, or rivets and centrally located on top of the accessory boxes and on top of the noise enclosure in a location that does not interfere with accessibility or any operator functions.

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3.18 Cleaning, treatment, and painting. Cleaning, treatment, and painting of the entire pumping assembly shall be in accordance with MIL-T-704, type F or G, and as stated herein.

- a. All external surfaces of the pumping assembly (except those that reach a temperature of 400 °F), regardless of the material selected, shall have a finish coat of CARC paint in accordance with MIL-C-46168 or MIL-C-53039. All marking and caution lettering shall be flat black. Any external surface that reaches a temperature of 400 °F during operation shall be finish coated with paint conforming to MIL-P-14105. Unless otherwise specified (see 6.2), color shall approximate tan 686A, color chip No. 33446 in accordance with FED-STD-595.
- b. All other surfaces of the pumping assembly, to include those within the noise enclosure and those behind insulation material, shall be treated and painted using manufacturers commercial practices. The engine, pump, internal components, hardware, fasteners and fittings may be finished with the manufacturer's standard commercial paint and color, plating or treatment.
- c. MIL-T-704 permits, as an option, the use of ozone depleting substances. The contractor shall use the non-ODS choices in the performance of this specification.

3.19 Workmanship.

3.19.1 Castings and forging. All parts, components, and assemblies of the pumping assembly that include castings and forging shall be clean of harmful extraneous material such as sand, dirt, pits, sprues, seals and flux. Rework shall be limited to procedures that do not reduce strength or affect function.

3.19.2 Metal fabrication. Metal used in fabrication shall be free from kinks and sharp bends. The straightening of material shall be done by methods that will not cause damage to the material. Corners shall be square and true. Flame cutting, using tips suitable for the thickness of the steel, may be employed instead of shearing and sawing. All bends shall be made with controlled means to insure uniformity of size and shape. Precaution shall be taken to avoid overheating. Heated steel shall be allowed to cool slowly. External surfaces shall be free of burrs, sharp edges, and corners, except when sharp edges or corners are required or where they are not detrimental to safety.

3.19.3 Welding. The surfaces of parts to be welded shall be free from rust, scale, paint, grease, mill scale that can be removed by chipping and wire brushing, and other foreign matter. Parent materials, weld filler metals, and fabrication techniques shall be required to enable the pumping assembly to conform to the examination and test requirements specified in section 4. Parts to be joined by fillet welds shall be brought into as close contact as possible and in no event shall be separated by more than 0.188 inch unless appropriate bridging techniques are used.

3.19.4 Bolted connections. Bolt holes shall be accurately formed and shall have the burrs removed. Washers and lockwashers shall be provided where necessary. Matching thread areas securing bolts conforming to SAE J429 or capscrews, shall be of sufficient strength to withstand the tensile strength of the bolt. All fasteners shall be correctly torqued and shall have full thread engagement. Bolts shall protrude not more than two full threads.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, and disapproved by the Government, the contractor's own or any other facilities suitable for the performance of the inspection requirements specified herein, may be used. 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.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall be come 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.

4.1.2 Component and material inspection. The contractor is responsible for insuring that components and materials used are manufactured, examined, and tested in accordance with referenced specifications and standards, as applicable.

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

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).
- c. Inspection of packaging (see 4.6).

4.3 First article inspection.

4.3.1 Examination. The first article pumping assembly shall be examined as specified in 4.5.1. Presence of one or more defect shall be cause for rejection.

4.3.2 Test. The first article pumping assembly shall be subjected to the test marked "X" in column 1 of table I. Failure of any test shall be cause for rejection.

4.4 Quality conformance inspection.

4.4.1 Examination. Each pumping assembly shall be examined for the defects specified in 4.5.1. Failure of any inspection shall be cause for rejection.

4.4.2 Tests. Each pumping assembly and component shall be subjected to the tests marked "X" in column 2 of table I. Failure of any test shall be cause for rejection.

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4.5 Inspection procedure.

4.5.1 Examination. The pumping assembly shall be examined as specified herein for the following defects:

101. Any component not in accordance with the requirements on the drawing.
102. Components missing or not as specified.
103. Parts or components do not function.
104. Any dimension not as specified.
105. Materials not as specified (see 3.3).
106. Used, rebuilt or remanufactured components, pieces, or parts incorporated in the pumping assembly (see 3.3.1).
107. Use of cadmium plating except for grade 5B and grade 8B bolts (see 3.3.2).
108. Threads not as specified (see 3.4).
109. Safety requirements not as specified (see 3.6).
110. Noise enclosure not as specified (see 3.8.1).
111. Pump not as specified (see 3.11).
112. Hose not as specified (see 3.12).
113. Attachment of coupling halves to hoses not as specified (see 3.12.3).
114. Couplings not as specified (see 3.12.4).
115. Engine not as specified (see 3.15).
116. Fuel system not as specified (see 3.15.1).
117. Manual engine controls not as specified (see 3.15.2).
118. Spark arrestor not as specified (see 3.15.3).
119. Lubricants not as specified (see 3.16).
120. Identification marking missing, incomplete or illegible (see 3.17).
121. Treatment and painting not as specified (see 3.18).
122. Color not as specified (see 3.18).
123. Castings and forging not as specified (see 3.19.1).
124. Metal fabrication not as specified (see 3.19.2).
125. Welding not as specified (see 3.19.3).
126. Bolted connections not as specified (see 3.19.4).

4.5.2 Tests.

4.5.2.1 Test conditions. Unless otherwise specified in a test, tests shall be performed in accordance with the applicable provisions of the test code for centrifugal pumps of the standards of the Hydraulic Institute. All performance data shall be corrected to standard sea level conditions of barometric pressure of 29.92 inches of mercury and liquid fuel at +60 °F (+16 °C) having a specific gravity of 0.75 and vapor pressure of 4.0 psi. Water at a temperature of between +60 and 80 °F (+60 and 27 °C), may be used as the test fluid.

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4.5.2.2 Test schedule.TABLE I. Test schedule.

First Article	Quality Conformance	Test	Test Paragraph	Rqmt Paragraph
1	2	3	4	5
X	-	High temperature	4.5.2.3	3.5
X	-	Low Temperature	4.5.2.4	3.5
X	-	Vibration	4.5.2.5	3.5.3
X	-	Shock	4.5.2.6	3.5.4
X	-	Safety	4.5.2.7	3.6
X	-	Human factors	4.5.2.8	3.7
X	-	Noise level measurements	4.5.2.9	3.8
X	-	Reliability	4.5.2.10	3.9
X	-	Maintenance ratio	4.5.2.11	3.10
X	X	Continuity performance	4.5.2.12	3.12.3
X	-	Pumping assembly	4.5.2.13.1	3.13
X	-	Priming	4.5.2.13.2	3.13
X	X	Hydrostatic pressure	4.5.2.14	3.14

4.5.2.3 High temperature. The pumping assembly shall be tested as specified in MIL-STD-810, method 501, procedures I and II. The maximum ambient storage temperature shall be +160 °F (+70 °C), and the maximum operating temperature shall be +125 °F (+52 °C). The storage period of procedure I shall be 24 hours. After temperature stabilization at 125 °F and using constant temperature exposure, the operating period of procedure II shall be 3 hours. The pump assembly shall be operated at rated capacity. Nonconformance to 3.5 shall constitute failure of this test.

4.5.2.4 Low temperature. The pumping assembly shall be tested as specified in MIL-STD-810, method 502, procedures I and II. The minimum ambient storage temperature shall be -65 °F (-54 °C), and the minimum ambient operating temperature shall be -25 °F (-32 °C). The storage period of procedure I shall be 24 hours. After temperature stabilization at -25 °F and using constant temperature exposure, the operating period of procedure II shall be 3 hours. The pump assembly shall be operated at rated capacity. Nonconformance to 3.5 shall constitute failure of this test.

4.5.2.5 Vibration. The pump assembly, unpackaged, and the accessory boxes containing all the accessories, shall be subjected to the tests specified in MIL-STD-810, method 514, procedure III, equipment category 3. Any breakage, permanent deformation, or other damage to the pump assembly or accessory boxes, or failure of the pump assembly to operate as specified shall constitute failure of this test.

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4.5.2.6 Shock. The pump assembly shall be subjected to the tests specified in MIL-STD-810, method 516, procedure IV. The pump assembly shall be dropped on the bottom corners only for a total of four drops. Any breakage, permanent deformation, or other damage to the pump assembly or failure of the pump assembly to operate as specified shall constitute failure of this test.

4.5.2.7 Safety. The pumping assembly shall be evaluated throughout the testing as specified in 4.5.2. Nonconformance to 3.6 shall constitute failure of this test.

4.5.2.8 Human factors. The human factors engineering requirements shall be evaluated during testing. Nonconformance to 3.7 shall constitute failure of this test.

4.5.2.9 Noise level test. Noise levels shall be measured in accordance with MIL-STD-1474 requirements and reported in the format indicated by MIL-STD-1474, figure 11. As a minimum, noise levels shall be measured when the equipment is operating under full load. Noise levels shall be measured at not fewer than 12 equal (horizontal) arc increments for the occasionally occupied positions. Additionally, the noise level at the typical operating position (see 3.8) shall be provided as dB(A) level. Failure to comply with 3.8 provisions shall constitute failure of this test.

4.5.2.10 Reliability. The first article pump assembly shall be operated at its rated capacity under the standard conditions specified in 4.5.2.1. The pump assembly shall be continuously operated for 9 hours out of every 24 hours. Normal maintenance shall be performed in accordance with the manufacturer's operation and maintenance schedule. A failure is defined as any malfunction which:

- a. Cannot be corrected within 30 minutes by adjustment, repair or replacement using only the maintenance tools and repair parts furnished with the equipment; or
- b. May cause failure to commence operation, cessation of operation, or degradation of performance below specified level; or
- c. May damage pump assembly by continued operation; or
- d. May cause a safety hazard to operating personnel.

The total test time is total unit hours of pump "on" time and is expressed in multiples of specified MTBF (see 3.9). The test shall continue for a sufficient length of time to reach a decision to "accept" or "reject" in accordance with figure 1. Nonconformance to 3.9 shall constitute failure of this test.

4.5.2.11 Maintenance ratio. The maintenance ratio shall be computed during first article testing. Nonconformance to 3.10 shall constitute failure of this test.

4.5.2.12 Continuity. The complete pump assembly, with hoses and fittings, shall be subjected to a continuity test by using an ohmmeter to determine compliance with 3.12.3. Touch the two leads from the ohmmeter together and adjust the meter to read "0" using the R x 1 scale. Then touch one lead from the ohmmeter to the nozzle on one end of the discharge side of the system and

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simultaneously touch the other lead from the ohmmeter to the fitting on the suction side of the system. The meter reading at this point shall be "0" indicating complete continuity. A reading of other than "0" shall constitute failure of this test.

4.5.2.13 Performance.

4.5.2.13.1 Pumping assembly (operational). Assemble the pump to the engine and operate the pumping assembly at the designated operating speed and at a static suction lift equivalent to 10 feet. Test the pumping assembly for the requirements specified in 3.13 in accordance with the Rating Standards and Test Code Standards for centrifugal pumps of the Hydraulic Institute. Data relative to head and capacity of the pump and speed (rpm) of the engine shall be measured and recorded at a minimum of six points on the pump performance curve. The measured points shall include the rating points (see 3.13), wide-open discharge, and shutoff. The pump assembly shall run for a minimum of 5 minutes at each measured point. Delivery of less than the capacities specified in 3.13 or failure of the engine to meet any of the operational requirements or conditions specified in 3.13 shall constitute failure of this test.

4.5.2.13.2 Priming. Fill the pump case with either liquid petroleum fuel or a suitable solvent having a specific gravity of 0.75 and conduct the priming test with a static suction lift equivalent to 10 feet of water using a 1-1/2 inch suction hose at standard atmospheric conditions. This test may be performed with either water, gasoline of 0.75 specific gravity, or a solvent of 0.75 specific gravity. Inability of the pump to prime and deliver full capacity in 2 minutes shall constitute failure of this test.

4.5.2.14 Hydrostatic pressure. The pump shall be subjected to a hydrostatic pressure of 80 psi for a period of not less than 5 minutes. Nonconformance to 3.14 shall constitute failure of this test.

4.6 Inspection of packaging.

4.6.1 Quality conformance inspection of pack.

4.6.1.1 Unit of product. For the purpose of inspection, a completed pack prepared for shipment shall be considered a unit of product.

4.6.1.2 Sampling. Sample size shall be determined by using MIL-STD-105, tables I and IIa. A lot shall be accepted when zero defects are found and rejected when one or more defects are found.

4.6.1.3 Examination. Samples selected in accordance with 4.6.1.2 shall be examined for the following defects:

127. Unpainted exterior metal surfaces of components requiring preservation not coated with preservative as specified for level A.
128. Pump not drained and openings not sealed as specified for level A.
129. Engine and engine accessories not preserved in accordance with the referenced document for level A or commercial.
130. Packing not as specified for level A or level B.
131. Strapping not as specified for level A.
132. Marking missing, illegible, incorrect, or incomplete.

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5. PACKAGING

5.1 Preservation. Preservation shall be level A or commercial as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Unprotected surfaces. Unpainted exterior metal surfaces of the components requiring the application of a contact preservation in accordance with MIL-P-116 shall be coated with type P-1 preservative. The preservative shall conform to the applicable specification listed in, and shall be applied in accordance with MIL-P-116, however, any preservative selected shall not be an ozone depleting substance (ODS).

5.1.1.2 Pump. The pump shall be completely drained and dried. Interior surfaces of the pump and connecting piping shall then be coated with preservative. The suction and discharge openings shall then be sealed.

5.1.1.3 Engine. The engine and engine accessories shall be preserved in accordance with the level A requirements of MIL-E-10062, type II, method 1.

5.1.1.4 Technical publications. Technical publications shall be preserved in accordance with MIL-P-116, method IC-1 or IC-3.

5.1.2 Commercial.

5.1.2.1 Engine. The engine and engine accessories shall be preserved in accordance with the level C alternate requirements of MIL-E-10062.

5.1.2.2 Other components. All other components shall be preserved in accordance with ASTM D 3951.

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

5.2.1 Level A. Each complete pumping assembly preserved as specified in 5.1, shall be packed in a close-fitting box conforming to PPP-B-601, overseas type, style A, with and unnailed type closure. Box closure and strapping shall be in accordance with the appendix to the box specification. Strapping shall conform to ASTM D 3953, type 1, finish B, size as applicable.

5.2.2 Level B. Each complete pumping assembly preserved as specified in 5.1 shall be packed as specified in 5.2.1 for level A, except the box shall be domestic type. Box closure and strapping shall be in accordance with the appendix to the box specification.

5.2.3 Commercial. Each complete pumping assembly, preserved as specified in 5.1.2, shall be packed in accordance with ASTM D 3951.

5.3 Marking. Marking shall be in accordance with MIL-STD-129 for military levels of protection. Commercial marking shall be in accordance with ASTM D 3951.

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6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The pumping assembly covered by this specification is intended for use in transferring liquid petroleum to and from bulk storage facilities and dispensing in 5-gallon cans, vehicles, and aircraft.

6.2 Acquisition requirements. Acquisition documents shall specify the following:

- a. Title, number, and date of this publication.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- c. When a first article pumping assembly is not required and time frame for submission of first article (see 3.2).
- d. Color when other than as specified (see 3.18).
- e. Degree of preservation and packing required (see 5.1 and 5.2).

6.3 First article. When a first article inspection is required, the item should be a preproduction model. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of the first article test results and disposition of the first articles. Invitation for bids should provide that the Government 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, and that 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. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

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

6.5 Subject term (key word) listing.

Fuel distribution, portable, 50 GPM
 Pump, centrifugal, self-priming
 Pump, diesel engine driven

6.6 Noise limits. Where the limit of Category D can be documented as being clearly beyond the state-of-the-art, per MIL-STD-1474, 5.1.1.2, selection of another noise limit should be considered by the procuring activity, as described in MIL-STD-1474, acceptance requirements (5.1.1.3). Particular attention should

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be given to 5.1.1.2.2.d. When permission is granted to exceed the limits of Category D, the procuring activity should ensure that operator and maintenance manuals are prepared in accordance with MIL-STD-1474, manuals requirement (4.3).

Custodians:

Army - ME

Air Force - 99

Preparing activity:

Army - ME

Project 4320-0355

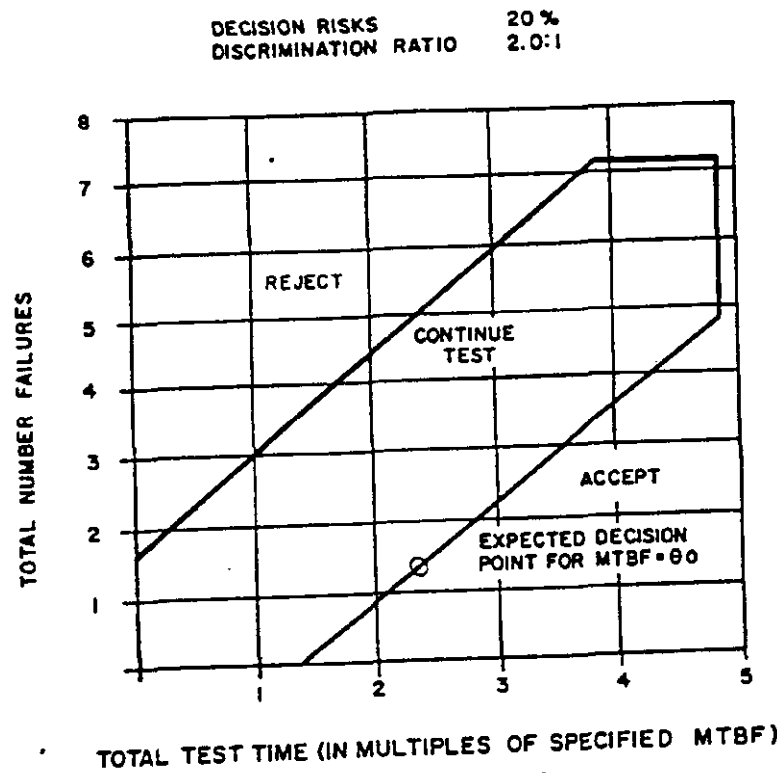
Review activities:

Army - MD

Navy - MC

Air Force - 84

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NO. OF FAILURES	TOTAL TEST TIME *	
	REJECT (EQUAL OR LESS)	ACCEPT EQUAL OR MORE
0	N/A	1.40
1	N/A	2.09
2	.35	2.79
3	1.04	3.48
4	1.73	4.17
5	2.43	4.87
6	3.12	4.87
7	3.81	4.87
8	4.87	N/A

* TOTAL TEST TIME IS TOTAL UNIT HOURS OF "EQUIPMENT ON" TIME AND IS EXPRESSED IN MULTIPLES OF THE SPECIFIED MTBF.

FIGURE 1. Accept-reject criteria.

X-3499

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

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

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

RECOMMEND A CHANGE:	1. DOCUMENT NUMBER TT-E-489J	2. DOCUMENT DATE (YYMMDD) 940307
3. DOCUMENT TITLE ENAMEL, ALKYD, GLOSS, LOW VOC CONTENT		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (if applicable) (2) DSN	7. DATE SUBMITTED
8. PREPARING ACTIVITY		
a. NAME Carolyn B. Johnson	b. TELEPHONE (Include Area Code) (1) Commercial (703) 704-3468 (2) DSN 654-3468	
c. ADDRESS (Include Zip Code) US ARMY BELVOIR RDE CTR ATTN SATBE TSE 10101 GRIDLEY RD STE 104 FT BELVOIR VA 22060-5818	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: DEFNS QLTY & STDZN OFC 5203 LEESBURG PIKE STE 1403 FLS CHURCH VA 22041-3466 Telephone (703) 756-2340 DSN 289-2340	