

MIL-P-29238(YD)
25 March 1985

MILITARY SPECIFICATION

PUMP UNIT, WATER CIRCULATION, ELECTRIC MOTOR DRIVEN SKID BASED MOUNTED

This specification is approved for use by the Naval Facilities Engineering Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers an electric motor driven, skid base mounted water circulation pump unit complete with tank, automatic controls, and provisions for outgoing electrical power connections. The pump unit shall be capable of providing not less than 765 gallons of water per hour at 5 feet suction lift and 50 pound-force per square inch gage (psig) discharge pressure.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

SPECIFICATIONS

MILITARY

- MIL-V-173 - Varnish, Moisture- and-Fungus-Resistant (for Treatment of Communications, Electronic, and Associated Equipment).
- MIL-T-704 - Treatment and Painting of Material.
- MIL-P-10603 - Pumps and Pumping Units, Centrifugal, Power-Driven For Water, Packaging of.
- MIL-C-22992 - Connector, Plugs and Receptacles, Electrical, Waterproof, Quick Disconnect, Heavy Duty Type.
- MIL-C-27487 - Coupling Halves, Quick-Disconnect, Cam-Locking Type.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer (Code 156), Naval Construction Battalion Center, Port Hueneme, CA 93043, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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STANDARDS

FEDERAL

- FED-STD-H28 - Screw-Thread Standards for Federal Services.
- FED-STD-595 - Color.

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- MIL-STD-209 - Slings Eyes and Attachments for Lifting and Tying Down Military Equipment.
- MIL-STD-461 - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.
- MIL-STD-462 - Electromagnetic Interference Characteristics, Measurement of.
- MIL-STD-889 - Dissimilar Metals.

(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting 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 a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- E380 - Metric Practice.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

- ICS 1 - General Standards for Industrial Controls and Systems.
- ICS 2 - Industrial Control Devices, Controllers and Assemblies.
- ICS 6 - Enclosures for Industrial Controls and Systems.
- MG 1 - Motors and Generators.

(Application for copies should be addressed to the National Electrical Manufacturers Association, 2101 L Street, N.W., Washington, DC 20037.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- No. 70 - National Electrical Code.

(Application for copies should be addressed to the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.)

HYDRAULIC INSTITUTE (HI)**Standards of Hydraulic Institute.**

(Application for copies should be addressed to the Hydraulic Institute, 712 Lakewood Center, North Cleveland, OH 44107.)

UNDERWRITERS LABORATORIES INC. (UL)

- UL 67 - Panelboards.
- UL 489 - Molded-Case Circuit Breakers and Circuit Breaker Enclosures.
- UL 1081 - Swimming Pool Pumps, Filters and Chlorinators.

(Application for copies should be addressed to the Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.)

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

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Description. The pump unit shall be provided with all commercial type equipment consisting essentially of a close-coupled jet pump, a diaphragm tank, an electric motor, automatic controls, an electrical panelboard, an aluminum enclosure, and with provisions for outgoing electrical power connectors. The equipment layout shall be arranged for the convenience of operation similar to that shown on figure 1 and figure 2, mounted on a 2-foot 6-inch by 3-foot 10-inch skid base. The pump unit shall be furnished complete with all interconnections made and shall be ready for operation when connected to an outside water and power source.

3.2 First article. When specified (see 6.2.1), the contractor shall furnish one complete pump unit for first article inspection and approval (see 4.2.1 and 6.2.1).

3.3 Codes and standards.

3.3.1 NFPA. The pump unit shall be wired to conform to the design and wiring requirements of NFPA No. 70.

3.3.2 UL. The wiring, fittings, and conduit shall conform to applicable UL standards.

3.3.3 NEMA. Motor controllers, switches, relays, and time delays shall conform to the design, performance, and testing requirements of NEMA ICS.

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3.3.5 Certification. Prior to approval of the first article, or if none is submitted, prior to approval of the first shipment, the contractor shall submit satisfactory evidence to the contracting officer, or his authorized representative, that the pump unit proposed to be furnished meets the requirements specified in 3.3.1 through 3.3.4.

3.3.5.1 NFPA. Acceptable evidence of meeting requirements of 3.3.1 shall be the manufacturer's certified statement, acceptable to the contracting officer or his authorized representative, that the pump unit is wired in accordance with NFPA No. 70 wiring design practice requirements.

3.3.5.2 UL. Acceptable evidence of meeting the requirements of 3.3.2 shall be the UL label, or Listing Mark, or a certification from an independent testing laboratory, acceptable to the contracting officer, or his authorized representative, that the pump unit wiring, fittings, and conduit conform to applicable UL standards.

3.3.5.3 NEMA. Acceptable evidence of meeting the requirements of 3.3.3 shall be the manufacturer's certified statement, acceptable to the contracting officer or his authorized representative, that the motor controllers, switches, relays, and time delays, conform to NEMA ICS. A tag or label attached to these items stating these components conform to this standard is acceptable evidence.

3.4 Standard commercial product. The pump unit shall, as a minimum, be in accordance with the requirements of this specification and shall be manufactured from standard commercial product. Additional or better features which are not specifically prohibited by this specification but which are a part of the manufacturer's standard commercial product, shall be included in the pump unit being furnished. A standard commercial product is a product which has been sold or is being currently offered for sale on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

3.5 Interchangeability. All units of the same classification furnished with similar options under a specific contract shall be identical to the extent necessary to insure interchangeability of component parts, assemblies, accessories, and spare parts.

3.6 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification unless otherwise specified.

3.6.1 Aluminum. Aluminum for fabrication of the enclosure shall be made of commercial quality sheet or plate, suitable for the intended purpose.

3.6.2 Pipe, tube, fittings, and valves. Pipe, tube, fittings, and valves used for water and fuel oil lines shall be standard commercial items designed for the intended use.

3.6.3 Conduit, fittings, and electrical wire. Electrical conduit shall be rigid, electric metallic tube or liquid-tight flexible conduit. All electrical wire shall be stranded copper heat-resistant grade, thermoplastic insulated. Solid (nonstranded) wire shall not be used.

3.6.4 Dissimilar materials. Intimate contact of dissimilar metals, as defined in MIL-STD-889, which can be expected to cause galvanic corrosion shall have an interposing insulation material provided to minimize the corrosive effect.

3.7 Design. The pump unit shall be designed for continuous and balanced operation as a complete field water pump station. The pump unit shall conform to the applicable safety requirement of UL 1081 and as specified herein. The enclosure of the pump unit shall be designed with removable cover and sides for access to internal components and provide adequate ventilation during operation. The diaphragm tank shall be properly sized to protect the pump and operating controls by insuring that pump operations conforms to manufacturer's specified minimum running time. Protection to personnel shall be provided in accordance with NFPA No. 70. All screw threads shall conform to FED-STD-H28.

3.7.1 Dimensions. The pump unit dimensions shall conform to Table I.

TABLE I. Dimensions. (inches)

Maximum height	30
Maximum width	30
Maximum length	46

3.7.2 Measurement systems. Unless otherwise specified, either the U.S. Customary System of Units (US) or the International System of Units (SI) shall be used in the design and construction of the machine. When only one system of measurements is acceptable, the particular system required shall be as specified (see 6.2.1). In this specification, all measurements, dimensions, sizes and capacities are given in US units. These measurements may be converted to SI units through the use of the conversion factors and methods specified in ASTM E380.

3.8 Performance. The pump unit shall be capable of delivering a minimum 765 gallons of water per hour against a discharge pressure of 50 psig with a suction lift of 5 feet. The pump unit shall be capable of operating continuously at an ambient air temperature of not warmer than -10 degrees Fahrenheit (°F).

3.8.1 Vibration and noise. The pump unit shall operate without excessive or undesirable noise, vibration, or pulsations.

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3.8.2 Freeze protection. Provisions for freeze protection, such as self-regulated heating cable, shall be installed on all internal piping to maintain a minimum water temperature of 40°F at ambient air temperature of not warmer than -10°F. The freeze protection system shall be automatically turned on and off to maintain the required water temperature.

3.8.3 Stacking. The pump unit shall withstand three high stacking when tested in accordance with 4.4.1.3.2. Upon completion of the test, the pump unit shall show neither permanent deformation or dimension requirements affecting securing and handling of the unit.

3.8.4 Strength of top cover. The top cover of the pump unit shall withstand the loadings when tested in accordance with 4.4.1.3.3. Upon completion of the test, the deformation at the center of the top shall not exceed 1 inch.

3.9 Construction. Construction of the pump unit shall be in accordance with good engineering practice. The pump unit shall be constructed so that no parts will work loose during service. All adjustments and replaceable accessories shall be readily accessible. The pump unit shall be built to withstand the strains, jars, vibrations, and other conditions incident to shipping, storage and operation. Where applicable, warnings shall be mounted on or near components containing hidden hazards.

3.9.1 Enclosure. An aluminum enclosure shall be furnished to protect all pump components. The thickness of the aluminum enclosure shall withstand the tests as specified in 4.4. Integral openings for accomodating all piping and electrical connections shall be provided. The enclosure shall be securely anchored to the skid base. Where applicable, suitable 1/4 - turn fastener shall be used for removal of top and sides. The electrical panelboard shall be recessively mounted or otherwise guarded to protect damage to protruding elements.

3.9.2 Lifting handles. Lifting handles shall be provided full length of pump unit to provide protection of nozzles and electrical connectors.

3.10 Centrifugal jet pump.

3.10.1 Pump casing. The pump casing shall be capable of withstanding a hydrostatic pressure of 1.5 times the working pressure. The pump shall be close-coupled and shall have the pump and its driver built together as one unit. The casing shall be cast or bolted together, and the pump casing shall house an overhung impeller or impellers. The pump shaft shall be an extension of the driver shaft and the two or more shaft bearings shall be of sufficient size and adequately spaced for proper support and alinement of rotating parts of both the pump and its driver.

3.10.2 Single-stage pumps. Single-stage pumps shall have a single impeller that developes the total head of the pump.

3.10.3 Multi-stage pumps. Multi-stage pumps shall have two or more impellers which act in series to develop the total head of the pump.

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3.10.4 Intake and discharge connections. Intake and discharge openings shall be terminated with male camlock type quick disconnect fittings. These male fittings shall conform to MIL-C-27487, Type XVII, Size 2, and Class 2 - brass finishing with Teflon gaskets. These male fittings shall be removed and stored during shipping as indicated in figure 1. The end of the connection shall be fitted with a chain attached moisture-proof end cup after removal of male fitting. Discharge and intake sides of the pump shall be conspicuously identified by the words "IN" and "OUT" on the enclosure above the openings.

3.10.5 Impellers. The impellers shall be designed in accordance with the standards of the Water Systems Council, when applicable. Metal impellers shall be machined and polished. Plastic impellers shall be in accordance with the manufacturer's standard practice. Each impeller shall be accurately fitted and keyed, splined, and locked against lateral movement. Impellers shall be of the closed type and shall be statically balanced and compensated for axial thrust or provided with suitable thrust bearing.

3.10.6 Diffusers. When a diffuser type pump is furnished, the diffuser shall be readily replaceable. Diffuser vanes and water passages shall be designed and finished for maximum pump efficiency.

3.10.7 Pump shaft. The pump shaft shall be corrosion-resistant alloy steel having physical properties consistent with its intended use.

3.10.8 Stuffing boxes. Stuffing boxes shall be an integral part of the casing or support head and of adequate depth and design to minimize water or air leakage regardless of the conditions of operation. Stuffing boxes shall be of the mechanical seal-type.

3.10.9 Bearings. Bearings shall be the rolling or sliding-contact type, as appropriate for the pump size. When motor bearings are used to support the impeller they shall resist impeller thrust and in other respects be suitable for the service.

3.11 Controls.

3.11.1 Automatic pressure switch. An automatic switch shall be incorporated in the design of the unit. The switch shall be calibrated and adjusted to start the motor when tank pressure falls below 30 psi and stops the motor when pressure reaches 50 psi.

3.12 Diaphragm tank. A hydro-pneumatic tank of not less than 2 gallons drawdown capacity and precharge to meet the specific working pressure shall be included in the pump unit. The tank shall be fabricated of heavy gage steel with rust resistant finish. Inside of the tank shall be coated with polypropylene or epoxy to provide maximum resistance to corrosion. The diaphragm that separates air and water shall not impart taste or odor and remain flexible during the life time of the tank.

3.13 Check valve. A check valve of swing check type or poppet type with bronze disc shall be installed in the suction adjacent to or within the pump.

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3.14 Piping. All piping, fittings, valves, and associated plumbing devices and appurtenance shall be properly connected and installed for outside connections. Piping shall be adequately sized for the intended purpose and continuous operation of the pump unit. All piping shall be installed so as to comply with acceptable plumbing practices. Piping between vibration parts shall be protected by flexible hose connections, if vibration is sufficient to induce leakage in rigidly connected joints. A 3/4-inch brass hose valve with wheel handle secured to stem with machine screw shall be provided as indicated in figure 2.

3.15 Electrical requirements. The pump unit shall be designed for operating on 208 volt (V), 3 phase, 60 cycle power supply from a 3 phase, 5 wire, solidly grounded neutral system. The pump unit shall be completely wired at the factory including all receptacles. Electrical components, as applicable, including wire, switches, controls, and connectors shall be approved by UL.

3.15.1 Wiring. Wiring shall conform to the applicable wiring practices, selection, and design requirements of NFPA No. 70 for the operating conditions and load requirements and the requirements as specified herein. All wiring in the pump unit shall be color coded. All wiring outside the junction box shall be in liquid-tight flexible conduit.

3.15.1.1 Connectors. Output feed connectors shall be provided to connect power to the end loads as shown in figure 1. Connectors J2, J3, and J4 shall be 208V, 15-ampere (A), single-phase, 4-wire NEMA, L14-20 receptacles. Connector J1 shall be a 208V, 60A, 3-phase, 5-wire receptacle conforming to MIL-C-22992, class L.

3.15.2 Power distribution panel. The power distribution panel shall be provided to provide and distribute external power to the pump unit and end items external to the pump station. The panel shall conform to the requirements of UL 67 and NFPA No. 70 and be in general agreement with the electrical schematic of figure 2 and figure 3.

3.15.2.1 Bus systems. The bus systems shall be a 208V, 3 phase, neutral, 60A minimum rated system. The neutral bus shall be of the same rating as the phase buses. The bus material may be of copper or aluminum. If aluminum the interconnecting surfaces shall be plated in accordance with UL 67.

3.15.2.2 Circuit breakers. The panel circuit breaker shall conform to UL 489 and be rated for a short circuit interrupt rating of 10,000A. The breaker load ratings and poles shall be in accordance with figure 3.

3.15.2.3 Enclosure. The panel enclosure shall be of water-tight, sleet proof construction in accordance with NEMA ICS 6, type 3S.

3.15.2.4 Input connector. The electrical power input connector shall be a 208V, 3-phase, 5-wire, 60A receptacle conforming to MIL-C-22992, class L. Location of the connector is optional but shall be in close proximity to the panel if not located on the panel. It shall also be accessible externally.

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3.15.3 Motor controller. Electric motors shall be solid shaft, total enclosed, fan cool, squirrel-cage induction type, designed to operate on 208V, 3-phase, 60-Hertz alternating current. Electric motors shall conform to NEMA MG 1 and shall be rated for continuous duty with starting torque and horsepower rating suitable for the application. The motor shall have a horsepower rating adequate for operation of the specified pump with allowable nameplate temperature limits. The horsepower rating shall be not less than the maximum brake horsepower requirement of the pump under any condition of operation. Motor starter shall be designed and constructed in accordance with NEMA ICS 1 and ICS 2, where applicable, motor starter shall have an enclosure in accordance with NEMA ICS 6, type 12. Combination motor controller and pressure switch for the pump motor shall be adequately sized for the motor and shall be full voltage start. The pressure switch shall provide for 30 psig cut-in and 50 psig cut-out pressure settings.

3.15.4 Switches. Switches shall be of adequate current and voltage rating and shall meet the requirement of NFPA No. 70.

3.16 Skid base. All components for the pump unit shall be mounted and contained on a welded, structural steel skid base. The base shall consist of not less than two steel skid runners with an integrally formed, welded, or bolted base plate for mounting components of the unit. The skid runners shall be furnished with mounting holes for anchor bolts. The number and size of holes shall be as determined by the manufacturer to be required for anchorage of the unit under the most severe condition of vibration or thrust likely to develop during operation. The skid runners shall be provided with pockets to permit lifting of the unit by a forklift truck. The pockets shall be a minimum of 24 inches on centers and shall be shaped to accommodate forks in sizes up to 2 inches in thickness by 8 inches in width. Individual mountings shall be furnished as required on the base plate for supporting motors, pumps, and other components in vertical alignment. Other components requiring removal for service, adjustment, or horizontal alignment shall be mounted in a manner to permit such removal or alignment. Tiedown devices and lifting attachments, if furnished (see 3.19), shall be welded to the skid base.

3.17 Electromagnetic interference control. When specified (see 6.2.1), each unit of the pump unit shall meet the electromagnetic interference control requirements of UM05 for class C3 of MIL-STD-461.

3.18 Fungus resistance. When specified (see 6.2.1), electrical components and circuit elements, including terminal and circuit connections, shall be coated with varnish conforming to MIL-V-173, except that:

- a. Components and elements inherently inert to fungi or in hermetically sealed enclosures need not be coated.
- b. Current-carrying contact surfaces, such as relay contact points, shall not be coated.

3.19 Lifting and tiedown attachments. When specified (see 6.2.1), the pump unit shall be equipped with lifting and tiedown attachments. Lifting and tiedown attachments shall conform to type II or type III of MIL-STD-209. A nonferrous transportation plate shall be provided and mechanically attached to the pump unit. Transportation plates shall be inscribed with a diagram

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showing the lifting attachments and lifting slings, the capacity of each attachment, and the required length and size of each sling cable. A silhouette of the item furnished showing the center of gravity shall be provided on the transportation plate. Tiedown attachments may be identified by stenciling or other suitable marking. Tiedown marking shall clearly indicate that the attachments are intended for the tie down of the pump unit on the carrier when shipped.

3.20 Lubrication. Lubrication means shall be provided for all moving parts requiring lubrication. Pressure lubrication fittings shall not be used where normal lubricating pressure may damage grease seals or other parts. The pump units shall be lubricated prior to delivery with the manufacturer's recommended lubricants. The unit shall be conspicuously tagged to identify the lubricants and their temperature range.

3.21 Identification marking. The contracting officer will furnish the required identification plates. The contractor will be required to stamp necessary data in the blank spaces of the identification plates, and securely affix said plates in a conspicuous place on the equipment. Brass screws or bolts shall be used to affix the plates. An identification plate shall be affixed to the pump unit. The nomenclature shall be in accordance with the following: "PUMP UNIT, WATER CIRCULATION, 765 GPH."

3.22 Instruction plates. The pump unit shall be equipped with instruction plates suitably located, describing any special or important procedures to be followed in operating and servicing the equipment. Plates shall be of a material which will last and remain legible for the life of the equipment. Plates shall be securely affixed to the equipment with nonferrous screws or bolts of not less than 1/8-inch diameter.

3.23 Treatment and painting. Exposed exterior surfaces of the unit, including the skid base, shall be treated and painted in accordance with type A of MIL-T-704. The color shall be green conforming to color No. 14064 of FED-STD-595. The total dry film thickness shall be not less than 2.5 mils over the entire surface.

3.24 Technical publications. The contractor shall furnish the following publications applicable to the pump units supplied under this specification:

- a. Operator's manual.
- b. Parts manual.
- c. Maintenance, service, and repair manual.

Detailed requirements for the contents of technical publications, and the quantity and distribution of copies shall be as specified in the contract (see 6.2.1).

3.25 Workmanship.

3.25.1 Fabricated parts and components. Fabricated parts and components shall be free from discontinuities, cracks welding undercuts, weld spatter, and any other injurious defects. Start and finish of hand and automatic welds shall be done in a manner to provide uniform welds.

3.25.2 Subassemblies. Subassemblies shall be within manufacturing tolerances to permit proper fitting. Shims, spacers, calking compounds, and weld build-up, shall not be used to make allowances for poor fitting assemblies.

3.25.3 Bolted connections. Boltholes shall be accurately punched or drilled and shall have the burrs removed. Washers or lockwashers shall be provided in accordance with good commercial practice, and all bolts, nuts, and screws shall be tight.

3.25.4 Riveted connections. Rivet holes shall be accurately punched or drilled and shall have the burrs removed. Rivets shall be driven with pressure tools and shall completely fill the holes. Rivet heads, when not countersunk or flattened, shall be of approved shape and of uniform size for the same diameter of rivet. Rivet heads shall be full, neatly made, concentric with the rivet holes, and in full contact with the surface of the member.

3.25.5 Castings. All castings shall be sound and free from patching, misplaced coring, warping, or any other defect which reduces the castings ability to perform its intended function.

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, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Component and material inspection. Components and materials shall be inspected in accordance with all the requirements specified herein and in applicable referenced documents.

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

- a. First article inspection (see 4.2.1).
- b. Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. The first article inspection shall be performed on one complete pump unit when a first article is required (see 3.2 and 6.2.1). This inspection shall include the examination of 4.3, the tests of 4.4.1 and 4.5 (when applicable) and, when specified, the preproduction pack inspection of 4.6 (see 4.6 and 6.2.1). The first article may be either a first production item or a standard production item from the supplier's current inventory provided the item meets the requirements of the

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specification and is representative of the design, construction, and manufacturing technique applicable to the remaining items to be furnished under the contract.

4.2.2 Quality conformance inspection. The quality conformance inspection shall include the examination of 4.3, the tests of 4.4.2, and the packaging inspection of 4.6. This inspection shall be performed on the samples selected in accordance with 4.3.

4.3 Examination. Each pump unit shall be examined for compliance with the requirements specified in section 3 of this specification. Any redesign or modification of the contractor's standard product to comply with specified requirements, or any necessary redesign or modification following failure to meet specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations and dimensional measurements. Noncompliance with any specified requirements or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.3.1 Standards compliance. The contractor shall make available to the contracting officer or his authorized representative evidence of compliance with the applicable standards cited in 3.3.

4.4 Tests.

4.4.1 First article tests. When a first article is required, the first article shall be tested as specified in 4.4.1.1 through 4.4.1.3.3. The first article test shall be performed by the contractor under the direction and in the presence of Government representatives. Failure to pass any phase of the required tests shall be cause for the Government to refuse acceptance of all pump units until corrective action has been taken. Acceptance of first article shall not constitute a waiver by the government of its rights under provisions of the contract.

4.4.1.1 Hydrostatic test. The pump unit shall be hydrostatically tested at a pressure equal to 1 1/2 times the allowable working pressure specified in 3.8. Any evidence of leakage within the pumping system shall be cause for rejection.

4.4.1.2 Operational tests. Each pump unit shall be completely assembled and connected to the applicable electric, water and discharge services, and operated at zero discharge pressure to determine that the assembly of components is complete and of proper interrelationships; moving parts and the pump unit evidence no undue vibration; and that all controls operate smoothly and positively. In the course of the operational testing, determination shall be made to establish compliance with all performance requirements specified in section 3 applicable to the fully assembled pump unit except those that require performance testing, such as the water discharge capacity pumping through the components. The pump unit shall be operated for not less than 10 minutes to insure that it will reliably meet the operational requirements of the specification.

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4.4.1.3 Performance test. When a first article is required (see 3.2), and unless otherwise specified (see 6.2.1), the first article shall be subjected to a 40 hour endurance/performance run. The pump unit shall be tested by making all necessary connections and in accordance with standards of the Hydraulic Institute for the required capacity in gallons per hour under the specified conditions (see 3.8). The average hourly discharge capacity (calculated at the end of the test) of the pump unit shall meet the requirements as specified in 3.8. The total hours shall be accumulated in 8 hours run in accordance with the manufacturer's operating procedures. Inability to meet the performance requirement of this specification shall be cause for rejection.

4.4.1.3.1 Freeze protection test. The pump unit shall be connected with all services and placed in an area with an ambient temperature of not warmer than -10°F . The pump unit shall be exposed without the pump operating for not less than 8 hours. Failure to comply with 3.8.2 shall be cause for rejection.

4.4.1.3.2 Stacking test. The pump unit shall be placed on level ground. A piece of plywood with adequate thickness and of approximately the same plan area shall be placed on top of the pump unit. The pump unit shall then be subjected to a vertical force equivalent to a load of 3 times the pump unit uniformly distributed over the plywood area. Failure to comply with 3.8.3 shall be cause for rejection.

4.4.1.3.3 Strength of top cover test. The pump unit shall be placed on level ground. A load of not less than 200 pounds shall be placed 2 feet above the pump unit cover and dropped at the center of an area not exceeding one square foot. A total of 6 drops shall be performed to verify compliance with 3.8.4. Failure to comply shall be cause for rejection.

4.4.1.4 First article sample. Upon acceptance of the first article, the first article shall remain at the manufacturing facility as a production sample, and shall be the last pump unit delivered on the contract. The first article shall be reconditioned, including replacement of abnormally worn parts and paint touch-up or repainting, prior to delivery to enable it to be accepted as a contract item. The contractor shall maintain the first article in a serviceable condition for the duration of the contract.

4.4.2 Quality conformance inspection. Each production pump unit shall be operated and tested as specified in 4.4.1.1 and 4.4.1.2.

4.5 Electromagnetic interference control tests. When electromagnetic interference control is specified (see 3.17), the unit equipped for the control of the electromagnetic interference, shall be tested in accordance with the methods of MIL-STD-462 applicable to class C3 equipment.

4.6 Packaging inspection. The inspection of the preservation, packing, and marking shall be in accordance with the requirements of section 4 of MIL-P-10603. The inspection shall consist of the quality conformance inspection; and, when specified (see 6.2.1), a preproduction pack shall be furnished for examination and test within the time frame required (see 6.2.1).

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5. PACKAGING.

5.1 Preservation, packing, and marking. Preservation, packing, and marking shall be in accordance with the requirements of MIL-P-10603 with the level of preservation and the level of packing as specified (see 6.2.1).

6. NOTES.

6.1 Intended use. Skid-mounted water pump units are used in fields and semi-permanent locations to boost and maintain water system pressure and to deliver adequate discharge capacity.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- a. Number, title, and date of this specification.
- b. When a first article is required for inspection and approval (see 3.2, 4.2.1, and 6.4).
- c. When only one system of measurement is required (see 3.7.2).
- d. When electromagnetic interference control is required (see 3.17).
- e. When fungus resistance treatment is required (see 3.18).
- f. When either lifting attachments or tiedown devices or both are required (see 3.19).
- g. Requirements for technical publications (see 3.24).
- h. Length of performance test (hours) if other than specified (see 4.4.1.3).
- i. When a preproduction pack inspection is required and time frame required for submission (see 4.2.1 and 4.6).
- j. Level of preservation and level of packing required (see 5.1).

6.3 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved DD Form 1664, Data Item Description (DID), and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of paragraph 52.227-7031 of the Federal Acquisition Regulations are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraphs:

<u>Paragraph No.</u>	<u>Data requirements title</u>	<u>Applicable DID No.</u>	<u>Option</u>
3.24	Publication, Commercial	DI-M-24010A	

6.4 First article. When a first article inspection is required, the item will be tested and should be a first article sample or it may be a standard production item from the contractor's current inventory as specified in

4.2.1. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

Preparing Activity:

Navy - YD

(Project 4320-N221)

MIL-P-29238(YD)

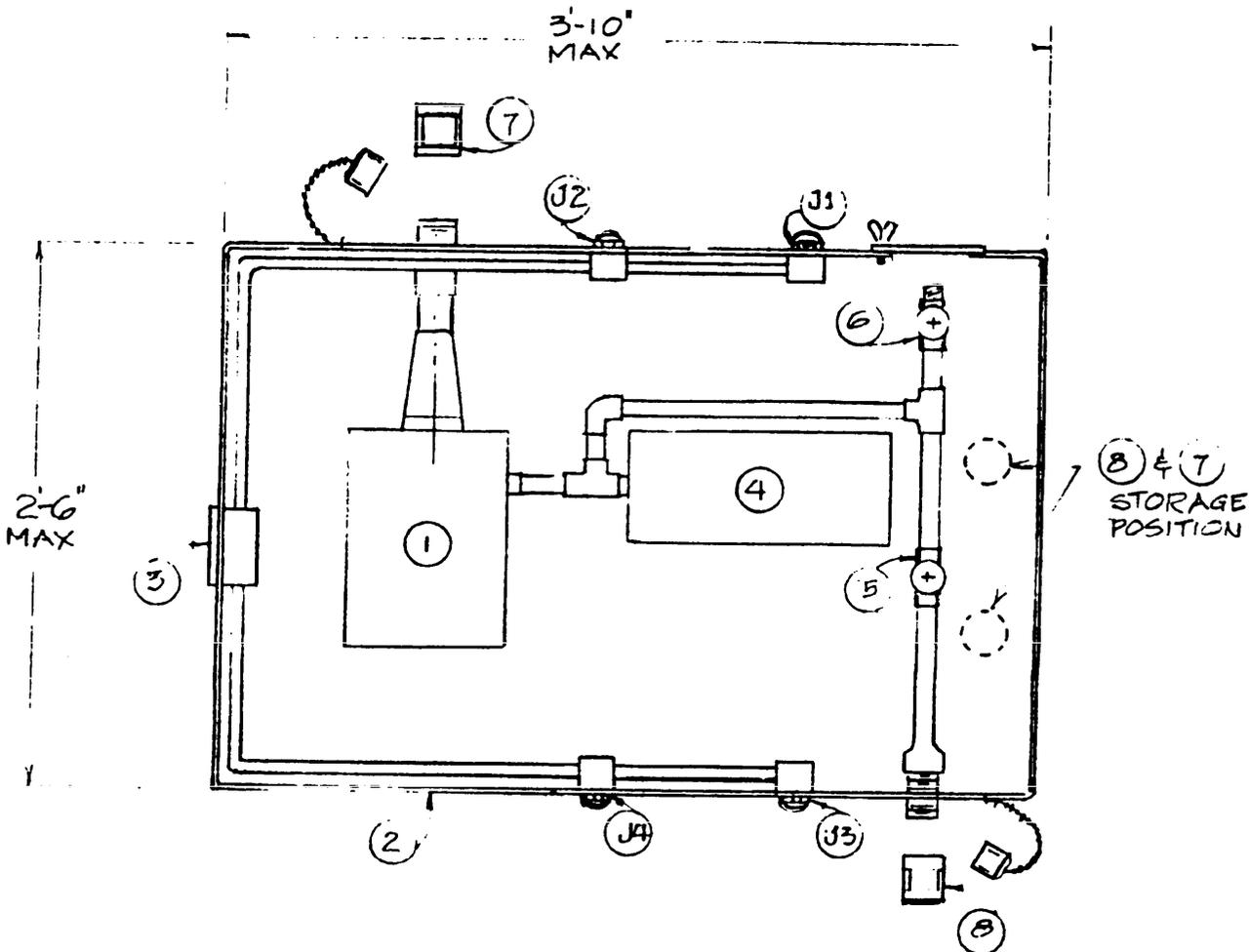


FIGURE 1. TYPICAL EQUIPMENT LAYOUT FOR PUMP UNIT.

1. Jet pump with motor & controls.
2. Aluminum enclosure.
3. Panelboard.
4. Hydro-pneumatic tank.
5. Check valve
6. Hose bibb.
7. 2" suction fitting.
8. 2" discharge fitting.

J1	}	Receptacles
J2		
J3		See figure 3 for detail.
J4		

MIL-P-29238(YD)

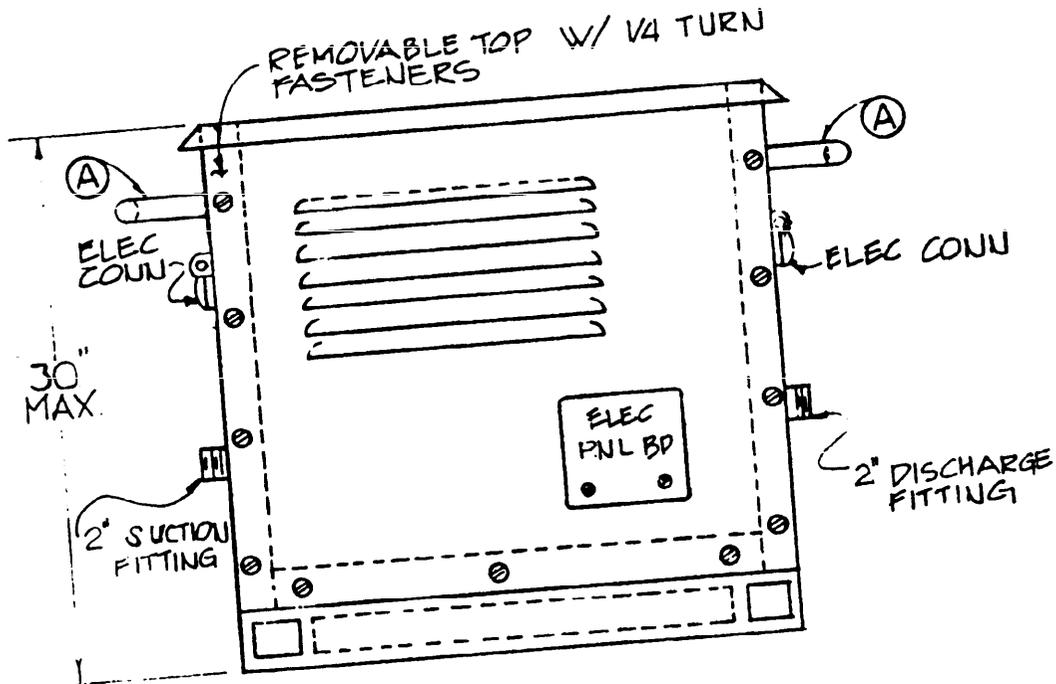


FIGURE 2. TYPICAL ELEVATION OF PANEL LOCATION.

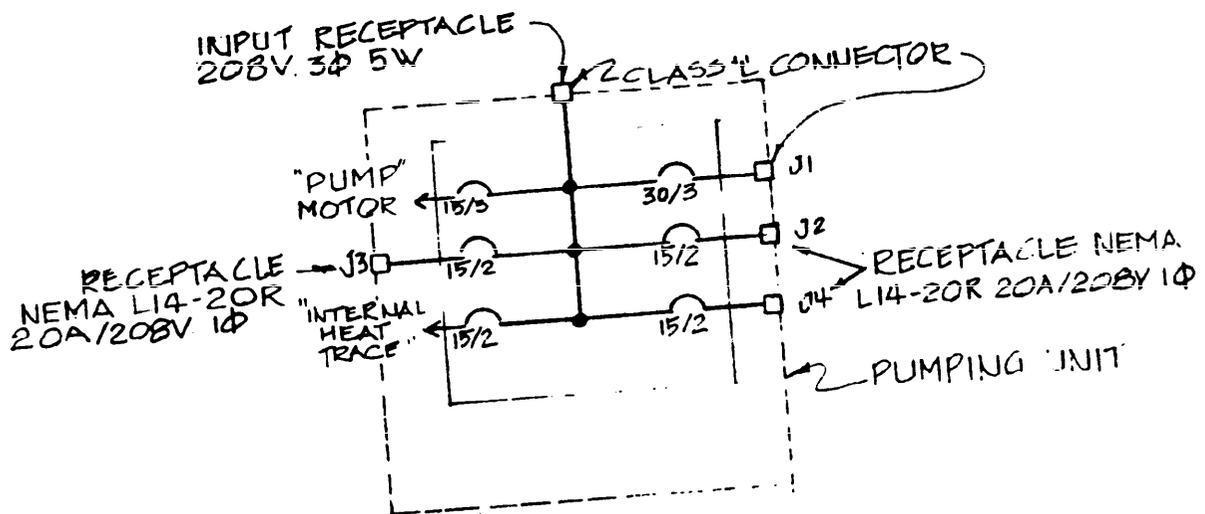


FIGURE 3. TYPICAL ONE LINE SCHEMATIC FOR PUMP UNIT.



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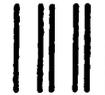
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