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INCH-POUND

F-P-2908
NOTICE 1
6 September 2001

FEDERAL SPECIFICATION

PUMPING UNITS, CONDENSATE, RETURN; AND BOILER FEED PACKAGE

F-P-2908, dated 2 June 1997, is hereby canceled without replacement.

Custodians:
Army - CR4
Navy - YD
Air Force - 99

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AMSC N/A **FSC 4520**

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[INCH-POUND]
F-P-2908
June 2, 1997
SUPERSEDING
MIL-P-17749E
22 March 1993

FEDERAL SPECIFICATION

PUMPING UNITS, CONDENSATE, RETURN; AND BOILER FEED PACKAGE

The General Services Administration has authorized the use of this specification by all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers electric-motor-driven condensate return and boiler feed pumping units with receiver and controls for steam systems in which the condensate cannot be returned to the boiler by gravity.

1.2 Classification. The pumping units shall be of the following types, design, styles or groups, and classes as specified (see 6.1 and 6.2).

Type I - Condensate return pumping units.

Style A - Box-shaped (hexahedral) or cylindrically-shaped, floor-mounted receiver.
Style B - Horizontal, cylindrical, stand-mounted receiver.
Style C - Vertical, cylindrical, underground receiver.

Type II - Vacuum return pumping units.

Group A - Units with centrifugal condensate pump(s) and jet-type vacuum producer(s).
Group B - Units with centrifugal condensate pumping element and rotary air pumping element on a common shaft.

Beneficial comments, recommendations, additions, deletions, clarifications, etc. and any data which may improve this document should be sent to: Commanding Officer (Code 15E2), Naval Construction Battalion Center, 1000 23rd Avenue, Port Hueneme, CA 93043-4301, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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Group C - Units with centrifugal condensate pump(s) and separate rotary or jet-type air pump(s).

Class 1 - Vacuums to 10 inches, mercury (33.76 kilopascals (kPa)).
Class 2 - Vacuums to 20 inches, mercury (67.73 kPa).

Type III - Boiler feedwater pumping units.

Style B - Horizontal, cylindrical, stand, or saddle mounted.

Design A - Single pump unit.
Design B - Duplex pump unit.
Design C - Semi-duplex pump unit (type II only).
Design D - Dual pump unit (type III only).
Design E - Triplex pump unit (type I, style B and type III only).

2. APPLICABLE DOCUMENTS

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

Federal Specification

W-S-2739 - Strainers, Sediment: Pipeline, Air, Gas or Steam.

(Copies of federal specification required by contractors in connection with specific procurement functions are obtained from the Defense Automated Printing Services, Attn: DoDSSP, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

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 NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B1.1 - Unified Inch Screw Threads (UN and UNR Thread Form).
ANSI B1.20.1 - Pipe Threads, General Purpose (Inch).

(Private sector and civil agencies may purchase copies of these voluntary standards from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.)

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AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B15.1 - Safety Standard for Mechanical Power Transmission Apparatus.
ASME B40.1 - Gauges - Pressure Indicating Dial Type - Elastic Element.

(Private sector and civil agencies may purchase copies of these voluntary standards from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.)

ASTM

ASTM A 48 - Gray Iron Castings.
ASTM A 123 - Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.
ASTM A 276 - Stainless and Heat-Resisting Steel Bars and Shapes.
ASTM D 570 - Water Absorption of Plastics, Test for.

(Private sector and civil agencies may purchase copies of these voluntary standards from the American Society for Testing and Materials, 100 Barr Harbor Drive., West Conshohocken, PA 19428-2959.)

AMERICAN WELDING SOCIETY (AWS)

D1.1 - Structural Welding Code.

(Private sector and civil agencies may purchase copies of these voluntary standards from the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.)

HYDRONICS INSTITUTE (HI)

Hydronics Institute Standards.

(Private sector and civil agencies may purchase copies of these voluntary standards from the Hydronics Institute, 30200 Detroit Road, Cleveland, OH 44145-1967.)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

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

(Private sector and civil agencies may purchase copies of these voluntary standards from the National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1847, Rosslyn, VA 22209.)

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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 - National Electric Code.

(Private sector and civil agencies may purchase copies of these voluntary standards from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.)

UNDERWRITERS LABORATORIES, INC. (UL)

UL-778 - Motor Operated Water Pumps.

(Private sector and civil agencies may purchase copies of these voluntary standards from the Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.)

(DoD activities may obtain copies of those adopted voluntary standards listed in the DoD Index of Specifications and Standards free of charge from the Defense Automated Printing Services, Attn: DoDSSP, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

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.

3. REQUIREMENTS

3.1 Description. Type I and type II pumping units shall consist of a condensate receiver, electric-motor-driven condensate return pump(s), automatic controls, and accessories as specified herein. Type II units shall be equipped to evacuate the air-vapor mixture from the system, to exhaust the air and noncondensable gases to the atmosphere, and to maintain the system vacuum as specified herein. The air separation chamber on type II units shall be integral with or mounted on the condensate receiver. Except as otherwise specified herein, all pumps, controls and accessories shall be mounted directly on the receiver or, when applicable, on the air separation chamber to form compact, integrated, packaged units ready for operation when connected to system piping and electrical power supply.

3.1.1 Type I. Type I pumping units shall be furnished with condensate pumps and receivers in accordance with handling the following, as specified (see 6.2):

a. Single unit (design A) - One condensate pump and one receiver. For styles A and C, for units handling 3.5 million British thermal units per hour (Btu/h) (1 026 kilowatt (kW)) and over, one condensate pump and receiver with appropriate blanked-off openings to permit future conversion to duplex units.

b. Duplex unit (design B) - Two condensate pumps and one receiver.

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c. Triplex unit (design E) - Three condensate pumps (one standby) and one receiver.

3.1.2 Type II. Type II pumping units shall be furnished with condensate pumps and vacuum producers in accordance with the following, as specified (see 6.2):

a. Single unit (design A) - One condensate pump, one vacuum unit.
b. Duplex unit (design B) - Two condensate pumps, two vacuum units.
c. Semi-duplex units (design C) - Two condensate pumps, one vacuum unit.

Class 1 units shall be group A, B, or C, and class 2 units shall be group A or C, as specified (see 6.2).

3.1.3 Type III. Type III boiler feedwater pumping units shall be furnished with condensate pumps and receivers in accordance with the following, as specified (see 6.2):

a. Single unit (design A) - One condensate pump and one receiver.
b. Duplex unit (design B) - Two condensate pumps and one receiver.
c. Dual unit (design D) - Two condensate pumps and one receiver sized for two boiler operation from 15 to 50 horsepower (hp) (11 186 to 37 285 (Watts (W)) only.
d. Triplex unit (design E) - Three condensate pumps (one standby) and one receiver sized for two boiler operation.

3.2 Standard commercial product. Each pumping unit of the same classification shall, as a minimum, be in accordance with the requirements of this specification and shall be the manufacturer's 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 pumping unit being furnished. A standard commercial product is a product which has been sold or is currently being offered for sale on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model.

3.2.1 System of measurement. The dimensions used in this specification are not intended to preclude the use of the metric system of measurement in the fabrication and production of the material, individual parts, and finished product, provided form, fit, and function requirements are satisfied.

3.3 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 4.2.1 and 6.3).

3.4 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

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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 material, as opposed to virgin raw materials. Unless otherwise specified, none of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification.

3.4.1 Cast iron. Cast iron used for pump castings and receivers shall be a closed-grained, gray iron conforming to ASTM A 48, Class 25A.

3.4.2 Stainless steel. Stainless steel used for pump shafts shall be not less than ASTM A 276, UNS 541000.

3.5 Design. The pumping unit shall be designed to permit easy accessibility for maintenance and service in the field. The design shall be such as to prevent conditions hazardous to personnel or deleterious to equipment and meet requirements of ASME B15.1.

3.6 Maintainability. The pumping units shall operate as specified herein without maintenance other than the supplier's recommended normal scheduled adjustments and servicing as established by a maintenance schedule prepared and submitted by the supplier prior to test. All major assemblies shall be accessible for maintenance, repair, and replacement without the removal of assemblies and installed attachments not normally removed. Covers or plates which must be removed for component adjustment, repair, replacement, or maintenance shall be equipped with fastenings for use with common tools. Drain outlets shall be located for accessibility. Provision shall be made to permit complete drainage of equipment to drain lines. All fasteners shall be of corrosion-resistant material of shall be treated to be corrosion-resistant. Maximum use shall be made of interchangeable hardware and fastening devices.

3.7 Threads. Screw threads for all thread-securing or attaching devices and threaded parts shall be as follows:

a. Machine threads shall be the American National Standard coarse or fine thread series in accordance with ANSI B1.1.
b. Pipe threads shall be the American National Standard Taper Pipe Thread in accordance with ANSI B1.20.1.

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

3.9 Performance. The pumping units shall have the capacity to pump the gallons per minute (gpm) (litre per second (L/s)) of condensate, as specified (see 3.9.3, 6.1.1, and 6.2). The capacity of the pumping units shall be based on the output of the boiler(s) in boiler hp (W) or based on the thermal output of steam heating system in Btu/h (W) and shall be established on the basis of the operating conditions and pumping factors specified herein.

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3.9.1 Operating conditions. For type I pumping units, performance ratings shall be established on the basis of handling condensate at a temperature of 180 degrees Fahrenheit (F) (82 degrees Celsius (°C)) and delivering the condensate against the specified discharge pressure at the pump outlet (see 3.9 and 6.1.3). For type II, performance ratings shall be established on the basis of the simultaneous handling of condensate and saturated air under the following conditions:

a. Delivering condensate at 160°F (71 °C) against the specified discharge pressure at the pump outlet with a vacuum of 11 inches of mercury (37.14 kilopascals (kPa)) for class 2.
b. Discharging air and noncondensable gases to the atmosphere.
c. Maintaining a vacuum at the pump inlet of 5.5 inches of mercury (18.57 kPa) at 160 °F (71 °C) for class 1.
d. Maintaining a vacuum at the pump inlet of 11 inches of mercury (37.14 kPa) at 160 °F (71 °C) or 20 inches of mercury (67.53 kPa) at 70 °F (21 °C) for class 2.

Unless otherwise specified (see 6.2), for type III pumping units, performance ratings shall be established on the basis if handling condensate at 180 °F (82 °C) and delivering the condensate against the specified discharge pressure at the pump outlet (see 3.9.2, 3.9.4, and 6.1.3). When specified (see 6.2), type III pumping units performance rating shall be established on the basis of handling condensate at a temperature of 210 °F (99 °C) at sea level and delivering the condensate against the specified discharge pressure at the pump outlet (see 3.9.4 and 6.1.3).

3.9.2 Condensate rate. For purposes of this specification the condensate rate (C_r) shall be established on the basis of one boiler hp (9 809.5 W) for each 0.06974 gpm (0.004 4 L/s) of condensate, or 480,000 Btu/h (140 674 W) for each gpm (L/s) of condensate:

Thus C_r = 0.06974 (boiler hp (0.68366 boiler Watts))

$$\text{or } C_r = \frac{\text{Btu/h}}{480{,}000} \quad \left(\frac{\text{W}}{140\ 674.1}\right)$$

3.9.3 Pumping factors. The pumping rates of the units shall be established on the basis of the condensate rate. The pumping factor (P_f) to be applied is as follows:

a. Condensate return pumps (type I and II) - Not less than 2 times but not greater than 3 times for each gallon (litre) of condensate per minute (see 3.9.2).
b. Boiler feedwater pumps (type II) - Not less than 1.33 times but not greater than 3 times for each gallon (litre) of condensate per minute (see 3.9.2).
c. Vacuum pumps for type II, single and semi-duplex units:
   (1) To 10 inches of mercury (33.7 kPa) (class 1) - Not less than 1.0 cubic foot per minute (cfm) (0.000 471 9 cubic metre per second (m^3/s)) for each gallon (3.785 L) of condensate per minute (see 3.9.2).
   (2) 11 to 20 inches of mercury (37.14 to 67.53 kPa) (class 2) - Not less than 2.0 cfm (0.000 471 9 m^3/s) for each gallon (3.785 L) of condensate per minute (see 3.9.2).
d. Vacuum pumps for type II duplex units:

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(1) To 10 inches of mercury (33.76 kPa) (class 1) - Not less than 0.75 cfm (0.35 L/s) for each gallon (3.785 L) of condensate per minute (see 3.9.2).
(2) 11 to 20 inches of mercury (37.14 to 67.53 kPa) (class 2) - Not less than 1.50 cfm (0.71 L/s) for each gallon (3.785 L) of condensate per minute (see 3.9.2).

The pumping factors shall apply to each pump regardless of the number of pumps.

3.9.4 Discharge pressures. Discharge pressures at the outlet of the condensate pump will be as specified (see 6.1.3 and 6.2) and shall be within the following ranges, as applicable:

a. Type I, style A and C - 10 to 75 pounds per square inch gage (psi (gage)) (68 to 517 kilopascals (kPa (gage)).
b. Type I, style B - 10 to 200 psig (68 to 1 374 kPa (gage)).
c. Type II - 10 to 60 psig (68 to 414 kPa (gage)).
d. Type III - 10 to 300 psig (68 to 2 068 kPa (gage)).

3.10 Receivers. Type I pumping units shall be furnished with style A, B, or C receivers, as specified in 1.2. Condensate receivers for type II units, exclusive of air separation chambers or compartments, shall be as specified herein for type I, style A receivers. Receivers for type III units shall be style B, with horizontal stand or saddle mounted. Receivers for duplex and dual units shall provide mounting for two pumps and piping for two pumps. Receivers for triplex units shall provide mounting for three pumps and piping for three pumps. Receivers shall be either cast iron or steel in accordance with the requirements herein applicable to each style. The receiver wall thickness, including allowances for corrosion and before any required coatings are applied, shall be 0.3125-inch (7.9 millimetre (mm)) for cast iron and 0.1875-inch (4.76 mm) for steel. Receivers shall be equipped with inlet and outlet connections, an air venting connection, when required, and, except for type I, style C, a drain connection. Air vent connections shall have a capacity sufficient to protect the receiver from excessive steam pressure generated by the fail open capacity of either the steam heater supply valve(s) or the pressure reducing valve(s) of the steam heater, whichever is greater. Accessories shall be as specified herein.

Actual receiver volumes in gallons (litre) shall be not less than the maximum condensate rate of 3.9.2, times the indicated figure in table I.

TABLE I. Actual receiver volumes.

Boiler Horsepower (W)	GPM (L/s)	Type / Style / Design	I, II / A, B, C / A, B, C	III / B / B	III / B / D, E
15-50 (11 185-37 285)	to 4 (0.252)		5 (18.9)	8 (30.2)	8 (30.2)
60-100 (44 742-74 570)	to 4 (0.252)		3.5 (13.2)	8 (30.2)	10 (37.9)
125 and greater (93 212)	over 8 (0.505)		2 (7.6)	6 (22.7)	10 (37.9)

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Unless otherwise specified (see 6.1.2 and 6.2), the receiver shall have a net working volume so that type I and type II units will not cycle more than 20 times an hour at rated condensate return load and not less than 4 times an hour at 0.2 rated return load. For type III units, the receiver net working volume shall be sufficient so that the units will not cycle more than 15 times an hour at rated condensate return load and not less than 4 times an hour at 0.2 rated return load. The cycle time shall be calculated by the following formula:

$$CT = \frac{V}{P_r - C_r} + \frac{V}{C_r}$$

Where:

CT = Cycle time in minutes.
V = Net working volume of receiver from start of pump to stop of pump (gallons) (litre).
P_r = Pump rate, gpm (L/s) (see 3.9.3) ($P_f \times C_r = P_r$).
C_r = Condensate rate, gpm (L/s) (see 3.9.2).

NOTE: Formula applies only for units without water make up valve or when the water make up valve is shut off.

3.10.1 Style A. Style A receivers shall be box-shaped or cylindrically shaped, as specified (see 6.2). Pumps and controls shall be mounted directly on the receiver or an integral extension of the receiver base. The receivers shall be cast iron or steel, as specified (see 6.2). The receivers shall have a height of not greater than 24 inches (610 mm) and shall be suitable for floor mounting. Unless otherwise specified (see 6.2), the connection sizes for capacities through 60 hp (44.742 kW) shall be 2-inch (51mm) for the condensate inlet and 0.75-inch (19 mm) for pump discharge. For larger pumping units, the connection sizes shall be as furnished on the manufacturer's standard product.

3.10.2 Style B. Style B receivers shall be of the cylindrical, horizontal tank type and shall be of welded steel or 300 series stainless steel construction. The receiver and pump(s) shall be separately mounted on a common steel base plate or structural steel frame to form a complete unit. The frame shall have sufficient height so that the minimum water level shall satisfy the minimum net positive suction head (NPSH) requirements of the pump, the minimum NPSH of the pump may not be greater than 2 ft (0.6 metre) at the design point. Piping between the receiver and each pump shall consist of a section containing a gate valve, strainer, and pipe to provide minimum pressure drop. At the option of manufacturer, inlet strainers may be furnished in lieu of suction strainer.

3.10.3 Style C. Style C receivers shall be of the cylindrical, vertical tank type having a depth of not less than 30 inches (762 mm) and not more than 48 inches (1 219 mm). Unless otherwise specified (see 6.2), receivers shall be cast iron. When specified (see 6.2), receivers shall be steel.

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The pump(s) and controls shall be mounted on the cover of the tank to permit below grade installation of the receiver. The centerline of the condensate return connections shall be within 12 inches (305 mm) from the top of the tank. The condensate return connection shall be not less than 1-inch (25 mm) nominal pipe size larger than the pump discharge connection, and, if flanged, shall be furnished with a threaded companion flange. The receiver cover plate shall be connected to the cover plate. All equipment mounted on the cover plate shall be easily removable.

3.11 Condensate return pumps. Type I pumping units shall be equipped with the following condensate pumps in accordance with the style of receiver being furnished:

a. Style A receivers	-	Centrifugal-volute type, close coupled.
b. Style B receivers (discharge pressures to 15 psig (103 kPa (gage))	-	Centrifugal-volute or peripheral-turbine type, close-coupled or flexible-coupled.
c. Style B receivers (discharge pressures over 15 psig (103 kPa (gage))	-	Peripheral-turbine type, flexible-coupled.
d. Style C receivers (discharge pressures to 30 psig (207 kPa (gage))	-	Centrifugal-volute, flexible-coupled or sump type.
e. Style C receivers (discharge pressures over 30 psig (207 kPa (gage))	-	Sump type.

Condensate pumps for type II, class 1 may be integral with the air pump (group B) or of the close-coupled type as specified for type I, style A. For type II, class 2, condensate pumps shall be of the centrifugal, close-coupled type only. Condensate pumps for type III shall be peripheral-turbine type, flexible-coupled. All condensate return pumps shall be cast iron, bronze fitted, shall be furnished with dynamically balanced impellers keyed or screwed and lock-screwed to the shaft, and shall be provided with means for priming, venting, and draining, as required. Pump capacities shall be established on all the operating conditions specified herein. However, all condensate pumps shall be designed to handle condensate at temperatures up to 210 °F (99 °C) at sea level without cavitation or vapor binding. Water pumps shall be in accordance with UL 778.

3.11.1 Centrifugal, close-coupled pumps. Centrifugal, close-coupled pumps shall be furnished with brass or bronze, fully-enclosed impellers and renewable bronze wearing rings. Impellers shall be mounted on an extension of the electric motor shaft. The shaft shall be stainless steel or steel with stainless steel sleeve unless the impeller hub extends to enclose that portion of the shaft normally exposed to the condensate being pumped. The shaft shall be equipped with a mechanical seal having a temperature rating of not less than 210 °F (99 °C) at the specified discharge pressure. Close-coupled pumps shall be vertically or horizontally mounted in accordance with the

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manufacturer's standard design and shall be flange-connected directly to the receiver or an integral extension of the receiver base.

3.11.2 Centrifugal, flexible-coupled pumps. Centrifugal, flexible-coupled pumps shall be furnished with brass or bronze, fully-enclosed impellers. The pumps shall be equipped with either packed stuffing boxes or mechanical seals at the option of the supplier. Mechanical seals shall be rated at not less than 210 °F (99 °C) at the specified discharge pressure. The pump shaft shall be stainless steel. When centrifugal, flexible-coupled pumps are furnished on style C receivers, the pump shall be equipped with a suction riser pipe extending to the bottom of the receiver.

3.11.3 Peripheral, turbine-type pumps. Peripheral, turbine-type pumps shall be furnished with brass or bronze turbine-type impellers, renewable bronze liners, stainless steel shafts, and pre-lubricated antifriction bearings. The pumps shall be equipped with packed stuffing boxes or mechanical seals, at the option of the supplier. Seals shall be rated not less than 210°F (99 °C) at the specified discharge pressure.

3.11.4 Sump pumps. Sump pumps shall consist of volute or peripheral-turbine type centrifugal pump, a vertical, flexible-connected motor and motor pedestal stand, a support pipe enclosing the pump shaft and connecting the pump with the receiver cover, and a discharge pipe terminating in a suitable pipe connection at the cover plate. The pumps shall be furnished with a brass or bronze fully-enclosed impeller, bronze wearing ring, stainless steel shaft, and a removable cover plate on the pump casing. The pump shall be so designed that, when installed on the receiver cover, the pump casing will be in proximity to the bottom of the receiver tank. The pumps shall be equipped with an upper, pre-lubricated thrust bearing and a lower sleeve type shaft guide bearing. The thrust bearing shall provide full support for the pump shaft and be located above the floor plate in the pump pedestal. The lower shaft guide bearing shall be of the oil-less, water-lubricated type and shall be replaceable. Vapor seals or packing shall be provided at points where the pump shaft(s) and control rod(s) pass through the cover plate.

3.12 Vacuum systems. Type II pumping units shall include a condensate return system and a vacuum producing system.

3.12.1 Group A. Group A units shall consist of a two-compartmented, box-shaped (hexahedral) receiver, a condensate return pump conforming to 3.11.1, a venturi-type, multiple-jet, vacuum producer, a pilot-operated valve actuated by a float in the upper air separation compartment, and required float and vacuum switches. The condensate pump shall serve the dual purpose of supplying the jet-type vacuum producer and, when the float operated discharge valve is open, of simultaneously returning a portion of the condensate to the boiler. Receiver shall be either cast iron or steel at the option of the supplier.

3.12.2 Group B. Combination condensate-air pumps for group B units shall consist of a rotary-type air element and a centrifugal-type water impeller mounted on a common shaft. The shaft shall be an extension of the motor shaft (close-coupled) or may be flexible-coupled to the motor. The shaft shall be furnished with mechanical seals or packed stuffing boxes at the option of the supplier. Shafts shall be stainless steel.

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3.12.3 Group C. Group C units shall consist of a condensate receiver with an air separation chamber, a condensate return pump conforming to 3.11.1, a vacuum producer which shall be either a rotary, displacement-type vacuum pump, or a venturi-type, multiple-jet vacuum producer equipped with a close-coupled centrifugal pump. Units with jet-type vacuum producers will therefore be equipped with not less than two independently controlled close-coupled centrifugal pumps, one for the vacuum producer and one for returning condensate to the boiler. All pumps, vacuum producers, and controls shall be mounted directly on the receiver or separation chamber to form a compact, self-contained pumping unit.

3.13 Steam heater. When specified (see 6.2), a direct steam heater shall be provided in the receiver for type I, style B, or type III pumping units. The heater shall be equipped with automatic temperature regulating valve, pressure reducing valve, and shutoff valve. The heater shall have the capacity to heat the condensate and make up water to 210 °F (99 °C) in quantities and from temperatures specified (see 6.2).

3.14 Insulation. Unless otherwise specified (see 6.1.4 and 6.2), the receiver shall be insulated at the site of installation in accordance with the contract. When specified (see 6.2), the receiver shall be factory installed in accordance with the manufacturer's standard practice. Where practical, all exterior surfaces of the unit, except the doors, end covers, handholes, manholes, and vents shall be covered. The insulation shall consist of not less than two inches of fibrous glass, mineral wool, thermal block, or equivalent insulation. The insulation shall have a heat transfer coefficient at a mean temperature of 200 °F (93 °C), not greater than 0.45 Btu/h per square foot per °F per inch thickness (2.56 Watts per square metre per °Kelvin per 25.4 mm thickness) temperature difference. The insulation shall be so formed and secured in place as to prevent sagging or displacement during shipment and operation.

3.15 Controls. Type I, type II, and type III pumping units shall be furnished with the controls designated in table III as standard unless one or more optional items listed in table III are specified (see 6.2), as either an alternate, supplemental, or substitute control. The control circuits shall be nominal 120 volts. All electrical control equipment shall be in accordance with NEMA ICS-1 and ICS-2. Wiring practices shall be in accordance with NFPA 70.

3.15.1 Float switches. Float switches shall be enclosed in a NEMA ICS-6 type 2 enclosure and shall be suitably rated for the motor or magnetic controller to which the switch is connected. The float assembly shall include a stainless steel, seamless copper, or copper-clad float and a stainless steel or copper alloy float rod. Float switch assemblies for controlling condensate pumps shall be adjustable to permit pump-actuation at the desired condensate level.

3.15.2 Mechanical alternators. Mechanical alternators for type I, duplex units and type II, semi-duplex units shall include required floats and switches. The control shall provide for the following operation:

a. Automatically alternate operation of the duplex condensate pumps on successive cycles.

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b. Provide simultaneous operation of both pumps to deliver double capacity under peak load conditions.
c. Provide automatic operation of the idle pump should the active pump fail.

TABLE III. Standard and optional controls for type I, type II, and type III units.

Item No.	Control	Applicability													
	Type	I	I	I	I		II	II	II	II	II	II		III	III
	Style or group	A	B&C	A	B&C		A	A	B	C	C	C		B	B
	Design	A	A	B	B		A	B	A,B,C	A	B	C		C	E
1	Float switch(es)	S	S	O	O		S	S	S	S	S	S		S	S
2	Mechcanical alternator	-	-	S	S		-	O	-	-	O	O		S	S
3	Control cabinet for wall mounting	O	O	O	O		S	S	S	O	O	O		O	O
4	Unit-mounted control cabinet	O	-	S	O		-	-	O	S	S	S		O	O
5	Vacuum switch(es)	-	-	-	-		S	S	S	S	S	S		-	-
6	Selector switch (water)	-	-	O	O		S	S	S	S	O	O		O	O
7	Selector switch (air)	-	-	-	-		-	-	-	S	S	S		O	O
8	Sequence control (water)	-	-	O	O		-	-	-	-	S	S		O	O
9	Sequence control (air)	-	-	-	-		-	-	-	-	S	-		-	-
10	Electrical alternator (water)	-	-	O	-		-	-	-	-	O	O		-	-
11	Electrical alternater (water and air)	-	-	-	-		-	-	-	-	O	-		-	-
12	Make-up valve (water)	O	O	O	O		-	-		-	-	-		S	S

Legend:
S - Standard
O - Optional

3.15.3 Magnetic controllers. Magnetic controllers shall be used with motor start-sequencing control units involving single-phase electric motors of one or more hp (745 W), or polyphase motors. Controllers shall incorporate thermal overload and undervoltage protective functions for each motor power circuit serviced. Fault protective fuses or circuit breakers adequately rated in accordance with NFPA 70 shall be provided in each control power circuit hot leg. Controllers shall include a hands off selector switch unless the function is provided by selector switch or switches on the pumping units. Controllers shall conform to NEMA ICS-1 and ICS-2 design, operation, and test requirements, and enclosure to NEMA ICS-6 type 12.

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3.15.4 Vacuum switches. Vacuum switches shall provide automatic control of air pumping systems on type II units. The set point and differential setting shall be adjustable. For type II, class 1, settings shall provide for operation of the vacuum system between a low of 3 inches of mercury (10 kPa) and a high of 8 inches of mercury (27 kPa) for an average vacuum in the system of 5.5 inches (139.7 mm). For class 2, high and low settings shall be as specified (see 6.2).

3.15.5 Selector switches. Selector switches for condensate pumps shall have at a minimum hand-off-automatic positions. Selector switches for vacuum systems shall provide for automatic-off-continuous operation. When applicable, operating functions specified herein for selector switches may be controlled by switches integral with the magnetic controllers with the vacuum switch, or by the specified sequence control. Selector switches for type II, group A shall provide full automatic control, control by the condensate float only, and continuous operation.

3.15.6 Sequence control (condensate). The sequence control for duplex condensate pumps on type I, type II, group C, and type III shall provide for lead-off-lag and momentary test positions. The control system shall include two float switches, selector switches, and, when applicable, two magnetic controllers. The sequence control shall provide for the following:

a. Manual selection of the lead or active pump and inactive pump(s).
b. Simultaneous operation of two pumps and deliver double capacity under abnormal load conditions.
c. Automatic operation of the lag or inactive pump, light a red indicating light, and sound an alarm if the lead pump or its controls fail.

Sequence controls, when furnished, shall be mounted on the centralized, factory-wired control panel.

3.15.7 Sequence control (vacuum). The sequence control for vacuum systems on type II, group C, duplex units shall consist of selector switches, two vacuum switches, and, when applicable, two magnetic starters. The selector switches shall have off-lead-lag-continuous positions. The sequence control system shall provide for the following:

a. Manual selection of the lead or active pump.
b. Simultaneous operation of both vacuum producing pumps to deliver double capacity under peak load conditions.
c. Automatic operation of the lag of inactive pump, light a red indicating light, and sound an alarm of the lead pump or its controls fail.

Vacuum sequence controls shall be mounted as specified in 3.15.6.

3.15.8 Electrical alternators. Electrical alternators shall be suitable for use with duplex condensate pumps or duplex air pumping units. The alternators shall provide for the control functions specified in 3.15.2 for mechanical alternators.

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3.15.9 Water make up valves. Water make up valves shall be suitable for use with type I and type II pumping units on which the condensate pumps will be controlled by the boiler water level. The make up valves shall be designed and installed to maintain a predetermined condensate level in the receiver to compensate for system losses.

3.15.10 Control panel. The controls, including operating switches, indicating lights, alarms, motor controllers, fuses, and circuit elements of control systems shall be mounted and factory wired on a single control panel or cabinet insofar as practicable in order to centralize the control functions. The control panel shall be suitable for wall-mounting or shall be included as components of a centralized, unit-mounted control panel in accordance with table II. The control panel or cabinet shall be provided with NEMA ICS-6 type 12 dust protective covers. All terminals requiring connection upon installation shall be permanently identified in such a manner that correct connections can be easily made by reference to the instructions and wiring diagrams provided with the equipment. Terminal connections for control functions shall be segregated from power circuit terminals. Wiring shall be in accordance with NFPA 70.

3.16 Accessories.

3.16.1 Water level indicators. Condensate receivers of type I, style B, type II and type III units shall be equipped with a liquid level indicator. When specified (see 6.2), type I, style A units shall also be equipped with a level indicator. The indicators may be of the gage-glass type or of the dial-indicating, float-actuated type.

3.16.2 Strainer. Condensate systems on type I and style A and C and type II pumping units shall be equipped with an internal or external strainer installed in the inlet to the receiver. Condensate systems on type I, style B and type III pumping units shall be equipped with a strainer installed in the inlet to the pump(s). The strainer shall be provided with stainless steel mesh lined or perforated screen, as applicable, and conforming to W-S-2739. The strainer shall also be provided with blow-off outlet with pipe nipple and gate valve.

3.16.3 Pressure gage. Type I, style B and type III shall be equipped with a pressure gage on the discharge side of each pump with siphon and shutoff cocks. The gages shall have a scale not less than 1.5 times the discharge pressure and have a diameter of not less than 2.5 inches (63.5 mm), and be in accordance with ANSI B40.1.

3.16.4 Vacuum gage. The vacuum producing system on type II units shall be equipped with a vacuum or compound gage. The gages shall be self-draining and shall have a diameter of not less than 2.5 inches (63.5 mm), and be in accordance with ANSI B40.1.

3.16.5 Vacuum relief valves. When required, vacuum systems on type II units shall be equipped with a vacuum relief valve.

3.16.6 Air venting device. When specified (see 6.2), receivers shall be equipped with devices for venting air. The devices shall be designed to automatically close against the escape of condensate or steam.

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3.16.7 Thermometers. Type I, style B, type II, and type III pumping units shall be equipped with bi-metal dial type thermometers to indicate the temperature of the condensate entering or within the receiver.

3.17 Electric motors. Electric motors shall be designed and rated in accordance with NEMA MG-1. Motors shall have a continuous hp rating sufficient to meet the performance requirements of 3.9. Motors shall be suitable for use with the electrical power supply having the characteristics specified (see 6.2). Unless otherwise specified (see 6.2), motors shall be furnished with drip-proof enclosures with sealed windings. The continuous hp (W) rating of the motor shall be the nameplate hp (W) rating exclusive of any applicable service factors.

3.18 Coatings. Exterior coatings for receivers (except stainless steel receivers) shall be galvanized, epoxy, or organic, as specified (see 6.2). When specified (see 6.2), cast iron receivers shall be coated with an asphaltic base, rust inhibiting paint. The interior of all steel receivers (except stainless steel) shall be provided with effective material to protect the receiver against corrosive gases and untreated water, which will withstand temperatures up to 210 °F (99 °C). Acceptable material for inside surfaces shall be baked phenolic-epoxy, baked polymerized fluorocarbon amine or polyamine-epoxy. Plastic liners or coatings shall have water absorption rates of the cured lining of less than 2 percent by the long term immersion method of ASTM D 570.

3.18.1 Galvanized. Galvanized coatings shall conform to the applicable requirements of ASTM A 123.

3.18.2 Epoxy. Epoxy coatings applied to the surfaces of the receiver tank shall be a standard commercial epoxy coating system which will withstand temperatures up to 210 °F (99 °C) and requirements of 3.18.

3.19 Treatment and painting. Unless otherwise specified (see 6.2), all parts of the equipment normally painted, except surfaces coated under 3.18, shall be treated and painted in accordance with the manufacturer's standard practice.

3.20 Lubrication. Unless otherwise specified (see 6.2), means for lubrication shall be provided in accordance with the manufacturer's standard practice. Parts requiring lubrication shall be so located as to make the lubricating points easily visible and accessible. All parts requiring lubrication should be properly lubricated before delivery.

3.21 Bedplate. When specified (see 6.2), the pump and its drivers, condensate receiver, and accessories shall be bolted to a common bedplate made of heavy cast iron, cast steel, or fabricated structural steel, as specified. The bedplate shall be designed to provide ample strength and rigidity during shipping and maintain alignment or be readily realigned prior to permanent installation and startup. The mounting surfaces of the bedplate shall be smooth finish and made parallel to each other. Not less than four bolt holes and a sufficient number of grouting holes shall be provided to facilitate installation on a concrete base.

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3.22 Identification marking. Identification shall be permanently and legibly marked directly on the deaerating heater or on a corrosion-resisting metal plate securely attached to the pumping unit at the source of manufacture. Identification shall include the manufacturer's model and serial number, name and trademark to be readily identifiable to the manufacturer.

3.23 Instruction plates. The equipment 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 life of the equipment, and shall be securely affixed thereto with nonferrous screws or bolts of not less than 1/8-inch diameter.

3.24 Servicing and adjusting. When specified (see 6.2), prior to acceptance of the pumping unit by the Government, and after installation, the contractor shall service and adjust each unit and all accessories the contractor furnishes. The servicing and adjustments shall be performed at the installation site and under actual operating conditions.

3.25 Workmanship.

3.25.1 Steel fabrication. The steel used in fabrication shall be free from kinks, sharp bends, and other conditions which would be deleterious to the finished product. Manufacturing processes shall not reduce the strength of the steel to a valve less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to insure uniformity of size and shape.

3.25.2 Bolted connections. Bolt holes 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.

3.25.3 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 contract with the surface of the member.

3.25.4 Welding. Welding procedures shall be in accordance with an AWS D1.1 welding code. The surface of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Welds shall be of sufficient size and shape to develop the full strength of the parts connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof and service loadings.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as

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specified herein. Except as otherwise specified in the contract, 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 ensure supplies and services conform to prescribed requirements.

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

4.2 Classification of inspections. The inspection requirement 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 of each classification of pumping unit as specified when a first article is required (see 3.3). This inspection shall include the examination of 4.3 and the test of 4.4. Failure of the first article to pass the examination or any of the test shall be cause for rejection.

4.2.2 Quality conformance inspection. The quality conformance inspection shall consist of the examination of 4.3, and the test of 4.4.3, the on-site inspection of 4.5.

4.3 Examination. Each unit shall be examined for compliance with the requirements specified in section 3 of this document. 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.

4.4 Tests.

4.4.1 Capacity. The storage capacity of receivers shall be checked to verify conformance to the requirements of table I. Nonconformance to the requirements of table I shall constitute failure of this test.

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4.4.2 Performance. Each pumping unit shall be tested to verify compliance with the pumping capacities pressure of 3.9.4, the net working volume of 3.10, and the control functions of table III and 3.15. Test for condensate pumps shall be conducted in accordance with the applicable test methods and procedures given in the standards of the Hydraulic Institute. Test shall be conducted at water temperature of 70 °F (21 °C) and corrected to the water conditions specified in 3.9.1.

4.4.3 Functional test. Each pumping unit shall be operated as required to verify that all components and controls are properly installed and wired and that control functions are effected in accordance with the applicable requirements of 3.15 through 3.15.9.

4.5 On-site inspection. The on-sight inspection shall consist of the performance test of 4.4.2 to be performed at the site after installation. The test shall be performed on the intended unit at the rated load, and at the minimum load if unit is connected to a boiler of the modulating type.

5. PACKAGING

5.1 Packaging requirements. The preservation, packing, and marking shall be as specified in the contract or order.

6. NOTES

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

6.1 Intended use. Type I, type II, and type III pumping units covered by this specification are intended for use in steam heating and process systems in which the condensate cannot be returned to the boiler by gravity. Class 1, type II units are intended for use on systems in which the returns are under a vacuum, class 2 is intended for use on sub-atmospheric system in which the supply piping, radiation, and returns are all under a vacuum.

6.1.1 Capacity. Capacity shall be based on the actual output of the boiler or steam heating system expressed in gpm (L/s) of condensate based on boiler hp or Btu/h (W). Some manufacturer's make units to the standard hp ratings of the American Boiler Manufacturers Association. Branch lines of steam heating systems should be based on Btu/h (W). When the capacity is expressed in Effective Direct Radiation (EDR), the EDR rating should be converted to Btu/h (W) by multiplying the EDR by 240 (Btu/h/square foot) (W/m^2). The EDR is not applicable in specifying the capacity of the condensate return units since the Hydronics Institute has changed its method of rating radiators for baseboard and convection heating systems to Btu/linear foot (joule per metre (J/m)). The 480,000 Btu/h (140 674.1 W) for gpm (L/s) of condensate has been established on the basis that there are approximately 1,000 Btu (1 055 kJ) in 1-pound (0.45 kg) of steam at 212 °F (100 °C), and water at 212 °F (100 °C) weighs approximately 8 pounds per gallon (958.6 gram per litre) and for a time of 60 minutes. The 0.06974 gpm (0.004 39 L/s) of condensate for one boiler hp (3.281 08 W) was established by

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dividing 33,475 Btu/h (9 810.55 W) for one hp by 480,000 Btu/h (140 674.1 W) for gpm (L/s). The 0.558-pound (0.2531 kg) per minute for one hp (W) was established by multiplying 0.06974 gpm (0.004 39 L/s) by 8.00 pounds per gallon (958.611 2 gram per L).

6.1.2 Receiver capacities. Receiver capacities given in the manufacturers' catalogs are generally the actual volumes of the receiver and not the net working volumes required. In calculating the cycle time of the pumping unit the net working volume should be obtained from the manufacturer. The cycle time requirements of 3.10 should be adhered to in order that adequate life can be obtained from the motors and other components of the electrical system. Units with smaller receiver capacities, such as type I, style A and type II, class 1, are suitable for compact heating systems having short return lines where condensate will be returned to the receiver within 5 minutes for the smaller units and 2 to 3 minutes for larger units. For systems with longer return lines and higher pressures, such as multi-story buildings or multiple building installations, other units having a larger storage capacity, such as type I, style C, should be specified. When type I and type III units will be equipped with feedwater make up valves (see 3.15.9) and controlled by water level sensing elements on boiler, a receiver capacity equal to not less than 1 gallon (3.79 L) per boiler hp (9.803 kW) is recommended.

6.1.3 Discharge pressure. Condensate pump capacities specified herein are based on the pressure at the pump outlet. In selecting the appropriate discharge pressure for the intended installation, the static head and friction losses in piping from the receiver to the boiler must be considered in addition to the boiler operating pressure.

6.1.4 Insulation. Whenever possible, it is recommended that the receiver be procured without insulation. It is preferable that the unit be lagged at the site after the unit is in place, connected, and tested. Not only is the insulation susceptible to damage during shipment and handling at the job site, but should any leaks develop in joints or fittings due to strains and jars incident to shipment and handling, the lagging will be damaged to an extent normally requiring complete replacement.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Type, design, style, group, class, capacity and discharge pressure (see 1.2, 3.1.1, 3.1.2, 3.1.3, 3.9, and 3.9.4).
c. When a first article is required (see 3.3).
d. If machine is required to be configured in a specific measurement (see 3.8).
e. When performance rating for type III shall be other than as specified (see 3.9.1).
f. When type III performance rating shall be established at 210 °F (99 °C) condensate (see 3.9.1).
g. When receiver net working volume shall be other than as specified (see 3.10).
h. Shape of style A receiver required (see 3.10.1).
i. Whether iron or steel receivers are required for style A (see 3.10.1).
j. When connection sizes shall be other than as specified (see 3.10.1).
k. When style C receivers shall be other than cast iron (see 3.10.3).

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l. When steel is required for style C receivers (see 3.10.3).
m. When steam heater is required for type I, style B and type III pumping units (see 3.13).
n. Quantities and inlet temperature of condensate and make up water that heater shall have the capacity to heat (see 3.13):

	gph (L/s)	Inlet temperature (°F) (°C)
Condensate	_____	_____
Make up	_____	_____

o. When receiver is to be insulated elsewhere other than as specified (see 3.14).
p. When receiver is to be factory insulated (see 3.14).
q. Options required for controls other than standard (see 3.15 and table III).
r. Settings for vacuum switches on type II, class 2 (see 3.15.4).
s. When a liquid level indicator is required on type I, style A (see 3.16.1).
t. When an air venting device is required (see 3.16.6).
u. Electrical power supply characteristics required (see 3.17).
v. When motors shall be furnished with other than drip-proof enclosures with sealed windings (see 3.17).
w. When exterior coating for receivers shall be galvanized, epoxy, or organic (see 3.18).
x. When cast iron receivers shall be furnished with asphaltic base coatings (see 3.18).
y. When painting shall be other than as specified (see 3.19).
z. When lubrication shall be other than as specified (see 3.20).
aa. When bedplate fabrication is required, material for bedplate shall be as specified (3.21).
bb. When servicing and adjusting of each unit by the contractor is required after installation (see 3.24).

6.3 First article. When a first article inspection is required, the item will be tested and should be a sample selected from the first production item consisting of one pumping unit, 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.

6.4 Supersession data. This specification replaces Military Specification MIL-P-17749E dated 22 March 1993.

6.5 Part or Identifying Numbers (PINs). The specification number, class, type, and size are combined to form PINs for pumping units covered by this document (see 1.2). PINs for the pumping units are established as follows:

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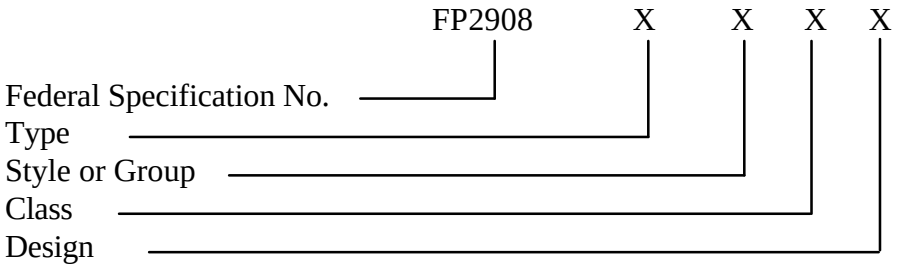

6.5.1 Type. The type of pumping units (see 1.2) is identified by a single numerical character (see table IV).

TABLE IV. Code number to type.

Type	Code
I	1
II	2
III	3

6.5.2 Style and group. The style and group of units (see 1.2) are identified by a single alphabetic character (see table V).

TABLE V. Code letter to style or group.

Style or Group	Code
A	A
B	B
C	C

6.5.3 Class. The class of the units (see 1.2) is identified by a single numerical character (see table VI).

TABLE VI. Code number to class.

Class	Code
1	1
2	2

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6.5.4 Design. The design of the units (see 1.2) is identified by a single numerical character (see table VII).

TABLE VII. Code letter to design.

Design	Code
A	A
B	B
C	C
D	D
E	E

6.6 National Stock Numbers (NSNs). The following is a list of NSNs assigned which correspond to this federal specification. The list may not be indicative of all possible NSNs associated with the federal specification.

NSN	Nomenclature
4520-00-089-3659	Pumping Unit, Condensate, Heating.

6.7 Subject term (keyword) listing.

Duplex unit
Receivers
Single unit
Steam system
Triplex unit
Vacuum return
Water make up

6.8 Classification cross reference. Classification used in this specification (see 1.2) are identical to those found in the superseded Military Specification MIL-P-17749E.

MILITARY INTERESTS:

Custodians:
Navy - YD1
Army - ME
Air Force - 99

Review Activities:
Air Force - 84
DLA - CS

CIVIL AGENCY COORDINATION ACTIVITY:

GSA-FSS

Preparing Activity:
Navy - YD1

(Project 4520-0392)

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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.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER F-B-2908	2. DOCUMENT DATE (YYMMDD) 970602

3. DOCUMENT TITLE PUMPING UNITS, CONDENSATE, RETURN AND BOILER FEED PACKAGE

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 (2) AUTOVON *(if applicable)*	**7. DATE SUBMITTED** (YYMMDD)

8. PREPARING ACTIVITY

a. NAME DANNY MUI	b. TELEPHONE *Include Area Code)* (1) Commercial (805) 982-5666	(2) AUTOVON 551-5666
c. ADDRESS *(Include Zip Code)* COMMANDING OFFICER, NCBC, CODE 15E2G 1000 23RD AVENUE PORT HUENEME, CA 93043-5000	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** DEFENSE QUALITY AND STANDARDIZATION OFFICE 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22401-3466 Telephone (703) 756-2340 AUTOVON 289-2340	