NOTICE OF CANCELLATION

INCH-POUND

MIL-W-17122D
NOTICE 1
21 April 1997

MILITARY SPECIFICATION

WATER SOFTENER UNIT, LIME-SODA TYPE

Military Specification MIL-W-17122D, dated 30 August 1991, is hereby canceled. Future acquisition of this material should refer to Commercial Item Description A-A-50573.

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

Custodians:
Navy - YD1
Air Force - 99

Review Activities:
Army - AT
Air Force - 84
DLA - CS

Preparing Activity:
Navy - YD1

(Project 4610-0003)

AMSC N/A

FSC 4610

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* Inch-Pound *

MIL-W-17122D
30 August 1991
SUPERSEDING
MIL-W-17122C(YD)
24 March 1981

MILITARY SPECIFICATION

WATER SOFTENER UNIT, LIME-SODA TYPE

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 water softening equipment for process and boiler feed water treatment using lime or soda ash. Both hot process and cold process equipment are covered.

1.2 Classification. Water softeners shall be of the following types, as specified (see 6.2):

Type I - Hot process, lime-soda
Type II - Cold process, lime-soda

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

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 93043-5000, by using the self-addressed Standardization *
*Document Improvement Proposal (DD Form 1426) appearing at the end of this *
*document or by letter. *

AMSC N/A FSC 4610

SPECIFICATIONS

FEDERAL

UU-T-81 - Tag, Shipping and Stock.
PPP-B-601 - Boxes, Wood, Cleated-Plywood.
PPP-B-621 - Boxes, Wood, Nailed and Lock Corner.

MILITARY

MIL-V-3 - Valve, Fittings, and Flanges (Except for systems indicated herein); Packaging of.
MIL-C-104 - Crates, Wood; Lumber and Plywood Sheathed, Nailed and Bolted.
MIL-P-116 - Preservation-Packaging; Methods of.
MIL-V-173 - Varnish, Moisture and Fungus-Resistant, (for treatment of communications, electronic, and associated equipment).
MIL-C-3774 - Crates, Wood; Open 12,000 and 16,000-Pound Capacity.
MIL-E-16298 - Electric Machines Having Rotating Parts and Associated Repair Parts; Packaging of.
MIL-C-52950 - Crates, Wood; Open and Covered.

STANDARDS

MILITARY

MIL-STD-129 - Marking for Shipment and Storage.
MIL-STD-147 - Palletized Unit Loads.
MIL-STD-461 - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

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

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME - Boiler and Pressure Vessel Code.
ASME - Section VIII, Division 1 - Rules for Construction of Pressure Vessels.

(Application for copies should be addressed to the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.)

ASTM

ASTM A 53 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded, and Seamless Steel.
ASTM D 888 - Methods of Test for Dissolved Oxygen in Industrial Water.
ASTM D 3951 - Practice for Commercial Packaging.

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C700 - Standard for Cold Water Meters - Displacement Type.
AWWA C701 - Standard for Cold Water Meters - Turbine Type for Customer Service.

(Application for copies should be addressed to the American Water Works Association, Inc., 6666 W. Quincy Avenue, Denver, CO 80235.)

AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)

ANSI B15.1 - Mechanical Power-Transmission Apparatus; Safety Standard for.

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 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.)

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

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

3. REQUIREMENTS

3.1 Description. Water softeners covered by this specification shall be designed to treat boiler feed water or process water in self-contained units. The softening process shall include the use of lime and soda ash. Provision shall be made for the addition of a coagulant feeder when the condition of the water requires coagulants. Supplementary treatment with phosphates and sulfuric acid, if necessary in order to meet effluent requirements, shall be included. The equipment shall be complete and ready for service with all interconnection piping, fittings, valves, and control lines. The equipment shall include principally the softener tank with or without heating chamber, settling tank

and, if required, a deaerator (see 3.7.1 and 6.2), and all connections, the control systems, the chemical feeders and the filters. Unless otherwise specified, the treated water shall have a hardness of less than 1.50 grains per gallon in terms of Calcium Carbonate (CaCO3) for Type I, and less than 3 grains per gallon for Type II, with an excess soda ash content of less than 2.00 grains per gallon.

3.2 First article. When specified (see 6.2), the contractor shall furnish the water softener equipment for first article inspection and approval (see 4.2.1 and 6.4).

3.3 Standard commercial product. The equipment 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 water softening equipment 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, manufacturer's catalogs, or brochures, and represents the latest production model.

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 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.

3.5 Components for Type I.

3.5.1 Softener tanks. The Type I, hot process softener tank shall conform to ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. The tank shall be constructed of welded steel plate not less than 1/4 inch thick and shall be of the sludge blanket type. The design pressure shall be as specified (see 6.2). The interiors of the tanks shall be provided with the necessary baffles, cylinders, or shields required for the satisfactory performance of the equipment. Softeners equipped for deaerating and heating returned condensate shall be so designed that only raw or makeup water shall pass through the softening section and the filters. The tanks shall be provided with approved steel legs so that they shall be supported high enough off the ground to permit gravity flow to the filters, unless there is insufficient headroom.

3.5.2 Settling tanks. In the Type I, hot-process softeners, the settling tanks shall be large enough to provide one hour retention, between the top of the conical bottom and the normal working level of makeup water going through the softening process when the units are operating at rated capacity. The rise rate based on the outlet service flow shall not exceed 2.5 gallons per minute

(gpm) per square foot (sq ft). The flow rate through the softener shall be low enough so that a filter can be backwashed at the specified rate continuously for 10 minutes without any carryover of slurry from the softener to the filter. The conical bottom shall have a slope of 50 to 60 degrees to facilitate the removal of sludge. The knuckle radius of the bottom shall be not less than 3 inches. A backwash recovery ring shall be placed above the sludge bed, so when backwashed it will not disturb the accumulated sludge.

3.5.3 Tank connections. The Type I softener tank shall have all the connections necessary for the satisfactory operation of the equipment. Connections shall be included for the vent condenser and bypass around the condenser, makeup spray, vacuum breaker, steam inlet, chemical inlet, sludge drain, outlets, and returns from the filters and sampling spigots, as required for complete installation.

3.5.4 Spray valves. In the Type I hot process softeners, heating the makeup water shall be accomplished by use of self-regulating, nonfouling spray valves. The spray valves shall be made of chromium-nickel steel, type 304 (UNS S30400) in accordance with the manufacturer's standard practice. The spray valves shall be so designed to provide a constant angle of thin spray with uniform water film at rates from 3 percent to over 150 percent of rated design. The pressure drop required for the spray valves shall be kept to a minimum to effect complete and uniform spraying at full flow. The water shall be heated to within 3 degrees Fahrenheit (oF) of the steam temperature.

3.5.5 Vent condensers. Provision for the complete venting of all released non-condensable gases, including oxygen, carbon dioxide, and nitrogen, shall be made by supply vent condensers of the direct contact internal type, using makeup water as the cooling fluid, with a minimum of steam loss. All parts of the condenser tube and the interior of steel-shell-vent condensers shall be chromium-nickel steel, type 304 (UNS S30400).

3.5.6 Vacuum breakers. In the Type I process, softener tanks shall be equipped with vacuum breakers of adequate size. Shells less than 10 feet in diameter may have only a single port, not smaller than the sizes given below. The vacuum breakers shall seal tight against steam pressure and open to relieve vacuum before the tanks are in danger of collapsing.

Softener capacity gallons per hour	Breaker nominal pipe size
Under 5000	One 6-inch breaker
5000 to 7000	One 10-inch breaker
7000 to 10,000	One 16-inch breaker

3.6 Components for type II.

3.6.1 Softener tanks. The Type II process softener tank shall be constructed of welded steel plate not less than 1/4 inch thick, designed for field assembly and shall be of the solids-contact, sludge recirculation type unit. The tank shall be large enough to provide 1 hour retention of the water being treated when operating at rated capacity. The takeoff rate shall not exceed 1.5 gpm per sq ft of surface area. The tank shall have interior baffles,

partitions, or draft tubes as required for the performance of the equipment. The baffles, partitions, or draft tubes shall be of steel plate not less than 3/16 inch thick.

3.6.2 Tank connections. The Type II softener tank shall be provided with connections for the water inlet, the outlet, sludge removal, sampling pipes, and a bottom drain. All necessary pipe and fittings associated with these connections sufficient to bring the piping to points one foot beyond the surface of the equipment shall be supplied.

3.6.3 Tank mixing zone. The tank for the Type II process shall have a mixing zone, separated from the rest of the tank, where the raw water chemicals shall be thoroughly mixed by mechanical or hydraulic agitation. The sludge-recirculation, solids contact unit shall provide for flash mixing, sludge recirculation, flocculation settling, and clarification within a single basin.

3.6.4 Effluent removal trough. An effluent removal trough shall be provided to receive the softened effluent from the softener tank.

3.7 Accessory components for Type I and Type II.

3.7.1 Deaerators. Deaerators shall be of 100 percent makeup type, and an integral part of the softener tanks. All portions of the deaerating interior that come in contact with corrosive gases shall be made of chromium-nickel steel, type 304 (UNS S30400)in accordance with the manufacturer's standard practice. The deaerating unit shall be designed to thoroughly scrub softened water and the return condensate, reducing the oxygen content to a value of less than 0.005 milliliter (mL) per liter of dissolved oxygen (O2) as determined by the ASTM D 888, and raising the water temperature to steam temperature within the deaerators first and then to the preheaters. Storage tank(s), for deaerators and softened water shall be provided and shall be large enough to hold the equivalent of 7.5 minutes total output at rated capacity.

3.7.2 Water level controls. Automatic control valves for maintaining the water level shall be float-operated with the float in an external case. The float lever shall act through a ball bearing stuffing box assembly and a rotary stem head to minimize friction. Valves of 4-inch iron pipe size and smaller, shall be directly operated, and valves above 4 inches shall be diaphragm operated by use of air or water pressure. The valves shall be balanced double-seated or balanced single-seated if the pressure differential between the water at the valve and the exhaust steam is less than 20 pounds per square inch (psi); if greater, a pilot-operated valve shall be supplied. The valves shall be made of a material suitable for the service intended.

3.7.3 Overflow loop seal. The softener tank shall be equipped with overflow loop seals for pressures under 7 psi. Over 7 psi a float-actuated pilot operated valve shall be provided.

3.7.4 Thermometer. When specified (see 6.2), the softener shall have a thermometer which indicates the temperature of the water near the top of the tank. The sensing element of the thermometer shall be located in the water.

3.7.5 Desludging valve. Unless otherwise specified (see 6.2), an automatic electrically operated, air operated, or hydraulically operated desludging valve

of the best quality normally used for this purpose, shall be supplied. The associated cycle timer, electrical connections, motor, reduction gear, and all other necessary parts shall be provided. The motor and gear shall be totally enclosed. The valve shall be actuated for desludging by the raw water meter.

3.7.6 Agitator. When the design requires mechanical agitation, an impeller driven by a totally enclosed gear reducer agitating and circulating the water during the conditioning process shall be furnished. The tip speed of the impeller shall not exceed 300 feet per minute (fpm). The impeller and component parts shall be constructed of durable material. If the water in which the impeller and components operate is acid, such parts shall be made of or coated with corrosion-resistant materials.

3.7.7 Shaft. The shaft design shall comply with ANSI B15.1. Thrust bearings shall be above water level. Water lubricated sleeve guide bearings shall be provided below water level.

3.7.8 Chemical tanks. Separate tanks shall be provided for lime and soda ash. If required, duplicate tanks may be provided for lime and soda ash. The tanks shall be large enough to hold a 12-hour supply when the softener is operating at rated capacity. Lime tanks shall be equipped with motor-driven mechanical agitators. The tanks shall have covers and dust evacuators and be constructed of steel sheet not less than 3/16 inch thick. Tanks for acidic solutions shall be plastic, such as polyvinyl chloride for plastic lined steel, or lead-lined steel, in accordance with best commercial practice.

3.7.9 Chemical feeders. Chemical feeders shall be of the electrical mechanical type, actuated by a meter in the raw water line. The device shall be of the best quality normally used for this purpose in accordance with commercial practice. The volumes of chemicals fed in each cycle shall be directly proportional to the volume of water passing through the water meter. The solution shall be injected in the softener by a pump operating on a recirculating system. An indicator shall show when the tank needs recharging. All necessary electrical equipment, pump, motors, connecting linkages, valves, fittings, and interconnecting piping required to make a complete unit, shall be supplied. The feeders shall deliver the correct amount of chemicals within +2 percent for the given flow, as the water flow is varied from 25 percent of rated capacity to 100 percent of rated capacity. The rate of feed shall be adjustable while the unit is in operation. The concentration of lime shall not exceed 5 percent.

3.7.9.1 Pumps. The pumps feeding lime or soda ash shall be of the centrifugal design with all iron pump construction, hardened steel shaft, sleeve flexible couplings, and open impellers. The shafts shall have long water-seal packing glands. Pumps feeding acidic solutions shall be constructed of chromium-nickel steel, type 304 (UNS S30400) in accordance with manufacturer's standard practice. Motors shall be provided for all pumps.

3.7.9.2 Proportioning pipe operating mechanism. When used as a device to lower a proportioning pipe, motors shall operate with totally enclosed gear reducers. Motors shall be so designed that no drift develops, and shall automatically lock when the current stops.

3.7.10 Filters. Three or more vertical filters shall be provided for each softener to remove solids from the softened water. The filtration rate shall not exceed 3 gpm per sq ft of bed area when all the filters are operating, except when some of the filters are being backwashed. When filters are being backwashed, the filtration rate for the remaining filters shall not exceed 4.5 gpm per sq ft for short periods. The filter shells shall conform to ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. The filtering material shall be anthracite and shall have no less than 4 different layers and a minimum depth of 36 inches. The following sizes and depths may be used as a guide:

Bed depth-inches	Material mesh sizes
18 inches	10 - 30
6 inches	3/16 - 5/16
6 inches	5/16 - 9/16
6 inches	9/16 - 13/16

The filters shall be backwashed with water taken from the uptake chamber of the settling tank or from a backwash water compartment at a rate of not less than 12 gpm per sq ft. When specified (see 6.2), provision shall be made for recovering the wash water. All necessary valves, fittings, and interconnecting piping shall be provided.

3.7.10.1 Booster pump and motor. Where there is insufficient head to circulate water through the filters, a booster pump of all-iron construction and hardened steel shaft sleeves and motor shall be provided.

3.7.10.2 Backwash pump and motor. A backwash pump of all-iron construction and hardened steel shaft sleeves and motor shall be supplied. The set shall have sufficient capacity to backwash the filters at the required rate.

3.7.10.3 Gages. The following number of gages shall be supplied for the filters:

Loss of head - 2 gages
Rate of flow - 2 indicators for each filter:
one for use during filtration and
one for use during backwashing.

3.7.10.4 Controls. A complete valve nest shall be supplied with every filter. The valves shall have threaded connections for sizes smaller than 4-inch iron pipe size. Valves 4 inches and over shall have flanged connections. Multiport valves shall not be used. Pipe shall be of black wrought steel. Valves shall be of all-iron construction.

3.7.11 Piping. All piping shall be standard weight steel pipe conforming to ASTM A 53. Pipe less than 4-inch iron pipe size shall have threaded connections, and sizes 4 inches and over, flanged connections.

3.7.12 Sludge recirculation pump. When required for satisfactory softening of the raw water, a sludge recirculation pump of all-iron construction, hardened steel shaft sleeve and motor, shall be provided. When sludge recirculation is accomplished internally, the pump shall be a cast iron open impeller and a

capacity of not less than 5 percent of the makeup requirements. When external recirculation is required the pump shall be a diaphragm type that would not tear the sludge apart.

3.7.13 Oil separator. When specified (see 6.2), an oil separator shall be supplied.

3.7.14 Water meter. Each unit shall be provided with a water meter. For inlet pipes under 2 inches in diameter a displacement type shall be used; for pipe 2 inches in diameter and over, the turbine type shall be used; and for pipe over 4 inches, orifice plates or venturi meters shall be used. The rated capacity of the water meter shall be 20 percent greater than the rated capacity of the unit. The meters shall conform to the standard C700 and C701 of the American Water Works Association.

3.7.15 Electric motors. Unless otherwise specified (see 6.2), the motors shall be 208-volt; 3-phase, 60-cycle, totally enclosed, class A insulation motors equipped with thermal overload elements. The motors shall be the manufacturer's recommended size for the power requirements. The motor temperature rise shall not exceed 55 degrees Celsius (|C) when operated at full load in an ambient temperature of 40|C. The motors shall conform to NEMA MG 1.

3.8 Current characteristics. Unless otherwise specified (see 6.2), all electrically operated equipment, such as pumps and agitators, shall be designed for 208-volt, 3-phase, 60-cycle supply.

3.9 Testing apparatus. When specified (see 6.2), the manufacturer shall supply, for each installation, a chemical testing outfit, including a supply of chemicals, the test apparatus, report forms, and a cabinet to contain all the equipment. The apparatus shall permit making a quantitative analysis of the following constituents in the treated and concentrated boiler water:

a. Alkalinity (phenolphthalein and methyl orange).
b. Sodium chloride.
c. Hardness.
d. Phosphate (boiler concentrate only), O to 100 part per million (ppm).
e. Dissolved oxygen.

The tests shall be the accepted standard laboratory tests and the equipment shall be in accordance with good commercial practice.

3.10 Fungus resistance. When specified (see 6.2), 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.

3.11 Electromagnetic interference control. When specified (see 6.2), the equipment shall conform to the electromagnetic interference control requirements and test limits for class No. IIIC equipment as specified in MIL-STD-461.

3.12 Guards. Guards shall be provided for all moving parts dangerous to personnel.

3.13 Stenciling. The gross weight of each unit of equipment shall be stenciled on each side of the unit in such a manner as to be readily discernible to dock and military personnel.

3.14 Instruction plates. Each unit of 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 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.

3.15 Treatment and painting. Unless otherwise specified (see 6.2), the equipment shall be treated and painted in accordance with the manufacturer's standard practice. All surfaces of the equipment other than corrosion-resisting steel shall be protected against corrosion and present a neat appearance.

3.16 Identification plate. An identification plate will be furnished by the contracting officer for each water softening unit. The contractor shall stamp all necessary data in the blank spaces of the plate provided for that purpose, and securely affix a plate to each unit in a conspicuous place with nonferrous screws, rivets, or bolts not less than 1/8-inch in diameter. The applicable nomenclature contained in the contract item description shall be placed in the top blank.

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

3.18 Lifting attachments. When specified (see 6.2), the equipment shall be provided with suitable lifting attachments to enable the equipment to be lifted in its normal position. Where practicable, one attachment of sufficient capacity to carry the total weight shall be used. Where more than one attachment is required, each attachment, when practicable, shall be of sufficient capacity to carry the total weight. The eye of each lifting attachment shall be not less than 3 inches in diameter. The lifting attachments shall be constructed to withstand any handling conditions which might be encountered, such as rapid lowering and violent braking of load. Special slings shall be furnished where necessary, and the attachments shall be so designed that no clamps or other devices are required for their installations. Suitable provisions shall be made for storing the slings on the equipment when not in use. The attachments shall be diagrammatically indicated on a copper or zinc-base-alloy plate securely fastened to the unit, with the lifting capacity of each attachment stated thereon.

3.19 Drawings and technical publications. When specified (see 6.2), the manufacturer shall submit installation drawings and shall furnish operating instruction manuals with lubrication chart, parts book, and repair manuals applicable to the equipment and the attachments with each unit in reference to section 6.3 of this specification.

3.20 Repair or maintenance parts, maintenance tools, and accessories. When specified (see 6.2), repair or maintenance parts, maintenance tools, and accessories shall be furnished, applicable to the prime equipment.

3.21 Workmanship.

3.21.1 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 value less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to ensure uniformity of size and shape.

3.21.2 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.

3.21.3 Welding. Welding procedures shall be in accordance with a nationally recognized 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.

3.21.4 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 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.

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 (examinations and tests) 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 this document 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 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 water softening unit when a first article is required (see 3.2 and 6.2). This inspection shall include the examination of 4.3 and the tests of 4.4 and 4.5. 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 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 and 4.5, and the packaging inspection of 4.6.

4.3 Examination. Each equipment 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 Performance test. After inspection the effluent of each unit shall be tested, when operating on raw water approximately of the analysis specified (see 6.2), to determine whether the equipment meets the requirements of this specification.

4.5 Shell test. Each shell shall be tested in accordance with the ASME Boiler and Pressure Vessel Code.

4.6 Packaging inspection. The preservation, packing, and marking shall be inspected to verify conformance to the requirements of Section 5.

5. PACKAGING

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

5.1.1 Level A.

5.1.1.1 Disassembly and matchmarking. Disassembly shall be the minimum necessary to safeguard parts known to the subject to damage and loss and which would interfere with carrier limitations of height, width, and weight. Bolts,

nuts, screws, pins, and washers removed shall be reinstalled in one of the mating parts and secured to prevent their loss. When necessary, to facilitate reassembly, parts removed and mating parts shall be matchmarked. Matchmarking shall be printed on tags conforming to UU-T-81, type A, attached to the mating parts. Waterproof ink shall be used for marking of information on tags.

5.1.1.2 Preservatives. Preservatives shall conform to the applicable specifications listed in, and shall be applied in accordance with MIL-P-116.

5.1.1.3 Unprotected metal surfaces. Unpainted and uncoated, exposed ferrous metal surfaces, such as bolts, nuts, pins, including threaded surfaces and surfaces exposed by disassembly, shall be coated with type P-1 preservative.

5.1.1.4 Valves, fittings and pipe. Valves, fittings, and pipe shall be preserved and packaged in accordance with the applicable level A requirements of MIL-V-3.

5.1.1.5 Meters and gages. The meters and gages shall be preserved by method IC-2 in accordance with MIL-P-116.

5.1.1.6 Electrical equipment. Electrical equipment shall be preserved and packaged in accordance with the applicable level A requirements of MIL-E-16298.

5.1.1.7 Pumps. The interior surfaces of the pumps shall be coated with type P-14 preservative in a manner to ensure thorough coating of all interior parts and surfaces. Excess preservative shall be drained. All threaded surfaces shall be sealed with threaded metal or plastic caps or plugs.

5.1.1.8 Anthracite. Anthracite shall be packaged in sacks that are fabricated from water resistant, reinforced kraft paper in accordance with the standard commercial practice.

5.1.1.9 Technical publications. Technical publications for each unit shall be preserved by method IC-1 in accordance with MIL-P-116.

5.1.1.10 Consolidated packaging.

5.1.1.10.1 Disassembled components. Small disassembled components shall be packed in close-fitting boxes conforming to PPP-B-601, overseas type. The contents shall be cushioned, blocked, and braced to prevent movement within the boxes.

5.1.1.10.2 Testing apparatus, and technical publications. The testing apparatus, and technical publications shall be packaged as specified for disassembled components.

5.1.2 Commercial. The complete unit shall be preserved in accordance with ASTM D 3951.

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

5.2.1 Level A.

5.2.1.1 Shells and tanks. Shells and tanks shall be packed in open wood crates conforming to MIL-C-52950 or MIL-C-3774. Contents shall be shrouded in accordance with the applicable crate specification. Contents shall be secured, cushioned, blocked and braced to prevent movement or damage.

5.2.1.2 Valves fittings, pipes, meters, gages, electrical equipment and pumps. All valves, fittings, pipe, meters, gages, electrical equipment, and pumps together with packaged components shall be packed in close fitting boxes conforming to PPP-B-601, overseas type, PPP-B-621 class 2, or nailed sheathed crates conforming to MIL-C-104. Contents shall be secured, cushioned, blocked, and braced to prevent movement or damage.

5.2.1.3 Palletization. Bags of anthracite shall be palletized in accordance with MIL-STD-147, load type XV.

5.2.2 Level B. Packing for level B shall be as specified for level A except the boxes shall conform to PPP-B-621, class 1 or PPP-B-601, domestic type.

5.2.3 Commercial. The complete equipment shall be packed in accordance with ASTM D 3951.

5.3 Marking. In addition to any special marking required, bags, packages, and shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

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

6.1 Intended use.

6.1.1 Type I. Type I, hot process softeners are generally used for conditioning boiler feed water. When a supply of steam is available, the hot process softeners are also used to condition water for chemical process work. Hot process softeners reduce hardness, total dissolved solids, and alkalinity. However, hot process softeners cannot reduce hardness to zero, as the zeolite softeners can, without the addition of supplementary phosphate treatment. For high pressure boilers requiring very pure water, hot process softeners followed by sodium cycle zeolite softeners have been used.

6.1.2 Type II. Type II, cold process water softeners are large capacity water treating units which reduce the hardness, turbidity, and alkalinity in a raw water using lime and soda ash and occasionally supplementary chemicals. This process cannot reduce the hardness factor to as low a quantity as the hot process. They are used for testing community water supplies, for treating some process water and for low pressure boiler feed water. Sizes of over one million gallons a day should not be ordered with this specification.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of specification.
b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
c. Design information (see 1.2 and 3.1).
   (1) Type, size, and service in which softener will be used.
   (2) Source of raw water (name of river, name of city water supply, geographic location of well, etc.).
   (3) Raw water analysis:
      Give quantities of the following substances in ppm or grains per gallon:
         Calcium, magnesium, sodium, silica, iron oxide and alumina, bicarbonate, carbonate, hydroxide, sulfate, chloride, phosphate, volatile and organic matter total, solids in solution, suspended matter, C02-free, hardness in terms of CaCO3, free acid, pH, color.
   (4) Effluent analysis:
      Specify the allowable solids in solution, hardness in terms of CaCO3, and pH required of the softened water (see 3.1).
   (5) Boiler pressure, if necessary.
   (6) Capacity in terms of outflow from softener:
      Makeup (raw) water - temperature and volume.
      Condensate returned - temperature and volume.
      Pounds per hour of boiler feed water (include steam for feed water heating.)
   (7) Whether softeners shall be deaerating or nondeaerating (see 3.1 and 3.7.1).
   (8) When first article is required for inspection and approval (see 3.2, 4.2.1, and 6.4).
   (9) Pressure of exhaust steam used for heating.
   (10) Softener design pressure (see 3.5.1).
   (11) Indoor or outdoor installation; if indoor, give overall clearance available.
   (12) When wash water should be recovered (see 3.7.10).
d. When thermometer is required (see 3.7.4).
e. Whether a manual desludging valve is required or a hydraulically operated automatic valve (see 3.7.5).
f. Whether exhaust steam will have entrained oil thus requiring an oil separator (see 3.7.13).
g. Motor characteristics if other than that specified (see 3.7.15).
h. Specify supply current if other than 208-volt, 3-phase, 60-cycle (see 3.8).
i. When chemical testing apparatus is required (see 3.9).
j. If fungus treatment is required (see 3.10).
k. Whether electrical equipment shall be electromagnetic interference controlled (see 3.11).
l. When treatment and painting, other than that specified is required (see 3.15).
m. Lifting attachments if necessary (see 3.18).
n. When technical publication is required (see 3.19).

o. Applicable list of repair or maintenance parts, maintenance tools and accessories (see 3.20).
p. When performance test is required (see 4.4).
q. Level of preservation and packing required (see 5.1 and 5.2).

6.3 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (CDRL), incorporated into the contract. When the provisions of DoD Federal Acquisition Regulations (FAR) Supplement, Part 27, Sub-Part 27.475-1 (DD Form 1423) are invoked and the DD Form 1423 is not used, the data should be delivered by the contractor in accordance with the contract or purchase order requirements.

6.4 First article. When a first article inspection is required, the item will be tested and should be a first production item, 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 complete water softening unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

6.5 Subject term (key word) listing.

Boiler feed water treatment
Softener, cold process
Softener, hot process
Softening process
Water softening equipment

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

Custodians:
Navy - YD
Air Force - 99

Review Activities:
Air Force - 84
DLA - CS

Preparing Activity:
Navy - YD

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