

[INCH-POUND]
A-A-50573
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SUPERSEDING
MIL-W-17122D
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COMMERCIAL ITEM DESCRIPTION

WATER SOFTENER UNIT, LIME-SODA TYPE

The General Services Administration has authorized the use of this commercial item description for all Federal agencies.

1. **SCOPE.** This commercial item description (CID) 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.
2. **CLASSIFICATION.** Water softeners are of the following types, as specified (see 7.1 and 7.3).

2.1 Type:

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

2.2 Capacity:

- | | |
|---------|---|
| Class 1 | - Under 5,000 gallons per hour (gph) (Under 5 250 cubic centimetre per second (cm ³ /s)) |
| Class 2 | - 5,000 to 7,000 gph (5 250 to 7 350 cm ³ /s) |
| Class 3 | - 7,000 to 10,000 gph (7 350 to 10 500 cm ³ /s) |

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.

A-A-50573

3. SALIENT CHARACTERISTICS.

3.1 Description. Water softeners covered by this CID 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. Provisions shall be made for the addition of a chemical feeder for coagulant, phosphates, and sulfuric acid. 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 3.6 and 7.3), and all connections, the control systems, the chemical feeders and the filters.

3.2 Standard commercial product. The water softening equipment shall, as a minimum, be in accordance with the requirements of this CID and shall be the manufacturer's standard commercial product. Additional or better features which are not specifically prohibited by this CID 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 being currently offered for sale on the commercial market through advertisement or manufacturer's catalogs or brochures, and represents the latest production model.

3.3 Performance. The water softener equipment shall be capable of meeting the capacities specified (see 2.) The tank interiors shall be provided with all of the necessary baffles, cylinders, partitions or tubes required for the satisfactory performance of the equipment. Unless otherwise specified (see 7.3), the treated water shall have hardness of less than 1.50 grains per gallon (25.68 milligrams per litre (mg/L)) in terms of calcium carbonate (CaCO_3) for type I, and less than 3 grains per gallon (51.36 mg/L) for type II, with an excess soda ash content of less than 2.00 grains per gallon (34.24 mg/L).

3.4 Components for type I.

3.4.1 Softener tanks. The softener tank shall conform to ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. The tank shall be of the sludge blanket or solids contact type as specified (see 7.3) and meet the design pressure specified (see 7.3). 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.

3.4.2 Settling tanks. The settling tanks shall be large enough to provide one-hour retention when the units are working at rated capacity. The rise rate based on the outlet service flow shall be not greater than 2.3 gallons per minute (gpm) per square foot (ft^2) (0.15 litre per second (L/s) per square metre (m^2)). 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 the slurry from the softener to the filter. The conical bottom shall have sufficient slope as to allow for sludge removal.

A-A-50573

3.4.3 Tank connections. The tank shall have all the connections necessary for the satisfactory operation of the equipment including the following:

- a. Internal direct contact vent condenser
- b. Makeup inlet
- c. Vacuum breaker
- d. Chemical inlet
- e. Recirculation inlet
- f. Sludge drain
- g. Treated water outlet
- h. Overflow
- i. Clean backwash fill
- j. Dirty backwash return
- k. Sample connections
- l. Pressure and temperature connections
- m. Vent and access manways for access to upper chemical reaction zone
- n. Lower settling zone
- o. Backwash compartments

3.4.4 Spray valves. Heating the makeup water shall be accomplished by use of self-regulating, nonfouling spray valves. The spray valves shall be accessible from outside of the pressure vessel through removable cover plates. The spray valves shall provide a constant angle of thin film spray with uniform water film at rates from 3 percent to 120 percent of rated system design capacity. The pressure drop required for the spray valves shall be kept to a minimum to effect complete and uniform spraying at full flow when the water is heated to within 2 degrees Fahrenheit ($^{\circ}\text{F}$) (1.1 degrees Celsius ($^{\circ}\text{C}$)) of saturation temperature maintained by heating steam in process vessel.

3.4.5 Vent condensers. Provisions shall be made for complete venting of all released noncondensable gases, including oxygen, carbon dioxide, and nitrogen using supply vent condensers of the direct contact internal type, using makeup water as the cooling fluid, with a minimum of steam loss.

3.4.6 Vacuum breakers. Tanks shall be equipped with vacuum breakers of adequate size. Shells less than 10 feet (3 metre (m)) in diameter may have only a single port, not smaller than the size given below. The vacuum breakers shall seal tight against steam pressure and open to relieve vacuum before the tanks are in danger of collapsing.

Type I softeners

Breaker nominal pipe size

Class 1

One 6-inch (150 mm) breaker

Class 2

One 10-inch (250 mm) breaker

Class 3

One 16-inch (410 mm) breaker

A-A-50573

3.5 Components for type II.

3.5.1 Softener tanks. Tanks shall be designed for field assembly and be of the solids-contact, sludge recirculation type units. Tanks shall be large enough to provide one-hour retention of water being treated when operating at rated capacity. The takeoff rate shall be not greater than 1.5 gpm per ft² (0.09 L/s per m²) of surface area.

3.5.2 Tank connections. Connections shall be provided for the water inlet, the outlet, sludge removal, sampling pipes, and bottom drain. All necessary pipe and fittings associated with the connections sufficient to bring the piping to points 6 inches (152 millimetre (mm)) beyond the surface of the equipment, shall be supplied.

3.5.3 Tank mixing zone. Type II tanks 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 setting, and clarification within a single basin.

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

3.6 Accessory components for type I and type II. When specified (see 7.3) accessory components designed to supplement the operation of lime soda ash softener systems shall consist of:

- a. **Deaerator.** When used with type I hot lime softener, deaerator shall be furnished as an integral part of softener tank designed to receive 100 percent makeup or varying percentages of makeup and condensate as required to support boiler feed requirements. When furnished with type II lime soda softener, deaerator shall be furnished as a separate pressure vessel being designed for 100 percent makeup or makeup and condensate returns. Deaerator systems shall be furnished with automatic water level control valves, overflow valves, level alarms, pressure, temperature indicators, pressure and vacuum relief valves.
- b. **Chemical feed system for lime and soda ash.** The system shall consist of an electrically agitated lime slurry storage tank with depth gauge and low level alarm. It shall be fitted with a centrifugal transfer pump complete with recirculation valve, automatic inlet valve, lime softener makeup water meter. The system shall have an electromechanical or process logic control (PLC) design control station to inject chemical in proportion to raw water entering softener system.
- c. **Automatic desludge system.** A pneumatically actuated sludge removal valve with electromechanical or PLC design control loop, designed to effect valve opening (sludge removal) from base of softener by gravity drain for a timed duration. Valve opening will occur based upon volume of makeup water supplied to softener tank as registered by the inlet water meter.

A-A-50573

3.6.1 **Electric motors.** Unless otherwise specified (see 7.3), 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 be not greater than 131 °F (55 °C) when operated at full load in an ambient temperature of 104 °F (40°C). The motors shall conform to NEMA MG 1.

3.6.2 **Acidic resistant components.** If the water in which the impeller and components operate is acidic, such parts shall be made of or coated with corrosion-resistant materials. Tanks for acidic solutions shall be of plastic, such as polyvinyl chloride for plastic lined steel, or lead lined steel, in accordance with manufacturer's standard practices.

3.7 **Testing apparatus.** When specified (see 7.3), the manufacturer shall supply, for each installation, a chemical testing outfit, (including a supply of testing chemicals), the test apparatus, report forms, and a cabinet to contain all of the equipment. The apparatus shall permit making a quantitative analysis of the following constituents in the treated and concentrated boiler water:

- a. Alkalinity.
- b. Sodium chloride.
- c. Hardness.
- d. Phosphate (boiler concentrate only), 0 to 100 parts 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.

3.8 **Drawings and technical publications.** When specified (see 7.3), 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 attachments with each unit being supplied.

3.9 **Repair or maintenance parts, maintenance tools, and accessories.** When specified (see 7.3), repair or maintenance parts, maintenance tools, and accessories shall be furnished applicable to the units being supplied.

4. REGULATORY REQUIREMENTS.

4.1 **Materials.** The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR). 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 Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this commercial item description are to be new and fabricated using materials recovered from solid waste and reprocessed to become a source of raw materials, 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 are allowed under this commercial item description.

A-A-50573

4.2 Metric products. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, provided they fall within the specified tolerances using conversion tables contained in the latest version of ASTM E 380, and all other requirements of this commercial item description including form, fit, and function are met. If a product is manufactured to metric dimensions and those dimensions exceed the tolerances specified in the inch-pound units, a request should be made to the contracting officer to determine if the product is acceptable. The contracting officer has the option of accepting or rejecting the product.

5. QUALITY ASSURANCE PROVISIONS.

5.1 Product conformance. The products provided shall meet the salient characteristics of this commercial item description, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and be the same product offered for sale in the commercial market. The government reserves the right to require proof of such conformance.

6. PACKAGING. The preservation, packing, and marking shall be as specified in the contract or order.

7. NOTES.

7.1 Part Identification Number (PIN). The following part identification numbering procedure is for government purposes and does not constitute a requirement for the contractor. The PINs to be used for items acquired to this description are created as follows:

AA50573-X-X

CID number _____

Type (see 7.1.1) _____

7.1.1 Type. The type of water softeners shall be identified by a two-digit identifier shown in table I.

TABLE I. Type identifier.

	<u>Identifier</u>	<u>Class</u>	<u>Nominal pipe size</u>
Type I	1-A	Class 1	One 6-inch (150 mm) breaker
	1-B	Class 2.	One 10-inch (250 mm) breaker
	1-C		One 16-inch (410 mm) breaker
Type II	2-A		

A-A-50573

7.2 Source of documents.

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

7.2.2 ASME Boiler and Pressure Vessel Code is available from the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.

7.2.3 NEMA Standards are available from the National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1847, Rosslyn, VA 22209.

7.2.4 ASTM Standards are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

7.2.5 The Federal Acquisition Regulation (FAR) may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

7.3 Ordering data. Acquisition documents should specify the following:

- a. Design information (see 2. and 3.).
 - (1) Type and capacity (see 2. and 3.4.6.).
 - (2) 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, CO₂-free, hardness in terms of CaCO₃, free acid, pH, and color (see 3.1).
 - (4) Whether deaerating is required (see 3.1).
 - (5) Specify treated water hardness in terms of CaCO₃ and pH required (see 3.1).
 - (6) Specify sludge blanket or solids contact type (see 3.4.1).
 - (7) Specify design pressure (see 3.4.1).
- b. Specify accessory components required (see 3.6).
- c. When motors are to be other than 208-volt, 3-phase, 60-cycle (see 3.6.1).
- d. When testing apparatus is required (see 3.7).
- e. When drawings and technical publications are required (see 3.8).
- f. When repair or maintenance parts, maintenance tools, and accessories are required see 3.9).

A-A-50573

7.4 Subject term (key word) listing.

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

7.5 National Stock Numbers (NSNs):

NONE FOUND.

MILITARY INTERESTS:

CIVIL AGENCY COORDINATING ACTIVITY:

Custodians:

Navy-YD1
Air Force-99
Army - AT

GSA-FSS

PREPARING ACTIVITY:

Review Activities:

Air Force-84
DLA-CS

Navy-YD1
(Project 4610-0004)

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 A-A-50573	2. DOCUMENT DATE (YYMMDD) 970421
3. DOCUMENT TITLE WATER SOFTENER UNIT, LIME-SODA TYPE		
4. NATURE OF CHANGE <i>(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)</i>		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME <i>(Last, First, Middle Initial)</i>	b. ORGANIZATION	
c. ADDRESS <i>(Include Zip Code)</i>	d. TELEPHONE <i>(Include Area Code)</i> (1) Commercial (2) AUTOVON <i>(if applicable)</i>	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY		
a. NAME ROMULO R. NICHOLAS	b. TELEPHONE <i>Include Area Code</i> (1) Commercial 805-982-6063	(2) AUTOVON 551-6063
c. ADDRESS <i>(Include Zip Code)</i> COMMANDING OFFICER, NCBC CODE 15E2N 1000 23RD AVENUE PORT HUENEME, CA 93043-4301	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	