

[INCH-POUND]
F-F-2901
April 21, 1997
SUPERSEDING
MIL-F-18113E
11 MAY 1992

FEDERAL SPECIFICATION

FEEDERS, BOILER WATER TREATMENT, BY-PASS AND COMPOUND RECEIVER TYPES

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 pressure-type chemical solution feeders for treatment of boiler feed water or raw makeup water.

1.2 Classification. The chemical feeders shall be of the following types and styles as specified (see 6.2):

Type I - Automatic proportioning feeder.

Type II - Shot-type feeder (manual, intermittent feed).

Style A - For use with pressure systems up to 200 pounds force per square inch gage (psig) (1 379 kilopascals gage (kPa (gage)) maximum.

Style B - For use with pressure systems up to 500 psig (3 447 kPa (gage)) maximum.

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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AMSC N/A

FSC 4410

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2. APPLICABLE DOCUMENTS

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

Military Standard

MIL-STD-889 - Dissimilar Metals.

(Copies of military standards 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 other 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, INC. (ANSI)

ANSI B36.10 - Welded and Seamless Wrought-Steel Pipe.

(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.)

(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 reference cited herein, the text of this document shall take precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. The feeders shall consist primarily of a reservoir, by-pass or shut-off valves, air-cock valve, globe valve (when required), fittings, and piping.

3.2 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.1.

3.3 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

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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. 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.

3.3.1 Dissimilar materials. Intimate contact of dissimilar metals, as defined in MIL-STD-889, which can be expected to cause galvanic corrosion shall have an interposing insulating material provided to minimize the corrosive effect. The insulating material shall be suitable for operation at pressures up to 500 psig (3 447 kPa (gage)) and temperatures up to 250 degrees Fahrenheit (°F) (121.1 degrees Celsius (°C)).

3.4 Interchangeability. All 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.

3.4.1 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.

3.5 Design. Feeders shall be designed to inject chemical solutions into boiler feedwater piping. Feeder designs shall be of two types; type I shall be an automatic proportioning unit and type II shall be a shot-type (manual intermittent feed) unit. The design shall be suitable for operation at temperatures not greater than 250 °F (121.1 °C).

3.5.1 Type I. The type I automatic proportioning feeder is designed for operation on a pressure differential created across an orifice, a pump, or lift check valve thereby producing a proportional feed of chemical solution. The feeder shall incorporate design requirements so that the feeder may be shut off from its feedwater piping while the pressure feed tank is being filled with the treatment solution. Each tank shall be equipped for drainage to a waste receptacle. An air-cock, for venting accumulated air, shall be provided for each pressure tank. A valve shall be provided on the inlet side of the feeder to adjust the chemical solution rate of flow. When specified (see 6.2), the design shall incorporate a gage glass to indicate the quantity of chemical solution in the feeder. All the chemical piping, valves, and fittings used in the feeding of alum solution shall be of brass, copper, or copper alloy. Unless otherwise specified (see 6.2), type I feeders shall be designed with a quick opening access not less than 3.5 inches (89 millimetre (mm)) on the top of the tank. When an access of less than 3.5 inches (89 mm) is provided, the design shall incorporate a funnel and associated valve to facilitate the filling operation. The minimum effective capacity of type I feeders shall be as specified (see 6.2). Typical sizes for type I feeders are: 1 gallon (3.7 litre (L)), 2 to 2.5 gallons (7.5 to 9.4 L), 5 to 6 gallons (19 to 22 L), and 10 to 12.5 gallon (38 to 47 L). Type I feeders may be designed for either floor mounting or mounting

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to the existing boiler feedwater piping as specified (see 6.2). Capacity of units designed to mount to the existing feedwater piping shall be not greater than 2.5 gallons (9.4 L).

3.5.1.1 Type I style A. The type I style A proportional feeder shall be designed to operate at a pressure not greater than 200 psig (1 379 kPa (gage)).

3.5.1.2 Type I style B. The type I style B feeder shall be designed to operate at a pressure not greater than 500 psig (3 447 kPa (gage)).

3.5.2 Type II. The type II feeder shall be so designed that a measured amount of chemical solution can be manually introduced into the feeder receiver and subsequently transferred to the boiler feedwater piping. The feeder shall incorporate design requirements so that the feeder may be shut off from its feedwater piping while the pressure feed tank is being filled with the treatment solution. Each tank shall be equipped for drainage to a waste receptacle. An air-vent, for venting accumulated air, shall be provided for each pressure tank. When specified (see 6.2), the design shall incorporate a gage glass to indicate the quantity of chemical solution in the feeder. All chemical piping, valves, and fittings used in the feeding of alum solution shall be of brass, copper, or copper alloy. Unless otherwise specified (see 6.2), type II feeders shall be designed with a quick opening access not less than 3.5 inches (89 mm) on the top of the tank. When an access of less than 3.5 inches (89 mm) is provided, the design shall incorporate a funnel and associated valve to facilitate the filling operation. The minimum effective capacity of type II feeders shall be as specified (see 6.2). Typical sizes for type II feeders are: 1 gallon (3.7 L), 2 to 2.5 gallons (7.5 to 9.4 L), 5 to 6 gallons (19 to 22 L), and 10 to 12.5 gallons (38 to 47 L). Type II feeders may be designed for either floor mounting or mounting to the existing boiler feedwater piping as specified (see 6.2). Capacity of units designed to mount to the existing feedwater piping shall be not greater than 2.5 gallons (9.4 L).

3.5.2.1 Type II style A. The type II style A shot-type feeder is designed to operate at a pressure not greater than 200 psig (1 379 kPa (gage)).

3.5.2.2 Type II style B. The type II style B shot-type feeder is designed to operate at a pressure not greater than 500 psig (3 447 kPa (gage)).

3.6 Performance.

3.6.1 Type I. The type I automatic proportioning feeder, per charge of chemical solution, shall be capable of discharging the entire contents of the feeder when the quantity of water specified (see 6.2) is passed through the feedwater piping at a differential pressure across the feeder as specified (see 6.2).

3.6.2 Type II. The type II shot-type manual feeder, per charge of chemical solution, shall be capable of discharging the entire contents of the receiver when a quantity of water equivalent to twice the volume of the feeder is passed through the feedwater piping.

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3.7 Construction.

3.7.1 Receiver. Physical configuration of the receiver for type I feeders shall be in accordance with figure 1. Physical configuration of the receiver for type II feeders shall be in accordance with figure 2. Unless otherwise specified (see 6.2), the body of type I and type II feeder receivers shall be a section of seamless, carbon steel pipe in accordance with ANSI B36.10. The ends shall either be threaded and fitted with threaded flanges or shall be of a welded construction. The ends, when installed or assembled, shall be capable of sustaining the operating pressure specified at feedwater temperatures up to 250 °F (1.21 °C) (see 6.2). The receiver shall be fabricated where applicable to accommodate the feed, filling, drain, and vent connections, and the body shall be constructed to accommodate the gage glass fittings.

3.8 Feeder components.

3.8.1 Gage glass. The gage glass shall be furnished with shut-off cocks at top and bottom, and shall be designed to withstand the operating pressure specified for the receiver.

3.8.2 Funnel. The funnel required for type I and type II feeders shall be fabricated from sheet copper having a thickness of not less than 0.060-inch (1.52 mm).

3.8.3 Valves, fittings, and piping. Unless otherwise specified (see 6.2), the valves, fittings, and piping shall be not less than 3/4 inch (19 mm) National Pipe Size (see figure 1). All valves, fittings and piping shall be of a type and material suitable for the operating pressure and temperature specified.

3.8.4 Union. Each feeder shall be furnished with unions on both the inlet and outlet connections. The size of the unions shall correspond to the inlet and outlet pipe size of the feeder.

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

3.10 Identification marking. Identification shall be permanent and legibly marked directly on the feeder or on a corrosion-resisting metal plate securely attached to the feeder at the source of manufacturer. Identification shall include the manufacturer's model and serial number, name, date of manufacture, size, and pressure rating.

3.11 Instruction plates. The feeder 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, and shall be securely affixed to the feeder receiver.

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3.12 Workmanship. The quality of workmanship shall be such as to produce feeders that are in accordance with the requirements of this specification and standards prevailing among manufacturers normally producing this equipment.

3.12.1 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 insure uniformity of size and shape.

3.12.2 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.

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 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.

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

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

- a. First article inspection (see 4.2.1).
- b. Quality conformance inspection (see 4.2.2).
- c. On-site testing (see 4.2.3).

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4.2.1 First article inspection. The first article inspection shall be performed on one feeder when a first article is required (see 3.2, 6.2, and 6.3). This inspection shall include the examination of 4.3, and the tests of 4.4. 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 and the test of 4.4.2.

4.2.3 On-site testing. When specified (see 6.2), testing shall be performed on the units at the site after installation. This testing shall be in addition to quality conformance inspection performed at the factory, and shall be supplemental to the first article inspection, if such inspection is specified. On-site testing shall include the test of 4.4 to verify compliance with the performance requirements of this specification. On-site testing shall be performed either by the feeder manufacturer or by the installing contractor specified (see 6.2). The manufacturer shall have the privilege of representation at tests performed by others. When the manufacturer is responsible for on-site test, the detailed requirements and schedule for the test program will be as specified in the contract (see 6.2). In all cases, deficiencies revealed by on-site testing shall be corrected at the feeder manufacturer's expense, and any required re-testing shall also be at the manufacturer's expense.

4.3 Examination. Each feeder 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 requirement or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.4 Tests. Each feeder (including the first article sample when required) shall be tested. Any unit failing to pass the tests of 4.4.1, 4.4.2, and 4.4.3, as applicable, shall be rejected. Tests shall be conducted as outlined in the referenced documents as herein specified.

4.4.1 Performance. Each feeder shall be tested for conformance to the applicable performance requirements of section 3. Nonconformance to the applicable performance requirements of section 3 shall constitute failure of the unit.

4.4.2 Hydrostatic. The pressure tanks shall be subjected to a hydrostatic test pressure equal to 1.5 times the specified operating pressure. Any evidence of leakage, sweating, or deformation shall be cause for rejection.

4.4.3 Operational. The feeders shall be tested within the full operating pressures and flow requirements specified herein and in resulting contractual documents. Failure of the feeders to perform satisfactorily at the full operating limits specified shall be cause for rejection.

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5. PACKAGING

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

6. NOTES

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

6.1 Intended use. The automatic proportioning feeders covered by this specification are intended for feeding alum and alkali solutions into raw water piping ahead of filters or for feeding ordinary internal boiler water treatment solutions into the feed water piping. The capacity of the feeder selected should ordinarily be such that one charge of solution of the desired strength will suffice for 24 hours of operation. The shot-type feeders covered by this specification are intended for injecting boiler water treatment solutions into the feed water piping in manually-controlled doses, and are ordinarily suitable for operating pressures up to 500 psig (3 447 kPa (gage)), and temperatures up to 250 °F (121.1 °C).

6.1.1 Raw water treatment. For raw water treatment, a sediment tank or self-cleaning strainer shall be provided in the pipe leading to the high pressure side of the feeder.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type and style of feeder (see 1.2).
- c. When a first article sample is required for inspection and approval (see 3.2).
- d. When a gage glass is required (see 3.5.1 and 3.5.2).
- e. When the access to the feeder is to be other than as specified (see 3.5.1 and 3.5.2).
- f. Minimum effective capacity of the feeder (see 3.5.1 and 3.5.2).
- g. If the feeder is to be floor mounted or mounted to the existing feedwater piping (see 3.5.1 and 3.5.2).
- h. Minimum quantity of feedwater flow required to transfer the entire contents of a type I feeder into the feedwater piping and the feedwater pressure differential (see 3.6.1).
- i. Material of receiver, if other than as specified (see 3.7.1).
- j. Operating pressure of receiver (see 3.7.1).
- k. Size of valves, fittings, and piping required (see 3.8.3).
- l. Treatment and painting, if different (see 3.9).
- m. When first article testing is required (see 4.2.1 and 6.3).
- n. When on-site testing is performed either by the feeder manufacturer or by the installing contractor (see 4.2.3).
- o. When detailed test requirements and schedule are required (see 4.2.3).

6.3 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

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inventory as specified in 4.2.1. The first article should consist of one complete feeder. 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-F-18113E dated 6 February 1984.

6.5 Classification cross reference. Classification used in this specification (see 1.2) are identical to those found in the superseded MIL-F-18113E.

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

	FF2901	X	X
Federal Specification No.:			
Type:			
Style:			

6.6.1 Type. The type of units (see 1.2) is identified by a single numerical character (see table I).

TABLE I. Code number to type.

Type	Code
I	1
II	2

6.6.2 Style. The style of units (see 1.2) are identified by a single alphabetic character (see table II).

TABLE II. Code letter to style.

Style	Code
A	A
B	B

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6.7 Subject term (keyword) listing:

Automatic proportioning
Boiler water treatment
Feeders
Shot-type

MILITARY INTERESTS:

Custodians:

Navy - YD1

Air Force - 99

Review Activity:

Air Force - 84

CIVIL AGENCY COORDINATING ACTIVITY:

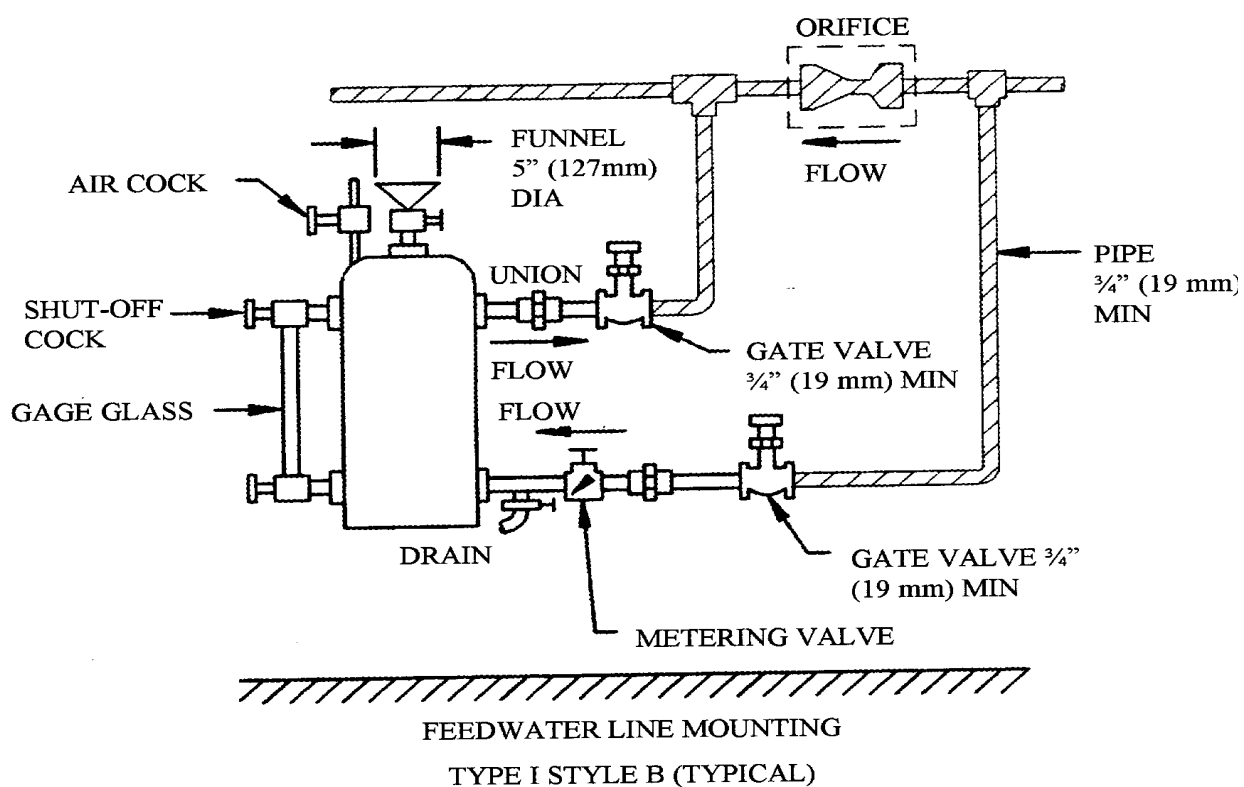
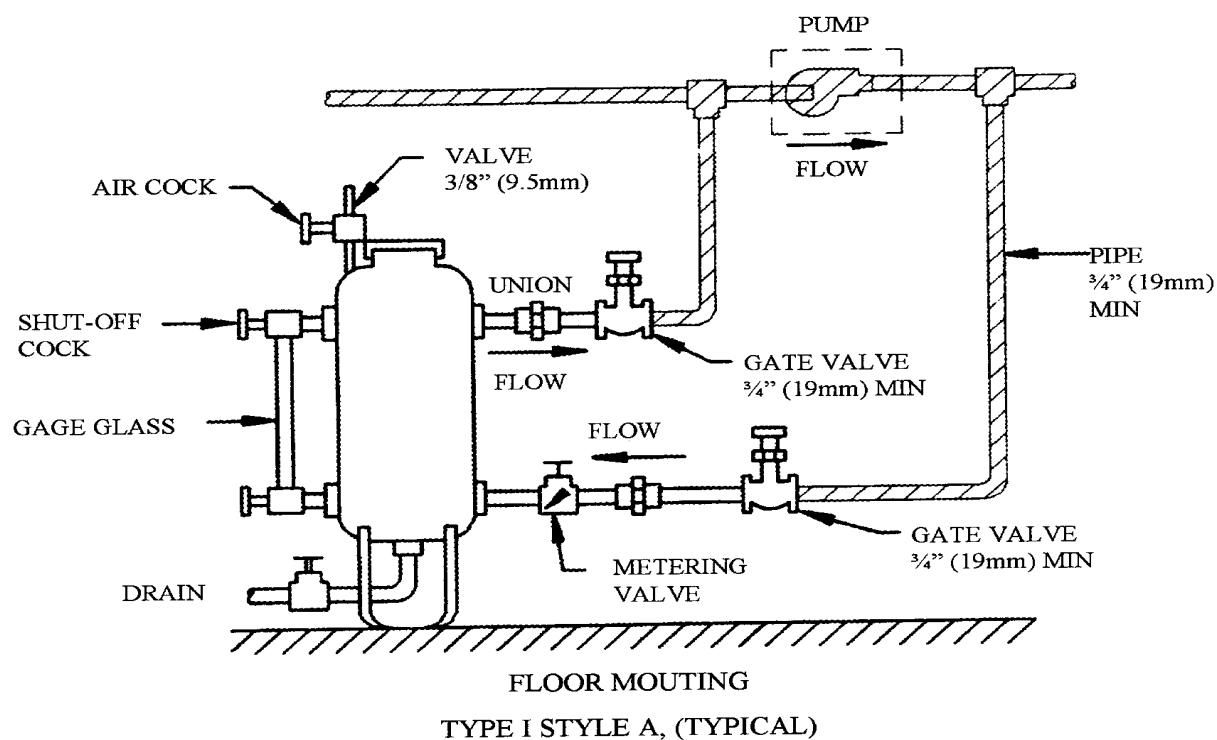
GSA-FSS

Preparing Activity:

Navy - YD1

(Project 4410-0096)

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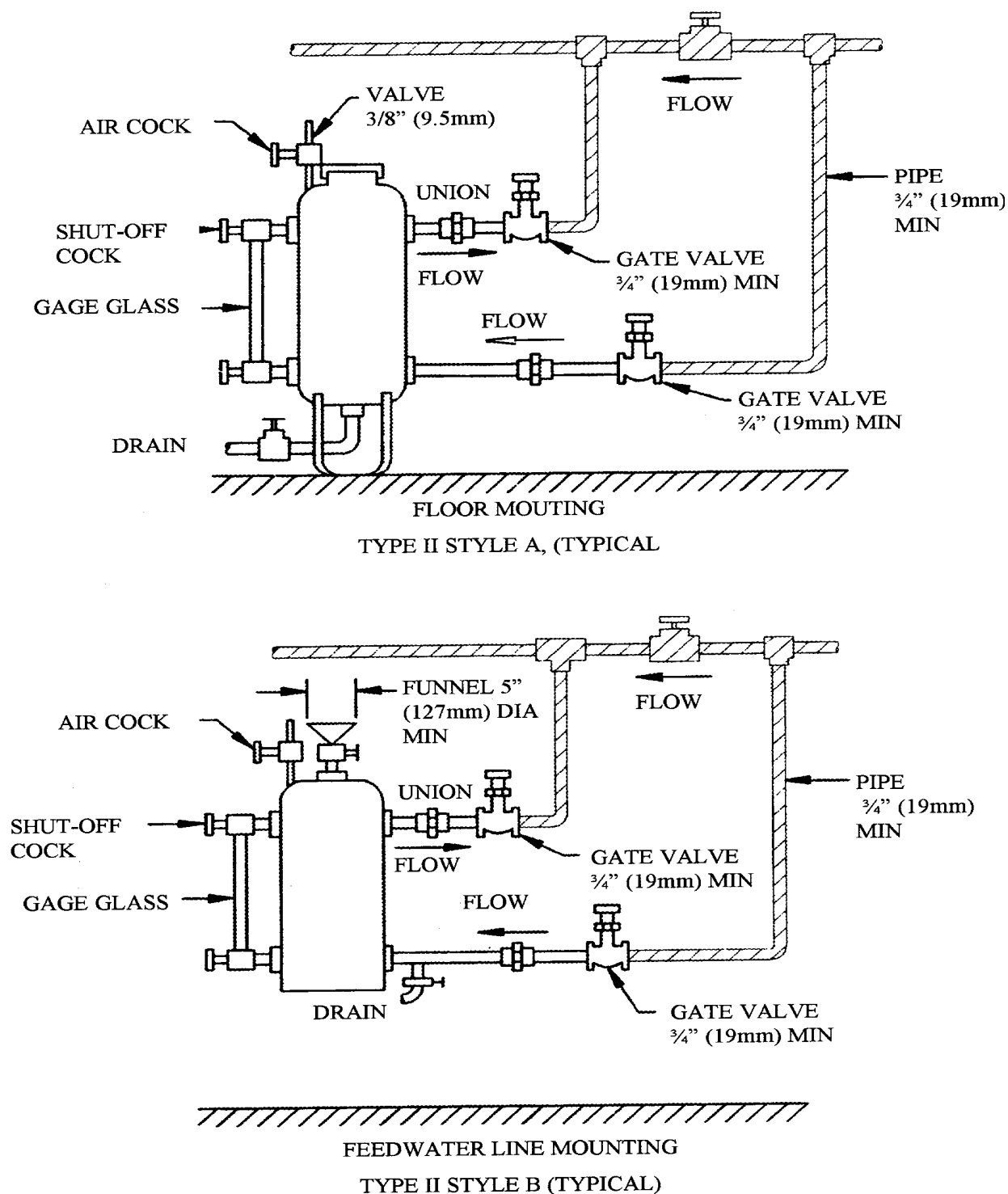


Note:

1. PARTS SHOWN IN CROSS-HATCH NOT FURNISHED AS PART OF THE FEEDER.

FIGURE 1. Type I style A and style B feeders.

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Note:

1. PARTS SHOWN IN CROSS-HATCH NOT FURNISHED AS PART OF THE FEEDER.

FIGURE 2. Type II style A and style B feeders.

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-F-2901

2. DOCUMENT DATE (YYMMDD)
970421

3. DOCUMENT TITLE FEEDERS, BOILER WATER TREATMENT, BY-PASS AND COMPOUND TYPES

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 93043-4301

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DEFENSE QUALITY AND STANDARDIZATION OFFICE
5203 Leesburg Pike, Suite 1403, Falls Church, VA 22401-3466
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