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 SUPERSEDING
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MILITARY SPECIFICATION

VALVES, PRESSURE REGULATING, BOILER FUEL-OIL

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy and the Air Force.

1. SCOPE

1.1 This specification covers boiler fuel-oil pressure regulating valves.

1.2 Classification. - Boiler fuel-oil pressure regulating valves shall be of the following classes as specified (see 6. 1):

- Class 1 - 350 pounds per square inch gage (psig) design pressure.
- Class 2 - 1000 psig design pressure.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

MILITARY

- MIL-V-3 - Valves, Fittings, and Flanges (Except for Oxygen Systems Indicated Herein); Packaging of.
- MIL-P-116 - Preservation, Methods of.
- MIL-B-857 - Bolts, Nuts and Studs.
- MIL-D-963 - Drawings, Electrical, Hull and Mechanical Equipment for Naval Shipboard Use.
- MIL-P-3115 - Plastic-Material, Laminated, Thermosetting, Sheets, Paper-Base, Phenolic-Resin.
- MIL-P-15024 - Plates, Identification-Information and Marking for Identification of Electrical, Electronic and Mechanical Equipment.
- MIL-H-15424 - Hand Tools, Packaging of.

STANDARDS

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129 - Marking for Shipment and Storage.

MIL-STD-278 - Welding and Allied Processes for Machinery for Ships of the United States Navy.

DRAWINGS

BUREAU OF SHIPS

B-153 - Packings and Gaskets, Standard Application for.

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

2.2 Other publications. - The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

- SA-105 - Forged or Rolled Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service.
- SA-193 - Bolts.
- SA-194 - Nuts.
- SA-216 - Carbon Steel Castings.
- SA-276 - Steel Bars.
- SA-296 - Alloy Castings.
- SB-143 - Bronze Castings.
- SB-164 - Nickel-Copper Alloy Rods and Bars.

(Application for copies should be addressed to the American Society of Mechanical Engineers, 29 West 39th St., New York, N. Y.)

NATIONAL BUREAU OF STANDARDS

Handbook H28 - Screw Thread Standards for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

FSC 4820

MIL-V-2962B

3. REQUIREMENTS

3.1 Preproduction. - Prior to production, one valve of each new flow design capacity at working pressure shall be submitted and tested as specified in 4.2.

3.2 Materials. -

3.2.1 Materials shall be of the quality best suited for the purpose intended. The material used in construction of the valves shall, in all cases, be the

lightest possible consistent with the strength required for safety and reliability.

3.2.2 The materials, except as hereinafter specified, shall conform to the manufacturer's standards for the particular parts, and shall be as approved by the bureau or agency concerned.

3.2.3 The materials of the parts specified in table I shall as a minimum be selected from and conform to the requirements of the applicable documents specified therein.

Table I - Materials.

Part	Material	Applicable documents
Body and bonnet	Cast steel Forged steel	Publication SA-216, grade WCB Publication SA-105, grade II
Stem	Cast steel Forged steel Corrosion-resisting steel Case corrosion-resisting steel Cold-rolled or cold-drawn steel	Publication SA-216 Publication SA-105, grade II Publication SA-276, classes 416 and 420 Publication SA-296, grade CF-8
Disc	Bronze Corrosion-resisting steel Case corrosion-resisting steel Nickel-copper	Publication SB-143, alloy 2A Publication SB-143, classes 416 and 420 Publication SA-296, CF-8 Publication SB-164, class A
Handle	Cast steel Forged steel	Publication SA-216 Publication SA-105, grade II
Bolts and nuts	Steel	Specification MIL-B-857 classes B and C; Publications SA-193 and SA-194
Bonnet gasket	Compressed asbestos sheet Gasket, spiral wound metal, asbestos Gasket, metal case, asbestos, steel (maximum hardness 80 Brinell)	Drawing B-153, symbol 2150 Drawing B-153, symbol 2410 Drawing B-153
Packing	Asbestos, high-pressure, rod Asbestos, square-braided, plain Flax, braided Fleximetallic rod Plastic metallic, foil jacket class I Plastic metallic, copper base, class II	Drawing B-153, symbol 1100 Drawing B-153, symbol 1103 Drawing B-153, symbol 1260 Drawing B-153, symbol 1430 Drawing B-153, symbol 1434 Drawing B-153, symbol 1108

3.3 Classes. -

3.3.1 Class 1. - Class 1 boiler fuel-oil pressure regulating valves shall be of the hand-operated type suitable for installation in the piping to the burner manifold (supply header) servicing straight mechanical burner atomizers.

3.3.2 Class 2. - Class 2 boiler fuel-oil pressure regulating valves shall be of the hand-operating type suitable for installation in the return oil line from the return header to the fuel-oil service tanks in wide range return-flow fuel-oil burner applications.

3.4 Pressure control. -

3.4.1 Pressure control (class 1). - Class 1 valves shall permit rapid and accurate control of discharge pressure between 50 and 290 psig with an inlet pressure of 300 psig.

3.4.2 Pressure control (class 2). - Class 2 valves shall permit rapid and accurate control of inlet pressure between 50 psig and 400 psig with discharge pressure 40 psig or less.

3.5 Bypass. -

3.5.1 Class 1. - Class 1 valves shall have a bypass arrangement which will operate only when the valve is in the "shut" position. The bypass shall be incorporated internally into the valve. The bypass shall open only when the main valve port is completely closed, and shall be completely closed when the main port starts to open, in order that control of oil flow will not be affected by the bypass. The portion of travel in which the main valve port and bypass are closed shall be the smallest practicable and shall not in any case exceed 2 degrees. The bypass port shall be wide open after a travel of not more than 6 degrees from where the main port closes.

3.5.2 Class 2. - Class 2 valves shall not be equipped with a bypass.

3.6 Flow characteristics. -

3.6.1 Flow characteristics as specified in 3.6.1.1 through 3.6.1.2.3 are based on idealized linear sprayer plate. Unless otherwise specified in the contract or order, the following shall be furnished:

- (a) Applicable sprayer plate capacity curves by the contracting officer
- or (b) The resistance characteristics of the sprayer plates shall be described by either of the following:
 - (1) Contracting officer.
 - (2) Philadelphia Naval Shipyard (Naval Boiler and Turbine Laboratory at the request of the contracting officer).

The bidder shall design for linear changes in firing rate of burners with linear changes in operating lever position of the valves.

3.6.1.1 Class 1. - Class 1 valves shall be designed to provide the flow characteristics and pressure drops specified in 3.6.1.1.1 through 3.6.1.1.6 (see 6.1).

3.6.1.1.1 The pressure drop through the class 1 valves shall be 10 psi, plus 2, minus 1 psi, when passing fuel-oil of 135 SSU viscosity, with an inlet pressure of 300 psi at a rate of flow equal to the design capacity of the valve as specified (see 6.1).

3.6.1.1.2 Starting from the full open position, with the flow conditions specified in 3.6.1.2.1, the class 1 valve shall produce, as nearly as practicable, a uniform and proportionate reduction in pressure, with the movement of the operating lever toward the closed position in such a manner that the pressure drop will be 250 psi, with the operating lever in a position 20 to 30 percent of the rotation from the closed position.

3.6.1.1.3 Absolute tightness between the seat and disc is not required but the leakage past the seat shall not, in any case, exceed 60 pounds of water per hour with an inlet pressure of 300 psi and an atmospheric discharge pressure.

3.6.1.1.4 In order to provide adequate control of fuel-oil pressure at "port" firing rate, the valve shall produce a drop of 50 psi, or more at a setting of the operating lever 15 percent of the rotation from the closed position when passing 4 percent of the design oil rate at 135 SSU viscosity and with an inlet pressure of 300 psi.

3.6.1.1.5 Starting from the setting, and with the flow conditions specified in 3.6.1.1.4, the valve shall produce, as nearly as practicable a uniform and proportionate reduction in pressure with the movement of the operating lever to the shut-off point at approximately zero degree rotation.

3.6.1.1.6 The bypass of class 1 valves shall have a capacity of 1/2 the design capacity of the valve as specified (see 6.1) with a pressure drop of 225 psi, + 10 psi, and with an inlet pressure of 300 psi.

3.6.1.2 Class 2. - Class 2 valves shall be designed to provide the flow characteristics and pressure drops specified in 3.6.1.2.1 through 3.6.1.2.3 (see 6.1).

3.6.1.2.1 The pressure drop through class 2 valve shall be 10 psi, plus 2 minus 1 psi, when passing fuel oil of 135 SSU viscosity with an inlet pressure of 50 psi, at a rate of flow equal to the valve as specified (see 6.1).

3.6.1.2.2 Starting from the full open position, with flow conditions as specified in 3.6.1.1, the valve shall produce, as nearly as practicable, a linear increase in pressure drop with flow regulated nearly to shutoff, with linear angular movement of the operating lever toward the closed position in such a manner that the pressure drop in the closed position shall be 400 psi.

MIL-V-2962B

3.6.1.2.3 Absolute tightness between the seat and disc is not required but the leakage past the seat shall not, in any case, exceed 60 pounds of water per hour with an inlet pressure of 300 psi and atmospheric discharge pressure.

3.7 Design pressure. -

3.7.1 Class 1 valves shall be designed for an operating pressure of 350 psig.

3.7.2 Class 2 valves shall be designed for an operating pressure of 1000 psig.

3.8 If the valves are of such design that flow through the valves is permissible in one direction only, an arrow indicating the direction of flow shall be cast on the valve body.

3.9 Dimensions. - The valve bodies shall be flanged. Unless otherwise specified in the contract or order the flanges shall be nonraised face with fine tool finished machined joint faces, and shall be furnished undrilled. Unless otherwise specified (see 6.1), the face-to-face dimensions of valves and flange dimensions shall be as specified in table II, and shall be suitable for the bolting indicated.

3.10 Dial indicator. - In order to facilitate duplication of previous valve settings, a dial indicator shall be provided. The dial shall be graduated in 2 degree increments, as a minimum and marked with the number of degrees every 10 degrees, over an arc extending from the closing point to the full open point of the valve. The dial may be made of phenolic-material conforming to the requirements for type PBG of Specification MIL-P-3115.

Table II - Flange dimensions.

Size of valve	Face-to-face of flanges	Flange diameter	Flange thickness	Flange bolting		
				Number of bolts	Diameter of bolt holes	Diameter of pitch circle
Inches	Inches	Inches	Inch		Inch	Inches
1-1/4	8-3/4	5-3/8	5/8	5	11/16	4-1/16
1-1/2	10-1/4	5-15/16	11/16	6	11/16	4-5/8
2	11-1/2	6-1/2	11/16	7	11/16	5-3/16

3.11 Provision shall be made for setting the operating lever and the indicating scale in any one of at least six positions.

3.12 Bolts, bolt-studs and nuts. - Bolts, bolt-studs and nuts shall be threaded, UNC class 2 fit; studs shall be threaded, UNC class 2 fit on the nut end and class UNC 5 fit on the stud end. Minimum standards of threading shall be in accordance with Handbook H28.

3.13 Marking. - All valve discs (including repair parts) and the indicating dials shall be stamped with the design capacity of the valve. In addition, when specified (see 6.1), the discs shall be stamped to indicate the intended use.

3.14 Welding. - All welding shall be in accordance with Standard MIL-STD-278.

3.15 Identification plates. - A suitable identification plate shall be provided in accordance with Specification MIL-P-15024, mounted under the fastening nut of the operating lever, engraved as specified (see 6.1).

3.16 Repair parts and tools. -

3.16.1 Repair parts. - Unless otherwise specified (see 6.1), one set of repair parts shall be supplied with the valves for each ship. This set shall consist of the following parts, the quantity of each to be 25 percent of the total number of valves being furnished for the particular ship:

- (a) Valve disc.
- (b) Valve seat (if removable).
- (c) Springs of each kind and size.

3.16.2 Tools. - Unless otherwise specified (see 6.1), one each of all special tools required for assembly or for normal maintenance, repair and adjustment of the valves shall be furnished for each ship on which the valves are to be installed. No ordinary tools are required. Special tools are defined as those tools not listed in the Navy Stock List of General Stores. (Copies of this stock list may be consulted in the office of the Government inspector.)

3.17 Drawings. - Drawings shall be furnished in accordance with Specification MIL-D-963.

3.18 Workmanship. - Workmanship shall be first class in every respect.

4. QUALITY ASSURANCE PROVISIONS

4.1 The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Preproduction testing. - Preproduction testing of one valve of each new flow design capacity at working pressure shall be conducted at a laboratory satisfactory to the bureau or agency concerned. When tests are made at a Government laboratory, designated activity is the Philadelphia Naval Shipyard (Naval Boiler and Turbine Laboratory). Testing shall consist of tests specified in 4.5 and any other tests considered necessary to determine that the valve satisfactorily meets the specified requirements when installed in a boiler fuel oil supply line of sufficient capacity. After approval of a flow design capacity, the test shall not be repeated unless the valve is redesigned. Need for Government laboratory test of a redesigned valve shall be at the discretion of the bureau or agency concerned.

4.3 Sampling for lot acceptance. -

4.3.1 Lot. - All valves of the same flow design capacity offered for delivery at one time shall be considered a lot.

4.3.2 Sampling for visual and dimensional examination. - A random sample of valves shall be selected from each lot, for the examination specified in 4.4, in accordance with Standard MIL-STD-105 at inspection level III for lots of 110 and under; and inspection level II for lots over 110. The acceptable quality level shall be equal to 1.5 percent defective.

4.3.3 Sampling for tests. - A random sample of valves shall be selected from each lot for the tests specified in 4.5, in accordance with Standard MIL-STD-105 at inspection level I. However, the smallest sample size shall be 5. Failure of any valve in the sample to pass any of the tests shall be cause for rejection of the lot.

4.4 Visual and dimensional examination. - Each of the sample valves selected in accordance with 4.3.2 shall be visually and dimensionally examined

to determine compliance with the requirements of approved drawings and of this specification, not involving tests. Any valve in the sample containing one or more defects shall be rejected, and if the number of defective valves in any sample exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected.

4.5 Acceptance tests. - Each of the sample valves selected in accordance with 4.3.3 shall be subjected to the tests specified in 4.6.1 and 4.6.2. In addition should the contract or order date of award be more than one year from date of last award date for identical items, the tests specified in 4.5.1, 4.5.2 and 4.5.3 shall be conducted on a random valve of the first contract or order.

4.5.1 Control of pressure. - Valves shall be tested to determine conformance with the discharge and inlet pressures specified in 3.4 for the valve class concerned.

4.5.2 By-pass flow. - Class 1 valves shall be tested to determine conformance to 3.5.1.

4.5.3 Pressure drop. - Flow characteristics of the class of valves concerned shall be tested to determine conformance with 3.6 based on the resistance characteristics of the applicable sprayer plates.

4.6 Tests. -

4.6.1 Hydrostatic. - Unless otherwise specified in the contract or order, valves selected in accordance with 4.3.3 shall be subjected to a hydrostatic test pressure of twice the design pressure with the valve in the "open" position.

4.6.2 Leakage. - Valves selected in accordance with 4.3.3 shall be hydrostatically tested for leakage past the disc to determine conformance with 3.6.1.1.3.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging (see 6.1). -

5.1.1 Level A. -

5.1.1.1 Valves. - Valves shall be cleaned, preserved and packaged in accordance with Specification MIL-V-3. Interior surfaces of the valve shall be coated with type P-3 preservative. Packing material shall be removed and processed in accordance with the requirements of Specification MIL-V-3.

5.1.1.2 Repair parts and tools. - Repair parts and tools shall be preserved and packaged in accordance with Specifications MIL-P-116 and MIL-H-15424, as applicable. Repair parts shall be

MIL-V-2962B

individually packaged except when used in sets or quantities greater than one.

5.1.2 Level C. - Valves shall be cleaned, preserved and packaged in accordance with the manufacturer's commercial practice.

5.2 Packing (see 6.1). -

5.2.1 Levels A, B and C. -

5.2.1.1 Valves. - Valves shall be packed for the level specified in accordance with Specification MIL-V-3.

5.2.1.2 Repair parts and tools. - Repair parts and tools shall be packed in containers for the level specified in accordance with Specification MIL-V-3.

5.2.1.2.1 Index list. - An index list of repair parts and tools shall be inserted in each container containing repair parts and tools accompanying the equipment. The list shall completely itemize the container contents that is, stock numbers, nomenclature and quantities. The list shall be placed in a waterproof envelope or shall be so treated as to be resistant to oil, water and fading. The list shall be placed in the index list support on the inside of each container cover or placed within the container for quick accessibility.

5.2.1.3 Drawings. - Drawings shall be prepared for the level specified in accordance with Specification MIL-STD-129.

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

6. NOTES

6.1 Ordering data. - Procurement documents should specify the following:

Custodians:
Army - CE
Navy - Ships

- (a) Title, number and date of this specification.
- (b) Class required (see 1.2 and 3.3).
- (c) Design capacity of valves in pounds of fuel oil per hour (see 3.6.1.1, 3.6.1.1.1, 3.6.1.1.6, 3.6.1.2 and 3.6.1.2.1); select one:
 - (1) Applicable drawing enclosed.
 - (2) Applicable sprayer plate capacity curves enclosed.
 - (3) Description of resistance characteristics of applicable sprayer plates enclosed.
- (d) Dimensions of flanges (see 3.9).
- (e) Identification data including intended use (see 3.13 and 3.15); examples:
 - (1) "F. O. RETURN LINE"
 - (2) "F. O. THROTTLING - SAT SIDE"
 - (3) "F. O. THROTTLING - S. H. SIDE"
- (f) Whether repair parts are required (see 3.16.1).
- (g) Whether special tools are required (see 3.16.2).
- (h) Preparation for delivery requirements (see 5.1 and 5.2).

Notice. - When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Preparing activity:
Navy - Ships
(Project 4820-0027)