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20 March 1978
SUPERSEDING
MIL-V-22052C(SHIPS)
11 April 1961
(See 6.5)

MILITARY SPECIFICATION

VALVES, STOP AND STOP CHECK, GLOBE, ANGLE, AND Y PATTERN, CAST OR FORGED CARBON OR ALLOY STEEL, OUTSIDE SCREW AND YOKE

(SIZES 2-1/2 INCHES AND LARGER)

This specification is approved for use by the Naval Sea Systems Command and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers steel globe, angle, and Y pattern valves in sizes 2-1/2 inches and larger.

1.2 Classification. Valves shall be classified in accordance with the composition and rating (see 1.2.1 and 1.2.2), as specified (see 6.2.1).

1.2.1 Composition. Valves shall be of the following compositions:

Composition A:
Chromium - 2-1/4 percent.
Molybdenum - 1 percent.
Composition B:
Chromium - 1-1/4 percent.
Molybdenum - 1/2 percent.
Composition C:
Carbon steel.

1.2.2 Rating. Valves shall be rated as standard (150, 300, or 400 class), and as special (600, 900, 1500, or 2500 class) in accordance with ANSI B16.34.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL
HH-P-46 - Packing; Asbestos, Sheet, Compressed.

MILITARY
MIL-V-3 - Valves, Fittings, and Flanges (Except for Systems Indicated Herein); Packaging of.
MIL-R-196 - Repair Parts for Internal Combustion Engines, Packaging of.
MIL-S-901 - Shock Tests, H.I. (High-Impact); Shipboard Machinery, Equipment and Systems, Requirements for.
MIL-F-3541 - Fittings, Lubrication.
MIL-A-7021 - Asbestos Sheet, Compressed, for Fuel, Lubricant, Coolant, Water, and High Temperature Resistant Gaskets.
MIL-R-17131 - Rods and Powders, Welding, Surfacing.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Ship Engineering Center, SEC 6124, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

MILITARY (Continued)

MIL-P-17303 - Packing Materials, Plastic Metallic and Plastic Nonmetallic.
MIL-G-21032 - Gaskets, Metallic-Asbestos, Spiral Wound.
MIL-V-22094 - Valves, Globe, Y-Pattern Globe, Stop Check, Angle, Flanged Bonnet, Manually Operated Nominal Pipe Size (NPS), 2 Inches and Less.
MIL-P-24377 - Packing Material, Asbestos, Braided, Impregnated With TFE (Polytetrafluoroethylene), Surface Lubricated.

STANDARDS

MILITARY

MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited).
MIL-STD-271 - Nondestructive Testing Requirements for Metals.
MIL-STD-278 - Fabrication Welding and Inspection; and Casting Inspection and Repair for Machinery, Piping and Pressure Vessels in Ships of the United States Navy.
MIL-STD-798 - Nondestructive Testing, Welding, Quality Control, Material Control and Identification and HI-Shock Test Requirements for Piping System Components for Naval Shipboard Use.
MIL-STD-1552 - Provisioning Technical Documentation, Uniform DOD Requirements for.
MIL-STD-1561 - Provisioning Procedures, Uniform DOD.
MS15003 - Fittings, Lubrication (Hydraulic): Surface Check, 1/8 Pipe Threads.

DRAWINGS

MILITARY

NAVSHIPS 5000-S4824-1385620 - Handwheels for Valves.
NAVSEA 803-5001021 - Pressure Seal Ring-Standard and Oversize-Valve Pressure Class 600-1500.

(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 or request for proposal shall apply.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

B16.10 - Face-to-Face and End-to-End Dimensions of Ferrous Valves.
B16.34 - Steel Butt-Welding End Valves.

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A105 - Forgings, Carbon Steel, for Piping Components.
A106 - Seamless Carbon Steel Pipe for High-Temperature Service.
A182 - Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
A193 - Alloy-Steel and Stainless Steel, Bolting Materials for High-Temperature Service.
A194 - Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.
A216 - Carbon-Steel Castings Suitable for Fusion Welding for High-Temperature Service.
A217 - Martensitic Stainless Steel and Alloy Steel Castings for Pressure-Containing Parts Suitable for High-Temperature Service.
A335 - Seamless Ferritic Alloy Steel Pipe for High-Temperature Service.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Qualification. Valves with a 600, 900, 1500, or 2500 special class rating, furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the the time set for opening of bids (see 4.3 and 6.3).

3.2 Materials. Materials shall be as specified in table I. Materials for parts other than those listed in table I shall be selected so as to prevent galling, seizing, or excessive wear of operating parts. Cast iron and aluminum shall be used only for those parts where permitted in this specification. Magnesium alloys shall not be used. Clearances shall be adequate to prevent interferences due to thermal expansion.

TABLE I. List of materials.

Name of parts	Materials form	Composition A	Composition B	Composition D
		Applicable documents		
Body, bonnet	Forgings or castings	ASTM A182, grade F22 ASTM A217, grade WC9	ASTM A182, grade F11 ASTM A217, grade WC6	ASTM A105, ASTM A216, grade WCB 1/
Retaining ring and yoke	Forgings or castings	ASTM A182, grades F22 or F11 ASTM A105 ASTM A217, grades WC9 or WC6 ASTM A216, grade WCB		
Studs for bonnets	Alloy steel for high temperature bolting	ASTM A193, grade B16	ASTM A193, grade B16	ASTM A193, grades B7 and B16
Nuts for bonnets	Heavy semi-finished hexagon carbon and alloy steel for high temperature bolting	ASTM A194, grade 4	ASTM A194, grade 4	ASTM A194, grades 2H and 4
Standard pressure seal rings and standard oversized pressure seal rings 2/	Soft carbon steel, silver-plated	Commercial		
Gaskets (for flanged bonnets)	Spiral wound	MIL-G-21032, type I, class A or B		
	Compressed asbestos sheet	MIL-A-7021 (where fuel resistance is necessary) MIL-P-46, class 1 (except where fuel resistance is necessary)		
Packing	Asbestos impregnated with polytetrafluoroethylene	MIL-P-24377 (nonlubricated) service temperature not to exceed that of saturated steam MIL-P-24377, superheated steam total temperature in excess of 550°F		
	Plastic, metallic or nonmetallic	MIL-P-17303, symbol 1111 for temperatures above 500°F		
Nuts, bolts, washers, bushings, liners	Materials used in the construction of these parts other than specified above shall be in accordance with the material specifications shown on the manufacturer's drawings (see 3.6.1)			
Valve trim	(See table IV)			

1/ Bonnet material for composition D valves may also be grade WC6 of ASTM A217.

2/ Oversized seal rings may be used in the repair of pressure seal bonnets, (i.e.) as shown on Drawing 803-5001021.

3.3 Design. Unless otherwise specified herein, valves, valve parts, and design features and parameters shall conform to ANSI B16.34.

3.3.1 Pressure-temperature ratings. The design and pressure-temperature rating shall be in accordance with ANSI B16.34, except the maximum allowable temperature for composition D shall be 775°F. Pressure seal valves shall be designed in such a manner as to permit repair by the use of oversize seal rings. The detail design of the oversize seal ring shall be as shown on Drawing 803-5001021.

3.3.2 End connections. Valve end connections shall withstand the forces and moments imposed by the connecting pipe to which they are attached. For design purposes, the maximum value of the fiber stress in the connecting pipe produced by these forces and moments shall be considered to be equal to 0.2 percent offset yield stress of the piping material at room temperature.

3.3.3 End preparation. Design of welding ends and flange facing shall be as specified (see 6.2.1).

3.3.4 Drains and by-passes. Drains and by-passes shall be in accordance with the requirements specified in 3.3.4.1 through 3.3.4.5. A drain shall consist of a nipple and drain valve. A by-pass shall consist of connecting lines and a by-pass valve.

3.3.4.1 Size of drains and by-passes. Standard drain and by-pass sizes shall be as shown in table II. Nonstandard sizes shall be as specified (see 6.2.1).

TABLE II. Standard drain and by-pass sizes.

Valve size (inches)	Size of by-pass and drains (inches)
2-1/2	1/2
3	1/2
4	3/4
5	3/4
6	3/4
8	3/4
10	1
12	1
14	1-1/4
16	1-1/4

3.3.4.2 Location. The location of drains and by-passes shall be specified by referencing the letter designation of the desired bosses (see figure 1 and 6.2.1). Bosses shall be sufficient distance away from seating area to allow welding of replacement by-pass line without damage to valve seat. When nonstandard locations are required, a drawing shall be furnished by the user indicating the desired location. When a location is not specified, the following standard locations shall be used:

(a) By-pass - "A" to "B" of figure 1 (for globe and Y pattern valves), "E" to "F" of figure 1 (for angle valves).
(b) Drain - "C" of figure 1 (for globe and Y pattern valves).

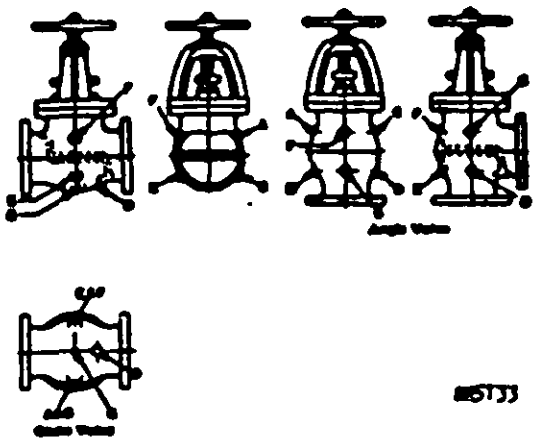

FIGURE 1. Designating of boss locations for drains and by-passes.

3.3.4.3 Root connections. Drain and by-pass line root connections shall be welded to the valve body in accordance with MIL-STD-278. Materials for these lines shall be as follows:

(a) Composition A - ASTM A335, grade P22.
(b) Composition B - ASTM A335, grade P11.
(c) Composition D - ASTM A106, grade B.

3.3.4.4 Bosses. When specified (see 6.2.1), bosses shall be required for valves of class 600 and above in sizes 2-1/2 inches and larger and valves less than class 600 in sizes 4 inches and larger, when these valves are furnished without a by-pass and drain. When specified (see 6.2.1), the valve bodies shall be provided with bosses as shown on "A", "B", and "C" of figure 1 for globe and Y pattern valves and as shown on "E" and "F" of figure 1 for angle valves.

3.3.4.5 Drain and by-pass valves. Drain and by-pass valves shall be in accordance with MIL-V-22094 and shall have welding ends.

3.3.5 Body pattern. The body pattern, globe, angle, or Y pattern shall be as specified (see 6.2.1).

3.3.6 Port arrangement. Unless otherwise specified (see 6.2.1), the port arrangement on globe valves shall be in-line.

3.3.7 Weights and center of gravity. The manufacturer shall supply a calculated weight with his proposal. After completion of the first valve, a weight shall be shown on the drawing. When specified (see 6.2.1), the manufacturer shall submit center of gravity information for valves weighing in excess of 200 pounds. The estimated center of gravity location and the calculated center of gravity shall be as shown on the drawings. Handwheel operated, welded end globe, angle, and Y pattern valves shall not exceed the maximum weights listed in table III. Weights are based on valves with welded ends and do not include weights of drains, by-passes, operators, etc. Weights of valves in classes and sizes not listed in table III are not required.

TABLE III. Maximum weights of welded end valves.

Valve size (inches)	Valve weights						
	Class 150	Class 300	Class 400	Class 600	Class 900	Class 1500	Class 2500
2-1/2	64	88	--	100	--	165	450
3	64	105	--	155	223	220	670
4	108	180	240	230	414	530	800
5	136	250	355	485	515	800	1775
6	207	385	730	600	778	880	2290
8	307	650	1100	800	840	1500	3500
10	500	1020	1630	1620	1800	2500	5000
12	730	1610	2090	2250	2500	3000	--
14	--	2375	--	3510	3900	3950	--
16	--	3000	--	--	5000	5600	--

3.3.8 Face-to-face and end-to-end dimensions. Face-to-face and end-to-end dimensions shall be in accordance with ANSI B16.10.

3.3.9 Shock and vibration. Valves shall withstand the shock requirements conforming to grade A, class I, type C of MIL-S-901 and MIL-STD-798. When specified (see 6.2.1), valves shall meet the vibration requirements of MIL-STD-167-1, type I.

3.3.9.1 Acceptance criteria for shock shall be as follows:

(a) Momentary malfunction at the time of the impact blow is permitted and acceptable.
(b) Permanent deformation, misalinement, and functional impairments shall be cause for rejection.
(c) Permissible seat leakage shall be as specified in 4.6.5.2.

3.3.9.2 Shock and vibration with power operators. When power operators (other than handwheels) are required, shock and vibration shall be conducted on the assembly of the valve operator as a unit.

3.3.10 Bonnet and yoke construction.

3.3.10.1 Pressure seal and breech lock bonnets. Valves classes 600, 900, 1500, and 2500 shall have pressure seal or breech lock bonnets.

3.3.10.1.1 Threads. When retaining rings are threaded, the threads shall be either chromium or nickel-plated.

3.3.10.1.2 Bonnet seal rings. Bonnet seal rings shall provide a seal either by plastic or elastic expansion. Where a seal is obtained by means of plastic expansion, the seal ring shall have a Brinell hardness number (BHN) of 100 maximum. Where a seal is obtained by means of elastic expansion, the seal ring shall have a BHN of 140 maximum. Seal rings shall be silver-plated. Each manufacturer shall supply a list detailing oversized seal rings for repair purposes. The bonnet seal ring region of the valve body shall be inlayed with corrosion-resisting steel.

3.3.10.2 Flanged bonnets. Valves of classes 150, 300, and 400 shall have bonnets with the joint faces of bonnet flanges of the male and female or small tongue and groove type and spiral wound gaskets.

3.3.10.2.1 Bearing surfaces. Bearing surfaces of nuts and bolt heads and their respective mating surfaced on the valves shall be machine finished.

3.3.10.2.2 Fasteners. Fasteners shall be as follows:

(a) Through-bolt type shall be bolt studs with studs threaded the entire length.
(b) Studs of the single nut type shall have 1-1/4 diameters fully formed thread engagement, lead and vanishing threads shall not be considered.
(c) Cap screws shall have 1 diameter fully formed thread engagement, lead and vanishing threads shall not be considered.

3.3.10.3 Yoke construction. Valves shall be of the outside screw and yoke design.

3.3.11 Stuffing boxes and glands.

3.3.11.1 Stuffing boxes. Stuffing boxes shall be of a depth to accommodate packing that will assure a pressure tight seal at the rated pressure and temperature of the valve and to assure a positive engagement between the stuffing box and gland.

3.3.11.2 Glands. Stuffing box glands shall be secured and adjusted by a bolting arrangement which by adjustment will insure tightness of the stuffing box under all operating conditions. Bearing surface between the gland follower and the gland flange shall be spherically finished.

3.3.12 Trim.

3.3.12.1 Stem. Valve stems shall have modified Acme type threads.

3.3.12.1.1 The stem of a stop check valve shall not be attached to the disc. The end of the stem shall be constructed to serve as a disc guide throughout the full travel of the disc.

3.3.12.2 Disc construction.

3.3.12.2.1 Attachment of the disc to the stem of stop valve shall be of swivel construction. The use of balls or of slip-on type is prohibited in the design of the swivel feature in the stem to disc attachment. Furthermore, the combined design features of the disc and the swivel attachment shall be such that the disc will not spin when subject to the normal flow conditions of the valve.

3.3.12.2.2 The disc of stop check valves shall be of the piston guide and dash pot design. The disc shall fit into the body in such a manner as to serve as a guide during the full travel of the disc. The dash pot effect shall provide an effective cushion for the disc and prevent vibration and hammer at low velocities or pulsating loads. The disc shall be free of protrusions that could cause spinning of the disc.

3.3.12.2.3 For stop valves, provision shall be made to prevent galling between the end of the stem and the disc. This may be accomplished by the insertion of a hardened washer (485 Brinell minimum) between the stem and disc, or by a pad of stellite inlaid on the inside of the disc at the point of contact or on the bottom of the stem. A cast stellite disc shall be satisfactory to meet this requirement.

3.3.12.3 Main seat construction. Seats may be of any of the following constructions:

(a) Integral.
(b) Threaded.
(c) Welded-in.

When the threaded construction is used in valves intended for steam service, the seat ring shall be seal welded circumferentially so as to prevent leakage past the seat rings.

3.3.12.4 Back seat. Valves shall have a positive back seat. Class 600 and higher shall have hard facing (HF) back seats (see 3.3.12.6).

3.3.12.5 Valve trim material. Unless otherwise specified (see 6.2.1), valve trim materials shall be in accordance with table IV.

TABLE IV. Valve trim materials.

Service	Valve trim symbols 1/			
	Stem	Disc 2/	Seat 2/	Temperature limitation °F
Steam 3/	Cr 13	HF 3/	HF	1050
Water 4/	Cr 13	Ni-Cu	Cr 13	750
	Cr 13	HF	HF	1050
Oil	Cr 13	Ni-Cu	Cr 13	500
	Cr 13	Cr 13	Cr 13	1000
	Cr 13	HF	HF	1050

See footnotes at top of next page.

1/ MF may be substituted for other seats and discs under all steam temperature and service conditions.

2/ Where unlike seats and discs are used, either the seat or the disc may be Cr 13 or Ni-Cu at the manufacturer's option.

3/ Steam valves shall have MF seats and discs.

4/ Water valves pressure class 600 and higher shall have MF seats and discs.

3.3.12.6 Hard facing. Welding materials shall be in accordance with type MIL-RCoCr-A of MIL-R-17131. The minimum finished thickness of MF seating surfaces shall be 3/32 inch.

3.3.13 Valve handwheels.

3.3.13.1 Rotation. Valves shall close by clockwise rotation of the handwheel when facing the handwheel.

3.3.13.2 Material and design. Handwheels smaller than 11 inches in diameter shall be of commercial design and manufactured from steel, ductile iron, malleable iron, or aluminum. Handwheels 10 inches in diameter and larger shall be of aluminum alloy or cast steel in accordance with the general dimensions of Drawing 5000-S4824-1385620. Stem handwheel connection shall be in accordance with Drawing 5000-S4824-1385620.

3.3.13.3 Size. Handwheels shall be sized so that a tangential force of not more than the value specified in table V is required to be exerted on the rim of the handwheel to effect tight closure (see 4.6.5.2). Valve operating devices may be necessary to accomplish effective closure.

TABLE V. Maximum allowable tangential force to seat valves based on valve handwheel size.

Handwheel diameter	Tangential force
(Inches)	(Pounds)
2	90
3	98
4	106
5	112
6	118
7	121
8	124
9	127
10	130
11	133
12	135
14	138
16	141
18	144
21	147
24	150
27	150
30	150
36	150

3.3.13.4 Hammer-blow wheel. Valves of class 600, sizes 4 inch and larger, and valves of class 1500, sizes 3 inch and larger shall be equipped with hammer-blow wheels unless a valve operator is specified.

3.3.13.5 Toggle operators. Toggle operators shall be of the double toggle design and shall consist of 2 equal length toggle arms with the toggle arrangement being mounted on the valve yoke. Valve clamp ring shall not be a part of the valve yoke or toggle operator. Toggle design shall include a means of avoiding overstressing of the valve stem by providing ample stops to limit the stress applied to the valve stem. A means shall be provided to assure a constant seating load on the valve seats when the valve is in the closed position.

3.3.13.6 Power operators. Valves shall be designed to assure means of mounting c. ercial type power operators on the valve.

3.3.14 Seat leakage. Unless otherwise specified (see 6.2.1), allowable seat leakage is considered to be leakage of water not in excess of 10 cubic centimeters (cm^3) per hour per inch of nominal pipe size when tested in accordance with 4.6.5.2.

3.3.15 Lubrication. Yoke bushings 2-1/2 inches and larger shall be equipped with a 1/8-inch threaded or push designed, type III lubricating fitting in accordance with MIL-F-3541 and MS15003.

3.3.16 Welding and fabrication.

3.3.16.1 Welding. Welding shall be in accordance with MIL-STD-278.

3.3.16.2 Fabrication. Fabricated assemblies shall be stress relieved as units prior to finish machining. Stress relieving shall be done in accordance with MIL-STD-278.

3.3.17 Assembly and disassembly. Valve design and construction shall assure that assembly and disassembly of the valve can be accomplished onboard ship by Navy shipboard personnel without the need for special training or special tools. Special tools are defined as those tools not listed in the National Supply Catalog (copies of this catalog may be consulted in the office of the Defense Contract Administration Service (DCAS). Design and external configuration shall be such as to permit the use of a portable boring machine to repair the bonnet inlay of the valve with the valve in place in the piping system.

3.4 Body markings and identification plates.

3.4.1 Body markings. Valve bodies shall have the class and manufacturer's name or trademark cast or forged integral with the valve body. Globe valves shall have a bridge wall marking in addition to the above markings. When necessary, metal stamping shall be permitted on the neck of the valve body or other similar areas not subjected to high stress in service.

3.4.2 Identification plates. Identification plates made of corrosion-resisting steel . ass shall be permanently fastened to a part of the valve not subjected to working ; sure, preferably the yoke. Drawings of the proposed identification plates shall be reviewed by the procuring activity prior to their manufacture, and shall include the following data or a space therefor:

(a) Manufacturer's name or trademark.
(b) Size of valve and class.
(c) Stop check valve, if so constructed.
(d) Body and bonnet material composition.
(e) Valve trim identification (stem-disc-seat).
(f) Manufacturer's identification number (optional).
(g) Manufacturer's drawing number.
(h) MIL-V-22052.
(i) Component identification number (CID).
(j) National stock number (NSN).

3.5 Onboard repair parts. Onboard repair parts shall be as specified in table VI.

TABLE VI. Onboard repair parts.

Item	Quantities
Packings, gaskets, bonnet seal rings	50 percent of ship order but not less than two sets for each size, composition, and class
Valve disc and stem assembly	5 percent of ship order but not less than one complete set for each size, composition, and class

3.5.1 Repair parts (and special tools if required). When specified (see 6.2.1), repair parts (and special tools if required) shall be furnished in accordance with MIL-STD-1552 and MIL-STD-1561.

3.6 Technical data. The contractor shall prepare technical data in accordance with the data ordering document included in the contract or order (see 6.2.2), and as specified in 3.6.1 through 3.6.2.

3.6.1 Drawings. In addition to the drawing content required by the data ordering document (see 6.2.2), the following features shall be included:

(a) Accurately scaled sectional assembly which clearly depicts the design and construction of the valve.
(b) Bill of material listing specification, grade, condition, and any other data required to fully identify the properties of the materials proposed.
(c) Details of the seat, disc, and stem assembly and all other replaceable internal trim.
(d) Layout of the pressure-containing envelope (body and bonnet) giving dimensions which control compression of the spiral-wound gaskets and pressure seal ring. This is to assure that where remachining is necessary to repair the gasket-sealing surfaces on these parts, that compensating cuts can be accurately made to restore original gasket compression. This layout shall also specify the dimensional limits of such corrective remachining within which function of the valve remains unaffected.
(e) Recommended assembly torques, or equivalent procedures, for making up all joints and threaded assemblies.
(f) Tabulation of required gasket characteristics including all dimensions (with tolerances) and load versus compression characteristics (with tolerances).
(g) Mark areas to be radiographic, magnetic particle, or dye penetrant inspected.
(h) Dimensions-overall, accessibility space including disassembly clearances and all dimensions pertinent to installation.
(i) Surface finishes-show finish marks for all hard face surfaces and bearing areas.
(j) Name of laboratory conducting tests and date of previous successful shock and vibration tests.
(k) Welding procedure for seal canopy. Welding procedures shall include the following:

(1) Detail of weld.
(2) Welding process.
(3) Welding current (where applicable).
(4) Filler metal.
(5) Preparation.
(6) Interpass temperature.
(7) Technique.
(8) Post heat treatment.
(9) Provide a table listing size of weld, number of passes, electrode diameter, and welding characteristics.

3.6.1.1 Certification data. Certification data sheets shall be prepared by the contractor (see 6.2.2). In addition to the general requirements, the certification data sheets shall include the following:

(a) Class.
(b) Pressure and temperature rating.
(c) Body and bonnet material.
(d) Seat, disc, and stem material.
(e) Type of power operator, if required.
(1) Shock and vibration tests of valve with the power operator attached.

3.6.2 Manuals. In addition to the general requirements for technical manuals (see 6.2.2), the following shall be included as part of the contents:

(a) Drawings for the valve (including certification data sheet). Drawings shall be supplemented by additional illustrations where necessary to adequately illustrate operation and maintenance. These additional illustrations may consist of blowouts, partial or full sections, etc., and may eliminate extraneous lines and details to clarify the interaction of parts.
(b) Table listing wrench sizes and assembly torques (or other equivalent procedures) for making up all joints and threaded assemblies.
(c) Instructions to permit overhaul by shipyard or other repair facility. These should include procedures for checking all critical dimensions subject to wear or change and the acceptable dimensional limits, surface finish conditon, etc. Also, the appropriate procedure (that is, part replacement, correction at repair facility, or repair at manufacturer's facility) which should be followed to correct each case of damage or wear.

(d) Detailed disassembly and reassembly procedures. In addition to providing procedures for the complete disassembly and reassembly of the equipment, maintenance and troubleshooting sections shall contain, or refer to, only the limited disassembly and reassembly required to accomplish each particular operation. This is intended to reduce the possibility of unnecessary disassembly and unnecessary disturbance of adjustments when performing specific or limited maintenance or troubleshooting operations.
(e) Adjustment procedures.

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 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 assure supplies and services conform to prescribed requirements.

4.1.1 Inspection system program plan. The contractor shall provide and maintain an inspection system program plan in accordance with the data ordering document included in the contract or order (see 6.2.2).

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

(a) Qualification inspection (see 4.3).
(b) Quality conformance inspection (see 4.4).

4.3 Qualification inspection. Qualification inspection shall be conducted at a laboratory satisfactory to the Naval Ship Engineering Center (NAVSEC). Qualification shall consist of the examinations and tests specified in 4.5 through 4.7.

4.3.1 Qualification inspection samples. Sample valves submitted for qualification inspection shall be of the 2-1/2 inch size, special class 1500, composition B. Valves of the 2-1/2-inch size, class 1500, composition B, which have passed the qualification tests will qualify valves in sizes 2-1/2 inches and larger of all compositions, classes 600, 900, 1500, and 2500, provided variations in design throughout the various sizes and classes are demonstrated by analysis to be satisfactory to NAVSEC.

4.3.2 Authorization for qualification tests. Prior to authorization of qualification tests, the drawings specified in 3.6.1 shall be submitted to NAVSEC for review.

4.4 Quality conformance inspection. Each special class valve shall be examined and tested as specified in 4.5, 4.6.1, and 4.6.5. Each standard class valve shall be examined and tested as specified in 4.5, 4.6.1.4, and 4.6.5. The DCAS shall normally accept certification that materials comply with the specification, however, proof of compliance may be required by the DCAS.

4.5 Visual and dimensional examination. Valves shall be visually and dimensionally examined to verify compliance with the requirements of this specification not involving tests.

4.6 Tests.

4.6.1 Nondestructive testing.

4.6.1.1 Pressure containing castings of valves shall be 100 percent radiographically inspected when the service pressure or temperature will exceed the values listed in table VII. Inspection shall be in accordance with the following:

(a) Radiographic inspection shall conform to MIL-STD-271.
(b) Radiographic acceptance shall conform to MIL-STD-278.
(c) Radiographic coverage shall conform to the shaded areas shown on figures 2 and 3.

TABLE VII. Pressure or temperature criteria for nondestructive testing.

Service 1/	Gage pressure pounds per square inch (lb/in^2)	Temperature (°F)
Steam	225	500
Water	600	200
Oil	300	150

1/ When valves are used in services other than those listed, the criteria for nondestructive testing shall be as specified (see 6.2.1).

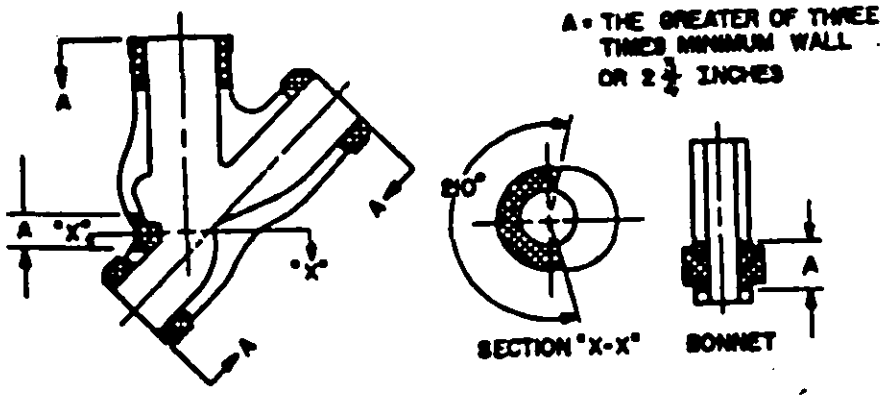

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FIGURE 2. "Y" pattern globe body (pressure seal bonnet).

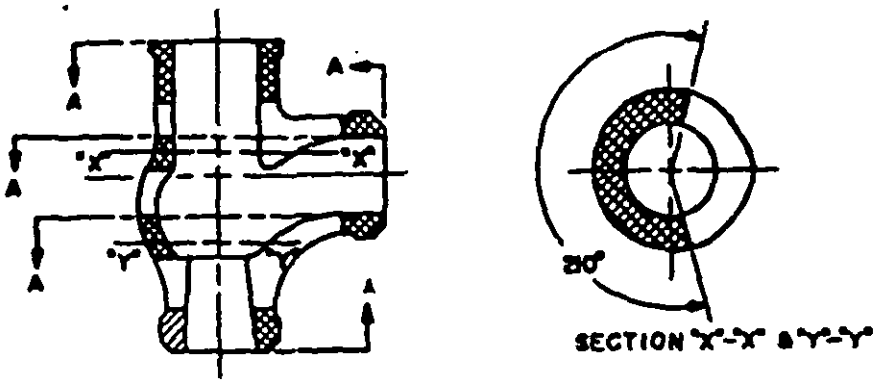

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FIGURE 3. Angle body (pressure seal bonnet) bonnet same as "Y" pattern globe.

4.6.1.2 Pressure containing forgings of valves shall be 100 percent magnetic particle inspected in accordance with MIL-STD-271 when the service pressure or temperature exceeds the values listed in table VII. Forgings shall be free from flaws such as seams, cracks, laps, porosity, scale, flakes, and all other defects detrimentally affecting the suitability of the forging for the service intended.

4.6.1.3 Defects to be repaired. The following shall apply to those parts inspected in accordance with 4.6.1.1 and 4.6.1.2:

(a) Defects less than 0.030 inch in depth need not be repaired provided the bottom of the defect is rounded and visible and the minimum wall thickness is maintained.

(b) Defects greater than 0.030 inch in depth but less than 15 percent of the wall thickness shall be repaired by removing the defective material. This material shall be removed by drilling or grinding to a bottom radius of at least three times the depth of the defect. The depth of the finished repair shall be less than 15 percent of the undamaged wall thickness. Sharp corners shall be faired into the base metal. Welding is not required to effect a repair of this nature, provided the minimum wall thickness is maintained.

(c) Defects greater than 15 percent of the wall thickness shall be repaired by removing the defective material and welding. The material shall be removed by grinding or drilling and then welded in accordance with 3.3.16. The crown of the weld shall be blended into the base metal.

4.6.1.4 Hard faced seating. Hard faced seating surfaces shall be liquid penetrant inspected in accordance with MIL-STD-271 after rough machining and shall be free of cracks or crack-like defects.

4.6.2 Cold tests. Cold tests shall be performed as follows:

(a) Operation - 10 cycles.
(b) Hydrostatic - shell and closure tests (see 4.6.5.1 and 4.6.5.2).

4.6.3 Hot tests. Hot tests shall be conducted with a gage pressure of 1200 lb/in^2 steam at 950°F and shall be performed in the following sequence:

(a) Thermal shock.
(b) Operation - 200 cycles.

4.6.3.1 Thermal shock tests. Valves shall be thermal shocked ten times by reducing the steam temperature from 950°F to 600°F in not more than 30 seconds.

4.6.3.2 Operational tests. Steam shall be passed through the valve for a period of not less than 48 hours. During this period two securing trials shall be made to determine if the valve remains tight while and after cooling to ambient temperature, and two warm-up trials shall be made to determine the torque required to open the valve which has been closed while cold. The valve shall be cycled a minimum of 200 times and the operating torque shall be recorded periodically during the cycling.

4.6.4 Shock and vibration. Valves shall be shock and vibration tested to determine conformance to the requirements specified in 3.3.9.

4.6.5 Hydrostatic tests. Valves shall be subjected to the tests specified in 4.6.5.1 for strength and porosity and the tests specified in 4.6.5.2 for tightness. Water temperature shall not exceed 100°F.

4.6.5.1 Shell test. Valves shall be given a shell test at a gage pressure no less than 1-1/2 times the 100°F rating, rounded off to the next higher 25 lb/in^2 increment. The test shall be made with water, which may contain a corrosion inhibitor, or with kerosene, or with other suitable fluid, provided such fluid has viscosity not greater than that of water, at a temperature not above 125°F. Visually detectable leakage through pressure boundary walls is not acceptable. Test duration shall be not less than as follows:

Valve size ips (inches)	Test time (seconds)
2-1/2 - 8	60
10 and larger	180

Test shall be made with the valve in the partially open position. Leakage through the stem packing shall not be cause for rejection.

4.6.5.2 Closure tests. Following the shell test, valves shall be given a closure test. Each valve 10 ips and larger, regardless of class and each valve in the size range ips 4 through ips 8, class 600 and higher shall be given a closure test using a fluid described in 4.6.5.1 at a pressure no less than 110 percent of the 100°F pressure rating. Each valve ips 4 through ips 8, class less than 600 and each valve in size less than ips 4, regardless of the pressure rating shall, be given either a fluid closure test at a pressure no less than 110 percent of the 100°F pressure rating or a gas closure test at a minimum gage pressure of 80 lb/in^2. The test pressure shall be applied successively on each side of the closed valve. Leakage rate of fluid test shall not exceed 10 cm^3, per hour per inch of nominal pipe size. Air test under water shall not allow the formation of a free air bubble. Duration of closure test shall be the same as specified in 4.6.5.1.

4.6.5.2.1 For globe and angle valves, the test pressure shall be applied across the closure member in the direction producing the most adverse seating condition. A stop check valve or other valve type designed to be a one-way valve, requires a closure test only in the appropriate direction.

4.6.5.2.2 Valves designed for operating conditions, that have the pressure differential across the closure member limited to values less than the 100 percent pressure rating and having closure members or actuating devices (direct, mechanical, fluid, or electrical) that would be subject to damage at high differential pressures, shall be tested as described above except that the closure test may be reduced to 110 percent of the maximum specified closed position differential pressure. This exception may be exercised upon agreement between the Navy and manufacturer. The manufacturer's nameplate data shall include reference to any such limitations.

4.7 Examination after qualification tests. Valves shall be disassembled and shall be visually and dimensionally examined for damage and wear. Disassembly and reassembly shall be performed to determine the practicability of maintaining a valve of this design for shipboard use (see 3.3.17). The maintainability demonstration shall be conducted by removing and replacing the pressure seal ring, disc, and stem. This shall be accomplished by following the instructions in the technical manual. Particular emphasis shall be directed towards the possibility of loss of small parts by the maintenance crew.

4.8 Inspection of preparation for delivery. Preservation-packaging, packing, and marking shall be inspected for compliance with section 5 of this document.

5. PREPARATION FOR DELIVERY

(The preparation for delivery requirements specified herein apply only for direct Government procurements. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.4.)

5.1 Preservation-packaging, packing, and marking. Valves shall be individually preserved-packaged level A or C, packed level A, B, or C, as specified (see 6.2.1), and marked in accordance with MIL-V-3.

5.2 Repair parts and tools. Repair parts and tools shall be preserved-packaged, packed, and marked for the level specified (see 6.2.1) in accordance with MIL-R-196.

5.3 Cushioning, dunnage, and wrapping materials.

5.3.1 Level A preservation-packaging and levels A and B packing. Use of all types of loose-fill materials for packaging and packing applications such as cushioning, filler, or dunnage is prohibited for materials destined for shipboard installation/stowage.

5.3.2 Level C preservation-packaging and packing. When loose-fill type materials are used for packaging and packing applications such as cushioning, filler, and dunnage, all containers (unit, intermediate, and shipping) shall be marked or labelled with the following information:

"CAUTION

Contents cushioned etc., with loose-fill material.
Not to be taken onboard ship.
Remove and discard loose-fill material before
shipboard stowage.
If required, recushion with cellulosic material,
bound fiber, fiberboard, or transparent flexible
cellular material."

5.3.3 Cushioning, filler, dunnage, and wrapping materials selected, whenever available, shall exhibit improved performance for resistance to fire.

6. NOTES

6.1 Intended use. Globe, angle, and Y pattern valves are intended for use in steam, water, and oil service.

6.2 Ordering data.

6.2.1 Procurement requirements. Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Composition and rating required (see 1.2).
(c) End preparation (see 3.3.3).
(d) Size required (see tables II and III).
(e) Nonstandard sizes of drains and by-passes (see 3.3.4.1).
(f) Service conditions.
(g) Quantity required.
(h) Location of drains and by-passes (see 3.3.4.2).
(i) Boss requirements (see 3.3.4.4).
(j) Pattern required (see 3.3.5).
(k) Port arrangement on globe valves (see 3.3.6).
(l) Center of gravity location (see 3.3.7).

(m) Whether vibration test is required (see 3.3.9).
(n) Valve trim (see 3.3.12.5).
(o) Allowable seat leakage (see 3.3.14).
(p) Repair parts and special tools required (see 3.5.1).
(q) Criteria for nondestructive testing when valves are used in services other than as listed (see table VII).
(r) Level of preservation-packaging and packing required (see 5.1).
(s) Level of preservation-packaging and packing of repair parts and tools required (see 5.2).

6.2.2 Data requirements. When this specification is used in a procurement which invokes the provision of the "Requirements for Data" of the Armed Services Procurement Regulations (ASPR), the data identified below, which are required to be developed by the contractor, as specified on an approved Data Item Description (DD Form 1664), and which are required to be delivered to the Government, should be selected and specified on the approved Contract Data Requirement List (DD Form 1423) and incorporated in the contract. When the provisions of the "Requirements for Data" of the ASPR are not invoked in a procurement, the data required to be developed by the contractor and required to be delivered to the Government should be selected from the list below and specified in the contract.

Paragraph	Data requirements	Applicable DID	Option
3.6.1 and 3.6.1.1	Drawings, engineering and associated lists	DI-E-7031	Level 2 Design activity designation - Contractor Drawing Number - Contractor Delivery of hard copies - Procuring activity
3.6.2	Manuals	DI-M-2043	MIL-M-15071, type I
4.1.1	Inspection system program plan	DI-R-4803	---

(Copies of data items descriptions required by the contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.)

6.2.2.1 The data requirements of 6.2.2 and any task in section 3, 4, or 5 of the specification required to be performed to meet a data requirement may be waived by the procuring/purchasing activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item procured to this specification. This does not apply to specific data which may be required for each procurement, regardless of whether an identical item has been supplied previously (for example, test reports).

6.2.2.2 Where the Government has limited rights in the data shown on the drawings, as determined by the contractual provisions regarding rights in technical data, the drawings may be marked with a legend. If used, the "Limited Rights Legend" of ASPR should be used.

6.3 With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in applicable Qualified Products List QPL-22052 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Naval Ship Engineering Center, Department of the Navy, Washington, DC 20362, and information pertaining to qualification of products may be obtained from that activity. Application for qualification tests shall be made in accordance with "Provisions Governing Qualification SD-6" (see 6.3.1).

6.3.1 Copies of "Provisions Governing Qualification SD-6" may be obtained upon application to Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

6.4 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in section 2 do not apply when material and parts are procured by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

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