INCH-POUND
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DETAIL SPECIFICATION

VALVES, ANGLE, PRESSURE RELIEF, NAVAL SHIPBOARD, FOR STEAM SERVICE

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 spring loaded pressure relief angle valves for naval shipboard steam service.

1.2 Classification. Pressure relief valves are of the following types and compositions as specified (see 6.2).

1.2.1 Types. Pressure relief valves are of the following types:

a. Type I – Atmospheric outlet
b. Type II – Pressure-tight outlet

1.2.2 Compositions. Pressure relief valves are of the following compositions:

a. Composition A:
   (1) Chromium – 2¼ percent
   (2) Molybdenum – 1 percent
b. Composition B:
   (1) Chromium – 1¼ percent
   (2) Molybdenum – ½ percent
c. Composition D: Carbon steel

Comments, suggestions, or questions on this document should be addressed to: Commander, Naval Sea Systems Command, ATTN: SEA 05S, 1333 Isaac Hull Avenue, SE, Stop 5160, Washington Navy Yard DC 20376-5160 or emailed to CommandStandards@navy mil, with the subject line "Document Comment". Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at https://assist.dla.mil.

AMSC N/A FSC 4820

1.3 Part or identifying number (PIN). PINs to be used for pressure relief valves acquired to this specification are created as follows:

M	**20065**	**-**	**X**	**X**
Prefix for Military Specification	Specification Number	-	Type (see code below)	Composition (see code below)

Type Code		Composition Code	
Type	Code	Composition	Code
I	1	A	A
II	2	B	B
		D	D

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

FEDERAL STANDARDS

FED-STD-H28 - Screw-Thread Standards for Federal Services

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-S-901 - Shock Tests, H.I. (High-Impact) Shipboard Machinery, Equipment, and Systems, Requirements for

MIL-R-17131 - Rods and Powers, Welding, Surfacing

MIL-DTL-23192 - Springs, Helical, Age-Hardenable Nickel-Chromium-Iron Alloy

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I – Environmental and Type II – Internally Excited)

MIL-STD-2035 - Nondestructive Testing Acceptance Criteria

COMMERCIAL ITEM DESCRIPTION

A-A-59720 - Sealing and Locking Compounds, Single-Component

(Copies of these documents are available online at http://quicksearch.dla.mil/.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

NAVAL SEA SYSTEMS COMMAND (NAVSEA) PUBLICATIONS

S9074-AR-GIB-010/278 - Requirements for Fabrications Welding and Inspection, and Casting Inspection and Repair for Machinery Piping, and Pressure Vessels

T9074-AS-GIB-010/271 - Requirements for Nondestructive Testing Methods

(Copies of these documents are available online via Technical Data Management Information System (TDMIS) at https://mercury.tdmis navy mil/ by searching for the TMIN without the suffix. Refer questions, inquiries, or problems to: DSN 296-0669, Commercial (805) 228-0669. These documents are available for ordering (hard copy) via the Naval Logistics Library at https://nll.ahf nmci.navy.mil. For questions regarding the NLL, contact the NLL Customer Service at nllhelpdesk@navy.mil, (866) 817-3130, or (215) 697-2626/DSN 442-2626.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME Boiler and Pressure Vessel Code, Section VIII, Rules for Construction of Pressure Vessels

ASME B1.12 - Class 5 Interference-Fit Thread

ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch Standard

(Copies of these documents are available online at www.asme.org.)

ASTM INTERNATIONAL

ASTM A105/A105M - Standard Specification for Carbon Steel Forgings for Piping Applications

ASTM A182/A182M - Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service

ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications

ASTM A194/A194M - Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both

ASTM A216/A216M - Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service

ASTM A217/A217M - Standard Specification for Steel Castings, Martensitic Stainless and Alloy, for Pressure-Containing Parts Suitable for High-Temperature Service

ASTM A227/A227M - Standard Specification for Steel Wire, Cold-Drawn for Mechanical Springs

ASTM A229/A229M - Standard Specification for Steel Wire, Quenched and Tempered for Mechanical Springs

ASTM A230/A230M - Standard Specification for Steel Wire, Oil-Tempered Carbon Valve Spring Quality

ASTM A231/A231M - Standard Specification for Chromium-Vanadium Alloy Steel Spring Wire

ASTM A232/A232M	-	Standard Specification for Chromium-Vanadium Alloy Steel Valve Spring Quality Wire
ASTM A276	-	Standard Specification for Stainless Steel Bars and Shapes
ASTM A351/A351M	-	Standard Specification for Castings, Austenitic, for Pressure-Containing Parts
ASTM A479/A479M	-	Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
ASTM A582/A582M	-	Standard Specification for Free-Machining Stainless Steel Bars
ASTM A689	-	Standard Specification for Carbon and Alloy Steel Bars for Springs
ASTM B164	-	Standard Specification for Nickel-Copper Alloy Rod, Bar, and Wire

(Copies of these documents are available online at www.astm.org.)

SAE INTERNATIONAL

SAE AMS5699	-	Nickel Alloy, Corrosion and Heat-Resistant, Wire, 72Ni - 15.5Cr - 0.95Cb - 2.5Ti - 0.70Al - 7.0Fe, Spring Temper, Precipitation Hardenable
SAE J2270	-	Ship Systems and Equipment—Threaded Fasteners—Inspection, Test, and Installation Requirements

(Copies of these documents are available online at www.sae.org.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2 Valve description. This specification covers self-contained, single seated, spring loaded relief valves, where the inlet pressure is sensed under and directly operates the spring loaded disc (see 6.7.8).

3.3 Materials of construction. Materials shall be as specified in table I. All materials shall be selected to prevent galling, seizing, or excessive wear between parts. Clearances shall be such as to prevent interferences due to thermal expansion. Welding, weld repair, and hardfacing shall be in accordance with S9074-AR-GIB-010/278.

TABLE I. List of materials.

Name of Parts	Composition A	Composition B	Composition D
Body, bonnet, and yoke	ASTM A182/A182M, Grade F22, Class 3, ASTM A217/A217M, Grade WC9	ASTM A182/A182M, Grade F11, Class 2, ASTM A217/A217M, Grade WC6	ASTM A105/A105M, ASTM A216/A216M, Grade WCB, ASTM A217/A217M, Grade WC1 or WC6
Disc and seat ring	Haynes 25, Stellite (wrought Stellite 6B, cast Stellite 6, or an inlay of Stellite not less than $^{3}/_{32}$ inch thick. Where inlays are used, welding rod shall be used in accordance with Type MIL-RCoCr-A of MIL-R-17131 and base materials shall be one of the following: ASTM A351/A351M, Grade CF3, CF3M, ASTM A276, Types 302, 304, 316, 347, ASTM A479/A479M, Types 302, 304, 316, 347), or equal. 1/	Same as for Composition A	ASTM A276, Types 302, 303, 304, 316, 431, 440, ASTM A351/A351M, Grades CF3, CF3M, CF8, CF8M, ASTM B164, ASTM A494, Type M30C, ASTM A479/A479M, Types 302, 304, 316, 347
Stem	Corrosion-resistant steel of 13% Chromium composition (CR 13), ASTM A479/A479M, ASTM A582/A582M	CR 13, ASTM A479/A479M, ASTM A582/A582M	CR 13, ASTM A479/A479M, ASTM A582/A582M
Springs	SAE AMS5699	SAE AMS5699	SAE AMS5699, ASTM A231/A231M, ASTM A232/A232M, ASTM A230/A230M, ASTM A689, ASTM A227/A227M, ASTM A229/A229M
Body bolts and nuts	ASTM A193/A193M, Grade B16, ASTM A194/A194M, Grade 7	ASTM A193/A193M, Grade B16, ASTM A194/A194M, Grade 7	ASTM A193/A193M, Grade B7 or B16, ASTM A194/A194M, Grade 4

NOTE:
1/ Where alternate material used, Government approval of material is required.

3.4 Design and construction requirements.

3.4.1 Pressure-temperature ratings. As specified (see 6.2), the design and pressure-temperature rating for valves of this specification shall be in accordance with ASME B16.5. Design ratings apply to both Type I and II valves. Maximum temperature limitations shall be as follows:

Composition A	1,050 °F
Composition B	1,000 °F
Composition D	775 °F

3.4.1.1 Type II pressure-temperature ratings. The outlet and spring housing for Type II valves shall be designed to withstand the higher of the following:

a. 150 percent of maximum system back-pressure.

b. ASME B16.5, Class 150, pressure rating.

3.4.2 End connections. Valve inlet and outlet connections shall be flanged in accordance with ASME B16.5.

3.4.3 Body construction. The valve shall be designed and constructed so that the seat (see 6.7.10) shall not become distorted, relative to the disc, and valve operation is not adversely affected by internal pressure.

3.4.4 Bonnet construction. The bonnet shall be flanged for attachment to the body (see 6.7.6). Sufficient bolting area shall be provided to maintain a leak-proof joint over a 3-year period. Bearing surfaces of nuts and bolts and their respective mating surfaces on the valve shall be finished machined.

3.4.5 Seat rings. A seat ring shall be provided that is seal-welded or silver-brazed circumferentially to the body. When the seat ring is part of the inlet flange raised face, such as in full nozzle valves, no welding or brazing is required.

3.4.6 Stem and disc. The stem or stem and disc assembly shall be top-guided. Guiding surfaces shall have the proper hardness, finish, concentricity, parallelism, clearance, length, and rigidity to prevent binding or seizing due to lateral thrust or thermal expansion, and to ensure proper seating. These requirements shall be maintained with interchangeable parts.

3.4.7 Springs. Springs shall be designed so that they will not be fully compressed or stressed beyond two-thirds of the yield strength of the spring material under any normal operation or adjustment of the valve (see 6.7.14). The working stress shall be such that relaxation shall not exceed 5 percent over a 1,000-hour period at the operating temperature. When removed and compressed solid, the springs shall not exhibit a permanent set exceeding 0.010 inch per inch of free spring length, measured 10 minutes after release of the spring. Spring ends shall be squared and ground.

3.4.8 Threads. All threads shall conform to FED-STD-H28. Provisions shall be incorporated to prevent the accidental loosening of all threaded parts. Unless otherwise specified (see 6.2), bolting shall be Class 2 fit. When tap-end studs are used, the tap end shall have an interference fit in accordance with ASME B1.12. Pipe threads shall not be used.

3.4.8.1 Thread-locking compound. Where service temperature of the valves does not exceed 425 °F, thread-locking compound shall be used instead of an interference fit for tap-end studs. The set end of the studs shall be Class 3A in Class 3B holes locked in place with a thread-locking compound in accordance with A-A-59720, Grade HT. The procedure for installing studs with a thread-locking compound shall meet the requirements of SAE J2270.

3.4.9 Interchangeability. All parts having the same manufacturer's part number shall be directly interchangeable with each other with respect to installation and performance and should not require selection, fitting, or machining of any kind.

3.4.9.1 Shipboard maintainability. Where the intended end use of the valve is a shipboard system installation, Master Drawings shall be as specified (see 6.2 and 6.4).

3.4.10 Hand lifting device. Valves shall be designed so that they may be operated by hand for testing purposes with an inlet pressure of 75 percent of the set pressure (see 6.7.11). The necessary lever or tool shall be furnished as part of each valve.

3.4.11 Stuffing boxes. A stuffing box on the valve stem shall not be permitted. Type II valves shall have a stuffing box on the shaft of the hand lifting device. The stuffing box will have no effect on the relief valve setting.

3.4.12 Gagging device. Where required for system test purposes, a gagging device (see 6.7.9) shall be supplied with the valve, as specified (see 6.2). Valves shall be capable of being gagged at pressures of 150 percent of the set pressure without alteration of the set point. The gagging screw shall be provided with a knurled or wing nut type head to discourage the use of wrenches when gagging the valve. The gagging device shall be designed to minimize the possibility of overlooking its removal after test and shall include a tag or other warning to this effect.

3.4.13 Accessibility. Valves shall be accessible for adjustment and repair without requiring removal from the line.

3.4.14 Valve adjustment. Means shall be provided for adjusting the setting with the valve under pressure. The adjusting screw shall have right-hand threads so that clockwise rotation increases the set pressure. The adjusting device shall be provided with a locknut and cap, or other suitable means, to prevent accidental change of adjustment.

3.4.15 Valve requirements.

3.4.15.1 Type I valve requirements. Type I valves shall have exposed springs. The clearance between the stem and the bonnet shall be sufficiently close to minimize the escape of steam between the stem and bonnet while the valve is relieving.

3.4.15.2 Type II valve requirements. Type II valves shall be pressure-tight on the outlet side. The pressure-temperature rating for the valve outlet shall be in accordance with 3.4.1 or as limited by the pressure rating of the bellows, if applicable. When specified (see 6.2), Type II valves shall include a balanced bellows design (see 6.7.3) to mitigate excessive system back-pressure exceeding limitations identified in 4.5.2. Bonnet of bellows valve shall be vented in service so pressure in bonnet does not impact set point. Approved designs which are modified to incorporate bellows shall be subjected to the first article inspections tests (see 4.2).

3.5 Performance requirements. Unless otherwise specified (see 6.2), performance requirements are as follows.

3.5.1 Set pressure range. For set pressures up to 250 pounds per square inch gage (psig), the set pressure shall be adjustable over a range of ±10 percent without requiring replacement of any internal parts. For set pressures over 250 psig, the set pressure shall be adjustable over a range of ±5 percent without requiring replacement of any internal parts.

3.5.2 Set pressure tolerance. The set pressure tolerance, plus or minus, shall not exceed 2 pounds per square inch (psi) or 2 percent of the set pressure, whichever is greater (see 6.7.13).

3.5.3 Accumulation. Valves shall be sized to pass the capacity specified (see 6.2) without permitting the inlet pressure to exceed the accumulation (see 6.7.1) limit specified on figure 1.

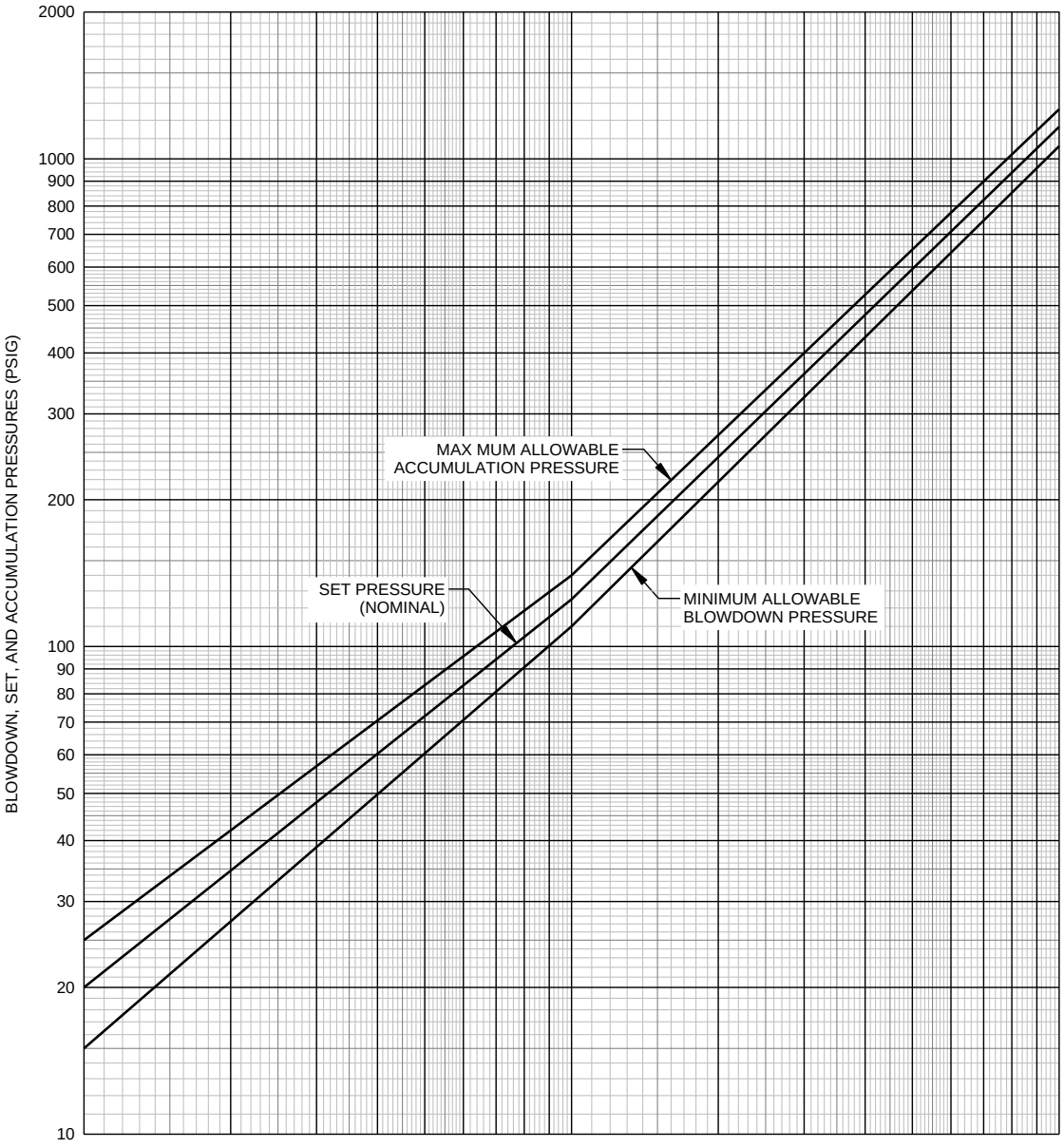

FIGURE 1. Relief valve characteristics.

3.5.4 Blowdown. Valves shall operate satisfactorily with a blowdown (see 6.7.4) setting not below that permitted by figure 1.

3.5.5 Seat tightness. With an inlet pressure equal to the minimum allowable blowdown pressure, there shall be no visible evidence of steam leakage when the outlet is viewed against a dark background.

3.6 Mechanical shock. Valves shall be designed to meet the mechanical shock requirements of MIL-S-901. Equipment and test classification shall be in accordance with MIL-S-901, Grade A, hull and bulkhead mounted principal unit, complete assembly, Class I, Type A (see 4.6).

3.7 Vibration. Each valve shall pass the vibration requirements as specified in MIL-STD-167-1. Test classification shall be in accordance with MIL-STD-167-1, Type I environmental vibration, up to and including 50 cycles per second (see 4.7).

3.8 Marking.

3.8.1 Body markings. The manufacturer's name or trademark and the body material composition shall be cast or forged integral with the valve body. The size and ASME pressure rating (inlet and outlet) shall be cast or forged integral with the valve body or stamped in the outside diameter of the flanges.

3.8.2 Identification plates. Each valve shall have an identification plate permanently attached to an exposed position on the valve on the lever housing. The identification plate shall be made of a corrosion-resistant material and shall contain the following information or a space there for:

a. Manufacturer's name or trademark.

b. Rated capacity at the applicable setting and accumulation.

c. Body material composition.

d. Service temperature (°F).

e. Set pressure (psig), blowdown pressure (psig), and accumulation pressure (psig) (see 6.7.2) with steam test medium.

f. Set pressure range adjustment available with installed spring.

g. Cold differential test pressure (psig) with compressible gas test medium (see 6.7.7) other than steam. This information is required regardless of whether valves are tested with steam.

h. Installation limitations of valve (maximum permissible inlet pressure loss and maximum permissible back-pressure buildup for which a valve is designed).

i. Manufacturer's model or part number and drawing number.

3.9 Workmanship. Valves shall be free from defects that affect their appearance or operation. Castings shall be clean, sound, and free from hard spots, porosity, cracks, and other injurious defects. Castings shall be smooth and well-cleaned, both inside and outside, and all fins and roughness shall be removed.

4. VERIFICATION

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

a. First article inspection (see 4.2).

b. Conformance inspection (see 4.3).

4.2 First article inspection. First article inspection shall be performed on the first valve of each lot, or when a first article sample is required (see 3.1 and 6.2). This inspection shall include the examination of 4.4 and the tests of 4.5.1 through 4.7, as specified in table II.

4.2.1 Lot. All relief valves of the same size, design, pressure rating, setting, and capacity offered for delivery at one time shall be considered a lot.

4.3 Conformance inspection. Conformance inspection shall include the examination of 4.4 and the tests of 4.5.1, 4.5.2, 4.5.4, and 4.5.5, as specified in table II. Each valve of each lot shall be subjected to conformance inspection.

TABLE II. First article and conformance inspections.

Characteristic	Requirement	First Article	Conformance
Visual examination	3.4, 3.8, 3.9	4.4	4.4
Proof	3.4.1	4.5.1	4.5.1
Set pressure, blowdown, and seat tightness	3.5.1, 3.5.4, 3.5.5	4.5.2	4.5.2
Accumulation	3.5.3	4.5.3	-
Material examination, chemical and physical	3.3	4.5.4	4.5.4
Non-destructive	3.3, 3.9	4.5.5	4.5.5
Set pressure repeatability and endurance	3.5.2, 3.5.5	4.5.6	-
Workmanship	3.9	4.4	4.4
Shock	3.6	4.6	-
Vibration	3.7	4.7	-

4.4 Visual examination. Each valve, without disassembly, shall be examined for compliance with the requirements specified in 3.4, 3.8, and 3.9 (see table II). 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 the specified requirements, shall receive particular attention for adequacy and suitability. Noncompliance with any specified requirements or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.5 Performance tests.

4.5.1 Proof test. A proof test shall be completed to test strength and soundness of pressure-containing envelope.

4.5.1.1 Test conditions. Valves shall be gagged shut and water shall be applied to the inlet at 1.5 times the set pressure. For Type II valves, water shall be applied to outlet at pressure defined by 3.4.1.

4.5.1.2 Acceptance criteria. Valves shall have no external leakage, permanent deformation, or structural failure.

4.5.2 Set pressure, blowdown, and seat tightness test. Set pressure, blowdown, and seat tightness tests shall be performed to determine set point and blowdown setting of valve, and to test for seat tightness at the minimum allowable blowdown pressure. Test setup shall impose an inlet pressure loss of 25 percent of the relief valve blowdown and a discharge pressure buildup of 10 percent of the set pressure. When specified (see 6.2), greater losses shall be imposed instead.

4.5.2.1 Test conditions. Steam inlet pressure shall be increased until valve lifts. Inlet pressure shall be reduced until a valve reseats. Leakage shall be checked for over a 10-minute period with an inlet pressure equal to the minimum blowdown pressure permitted by figure 1.

4.5.2.2 Acceptance criteria. For blowdown acceptance criteria, see 3.5.4. For seat tightness acceptance criteria, see 3.5.5. Tests shall not cause damage to seating surfaces. No instability shall be accepted and relief valves shall operate over entire flow range without chatter. Valve lift shall be sufficient to prevent wire drawing. Valves shall open with a clear, sharp pop at the pressure for which they are set. Valve closure shall be clean and sharp when the inlet pressure is reduced to the blowdown pressure (see 6.7.5) after the valve has passed full-rated flow or any intermediate flow.

4.5.3 Accumulation test. To verify relief valve capacity, instability shall be detected over operational range of valve, and the extent of leakage past Type I valve stems shall be identified.

4.5.3.1 Test conditions. Steam inlet pressure shall be increased until valve passes rated flow.

4.5.3.2 Acceptance criteria. Valve shall pass rated flow without exceeding accumulation permitted by figure 1. No instability shall be evident in the valve and relief valves shall operate over entire flow range without chatter. Unless otherwise specified (see 6.2), performance requirements are based on figure 1.

4.5.4 Material, chemical, and physical test. Material, chemical, and physical tests shall be performed to verify conformance of materials used to their applicable material specifications.

4.5.4.1 Test conditions. As specified in the applicable material specifications, all materials used in the manufacture of valves shall be examined and material certifications verified for conformance to 3.3.

4.5.4.2 Acceptance criteria. Valves shall only be accepted when specified material and material certifications are verified for conformance to 3.3.

4.5.5 Non-destructive tests. Pressure-containing components (bodies, bonnets, covers, discs) shall have non-destructive testing accomplished in accordance with the following:

a. Radiographic examination shall be in accordance with T9074-AS-GIB-010/271. Radiographic inspections shall be accomplished on cast components on valve sizes over 2 NPS with primary service pressure ratings of 300 psi or higher and valve sizes ½ NPS and higher with pressure ratings over 3,000 psi. Acceptance criteria for radiographic testing shall be as defined in S9074-AR-GIB-010/278.

b. Magnetic particle inspection shall be in accordance T9074-AS-GIB-010/271. Magnetic particle inspection shall be accomplished on all external surfaces and accessible internal surfaces of cast or forged pressure-containing components in valves ½ NPS and above, with pressure ratings of 600 psi or higher. Magnetic particle inspection is required on all but weld end preps of valves ½ NPS and larger with pressure ratings 225 psi and above. Acceptance criteria shall be as defined in MIL-STD-2035.

c. Dye penetrant inspection shall be in accordance with T9074-AS-GIB-010/271. A dye penetrant test shall be accomplished on all finished seating surfaces and finished hardfacing or inlay surfaces. Acceptance criteria shall be as defined in MIL-STD-2035.

4.5.6 Set pressure repeatability and endurance test. Set pressure repeatability and endurance tests shall be performed to verify that set pressure repeatability is within allowable limits, and to verify valve ability to withstand repetitive cycling.

4.5.6.1 Test conditions. Using steam, the valve lift shall be cycled and reseated 50 times. After every 10 cycles, a check for leakage shall be performed.

4.5.6.2 Acceptance criteria. For set pressure repeatability, see 3.5.2. For seat tightness, see 3.5.5. No damage to seating surface caused by cycling impact shall be present. No instability shall be present in the valve.

4.5.6.3 Test waiver. When specified (see 6.2), this test may be waived providing certified test data is available showing that the same basic design and size has previously passed these tests.

4.6 Shock test. Each type and valve design shall be shock tested to assure compliance with the requirements specified in 3.6 and shall be subject to review for similarity of design and materials. Evidence of previously conducted successful tests will be accepted as meeting this test.

4.6.1 Shock test procedure. Valves shall be tested at the setting required by the application for which they are being procured, and pressurized on the inlet side (see table III) with the corresponding system operating pressure. Testing medium shall be clean tap water with no additive other than cutting oil at temperatures not less than 40 °F or exceeding 100 °F. A total of nine blows shall be applied in accordance with MIL-S-901 for the condition and position specified in table III below. Momentary malfunction at the time for impact blow is permitted and acceptable. Permanent deformation, misalignment, or functional impairments shall be cause for rejection.

TABLE III. Hi-shock tests.

Valve Type	Position	Pressure Condition
Relief	Full closed	Pressurized on inlet side

4.6.2 Shock test examination. Each valve tested shall receive a complete visual and dimensional examination before and after shock tests. Pre-shock visual and dimensional examination shall be performed on the external surfaces only, without valve disassembly. Visual and dimensional examinations of internal and external valve surfaces and components shall be conducted upon shock test conclusion. No relaxation or deviations in post shock testing shall be permitted unless specifically approved by NAVSEA.

4.6.3 Post shock tests. The following minimum post shock tests are required in all cases. The tests shall be conducted in the order listed.

a. An external visual and dimensional check. The valve shall not be disassembled. This may include a dye penetrant or magnetic particle inspection as specified in 4.5.5 depending upon the requirements of individual ship specifications.

b. A proof test, as specified in 4.5.1. Pressure shall be maintained for at least 10 minutes.

c. A seat tightness test, as specified in 4.5.2. Pressure shall be maintained for at least 10 minutes.

d. A final visual and dimensional check, including valve internals.

4.6.4 Shock test acceptance criteria. The valve shall pass all post shock tests without exception. In the case of the visual and dimensional checks, any permanent damage that is detrimental to the valve shall be considered cause for rejection. This shall include any permanent deformation of any pressure-containing part.

4.6.5 Adjustments. Adjustments to correct minor malfunctions during shock tests will be permitted within the scope of immediate adjustment by ship personnel (e.g., tightening a packing gland is permissible; replacing a yielded or sheared bolt is not.)

4.7 Vibration test. Each valve design shall be vibration tested under normal operating conditions to duplicate shipboard installation and shall comply with the requirements specified in 3.7.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. Pressure relief valves covered by this specification are intended for naval shipboard line steam overpressure protection. Existing stock of pressure relief valves manufactured to MIL-V-20065D dated 8 June 1967 and Amendment 3 dated 13 March 1972 are acceptable for use until depleted.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.

b. Type and composition required (see 1.2).

c. When first article inspection tests are required (see 3.1).

d. ASME pressure rating required (see 3.4.1).

e. Maximum inlet pressure and temperature (see 3.4.1).

f. Bolting fit requirements, if other than specified in 3.4.8.

g. Requirements for Master Drawings, unless the drawings had been submitted to the Navy as part of a previous order (see 3.4.9.1 and 6.4).

h. If a gagging device is required to be supplied with valve (see 3.4.12).

i. If a balanced bellows design is required to be supplied with valve (see 3.4.15.2).

j. Set pressure required (see 3.5).

k. Performance requirements (set pressure tolerance, accumulation, blowdown) if other than specified in 3.5.

l. Capacity required (see 3.5.3).

m. When shock and vibration tests are required (see 3.6).

n. Data on the inlet and outlet piping restrictions to be imposed on the valve, if other than specified in 4.5.2.

o. Performance requirements, if other than specified in 4.5.3.2.

p. If certified repeatability and endurance test data exists (see 4.5.6.3).

q. Packaging requirements (see 5.1).

r. Valve orientation (see 6.5).

s. If certified capacity test data exists (see 6.6).

6.3 First article waiver. When first article inspection is required (see 6.2), the contracting officer should provide guidance to offerors as to whether or not the item should be a first article sample (see 3.1) as well as the number of items to be tested as specified in 4.2. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternative bids unless specifically requested to do so in the solicitation.

6.4 Master drawings. Detailed drawings that are sufficient to permit evaluation of the design should show the following:

a. A sectional assembly of the valve and details of the seat, and disk and stem assembly.

b. Finishes of all guiding and seating surfaces.

c. Bill of materials listing specification, grade, condition, and any other data required to fully identify the properties of the materials proposed.

d. Installation dimensions, end connection detail, and clearance dimensions required for disassembly.

e. Performance characteristics, estimated weight, and any limitations on installation.

f. Note any previous shock, vibration, or first unit test approval.

g. Note where machining is required after seat ring or guide installation in order to maintain critical concentricity or alignment dimensions.

6.5 Valve orientation. Valves should be packaged with valve stem vertically upright and packaging marked “This End Up” to avoid damage to sealing surfaces.

6.6 Accumulation test waiver. When specified (see 6.2), the accumulation test may be waived by providing that capacity data, obtained and certified in accordance with the ASME Boiler and Pressure Vessel Code.

6.7 Definitions. The following definitions are applicable to this specification.

6.7.1 Accumulation. The increase in static pressure, above the set pressure, required to pass rated flow. Expressed in psi or as a percent of the set pressure.

6.7.2 Accumulation pressure. The set pressure plus the accumulation. Expressed in psig.

6.7.3 Bellows. A flexible, pressure-containing component of a balance direct spring valve used to prevent changes in set pressure when the valve is subjected to a superimposed back pressure or to prevent corrosion between the disc holder and guide.

6.7.4 Blowdown. The decrease in pressure below the set pressure required for the valve to re-seat. Expressed in psi or as a percent of the set pressure. The accumulation and blowdown establish the operating band of the relief valve at a particular setting.

6.7.5 Blowdown pressure. The set pressure minus the blowdown. Expressed in psig.

6.7.6 Bonnet. A component of a direct spring valve that supports the spring.

6.7.7 Cold differential test pressure. The set pressure at which a pressure relief valve is adjusted to open on the test stand. This test pressure includes corrections for service conditions of superimposed back-pressure, temperature, and test medium. Expressed in psig.

6.7.8 Disc. A movable component of a pressure relief device that contains the primary pressure when it rests against the nozzle.

6.7.9 Gag. A device used on reclosing pressure relief devices to prevent the device from opening.

6.7.10 Seat. The pressure-sealing surfaces of the fixed and moving pressure-containing components.

6.7.11 Set pressure. The pressure at which the valve pops. Expressed in psig.

6.7.12 Set pressure range. The range over which the set pressure can be adjusted with the installed spring.

6.7.13 Set pressure tolerance. The permissible plus or minus deviation from the specified set pressure. Expressed in psi or as a percent of the set pressure.

6.7.14 Spring. The element in a pressure relief valve that provides the force to keep the disc on the nozzle.

6.8 Subject term (key word) listing.

Spring actuated

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

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