NOTICE
OF CANCELLATION

INCH-POUND

MIL-V-18634B
NOTICE 2
30 June 1998

MILITARY SPECIFICATION

VALVES; SAFETY, RELIEF, AND SAFETY-RELIEF

MIL-V-18634B, dated 3 April 1981, is hereby canceled. The preparing activity for this document has determined that the documents shown below are suitable replacements for the given classes. Users are cautioned to evaluate these documents for their particular application before citing them as a replacement document.

MIL-V-18643B	Class 1 through 10 (except 7)	Recommended Replacement: ASME/ANSI B16.34
	Class 7	ASTM F 1508

Custodian:
Army - CR4
Navy - YD1
Air Force - 99

Preparing Activity
Navy - YD1

(Project 4820-0781)

Review Activities:
Army - CE
DLA - CC
Navy - CG, MC

AMSC N/A

FSC 4820

NOTICE OF
VALIDATION

INCH-POUND

MIL-V-18634B
NOTICE 1
26 July 1991

MILITARY SPECIFICATION

VALVES: SAFETY, RELIEF, AND SAFETY-RELIEF

MIL-V-18634B, dated 3 April 1981, has been reviewed and determined to be valid for use in acquisition.

Custodians:
Army - ME
Navy - YD
Air Force - 99

Review activities:
Army - CE
DLA - CS

User activities:
Navy - CG, MC

Preparing activity:
Navy - YD

MIL-V-18634B
3 April 1981
SUPERSEDING
MIL-V-18634A
6 February 1967

MILITARY SPECIFICATION

VALVES: SAFETY, RELIEF, AND SAFETY-RELIEF

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers direct spring-loaded, pressure relief valves for steam, gas, vapor, and liquid service on boilers, hot water generators, nuclear vessels, and unfired pressure vessels constructed in accordance with the ASME Boiler and Pressure Vessel Code. It also covers one class of liquid relief valve intended for noncode medium-pressure applications such as pumps and pipe lines.

1.2 Classification. Valves shall be of the following types, classes, sizes, styles, and flange ratings, as specified (see 6.2 and Table I), and shall meet the requirements of the applicable section of the ASME Boiler and Pressure Vessel Code (hereinafter referred to as the ASME Code).

Type I - Safety valve.

Class 1 - Styles A, B, C, D, E, and G.
Class 1A, 1B - Styles E and G.
Class 2 - Style H.
Class 3, 3A - Styles A and B.
Class 4 - Styles A, B, C, D, E, and G.

Type II - Relief valve.

Class 5 - Style H.
Class 6, 7 - Styles A, B, and C.

Type III - Safety-relief valve

Class 8 - Styles D and E.
Class 9 - Style A.
Class 10 - Styles B, C, D, E, and F.

Size - As specified (see 3.6 and Table I).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer (Code 156), Naval Construction Battalion Center, Port Hueneme, CA 93043, by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

Style A - Bronze body with bronze trim.
Style B - Cast iron body with bronze trim.
Style C - Cast iron body with corrosion-resistant steel (CRES) trim.
Style D - Carbon steel body with CRES trim and carbon steel spring.
Style E - Carbon steel body with CRES trim and high-temperature alloy steel spring.
Style F - Low-alloy Carbon-molybdenum, steel body with CRES trim and high-temperature alloy steel spring.
Style G - Low-alloy, Chromium-molybdenum, steel body with CRES trim and high-temperature alloy steel spring.
Style H - High-alloy steel body with CRES trim and high-temperature steel spring.

Inlet flange pressure ratings (styles D, E, F, G, and H; see table I).

150-pound (lb) (except style F and G).
300-lb.
600-lb.
900-lb.
1500-lb.
2500-lb (size 3-inch and under).

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

MILITARY

MIL-V-3 - Valves, Fittings, and Flanges (Except for Systems Indicated Herein) ; Packaging of.
MIL-V-13612 - Valve, Relief, Pressure and Temperature (for Hot Water Supply System).

STANDARD

MILITARY

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

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific acquisition functions should be obtained from 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 IRON AND STEEL INSTITUTE (AISI)
300 and 400 series.

(Application for copies should be addressed to the American Iron and Steel Institute, 150 East 42nd Street, New York, NY 10017.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

B16.1 - Cast Iron Pipe Flanges and Flanged Fittings, 25, 125, 250, and 800 Lb.
B16.5 - Steel Pipe Flanges and Flanged Fittings.
B16.15 - Cast Bronze Screwed Fittings, 125 and 250 Lb.

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

AMERICAN PETROLEUM INSTITUTE (API)

Standard 526 - Flanged Steel Safety Relief Valves for Use In Petroleum Refineries.
Standard 527 - Commercial Seat Tightness of Safety Relief Valves with Metal-To-Metal Sheets.

(Application for copies should be addressed to the American Petroleum Institute, 2101 L Street, N.W., Washington, DC 20037.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
A216 - Carbon-Steel Castings Suitable for Fusion Welding for High-Temperature Service.
A217 - Alloy Steel Castings for Pressure Containing Parts Suitable for High-Temperature Service.
A351 - Ferritic and Austenitic Steel Castings for High-Temperatures.
A637 - Precipitation Hardening Nickel Alloy Bars, Forgings, and Forging Stock for High-Temperature Service.
A638 - Precipitation Hardening Iron Base Superalloy Bars, Forgings, and Forging Stock for High-Temperature Service.
B61 - Steam or Valve Bronze Castings.
B62 - Composition Bronze or Ounce Metal Castings.

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

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

Boiler and Pressure Vessel Code.
Section I - Power Boilers.
Section III - Nuclear Vessels.
Section IV - Low-Pressure Heating Boilers.
Section VIII - Pressure Vessels - Division 1.
- Alternative Rules for Pressure Vessels - Division 2.

(Application for copies should be addressed to the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th St., New York, NY 10017.)

NATIONAL BOARD OF BOILER AND PRESSURE VESSEL INSPECTOR (NB)

Relieving Capacities of Safety Valves and Relief Valves.

(Application for copies should be addressed to the National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, OH 43229.)

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 Description. The valves shall be automatic, spring-loaded, self-contained, direct-pressure, actuated, pressure-relieving valves consisting of a body, bonnet, cap, stem, spring, seating surface, disk and guide, blowdown ring, lifting lever, inlet and outlet connections, and, except for class 3 valves, a spring adjusting screw. Valves shall be of the specified types, classes, styles and for steel body valves, of the specified inlet flange rating (see 1.2). Unless otherwise specified (see 6.2), the styles applicable to each class shall be as specified herein.

3.1.1 Classes 1, 1A, and 1B. Class 1 safety valves for power boilers shall be style A, B, C, D, E, or G and in accordance with the temperature and pressure limits specified in 3.8 and Table I. Class lA safety valves for power boilers with superheated steam over 450 deg shall be style E or G with a spring fully exposed outside the valve casing. Class lB for organic fluid vaporizer generator using Dowtherm A (to 700 deg Fahrenheit (F)), Dowtherm E (300 deg F to 500 deg F) or equivalent organic heat transfer media shall be style E or G with totally enclosed spring only, shall be furnished without lifting levers, and shall be suitable for use with an escape pipe or condenser at the outlet connection. Class 1, lA, lB safety valves shall meet the requirements of Section I of the ASME Code.

TABLE I. Valve requirements.

CLASSIFICATION				INLET SIZES (INCHES)		ANSI FLANGE RATING		MAX. SET PRES.	TEMP LIMITS
STYLE	CLASSES TYPE I	TYPE II	TYPE III	MIN	MAX.	INLET(#)	OUTLET(#)	(PSIG)	DEG F
A	1,4			0.75	3.0	-MPT	-FPT	250	400
	3			0.75	4.0	-MPT	-FPT	15	250
	3A		9	0.75	3.0	-MPT	-FPT	160	250
		6,7		0.50	3.0	-MPT	-FPT	400	150
B,C	1,4	6,7	10	1.50	4	250 RF	125 FF or FPT	250 or 400	450 150
D	1,4		8,10	1.0	6.0	150 RF	150 RF	165	450
				1.0	6.0	300 RF	150 RF	275	450
				1.0	6.0	300 RF	150 RF	650	450
	(WCB)		(WCB)	1.50	6.0	600 RF	150 RF	1305	450
				1.50	6.0	900 RF	150 RF	1955	450
				1.50	3.0	1500 RF	150 RF	3255	450
						2500 RF	300 RF	5430	450

TABLE I. Valve requirements - continued.

CLASSIFICATION				INLET SIZES (INCHES)		ANSI FLANGE RATING		MAX. SET PRES.	TEMP LIMITS
STYLE	TYPE I	TYPE II	TYPE III	MIN	MAX.	INLET(#)	OUTLET(#)	(PSIG)	DEG F
	1,1A,			1.0	6.0	150 RF	150 RF	92	800
	1B,4,		8,10	1.0	6.0	300 RF	150 RF	275	800
E				1.0	6.0	300 RF	150 RF	365	800
	WCB		WCB	1.50	6.0	600 RF	150 RF	730	800
				1.50	6.0	900 RF	150 RF	1100	800
				1.50	3.0	1500 RF	150 RF	1830	800
						2500 RF	300 RF	3050	800
	4		10	1.0	6.0	300 RF	150 RF	215	1000
				1.0	6.0	600 RF	150 RF	430	1000
F	(WC1)		(WC1)	1.50	6.0	900 RF	150 RF	645	1000
				1.50	6.0	1500 RF	150 RF	1070	1000
				1.50	3.0	2500 RF	300 RF	1785	1000
	1,1A			1.0	6.0	300 RF	150 RF	265	1000
	1B			1.0	6.0	600 RF	150 RF	535	1000
				1.50	6.0	900 RF	150 RF	800	1000
G	(WC6)			1.50	6.0	1500 RF	150 RF	1335	1000
	(CF8M)			1.50	3.0	2500 RF	300 RF	2230	1000
		5		1.0	6.0	150 RF	150 RF	92	800
				1.0	6.0	300 RF	150 RF	290	800
				1.0	6.0	600 RF	150 RF	580	800
H	(CF8M)	(CF8M)		1.50	6.0	900 RF	150 RF	87	800
				1.50	6.0	1500 RF	150 RF	145	800
				1.50	3.0	2500 RF	300 RF	241	800

Notes for Table I:

1. Abbreviations used in the table are as follows: MPT - male pipe thread; FPT - female pipe thread; RF - raised face flange conforming to ANSI B16.5; FF - flat, plain-faced flange conforming to ANSI B16.1.
2. The letters in parentheses under types indicate the grade of steel specified in 1.2 and 3.4 for valve bodies.
3. Side outlet flanges for class 900 and 1500 steel body relief valves and safety relief valves shall be rated in accordance with API STD 526 either at 150 or 300 lb, depending on the orifice size.
4. Pressure ratings for steel body valves for operating temperatures less than the maximum indicated in the table shall be in accordance with ANSI B16.5 for the applicable material.
5. Style A, class 1 safety valves for miniature boilers may be 1/2-inch minimum provided the valve has the required relieving capacity.
6. The maximum pressures listed represent the maximum set pressure of the valves and in most instances also represent the maximum allowable working pressure of the equipment on which the valve will be installed. In some cases the set pressure will exceed the maximum allowable working pressure, as for power boilers where more than one valve is installed, the additional valve(s) may be set at a pressure not exceeding 3 percent of the maximum allowable working pressure.

3.1.2 Class 2. Class 2 safety valves for class A nuclear vessels; steam, vapor, or gas service shall be style H and shall meet the requirements of Section III of the ASME Code.

3.1.3 Class 3 and 3A. Class 3 and class 3A safety valves for low-pressure steaming heating and low-pressure hot water heating boiler shall be style A or B and shall meet the requirements of Section IV of the ASME Code.

3.1.4 Class 4. Class 4 safety valves for unfired pressure vessels, class B and C nuclear vessels; steam, vapor or gas service shall be style A, B, C, D, E, or F, and shall meet the applicable requirements of Section VIII of the ASME Code, and in accordance with the temperature and pressure limits specified in Table I.

3.1.5 Class 5. Class 5 relief valves for class A nuclear vessels and liquid service shall be style H and shall meet the requirements of Section III of the ASME Code.

3.1.6 Class 6. Class 6 relief valves for liquid service, unfired pressure vessels and class B and C nuclear vessels shall be style A, B, or C, and shall meet the requirements of Section VIII of the ASME Code.

3.1.7 Class 7. Class 7 relief valves shall be style A, B, and C designed for liquid service as specified up to 400 pounds per square inch gage (psig), and shall be suitable for the specified operating temperature and for the specific characteristics, such as viscosity and specific gravity of the liquid to be relieved (see 6.2).

3.1.8 Class 8. Class 8 safety-relief valves for high-temperature hot water generators shall be style D or E, as specified, and shall be furnished with fully-enclosed springs. The valves shall meet the requirements of Section I of the ASME Code.

3.1.9 Class 9. Class 9 safety-relief valves for low-pressure hot water supply boilers shall be style A and shall be furnished with top-guided disks (see 3.9.7). The valves shall meet the requirements of Section IV of the ASME Code.

3.1.10 Class 10. Class 10 Safety-relief valves shall be style B, C, D, E, or F, and shall be suitable for the specified pressure, temperature and, when applicable, viscosity, specific gravity, or other characteristics of the fluid to be relieved (see 6.2).

3.2 First article. When specified (see 6.2), the contractor shall furnish valves for first article inspection and approval (see 4.3 and 6.3).

3.3 Standard commercial product. The valves shall, as a minimum, be in accordance with the requirements of this specification and shall be the manufacturer’s standard commercial product. Additional or better features which are not specifically prohibited by this specification but which are a part of the manufacturer’s standard commercial product, shall be included in the valves being furnished. A standard commercial product is a product which has been sold or is being currently offered for sale on the commercial market through advertisements or manufacturer’s catalogs, or brochures, and represents the latest production model.

3.4 Interchangeability. All valves of the same classification furnished with similar options under a specific contract shall be identical to the extent necessary to insure interchangeability of component parts, assemblies, accessories, and spare parts.

3.5 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification unless otherwise specified.

3.5.1 Bronze. Bronze castings for style A valves shall conform to ASTM B61 or B62 except that, for style A valves intended for use on superheaters delivering steam at a temperature over 306 deg F, the body shall be cast of B61 bronze only.

3.5.2 Cast iron. Cast iron for style B and style C valves shall conform to class B of ASTM A126.

3.5.3 Carbon steel. Carbon steel castings for styles D and E shall conform to grade WCB of ASTM A216.

3.5.4 Low-alloy steel. Low-alloy steel castings shall conform to ASTM A217, grade WC1 for style F and grade WC6 for style G.

3.5.5 High-alloy steel. High-alloy steel castings for style G and H valves shall conform to grade CF8M of ASTM A351 or to another grade approved in Section III of the ASME Code as suitable for the specified operating temperature.

3.5.6 Corrosion-resistant steel trim. Trim for styles C, D, E, F, G, and H shall be fabricated of any CRES in the American Iron and Steel Institute (AISI) 300 and 400 series CRES (stainless) steels in accordance with the manufacturer’s standard practice for valves with CRES trim. In lieu of the AISI 300 and 400 steels, the following alternate materials may be substituted for disks or guides provided the materials have been used commercially on the manufacturer’s standard product at the specified set pressure and operating temperature:

(a) Precipitation hardenable stainless steel.
(b) Nickel-copper alloys.
(c) Nickel-chromium alloys.

3.5.7 High-temperature-alloy spring steel. High-temperature alloy steel for springs on styles E, F, G, and H shall be tungsten steel containing between 8.75 and 10 percent tungsten. In lieu of tungsten steel, high-temperature alloy springs may, at the option of the contractor, be fabricated of spring-tempered, age-hardenable nickel-chromium alloy wire having a chemical composition specified for grade 660 of ASTM A638 or grade 688 of ASTM A637 and solution treated and age-hardened as required for high-temperature service.

3.6 Size. The valve size shall be designated by the nominal size of the inlet connection, and shall be furnished within the size limits indicated in Table I applicable to the specified class and style. If the discharge capacity specified in accordance with 3.7 by the procuring activity exceeds the manufacturer's rated capacity for the size specified, the required discharge capacity shall take precedence. In this case the manufacturer shall indicate in his bid response the size of valve required to satisfy the specified capacity requirements. However, the Government reserves the right to reject bids which offer nonconforming sizes.

3.7 Operational requirements. When specified (see 6.2), the discharge capacity and set pressure of the valves shall be in the contract or order. Valves with a higher rated discharge capacity than specified will be acceptable. Unless a set pressure of 10 psig is specified, the set pressure for class 3 valves shall be 15 psig.

3.7.1 Discharge capacity. The discharge capacity at the specified set pressure shall be established on the basis of the following accumulations expressed as a percent of the set pressure:

(a) Classes 1, 1A, 1B, and 8: 3 percent
(b) Classes 2, 3A, 4, 5, 6, and 9: 10 percent
(c) Class 3: 33-1/3 percent.

The discharge capacity stamped on the valves shall be 90 percent of the actual capacity in accordance with provisions of the ASME Code, except for class 7 which may be stamped with the 100 percent capacity rating. Unless otherwise specified (see 6.2), class 7 valves shall be rated on the basis of a 25 percent accumulation. For rating class 10 valves, the accumulation shall be in accordance with the section of the ASME Code under which the valve will be installed. In accordance with the ASME Code, the discharge capacity of a pressure relief valve or valves must be sufficient to prevent the pressure in a boiler or other fired or unfired vessel from rising above a fixed percentage of the maximum allowable working pressure (e.g., 6 percent for power boilers and 10 percent for unfired pressure vessels). If the adequacy of the discharge capacity cannot be verified by computations or actual accumulation tests on the equipment, the following formula may be applied to fuel-firing equipment for computing the required steam discharge capacity:

$$W = \frac{C \times H \times 0.75}{1100}$$

where W = weight of steam generated per hour in lbs and minimum total required discharge capacity for pressure relief valve(s).
C = total weight or volume of fuel burned per hour at maximum firing rate in lb or cubic feet, as applicable.
H = high heat of combustion for fuel in British thermal units per lb or per cubic feet, as applicable.

For high-temperature water generators and hot water supply and hot water heating boilers, the modified formula W = C x H x 0.75 may be applied to give the discharge capacity in British thermal units per hour.

3.7.2 Blowdown. When specified (see 6.2), the blowdown for type I and III valves shall be adjusted in accordance with the manufacturer's standard practice. The minimum blowdown shall be 2 pounds per square inch.

3.7.3 Seat tightness. When the differential between the operating pressure and maximum allowable working pressure of equipment requires greater seat tightness for pressure relief valves than specified herein, the seats shall be leaktight to the extent specified in the contract or order (see 6.2). Seat tightness shall be in accordance with API STD 527 and shall be tight to the extent specified herein at the following pressures:

(a) Type I - Seat tightness for type I valves shall be established using air or steam at a test pressure equal to 94 percent or more of the set pressure, except for valves with a set pressure of 50 psig or below, in which case the test pressure shall be maintained at 5 psig or less below the set pressure.

(b) Type II - Seat tightness for type II valves shall be established using water at a temperature between 60 deg F and 70 deg F. Steam or air may be used at the option of the contractor. In any case, the test pressure shall be equal to 85 percent or more of the set pressure, except for valves with a set pressure of 50 psig or below, in which case the test pressure shall be maintained at 5 psig or less below the set pressure.

(c) Type III - Seat tightness for type III valves, shall be established using air or steam at a test pressure equal to 90 percent or more of the set pressure, except for valves with a set pressure of 50 psig or below, in which case the test pressure shall be maintained at 5 psig or less below the set pressure. For class 9 valves, water at a temperature not less than 180 deg F or stem shall be used for set tightness tests. For tests with air, the seat leakage rate shall not exceed the rates specified in API STD 527. For tests with steam or liquid, there shall be no visible discharge of the test medium from the outlet connection of the valve.

3.8 Design. Valve castings shall be designed for not less than the maximum applicable service pressures and temperatures specified in Table I. These pressures shall apply regardless of the specified set pressure. Except as otherwise specified herein, valves shall be designed with bottom inlets and side outlets. The pressure-temperatures rating for steel body valves, styles D, E, F, G, and H at temperatures less than the maximum specified in table I shall be in accordance with ANSI B16.5. All valves, except class 3, shall be designed with means for adjusting the spring tension within +/-10 percent of the set pressure for service up to and including 250 psig and within +/-5 percent for set pressures over 250 psig. Springs shall be adjusted and set at the factory and sealed in accordance with the ASME Code prior to shipment. When specified (see 6.2), valves shall be designed, rated and set for atmospheric discharge. The pressure side of the valves shall withstand the test pressures specified in Table II. Valves, except class 7, shall otherwise be designed and constructed in accordance with the applicable section of the latest issue of the ASME Code, including all addenda thereto.

TABLE II. Test pressures.

Style	Classes	Inlet flange ratings	Pressure (psig)
A	1,4,6,7	-	500
A	3	-	180
A	3A,9	-	240
B,C	1,4,6,7,10	256	500
D	1,4,8,10	150	250
		300	975
		600	1975
E,F,G	1,1A,1B,4,		
		1500	4900
		2500	8150
H	2,5	150	175
		300	500
		600	1000
		900	1500
		1500	2450
		2500	4075

3.9 Details of components.

3.9.1 Body. When specified (see 6.2), valves shall be of the angle pattern with bottom inlet and side outlet except that, for style A bronze body valves, top outlets in lieu of side outlets shall be furnished. The connections shall be threaded or flanged in accordance with Table I. Cast iron flanges shall be drilled and faced in accordance with ANSI B16.1. Steel flanges shall conform to ANSI B16.5. Body castings for class 3 valves shall meet or exceed the requirements for class 125 of ANSI B16.15.

3.9.2 Bonnet. The bonnet on cast iron and steel body valves shall be fabricated of the same material as the body. On bronze body valves the bonnet shall be screwed or bolted to the body. Cast iron and steel body valves shall be furnished with bolted bonnets except for class 6 and 7 cast iron relief valves which may be furnished with screwed bonnets for sizes up to and including 3 inch. Class 1A valves shall be furnished with a yoke (open bonnet) and exposed spring. Class 8 valves shall be furnished with fully enclosed bonnets. Other cast iron and steel body valves shall be furnished with either enclosed bonnets or open yokes at the option of the contractor.

3.9.3 Cap. Except for class 3 valves, each valve shall be equipped with a removable cap. For class 8 valves, the cap shall be pressure tight at the set pressure. Caps for other classes shall be pressure tight when a discharge back pressure is specified or when packed lifting levers are specified (see 3.9.10).

3.9.4 Nozzle. On cast iron and steel body valves, the nozzle in a venturi-shaped bushing inserted in the inlet throat section of the valve body casting to form the relieving port and seat. A full nozzle extends from the face of the flange to the disk and is installed with threaded connections for ready removal and replacement. Semi-nozzles are of two designs, as follows:

(a) Threaded, replaceable semi-nozzles which extend approximately one-half the distance from the disk to the face of the inlet flange.
(b) Seal-welded, nonreplaceable semi-nozzles which extend from the disk to a distance from the flange face less than the flange thickness and at this lowest extremity, are seal-welded to the body casting. On welding end inlets, these semi-nozzles may be an integral extension of the inlet neck.

3.9.5 Connections. Connections shall be threaded or flanged in accordance with Table I. Outlet connections for cast-iron body valves shall be class 125-lb flat flanges unless female threaded outlets are specified (see 6.2). Unless specific sizes are specified (see 6.2), outlet connections shall be sized in accordance with the following:

(a) Types I and III, style A, all sizes: Equal to or larger than the nominal inlet size.
(b) Type II, style A, all sizes: Equal to or larger than the nominal inlet size.
(c) Types I, II, and III, styles B through H, sizes 3-inch and less: One inch minimum in nominal size larger than the inlet.
(d) Types I, II, and III, styles B through H, size 4-inches and over: Two inches minimum in nominal size larger than the inlet.

3.9.6 Seating surfaces. The seating surfaces of valves shall be finished, as required, to meet the seat tightness requirements of 3.7.3. The seating surface for bronze body valves shall be bronze cast integrally with the body. For cast iron and steel body valves the seating surface shall be an integral part of the nozzle. The type of nozzle to be furnished on particular valves shall be as follows (see 3.9.4):

(a) Cast iron body valves - Replaceable null nozzles or threaded, replaceable semi-nozzles, at the option of the manufacturer.
(b) Steel body safety valves (type I) for set pressures to 900 psig - replaceable full nozzles or nonreplaceable, seal-welded semi-nozzles, at the options of the manufacturer.
(c) Steel body safety valves (type I) for set pressures over 900 psig - replaceable full nozzles or nonreplaceable, seal-welded semi-nozzles, at the option of the manufacturer, unless seal-welded semi-nozzles only are specified (see 6.2).
(d) Steel body relief valves (type II, style H) - full nozzles.
(e) Steel body, safety-relief valves (type III) - full nozzles.

3.9.7 Disks and guides. Disks and guides shall be bronze or CRES in accordance with the trim material applicable to the style specified. Alternate materials specified in 3.5.6 may be used in lieu of CRES. Disks for relief valves and safety-relief valves, except for class 5, may be fabricated of silicon elastomer for temperatures not exceeding 450 deg F and of polymerized tetrafluoroethylene (PTFE), polytrifluorochloroethylene (PTFCE), or a silicon elastomer for temperatures not exceeding 250 deg F. Class 9 valves shall be furnished without guides on the pressure side of the valve. Other bronze-body valves shall be either bottom- or top-guided at the option of the contractor.

Unless otherwise specified (see 6.2), cast iron body valves shall be top-guided. All steel body valves shall be top-guided. PTFE is identified commercially under such trade names as Teflon, Tefal, Eluon and Halon TFE. PTFCE is identified commercially as Kel-F.

3.9.8 Stems. Stems for valves with bronze trim shall be brass, carbon steel, or CRES, at the option of the contractor. Stems for valves with CRES trim shall be CRES. Carbon steel stems shall be cadmium-plated or, for operating temperatures not exceeding 250 deg F, may instead be treated with a zinc-phosphate conversion coating provided the stems are heat treated as required after coating to relieve hydrogen embrittlement.

3.9.9 Springs. Springs for styles A, B, C, and D shall be carbon spring steel, chromium-vanadium steel, chromium silicon steel, or CRES at the option of the contractor provided the material is suitable for the specified operating temperature. Phosphor bronze springs may be used on classes 3, 3A, 6, and 9. The permanent set of all springs shall not exceed 1 percent of the free length of the spring 10 minutes after release from a cold compression test closing the spring solid. Carbon steel and alloy steel springs may be furnished on style E valves in lieu of high-temperature alloy springs for operating temperatures up to 650 deg F provided the spring is fully exposed outside the valve casing. Springs for style E (except as otherwise specified herein for exposed springs) and styles F, G, and H shall be fabricated of a high-temperature alloy steel specified in 3.5.5. Carbon steel springs shall be cadmium-plated or, for operating temperatures not exceeding 250 deg F for enclosed springs and 450 deg F for exposed springs, may be treated with a zinc-phosphate conversion coating provided the springs are heat treated as required after coating to relieve hydrogen embrittlement.

3.9.10 Blowdown adjusting rings. Blowdown adjustable rings for valves with bronze trim shall be fabricated of cast bronze conforming to ASTM B61 or B62 or of a forged copper alloy. For valves with CRES trim, blowdown adjusting rings shall be fabricated of CRES, a copper-nickel alloy or of nickel alloys having suitable corrosion and erosion resistance. Set screws for adjusting rings shall be CRES except for valves with bronze trim which may be furnished with brass set screws.

3.9.11 Lifting levers. Unless otherwise specified (see 6.2), class 4, 6, and 10 valves shall be equipped with lifting levers. All other classes of valves except class 1B shall be equipped with lifting levers. Class 8 valves and valves for which a back pressure is specified (see 3.7), shall be furnished with packed, pressure tight lifting levers. Other lifting levers shall be of the open type.

3.9.12 Gags. When specified (see 6.2), a positive mechanical test gag screw mounts in the pilot control bonnet and holds the trigger relay closed, and shall be furnished with each valve.

3.10 Treatment and painting. Unless otherwise specified (see 6.2), cast iron and steel body valve casings shall be treated and painted in accordance with the manufacturer’s best standard practice.

3.11 Identification marking. Valves, assemblies, and parts shall be marked for identification in accordance with the manufacturer’s standard practice, and in accordance with the ASME codes

3.12 End item applications. When this specification provides coverage for pressure relief valves by appropriate reference in specifications for ASME-construction boilers, unfired pressure vessels, hot-water boilers, and other end items, the requirements herein for design, construction, and materials shall apply. The manufacturer of the end item shall be responsible for selecting the proper class, size, style, capacity, set pressure, and, when applicable, blowdown to meet the requirements of the applicable section of the ASME Code under which the end item is being furnished. Pressure relief valves shall be removed or fully protected when the end item is being painted to prevent fouling of the internal working parts of the valve with paint.

3.13 Spare parts. When specified in the contract or order (see 6.2), repair parts shall be furnished. One act of repair parts shall consist, as applicable, of all replaceable gaskets, disks, nozzles, adjusting ring(s), and any additional parts specified in the contract or order. Repair parts shall be furnished in the ratio of one set of parts for every five valves furnished under a contract. When spare parts are specified and less than five valves are being furnished, one set of spare parts shall be supplied.

3.14 Workmanship. Workmanship shall be in accordance with the criteria established by the ASME as acceptable for approval of pressure relief valves.

3.14.1 Steel fabrication. The steel used in fabrication shall be free from kinks, sharp bends, and other conditions which would be deleterious to the finished product. Manufacturing processes shall not reduce the strength of the steel to a value less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to insure uniformity of size and shape.

3.14.2 Casting. All castings shall be sound and free from patching, misplaced coring, warping, or any other defect which reduces the casting ability to perform its intended function.

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.

4.2 Classification of inspection. Inspection shall be classified as follows:

(a) First article inspection (see 4.3).
(b) Quality conformance inspection (see 4.4).
(c) Packaging inspection (see 4.9).

4.3 First-article inspection. First article inspection shall be performed on one valve when a first article sample is required (see 3.2 and 6.3). This inspection shall include the examination of 4.6 and the tests of 4.7. The

first article may be a first production item or a standard production item from the contractor 's current inventory provided the valve meets the requirements of the specification and is representative of the design, construction, and manufacturing technique applicable to the remaining valves to be furnished under the contract.

4.4 Quality conformance inspection. Quality conformance inspection shall be performed on the sample valve selected in accordance with 4.5. The inspection shall include the examination of 4.6 and the tests of 4.7.

4.5 Sampling. A random sample of valves shall be selected from each lot offered to the Government in accordance with inspection level II of MIL-STD-105. The Acceptable Quality Level shall be 2.5 percent defective for major defects and 4.0 percent defective for minor defects.

4.5.1 Lot. A lot shall consist of all valves of the same classification offered for delivery to the Government at one time under a specific contract. A sample unit shall consist of one completely assembled valve.

4.6 Examination. Each valve shall be examined for compliance with the requirements specified in Section 3 of this specification. Any redesign or modification of the contractor's standard product to comply with specified requirements, or any necessary redesign or modification following failure to meet specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations and dimensional measurements. Noncompliance with any specified requirements or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.7 Tests.

4.7.1 Capacity test. Samples of valve designs to be furnished under this specification shall have been selected and tested for capacity tests in accordance with the applicable section of the ASME Code. Retesting of sample valves under each contract will not be required. Test shall meet the specified discharge capacity (see 3.7.1). For class 7 valves, the manufacturer's test records will be accepted as evidence of compliance.

4.7.2 Pressure tests. Each valve, except class 3, shall be gagged and tested at the applicable test pressure specified in Table II. The test pressure shall be applied to the parts of the valve inlet subjected to the full operating pressure. The test medium shall be air or water at the option of the manufacturer. Other cast parts of the valve casing either before or after assembly and class 3 valves shall be checked for porosity, blowholes, or other casting defects in accordance with the manufacturer's standard test procedures. Any leakage detected during the pressure tests shall be cause for rejection of the valve.

4.7.3 Set pressure. Each valve shall be tested and adjusted for the specified set pressure. The set pressure shall be corrected, as required,to compensate for the specified operating temperature and for back pressure, if specified. After testing and adjustment the spring adjusting screw shall be sealed in an approved manner by the manufacturer.

4.7.4 Seat tightness test. Each valve, adjusted in accordance with 4.7.3, shall be tested for leakage past the seat. The test medium and test pressure shall be as specified in 3.7.3. When air is used as the test medium for type I and III valves, the test apparatus and procedures shall conform to API STD 527. When steam is used as the test medium, visual examination shall be the standard for determining seat tightness. The discharge outlet shall be viewed against a dark background. Observations shall be made from a point 4 to 5 feet away from the outlet and at an angle of 45 deg from the center line of the valve outlet. There shall be no visible sign of escaping steam. When water is used as the test medium for relief valves, leakage shall be determined by visual examination of the valve outlet. Any leakage of steam or water or any leakage of air exceeding the rates specified in API STD 527 shall be cause for rejection of the valve unless the condition can be corrected by additional furnishing or replacement of seats or disks.

4.7.5 Blowdown tests. Tests for blowdown on each valve will not be required except as specified in 4.8 for field tests. Proper blowdown settings shall have previously been established in accordance with ASME capacity certification tests required under 4.7.1 or by flow tests conducted by the manufacturer. The blowdown on each valve shall be adjusted on the basis of these test data.

4.7.6 Material tests. Material tests shall be performed by the material contractor in accordance with the sampling procedures and test methods specified in the applicable ASTM standard. Valve manufacturers will not be required to perform material tests but shall be responsible, in accordance with 4.2, with the receipt and identification of material. The valve manufacturer shall maintain a general quality certification of the materials used and, when requested, shall make available to the contracting officer or his authorized representative suitable quality certification for materials.

4.8 Field tests. When specified (see 6.2), for styles E, F, G, and H procured for immediate use on central station boilers, the valves shall be tested at the site after installation. Field tests shall include the tests of 4.7.3, 4.7.4, and 4.7.5. At the discretion of the Government, an accumulation test on the equipment shall be performed to verify that the valve(s) has sufficient relieving capacity to prevent the pressure from rising above the limits specified in the applicable section of the ASME Code. Tests will be conducted by the Government, by the contractor installing the valves or by the valve manufacturer, as specified.

4.9 Packaging inspection. Requirements for the packaging inspection shall be in compliance with section 4 of MIL-V-3.

5. Packaging. Cleaning, drying, preservation, and packaging shall be level A or C; and, packing shall be level A, B, or C in accordance with MIL-V-3 as specified (see 6.2).

6. NOTES

6.1 Intended use. Pressure relief valves covered by this specification are intended primarily for use on equipment constructed in accordance with the ASME Boiler and Pressure Vessel Code including power boilers, electric boilers, miniature boilers, nuclear vessels, high-temperature water

generators, unfired pressure vessels, and low-pressure steam, hot water heating and hot water supply boilers. Combination relief valves intended specifically for hot water heaters are covered by MIL-V-13612. Class 7 valves specified herein are intended for use on noncode applications such as pumps, water and petroleum pipe lines, and medium pressure hydraulic systems.

6.2 Ordering data. Acquisition documents should specify the following:

(a) Title, number, and date of this specification.
(b) Valve classification (see 1.2, 3.1, 3.1.7, 3.1.10, and Table I):

(1) Type
(2) Class
(3) Size
(4) Style
(5) Flange rating (styles D, E, F, G, and H)
(6) Operating temperature.
(7) Type and characteristics (viscosity, specific gravity, molecular weight, etc.) of medium to be relieved if other than steam, air, or water. (See conversion formulas in ASME Code)
(8) Application for class 10 safety-relief valves.

(c) When a style not specified for a particular class shall be furnished (see 1.2, and 3.1).
(d) When first article is required for inspection and approval (see 3.2, 4.3, and 6.3).
(e) Discharge capacity and set pressure (see 3.7).
(f) Capacity-rating pressure for class 7 valves if based on other than 25 percent accumulation (see 3.7.1).
(g) Blowdown required if manufacturer's standard setting is not acceptable (see 3.7.2).
(h) When more stringent seat tightness than specified is required and details thereof (see 3.7.3).
(i) Backpressure, if discharge is not to atmosphere, and characteristics of the pressure (constant, variable, super-imposed, etc.) (see 3.8).
(j) When top discharge in lieu of side outlet is required for style A valves (see 3.9.1).
(k) When outlet connection sizes shall be other than as specified; when outlet connections for styles B and C shall be threaded in lieu of flanged (see 3.9.5).
(l) When seal-welded semi-nozzles is required (see 3.9.6(c)).
(m) When bottom guides will be acceptable for cast iron body valves (see 3.9.7).
(n) When class 4, 6, or 10 valves shall be furnished without lifting levers (see 3.9.11).
(o) When gags for testing are required (see 3.9.12).
(p) When cast iron and steel body valve casings is treated and painted (see 3.10).
(q) When square parts shall be furnished and list of parts required (see 3.13).
(r) When field testing of valves will be performed and responsibility for testing (see 4.8).
(s) Level of preservation and packaging and level of packing required (see 5.).

6.3 First article. When a first article is required, it shall be tested and approved under the appropriate provisions of paragraph 7-104.55 of the Defense Acquisition Regulations. The first article should be a first production item consisting of one completely assembled valve or it may be a standard production item from the contractor's current inventory as specified in 4.3. The contracting officer should include specific instructions in all acquisition instruments regarding arrangement for examinations, tests, and approval of the first article.

6.4 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:

Army - ME
Navy - YD
Air Force - 99

Preparing activity:

Navy - YD

Project No. 4820-0325

Review activities:

Army - CE
DLA - CS

User activities:

Navy - CG, MC