

Flanged Steel Pressure-relief Valves

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Flanged Steel Pressure-relief Valves

1 Scope

This standard is a purchase specification for flanged steel pressure-relief valves. Basic requirements are given for direct spring-loaded pressure-relief valves and pilot-operated pressure-relief valves as follows:

- orifice designation and area;
- valve size and pressure rating, inlet and outlet;
- materials;
- pressure–temperature limits;
- center-to-face dimensions, inlet and outlet.

Nameplate nomenclature and requirements for stamping are detailed in Annex A [metric units (SI)] and Annex E [U.S. customary units (USC)].

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Standard 520 (Part 1 and Part 2), *Sizing, Selection, and Installation of Pressure-relieving Devices in Refineries*

API Standard 527, *Seat Tightness of Pressure Relief Valves*

ASME B1.20.1¹, *Pipe Threads, General Purpose (Inch)*

ASME B16.5, *Pipe Flanges and Flanged Fittings—NPS 1/2 Through NPS 24 Metric/Inch Standard*

ASME B16.34, *Valves—Flanged, Threaded, and Welding End*

ASME Boiler and Pressure Vessel Code (BPVC), Section VIII: Pressure Vessels; Division 1 and Division 2

ASME Boiler and Pressure Vessel Code (BPVC), Section XIII: Rules for Overpressure Protection

ASME BPVC, Section II: Materials:

ASME SA-216, *Carbon-Steel Castings Suitable for Fusion Welding for High-Temperature Service*

ASME SA-217, *Martensitic Stainless Steel and Alloy Steel Castings for Pressure-Containing Parts, Suitable for High-Temperature Service*

ASME SA-351, *Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts*

ASME SA-494, *Specification for Castings, Nickel and Nickel Alloy*

¹ ASME International, 2 Park Avenue, New York, NY 10016-5990, www.asme.org.

ISO 23936-1 ², *Oil and gas industries including lower carbon energy—Non-metallic materials in contact with media related to oil and gas production—Part 1: Thermoplastics*

ISO 23936-2, *Petroleum, petrochemical and natural gas industries—Non-metallic materials in contact with media related to oil and gas production—Part 2: Elastomers*

NACE AMPP MR0103/ISO 17945 ³, *Petroleum, petrochemical and natural gas industries—Metallic materials resistant to sulfide stress cracking in corrosive petroleum refining environments*

NACE MR0175/ISO 15156, *Petroleum and natural gas industries—Materials for use in H₂S-containing environments in oil and gas production*

NORSOK Standard M-710 ⁴, *Qualification of non-metallic materials and manufacturers—Polymers*

3 Terms and Definitions

Pressure-relief valve terminology is defined in API 520, Part 1.

4 Responsibility

4.1 The purchaser is responsible for the following:

- a) selecting the type of pressure-relief valve and the required pressure–temperature ratings;
- b) specifying materials that will satisfactorily resist corrosion from the process fluid and environmental conditions;
- c) selecting the minimum required orifice area based upon relieving conditions derived from full knowledge of the pressure-relieving system and the requirements of the applicable codes and regulations;
- d) providing data for sizing and selection.

4.2 The manufacturer is responsible for the following:

- a) designing and manufacturing pressure-relief valves to satisfy the requirements of this standard and the purchaser's specification;
- b) publishing relieving capacities based upon certified test data;
- c) advising the purchaser of any nonconformance to the purchaser's specification;
- d) relieving capacities of the selected pressure-relief valves shall be those established and guaranteed by the pressure-relief valve manufacturer for the applicable service conditions and be equal to or greater than the required relieving capacities.

5 Conflicting Requirements

Whenever the information included on the purchaser's specification sheet or purchase order conflicts with the provisions of this standard, the purchaser's specification sheet or purchase order shall govern. Where conflicting requirements exist, the manufacturer shall call them to the attention of the purchaser.

² International Organization for Standardization, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, www.iso.org.

³ Formerly NACE International, now known as The Association for Materials Protection and Performance (AMPP), 15835 Park Ten Place, Houston, TX 77084, www.ampp.org/home.

⁴ Standards Norway, PO Box 252, NO-1326 Lysaker, Norway, www.standard.no/en/.

6 Orifice Areas and Designations

The standard effective orifice areas and the corresponding letter designations shall be selected from those detailed in Table 1. The effective orifice areas and designations shall be used in conjunction with the sizing equations contained in API 520, Part 1.

7 Design

7.1 General

Pressure-relief valves discussed in this standard shall be designed and manufactured in accordance with the applicable requirements of ASME *BPVC*, Section VIII pressure-relief devices.

7.1.1 The nozzle shall not be welded to the valve body.

7.1.2 The nozzle shall have an integral seat oversized to permit lapping or remachining operations, for metal seated valves only.

7.1.3 The blowdown adjusting ring shall be secured by means of an adjusting ring set screw.

7.1.4 The bonnet vent for bellows valves shall have a screwed vent fitting (see bug screen shown in Figure 1). The bug screen mesh holes size shall be 0.4 mm (0.015 in.) at a minimum to allow proper breathing with maximum 3.175 mm (0.125 in.) to prevent nesting insects from entering.

7.1.5 Spring-loaded pressure-relief valves shall have a bolted bonnet and be full nozzle type.

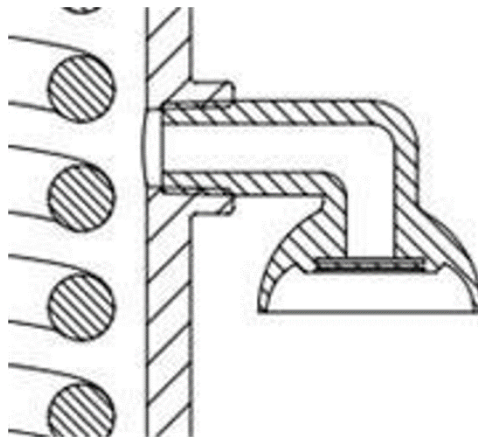


Figure 1—Typical Bug Screen

7.2 Determination of Orifice Area

The minimum required effective orifice area shall be determined in accordance with API 520, Part 1.

7.3 Valve Selection

For valves described in this standard, inlet and outlet flange sizes and pressure–temperature ratings shall conform to the data in Table 3 through Table 16 (SI) [Table 31 through Table 44 (USC)] for spring-loaded valves and Table 17 through Table 30 (SI) [Table 45 through Table 58 (USC)] for pilot-operated valves. Inlet and outlet pressure limits are governed by the flange pressure–temperature limits or by the manufacturer’s design limits, whichever is lower.

Table 1—Standard Effective Orifice Areas and Letter Designations

Designation	Effective Orifice Area mm ²	Effective Orifice Area in. ²
D	71	0.110
E	126	0.196
F	198	0.307
G	325	0.503
H	506	0.785
J	830	1.287
K	1,186	1.838
L	1,841	2.853
M	2,323	3.60
N	2,800	4.34
P	4,116	6.38
Q	7,129	11.05
R	10,323	16.00
T	16,774	26.00

7.4 Dimensions

Center-to-face dimensions shall be in accordance with Table 3 through Table 30 (SI) [Table 31 through Table 58 (USC)] with tolerances of ± 1.59 mm ($1/16$ in.) for valve inlet sizes up to and including 102 mm (4 in.), and ± 3.18 mm ($1/8$ in.) for valve inlet sizes larger than 102 mm (4 in.)

Flange facings and dimensions shall be in accordance with ASME B16.5.

For some valve designs, the inlet raised face height may substantially exceed the nominal dimension specified in ASME B16.5. Consult the manufacturer for exact dimensions.

7.5 Lifting Levers

Lifting levers shall be provided when required by ASME *BPVC* or when designated on the purchaser's specification sheet.

As allowed by code for pilot-operated pressure-relief valves, means in lieu of lifting levers may be specified for connecting and applying adequate pressure to the pilot to verify that the moving parts critical to proper operation are free to move.

7.6 Special Construction Features

Construction features beyond the scope of this standard shall be provided as agreed upon by the manufacturer and the purchaser and shall be designated on the drawings provided to the purchaser. Pressure-relief valves with a steam-relief scenario, not designated in steam service, shall not have an open bonnet design.

7.7 Restricted Lift Pressure-relief Valves (See API 520, Part 1, Paragraph 4.2.4)

7.8 Threaded Auxiliary Connections

7.8.1 Bonnet vent and body drain plugs shall have NPT thread design.

7.8.2 Pressure-retaining plugs shall be designed in accordance with ASME B1.20.1 with a minimum of four turns of hand tightening prior to wrench tight engagement.

7.8.3 A calibrated manual torque wrench shall be used to apply the manufacturer's stated torques.

7.9 Lifting

7.9.1 The manufacturer shall provide lifting sketches and handling instructions for valves weighing from 22.7 kg (50 lb) to 250 kg (550 lb).

7.9.2 Lifting lugs shall be provided for pilot operated valve assemblies over 250 kg (550 lb).

8 Material

8.1 General

Materials generally used for construction are covered in this section. For special corrosion problems and applications beyond the pressure–temperature limits of this standard, construction materials shall be those agreed upon by the manufacturer and the purchaser. Material selection shall be based on the specified service and pressure–temperature envelope. Materials for sour service shall be in accordance with NACE MR0175/ISO 15156 or NACE AMPP MR0103. When explosive-decompression-resistant elastomers are specified, they shall meet the requirements of either NORSOK M-710 or ISO 23936-1 and ISO 23936-2, as specified by the purchaser. User shall specify which standard they will follow.

NOTE 1 Explosive decompression (also referred to as rapid gas decompression or RGD) is a failure mechanism of elastomer seals and O-rings that is caused by a rapid reduction in pressure of gaseous media.

NOTE 2 Explosive-decompression-resistant elastomer grades are to be considered for high pressure applications, as the probability of explosive decompression increases with pressure, pressure variations, temperature, and cross-section of the O-ring.

NOTE 3 The presence of methanol and H₂S will make the elastomers significantly more prone to explosive decompression.

8.2 Spring-loaded Pressure-relief Valves

The body and bonnet materials shall be in accordance with Table 3 through Table 16 (SI) [Table 31 through Table 44 (USC)] for the required temperature range. The body and bonnet may be of different materials but must meet the minimum pressure–temperature requirement. The body and bonnet materials shall be equivalent to or better than the following types and grades:

- carbon steel, ASME SA-216, Grade WCB;
- austenitic stainless steel, ASME SA-351, Grade CF8M;
- chromium molybdenum steel, ASME SA-217, Grade WC6;
- nickel/copper alloy, ASME SA-494, Grade M35-1;
- alloy 20, ASME SA-351/SA-351M, Grade CN7M.

Materials for springs shall be selected per Table 2 on the basis of the operating temperature of the process fluid unless an analysis of the ambient or relieving conditions indicates a spring requiring a different material.

Material for the internal parts of the valve shall be in accordance with the manufacturer's standards for the temperature and service or as indicated on the purchaser's specification sheet.

Table 2—Spring Materials

Operating Temperature °C	Operating Temperature °F	Spring Material
−268 to −60	−450 to −76	Low-temperature alloy steel
−59 to 232	−75 to 450	Carbon steel or chrome alloy steel
233 to 538	451 to 1000	Chrome alloy or high-temperature alloy steel

8.3 Pilot-operated Pressure-relief Valves

The main valve body and cap material shall be in accordance with Table 17 through Table 30 (SI) [Table 45 through Table 58 (USC)] for the required temperature range. The body material shall be equivalent to or better than the following types and grades:

- carbon steel, ASME SA-216, Grade WCB;
- austenitic stainless steel, ASME SA-351, Grade CF8M;
- nickel/copper alloy, ASME SA-494, Grade M35-1;
- alloy 20, ASME SA-351, Grade CN7M.

Material for the pilot and internal parts of the valve shall be in accordance with the manufacturer's standards for the temperature and service or as indicated on the purchaser's specification sheet.

8.4 Material Marking

8.4.1 Cast and forged body, bonnet, and cap shall have the heat number cast or stamped in the material.

8.4.2 Springs used for the set pressure or cold differential test pressure (CDTP) adjustment shall have the spring number identified.

NOTE The spring number is either stamped directly on the spring, or if the wire diameter is smaller than 6 mm ($\frac{1}{4}$ in.), it may be provided with a color code or by other traceable identification means.

9 Inspection and Shop Tests

9.1 Inspection

The purchaser reserves the right to witness the shop tests and inspect the valves in the manufacturer's plant to the extent specified on the purchase order.

9.2 Set Pressure Test

All pressure-relief valves shall be adjusted to the specified set pressure in accordance with the ASME *BPVC*, the manufacturer's standard practice as published, or as designated by the purchaser. All set pressure adjustments shall be sealed.

9.3 Seat Leakage Test

All pressure-relief valves shall be seat leakage tested in accordance with API 527 or as agreed upon by the manufacturer and the purchaser.

10 Identification and Preparation for Shipment

10.1 Identification

Each pressure-relief valve shall have a corrosion-resistant nameplate permanently attached to the body or bonnet. This nameplate shall be stamped with the data specified in Table A.1 (SI) [Table E.1 (USC)]. Pilot-operated pressure-relief valves shall have an additional nameplate permanently attached to the pilot. The pilot nameplate shall be stamped with the data specified in Table A.2 (SI) [Table E.2 (USC)]. The data may be stamped on the nameplate or on a separate corrosion-resistant tag that is permanently attached to the valve. On completion of pressure-relief valve coating process, the nameplate shall be securely fastened to the valve at a visible location. A separate tag nameplate fixed by a wire shall be used when space is a constraint on the nameplate as detailed in Annex A (SI)/Annex E (USC).

10.2 Preparation for Shipment

Each pressure-relief valve shall be prepared for shipment as follows.

- a) After test and inspection, all exterior surfaces, except flange facings, shall be painted as agreed upon by the manufacturer and the purchaser. Corrosion-resistant materials need not be painted. Flange facings shall be coated with a suitable corrosion inhibitor.
- b) Prior to packaging and shipment, valve internals shall be cleaned and dried to ensure test fluids, cleaning agents, particles, and contaminants are removed (excluding corrosion inhibitors).
- c) Threaded openings shall be plugged with suitable protective devices. Temporary plugs shall be distinguishable from permanent metal plugs to ensure they are removed during the installation process.
- d) Inlet and outlet flanges shall be protected to prevent damage from or entrance of foreign material during shipment with the use of distinguishable and temporary covers. Protective covers shall be made of plastic at least $\frac{1}{8}$ in. (3 mm) thick or wood. The design of the covers shall prevent the valves from being installed without prior removal of the covers. Plastic covers with integral molded securing plugs shall be secured in bolt-holes.

11 Pressure–Temperature Tables

11.1 General

Table 3 through Table 30 (SI) [Table 31 through Table 58 (USC)] provide flange and bellows pressure limits, materials, and dimensions for pressure-relief valves. Table 3 through Table 16 (SI) [Table 31 through Table 44 (USC)] are specific to spring-loaded pressure-relief valves, while Table 17 through Table 30 (SI) [Table 45 through Table 58 (USC)] are specific to pilot-operated pressure-relief valves.

11.2 Materials

Materials for the body/bonnet and springs are indicated for spring-loaded pressure-relief valves. The material for the body is indicated for pilot-operated pressure-relief valves. For further description of body and bonnet materials, see 8.2 for spring-loaded pressure-relief valves and 8.3 for pilot-operated pressure-relief valves. Other combinations of pressure, temperature, size, and materials are outside the scope of this standard.

11.3 Temperature Ranges

Temperature ranges are provided to indicate distinct changes in body and/or spring material requirements.

11.4 Maximum Inlet Flange Pressure

The maximum inlet flange pressure is provided at specific temperatures. This represents the maximum set pressure for the temperature. The maximum inlet flange pressure values are per ASME B16.34 unless enclosed in parentheses. Values enclosed in parentheses are limited by this standard to a value less than the ASME B16.34 value. Inlet flange pressure values at other temperatures may be interpolated using the charts from Annex B (SI) [Annex F (USC)] or from tables in ASME B16.34 if these values do not exceed the limits in parentheses. The charts in Annex B (SI) [Annex F (USC)] are produced from ASME B16.34 with permission. Pressure changes within the temperature ranges above may not be linear.

11.5 Outlet Pressure Limit

11.5.1 Outlet Flange Limit

Outlet flange pressure limits are shown in the “Flange Rating” column and correspond to the ASME B16.34 value unless enclosed in parentheses. If the value is shown in parentheses, the value is less than that provided in ASME B16.34. The values in the “Flange Rating” column at 38 °C (100 °F) are the limit for this standard. Outlet flange pressure values at other temperatures may be interpolated using charts from Annex B (SI) [Annex F (USC)] or from tables in ASME B16.34 if these values do not exceed the value at 38 °C (100 °F) above. The charts in Annex B (SI) [Annex F (USC)] are produced from ASME B16.34 with permission. Pressure changes within the temperature ranges above may not be linear.

11.5.2 Bellows Limit

The bellows pressure limit is listed in the “Bellows Rating” column and represents the design pressure of the bellows at the outlet temperature of 38 °C (100 °F). The bellows pressure values at other temperatures may be determined by multiplying the above pressure value at 38 °C (100 °F) by the factor from Annex C (SI) [Annex G (USC)].

Table 3—Spring-loaded Pressure-relief Valves “D” Orifice ^f (Effective Orifice Area = 71 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 427 °C													
Carbon steel	1D2	150	150			1,965	1,275	550		1,965	1,585	105	114
	1D2 ^c	300	150			(1,965)	(1,965)	(1,965)		1,965	1,585	105	114
	1D2	300	150			5,100	4,275	2,825		1,965	1,585	105	114
	1D2	600	150			10,205	8,515	5,690		1,965	1,585	105	114
	1½D2	900	300			15,305	12,790	8,515		(4,135)	3,445	105	140
	1½D2	1500	300			25,545	21,305	14,170		(4,135)	3,445	105	140
	1½D3	2500	300			(41,370)	35,510	23,650		5,100	3,445	140	178
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	1D2	300	150					3,515	1,480	2,000	1,585	105	114
	1D2	600	150					7,000	2,965	2,000	1,585	105	114
	1½D2	900	300					10,515	4,480	(4,135)	3,445	105	140
	1½D2	1500	300					17,515	7,445	(4,135)	3,445	105	140
	1½D3	2500	300					29,165	12,410	5,170	3,445	140	178
Temperature Range Inclusive –268 °C to 538 °C													
Austenitic stainless steel	1D2	150	150	1,895	1,895	1,895	1,240	550	140	1,895	1,585	105	114
	1D2 ^c	300	150	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	1,895	1,585	105	114
	1D2	300	150	4,965	4,965	4,965	3,415	2,895	2,515	1,895	1,585	105	114
	1D2	600	150	9,930	9,930	9,930	6,825	5,825	5,000	1,895	1,585	105	114
	1½D2	900	300	14,895	14,895	14,895	10,240	8,720	7,515	(4,135)	3,445	105	140
	1½D2	1500	300	24,820	24,820	24,820	17,100	14,550	12,550	(4,135)	3,445	105	140
	1½D3	2500	300	(27,580)	41,370	41,370	28,475	24,270	20,890	4,965	3,445	140	178

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 482 °C ^d													
Nickel/copper alloy ^d	1D2	150	150			1,585	1,205	550	345	1,585	1,585	105	114
	1D2 ^c	300	150			(1,585)	(1,585)	(1,585)	(1,585)	1,585	1,585	105	114
	1D2	300	150			4,135	3,275	3,170	1,895	1,585	1,585	105	114
	1D2	600	150			8,275	6,515	6,310	3,790	1,585	1,585	105	114
	1½D2	900	300			12,410	9,790	9,480	5,690	4,135	3,445	105	140
Temperature Range Inclusive –29 °C to 149 °C ^e													
Alloy 20 ^e	1D2	150	150			1,585	1,240			1,585	1,585	105	114
	1D2 ^c	300	150			(1,585)	(1,240)			1,585	1,585	105	114
	1D2	300	150			4,135	3,205			1,585	1,585	105	114
	1D2	600	150			8,275	6,410			1,585	1,585	105	114
	1½D2	900	300			12,410	9,620			4,135	3,445	105	140
	1½D2	1500	300			20,685	16,065			4,135	3,445	105	140
	1½D3	2500	300			34,475	26,750			4,135	3,445	140	178
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME BPVC, Section XIII.													

Table 4—Spring-loaded Pressure-relief Valves “E” Orifice ^f (Effective Orifice Area = 126 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				−268 °C to −60 °C	−59 °C to −30 °C	−29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive −29 °C to 427 °C													
Carbon steel	1E2	150	150			1,965	1,275	550		1,965	1,585	105	114
	1E2 °	300	150			(1,965)	(1,965)	(1,965)		1,965	1,585	105	114
	1E2	300	150			5,100	4,275	2,825		1,965	1,585	105	114
	1E2	600	150			10,205	8,515	5,690		1,965	1,585	105	114
	1½E2	900	300			15,305	12,790	8,515		(4,135)	3,445	105	140
	1½E2	1500	300			25,545	21,305	14,170		(4,135)	3,445	105	140
	1½E3	2500	300			(41,370)	35,510	23,650		5,100	3,445	140	178
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	1E2	300	150					3,515	1,480	2,000	1,585	105	114
	1E2	600	150					7,000	2,965	2,000	1,585	105	114
	1½E2	900	300					10,515	4,480	(4,135)	3,445	105	140
	1½E2	1500	300					17,515	7,445	(4,135)	3,445	105	140
	1½E3	2500	300					29,165	12,410	5,170	3,445	140	178
Temperature Range Inclusive −268 °C to 538 °C													
Austenitic stainless steel	1E2	150	150	1,895	1,895	1,895	1,240	550	140	1,895	1,585	105	114
	1E2 °	300	150	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	1,895	1,585	105	114
	1E2	300	150	4,965	4,965	4,965	3,415	2,895	2,515	1,895	1,585	105	114
	1E2	600	150	9,930	9,930	9,930	6,825	5,825	5,000	1,895	1,585	105	114
	1½E2	900	300	14,895	14,895	14,895	10,240	8,720	7,515	(4,135)	3,445	105	140
	1½E2	1500	300	24,820	24,820	24,820	17,100	14,550	12,550	(4,135)	3,445	105	140
	1½E3	2500	300	(27,580)	41,370	41,370	28,475	24,270	20,890	4,965	3,445	140	178

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 482 °C ^d													
Nickel/copper alloy ^d	1E2	150	150			1,585	1,205	550	345	1,585	1,585	105	114
	1E2 ^c	300	150			(1,585)	(1,585)	(1,585)	(1,585)	1,585	1,585	105	114
	1E2	300	150			4,135	3,275	3,170	1,895	1,585	1,585	105	114
	1E2	600	150			8,275	6,515	6,310	3,790	1,585	1,585	105	114
	1 ¹ / ₂ E2	900	300			12,410	9,790	9,480	5,690	4,135	3,445	105	140
Temperature Range Inclusive –29 °C to 149 °C ^e													
Alloy 20 ^e	1E2	150	150			1,585	1,240			1,585	1,585	105	114
	1E2 ^c	300	150			(1,585)	(1,240)			1,585	1,585	105	114
	1E2	300	150			4,135	3,205			1,585	1,585	105	114
	1E2	600	150			8,275	6,410			1,585	1,585	105	114
	1 ¹ / ₂ E2	900	300			12,410	9,620			4,135	3,445	105	140
	1 ¹ / ₂ E2	1500	300			20,685	16,065			4,135	3,445	105	140
	1 ¹ / ₂ E3	2500	300			34,475	26,750			4,135	3,445	140	178
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME BPVC, Section XIII.													

Table 5—Spring-loaded Pressure-relief Valves “F” Orifice ^f (Effective Orifice Area = 198 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 427 °C													
Carbon steel	1½F2	150	150			1,965	1,275	550		1,965	1,585	124	121
	1½F2 °	300	150			(1,965)	(1,965)	(1,965)		1,965	1,585	124	121
	1½F2	300	150			5,100	4,275	2,825		1,965	1,585	124	152
	1½F2	600	150			10,205	8,515	5,690		1,965	1,585	124	152
	1½F3	900	300			15,305	12,790	8,515		5,100	3,445	124	165
	1½F3	1500	300			25,545	21,305	14,170		5,100	3,445	124	165
	1½F3	2500	300			(34,475)	(34,475)	23,650		5,100	3,445	140	178
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	1½F2	300	150					3,515	1,480	2,000	1,585	124	152
	1½F2	600	150					7,000	2,965	2,000	1,585	124	152
	1½F3	900	300					10,515	4,480	5,170	3,445	124	165
	1½F3	1500	300					17,515	7,445	5,170	3,445	124	165
	1½F3	2500	300					29,165	12,410	5,170	3,445	140	178
Temperature Range Inclusive –268 °C to 538 °C													
Austenitic stainless steel	1½F2	150	150	1,895	1,895	1,895	1,240	550	140	1,895	1,585	124	121
	1½F2 °	300	150	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	1,895	1,585	124	121
	1½F2	300	150	4,965	4,965	4,965	3,415	2,895	2,515	1,895	1,585	124	152
	1½F2	600	150	9,930	9,930	9,930	6,825	5,825	5,000	1,895	1,585	124	152
	1½F3	900	300	14,895	14,895	14,895	10,240	8,720	7,515	4,965	3,445	124	165
	1½F3	1500	300	(15,170)	24,820	24,820	17,100	14,550	12,550	4,965	3,445	124	165
	1½F3	2500	300	(23,440)	(34,475)	(34,475)	28,475	24,270	20,890	4,965	3,445	140	178

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
										38 °C	38 °C		
Temperature Range Inclusive –29 °C to 482 °C ^d													
Nickel/copper alloy ^d	1½F2	150	150			1,585	1,205	550	345	1,585	1,585	124	121
	1½F2 ^c	300	150			(1,585)	(1,585)	(1,585)	(1,585)	1,585	1,585	124	121
	1½F2	300	150			4,135	3,275	3,170	1,895	1,585	1,585	124	152
	1½F2	600	150			8,275	6,515	6,310	3,790	1,585	1,585	124	152
	1½F3	900	300			12,410	9,790	9,480	5,690	4,135	3,445	124	165
Temperature Range Inclusive –29 °C to 149 °C ^e													
Alloy 20 ^e	1½F2	150	150			1,585	1,240			1,585	1,585	124	121
	1½F2 ^c	300	150			(1,585)	(1,240)			1,585	1,585	124	121
	1½F2	300	150			4,135	3,205			1,585	1,585	124	152
	1½F2	600	150			8,275	6,410			1,585	1,585	124	152
	1½F3	900	300			12,410	9,620			4,135	3,445	124	165
	1½F3	1500	300			20,685	16,065			4,135	3,445	124	165
	1½F3	2500	300			34,475	26,750			4,135	3,445	140	178
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME BPVC, Section XIII.													

Table 6—Spring-loaded Pressure-relief Valves “G” Orifice ^f (Effective Orifice Area = 325 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 427 °C													
Carbon steel	1½G3	150	150			1,965	1,275	550		1,965	1,585	124	121
	1½G3 ^c	300	150			(1,965)	(1,965)	(1,965)		1,965	1,585	124	121
	1½G3	300	150			5,100	4,275	2,825		1,965	1,585	124	152
	1½G3	600	150			10,205	8,515	5,690		1,965	1,585	124	152
	1½G3	900	300			15,305	12,790	8,515		5,100	3,240	124	165
	2G3	1500	300			25,545	21,305	14,170		5,100	3,240	156	171
	2G3	2500	300			(25,545)	(25,545)	23,650		5,100	3,240	156	171
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	1½G3	300	150					3,515	1,480	2,000	1,585	124	152
	1½G3	600	150					7,000	2,965	2,000	1,585	124	152
	1½G3	900	300					10,515	4,480	5,170	3,240	124	165
	2G3	1500	300					17,515	7,445	5,170	3,240	156	171
	2G3	2500	300					(25,545)	12,410	5,170	3,240	156	171
Temperature Range Inclusive –268 °C to 538 °C													
Austenitic stainless steel	1½G3	150	150	1,895	1,895	1,895	1,240	550	140	1,895	1,585	124	121
	1½G3 ^c	300	150	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	1,895	1,585	124	121
	1½G3	300	150	4,965	4,965	4,965	3,415	2,895	2,515	1,895	1,585	124	152
	1½G3	600	150	9,930	9,930	9,930	6,825	5,825	5,000	1,895	1,585	124	152
	1½G3	900	300	14,895	14,895	14,895	10,240	8,720	7,515	4,965	3,240	124	165
	2G3	1500	300	(16,890)	24,820	24,820	17,100	14,550	12,550	4,965	3,240	156	171
	2G3	2500	300	(17,925)	(24,820)	(24,820)	(24,820)	24,270	20,890	4,965	3,240	156	171

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 482 °C ^d													
Nickel/copper alloy ^d	1½G3	150	150			1,585	1,205	550	345	1,585	1,585	124	121
	1½G3 ^c	300	150			(1,585)	(1,585)	(1,585)	(1,585)	1,585	1,585	124	121
	1½G3	300	150			4,135	3,275	3,170	1,895	1,585	1,585	124	152
	1½G3	600	150			8,275	6,515	6,310	3,790	1,585	1,585	124	152
	1½G3	900	300			12,410	9,790	9,480	5,690	4,135	3,240	124	165
Temperature Range Inclusive –29 °C to 149 °C ^e													
Alloy 20 ^e	1½G3	150	150			1,585	1,240			1,585	1,585	124	121
	1½G3 ^c	300	150			(1,585)	(1,240)			1,585	1,585	124	121
	1½G3	300	150			4,135	3,205			1,585	1,585	124	152
	1½G3	600	150			8,275	6,410			1,585	1,585	124	152
	1½G3	900	300			12,410	9,620			4,135	3,240	124	165
	2G3	1500	300			20,685	16,065			4,135	3,240	156	171
	2G3	2500	300			(25,545)	(25,545)			4,135	3,240	156	171
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME BPVC, Section XIII.													

Table 7—Spring-loaded Pressure-relief Valves “H” Orifice ^f (Effective Orifice Area = 506 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 427 °C													
Carbon steel	1½H3	150	150			1,965	1,275	550		1,965	1,585	130	124
	1½H3 ^c	300	150			(1,965)	(1,965)	(1,965)		1,965	1,585	130	124
	2H3	300	150			5,100	4,275	2,825		1,965	1,585	130	124
	2H3	600	150			10,205	8,515	5,690		1,965	1,585	154	162
	2H3	900	150			15,305	12,790	8,515		1,965	1,585	154	162
	2H3	1500	300			(18,960)	(18,960)	14,170		5,100	2,860	154	162
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	2H3	300	150					3,515	1,480	2,000	1,585	130	124
	2H3	600	150					7,000	2,965	2,000	1,585	130	124
	2H3	900	150					10,515	4,480	2,000	1,585	154	162
	2H3	1500	300					17,515	7,445	5,170	2,860	154	162
Temperature Range Inclusive –268 °C to 538 °C													
Austenitic stainless steel	1½H3	150	150	1,895	1,895	1,895	1,240	550	140	1,895	1,585	130	124
	1½H3 ^c	300	150	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	1,895	1,585	130	124
	2H3	300	150	4,965	4,965	4,965	3,415	2,895	2,515	1,895	1,585	130	124
	2H3	600	150	9,930	9,930	9,930	6,825	5,825	5,000	1,895	1,585	154	162
	2H3	900	150	(10,240)	14,895	14,895	10,240	8,720	7,515	1,895	1,585	154	162
	2H3	1500	300	(11,030)	(18,960)	(18,960)	17,100	14,550	12,550	(4,135)	2,860	154	162
Temperature Range Inclusive –29 °C to 482 °C ^d													
Nickel/copper alloy ^d	1½H3	150	150			1,585	1,205	550	345	1,585	1,585	130	124
	1½H3 ^c	300	150			(1,585)	(1,585)	(1,585)	(1,585)	1,585	1,585	130	124
	2H3	300	150			4,135	3,275	3,170	1,895	1,585	1,585	130	124
	2H3	600	150			8,275	6,515	6,310	3,790	1,585	1,585	154	162
	2H3	900	150			12,410	9,790	9,480	5,690	1,585	1,585	154	162

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 149 °C ^e													
Alloy 20 ^e	1½H3	150	150			1,585	1,240			1,585	1,585	130	124
	1½H3 ^c	300	150			(1,585)	(1,240)			1,585	1,585	130	124
	2H3	300	150			4,135	3,205			1,585	1,585	130	124
	2H3	600	150			8,275	6,410			1,585	1,585	154	162
	2H3	900	150			12,410	9,620			1,585	1,585	154	162
	2H3	1500	300			(18,960)	16,065			4,135	2,860	154	162
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME <i>BPVC</i> , Section XIII.													

Table 8—Spring-loaded Pressure-relief Valves “J” Orifice ^f (Effective Orifice Area = 830 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
										38 °C	38 °C		
Temperature Range Inclusive –29 °C to 427 °C													
Carbon steel	2J3	150	150			1,965	1,275	550		1,965	1,585	137	124
	2J3 ^c	300	150			(1,965)	(1,965)	(1,965)		1,965	1,585	137	124
	3J4	300	150			5,100	4,275	2,825		1,965	1,585	184	181
	3J4	600	150			10,205	8,515	5,690		1,965	1,585	184	181
	3J4	900	150			15,305	12,790	8,515		1,965	1,585	184	181
	3J4	1500	300			(18,615)	(18,615)	14,170		(4,135)	1,585	184	181
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	3J4	300	150					3,515	1,480	2,000	1,585	184	181
	3J4	600	150					7,000	2,965	2,000	1,585	184	181
	3J4	900	150					10,515	4,480	2,000	1,585	184	181
	3J4	1500	300					17,515	7,445	(4,135)	1,585	184	181
Temperature Range Inclusive –268 °C to 538 °C													
Austenitic stainless steel	2J3	150	150	1,895	1,895	1,895	1,240	550	140	1,895	1,585	137	124
	2J3 ^c	300	150	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	1,895	1,585	137	124
	3J4	300	150	(3,445)	4,965	4,965	3,415	2,895	2,515	1,895	1,585	184	181
	3J4	600	150	(4,310)	9,930	9,930	6,825	5,825	5,000	1,895	1,585	184	181
	3J4	900	150	(5,515)	14,895	14,895	10,240	8,720	7,515	1,895	1,585	184	181
	3J4	1500	300	(5,515)	(18,960)	(18,960)	17,100	14,550	12,550	(4,135)	1,585	184	181
Temperature Range Inclusive –29 °C to 482 °C ^d													
Nickel/copper alloy ^d	2J3	150	150			1,585	1,205	550	345	1,585	1,585	137	124
	2J3 ^c	300	150			(1,585)	(1,585)	(1,585)	(1,585)	1,585	1,585	137	124
	3J4	300	150			4,135	3,275	3,170	1,895	1,585	1,585	184	181
	3J4	600	150			8,275	6,515	6,310	3,790	1,585	1,585	184	181
	3J4	900	150			12,410	9,790	9,480	5,690	1,585	1,585	184	181

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 149 °C ^e													
Alloy 20 ^e	2J3	150	150			1,585	1,240			1,585	1,585	137	124
	2J3 ^c	300	150			(1,585)	(1,240)			1,585	1,585	137	124
	3J4	300	150			4,135	3,205			1,585	1,585	184	181
	3J4	600	150			8,275	6,410			1,585	1,585	184	181
	3J4	900	150			12,410	9,620			1,585	1,585	184	181
	3J4	1500	300			(18,615)	16,065			4,135	1,585	184	181
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials. ^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved. ^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange. ^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C. ^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C. ^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME <i>BPVC</i>, Section XIII.													

Table 9—Spring-loaded Pressure-relief Valves “K” Orifice ^f (Effective Orifice Area = 1,186 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 427 °C													
Carbon steel	3K4	150	150			1,965	1,275	550		1,965	1,035	156	162
	3K4 ^c	300	150			(1,965)	(1,965)	(1,965)		1,965	1,035	156	162
	3K4	300	150			5,100	4,275	2,825		1,965	1,035	156	162
	3K4	600	150			10,205	8,515	5,690		1,965	1,380	184	181
	3K6	900	150			15,305	12,790	8,515		1,965	1,380	198	216
	3K6	1500	300			(15,305)	(15,305)	14,170		(4,135)	1,380	197	216
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	3K4	300	150					3,515	1,480	2,000	1,035	156	162
	3K4	600	150					7,000	2,965	2,000	1,380	184	181
	3K6	900	150					10,515	4,480	2,000	1,380	198	216
	3K6	1500	300					(15,305)	7,445	(4,135)	1,380	197	216
Temperature Range Inclusive –268 °C to 538 °C													
Austenitic stainless steel	3K4	150	150	1,895	1,895	1,895	1,240	550	140	1,895	1,035	156	162
	3K4 ^c	300	150	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	1,895	1,035	156	162
	3K4	300	150	(3,620)	4,965	4,965	3,415	2,895	2,515	1,895	1,035	156	162
	3K4	600	150	(4,135)	9,930	9,930	6,825	5,825	5,000	1,895	1,380	184	181
	3K6	900	150	(4,135)	14,895	14,895	10,240	8,720	7,515	1,895	1,380	198	216
	3K6	1500	300	(5,170)	(15,305)	(15,305)	(15,305)	14,550	12,550	(4,135)	1,380	197	216
Temperature Range Inclusive –29 °C to 482 °C ^d													
Nickel/copper alloy ^d	3K4	150	150			1,585	1,205	550	345	1,585	1,035	156	162
	3K4 ^c	300	150			(1,585)	(1,585)	(1,585)	(1,585)	1,585	1,035	156	162
	3K4	300	150			4,135	3,275	3,170	1,895	1,585	1,035	156	162
	3K4	600	150			8,275	6,515	6,310	3,790	1,585	1,380	184	181
	3K6	900	150			12,410	9,790	9,480	5,690	1,585	1,380	198	216

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				−268 °C to −60 °C	−59 °C to −30 °C	−29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
										38 °C	38 °C		
Temperature Range Inclusive −29 °C to 149 °C ^e													
Alloy 20 ^e	3K4	150	150			1,585	1,240			1,585	1,035	156	162
	3K4 ^c	300	150			(1,585)	(1,240)			1,585	1,035	156	162
	3K4	300	150			4,135	3,205			1,585	1,035	156	162
	3K4	600	150			8,275	6,410			1,585	1,380	184	181
	3K6	900	150			12,410	9,620			1,585	1,380	198	216
	3K6	1500	300			(15,305)	(15,305)			4,135	1,380	197	216
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME <i>BPVC</i> , Section XIII.													

Table 10—Spring-loaded Pressure-relief Valves “L” Orifice ^f (Effective Orifice Area = 1,841 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				−268 °C to −60 °C	−59 °C to −30 °C	−29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive −29 °C to 427 °C													
Carbon steel	3L4	150	150			1,965	1,275	550		1,965	690	156	165
	3L4 ^c	300	150			(1,965)	(1,965)	(1,965)		1,965	690	156	165
	4L6	300	150			5,100	4,275	2,825		1,965	1,170	179	181
	4L6	600	150			(6,895)	(6,895)	5,690		1,965	1,170	179	203
	4L6	900	150			(10,340)	(10,340)	8,515		1,965	1,170	197	222
	4L6	1500	150			(10,340)	(10,340)	(10,340)		1,965	1,170	197	222
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	4L6	300	150					3,515	1,480	2,000	1,170	179	181
	4L6	600	150					(6,895)	2,965	2,000	1,170	179	203
	4L6	900	150					(10,340)	4,480	2,000	1,170	197	222
	4L6	1500	150					(10,340)	7,445	2,000	1,170	197	222
Temperature Range Inclusive −268 °C to 538 °C													
Austenitic stainless steel	3L4	150	150	1,895	1,895	1,895	1,240	550	140	1,895	690	156	165
	3L4 ^c	300	150	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	1,895	690	156	165
	4L6	300	150	(3,690)	4,965	4,965	3,415	2,895	2,515	1,895	1,170	179	181
	4L6	600	150	(3,690)	(6,895)	(6,895)	6,825	5,825	5,000	1,895	1,170	179	203
	4L6	900	150	(4,825)	(10,340)	(10,340)	10,240	8,720	7,515	1,895	1,170	197	222
Temperature Range Inclusive −29 °C to 482 °C ^d													
Nickel/copper alloy ^d	3L4	150	150			1,585	1,205	550	345	1,585	690	156	165
	3L4 ^c	300	150			(1,585)	(1,585)	(1,585)	(1,585)	1,585	690	156	165
	4L6	300	150			4,135	3,275	3,170	1,895	1,585	1,170	179	181
	4L6	600	150			8,275	6,515	6,310	3,790	1,585	1,170	179	203
	4L6	900	150			12,410	9,790	9,480	5,690	1,585	1,170	197	222

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 149 °C ^e													
Alloy 20 ^e	3L4	150	150			1,585	1,240			1,585	690	156	165
	3L4 ^c	300	150			(1,585)	(1,240)			1,585	690	156	165
	4L6	300	150			4,135	3,205			1,585	1,170	179	181
	4L6	600	150			8,275	6,410			1,585	1,170	179	203
	4L6	900	150			(10,340)	9,620			1,585	1,170	197	222
	4L6	1500	150			(10,340)	(10,340)			1,585	1,170	197	222
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME <i>BPVC</i> , Section XIII.													

Table 11—Spring-loaded Pressure-relief Valves “M” Orifice ^f (Effective Orifice Area = 2,323 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				−268 °C to −60 °C	−59 °C to −30 °C	−29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive −29 °C to 427 °C													
Carbon steel	4M6	150	150			1,965	1,275	550		1,965	550	178	184
	4M6 ^c	300	150			(1,965)	(1,965)	(1,965)		1,965	550	178	184
	4M6	300	150			5,100	4,275	2,825		1,965	1,105	178	184
	4M6	600	150			(7,585)	(7,585)	5,690		1,965	1,105	178	203
	4M6	900	150			(7,585)	(7,585)	(7,585)		1,965	1,105	197	222
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	4M6	300	150					3,515	1,480	2,000	1,105	178	184
	4M6	600	150					(6,895)	2,965	2,000	1,105	178	203
	4M6	900	150					(7,585)	4,480	2,000	1,105	197	222
Temperature Range Inclusive −268 °C to 538 °C													
Austenitic stainless steel	4M6	150	150	1,895	1,895	1,895	1,240	550	140	1,895	550	178	184
	4M6 ^c	300	150	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	1,895	550	178	184
	4M6	300	150	(3,620)	4,965	4,965	3,415	2,895	2,515	1,895	1,105	178	184
	4M6	600	150	(4,135)	(7,585)	(7,585)	6,825	5,825	5,000	1,895	1,105	178	203
Temperature Range Inclusive −29 °C to 482 °C ^d													
Nickel/copper alloy ^d	4M6	150	150			1,585	1,205	550	345	1,585	550	178	184
	4M6 ^c	300	150			(1,585)	(1,585)	(1,585)	(1,585)	1,585	550	178	184
	4M6	300	150			4,135	3,275	3,170	1,895	1,585	1,105	178	184
	4M6	600	150			(7,585)	6,515	6,310	3,790	1,585	1,105	178	203
	4M6	900	150			(7,585)	(7,585)	(7,585)	5,690	1,585	1,105	197	222

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				−268 °C to −60 °C	−59 °C to −30 °C	−29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
										38 °C	38 °C		
Temperature Range Inclusive −29 °C to 149 °C ^e													
Alloy 20 ^e	4M6	150	150			1,585	1,240			1,585	550	178	184
	4M6 ^c	300	150			(1,585)	(1,240)			1,585	550	178	184
	4M6	300	150			4,135	3,205			1,585	1,105	178	184
	4M6	600	150			(7,585)	6,410			1,585	1,105	178	203
	4M6	900	150			(7,585)	(7,585)			1,585	1,105	197	222
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME <i>BPVC</i> , Section XIII.													

Table 12—Spring-loaded Pressure-relief Valves “N” Orifice ^f (Effective Orifice Area = 2,800 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				−268 °C to −60 °C	−59 °C to −30 °C	−29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive −29 °C to 427 °C													
Carbon steel	4N6	150	150			1,965	1,275	550		1,965	550	197	210
	4N6 ^c	300	150			(1,965)	(1,965)	(1,965)		1,965	550	197	210
	4N6	300	150			5,100	4,275	2,825		1,965	1,105	197	210
	4N6	600	150			(6,895)	(6,895)	5,690		1,965	1,105	197	222
	4N6	900	150			(6,895)	(6,895)	(6,895)		1,965	1,105	197	222
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	4N6	300	150					3,515	1,480	2,000	1,105	197	210
	4N6	600	150					(6,895)	2,965	2,000	1,105	197	222
	4N6	900	150					(6,895)	4,480	2,000	1,105	197	222
Temperature Range Inclusive −268 °C to 538 °C													
Austenitic stainless steel	4N6	150	150	1,895	1,895	1,895	1,240	550	140	1,895	550	197	210
	4N6 ^c	300	150	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	1,895	550	197	210
	4N6	300	150	(3,105)	4,965	4,965	3,415	2,895	2,515	1,895	1,105	197	210
	4N6	600	150	(3,445)	(6,895)	(6,895)	6,825	5,825	5,000	1,895	1,105	197	222
Temperature Range Inclusive −29 °C to 482 °C ^d													
Nickel/copper alloy ^d	4N6	150	150			1,585	1,205	550	345	1,585	550	197	210
	4N6 ^c	300	150			(1,585)	(1,585)	(1,585)	(1,585)	1,585	550	197	210
	4N6	300	150			4,135	3,275	3,170	1,895	1,585	1,105	197	210
	4N6	600	150			(6,895)	6,515	6,310	3,790	1,585	1,105	197	222
	4N6	900	150			(6,895)	(6,895)	(6,895)	5,690	1,585	1,105	197	222

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				−268 °C to −60 °C	−59 °C to −30 °C	−29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
										38 °C	38 °C		
Temperature Range Inclusive −29 °C to 149 °C ^e													
Alloy 20 ^e	4N6	150	150			1,585	1,240			1,585	550	197	210
	4N6 ^c	300	150			(1,585)	(1,240)			1,585	550	197	210
	4N6	300	150			4,135	3,205			1,585	1,105	197	210
	4N6	600	150			(6,895)	6,410			1,585	1,105	197	222
	4N6	900	150			(6,895)	(6,895)			1,585	1,105	197	222
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME <i>BPVC</i> , Section XIII.													

Table 13—Spring-loaded Pressure-relief Valves “P” Orifice ^f (Effective Orifice Area = 4,116 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive –29 °C to 427 °C													
Carbon steel	4P6	150	150			1,965	1,275	550		1,965	550	181	229
	4P6 ^c	300	150			(1,965)	(1,965)	(1,965)		1,965	550	181	229
	4P6	300	150			(3,620)	(3,620)	2,825		1,965	1,035	225	254
	4P6	600	150			(6,895)	(6,895)	5,690		1,965	1,035	225	254
	4P6	900	150			(6,895)	(6,895)	(6,895)		1,965	1,035	225	254
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	4P6	300	150					3,515	1,480	2,000	1,035	225	254
	4P6	600	150					(6,895)	2,965	2,000	1,035	225	254
	4P6	900	150					(6,895)	4,480	2,000	1,035	225	254
Temperature Range Inclusive –268 °C to 538 °C													
Austenitic stainless steel	4P6	150	150	(1,205)	1,895	1,895	1,240	550	140	1,895	550	181	229
	4P6 ^c	300	150	(1,205)	(1,895)	(1,895)	(1,895)	(1,895)	(1,895)	1,895	550	181	229
	4P6	300	150	(2,070)	(3,620)	(3,620)	3,415	2,895	2,515	1,895	1,035	225	254
	4P6	600	150	(3,310)	(6,895)	(6,895)	6,825	5,825	5,000	1,895	1,035	225	254
Temperature Range Inclusive –29 °C to 482 °C ^d													
Nickel/copper alloy ^d	4P6	150	150			1,585	1,205	550	345	1,585	550	181	229
	4P6 ^c	300	150			(1,585)	(1,585)	(1,585)	(1,585)	1,585	550	181	229
	4P6	300	150			(3,620)	3,275	3,170	1,895	1,585	1,035	225	254
	4P6	600	150			(6,895)	6,515	6,310	3,790	1,585	1,035	225	254
	4P6	900	150			(6,895)	(6,895)	(6,895)	5,690	1,585	1,035	225	254

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
										38 °C	38 °C		
Temperature Range Inclusive –29 °C to 149 °C ^e													
Alloy 20 ^e	4P6	150	150			1,585	1,240			1,585	550	181	229
	4P6 ^c	300	150			(1,585)	(1,240)			1,585	550	181	229
	4P6	300	150			(3,620)	3,205			1,585	1,035	225	254
	4P6	600	150			(6,895)	6,410			1,585	1,035	225	254
	4P6	900	150			(6,895)	(6,895)			1,585	1,035	225	254
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME <i>BPVC</i> , Section XIII.													

Table 14—Spring-loaded Pressure-relief Valves “Q” Orifice ^f (Effective Orifice Area = 7,129 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				−268 °C to −60 °C	−59 °C to −30 °C	−29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive −29 °C to 427 °C													
Carbon steel	6Q8	150	150			(1,140)	(1,140)	550		(795)	485	240	241
	6Q8 ^c	300	150			(1,140)	(1,140)	(1,140)		(795)	485	240	241
	6Q8	300	150			(2,070)	(2,070)	(2,070)		(795)	795	240	241
	6Q8	600	150			(4,135)	(4,135)	(4,135)		(795)	795	240	241
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	6Q8	300	150					(1,140)	(1,140)	(795)	795	240	241
	6Q8	600	150					(4,135)	2,965	(795)	795	240	241
Temperature Range Inclusive −268 °C to 538 °C													
Austenitic stainless steel	6Q8	150	150	(1,140)	(1,140)	(1,140)	(1,140)	550	140	(795)	485	240	241
	6Q8 ^c	300	150	(1,140)	(1,140)	(1,140)	(1,140)	(1,140)	(1,140)	(795)	485	240	241
	6Q8	300	150	(1,725)	(2,070)	(2,070)	(2,070)	(2,070)	(2,070)	(795)	795	240	241
	6Q8	600	150	(2,070)	(4,135)	(4,135)	(4,135)	(4,135)	(4,135)	(795)	795	240	241
Temperature Range Inclusive −29 °C to 482 °C ^d													
Nickel/copper alloy ^d	6Q8	150	150			(1,140)	(1,140)	550	345	(795)	485	240	241
	6Q8 ^c	300	150			(1,140)	(1,140)	(1,140)	(965)	(795)	485	240	241
	6Q8	300	150			(2,070)	(2,070)	(2,070)	1,895	(795)	795	240	241
	6Q8	600	150			(4,135)	(4,135)	(4,135)	3,790	(795)	795	240	241

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
										38 °C	38 °C		
Temperature Range Inclusive –29 °C to 149 °C ^e													
Alloy 20 ^e	6Q8	150	150			(1,140)	(1,140)			(795)	485	240	241
	6Q8 ^c	300	150			(1,140)	(1,140)			(795)	485	240	241
	6Q8	300	150			(2,070)	(2,070)			(795)	795	240	241
	6Q8	600	150			(4,135)	(4,135)			(795)	795	240	241
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME <i>BPVC</i> , Section XIII.													

Table 15—Spring-loaded Pressure-relief Valves “R” Orifice ^f (Effective Orifice Area = 10,323 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				−268 °C to −60 °C	−59 °C to −30 °C	−29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C	38 °C								
Temperature Range Inclusive −29 °C to 427 °C													
Carbon steel	6R8	150	150			(690)	(690)	550		(415)	415	240	241
	6R8 ^c	300	150			(690)	(690)	(690)		(415)	415	240	241
	6R10	300	150			(1,585)	(1,585)	(1,585)		(690)	690	240	267
	6R10	600	150			(2,070)	(2,070)	(2,070)		(690)	690	240	267
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	6R8 ^c	300	150					(690)	(690)	(690)	690	240	241
	6R10	600	150					(2,070)	(2,070)	(690)	690	240	267
Temperature Range Inclusive −268 °C to 538 °C													
Austenitic stainless steel	6R8	150	150	(380)	(690)	(690)	(690)	550	140	(415)	415	240	241
	6R8 ^c	300	150	(380)	(690)	(690)	(690)	(690)	(690)	(415)	415	240	241
	6R10	300	150	(1,035)	(1,585)	(1,585)	(1,585)	(1,585)	(1,585)	(690)	690	240	267
	6R10	600	150	(1,380)	(2,070)	(2,070)	(2,070)	(2,070)	(2,070)	(690)	690	240	267
Temperature Range Inclusive −29 °C to 482 °C ^d													
Nickel/copper alloy ^d	6R8	150	150			(690)	(690)	550	345	(415)	415	240	241
	6R8 ^c	300	150			(690)	(690)	(690)	(690)	(415)	415	240	241
	6R10	300	150			(1,585)	(1,585)	(1,585)	(1,585)	(690)	690	240	267
	6R10	600	150			(2,070)	(2,070)	(2,070)	(2,070)	(690)	690	240	267

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
										38 °C	38 °C		
Temperature Range Inclusive –29 °C to 149 °C ^e													
Alloy 20 ^e	6R8	150	150			(690)	(690)			(415)	415	240	241
	6R8 ^c	300	150			(690)	(690)			(415)	415	240	241
	6R10	300	150			(1,585)	(1,585)			(690)	690	240	267
	6R10	600	150			(2,070)	(2,070)			(690)	690	240	267
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME BPVC, Section XIII.													

Table 16—Spring-loaded Pressure-relief Valves “T” Orifice ^f (Effective Orifice Area = 16,774 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				–268 °C to –60 °C	–59 °C to –30 °C	–29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
				38 °C		38 °C							
Temperature Range Inclusive –29 °C to 427 °C													
Carbon steel	8T10	150	150			(450)	(450)	(450)		(205)	205	276	279
	8T10 ^c	300	150			(450)	(450)	(450)		(205)	205	276	279
	8T10	300	150			(825)	(825)	(825)		(415)	415	276	279
	8T10	300	150			(2,070)	(2,070)	(2,070)		(690)	690	276	279
Temperature Range Inclusive 427 °C to 538 °C													
Chrome molybdenum steel	8T10	300	150					(825)	690	(415)	415	276	279
	8T10	300	150					(2,070)	(1,480)	(690)	690	276	279
Temperature Range Inclusive –268 °C to 538 °C													
Austenitic stainless steel	8T10	150	150	(345)	(450)	(450)	(450)	(450)	(140)	(205)	205	276	279
	8T10 ^c	300	150	(345)	(450)	(450)	(450)	(450)	(450)	(205)	205	276	279
	8T10	300	150	(450)	(825)	(825)	(825)	(825)	(825)	(415)	415	276	279
Temperature Range Inclusive –29 °C to 482 °C ^d													
Nickel/copper alloy ^d	8T10	150	150			(450)	(450)	(450)	345	(205)	205	276	279
	8T10 ^c	300	150			(450)	(450)	(450)	(450)	(205)	205	276	279
	8T10	300	150			(825)	(825)	(825)	(825)	(415)	415	276	279

Materials ^b	Valve Size	ASME Flange Class		Maximum Inlet Flange (Set) Pressure Limit ^a [kPa (gauge)]						Outlet Pressure Limit ^a [kPa (gauge)]		Center-to-face Dimensions (mm)	
Body/Bonnet	Inlet by Orifice by Outlet	Inlet	Outlet	Conventional and Balanced Bellows Valves						Flange Rating Limit ^a	Bellows Rating Limit ^a	Inlet	Outlet
				−268 °C to −60 °C	−59 °C to −30 °C	−29 °C to 38 °C	39 °C to 232 °C	233 °C to 427 °C	428 °C to 538 °C				
										38 °C	38 °C		
Temperature Range Inclusive −29 °C to 149 °C ^e													
Alloy 20 ^e	8T10	150	150			(450)	(450)			(205)	205	276	279
	8T10 ^c	300	150			(450)	(450)			(205)	205	276	279
	8T10	300	150			(825)	(825)			(415)	415	276	279
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limits for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. Bellows outlet pressure limits are the design pressure of the bellows at the outlet temperature of 38 °C, and pressure values at other temperatures may be determined from Annex C. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.													
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.													
^c Set pressure limited for low-pressure applications where a Class 300 inlet flange is preferred over a Class 150 flange.													
^d Materials limited to 482 °C. Pressure ratings indicated in the 538 °C column are limited to 482 °C.													
^e Materials limited to 149 °C. Pressure ratings indicated in the 232 °C column are limited to 149 °C.													
^f Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME BPVC, Section XIII.													

Table 17—Pilot-operated Pressure-relief Valves “D” Orifice ^d (Effective Orifice Area = 71 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Pressure Limits ^a [kPa (gauge)]				Center-to-face Dimensions (mm)	
Body	Inlet by Orifice by Outlet	Inlet	Outlet	Inlet Flange (Set) Pressure Limit			Outlet Pressure Limit ^a		
				−268 °C to −30 °C	−29 °C to 38 °C	39 °C to 260 °C	38 °C	Inlet	Outlet
Temperature Range Inclusive −29 °C to 260 °C									
Carbon steel	1D2	150	150		1,965	1,170	1,965	105	114
	1D2	300	150		5,100	4,170	1,965	111	114
	1D2	600	150		10,205	8,310	1,965	111	114
	1D2	900	300		15,305	12,480	5,100	125	121
	1D2	1500	300		25,545	20,790	5,100	125	121
	1D2	2500	300		42,540	34,645	5,100	125	121
	1½D2	150	150		1,965	1,170	1,965	124	121
	1½D2	300	150		5,100	4,170	1,965	124	121
	1½D2	600	150		10,205	8,310	1,965	124	121
	1½D2	900	300		15,305	12,480	5,100	149	140
	1½D2	1500	300		25,545	20,790	5,100	149	140
	1½D2	2500	300		42,540	34,645	5,100	149	140

Materials ^b	Valve Size	ASME Flange Class		Maximum Pressure Limits ^a [kPa (gauge)]				Center-to-face Dimensions (mm)	
Body	Inlet by Orifice by Outlet	Inlet	Outlet	Inlet Flange (Set) Pressure Limit			Outlet Pressure Limit ^a		
				−268 °C to −30 °C	−29 °C to 38 °C	39 °C to 260 °C	38 °C	Inlet	Outlet
Temperature Range Inclusive −268 °C to 260 °C									
Austenitic stainless steel	1D2	150	150	1,895	1,895	1,170	1,895	105	114
	1D2	300	150	4,965	4,965	3,310	1,895	111	114
	1D2	600	150	9,930	9,930	6,585	1,895	111	114
	1D2	900	300	14,895	14,895	9,895	4,965	125	121
	1D2	1500	300	24,820	24,820	16,480	4,965	125	121
	1D2	2500	300	41,370	41,370	27,440	4,965	125	121
	1½D2	150	150	1,895	1,895	1,170	1,895	124	121
	1½D2	300	150	4,965	4,965	3,310	1,895	124	121
	1½D2	600	150	9,930	9,930	6,585	1,895	124	121
	1½D2	900	300	14,895	14,895	9,895	4,965	149	140
	1½D2	1500	300	24,820	24,820	16,480	4,965	149	140
	1½D2	2500	300	41,370	41,370	27,440	4,965	149	140
Temperature Range Inclusive −29 °C to 260 °C									
Nickel/copper alloy	1D2	150	150		1,585	1,170	1,585	105	114
	1D2	300	150		4,135	3,275	1,585	111	114
	1D2	600	150		8,275	6,515	1,585	111	114
	1D2	900	300		12,410	9,790	4,135	125	121
	1½D2	150	150		1,585	1,170	1,585	124	121
	1½D2	300	150		4,135	3,275	1,585	124	121
	1½D2	600	150		8,275	6,515	1,585	124	121
	1½D2	900	300		12,410	9,790	4,135	149	140

Materials ^b	Valve Size	ASME Flange Class		Maximum Pressure Limits ^a [kPa (gauge)]				Center-to-face Dimensions (mm)	
Body	Inlet by Orifice by Outlet	Inlet	Outlet	Inlet Flange (Set) Pressure Limit			Outlet Pressure Limit ^a		
				−268 °C to −30 °C	−29 °C to 38 °C	39 °C to 260 °C	38 °C	Inlet	Outlet
Temperature Range Inclusive −29 °C to 149 °C ^c									
Alloy 20 ^c	1D2	150	150		1,585	1,240	1,585	105	114
	1D2	300	150		4,135	3,205	1,585	111	114
	1D2	600	150		8,275	6,410	1,585	111	114
	1D2	900	300		12,410	9,620	4,135	125	121
	1D2	1500	300		20,685	16,065	4,135	125	121
	1D2	2500	300		34,475	26,750	4,135	125	121
	1½D2	150	150		1,585	1,240	1,585	124	121
	1½D2	300	150		4,135	3,205	1,585	124	121
	1½D2	600	150		8,275	6,410	1,585	124	121
	1½D2	900	300		12,410	9,620	4,135	149	140
	1½D2	1500	300		20,685	16,065	4,135	149	140
	1½D2	2500	300		34,475	26,750	4,135	149	140
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limit for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.									
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.									
^c Materials limited to 149 °C. Pressure ratings indicated in the 260 °C column are limited to 149 °C.									
^d Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME <i>BPVC</i> , Section XIII.									

Table 18—Pilot-operated Pressure-relief Valves “E” Orifice ^d (Effective Orifice Area = 126 mm²) (SI)

Materials ^b	Valve Size	ASME Flange Class		Maximum Pressure Limits ^a [kPa (gauge)]				Center-to-face Dimensions (mm)	
Body	Inlet by Orifice by Outlet	Inlet	Outlet	Inlet Flange (Set) Pressure Limit			Outlet Pressure Limit ^a		
				−268 °C to −30 °C	−29 °C to 38 °C	39 °C to 260 °C	38 °C	Inlet	Outlet
Temperature Range Inclusive −29 °C to 260 °C									
Carbon steel	1E2	150	150		1,965	1,170	1,965	105	114
	1E2	300	150		5,100	4,170	1,965	111	114
	1E2	600	150		10,205	8,310	1,965	111	114
	1E2	900	300		15,305	12,480	5,100	125	121
	1E2	1500	300		25,545	20,790	5,100	125	121
	1E2	2500	300		42,540	34,645	5,100	125	121
	1 ¹ / ₂ E2	150	150		1,965	1,170	1,965	124	121
	1 ¹ / ₂ E2	300	150		5,100	4,170	1,965	124	121
	1 ¹ / ₂ E2	600	150		10,205	8,310	1,965	124	121
	1 ¹ / ₂ E2	900	300		15,305	12,480	5,100	149	140
	1 ¹ / ₂ E2	1500	300		25,545	20,790	5,100	149	140
	1 ¹ / ₂ E2	2500	300		42,540	34,645	5,100	149	140

Materials ^b	Valve Size	ASME Flange Class		Maximum Pressure Limits ^a [kPa (gauge)]				Center-to-face Dimensions (mm)	
Body	Inlet by Orifice by Outlet	Inlet	Outlet	Inlet Flange (Set) Pressure Limit			Outlet Pressure Limit ^a		
				−268 °C to −30 °C	−29 °C to 38 °C	39 °C to 260 °C	38 °C	Inlet	Outlet
Temperature Range Inclusive −268 °C to 260 °C									
Austenitic stainless steel	1E2	150	150	1,895	1,895	1,170	1,895	105	114
	1E2	300	150	4,965	4,965	3,310	1,895	111	114
	1E2	600	150	9,930	9,930	6,585	1,895	111	114
	1E2	900	300	14,895	14,895	9,895	4,965	125	121
	1E2	1500	300	24,820	24,820	16,480	4,965	125	121
	1E2	2500	300	41,370	41,370	27,440	4,965	125	121
	1½E2	150	150	1,895	1,895	1,170	1,895	124	121
	1½E2	300	150	4,965	4,965	3,310	1,895	124	121
	1½E2	600	150	9,930	9,930	6,585	1,895	124	121
	1½E2	900	300	14,895	14,895	9,895	4,965	149	140
	1½E2	1500	300	24,820	24,820	16,480	4,965	149	140
	1½E2	2500	300	41,370	41,370	27,440	4,965	149	140
Temperature Range Inclusive −29 °C to 260 °C									
Nickel/copper alloy	1E2	150	150		1,585	1,170	1,585	105	114
	1E2	300	150		4,135	3,275	1,585	111	114
	1E2	600	150		8,275	6,515	1,585	111	114
	1E2	900	300		12,410	9,790	4,135	125	121
	1½E2	150	150		1,585	1,170	1,585	124	121
	1½E2	300	150		4,135	3,275	1,585	124	121
	1½E2	600	150		8,275	6,515	1,585	124	121
	1½E2	900	300		12,410	9,790	4,135	149	140

Materials ^b	Valve Size	ASME Flange Class		Maximum Pressure Limits ^a [kPa (gauge)]				Center-to-face Dimensions (mm)	
Body	Inlet by Orifice by Outlet	Inlet	Outlet	Inlet Flange (Set) Pressure Limit			Outlet Pressure Limit ^a		
				−268 °C to −30 °C	−29 °C to 38 °C	39 °C to 260 °C	38 °C	Inlet	Outlet
Temperature Range Inclusive −29 °C to 149 °C ^c									
Alloy 20 ^c	1E2	150	150		1,585	1,240	1,585	105	114
	1E2	300	150		4,135	3,205	1,585	111	114
	1E2	600	150		8,275	6,410	1,585	111	114
	1E2	900	300		12,410	9,620	4,135	125	121
	1E2	1500	300		20,685	16,065	4,135	125	121
	1E2	2500	300		34,475	26,750	4,135	125	121
	1½E2	150	150		1,585	1,240	1,585	124	121
	1½E2	300	150		4,135	3,205	1,585	124	121
	1½E2	600	150		8,275	6,410	1,585	124	121
	1½E2	900	300		12,410	9,620	4,135	149	140
	1½E2	1500	300		20,685	16,065	4,135	149	140
	1½E2	2500	300		34,475	26,750	4,135	149	140
^a Inlet and outlet flange pressure limits correspond to the values in ASME B16.34 unless enclosed in parentheses. A value that is shown in parentheses is less than that provided in ASME B16.34. The outlet flange values at 38 °C above are the limit for this standard. Inlet and outlet flange pressure values at other temperatures may only be interpolated using graphs from Annex B or from tables in ASME B16.34 if these values do not exceed the values in parentheses or the outlet flange values at 38 °C above. Pressure changes within the temperature ranges above may not be linear. User is cautioned to review the outlet temperature for possible cryogenic applications and select the appropriate materials.									
^b Materials given are minimum requirements for the pressure and temperature ratings. Other suitable materials may be used, as required for the service involved.									
^c Materials limited to 149 °C. Pressure ratings indicated in the 260 °C column are limited to 149 °C.									
^d Restricted lift pressure-relief valves, as described in paragraph 4.2.4 of API 520, Part 1, may be specified. The valves supplied shall have a reduction in effective area and meet the restricted lift requirements per ASME BPVC, Section XIII.									