

**CROSBY SAFETY VALVES**

STYLES HE ISOFLEX®, HCI ISOFLEX®, HSJ

For utility, industrial steam generators and steam systems.

**Style HE ISOFLEX®**

- High capacity, back pressure assisted close, safety valve.
- High pressure drum service.
- Saturated steam applications.
- Two-ring control.
- Seat tightness\* at 96% set pressure.
- Welded and flanged inlets.
- Sizes: 2 1/2 K 6, 2 1/2 K2 6, 3 M 6, 3 M2 6 and 4 P2 8.
- Inlet pressure ratings: 2500 and 3000 psig [172 barg and 207 barg].

**Style HSJ**

- High capacity safety valve.
- Saturated and superheated steam.
- Two-ring control.
- Tight shut-off FLEXI-DISC.®
- Flanged Inlet.
- Sizes: 1 1/2 F 2 to 6 Q 8.
- Inlet ratings: Cl 150, Cl 300, Cl 600, Cl 900, Cl 1500, Cl 2500.
- Pressures to 2700 psig [186 barg].
- Temperatures to 1000°F [538°C].

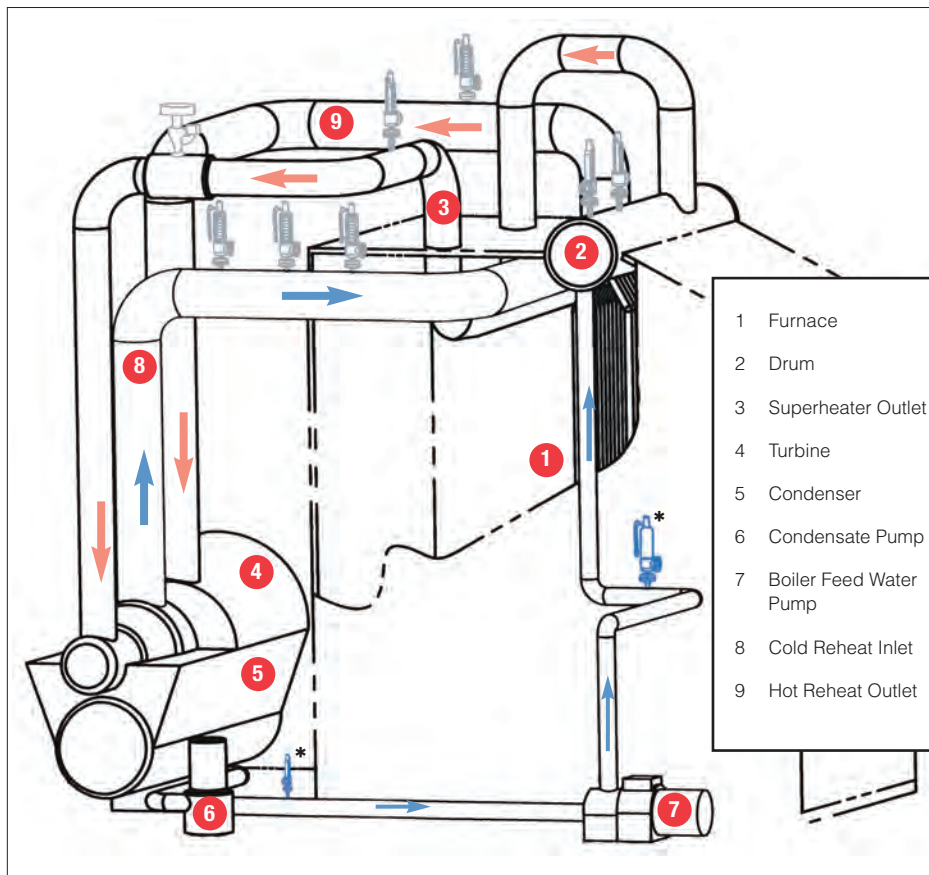
**Style HCI ISOFLEX®**

- High capacity safety valve.
- Saturated and superheated steam.
- Two-ring control.
- Restricted/adjustable lift option.
- Seat tightness\* at 96+% set pressure.
- Welded and flanged inlets.
- Sizes: 1 1/2 H2 3 to 6 RR 10.
- Inlet ratings: Cl 300, Cl 600, Cl 900, Cl 1500, Cl 2500.
- Pressures to 3000 psig [207 barg].
- Temperatures to 1100°F [593°C].

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**Application**



**Complete Overpressure Protection for ASME\* Code Section I**

Crosby supplies a complete safety valve package for Utility and Industrial Steam Generators and Steam Systems.

- Boilers with design pressures to 3000 psig [207 barg].
- Valves designed to increase plant up-times, extend maintenance intervals and increase total valve life.

- 1 Furnace
- 2 Drum
- 3 Superheater Outlet
- 4 Turbine
- 5 Condenser
- 6 Condensate Pump
- 7 Boiler Feed Water Pump
- 8 Cold Reheat Inlet
- 9 Hot Reheat Outlet



\*Crosby completes your pressure management needs with a complete line of ASME Section VIII "Off-Boiler" Safety and Pressure Relief Valves. Contact your local sales representative.

**Valve Selection**

Applications and Recommended <sup>1</sup> Valve Selection			
Steam System	Crosby Valve Style, Design Pressure - psig [barg]		
	15 - 600 [1 - 41]	300 - 2000 [21-138]	2001 - 3000 <sup>2</sup> [139-207]
Drum	HSJ	HCI	HE
Superheater Outlet	HSJ	HCI	HCI
Reheater Inlet	HSJ	HCI	HCI
Reheater Outlet	HSJ	HCI	HCI
Economizer (Section I)	HSJ	HSJ	HSJ

**Notes:**

1. Selection matrix at left shows valves in optimum locations - Styles HSJ and HCI may be interchanged to suit a specific application or to obtain a more economical selection.
2. For supercritical applications, consult your sales representative.

## Style HE ISOFLEX®

### Pressure Management Solutions

#### Extends Up-Times

- ISOFLEX® seat tightness to 96% of set pressure ensures maximum generating times as maintenance intervals are extended.

#### Reduces Maintenance Costs

- Exceptional seat tightness minimizes maintenance resources and repair times. Reduces costs associated with the purchase and inventory of spare parts.

#### Easily Adjusted According to ASME Code Section I Requirements

- HE ISOFLEX® advanced trim design has the backpressure assist closing feature and patented Eductor Control, eliminating the need for complex adjustment to obtain Code required blowdown.

#### Minimizes Installation Costs

- Weld end valves are shipped as two assemblies to minimize installation time and labor.
- No special vent discharge piping is required.

#### Benefits

- Packaging designed for quick and easy installation.
- Reduces installation costs with customer-specific weld preps or flanged inlets.
- Ease of adjustment and maintenance with fewer parts.



**Style HE ISOFLEX® Drum Service**

**Introduction**

Formerly known as Style HE, Style HE ISOFLEX® incorporates our latest seat tightness design. Exceptional seat tightness results from an intensive engineering product design analysis and upgrade program. For detailed discussion on the specific improvements incorporated in the Style HE ISOFLEX® design, and its “field-proven” results, please contact your local Crosby Sales Representative.

Style HE ISOFLEX® safety valves are high pressure, high capacity reaction type valves, designed specifically for saturated steam service on boiler drums having design pressures above 2000 psig [138 barg] up to critical pressure. It incorporates the unique patented eductor control that permits the valve to attain full capacity lift at a pressure 3% above popping pressure in accordance with the requirements of Section I of the ASME Boiler and Pressure Vessel Code.

**Low Friction Set Point Adjustment**

Springs on drum safety valves, of necessity, have very high preloads. A thrust bearing (25) between the adjusting bolt (26) and top spring washer (21) makes set point adjustments precise and keeps friction torque low. The valve seats are protected from damage during set point adjustment by lugs on the upper spring washer (21). The lugs engage the bonnet (17) to prevent rotation of the spring (20), spindle (12) and disc insert (5).

**Precise Popping and Blowdown Action**

The principle feature of the design is a dual-stage, controlled flow passage formed by the eductor (9), disc holder (6) and the adjustable guide ring (10).

The controlled flow passages co-act with the apertured guide ring to control the flow of steam to a chamber above the disc holder (6). Changes in chamber pressure plus the action of other internal parts assure full opening without warn and also assist in positive blowdown. By adjusting the guide ring, blowdown between 2% and 4% is obtained as required by Section I of the ASME Code. The adjustable nozzle ring (3) ensures accurate, warn-free and sharp pop action on opening.

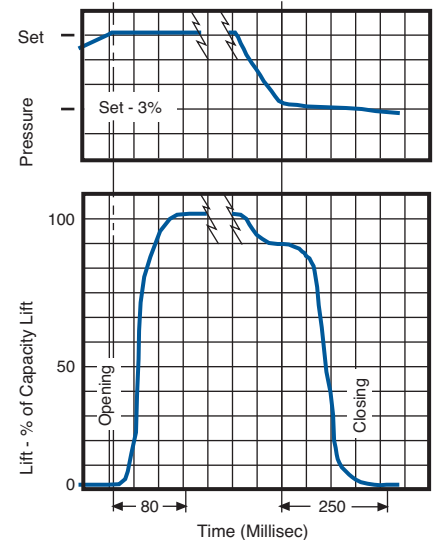
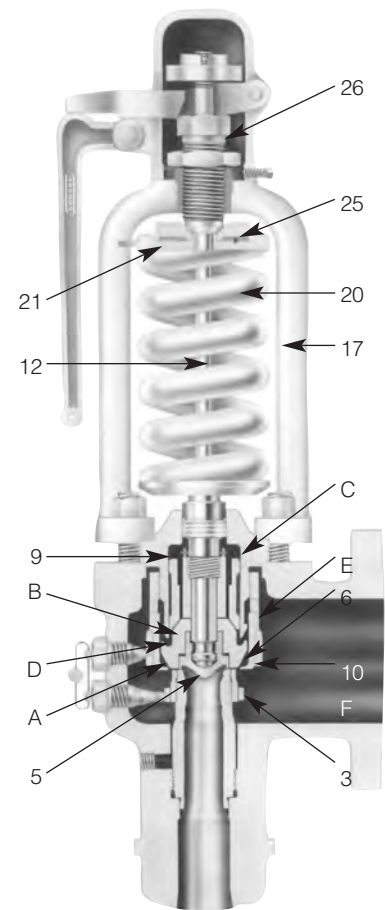
**Tight Shut-off with ISOFLEX® Design**

Style HE ISOFLEX® valve seals off tight. The seat-level loading of the spindle (12) on the disc insert (5) ensures uniform seat-loading. The seating region of the ISOFLEX® disc insert is recessed for pressure loading and temperature equalization ensuring maximum seat tightness.

**Operation**

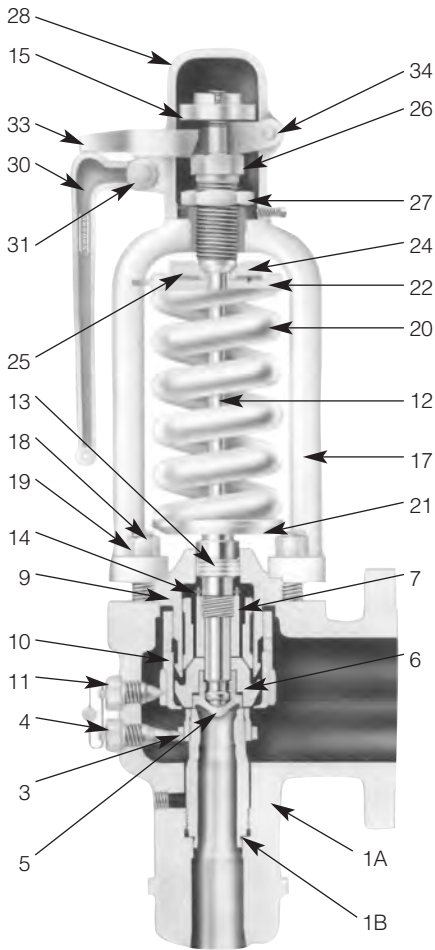
A typical valve operating cycle is as follows: as pressure in the boiler increases to the safety valve set point, the valve will pop open. After the valve opens, steam passes through a series of flow passages (A) and (B) which control the pressure developed in chambers (C) and (D), the excess steam exhausting through guide ring openings (E) to the valve body bowl (F).

As pressure in the boiler decays, the dynamic forces on the lower face of the disc holder assembly are reduced and the safety valve disc begins to close. Assisted by pressure in chambers (C) and (D), the valve at this point closes sharply and tightly.



**Typical Valve Opening and Closing Curve**

**Style HE ISOFLEX® Valve Materials**



Materials			
Part Ref. No.	Part Name	Material	Spare Parts Designation <sup>1,2,3</sup>
1A	Body	Carbon Steel SA-216 Gr. WCC	
1B	Nozzle	Stainless Steel	
3	Nozzle Ring	Stainless Steel	3
4	Nozzle Ring Set Screw	Stainless Steel	
5	Disc Insert	Inconel®	1
6	Disc Holder	Nickel Alloy	2
7	Disc Holder Retaining Nut	Stainless Steel	
9	Eductor	Nickel Alloy	2
10	Guide Ring	Stainless Steel	3
11	Guide Ring Set Screw	Stainless Steel	
12	Spindle Assembly	Stainless Steel	2
13	Piston	Nickel Alloy	
14	Piston Retaining Ring		2
15	Spindle Nut	Steel	
17	Bonnet	Carbon Steel SA-216 Gr. WCC	
18	Bonnet Studs	Alloy Steel SA-193 Gr. B7	
19	Bonnet Stud Nuts	Steel SA-194 Gr. 2H	
20	Spring	Alloy Steel Corrosion Resistant Coating	
21	Bottom Spring Washer	Steel	
22	Top Spring Washer		
24	Bearing Adapter		
25	Thrust Bearing	Commercial	
26	Adjusting Bolt	Stainless Steel	
27	Adjusting Bolt Nut	Steel	
28	Cap	Steel/Iron	
30	Lever	Steel/Iron	
31	Lever Pin	Steel	
33	Forked Lever	Steel/Iron	
34	Forked Lever Pin	Steel	

Note: A complete set of spare cotter pins (not listed above) is also recommended for proper maintenance of the valve.

**Notes:**

1. Consumable Spare Parts: Valve parts which should be replaced as part of any disassembly. (Disc inserts must be replaced if seats are severely damaged.)
2. Repair Spare Parts: Valve parts exposed to wear and/or corrosion during normal operation. They are in fluid flow paths and may require replacement as part of any repair.
3. Insurance Spare Parts: Valve parts exposed to process or environmental wear and/or corrosion and may require replacement as part of a major repair.

**Crosby recommends that sufficient inventory of spare parts be maintained to support process requirements. Always be sure to use genuine Crosby parts to ensure continued product performance and warranty.**

For information on installation and care, Crosby's Instruction No. IS-V3155B, "Installation, Operating and Maintenance Instruction for Crosby Style HE Design III Self-Actuated Safety Valves" is available on request.

**Style HE ISOFLEX® Specifications**

**USCS (United States Customary System) Units**

Valve Size Inlet x Orifice x Outlet	HE Valve Style <sup>1</sup>	Orifice Area sq. in. [sq. mm]	Connections in. [mm]		Dimensions - inches [mm]								Approx. Height <sup>4</sup> in. [mm]		Approx. Weight lbs. [kg]	
			Butt Weld Inlet	ANSI Class Flanged Outlet	Inlet I.D.		Bw <sup>2</sup> Inlet O.D.	Center to Face of				Ew	E	Welded	Flanged	
					Aw <sup>2</sup>	A		Inlet		Outlet <sup>3</sup>						
							Cw	C	Dw	D						
<b>2500 psig Maximum Pressure</b>																
2 1/2 K 6	HE-86W	1.840	2 1/2	6"-300	2 1/2	2 1/2	5 1/4	11	8 1/4	8 1/2	8 1/2	36 15/16	34 3/16	350	375	
2 1/2 K2 6	HE-86W	2.545	2 1/2	6"-300	2 1/2	2 1/2	6	12	8 13/16	8 1/2	8 1/2	44 1/4	41 1/16	410	435	
3 M 6	HE-86W	3.600	3	6"-300	3	3	8	12	8 7/8	10	10	49 1/2	46 3/8	630	625	
3 M26	HE-86W	3.976	3	6"-300	3	3	8	12	8 7/8	10	10	49 7/8	46 3/4	630	625	
4 P2 8	HE-86W	7.070	4	8"-300	4	4	9	13 1/4	14 1/2	13	13	64	65	1100	1185	
<b>3000 psig Maximum Pressure</b>																
2 1/2 K 6	HE-96W	1.840	2 1/2	6"-300	2 1/2	2 1/2	5 1/4	11	8 1/4	8 1/2	8 1/2	36 15/16	34 3/16	350	375	
2 1/2 K2 6	HE-96W	2.545	2 1/2	6"-300	2 1/2	2 1/2	6	12	8 13/16	8 1/2	8 1/2	44 1/4	41 1/16	410	435	
3 M 6	HE-96W	3.600	3	6"-300	3	3	8	12	8 7/8	10	10	49 1/2	46 3/8	630	635	
3 M26	HE-96W	3.976	3	6"-300	3	3	8	12	8 7/8	10	10	49 7/8	46 3/4	630	635	
4 P28	HE-96W	7.070	4	8"-300	4	4	9	13 1/4	14 1/2	13	13	64	65	1100	1185	

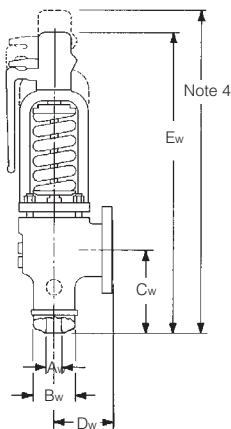
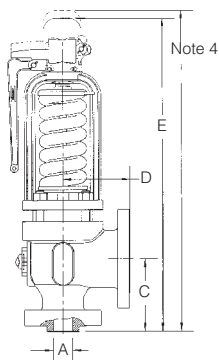
**Metric Units**

**172 barg Maximum Pressure**

2 1/2 K 6	HE-86W	1187.1	63.5	6"-300	63.5	63.5	133	279	210	216	216	938	868	159	170
2 1/2 K2 6	HE-86W	1641.9	63.5	6"-300	63.5	63.5	152	305	224	216	216	1124	1043	186	193
3 M 6	HE-86W	2322.6	76.2	6"-300	76.2	76.2	203	305	225	254	254	1257	1178	286	284
3 M2 6	HE-86W	2565.2	76.2	6"-300	76.2	76.2	203	305	225	254	254	1267	1187	286	284
4 P2 8	HE-86W	4560.4	101.6	8"-300	101.6	101.6	229	337	368	330	330	1626	1651	499	538

**207 barg Maximum Pressure**

2 1/2 K 6	HE-96W	1187.1	63.5	6"-300	63.5	63.5	133	279	210	216	216	938	868	159	170
2 1/2 K2 6	HE-96W	1641.9	63.5	6"-300	63.5	63.5	152	305	224	216	216	1124	1043	186	193
3 M 6	HE-96W	2322.6	76.2	6"-300	76.2	76.2	203	305	225	254	254	1257	1178	286	284
3 M2 6	HE-96W	2565.2	76.2	6"-300	76.2	76.2	203	305	225	254	254	1267	1187	286	284
4 P2 8	HE-96W	4560.4	101.6	8"-300	101.6	101.6	229	337	368	330	330	1626	1651	499	538



**Notes:**

1. These style designations are for standard welded inlets. For optional CL 2500 flanged inlet valves, the "W" is dropped from the style designation.
2. Weld prep per customer's specifications. Safety valves must be mounted on a nozzle with an inlet diameter equal to or greater than the nominal valve inlet size, Dimension A. See ASME Boiler and Pressure Vessel Code Section I and ANSI/ASME B31.1 for recommended installation.
3. Bolt holes straddle centerline on flanged connections.
4. Dismantling Height: An additional 20 inches [508 mm] is required.

Drain: Main valve drain is 1/2" NPT

## Crosby Style HCI ISOFLEX®

### Pressure Management Solutions

#### Precise Operation

- Two ring control.
- In accordance with requirements of the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers.
- Ease of setting and adjustment in service.

#### Tightness

- Tightest shut-off with field proven ISOFLEX® seat.
- Seat tightness up to 96% of valve set pressure.

#### Design Features

- Simple, rugged and reliable.
- Low maintenance.
- May also be used for ASME Boiler and Pressure Vessel Code, Section VIII, Unfired Pressure Vessels, services.
- Adjustable/restricted lift option (HCI-R)
  - Eliminates overcapacity
  - Reduces reaction forces
  - Allows building of standardized boilers

#### Benefits

- Reduces operating costs and increases efficiency with Restricted Lift Option (see page 18).
- Minimizes inventory with interchangeable spare parts.
- Packaging designed for quick and easy installation.
- Extends valve service life with higher nozzle seat step.



## Style HCI ISOFLEX®

Drum Service - Superheater Outlet - Reheaters

### Introduction

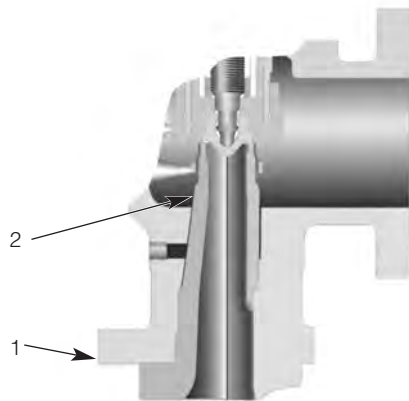
Crosby Style HCI ISOFLEX® is a high capacity nozzle type safety valve for saturated and superheated steam service, incorporating the technical excellence of Crosby's original Style HC design. It meets the requirements of the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers, and Section VIII, Unfired Pressure Vessels. The valves have been designed and are manufactured and tested in accordance with quality management systems.

Style HCI ISOFLEX® has been designed for 300 to 3000 psig [21 to 207 barg] steam generators. The valves are available in inlet sizes of 1 1/2", 2", 2 1/2", 3", 4" and 6" [38.1 mm, 50.8 mm, 63.5 mm, 76.2 mm, 101.6 mm], and in orifice sizes H2 to RR specifically designed for the power industry.

Welded inlets and flanged outlets are the standard connections. Flanged inlets (1) with full (removable) nozzles (2) are also available.

#### Note:

Full (removable) nozzles not available in P2 (8" Outlet), R & RR sizes



The relieving capacities of Style HCI ISOFLEX® have been determined by capacity certification tests conducted in accordance with ASME Code, Section I rules and are certified by the National Board of Boiler and Pressure Vessel Inspectors. Certified capacities are listed in the National Board publication, "Pressure Relief Device Certifications."

### High Capacity

The adjustable nozzle and guide rings (3 and 12) utilize the reactive and expansive forces of the flowing steam to provide full capacity lift. Valve capacity is determined by the nozzle (1B) throat area alone. With high capacity valves, positive overpressure protection is achieved with the fewest number of valves.

### Tight Shut-off

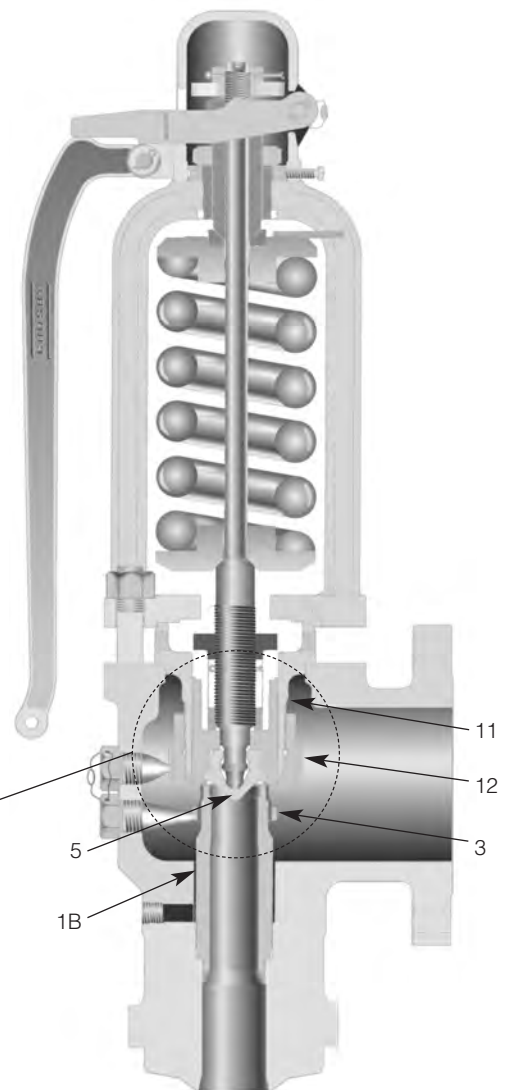
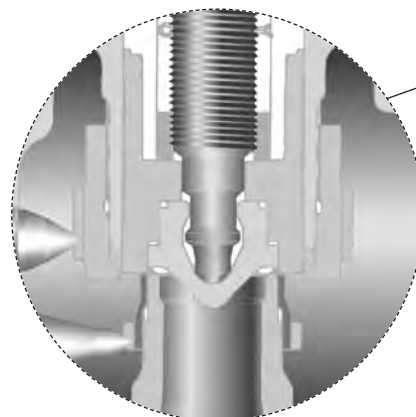
The Style HCI ISOFLEX® Safety Valve seals off tight. The seating region of the ISOFLEX® disc insert (5) is recessed for pressure and temperature equalization ensuring that the seats remain flat in service.

### Two Ring Design

Blowdown control is precise with two adjustable rings (3 and 12) - one each on the nozzle (1B or 2) and guide (11). Blowdown may be adjusted from 2 to 4% under operating conditions.

### Precise Popping Point

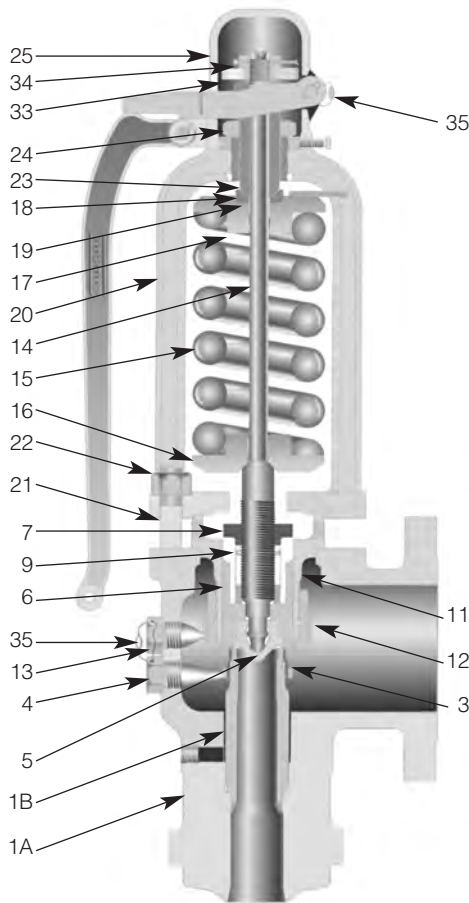
Close machining tolerances assure that the disc insert (5) is precisely centered, and special guide and disc/disc holder materials and surface finishes ensure low friction guiding at all temperatures. Spring specifications are held to rigid tolerances, and stresses are kept within lowest practical limits. The open bonnet exposes the spring to atmosphere, minimizing thermal effects. The valves open precisely at their established set pressure, even after repeated cycling.



Style HCI ISOFLEX® Safety Valve



**Style HCI ISOFLEX® Materials**



**Materials**

Part Ref. No.	Part Name	Material and Maximum Temperature			Spare Parts Designation <sup>1,2,3</sup>
		750°F [399°C]	1050°F [566°C]	1100°F [593°C]	
1A	Body	Carbon Steel SA-216 Gr. WCC	Alloy Steel SA-217 Gr. WC6	Alloy Steel*** SA-217 Gr. WC9	
*1B	Nozzle	Stainless Steel	Stainless Steel	Stainless Steel	
*2	Nozzle	Stainless Steel	Stainless Steel	Stainless Steel	3
3	Nozzle Ring	Stainless Steel	Stainless Steel	Stainless Steel	3
4	Nozzle Ring Set Screw	Stainless Steel	Stainless Steel	Stainless Steel	
5	Disc Insert	Inconel®	Inconel®	Inconel®	1
6	Disc Holder	Nickel Alloy	Nickel Alloy	Nickel Alloy	2
7	Disc Holder Retainer	Stainless Steel	Stainless Steel	Stainless Steel	
**8	Lift Stop	Stainless Steel	Stainless Steel	Stainless Steel	
9	Disc Holder Retainer Cotter	Stainless Steel	Stainless Steel	Stainless Steel	1
**10	Lift Stop Cotter	Stainless Steel	Stainless Steel	Stainless Steel	1
11	Guide	Nickel Alloy	Nickel Alloy	Nickel Alloy	2
12	Guide Ring	Stainless Steel	Stainless Steel	Stainless Steel	3
13	Guide Ring Set Screw	Stainless Steel	Stainless Steel	Stainless Steel	
14	Spindle Assembly	Stainless Steel	Stainless Steel	Stainless Steel	2
15	Spring	Alloy Steel Corrosion Resistant Coating	Alloy Steel Corrosion Resistant Coating	High Temp. Alloy Steel Corrosion Resistant Coating	
16	Bottom Spring Washer	Steel	Steel	Steel	
17	Top Spring Washer	Steel	Steel	Steel	
18	Bearing Adapter	Alloy Steel	Alloy Steel	Alloy Steel	
19	Thrust Washer	Steel	Steel	Steel	
20	Bonnet	Carbon Steel SA-216 Gr. WCC	Alloy Steel SA-217 Gr. WC6	Alloy Steel SA-217 Gr. WC6	
21	Bonnet Studs	Alloy Steel SA-193 Gr. B7	Alloy Steel SA-193 Gr. B16	Alloy Steel SA-193 Gr. B16	
22	Bonnet Stud Nuts	Steel SA-194 Gr. 2H	Steel SA-194 Gr. 2H	Steel SA-194 Gr. 2H	
23	Adjusting Bolt	Stainless Steel	Stainless Steel	Stainless Steel	
24	Adjusting Bolt Nut	Stainless Steel	Stainless Steel	Stainless Steel	
25	Cap/Lever Assembly	Steel/Iron	Steel/Iron	Steel/Iron	
33	Spindle Nut	Stainless Steel	Stainless Steel	Stainless Steel	
34	Spindle Nut Cotter	Stainless Steel	Stainless Steel	Stainless Steel	1
35	Seal & Wire	Lead & SS	Lead & SS	Lead & SS	

**Notes:**

1. Consumable Spare Parts: Valve parts which should be replaced as part of any disassembly, and discs and disc inserts which must be replaced if seats are damaged.
2. Repair Spare Parts: Valve parts exposed to wear and/or corrosion during normal operation. They are in fluid flow paths and may require replacement as part of any repair.
3. Insurance Spare Parts: Valve parts exposed to process or environmental wear and/or corrosion and may require replacement as part of a major repair.

**Crosby recommends that sufficient inventory of spare parts be maintained to support process requirements. Always be sure to use genuine Crosby parts to ensure continued product performance and warranty.**

For information on installation and care, Crosby's Instruction No. IS-V3143A, "Installation, Maintenance and Adjustment Instruction for Crosby Style HCI ISOFLEX® Safety Valves" is available on request.

\* Semi-nozzle design for welded inlet and P2 (8" Outlet), R & RR orifice flanged inlet valves. Full nozzle design for remaining H2 through QO orifice flanged inlet valves.

\*\* Restricted Lift Valve (HCI-R) part only (see page 18).

\*\*\* SA-217 Gr. WC9 is Crosby's standard high temperature material. SA-217 Gr. C12A is available as an alternative.

**Specifications\* Style HCI ISOFLEX®**

**USCS (United States Customary System) Units**

Valve Size Inlet x Orifice x Outlet	Orifice Area (sq. in.)	Maximum Set Pressure (psig) and Temperature <sup>2</sup> for Standard Body Material Listed							Standard Flanged Outlet Class	Optional Flanged Outlet Class
		Flanged Inlet		Welded Inlet						
		SA216 Gr. WCC	SA217 Gr. WC6	SA216 Gr. WCC	SA217 Gr. WC6	SA217 Gr. C12A	SA217 Gr. WC9	SA217 Gr. C12A		
		750°F	1050°F	750°F	1050°F		1100°F			
<b>Class 300</b> - ANSI raised face flange or welded CL 300 inlet										
		HCI-36	HCI-38	HCI-36W	HCI-38W					
1 1/2 H2 3	0.994	665	665	665	665	—	—	—	3" CI 150	3" CI 300
2 J2 4	1.431	665	665	665	665	—	—	—	4" CI 150	4" CI 300
2 1/2 K2 6	2.545	665	665	665	665	—	—	—	6" CI 150	6" CI 300
3 L2 6	3.341	665	665	665	665	—	—	—	6" CI 150	6" CI 300
3 M2 6	3.976	665	665	665	665	—	—	—	6" CI 150	6" CI 300
4 P2 6	7.07	665	665	665	665	—	—	—	6" CI 300	—
6 Q2 8	12.25	665	665	665	665	—	—	—	8" CI 300	—
6 R 8	16.00	665	665	665	665	—	—	—	8" CI 300	—
6 RR 10	19.29	665	665	665	665	—	—	—	10" CI 300	—
<b>Class 600</b> - ANSI raised face flange or welded CL 600 inlet										
		HCI-46	HCI-48	HCI-46W	HCI-48W					
1 1/2 H2 3	0.994	1250	1250	1250	1250	—	—	—	3" CI 150	3" CI 300
2 J2 4	1.431	1250	1250	1250	1250	—	—	—	4" CI 150	4" CI 300
2 1/2 K2 6	2.545	1250	1250	1250	1250	—	—	—	6" CI 150	6" CI 300
3 L2 6	3.341	1250	1250	1250	1250	—	—	—	6" CI 150	6" CI 300
3 M2 6	3.976	1250	1250	1250	1250	—	—	—	6" CI 150	6" CI 300
4 P2 6	7.07	1250	1250	1250	1250	—	—	—	6" CI 300	—
6 Q2 8	12.25	1250	1250	1250	1250	—	—	—	8" CI 300	—
6 R 8	16.00	750	750	750	750	—	—	—	8" CI 300	—
6 R 10	16.00	900	900	900	900	—	—	—	10" CI 300	—
6 RR 10	19.29	900	900	900	900	—	—	—	10" CI 300	—
<b>Class 900</b> - ANSI raised face flange or welded CL 900 inlet										
		HCI-56	HCI-58	HCI-56W	HCI-58W	HCI-58W -C12A	HCI-59W	HCI-59W -C12A		
1 1/2 H2 3	0.994	1500	1500	1500	1500	—	—	—	3" CI 150	3" CI 300
2 J2 4	1.431	1500	1500	1500	1500	—	—	—	4" CI 150	4" CI 300
2 1/2 K2 6	2.545	1500	1500	1500	1500	—	—	—	6" CI 150	6" CI 300
3 L2 6	3.341	1500	1500	1500	1500	—	—	—	6" CI 150	6" CI 300
3 M2 6	3.976	1500	1500	1500	1500	—	—	—	6" CI 150	6" CI 300
4 P2 6	7.07	1500	1500	1500	1500	—	—	—	6" CI 300	—
6 Q2 8	12.25	1500	1500	1500	1500	—	—	—	8" CI 300	—
6 R 8	16.00	750	750	750	750	—	—	—	8" CI 300	—
6 R 10	16.00	900	900	900	900	—	—	—	10" CI 300	—
6 RR 10	19.29	900	900	900	900 <sup>1</sup>	750 <sup>1</sup>	750 <sup>1</sup>	575 <sup>1</sup>	10" CI 300	—
		HCI-76	HCI-78	HCI-76W	HCI-78W	HCI-78W -C12A	HCI-79W	HCI-79W -C12A		
1 1/2 H2 4	0.994	1795	1795	1795	1795	1795	1080	1080	4" CI 300	—
2 J2 6	1.431	1795	1795	1795	1795	1795	1080	1080	6" CI 300	—
2 1/2 K2 6	2.545	1795	1795	1795	1795	1795	1080	1080	6" CI 300	—
3 L2 6	3.341	1795	1795	1795	1795	1795	1080	1080	6" CI 300	—
3 M2 6	3.976	1795	1795	1795	1795	1795	1080	1080	6" CI 300	—
4 P2 8	7.07	1795	1795	1795	1795	1795	1080	1080	8" CI 300	—

\* Select appropriate class to meet pressure/temperature requirements for each application. Refer to pages 42-45 for Pressure/Temperature limits for Standard Class valves per ASME/ANSI B16.34.

**Specifications\* Style HCI ISOFLEX®**

**USCS (United States Customary System) Units**

Valve Size Inlet x Orifice x Outlet	Orifice Area (sq. in.)	Maximum Set Pressure (psig) and Temperature <sup>2</sup> for Standard Body Material Listed							Standard Flanged Outlet Class	Optional Flanged Outlet Class
		Flanged Inlet			Welded Inlet					
		SA216 Gr. WCC 750°F	SA217 Gr. WC6 1050°F	SA216 Gr. WCC 750°F	SA217 Gr. WC6 1050°F	SA217 Gr. C12A 1050°F	SA217 Gr. WC9 1100°F	SA217 Gr. C12A 1100°F		

**Class 1500 - ANSI raised face flange or welded CL 1500 inlet**

		HCI-66	HCI-68	HCI-66W	HCI-68W	HCI-68W -C12A	HCI-69W	HCI-69W -C12A		
1 1/2 H2 3	0.994	1500	1500	1500	1500	—	—	—	3" CI 150	3" CI 300
2 J2 4	1.431	1500	1500	1500	1500	—	—	—	4" CI 150	4" CI 300
2 1/2 K2 6	2.545	1500	1500	1500	1500	—	—	—	6" CI 150	6" CI 300
3 L2 6	3.341	1500	1500	1500	1500	—	—	—	6" CI 150	6" CI 300
3 M2 6	3.976	1500	1500	1500	1500	—	—	—	6" CI 150	6" CI 300
4 P2 6	7.07	1500	1500	1500	1500 <sup>1</sup>	950 <sup>1</sup>	950 <sup>1</sup>	750 <sup>1</sup>	6" CI 300	—
6 Q2 8	12.25	1500	1500	1500	1500 <sup>1</sup>	1250 <sup>1</sup>	1300 <sup>1</sup>	950 <sup>1</sup>	8" CI 300	—
6 R 8	16.00	750	750	750	750 <sup>1</sup>	750 <sup>1</sup>	750 <sup>1</sup>	650 <sup>1</sup>	8" CI 300	—
6 R 10	16.00	1200	1200	1200	1200 <sup>1</sup>	1200 <sup>1</sup>	1200 <sup>1</sup>	1000 <sup>1</sup>	10" CI 300	—
		HCI-86	HCI-88	HCI-86W	HCI-88W	HCI-88W -C12A	HCI-89W	HCI-89W -C12A		
1 1/2 H2 4	0.994	2000 <sup>3</sup>	2000	2000 <sup>3</sup>	2865	2865	1800	1800	4" CI 300	—
2 J2 6	1.431	2000 <sup>3</sup>	2865	2000 <sup>3</sup>	2865	2865	1800	1800	6" CI 300	—
2 1/2 K2 6	2.545	2000 <sup>3</sup>	2865	2000 <sup>3</sup>	2865	2865	1800	1800	6" CI 300	—
3 L2 6	3.341	2000 <sup>3</sup>	2000	2000 <sup>3</sup>	2865	2865	1800	1800	6" CI 300	—
3 M2 6	3.976	2000 <sup>3</sup>	1800	2000 <sup>3</sup>	2865	2865	1800	1800	6" CI 300	—
4 P2 8	7.07	2000 <sup>3</sup>	2000	2000 <sup>3</sup>	2865	2865	1800	1800	8" CI 300	—

**Class 2500 - ANSI raised face flange or welded CL 2500 inlet**

		HCI-96	HCI-98	HCI-96W	HCI-98W	HCI-98W -C12A	HCI-99W	HCI-99W -C12A		
1 1/2 H2 4	0.994	2000 <sup>3</sup>	2000	2000 <sup>3</sup>	3000 <sup>1</sup>	2500 <sup>1</sup>	2500 <sup>1</sup>	2000 <sup>1</sup>	4" CI 300	—
2 J2 6	1.431	2000 <sup>3</sup>	3000	2000 <sup>3</sup>	3000 <sup>1</sup>	2750 <sup>1</sup>	2900 <sup>1</sup>	2100 <sup>1</sup>	6" CI 300	—
2 1/2 K2 6	2.545	2000 <sup>3</sup>	3000	2000 <sup>3</sup>	3000 <sup>1</sup>	3000 <sup>1</sup>	3000 <sup>1</sup>	2750 <sup>1</sup>	6" CI 300	—
3 L2 6	3.341	2000 <sup>3</sup>	3000	2000 <sup>3</sup>	3000 <sup>1</sup>	3000 <sup>1</sup>	3000 <sup>1</sup>	3000 <sup>1</sup>	6" CI 300	—
3 M2 6	3.976	2000 <sup>3</sup>	2800	2000 <sup>3</sup>	3000 <sup>1</sup>	3000 <sup>1</sup>	3000 <sup>1</sup>	2500 <sup>1</sup>	6" CI 300	—
4 P2 8	7.07	2000 <sup>3</sup>	3000	2000 <sup>3</sup>	3000 <sup>1</sup>	2900 <sup>1</sup>	2000 <sup>1</sup>	2000 <sup>1</sup>	8" CI 300	—

\* Select appropriate class to meet pressure/temperature requirements for each application. Refer to pages 42-45 for Pressure/Temperature limits for Standard Class valves per ASME/ANSI B16.34.

**Notes:**

1. For applications exceeding ASME/ANSI B16.34 Pressure - Temperature limits - Specified HCI-(J)W (welded only) have been designed to maximum set pressure at maximum temperature stated in the table.
2. Set pressure is limited to either the inlet pressure limit per ASME/ANSI B16.34 (pages 42-45) or the maximum set pressure, whichever is lower.
3. Style HE ISOFLEX® Safety Valves (pages 3-6) are recommended for high pressure drum saturated steam service between 2000-3000 psig.

**Style HCI ISOFLEX® Dimensions and Weights**

USCS (United States Customary System) Units																	
Valve Size Inlet x Orifice x Outlet	HCI Valve Style <sup>1</sup>	General Dimensions - Inches											Approximate Weight (lbs)				
		Inlet ID		Inlet Neck OD <sup>2</sup> (Welded)	Center-to-Face				Used to Find Bolt Length (Flanged) <sup>4</sup>	Approx. Height <sup>2</sup>		Class 150		Class 300			
					Inlet		Outlet					Outlet		Outlet			
		Aw	A	Bw	Cw	C	Dw	D	Dw	D	X	Ew	E	Welded	Flanged	Welded	Flanged
<b>Class 300</b> - ANSI raised face flange or welded CL 300 inlet																	
1 1/2 H2 3	3( )W	1 1/2	1 1/2	3 1/2	6 3/8	5 7/8	6	6	6	6	19 1/16	25 1/2	25	105	108	110	113
2 J2 4	3( )W	2	2	4 1/2	8 7/16	6 1/2	7	7	7	7	13 3/4	30 3/8	28 7/16	135	132	144	141
2 1/2 K2 6	3( )W	2 1/2	2 1/2	5 1/4	8 15/16	8 1/16	7	7	7 7/8	7 7/8	1 15/16	34 5/16	33 7/16	230	230	249	249
3 L2 6	3( )W	3	3	6	9 11/16	8 3/4	7 1/2	7 1/2	8 1/4	8 1/4	2 1/16	39 15/16	39	340	360	359	359
3 M2 6	3( )W	3	3	6	9 11/16	8 3/4	7 1/2	7 1/2	8 1/4	8 1/4	2 1/16	40 1/16	39 1/8	400	400	419	419
4 P2 6	3( )W	4	4	6 7/8	9 3/8	9 1/8	—	—	10	10	2 1/16	45 13/16	45 9/16	—	—	575	617
6 Q2 8	3( )W	6	6	9	11 1/2	12	—	—	11	11 1/2	2 1/4	61 1/8	61 5/8	—	—	850	906
6 R 8	3( )W	6	6	9	11 1/2	11 1/2	—	—	11	11 1/2	—	61 7/16	61 7/16	—	—	902	937
6 RR 10	3( )W	6	6	9	12	12	—	—	12	12	—	63	63	—	—	1179	1214
<b>Class 600</b> - ANSI raised face flange or welded CL 600 inlet																	
1 1/2 H2 3	4( )W	1 1/2	1 1/2	3 1/2	6 3/8	5 7/8	6	6	6	6	19 1/16	25 1/2	25	105	108	110	113
2 J2 4	4( )W	2	2	4 1/2	8 7/16	6 1/2	7	7	7	7	13 3/4	30 3/8	28 7/16	135	132	144	141
2 1/2 K2 6	4( )W	2 1/2	2 1/2	5 1/4	8 15/16	8 1/16	7	7	7 7/8	7 7/8	1 15/16	34 5/16	33 7/16	230	230	249	249
3 L2 6	4( )W	3	3	6	9 11/16	8 3/4	7 1/2	7 1/2	8 1/4	8 1/4	2 1/16	39 15/16	39	340	360	359	359
3 M2 6	4( )W	3	3	6	9 11/16	8 3/4	7 1/2	7 1/2	8 1/4	8 1/4	2 1/16	40 1/16	39 1/8	400	400	419	419
4 P2 6	4( )W	4	4	6 7/8	9 3/8	9 1/8	—	—	10	10	2 5/16	45 13/16	45 9/16	—	—	575	606
6 Q2 8	4( )W	6	6	9	11 1/2	12	—	—	11	11 1/2	2 1 1/16	61 1/8	61 5/8	—	—	850	927
6 R 8	4( )W	6	6	9	11 1/2	11 9/16	—	—	11	11 1/2	—	61 7/16	61 1/2	—	—	902	958
6 R 10	4( )W	6	6	10	12	13	—	—	11 1/2	11 1/2	—	62 3/4	63 3/4	—	—	1065	1126
6 RR 10	4( )W	6	6	9	12	12	—	—	12	12	—	63	63	—	—	1179	1234
<b>Class 900</b> - ANSI raised face flange or welded CL 900 inlet																	
1 1/2 H2 3	5( )W	1 1/2	1 1/2	3 1/2	6 3/8	5 7/8	6	6	6	6	1 15/16	25 1/2	25	105	114	110	119
1 1/2 H2 4	7( )W	1 1/2	1 1/2	4 1/2	8	7 3/4	—	—	6 1/4	6 15/4	2	28 1/8	27 7/8	—	—	140	146
2 J2 4	5( )W	2	2	4 1/2	8 7/16	6 1/2	7	7	7	7	2 1/4	30 3/8	28 7/16	135	146	144	155
2 J2 6	7( )W	2	2	5 1/4	11	8 1/4	—	—	8 1/2	8 1/2	2 1/4	36 1/4	33 1/2	—	—	220	223
2 1/2 K2 6	5( )W	2 1/2	2 1/2	5 1/4	8 15/16	8 1/16	7	7	7 7/8	7 7/8	2 7/16	34 5/16	33 7/16	230	250	249	269
2 1/2 K2 6	7( )W	2 1/2	2 1/2	7	12	9 1/4	—	—	8 1/2	8 1/2	2 9/16	42 5/16	39 9/16	—	—	420	403
3 L2 6	5( )W	3	3	6	9 11/16	8 3/4	7 1/2	7 1/2	8 1/4	8 1/4	2 5/16	39 15/16	39	340	350	359	369
3 L2 6	7( )W	3	3	8	12	9 3/8	—	—	10	10	2 5/16	48 1/4	45 5/8	—	—	570	522
3 M2 6	5( )W	3	3	6	9 11/16	8 3/4	7 1/2	7 1/2	8 1/4	8 1/4	2 5/16	40 1/16	39 1/8	400	410	419	429
3 M2 6	7( )W	3	3	8	12	9 3/8	—	—	10	10	2 5/16	48 1/4	45 5/8	—	—	570	522
4 P2 6	5( )W	4	4	6 7/8	9 3/8	9 1/8	—	—	10	10	2 9/16	45 13/16	45 9/16	—	—	575	617
4 P2 8	7( )W	4	4	9	13 1/4	13 3/4	—	—	13	13	—	65	65 1/2	—	—	1100	1080
6 Q2 8	5( )W	6	6	9	11 1/2	12	—	—	11	11 1/2	3	61 1/8	61 5/8	—	—	850	931
6 R 8	5( )W	6	6	9	11 1/2	11 9/16	—	—	11	11 1/2	—	61 7/16	61 1/2	—	—	902	975
6 R 10	5( )W	6	6	10	12	13	—	—	11 1/2	11 1/2	—	62 3/4	63 3/4	—	—	1065	1149
6 RR 10	5( )W	6	6	9	12	12	—	—	12	12	—	63	63	—	—	1179	1260

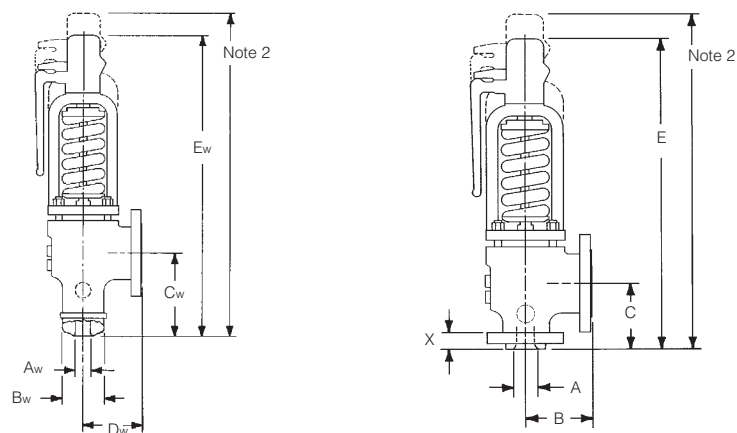
**Style HCI ISOFLEX® Dimensions and Weights**

USCS (United States Customary System) Units																	
Valve Size Inlet x Orifice x Outlet	HCI Valve Style <sup>1</sup>	General Dimensions - Inches												Approximate Weight (lbs)			
		Inlet ID		Inlet Neck OD <sup>3</sup> (Welded)	Center-to-Face				Used to Find Bolt Length (Flanged) <sup>4</sup>	Approx. Height <sup>2</sup>		Class 150 Outlet		Class 300 Outlet			
					Inlet		Outlet										
		Aw	A	Bw	Cw	C	Dw	D	Dw	D	X	Ew	E	Welded	Flanged	Welded	Flanged
<b>Class 1500</b> - ANSI raised face flange or welded CL 1500 inlet																	
1 1/2 H2 3	6( )W	1 1/2	1 1/2	3 1/2	6 3/8	5 7/8	6	6	6	6	1 15/16	25 1/2	25	105	114	110	119
1 1/2 H2 4	8( )W	1 1/2	1 1/2	4 1/2	8	7 3/4	—	—	6 1/4	6 1/4	2	28 1/8	27 7/8	—	—	140	146
2 J2 4	6( )W	2	2	4 1/2	8 7/16	6 1/2	7	7	7	7	2 1/4	30 3/8	28 7/16	135	146	144	155
2 J2 6	8( )W	2	2	5 1/4	11	8 1/4	—	—	8 1/2	8 1/2	2 1/4	36 1/4	33 1/2	—	—	220	223
2 1/2 K2 6	6( )W	2 1/2	2 1/2	5 1/4	8 15/16	8 1/16	7	7	7 7/8	7 7/8	2 7/16	34 5/16	33 7/16	230	250	249	269
2 1/2 K2 8	8( )W	2 1/2	2 1/2	7	12	9 1/4	—	—	8 1/2	8 1/2	2 9/16	42 5/16	39 9/16	—	—	420	403
3 L2 6	6( )W	3	3	6	9 11/16	8 3/4	7 1/2	7 1/2	8 1/4	8 1/4	2 11/16	39 15/16	39	340	366	359	385
3 L2 6	8( )W	3	3	8	12	9 3/8	—	—	10	10	2 11/16	48 1/2	45 5/8	—	—	570	534
3 M2 6	6( )W	3	3	6	9 11/16	8 3/4	7 1/2	7 1/2	8 1/4	8 1/4	2 11/16	40 1/16	39 1/8	400	426	419	445
3 M2 6	8( )W	3	3	8	12	9 3/8	—	—	10	10	2 11/16	48 1/4	45 5/8	—	—	570	534
4 P2 6	6( )W	4	4	6 7/8	9 3/8	9 1/8	—	—	10	10	2 15/16	45 13/16	45 9/16	—	—	575	632
4 P2 8	8( )W	4	4	9	13 1/4	13 3/4	—	—	13	13	—	65	65 1/2	—	—	1100	1100
6 Q2 8	6( )W	6	6	9	11 1/2	12	—	—	11	11 1/2	4 1/16	61 1/8	61 5/8	—	—	850	978
6 R 8	6( )W	6	6	9	11 1/2	11 9/16	—	—	11	11 1/2	—	61 7/16	61 1/2	—	—	902	1044
6 R 10	6( )W	6	6	10	12	13	—	—	11 1/2	11 1/2	—	62 3/4	63 3/4	—	—	1065	1189
<b>Class 2500</b> - ANSI raised face flange or welded CL 2500 inlet																	
1 1/2 H2 4	9( )W	1 1/2	1 1/2	4 1/2	8	7 3/4	—	—	6 1/4	6 1/4	2 13/16	28 1/8	27 7/8	—	—	140	162
2 J2 6	9( )W	2	2	5 1/4	11	8 1/4	—	—	8 1/2	8 1/2	2 13/16	36 1/4	33 1/2	—	—	220	233
2 1/2 K2 6	9( )W	2 1/2	2 1/2	7	12	9 1/4	—	—	8 1/2	8 1/2	3 1/16	42 5/16	39 9/16	—	—	420	420
3 L2 6	9( )W	3	3	8	12	9 3/8	—	—	10	10	3 7/16	48 1/4	45 5/8	—	—	570	572
3 M2 6	9( )W	3	3	8	12	9 3/8	—	—	10	10	3 7/16	48 1/4	45 5/8	—	—	570	572
4 P2 8	9( )W	4	4	9	13 1/4	14 1/2	—	—	13	13	—	65	66 1/4	—	—	1100	1160

**Notes:**

1. These style designations are for standard welded inlets. For optional flanged inlet valves, the "W" is dropped from the style designation.
2. Dismantling Height: An additional 20 inches is required.
3. Weld prep per customer's specifications. Safety valves must be mounted on a nozzle with an inlet diameter equal to or greater than the nominal valve inlet size, Dimension A. See ASME Boiler and Pressure Code Section I and ANSI/ASME B31.1 for recommended installation.
4. Bolt holes straddle centerline on flanged connections.

Drain: 1/2" NPT for inlet sizes 1 1/2" to 4" and 3/4" NPT for 6" inlet size.



**Specifications\* Style HCI ISOFLEX®**

Metric Units										
Valve Size Inlet x Orifice x Outlet	Orifice Area [sq. mm]	Maximum Set Pressure (barg) and Temperature <sup>2</sup> for Standard Body Material Listed							Standard Flanged Outlet Class	Optional Flanged Outlet Class
		Flanged Inlet			Welded Inlet					
		SA216 Gr. WCC	SA217 Gr. WC6	SA216 Gr. WCC	SA217 Gr. WC6	SA217 Gr. C12A	SA217 Gr. WC9	SA217 Gr. C12A		
		399°C	566°C	399°C	566°C		593°C			
<b>Class 300</b> - ANSI raised face flange or welded CL 300 inlet										
		HCI-36	HCI-38	HCI-36W	HCI-38W					
1½ H2 3	641.3	45.9	45.9	45.9	45.9	—	—	—	3" CI 150	3" CI 300
2 J2 4	923.2	45.9	45.9	45.9	45.9	—	—	—	4" CI 150	4" CI 300
2½ K2 6	1641.9	45.9	45.9	45.9	45.9	—	—	—	6" CI 150	6" CI 300
3 L2 6	2155.5	45.9	45.9	45.9	45.9	—	—	—	6" CI 150	6" CI 300
3 M2 6	2565.2	45.9	45.9	45.9	45.9	—	—	—	6" CI 150	6" CI 300
4 P2 6	4561.3	45.9	45.9	45.9	45.9	—	—	—	6" CI 300	—
6 Q2 8	7903.2	45.9	45.9	45.9	45.9	—	—	—	8" CI 300	—
6 R 8	10322.6	45.9	45.9	45.9	45.9	—	—	—	8" CI 300	—
6 RR 10	12445.1	45.9	45.9	45.9	45.9	—	—	—	10" CI 300	—
<b>Class 600</b> - ANSI raised face flange or welded CL 600 inlet										
		HCI-46	HCI-48	HCI-46W	HCI-48W					
1½ H2 3	641.3	86.2	86.2	86.2	86.2	—	—	—	3" CI 150	3" CI 300
2 J2 4	923.2	86.2	86.2	86.2	86.2	—	—	—	4" CI 150	4" CI 300
2½ K2 6	1641.9	86.2	86.2	86.2	86.2	—	—	—	6" CI 150	6" CI 300
3½ 6	2155.5	86.2	86.2	86.2	86.2	—	—	—	6" CI 150	6" CI 300
3 M2 6	2565.2	86.2	86.2	86.2	86.2	—	—	—	6" CI 150	6" CI 300
4 P2 6	4561.3	86.2	86.2	86.2	86.2	—	—	—	6" CI 300	—
6 Q2 8	7903.2	86.2	86.2	86.2	86.2	—	—	—	8" CI 300	—
6 R 8	10322.6	51.7	51.7	51.7	51.7	—	—	—	8" CI 300	—
6 R 10	10322.6	62.1	62.1	62.1	62.1	—	—	—	10" CI 300	—
6 RR 10	12445.1	62.1	62.1	62.1	62.1	—	—	—	10" CI 300	—
<b>Class 900</b> - ANSI raised face flange or welded CL 900 inlet										
		HCI-56	HCI-58	HCI-56W	HCI-58W	HCI-58W -C12A	HCI-59	HCI-59W -C12A		
1½ H2 3	641.3	103.4	103.4	103.4	103.4	—	—	—	3" CI 150	3" CI 300
2 J2 4	923.2	103.4	103.4	103.4	103.4	—	—	—	4" CI 150	4" CI 300
2½ K2 6	1641.9	103.4	103.4	103.4	103.4	—	—	—	6" CI 150	6" CI 300
3 L2 6	2155.5	103.4	103.4	103.4	103.4	—	—	—	6" CI 150	6" CI 300
3 M2 6	2565.2	103.4	103.4	103.4	103.4	—	—	—	6" CI 150	6" CI 300
4 P2 6	4561.3	103.4	103.4	103.4	103.4	—	—	—	6" CI 300	—
6 Q2 8	7903.2	103.4	103.4	103.4	103.4	—	—	—	8" CI 300	—
6 R 8	10322.6	51.7	51.7	51.7	51.7	—	—	—	8" CI 300	—
6 R 10	10322.6	62.1	62.1	62.1	62.1	—	—	—	10" CI 300	—
6 RR 10	12445.1	62.1	62.1	62.1	62.1 <sup>1</sup>	51.7 <sup>1</sup>	51.7 <sup>1</sup>	39.6 <sup>1</sup>	10" CI 300	—
		HCI-76	HCI-78	HCI-76W	HCI-78W	HCI-78W -C12A	HCI-79W	HCI-79W -C12A		
1½ H2 4	641.3	123.8	123.8	123.8	123.8	123.8	74.5	74.5	4" CI 300	—
2 J2 6	923.2	123.8	123.8	123.8	123.8	123.8	74.5	74.5	6" CI 300	—
2½ K2 6	1641.9	123.8	123.8	123.8	123.8	123.8	74.5	74.5	6" CI 300	—
3 L2 6	2155.5	123.8	123.8	123.8	123.8	123.8	74.5	74.5	6" CI 300	—
3 M2 6	2565.2	123.8	123.8	123.8	123.8	123.8	74.5	74.5	6" CI 300	—
4 P2 8	4561.3	123.8	123.8	123.8	123.8	123.8	74.5	74.5	8" CI 300	—

\* Select appropriate class to meet pressure/temperature requirements for each application. Refer to pages 42-45 for Pressure/Temperature limits for Standard Class valves per ASME/ANSI B16.34.

**Specifications\* Style HCI ISOFLEX®**

Metric Units										
Valve Size Inlet x Orifice x Outlet	Orifice Area [sq. mm]	Maximum Set Pressure (barg) and Temperature <sup>2</sup> for Standard Body Material Listed							Standard Flanged Outlet Class	Optional Flanged Outlet Class
		Flanged Inlet			Welded Inlet					
		SA216 Gr. WCC	SA217 Gr. WC6	SA216 Gr. WCC	SA217 Gr. WC6	SA217 Gr. C12A	SA217 Gr. WC9	SA217 Gr. C12A		
		399°C	566°C	399°C	566°C		593°C			
<b>Class 1500</b> - ANSI raised face flange or welded CL 1500 inlet										
		HCI-66	HCI-68	HCI-66W	HCI-68W	HCI-6W -C12A	HCI-69W	HCI-69W -C12A		
1 1/2 H2 3	641.3	103.4	103.4	103.4	103.4	—	—	—	3" CI 150	3" CI 300
2 J2 4	923.2	103.4	103.4	103.4	103.4	—	—	—	4" CI 150	4" CI 300
2 1/2 K2 6	1641.9	103.4	103.4	103.4	103.4	—	—	—	6" CI 150	6" CI 300
3 L2 6	2155.5	103.4	103.4	103.4	103.4	—	—	—	6" CI 150	6" CI 300
3 M2 6	2565.2	103.4	103.4	103.4	103.4	—	—	—	6" CI 150	6" CI 300
4 P2 6	4561.3	103.4	103.4	103.4	103.4 <sup>1</sup>	65.5 <sup>1</sup>	65.5 <sup>1</sup>	51.7 <sup>1</sup>	6" CI 300	—
6 Q2 8	7903.2	103.4	103.4	103.4	103.4 <sup>1</sup>	86.2 <sup>1</sup>	89.6 <sup>1</sup>	65.5 <sup>1</sup>	8" CI 300	—
6 R 8	10322.6	51.7	51.7	51.7	51.7 <sup>1</sup>	51.7 <sup>1</sup>	51.7 <sup>1</sup>	44.8 <sup>1</sup>	8" CI 300	—
6 R 10	10322.6	82.7	82.7	82.7	82.7 <sup>1</sup>	82.7 <sup>1</sup>	82.7 <sup>1</sup>	68.9 <sup>1</sup>	10" CI 300	—
		HCI-86	HCI-88	HCI-86W	HCI-88W	HCI-88W -C12A	HCI-89W	HCI-89W -C12A		
1 1/2 H2 4	641.3	137.9 <sup>3</sup>	137.9	137.9 <sup>3</sup>	197.5	197.5	124.1	124.1	4" CI 300	—
2 J2 6	923.2	137.9 <sup>3</sup>	197.5	137.9 <sup>3</sup>	197.5	197.5	124.1	124.1	6" CI 300	—
2 1/2 K2 6	1641.9	137.9 <sup>3</sup>	197.5	137.9 <sup>3</sup>	197.5	197.5	124.1	124.1	6" CI 300	—
3 L2 6	2155.5	137.9 <sup>3</sup>	137.9	137.9 <sup>3</sup>	197.5	197.5	124.1	124.1	6" CI 300	—
3 M2 6	2565.2	137.9 <sup>3</sup>	124.1	137.9 <sup>3</sup>	197.5	197.5	124.1	124.1	6" CI 300	—
4 P2 8	4561.3	137.9 <sup>3</sup>	137.9	137.9 <sup>3</sup>	197.5	197.5	124.1	124.1	8" CI 300	—
<b>Class 2500</b> - ANSI raised face flange or welded CL 2500 inlet										
		HCI-96	HCI-98	HCI-96W	HCI-98W	HCI-98W -C12A	HCI-99W	HCI-99W -C12A		
1 1/2 H2 4	641.3	137.9 <sup>3</sup>	137.9	137.9 <sup>3</sup>	206.8 <sup>1</sup>	172.4 <sup>1</sup>	172.4 <sup>1</sup>	137.9 <sup>1</sup>	4" CI 300	—
2 J2 6	923.2	137.9 <sup>3</sup>	206.8	137.9 <sup>3</sup>	206.8 <sup>1</sup>	189.6 <sup>1</sup>	199.9 <sup>1</sup>	144.8 <sup>1</sup>	6" CI 300	—
2 1/2 K2 6	1641.9	137.9 <sup>3</sup>	206.8	137.9 <sup>3</sup>	206.8 <sup>1</sup>	206.8 <sup>1</sup>	206.8 <sup>1</sup>	189.6 <sup>1</sup>	6" CI 300	—
3 L2 6	2155.5	137.9 <sup>3</sup>	206.8	137.9 <sup>3</sup>	206.8 <sup>1</sup>	206.8 <sup>1</sup>	206.8 <sup>1</sup>	206.8 <sup>1</sup>	6" CI 300	—
3 M2 6	2565.2	137.9 <sup>3</sup>	193.1	137.9 <sup>3</sup>	206.8 <sup>1</sup>	206.8 <sup>1</sup>	206.8 <sup>1</sup>	172.4 <sup>1</sup>	6" CI 300	—
4 P2 8	4561.3	137.9 <sup>3</sup>	206.8	137.9 <sup>3</sup>	206.8 <sup>1</sup>	199.9 <sup>1</sup>	137.9 <sup>1</sup>	137.9 <sup>1</sup>	8" CI 300	—

\* Select appropriate class to meet pressure/temperature requirements for each application. Refer to pages 42-45 for Pressure/Temperature limits for Standard Class valves per ASME/ANSI B16.34.

**Notes:**

1. For applications exceeding ASME/ANSI B16.34 pressure/temperature limits - Specified HCI-[ ]W (welded only) have been designed to maximum set pressure at maximum temperature stated in the table.
2. Set pressure is limited to either the inlet pressure limit per ASME/ANSI B16.34 (pages 42-45) or the maximum set pressure, whichever is lower.
3. Style HE ISOFLEX® Safety Valves (pages 3-6) are recommended for high pressure drum saturated steam service between 138-207 barg.

**Style HCI ISOFLEX® Dimensions and Weights**

Metric Units																	
Valve Size Inlet x Orifice x Outlet	HCI Valve Style <sup>1</sup>	General Dimensions - mm												Approximate Weight (kg)			
		Inlet ID		Inlet Neck OD <sup>3</sup> (Welded)	Center-to-Face				Used to Find Bolt Length (Flanged) <sup>4</sup>	Approx. Height <sup>2</sup>		Class 150		Class 300			
					Inlet		Outlet					Outlet		Outlet			
		Aw	A	Bw	Cw	C	Dw	D	Dw	D	X	Ew	E	Welded	Flanged	Welded	Flanged
<b>Class 300</b> - ANSI raised face flange or welded CL 300 inlet																	
1 1/2 H2 3	3( )W	38.1	38.1	88.9	161.9	149.2	152.4	152.4	152.4	152.4	39.7	647.7	635.0	48	49	50	51
2 J2 4	3( )W	50.8	50.8	114.3	214.3	165.1	177.8	177.8	177.8	177.8	44.5	771.5	722.3	61	60	65	64
2 1/2 K2 6	3( )W	63.5	63.5	133.4	227.0	204.8	177.8	177.8	200.0	200.0	49.2	871.5	849.3	104	104	113	113
3 L2 6	3( )W	76.2	76.2	152.4	246.1	222.3	190.5	190.5	209.6	209.6	52.4	1014.4	990.6	154	163	163	163
3 M2 6	3( )W	76.2	76.2	152.4	246.1	222.3	190.5	190.5	209.6	209.6	52.4	1017.6	993.8	181	181	190	190
4 P2 6	3( )W	101.6	101.6	174.6	238.1	231.8	—	—	254.0	254.0	52.4	1163.6	1157.3	—	—	261	280
6 Q2 8	3( )W	152.4	152.4	228.6	292.1	304.8	—	—	279.4	292.1	57.2	1552.6	1565.3	—	—	386	411
6 R 8	3( )W	152.4	152.4	228.6	292.1	292.1	—	—	279.4	292.1	—	1560.5	1560.5	—	—	409	425
6 RR 10	3( )W	152.4	152.4	228.6	304.8	304.8	—	—	304.8	304.8	—	1600.2	1600.2	—	—	535	551
<b>Class 600</b> - ANSI raised face flange or welded CL 600 inlet																	
1 1/2 H2 3	4( )W	38.1	38.1	88.9	161.9	149.2	152.4	152.4	152.4	152.4	39.7	647.7	635.0	48	49	50	51
2 J2 4	4( )W	50.8	50.8	114.3	214.3	165.1	177.8	177.8	177.8	177.8	44.5	771.5	722.3	61	60	65	64
2 1/2 K2 6	4( )W	63.5	63.5	133.4	227.0	204.8	177.8	177.8	200.0	200.0	49.2	871.5	849.3	104	104	113	113
3 L2 6	4( )W	76.2	76.2	152.4	246.1	222.3	190.5	190.5	209.6	209.6	52.4	1014.4	990.6	154	163	163	163
3 M2 6	4( )W	76.2	76.2	152.4	246.1	222.3	190.5	190.5	209.6	209.6	52.4	1017.6	993.8	181	181	190	190
4 P2 6	4( )W	101.6	101.6	174.6	238.1	231.8	—	—	254.0	254.0	58.7	1163.6	1157.3	—	—	261	275
6 Q2 8	4( )W	152.4	152.4	228.6	292.1	304.8	—	—	279.4	292.1	68.3	1552.6	1565.3	—	—	386	421
6 R 8	4( )W	152.4	152.4	228.6	292.1	293.7	—	—	279.4	292.1	—	1560.5	1562.1	—	—	409	435
6 R 10	4( )W	152.4	152.4	254.0	304.8	330.2	—	—	292.1	292.1	—	1593.9	1619.3	—	—	483	511
6 RR 10	4( )W	152.4	152.4	228.6	304.8	304.8	—	—	304.8	304.8	—	1600.2	1600.2	—	—	535	560
<b>Class 900</b> - ANSI raised face flange or welded CL 900 inlet																	
1 1/2 H2 3	5( )W	38.1	38.1	88.9	161.9	149.2	152.4	152.4	152.4	152.4	49.2	647.7	635.0	48	52	50	54
1 1/2 H2 4	7( )W	38.1	38.1	114.3	203.2	196.9	—	—	158.8	158.8	50.8	714.4	708.0	—	—	64	66
2 J2 4	5( )W	50.8	50.8	114.3	214.3	165.1	177.8	177.8	177.8	177.8	57.2	771.5	722.3	61	66	65	70
2 J2 6	7( )W	50.8	50.8	133.4	279.4	209.6	—	—	215.9	215.9	57.2	920.8	850.9	—	—	100	101
2 1/2 K2 6	5( )W	63.5	63.5	133.4	227.0	204.8	177.8	177.8	200.0	200.0	61.9	871.5	849.3	104	113	113	122
2 1/2 K2 6	7( )W	63.5	63.5	177.8	304.8	204.8	—	—	215.9	215.9	65.1	1074.7	1004.9	—	—	191	183
3 L2 6	5( )W	76.2	76.2	152.4	246.1	222.3	190.5	190.5	209.6	209.6	58.7	1014.4	990.6	154	159	163	167
3 L2 6	7( )W	76.2	76.2	203.2	304.8	238.1	—	—	254.0	254.0	58.7	1231.9	1158.9	—	—	259	237
3 M2 6	5( )W	76.2	76.2	152.4	246.1	222.3	190.5	190.5	209.6	209.6	74.6	1017.6	993.8	181	186	190	195
3 M2 6	7( )W	76.2	76.2	203.2	304.8	238.1	—	—	254.0	254.0	58.7	1231.9	1158.9	—	—	259	237
4 P2 6	5( )W	101.6	101.6	174.6	238.1	231.8	—	—	254.0	254.0	65.1	1163.6	1157.3	—	—	261	280
4 P2 8	7( )W	101.6	101.6	228.6	336.6	349.3	—	—	330.2	330.2	—	1651.0	1663.7	—	—	499	490
6 Q2 8	5( )W	152.4	152.4	228.6	292.1	304.8	—	—	279.4	292.1	76.2	—	1565.3	—	—	386	422
6 R 8	5( )W	152.4	152.4	228.6	292.1	293.7	—	—	279.4	292.1	—	1560.5	1562.1	—	—	409	442
6 R 10	5( )W	152.4	152.4	254.0	304.8	330.2	—	—	292.1	292.1	—	1593.9	1619.3	—	—	483	521
6 RR 10	5( )W	152.4	152.4	228.6	304.8	304.8	—	—	304.8	304.8	—	1600.2	1600.2	—	—	535	572



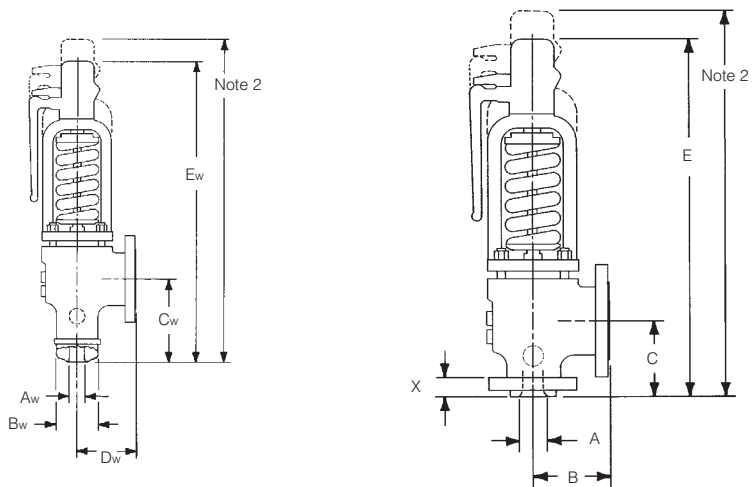
**Style HCI ISOFLEX® Dimensions and Weights**

Metric Units																	
Valve Size Inlet x Orifice x Outlet	HCI Valve Style <sup>1</sup>	General Dimensions - mm											Approximate Weight (kg)				
		Inlet ID		Inlet Neck OD <sup>3</sup> (Welded)	Center-to-Face				Used to Find Bolt Length (Flanged) <sup>4</sup>	Approx. Height <sup>2</sup>		Class 150 Outlet		Class 300 Outlet			
					Inlet		Outlet										
		Aw	A	Bw	Cw	C	Dw	D	Dw	D	X	Ew	E	Welded	Flanged	Welded	Flanged
<b>Class 1500</b> - ANSI raised face flange or welded CL 1500 inlet																	
1 1/2 H2 3	6( ) JW	38.1	38.1	88.9	161.9	149.2	152.4	152.4	152.4	152.4	49.2	647.7	635.0	48	52	50	54
1 1/2 H2 4	8( ) JW	38.1	38.1	114.3	203.2	196.9	—	—	158.8	158.8	50.8	714.4	708.0	—	—	64	66
2 J2 4	6( ) JW	50.8	50.8	114.3	214.3	165.1	177.8	177.8	177.8	177.8	57.2	771.5	722.3	61	66	65	70
2 J2 6	8( ) JW	50.8	50.8	133.4	279.4	209.6	—	—	215.9	215.9	57.2	920.8	850.9	—	—	100	101
2 1/2 K2 6	6( ) JW	63.5	63.5	133.4	227.0	204.8	177.8	177.8	200.0	200.0	61.9	871.5	849.3	104	113	113	122
2 1/2 K2 6	8( ) JW	63.5	63.5	177.8	304.8	204.8	—	—	215.9	215.9	65.1	1074.7	1004.9	—	—	191	183
3 L2 6	6( ) JW	76.2	76.2	152.4	246.1	222.3	190.5	190.5	209.6	209.6	68.3	1014.4	990.6	154	166	163	175
3 L2 6	8( ) JW	76.2	76.2	203.2	304.8	238.1	—	—	254.0	254.0	68.3	1231.9	1158.9	—	—	259	242
3 M2 6	6( ) JW	76.2	76.2	152.4	246.1	222.3	190.5	190.5	209.6	209.6	68.3	1017.6	993.8	181	193	190	202
3 M2 6	8( ) JW	76.2	76.2	203.2	304.8	238.1	—	—	254.0	254.0	68.3	1225.6	1158.9	—	—	259	242
4 P2 6	6( ) JW	101.6	101.6	174.6	238.1	231.8	—	—	254.0	254.0	74.6	1163.6	1157.3	—	—	261	287
4 P2 8	8( ) JW	101.6	101.6	228.6	336.6	349.3	—	—	330.2	330.2	—	1651.0	1663.7	—	—	499	499
6 Q2 8	6( ) JW	152.4	152.4	228.6	292.1	304.8	—	—	279.4	292.1	103.2	1552.6	1565.3	—	—	386	444
6 R 8	6( ) JW	152.4	152.4	228.6	292.1	293.7	—	—	279.4	292.1	—	1560.5	1562.1	—	—	409	474
6 R 10	6( ) JW	152.4	152.4	254.0	304.8	330.2	—	—	292.1	292.1	—	1593.9	1619.3	—	—	483	539
<b>Class 2500</b> - ANSI raised face flange or welded CL 2500 inlet																	
1 1/2 H2 4	9( ) JW	38.1	38.1	114.3	203.2	196.9	—	—	158.8	158.8	71.4	714.4	708.0	—	—	64	74
2 J2 6	9( ) JW	50.8	50.8	133.4	279.4	209.6	—	—	215.9	215.9	71.4	920.8	850.9	—	—	100	101
2 1/2 K2 6	9( ) JW	63.5	63.5	177.8	304.8	235.0	—	—	215.9	215.9	77.8	1074.7	1004.9	—	—	191	191
3 L2 6	9( ) JW	76.2	76.2	203.2	304.8	238.1	—	—	254.0	254.0	87.3	1231.9	1158.9	—	—	259	260
3 M2 6	9( ) JW	76.2	76.2	203.2	304.8	238.1	—	—	254.0	254.0	87.3	1231.9	1158.9	—	—	259	260
4 P2 8	9( ) JW	101.6	101.6	228.6	336.6	368.3	—	—	330.2	330.2	—	1651.0	1682.8	—	—	499	526

**Notes:**

1. These style designations are for standard welded inlets. For optional flanged inlet valves, the "W" is dropped from the style designation
2. Dismantling Height: An additional 508 mm is required.
3. Weld prep per customer's specifications. Safety valves must be mounted on a nozzle with an inlet diameter equal to or greater than the nominal valve inlet size, Dimension A. See ASME Boiler and Pressure Code Section I and ANSI/ASME B31.1 for recommended installation.
4. Bolt holes straddle centerline on flanged connections.

Drain: 1/2" NPT for inlet sizes 1 1/2" to 4" and 3/4" NPT for 6" inlet size.



**Style HCI-R ISOFLEX®**

**Restricted Lift Feature**

Crosby offers an optional restricted lift feature with its HCI ISOFLEX® Safety Valves (HCI-R). The restricted lift option is available on all HCI ISOFLEX® valve sizes, with either flanged or weld end connections.

The capacities for Style HCI-R Safety Valves with the restricted lift option adjust from 100% to 30% of full rated capacity. Restricted capacity = (% of restricted lift) x (ASME rated capacity).

- Eliminating over-capacity permits an economic distribution of relieving capacity between the drum and superheater valves, often resulting in a smaller superheater safety valve selection.
- Reduces reaction forces.
- Standardization of valve sizes allows boiler manufacturers to build standard boilers.
- Quality and performance assured via tamper-proof installation (prevents erroneous changes in capacity).

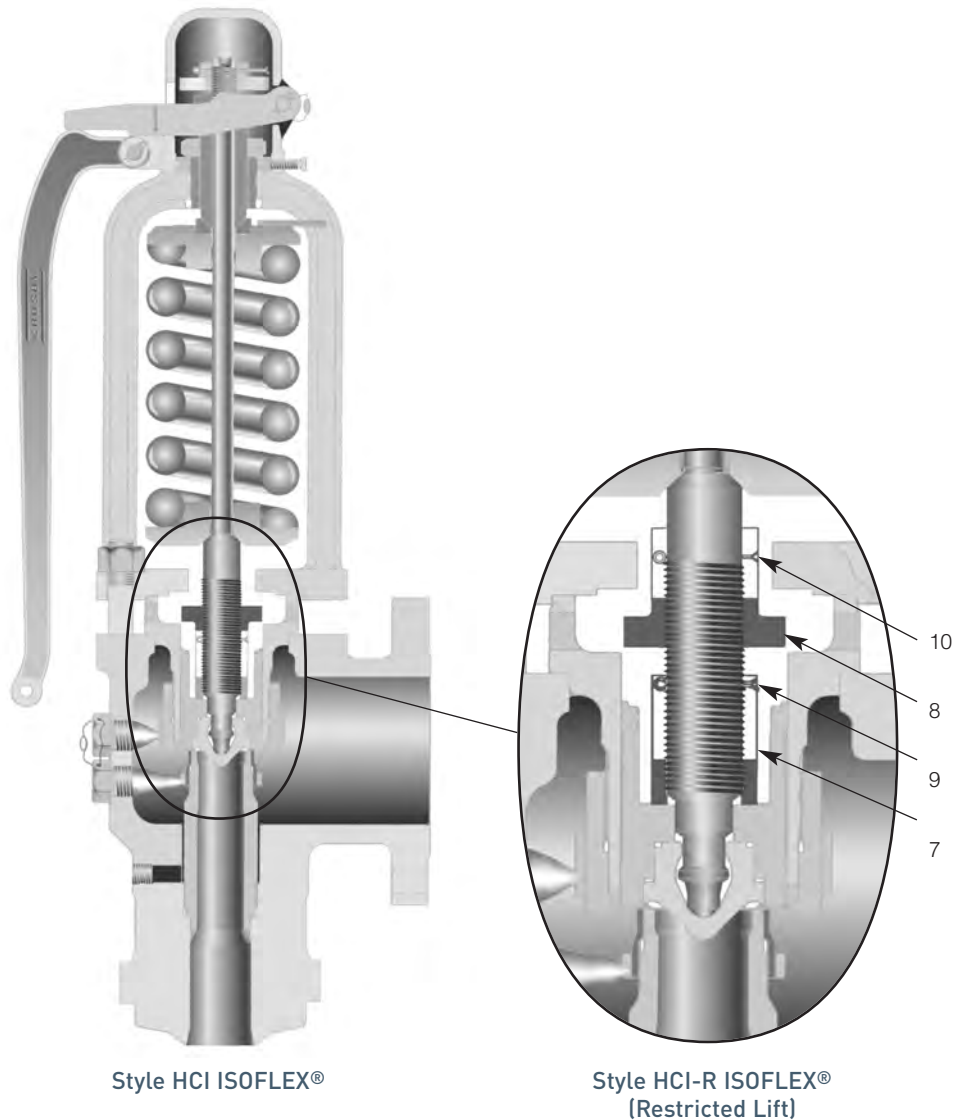
**Note:**

For information on installation and care, see Crosby's Instruction No. IS-V3143A, "Installation, Maintenance and Adjustment Instruction for Crosby Style HCI ISOFLEX® Safety Valves."

**HCI-R ISOFLEX®**

Part Ref. No.	Part Name	Material
7	Disc Holder Retainer	Stainless Steel
8	Lift Stop	Stainless Steel
9	Disc Holder Retainer Cotter	Stainless Steel
10	Lift Stop Cotter	Stainless Steel

Complete list of Parts and Materials on page 9.



## Crosby Style HSJ

### Pressure Management Solutions

#### Two Ring Control

- Precise operation in accordance with ASME Code Section I and Section VIII requirements.
- Ease of setting and adjustment in service.

#### Standard Body and Bonnet Design, Full Nozzle

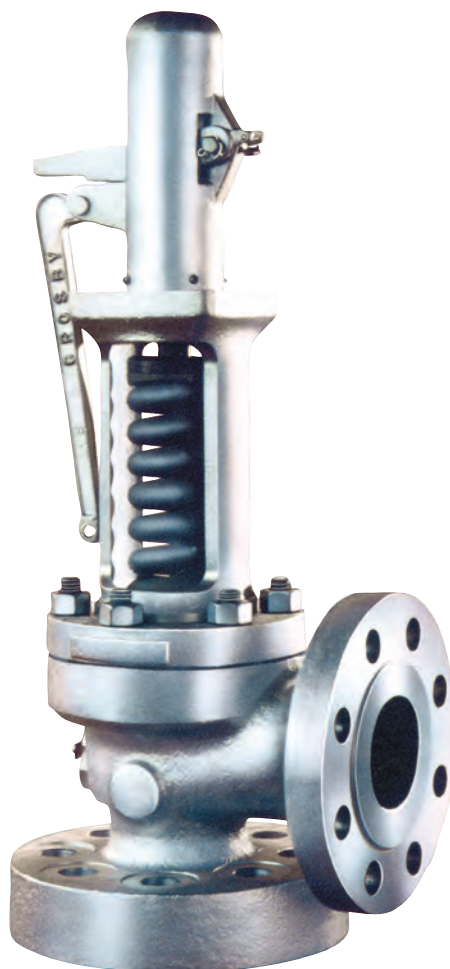
- Field proven design - refined through years of successful application.
- Low cost - economical to buy; economical to maintain.

#### Rugged Construction and High Performance

- Reliability.
- Long life.
- Low maintenance.
- Dependable overpressure protection.

#### Benefits

- Increases up-time with locally stocked valves and genuine spare parts.
- Reduces installation and operation costs through expanded size offerings.



## Style HSJ – Drum Service, Superheater Outlet, Reheaters

### Introduction

Crosby's Style HSJ is a full nozzle reaction type safety valve designed for saturated and superheated steam service. The valve combines the technical excellence of Crosby's field proven Styles HS and JOS designs and are in accordance with requirements of the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers, and Section VIII, Unfired Pressure Vessels. Discharge capacities are certified by the National Board of Boiler and Pressure Vessel Inspectors.

The Style HSJ safety valves are recommended for use on Boilers at design pressure from 15-600 psig [1-41 barg]. For Economizer, Dowtherm® and Section VIII applications, the HSJ Pressure Relief valves are designed for pressures to 2700 psig [186 barg] and temperatures to 1000°F [538°C]. This valve line is available in sizes 1 1/2 F 2 to 6 Q 8 with ANSI Cl 150, 300, 600, 900, 1500 and 2500 inlet flanges.

### High Performance

The adjustable nozzle ring (3) and guide ring (9) utilize the reactive and expansive forces of flowing steam to provide full lift. Valve capacity is governed by the nozzle throat area alone. With high capacity valves, positive overpressure protection is achieved with the fewest number of valves.

### Two-Ring Design

Precise blowdown control is provided by the adjustable two-ring design. Blowdown may be conveniently adjusted while the valve is installed in the system.

### Shut Tight - Stay Tight

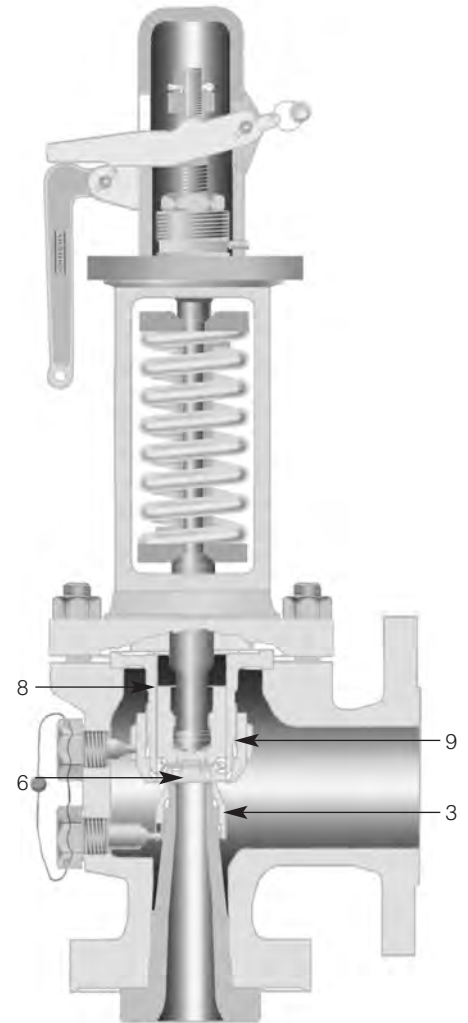
Style HSJ valves shut off tight. Years of application engineering have resulted in a FLEXI-DISC® (6) which is recessed for pressure and temperature equalization ensuring a flat, tight seal that is capable of containing system pressure at 94+% of the valve's set pressure.

### Precise Popping Point

Centering of the disc (6) through the low friction guide (8) ensures that Crosby's HSJ Safety Valves open precisely at set pressure, even after repeated cycling.

### Options

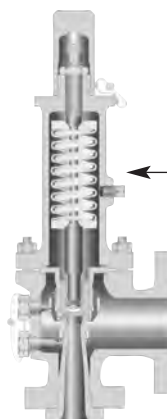
Closed and open bonnets are available for each valve size up to the maximum pressure rating (see pages 22-23). Closed bonnet valves, equipped with bonnet vents, are recommended for ASME Section VIII outdoor service. For ASME Code Section I, outdoor applications, select an open bonnet with weatherhood. *When ordering, specify open or closed bonnet.* Note: Bonnet vents are essential for proper valve operation and should not be plugged (except for Style HSJ-DOW shown below).



Style HSJ

### Dowtherm® Service

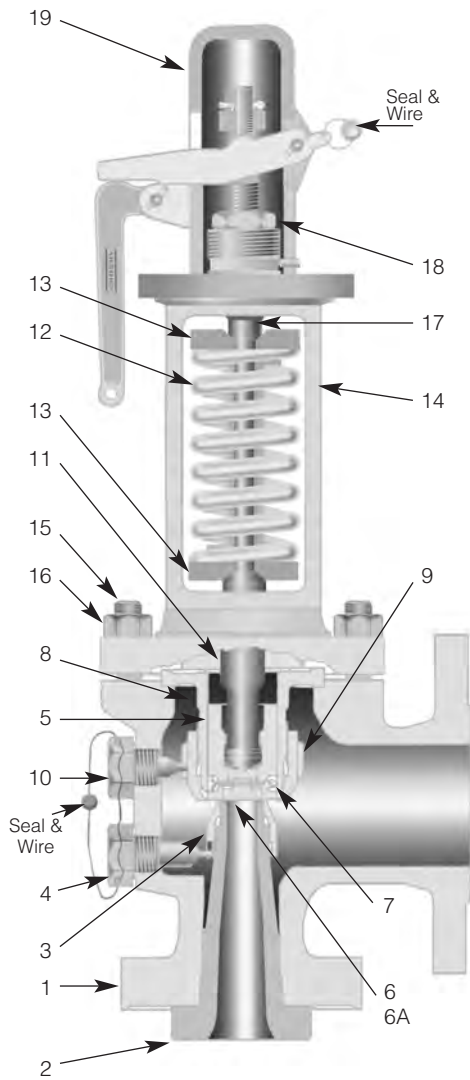
Demands upon a Dowtherm® vaporizer safety relief valve are severe. Temperatures are high and absolute seat tightness is required. For Dowtherm® service, specify safety relief valve Style HSJ-DOW. This valve is furnished with an unvented closed bonnet and Type A screwed cap. It also has an alloy steel spring for high operating temperatures. Style HSJ-DOW meets the requirements of the ASME Boiler and Pressure Vessel Code, Section I, Part PVG, "Requirements for Organic Fluid Vaporizer Generators." For organic fluid capacities, consult your sales representative.



Style HSJ-DOW

**Note:**  
Bonnet vent plugged  
only in HSJ-DOW

**Style HSJ Valve Materials**



Materials				
Part Ref. No.	Part Name	Material and Maximum Temperature		Spare Parts Designation <sup>1,2,3</sup>
		750°F [399°C]	1000°F [538°C]	
1	Body	Carbon Steel SA-216 Gr. WCB	Alloy Steel SA-217 Gr. WC6	
2	Nozzle	Stainless Steel	Stainless Steel	3
3	Nozzle Ring	Stainless Steel	Stainless Steel	3
4	Nozzle Ring Set Screw	Stainless Steel	Stainless Steel	
*5	Disc Holder	Nickel Alloy	Nickel Alloy	2
*6	Disc Insert	Stainless	Steel Stainless Steel	1
*6A	Disc	Stainless Steel	Stainless Steel	1
*7	Disc Insert Cotter	Stainless Steel	Stainless Steel	1
8	Guide	Nickel Alloy	Nickel Alloy	2
9	Guide Ring	Stainless Steel	Stainless Steel	3
10	Guide Ring Set Screw	Stainless Steel	Stainless Steel	
11	Spindle Assembly	Stainless Steel	Stainless Steel	2
12	Spring	Alloy Steel Corrosion Resistant Coating	Alloy Steel Corrosion Resistant Coating	
13	Spring Washers	Steel	Steel	
14	Bonnet	Carbon Steel SA-216 Gr. WCB	Alloy Steel SA-217 Gr. WC6	
15	Bonnet Stud	SA-193 Gr. B7	SA-193 Gr. B7	
16	Bonnet Stud Nut	SA-194 Gr. 2H	SA-194 Gr. 2H	
17	Adjusting Bolt	Stainless Steel	Stainless Steel	
18	Adjusting Bolt Nut	Steel	Steel	
19	Cap/Lever Assembly	Steel/Iron	Steel/Iron	

\* One piece disc (6A) replaces Part Reference Numbers 5, 6 and 7 in orifice sizes F, G, H and J (Class 150, 300, 600 only).

**Notes:**

1. Consumable Spare Parts: Valve parts which should be replaced as part of any disassembly, and discs and/or disc inserts which must be replaced if seats are damaged.
2. Repair Spare Parts: Valve parts exposed to wear and/or corrosion during normal operation. They are in the fluid flow path and may require replacement as part of any repair.
3. Insurance Spare Parts: Valve parts exposed to process or environmental wear and/or corrosion and may require replacement as part of a major repair.

**Crosby recommends that sufficient inventory of spare parts be maintained to support process requirements. Always be sure to use genuine Crosby parts to ensure continued product performance and warranty.**

For information on installation and care, Crosby's Instruction No. IS-V3146, "Installation, Maintenance and Adjustment Instruction for Crosby Style HSJ Safety Valves" is available on request.

**Specifications\* - Style HSJ**

**USCS (United States Customary System) Units**

Valve Size Inlet x Orifice x Outlet	Orifice Area		Maximum Set Pressure <sup>1</sup>		Style Designation		Standard Outlet Class
					Standard Body Material and Maximum Temperature <sup>2</sup> Flanged		
	sq. in.	[sq. mm]	psig	[barg]	SA216 Gr. WCB 750°F [399°C]	SA217 Gr. WC6 1000°F [538°C]	
<b>Class 150 - ANSI raised face flange CL 150 inlet</b>							
1 1/2 F 2	0.307	[198.1]	200	[13.8]	HSJ-16	—	CI 150
1 1/2 G 2 1/2	0.503	[324.5]	200	[13.8]	HSJ-16	—	CI 150
1 1/2 H 3	0.785	[506.5]	200	[13.8]	HSJ-16	—	CI 150
2 J 3	1.288	[831.0]	200	[13.8]	HSJ-16	—	CI 150
2 1/2 K 4	1.840	[1187.1]	200	[13.8]	HSJ-16	—	CI 150
3 K 4	1.840	[1187.1]	200	[13.8]	HSJ-16	—	CI 150
3 L 4	2.853	[1840.6]	200	[13.8]	HSJ-16	—	CI 150
3 M 6	3.600	[2322.6]	200	[13.8]	HSJ-16	—	CI 150
4 M 6	3.600	[2322.6]	200	[13.8]	HSJ-16	—	CI 150
4 N 6	4.341	[2800.6]	200	[13.8]	HSJ-16	—	CI 150
4 P 6	6.380	[4116.1]	200	[13.8]	HSJ-16	—	CI 150
6 Q 8	11.045	[7125.8]	165	[11.4]	HSJ-16	—	CI 150
<b>Class 300 - ANSI raised face flange CL 300 inlet</b>							
1 1/2 F 2	0.307	[198.1]	600	[41.4]	HSJ-46	HSJ-47	CI 150
1 1/2 G 2 1/2	0.503	[324.5]	600	[41.4]	HSJ-46	HSJ-47	CI 150
1 1/2 H 3	0.785	[506.5]	600	[41.4]	HSJ-36	HSJ-37	CI 150
2 J 3	1.288	[831.0]	285	[19.7]	HSJ-26	—	CI 150
2 J 4	1.288	[831.0]	600	[41.4]	HSJ-36	HSJ-37	CI 150
2 1/2 J 4	1.288	[831.0]	600	[41.4]	HSJ-36	HSJ-37	CI 150
2 1/2 K 4	1.840	[1187.1]	600	[41.4]	HSJ-36	HSJ-37	CI 150
3 K 4	1.840	[1187.1]	600	[41.4]	HSJ-36	HSJ-37	CI 150
3 L 4	2.853	[1840.6]	600	[41.4]	HSJ-36	HSJ-37	CI 150
3 M 6	3.600	[2322.6]	600	[41.4]	HSJ-36	HSJ-37	CI 150
4 M 6	3.600	[2322.6]	600	[41.4]	HSJ-36	HSJ-37	CI 150
4 N 6	4.341	[2800.6]	600	[41.4]	HSJ-36	HSJ-37	CI 150
4 P 6	6.380	[4116.1]	600	[41.4]	HSJ-36	HSJ-37	CI 150
6 Q 8	11.045	[7125.8]	300	[20.7]	HSJ-36	—	CI 150
6 Q 8	11.045	[7125.8]	165	[11.4]	—	HSJ-37	CI 150
<b>Class 600 - ANSI raised face flange CL 600 inlet</b>							
1 1/2 F 2	0.307	[198.1]	1095	[75.5]	HSJ-46	HSJ-47	CI 150
1 1/2 G 2 1/2	0.503	[324.5]	1095	[75.5]	HSJ-46	HSJ-47	CI 150
1 1/2 H 3	0.785	[506.5]	900	[62.1]	HSJ-46	HSJ-47	CI 150
2 H 3	0.785	[506.5]	900	[62.1]	HSJ-46	HSJ-47	CI 150
2 J 4	1.288	[831.0]	1095	[75.5]	HSJ-46	HSJ-47	CI 150
2 1/2 J 4	1.288	[831.0]	1095	[75.5]	HSJ-46	HSJ-47	CI 150
2 1/2 K 4	1.840	[1187.1]	1095	[75.5]	HSJ-46	HSJ-47	CI 150
3 K 4	1.840	[1187.1]	1095	[75.5]	HSJ-46	HSJ-47	CI 150
3 L 6	2.853	[1840.6]	900	[62.1]	HSJ-46	HSJ-47	CI 150
4 L 6	2.853	[1840.6]	900	[62.1]	HSJ-46	HSJ-47	CI 150
3 M 6	3.600	[2322.6]	900	[62.1]	HSJ-46	HSJ-47	CI 150
4 M 6	3.600	[2322.6]	900	[62.1]	HSJ-46	HSJ-47	CI 150
4 N 6	4.341	[2800.6]	900	[62.1]	HSJ-46	HSJ-47	CI 150
4 P 6	6.380	[4116.1]	900	[62.1]	HSJ-46	HSJ-47	CI 150
6 Q 8	11.045	[7125.8]	600	[41.4]	HSJ-46	HSJ-47	CI 150

\* Select appropriate class to meet pressure/temperature requirements for each application. Refer to pages 42-45 for Pressure/Temperature limits for Standard Class valves per ASME/ANSI B16.34.

**Specifications\* - Style HSJ**

USCS (United States Customary System) Units							
Valve Size Inlet x Orifice x Outlet	Orifice Area		Maximum Set Pressure <sup>1</sup>		Standard Body Material and Maximum Temperature <sup>2</sup> Flanged		Standard Outlet Class
					SA216 Gr. WCB 750°F [399°C]	SA217 Gr. WC6 1000°F [538°C]	
	sq. in.	[sq. mm]	psig	[barg]			
<b>Class 900</b> - ANSI raised face flange CL 900 inlet							
1 1/2 F 2 1/2	0.307	[198.1]	1970	[135.8]	HSJ-66	HSJ-67	CI 300
1 1/2 G 2 1/2	0.503	[324.5]	1970	[135.8]	HSJ-66	HSJ-67	CI 300
1 1/2 H 3	0.785	[506.5]	1610	[111.0]	HSJ-56	HSJ-57	CI 150
2 H 3	0.785	[506.5]	1610	[111.0]	HSJ-56	HSJ-57	CI 150
2 J 4	1.288	[831.0]	1600	[110.3]	HSJ-56	HSJ-57	CI 150
2 1/2 J 4	1.288	[831.0]	1600	[110.3]	—	HSJ-57	CI 150
3 J 4	1.288	[831.0]	1600	[110.3]	HSJ-56	—	CI 150
2 1/2 K 4	1.840	[1187.1]	1095	[75.5]	HSJ-56	HSJ-57	CI 150
3 K 4	1.840	[1187.1]	1095	[75.5]	HSJ-56	HSJ-57	CI 150
3 L 6	2.853	[1840.6]	900	[62.1]	HSJ-56	HSJ-57	CI 150
4 L 6	2.853	[1840.6]	900	[62.1]	HSJ-56	HSJ-57	CI 150
3 M 6	3.600	[2322.6]	900	[62.1]	HSJ-56	HSJ-57	CI 150
4 M 6	3.600	[2322.6]	900	[62.1]	HSJ-56	HSJ-57	CI 150
<b>Class 1500</b> - ANSI raised face flange CL 1500 inlet							
1 1/2 F 2 1/2	0.307	[198.1]	2520	[173.7]	HSJ-66	—	CI 300
1 1/2 F 2 1/2	0.307	[198.1]	2540	[175.1]	—	HSJ-67	CI 300
1 1/2 G 2 1/2	0.503	[324.5]	2520	[173.7]	HSJ-66	—	CI 300
1 1/2 G 2 1/2	0.503	[324.5]	2540	[175.1]	—	HSJ-67	CI 300
1 1/2 H 3	0.785	[506.5]	2665	[183.8]	HSJ-66	HSJ-67	CI 300
2 H 3	0.785	[506.5]	2665	[183.8]	HSJ-66	HSJ-67	CI 300
2 J 4	1.288	[831.0]	1600	[110.3]	HSJ-66	HSJ-67	CI 300
3 J 4	1.288	[831.0]	1600	[110.3]	HSJ-66	HSJ-67	CI 300
2 1/2 K 4	1.840	[1187.1]	1095	[75.5]	—	HSJ-67	CI 150
3 K 4	1.840	[1187.1]	1095	[75.5]	—	HSJ-67	CI 150
<b>Class 2500</b> - ANSI raised face flange CL 2500 inlet							
1 1/2 F 2 1/2	0.307	[198.1]	2700	[186.2]	HSJ-76	HSJ-77	CI 300
2 G 3	0.503	[324.5]	2700	[186.2]	HSJ-76	HSJ-77	CI 300

\* Select appropriate class to meet pressure/temperature requirements for each application. Refer to pages 42-45 for Pressure/Temperature limits for Standard Class valves per ASME/ANSI B16.34.

**Notes:**

1. Set pressure is limited to either the inlet flange pressure limit per ASME/ANSI B16.34 (pages 42-45) or the maximum set pressure, whichever is lower.
2. SA-217 Gr. WC6 is Crosby's standard high temperature material. SA-217 Gr. WC9 is available as an alternative.

**Specifications - Style HSJ**

USCS (United States Customary System) Units									
Valve Size Inlet x Orifice x Outlet	HSJ Valve Style	General Dimensions - Inches							Approx. Weight Type C (lbs)
		Inlet ID <sup>1</sup>	Center-to-Face		Used to Find Bolt Length <sup>3</sup>	Approximate Height <sup>2</sup> Valve (Cap) Type			
			Inlet	Outlet		A/B	C	D/E	
		A	C	D	X	A/B	C	D/E	
<b>Class 150</b> - ANSI raised face flange CL 150 inlet									
1 1/2 F 2	16	1 1/2	47/8	43/4	13/4	20 1/4	22 1/2	23 1/4	50
1 1/2 G 2 1/2	16	1 1/2	47/8	43/4	13/4	20 1/4	22 1/2	23 1/4	50
1 1/2 H 3	16	1 1/2	5 1/8	47/8	1 11/16	20 1/2	22 3/4	23 1/2	50
2 J 3	16	2	5 3/8	47/8	1 11/16	21	23 1/4	24	65
2 1/2 K 4	16	2 1/2	6 1/8	6 3/8	17/8	26	29 1/4	30	110
3 K 4	16	3	6 1/8	6 3/8	2 1/8	26	29 1/4	30	115
3 L 4	16	3	6 1/8	6 1/2	2	30 1/4	33 1/2	34 1/4	150
3 M 6	16	3	7	7 1/4	1 13/16	29 3/4	33	33 3/4	192
4 M 6	16	4	7	7 1/4	2 1/8	29 3/4	33	33 3/4	200
4 N 6	16	4	7 3/4	8 1/4	2 1/8	37 3/4	42 1/4	43	260
4 P 6	16	4	7 1/8	9	2 1/8	37	41 1/2	42 1/4	270
6 Q 8	16	6	9 7/16	9 1/2	2 5/16	42 1/4	46 3/4	47 1/2	475
<b>Class 300</b> - ANSI raised face flange CL 300 inlet									
1 1/2 F 2	4 ( )	1 1/2	47/8	6	13/4	20 1/4	22 1/2	23 1/4	50
1 1/2 G 2 1/2	4 ( )	1 1/2	47/8	6	13/4	20 1/4	22 1/2	23 1/4	50
1 1/2 H 3	3 ( )	1 1/2	5 1/8	47/8	1 11/16	20 1/2	22 3/4	23 1/2	55
2 J 3	26	2	5 3/8	47/8	1 11/16	21	23 1/4	24	65
2 J 4	3 ( )	2	5 7/8	5 5/8	17/8	23 1/2	26 3/4	27 1/2	83
2 1/2 J 4	3 ( )	2 1/2	5 3/8	5 5/8	2 1/16	23	26 1/4	27	90
2 1/2 K 4	3 ( )	2 1/2	6 1/8	6 3/8	17/8	26	29 1/4	30	110
3 K 4	3 ( )	3	6 1/8	6 3/8	2 1/8	26	29 1/4	30	115
3 L 4	3 ( )	3	6 1/8	6 1/2	2	30 1/4	33 1/2	34 1/4	150
3 M 6	3 ( )	3	7 1/2	7 1/4	2 1/8	32 3/4	36	36 3/4	215
4 M 6	3 ( )	4	7	7 1/4	2 1/8	32 1/4	35 1/2	36 1/4	225
4 N 6	3 ( )	4	7 3/4	8 1/4	2 1/8	37 3/4	42 1/4	43	270
4 P 6	3 ( )	4	8 7/8	10	2 1/8	38 3/4	43 1/4	44	290
6 Q 8	3 ( )	6	9 7/16	9 1/2	2 5/16	42 1/4	46 3/4	47 1/2	495
<b>Class 600</b> - ANSI raised face flange CL 600 inlet									
1 1/2 F 2	4 ( )	1 1/2	47/8	6	13/4	20 1/4	22 1/2	23 1/4	50
1 1/2 G 2 1/2	4 ( )	1 1/2	47/8	6	13/4	20 1/4	22 1/2	23 1/4	50
1 1/2 H 3	4 ( )	1 1/2	5 1/8	47/8	1 13/16	20 1/2	22 3/4	23 1/2	55
2 H 3	4 ( )	2	5 1/8	47/8	1 13/16	20 1/2	22 3/4	23 1/2	60
2 J 4	4 ( )	2	6 1/8	6 3/4	17/8	25 3/4	29	29 3/4	106
2 1/2 J 4	4 ( )	2 1/2	6 1/8	6 3/4	2 1/8	25 3/4	29	29 3/4	115
2 1/2 K 4	4 ( )	2 1/2	7 1/4	7 1/8	2	29 1/4	32 1/2	33 1/4	155
3 K 4	4 ( )	3	7 1/4	7 1/8	2 1/8	29 1/4	32 1/2	33 1/4	160
3 L 6	4 ( )	3	8	8	2 1/8	32 1/2	35 3/4	36 1/2	205
4 L 6	4 ( )	4	7 1/16	8	2 3/8	31 1/2	34 3/4	35 1/2	225
3 M 6	4 ( )	3	7 1/2	7 1/4	2 1/8	32 3/4	36	36 3/4	215
4 M 6	4 ( )	4	7	8	2 7/16	32 1/4	35 1/2	36 1/4	225
4 N 6	4 ( )	4	7 3/4	8 3/4	2 3/8	37 3/4	42 1/4	43	285
4 P 6	4 ( )	4	8 7/8	10	2 9/16	41	45 1/2	46 1/4	405
6 Q 8	4 ( )	6	9 7/16	9 1/2	2 15/16	46 1/4	50 3/4	51 1/2	570



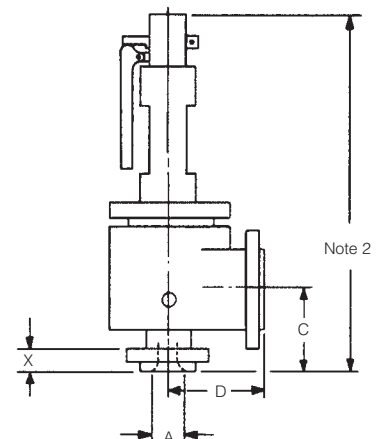
**Specifications - Style HSJ**

USCS (United States Customary System) Units										
Valve Size Inlet x Orifice x Outlet	HSJ Valve Style	General Dimensions - Inches								Approx. Weight Type C (lbs)
		Inlet ID <sup>1</sup>	Center-to-Face		Used to Find Bolt Length <sup>3</sup>	Approximate Height <sup>2</sup>				
			Inlet	Outlet		Valve (Cap) Type				
						A/B	C	D/E		
A	C	D	X	A/B	C	D/E				
<b>Class 900 - ANSI raised face flange CL 900 inlet</b>										
1 1/2 F 2 1/2	6 ( )	1 1/2	47/8	6	2	20	22 1/4	23	65	
1 1/2 G 2 1/2	6 ( )	1 1/2	47/8	6	2	22 1/4	25 1/4	26 1/4	70	
1 1/2 H 3	5 ( )	1 1/2	69/16	63/8	21/16	25	28	28 3/4	94	
2 H 3	5 ( )	2	61/16	63/8	23/8	24 1/2	27 1/2	28 1/4	110	
2 J 4	56	2	7 1/4	7 1/8	23/8	29	32 1/4	33	130	
2 J 4	57	2	6 1/8	6 3/4	23/8	25 3/4	29	29 3/4	115	
2 1/2 J 4	57	2 1/2	6 1/8	6 3/4	2 1/2	25 3/4	29	29 3/4	140	
3 J 4	56	3	7 1/4	7 1/8	23/4	29	32 1/4	33	155	
2 1/2 K 4	5 ( )	2 1/2	7 1/4	7 1/8	2 1/2	29 1/4	32 1/2	33 1/4	170	
3 K 4	5 ( )	3	7 1/4	7 1/8	27/16	29 1/4	32 1/2	33 1/4	175	
3 L 6	5 ( )	3	8	8	23/8	32 1/2	35 3/4	36 1/2	210	
4 L 6	5 ( )	4	7 3/4	8 3/4	25/8	32 1/4	35 1/2	36 1/4	230	
3 M 6	5 ( )	3	7 3/4	7 1/4	23/8	33	36 1/2	37 1/4	220	
4 M 6	5 ( )	4	7 3/4	8 3/4	29/16	33	36 1/4	37	230	
<b>Class 1500 - ANSI raised face flange CL 1500 inlet</b>										
1 1/2 F 2 1/2	6 ( )	1 1/2	47/8	6	2	20	22 1/4	23	65	
1 1/2 G 2 1/2	6 ( )	1 1/2	47/8	6	2	22 1/4	25 1/4	26 1/4	70	
1 1/2 H 3	6 ( )	1 1/2	69/16	63/8	21/16	25	28	28 3/4	96	
2 H 3	6 ( )	2	61/16	63/8	23/8	24 1/2	27 1/2	28 1/4	110	
2 J 4	6 ( )	2	7 1/4	7 1/8	23/8	29	32 1/4	33	130	
3 J 4	6 ( )	3	7 1/4	7 1/8	23/4	29	32 1/4	33	155	
2 1/2 K 4	67	2 1/2	7 1/4	7 1/8	2 1/2	29 1/4	32 1/2	33 1/4	170	
3 K 4	67	3	7 1/4	7 1/8	23/4	29 1/4	32 1/2	33 1/4	175	
<b>Class 2500 - ANSI raised face flange CL 2500 inlet</b>										
1 1/2 F 2 1/2	7 ( )	1 1/2	5 1/2	6 1/2	2 1/2	20 3/4	23	23 3/4	65	
2 G 3	7 ( )	2	6 1/8	6 3/4	23/4	23 1/4	26 1/2	27 1/4	70	

**Notes:**

- Safety valves must be mounted on a nozzle with an inlet diameter equal to or greater than the nominal valve inlet size, Dimension A. See ASME Boiler and Pressure Code Section I and ANSI/ASME B31.1 for recommended installation.
- Dismantling Height: An additional 20 inches [508 mm] is required.
- Bolt holes straddle center line.

Drain: Body drain is 1/2" NPT for F-N Orifices  
 3/4" NPT for P & Q Orifices



**Specifications - Style HSJ**

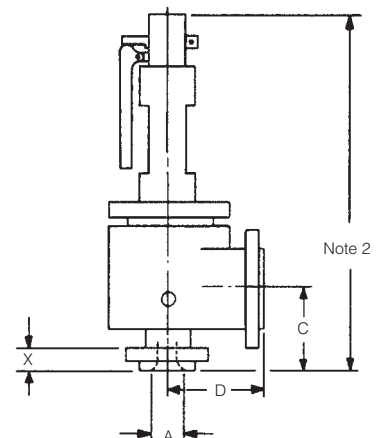
Metric Units									
Valve Size Inlet x Orifice x Outlet	HSJ Valve Style	General Dimensions - Millimeters							Approx. Weight Type C [kg]
		Inlet ID <sup>1</sup>	Center-to-Face		Used to Find Bolt Length <sup>3</sup>	Approximate Height <sup>2</sup>			
			Inlet	Outlet		Valve (Cap) Type			
						A	C	D	
<b>Class 150</b> - ANSI raised face flange CL 150 inlet									
1 1/2 F 2	16	38.1	123.8	120.7	44.5	514.4	571.5	590.6	23
1 1/2 G 2 1/2	16	38.1	123.8	120.7	44.5	514.4	571.5	590.6	23
1 1/2 H 3	16	38.1	130.2	123.8	42.9	520.7	577.9	596.9	23
2 J 3	16	50.8	136.5	123.8	42.9	533.4	590.6	609.6	29
2 1/2 K 4	16	63.5	155.6	161.9	47.6	660.4	743.0	762.0	50
3 K 4	16	76.2	155.6	161.9	54.0	660.4	743.0	762.0	52
3 L 4	16	76.2	155.6	165.1	50.8	768.4	850.9	870.0	68
3 M 6	16	76.2	177.8	184.2	46.0	755.7	838.2	857.3	87
4 M 6	16	101.6	177.8	184.2	54.0	755.7	838.2	857.3	91
4 N 6	16	101.6	196.9	209.6	54.0	958.9	1073.2	1092.2	118
4 P 6	16	101.6	181.0	228.6	54.0	938.8	1054.1	1079.5	123
6 Q 8	16	152.4	239.7	241.3	58.7	1073.2	1187.5	1206.5	216
<b>Class 300</b> - ANSI raised face flange CL 300 inlet									
1 1/2 F 2	4( )	38.1	123.8	152.4	44.5	514.4	571.5	590.6	23
1 1/2 G 2 1/2	4( )	38.1	123.8	152.4	44.5	514.4	571.5	590.6	23
1 1/2 H 3	3( )	38.1	130.2	123.8	42.9	520.7	577.9	596.9	25
2 J 3	26	50.8	136.5	123.8	42.9	533.4	590.6	609.6	29
2 J 4	3( )	50.8	149.2	142.9	47.6	596.9	679.5	698.5	38
2 1/2 J 4	3( )	63.5	136.5	142.9	52.4	584.2	666.8	685.8	41
2 1/2 K 4	3( )	63.5	155.6	161.9	47.6	660.4	743.0	762.0	50
3 K 4	3( )	76.2	155.6	161.9	54.0	660.4	743.0	762.0	52
3 L 4	3( )	76.2	155.6	165.1	50.8	768.4	850.9	870.0	68
3 M 6	3( )	76.2	190.5	184.2	54.0	831.9	914.4	933.5	98
4 M 6	3( )	101.6	177.8	184.2	54.0	819.2	901.7	920.8	102
4 N 6	3( )	101.6	196.9	209.6	54.0	958.9	1073.2	1092.2	123
4 P 6	3( )	101.6	225.4	254.0	54.0	984.3	1098.6	1117.6	132
6 Q 8	3( )	152.4	239.7	241.3	58.7	1073.2	1187.5	1206.5	225
<b>Class 600</b> - ANSI raised face flange CL 600 inlet									
1 1/2 F 2	4( )	38.1	123.8	152.4	44.5	514.4	571.5	590.6	23
1 1/2 G 2 1/2	4( )	38.1	123.8	152.4	44.5	514.4	571.5	590.6	23
1 1/2 H 3	4( )	38.1	130.2	123.8	46.0	520.7	577.9	596.9	25
2 H 3	4( )	50.8	130.2	123.8	46.0	520.7	577.9	596.9	27
2 J 4	4( )	50.8	155.6	171.5	47.6	654.1	736.6	755.7	48
2 1/2 J 4	4( )	63.5	155.6	171.5	54.0	654.1	736.6	755.7	52
2 1/2 K 4	4( )	63.5	184.2	181.0	50.8	743.0	825.5	844.6	70
3 K 4	4( )	76.2	184.2	181.0	54.0	743.0	825.5	844.6	73
3 L 6	4( )	76.2	203.2	203.2	54.0	825.5	908.1	927.1	93
4 L 6	4( )	101.6	179.4	203.2	60.3	800.1	882.7	901.7	102
3 M 6	4( )	76.2	190.5	184.2	54.0	831.9	914.4	933.5	98
4 M 6	4( )	101.6	177.8	203.2	61.9	819.2	901.7	920.8	102
4 N 6	4( )	101.6	196.9	222.3	60.3	958.9	1073.2	1092.2	129
4 P 6	4( )	101.6	225.4	254.0	65.1	1041.4	1155.7	1174.8	184
6 Q 8	4( )	152.46	239.7	241.3	74.6	1174.8	1289.1	1308.1	259

**Specifications - Style HSJ**

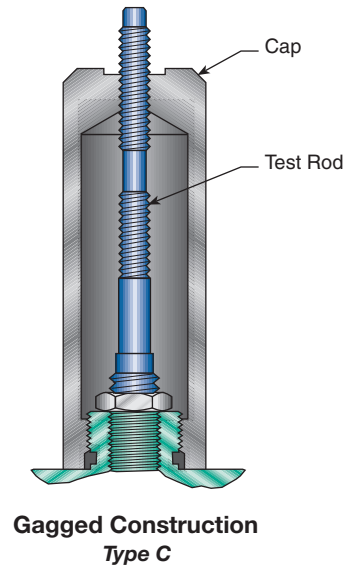
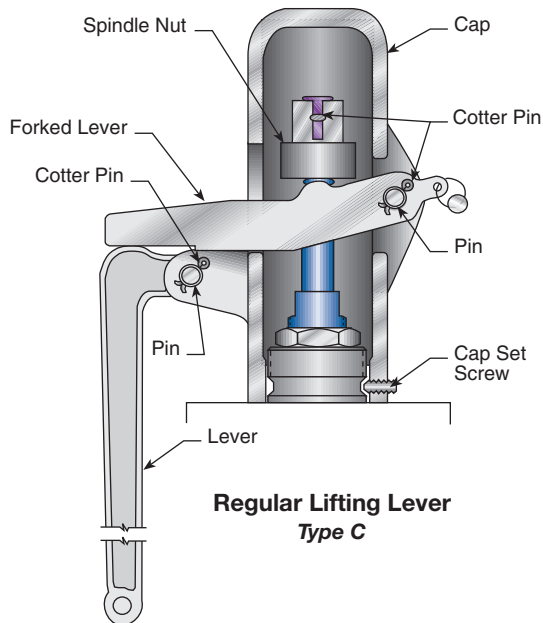
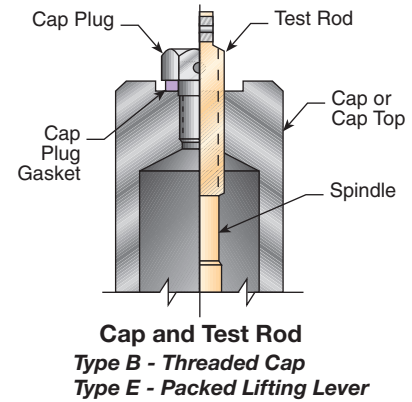
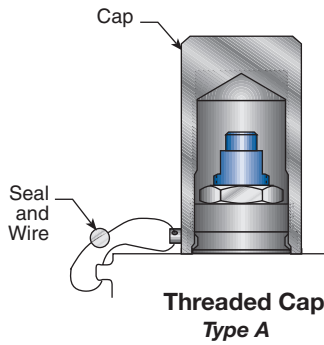
Metric Units									
Valve Size Inlet x Orifice x Outlet	HSJ Valve Style	General Dimensions - Millimeters							Approx. Weight Type C [kg]
		Inlet ID <sup>1</sup>	Center-to-Face		Used to Find Bolt Length <sup>3</sup>	Approximate Height <sup>2</sup> Valve (Cap) Type			
			Inlet	Outlet		A/B	C	D/E	
		A	C	D	X	A/B	C	D/E	
<b>Class 900</b> - ANSI raised face flange CL 900 inlet									
1 1/2 F 2 1/2	6( )	38.1	123.8	152.4	50.8	508.0	565.2	584.2	29
1 1/2 G 2 1/2	6( )	38.1	123.8	152.4	50.8	565.2	641.4	666.8	32
1 1/2 H 3	5( )	38.1	166.7	161.9	52.4	635.0	711.2	730.3	43
2 H 3	5( )	50.8	154.0	161.9	60.3	622.3	698.5	717.6	50
2 J 4	56	50.8	184.2	181.0	60.3	736.6	819.2	838.2	59
2 J 4	57	50.8	155.6	171.5	60.3	654.1	736.6	755.7	52
2 1/2 J 4	57	63.5	155.6	171.5	63.5	654.1	736.6	755.7	64
3 J 4	56	76.2	184.2	181.0	69.9	736.6	819.2	838.2	70
2 1/2 K 4	5( )	63.5	184.2	181.0	63.5	743.0	825.5	844.6	77
3 K 4	5( )	76.2	184.2	181.0	61.9	743.0	825.5	844.6	79
3 L 6	5( )	76.2	203.2	203.2	60.3	825.5	908.1	927.1	95
4 L 6	5( )	101.6	196.9	222.3	66.7	819.2	901.7	920.8	104
3 M 6	5( )	76.2	196.9	184.2	60.3	838.2	927.1	946.2	100
4 M 6	5( )	101.6	196.9	222.3	65.1	838.2	920.8	939.8	104
<b>Class 1500</b> - ANSI raised face flange CL 1500 inlet									
1 1/2 F 2 1/2	6( )	38.1	123.8	152.4	50.8	508.0	565.2	584.2	29
1 1/2 G 2 1/2	6( )	38.1	123.8	152.4	50.8	565.2	641.4	666.8	32
1 1/2 H 3	6( )	38.1	166.7	161.9	52.4	635.0	711.2	730.3	44
2 H 3	6( )	50.8	154.0	161.9	60.3	622.3	698.5	717.6	50
2 J 4	6( )	50.8	184.2	181.0	60.3	736.6	819.2	838.2	59
3 J 4	6( )	76.2	184.2	181.0	69.9	736.6	819.2	838.2	70
2 1/2 K 4	67	63.5	184.2	181.0	63.5	743.0	825.5	844.6	77
3 K 4	67	76.2	184.2	181.0	69.9	743.0	825.5	844.6	79
<b>Class 2500</b> - ANSI raised face flange CL 2500 inlet									
1 1/2 F 2 1/2	7( )	38.1	139.7	165.1	63.5	527.1	584.2	603.3	29
2 G 3	7( )	50.8	155.6	171.5	69.9	590.6	673.1	692.2	32

**Notes:**

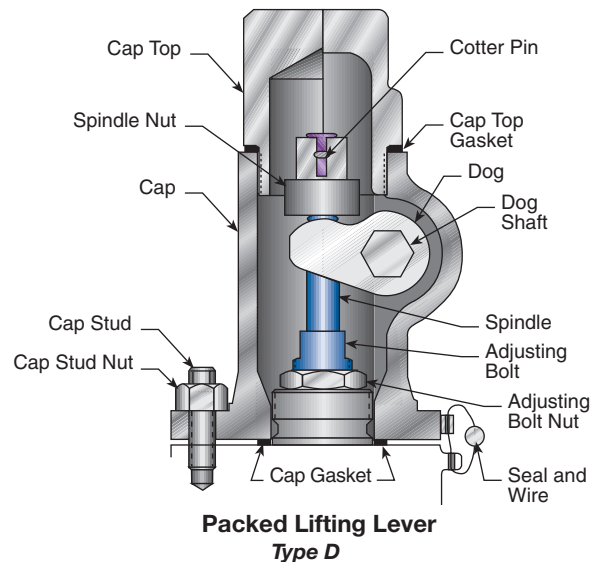
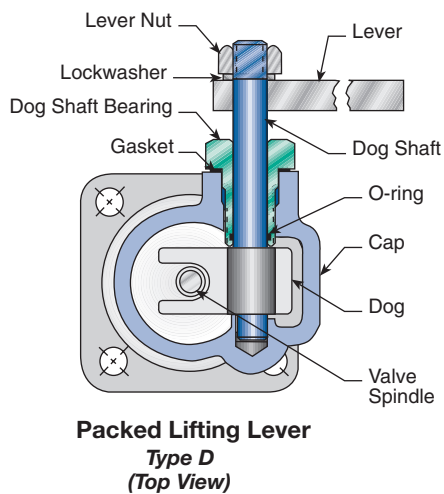
- Safety valves must be mounted on a nozzle with an inlet diameter equal to or greater than the nominal valve inlet size, Dimension A. See ASME Boiler and Pressure Code Section I and ANSI/ASME B31.1 for recommended installation.
  - Dismantling Height: An additional 20 inches [508 mm] is required.
  - Bolt holes straddle center line.
- Drain: Body drain is 1/2" NPT for F-N Orifices  
 3/4" NPT for P & Q Orifices



**Style HSJ Caps and Lifting Levers**



Additional cap furnished for gagging purposes only when requested and ordered by customer.



**Saturated Steam Capacities\*: Styles HE, HCI and HSJ - USCS (United States Customary System) Units**

Pounds per hour at 3% overpressure

**Saturated Steam Capacities - Set Pressures 15-550 psig**

HE HCI HSJ	Orifice Designation and Area (sq. in.)																		
	F 0.307	G 0.503	H 0.785	H2 0.994	J 1.288	J2 1.431	K 1.840	K2 2.545	L 2.853	L2 3.341	M 3.60	M2 3.976	N 4.341	P 6.38	P2 7.07	Q 11.045	Q2 12.25	R 16.00	RR 19.29
15	440	721	1125	—	1846	—	2637	—	4089	—	5160	—	6222	9145	—	15832	—	—	—
20	509	835	1303	—	2137	—	3053	—	4734	—	5974	—	7204	10587	—	18329	—	—	—
30	648	1062	1658	—	2720	—	3885	—	6024	—	7602	—	9167	13472	—	23323	—	—	—
40	787	1290	2013	—	3302	—	4717	—	7315	—	9230	—	11129	16357	—	28317	—	—	—
50	926	1517	2368	—	3885	—	5549	—	8605	—	10858	—	13092	19242	—	33311	—	—	—
60	1065	1744	2722	—	4467	—	6381	—	9895	—	12485	—	15055	22127	—	38306	—	—	—
70	1205	1974	3081	—	5055	—	7222	—	11198	—	14129	—	17038	25040	—	43350	—	—	—
80	1348	2208	3447	—	5655	—	8079	—	12526	—	15806	—	19059	28012	—	48494	—	—	—
90	1491	2443	3812	—	6255	—	8936	—	13855	—	17483	—	21081	30983	—	53638	—	—	—
100	1634	2677	4178	—	6855	—	9793	—	15184	—	19159	—	23103	33955	—	58782	—	—	—
110	1777	2911	4543	—	7455	—	10650	—	16513	—	20836	—	25125	36926	—	63926	—	—	—
120	1920	3146	4909	—	8055	—	11506	—	17841	—	22513	—	27146	39897	—	69070	—	—	—
130	2063	3380	5275	—	8654	—	12363	—	19170	—	24189	—	29168	42869	—	74214	—	—	—
140	2206	3614	5640	—	9254	—	13220	—	20499	—	25866	—	31190	45840	—	79358	—	—	—
150	2349	3848	6006	—	9854	—	14077	—	21827	—	27543	—	33212	48812	—	84502	—	—	—
160	2492	4083	6371	—	10454	—	14934	—	23156	—	29219	—	35234	51783	—	89646	—	—	—
170	2635	4317	6737	—	11054	—	15791	—	24485	—	30896	—	37255	54754	—	94790	—	—	—
180	2778	4551	7103	—	11654	—	16648	—	25814	—	32573	—	39277	57726	—	99934	—	—	—
190	2921	4785	7468	—	12254	—	17505	—	27142	—	34249	—	41299	60697	—	105078	—	—	—
200	3064	5020	7834	—	12853	—	18362	—	28471	—	35926	—	43321	63669	—	110222	—	—	—
210	3207	5254	8199	—	13453	—	19219	—	29800	—	37602	—	45342	66640	—	115366	—	—	—
220	3350	5488	8565	—	14053	—	20076	—	31129	—	39279	—	47364	69611	—	120510	—	—	—
230	3493	5722	8931	—	14653	—	20933	—	32457	—	40956	—	49386	72583	—	125655	—	—	—
240	3636	5957	9296	—	15253	—	21790	—	33786	—	42632	—	51408	75554	—	130799	—	—	—
250	3779	6191	9662	—	15853	—	22647	—	35115	—	44309	—	53429	78525	—	135943	—	—	—
260	3922	6425	10027	—	16453	—	23504	—	36444	—	45986	—	55451	81497	—	141087	—	—	—
270	4065	6659	10393	—	17053	—	24361	—	37772	—	47662	—	57473	84468	—	146231	—	—	—
280	4208	6894	10759	—	17652	—	25218	—	39101	—	49339	—	59495	87440	—	151375	—	—	—
290	4350	7128	11124	—	18252	—	26075	—	40430	—	51016	—	61516	90411	—	156519	—	—	—
300	4493	7362	11490	14549	18852	20945	26932	37251	41759	48901	52692	58196	63538	93382	103482	161663	179300	234188	282343
310	4636	7597	11855	15012	19452	21612	27789	38436	43087	50457	54369	60047	65560	96354	106775	166807	185005	241640	291327
320	4779	7831	12221	15475	20052	22278	28646	39621	44416	52013	56046	61899	67582	99325	110067	171951	190711	249091	300311
330	4922	8065	12587	15938	20652	22945	29502	40806	45745	53569	57722	63751	69603	102297	113360	177095	196416	256543	309295
340	5065	8299	12952	16401	21252	23611	30359	41992	47074	55125	59399	65603	71625	105268	116653	182239	202121	263995	318279
350	5208	8534	13318	16864	21851	24278	31216	43177	48402	56681	61076	67455	73647	108239	119946	187383	207826	271447	327263
360	5351	8768	13683	17327	22451	24944	32073	44362	49731	58237	62752	69306	75669	111211	123238	192527	213532	278898	336247
370	5494	9002	14049	17790	23051	25610	32930	45548	51060	59794	64429	71158	77690	114182	126531	197671	219237	286350	345231
380	5637	9236	14415	18252	23651	26277	33787	46733	52389	61350	66105	73010	79712	117154	129824	202815	224942	293802	354215
390	5780	9471	14780	18715	24251	26943	34644	47918	53717	62906	67782	74862	81734	120125	133116	207959	230647	301254	363199
400	5923	9705	15146	19178	24851	27610	35501	49103	55046	64462	69459	76713	83756	123096	136409	213103	236353	308706	372183
410	6066	9939	15511	19641	25451	28276	36358	50289	56375	66018	71135	78565	85777	126068	139702	218247	242058	316157	381167
420	6209	10173	15877	20104	26051	28943	37215	51474	57704	67574	72812	80417	87799	129039	142995	223391	247763	323609	390151
430	6352	10408	16243	20567	26650	29609	38072	52659	59032	69130	74489	82269	89821	132010	146287	228535	253468	331061	399135
440	6495	10642	16608	21030	27250	30276	38929	53845	60361	70686	76165	84120	91843	134982	149580	233679	259174	338513	408119
450	6638	10876	16974	21493	27850	30942	39786	55030	61690	72242	77842	85972	93864	137953	152873	238823	264879	345964	417103
460	6781	11111	17339	21956	28450	31609	40643	56215	63019	73798	79519	87824	95886	140925	156166	243968	270584	353416	426087
470	6924	11345	17705	22419	29050	32275	41500	57401	64347	75354	81195	89676	97908	143896	159458	249112	276289	360868	435071
480	7067	11579	18071	22882	29650	32942	42357	58586	65676	76910	82872	91527	99930	146867	162751	254256	281995	368320	444055
490	7210	11813	18436	23345	30250	33608	43214	59771	67005	78466	84549	93379	101951	149839	166044	259400	287700	375771	453039
500	7353	12048	18802	23808	30849	34275	44071	60956	68333	80022	86225	95231	103973	152810	169337	264544	293405	383223	462023
510	7496	12282	19167	24271	31449	34941	44928	62142	69662	81578	87902	97083	105995	155782	172629	269688	299110	390675	471007
520	7639	12516	19533	24734	32049	35607	45785	63327	70991	83134	89578	98934	108017	158753	175922	274832	304816	398127	479991
530	7782	12750	19899	25197	32649	36274	46642	64512	72320	84690	91255	100786	110038	161724	179215	279976	310521	405578	488975
540	7925	12985	20264	25659	33249	36940	47498	65698	73648	86246	92932	102638	112060	164696	182508	285120	316226	413030	497959
550	8068	13219	20630	26122	33849	37607	48355	66883	74977	87802	94608	104490	114082	167667	185800	290264	321931	420482	506944

Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors in accordance with the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers.

For superheated steam, multiply the saturated steam capacities by Superheat Correction Factor  $K_{sh}$ , page 40. Capacities for the HCI-R valves: Valves adjust to a minimum of 30% of full rated capacity. Restricted capacity = [% of restricted lift] x ASME rated capacity.

\* Refer to Capacity Formula, page 34.

**Saturated Steam Capacities\*: Styles HE, HCI and HSJ - USCS (United States Customary System) Units**

Pounds per hour at 3% overpressure

**Saturated Steam Capacities - Set Pressures 560-1100 psig**

		Orifice Designation and Area (sq. in.)																	
HE	HCI																		
HSJ																			
Orifice (sq in.)																			
	F 0.307	G 0.503	H 0.785	H2 0.994	J 1.288	J2 1.431	K 1.840	K2 2.545	L 2.853	L2 3.341	M 3.60	M2 3.976	N 4.341	P 6.38	P2 7.07	Q 11.045	Q2 12.25	R 16.00	RR 19.29
(psig) Set Pres.																			
560	8211	13453	20995	26585	34449	38273	49212	68068	76306	89358	96285	106342	116104	170639	189093	295408	327637	427934	515928
570	8354	13687	21361	27048	35049	38940	50069	69253	77635	90914	97962	108193	118126	173610	192386	300552	333342	435385	524912
580	8497	13922	21727	27511	35648	39606	50926	70439	78963	92470	99638	110045	120147	176581	195679	305696	339047	442837	533896
590	8640	14156	22092	27974	36248	40273	51783	71624	80292	94026	101315	111897	122169	179553	198971	310840	344752	450289	542880
600	8783	14390	22458	28437	36848	40939	52640	72809	81621	95582	102992	113749	124191	182524	202264	315984	350458	457741	551864
610	8926	14624	22824	28900	37448	41606	53497	73995	82950	97138	104668	115600	126213	185496	205557	—	356163	465192	560848
620	9069	14859	23189	29363	38048	42272	54354	75180	84278	98694	106345	117452	128234	188467	208850	—	361868	472644	569832
630	9212	15093	23555	29826	38648	42939	55211	76365	85607	100250	108022	119304	130256	191438	212142	—	367574	480096	578816
640	9355	15327	23920	30289	39248	43605	56068	77551	86936	101806	109698	121156	132278	194410	215435	—	373279	487548	587800
650	9498	15562	24286	30752	39847	44272	56925	78736	88265	103362	111375	123007	134300	197381	218728	—	378984	495000	596784
660	9641	15796	24652	31215	40447	44938	57782	79921	89593	104918	113052	124859	136321	200352	222021	—	384689	502451	605768
670	9784	16030	25017	31678	41047	45604	58639	81106	90922	106474	114728	126711	138343	203324	225313	—	390395	509903	614752
680	9927	16264	25383	32141	41647	46271	59496	82292	92251	108030	116405	128563	140365	206295	228606	—	396100	517355	623736
690	10070	16499	25748	32604	42247	46937	60353	83477	93580	109586	118081	130414	142387	209267	231899	—	401805	524807	632720
700	10213	16733	26114	33067	42847	47604	61210	84662	94908	111142	119758	132266	144408	212238	235192	—	407510	532258	641704
710	10356	16967	26480	33529	43447	48270	62067	85848	96237	112698	121435	134118	146430	215209	238484	—	413216	539710	650688
720	10499	17201	26845	33992	44047	48937	62924	87033	97566	114254	123111	135970	148452	218181	241777	—	418921	547162	659672
730	10642	17436	27211	34455	44646	49603	63781	88218	98895	115810	124788	137821	150474	221152	245070	—	424626	554614	668656
740	10785	17670	27576	34918	45246	50270	64638	89404	100223	117366	126465	139673	152495	224124	248363	—	430331	562065	677640
750	10928	17904	27942	35381	45846	50936	65494	90589	101552	118922	128141	141525	154517	227095	251655	—	436037	569517	686624
760	11071	18138	28308	35844	46446	51603	66351	91774	102881	120478	129818	143377	156539	230066	254948	—	441742	576969	695608
770	11214	18373	28673	36307	47046	52269	67208	92959	104210	122034	131495	145229	158561	233038	258241	—	447447	584421	704592
780	11357	18607	29039	36770	47646	52936	68065	94145	105538	123590	133171	147080	160582	236009	261534	—	453152	591872	713576
790	11500	18841	29404	37233	48246	53602	68922	95330	106867	125146	134848	148932	162604	238981	264826	—	458858	599324	722560
800	11643	19076	29770	37696	48845	54269	69779	96515	108196	126702	136525	150784	164626	241952	268119	—	464563	606776	731544
810	11785	19310	30136	38159	49445	54935	70636	97701	109524	128258	138201	152636	166648	244923	271412	—	470268	614228	740528
820	11928	19544	30501	38622	50045	55601	71493	98886	110853	129814	139878	154487	168669	247895	274705	—	475973	621679	749512
830	12071	19778	30867	39085	50645	56268	72350	100071	112182	131370	141555	156339	170691	250866	277997	—	481679	629131	758496
840	12214	20013	31232	39548	51245	56934	73207	101256	113511	132926	143231	158191	172713	253837	281290	—	487384	636583	767480
850	12357	20247	31598	40011	51845	57601	74064	102442	114839	134483	144908	160043	174735	256809	284583	—	493089	644035	776464
860	12500	20481	31964	40474	52445	58267	74921	103627	116168	136039	146584	161894	176756	259780	287876	—	498794	651487	785448
870	12643	20715	32329	40937	53045	58934	75778	104812	117497	137595	148261	163746	178778	262752	291168	—	504500	658938	794432
880	12786	20950	32695	41399	53644	59600	76635	105998	118826	139151	149938	165598	180800	265723	294461	—	510205	666390	803417
890	12929	21184	33060	41862	54244	60267	77492	107183	120154	140707	151614	167450	182822	268694	297754	—	515910	673842	812401
900	13072	21418	33426	42325	54844	60933	78349	108368	121483	142263	153291	169301	184843	271666	301047	—	521615	681294	821385
910	13215	21652	33792	42788	55444	61600	79206	109554	—	143819	—	171153	—	—	304339	—	527321	688745	—
920	13358	21887	34157	43251	56044	62266	80063	110739	—	145375	—	173005	—	—	307632	—	533026	696197	—
930	13501	22121	34523	43714	56644	62933	80920	111924	—	146931	—	174857	—	—	310925	—	538731	703649	—
940	13644	22355	34888	44177	57244	63599	81777	113109	—	148487	—	176709	—	—	314218	—	544436	711101	—
950	13787	22589	35254	44640	57843	64266	82634	114295	—	150043	—	178560	—	—	317510	—	550142	718552	—
960	13930	22824	35620	45103	58443	64932	83490	115480	—	151599	—	180412	—	—	320803	—	555847	726004	—
970	14073	23058	35985	45566	59043	65598	84347	116665	—	153155	—	182264	—	—	324096	—	561552	733456	—
980	14216	23292	36351	46029	59643	66265	85204	117851	—	154711	—	184116	—	—	327389	—	567257	740908	—
990	14359	23527	36716	46492	60243	66931	86061	119036	—	156267	—	185967	—	—	330681	—	572963	748359	—
1000	14502	23761	37082	46955	60843	67598	86918	120221	—	157823	—	187819	—	—	333974	—	578668	755811	—
1010	14645	23995	37448	47418	61443	68264	87775	121407	—	159379	—	189671	—	—	337267	—	584373	763263	—
1020	14788	24229	37813	47881	62043	68931	88632	122592	—	160935	—	191523	—	—	340560	—	590078	770715	—
1030	14931	24464	38179	48344	62642	69597	89489	123777	—	162491	—	193374	—	—	343852	—	595784	778166	—
1040	15074	24698	38544	48807	63242	70264	90346	124962	—	164047	—	195226	—	—	347145	—	601489	785618	—
1050	15217	24932	38910	49269	63842	70930	91203	126148	—	165603	—	197078	—	—	350438	—	607194	793070	—
1060	15360	25166	39276	49732	64442	71597	92060	127333	—	167159	—	198930	—	—	353731	—	612899	800522	—
1070	15503	25401	39641	50195	65042	72263	92917	128518	—	168715	—	200781	—	—	357023	—	618605	807974	—
1080	15646	25635	40007	50658	65642	72930	93774	129704	—	170271	—	202633	—	—	360316	—	624310	815425	—
1090	15789	25869	40372	51121	66242	73596	94631	130889	—	171827	—	204485	—	—	363609	—	630015	822877	—
1100	15932	26103	40738	51584	66841	74263	95488	132074	—	173383	—	206337	—	—	366902	—	635720	830329	—

Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors in accordance with the ASME boiler and Pressure Vessel Code, Section I, Power Boilers.

For superheated steam, multiply the saturated steam capacities by Superheat Correction Factor  $K_{sh}$ , page 40. Capacities for the HCI-R valves: Valves adjust to a minimum of 30% of full rated capacity. Restricted capacity = (% of restricted lift) x ASME rated capacity.

\* Refer to Capacity Formula, page 34.

**Saturated Steam Capacities\*: Styles HE, HCI and HSJ - USCS (United States Customary System) Units**

Pounds per hour at 3% overpressure

Saturated Steam Capacities - Set Pressures 1110-1650 psig																			
Orifice Designation and Area (sq. in.)																			
HE HCI HSJ	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Orifice (sq in.)	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
(psig) Set Pres.	0.307	0.503	0.785	0.994	1.288	1.431	1.840	2.545	2.853	3.341	3.60	3.976	4.341	6.38	7.07	11.045	12.25	16.00	19.29
1101	6075	26338	41104	52047	67441	74929	—	133259	—	174939	—	208188	—	—	370194	—	641426	837781	—
1120	16218	26572	41469	52510	68041	75595	—	134445	—	176495	—	210040	—	—	373487	—	647131	845232	—
1130	16361	26806	41835	52973	68641	76262	—	135630	—	178051	—	211892	—	—	376780	—	652836	852684	—
1140	16504	27041	42200	53436	69241	76928	—	136815	—	179607	—	213744	—	—	380073	—	658542	860136	—
1150	16647	27275	42566	53899	69841	77595	—	138001	—	181163	—	215596	—	—	383365	—	664247	867588	—
1160	16790	27509	42932	54362	70441	78261	—	139186	—	182719	—	217447	—	—	386658	—	669952	875039	—
1170	16933	27743	43297	54825	71041	78928	—	140371	—	184275	—	219299	—	—	389951	—	675657	882491	—
1180	17076	27978	43663	55288	71640	79594	—	141557	—	185831	—	221151	—	—	393244	—	681363	889943	—
1190	17219	28212	44028	55751	72240	80261	—	142742	—	187387	—	223003	—	—	396536	—	687068	897395	—
1200	17362	28446	44394	56214	72840	80927	—	143927	—	188943	—	224854	—	—	399829	—	692773	904846	—
1210	17505	28680	44760	56677	73440	81594	—	145112	—	190499	—	226706	—	—	403122	—	698478	—	—
1220	17648	28915	45125	57139	74040	82260	—	146298	—	192055	—	228558	—	—	406415	—	704184	—	—
1230	17791	29149	45491	57602	74640	82927	—	147483	—	193611	—	230410	—	—	409707	—	709889	—	—
1240	17934	29383	45856	58065	75240	83593	—	148668	—	195167	—	232261	—	—	413000	—	715594	—	—
1250	18077	29617	46222	58528	75839	84260	—	149854	—	196723	—	234113	—	—	416293	—	721299	—	—
1260	18220	29852	46588	58991	76439	84926	—	151039	—	198279	—	235965	—	—	419585	—	727005	—	—
1270	18363	30086	46953	59454	77039	85592	—	152224	—	199835	—	237817	—	—	422878	—	732710	—	—
1280	18506	30320	47319	59917	77639	86259	—	153410	—	201391	—	239668	—	—	426171	—	738415	—	—
1290	18649	30554	47684	60380	78239	86925	—	154595	—	202947	—	241520	—	—	429464	—	744120	—	—
1300	18792	30789	48050	60843	78839	87592	—	155780	—	204503	—	243372	—	—	432756	—	749826	—	—
1310	18935	31023	48416	61306	79439	88258	—	156965	—	206059	—	245224	—	—	436049	—	755531	—	—
1320	19078	31257	48781	61769	80039	88925	—	158151	—	207615	—	247075	—	—	439342	—	761236	—	—
1330	19220	31492	49147	62232	80638	89591	—	159336	—	209172	—	248927	—	—	442635	—	766941	—	—
1340	19363	31726	49512	62695	81238	90258	—	160521	—	210728	—	250779	—	—	445927	—	772647	—	—
1350	19506	31960	49878	63158	81838	90924	—	161707	—	212284	—	252631	—	—	449220	—	778352	—	—
1360	19649	32194	50244	63621	82438	91591	—	162892	—	213840	—	254483	—	—	452513	—	784057	—	—
1370	19792	32429	50609	64084	83038	92257	—	164077	—	215396	—	256334	—	—	455806	—	789762	—	—
1380	19935	32663	50975	64547	83638	92924	—	165262	—	216952	—	258186	—	—	459098	—	795468	—	—
1390	20078	32897	51340	65009	84238	93590	—	166448	—	218508	—	260038	—	—	462391	—	801173	—	—
1400	20221	33131	51706	65472	84837	94257	—	167633	—	220064	—	261890	—	—	465684	—	806878	—	—
1410	20364	33366	52072	65935	85437	94923	—	168818	—	221620	—	263741	—	—	468977	—	812583	—	—
1420	20507	33600	52437	66398	86037	95589	—	170004	—	223176	—	265593	—	—	472269	—	818289	—	—
1430	20650	33834	52803	66861	86637	96256	—	171189	—	224732	—	267445	—	—	475562	—	823994	—	—
1440	20793	34068	53168	67324	87237	96922	—	172374	—	226288	—	269297	—	—	478855	—	829699	—	—
1450	20936	34303	53534	67787	87837	97589	—	173560	—	227844	—	271148	—	—	482148	—	835404	—	—
1460	21079	34537	53900	68250	88437	98255	—	174745	—	229400	—	273000	—	—	485440	—	841110	—	—
1470	21222	34771	54265	68713	89037	98922	—	175930	—	230956	—	274852	—	—	488733	—	846815	—	—
1480	21365	35006	54631	69176	89636	99588	—	177115	—	232512	—	276704	—	—	492026	—	852520	—	—
1490	21508	35240	54996	69639	90236	100255	—	178301	—	234068	—	278555	—	—	495319	—	858225	—	—
1500	21651	35474	55362	70102	90836	100921	—	179486	—	235624	—	280407	—	—	498611	—	863931	—	—
1510	21794	35708	55728	70565	91436	101587	—	180671	—	237180	—	282299	—	—	501904	—	—	—	—
1520	21937	35943	56093	71028	92036	102254	—	181856	—	238736	—	284111	—	—	505197	—	—	—	—
1530	22080	36178	56458	71510	92636	102921	—	183041	—	240292	—	286003	—	—	508490	—	—	—	—
1540	22223	36413	56823	71992	93236	103587	—	184226	—	241848	—	287895	—	—	511783	—	—	—	—
1550	22366	36648	57188	72474	93836	104254	—	185411	—	243404	—	289787	—	—	515076	—	—	—	—
1560	22509	36883	57573	72956	94436	104921	—	186596	—	244960	—	291679	—	—	518369	—	—	—	—
1570	22652	37118	57958	73438	95036	105587	—	187781	—	246516	—	293571	—	—	521662	—	—	—	—
1580	22795	37353	58343	73920	95636	106254	—	188966	—	248072	—	295463	—	—	524955	—	—	—	—
1590	22938	37588	58728	74402	96236	106921	—	190151	—	249628	—	297355	—	—	528248	—	—	—	—
1600	23081	37823	59113	74884	96836	107587	—	191336	—	251184	—	299247	—	—	531541	—	—	—	—
1610	23224	38058	59498	75366	97436	108254	—	192521	—	252740	—	301139	—	—	534834	—	—	—	—
1620	23367	38293	59883	75848	98036	108921	—	193706	—	254296	—	303031	—	—	538127	—	—	—	—
1630	23510	38528	60238	76330	98636	109587	—	194891	—	255852	—	304923	—	—	541420	—	—	—	—
1640	23653	38763	60623	76812	99236	110254	—	196076	—	257408	—	306815	—	—	544713	—	—	—	—
1650	23796	38998	61008	77294	99836	110921	—	197261	—	258964	—	308707	—	—	548006	—	—	—	—

Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors in accordance with the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers.

For superheated steam, multiply the saturated steam capacities by Superheat Correction Factor  $K_{sh}$ , page 40. Capacities for the HCI-R valves: Valves adjust to a minimum of 30% of full rated capacity. Restricted capacity = (% of restricted lift) x ASME rated capacity.

\* Refer to Capacity Formula, page 34.

**Saturated Steam Capacities\*: Styles HE, HCI and HSJ - USCS (United States Customary System) Units**

Pounds per hour at 3% overpressure

**Saturated Steam Capacities - Set Pressures 1660-2200 psig**

		Orifice Designation and Area (sq. in.)																		
HE	HCI	HSJ	Orifice (sq in.)																	
(psig) Set Pres.	F 0.307	G 0.503	H 0.785	H2 0.994	J 1.288	J2 1.431	K 1.840	K2 2.545	L 2.853	L2 3.341	M 3.60	M2 3.976	N 4.341	P 6.38	P2 7.07	Q 11.045	Q2 12.25	R 16.00	RR 19.29	
1660	24139	39550	61723	78157	—	112518	—	200110	—	262698	—	312627	—	—	555904	—	—	—	—	
1670	24298	39811	62131	78673	—	113260	—	201431	—	264432	—	314691	—	—	559573	—	—	—	—	
1680	24458	40073	62539	79189	—	114004	—	202754	—	266169	—	316758	—	—	563249	—	—	—	—	
1690	24618	40335	62948	79707	—	114750	—	204079	—	267909	—	318829	—	—	566932	—	—	—	—	
1700	24778	40597	63358	80226	—	115496	—	205407	—	269653	—	320904	—	—	570621	—	—	—	—	
1710	24939	40860	63768	80746	—	116244	—	206738	—	271399	—	322982	—	—	574317	—	—	—	—	
1720	25099	41124	64179	81266	—	116994	—	208071	—	273149	—	325065	—	—	578020	—	—	—	—	
1730	25260	41388	64591	81788	—	117745	—	209407	—	274903	—	327151	—	—	581731	—	—	—	—	
1740	25422	41652	65004	82310	—	118497	—	210745	—	276659	—	329242	—	—	585448	—	—	—	—	
1750	25584	41917	65417	82834	—	119251	—	212085	—	278419	—	331336	—	—	589172	—	—	—	—	
1760	25746	42183	65832	83359	—	120006	—	213429	—	280183	—	333435	—	—	592904	—	—	—	—	
1770	25908	42449	66247	83884	—	120763	—	214775	—	281950	—	335538	—	—	596643	—	—	—	—	
1780	26071	42715	66663	84411	—	121521	—	216123	—	283720	—	337645	—	—	600389	—	—	—	—	
1790	26234	42982	67080	84939	—	122281	—	217474	—	285494	—	339756	—	—	604143	—	—	—	—	
1800	26397	43250	67497	85468	—	123043	—	218828	—	287271	—	341871	—	—	607905	—	—	—	—	
1810	26561	43518	67916	85998	—	123806	—	220185	—	289053	—	343991	—	—	611674	—	—	—	—	
1820	26725	43787	68335	86529	—	124570	—	221545	—	290837	—	346115	—	—	615451	—	—	—	—	
1830	26889	44056	68755	87061	—	125336	—	222907	—	292626	—	348243	—	—	619235	—	—	—	—	
1840	27054	44326	69176	87594	—	126104	—	224272	—	294418	—	350376	—	—	623028	—	—	—	—	
1850	27219	44596	69598	88128	—	126873	—	225641	—	296214	—	352514	—	—	626829	—	—	—	—	
1860	27384	44867	70021	88664	—	127644	—	227012	—	298014	—	354656	—	—	630637	—	—	—	—	
1870	27550	45139	70445	89201	—	128416	—	228386	—	299818	—	356802	—	—	634454	—	—	—	—	
1880	27716	45411	70870	89738	—	129191	—	229763	—	301626	—	358953	—	—	638280	—	—	—	—	
1890	27882	45684	71295	90277	—	129967	—	231143	—	303437	—	361109	—	—	642113	—	—	—	—	
1900	28049	45957	71722	90818	—	130744	—	232526	—	305253	—	363270	—	—	645956	—	—	—	—	
1910	28216	46231	72150	91359	—	131524	—	233912	—	307073	—	365436	—	—	649806	—	—	—	—	
1920	28384	46506	72578	91902	—	132305	—	235301	—	308896	—	367606	—	—	653666	—	—	—	—	
1930	28552	46781	73008	92445	—	133088	—	236694	—	310724	—	369782	—	—	657534	—	—	—	—	
1940	28720	47057	73438	92990	—	133873	—	238089	—	312557	—	371962	—	—	661411	—	—	—	—	
1950	28889	47333	73870	93537	—	134659	—	239488	—	314393	—	374147	—	—	665297	—	—	—	—	
1960	29058	47610	74302	94085	—	135448	—	240890	—	316234	—	376338	—	—	669193	—	—	—	—	
1970	29228	47888	74736	94633	—	136238	—	242296	—	318079	—	378534	—	—	673097	—	—	—	—	
1980	29398	48166	75170	95184	—	137030	—	243705	—	319928	—	380735	—	—	677011	—	—	—	—	
1990	29568	48446	75606	95735	—	137824	—	245117	—	321782	—	382941	—	—	680934	—	—	—	—	
2000	29739	48725	76043	96288	—	138620	178240	246533	—	323641	348730	385153	—	—	684867	—	—	—	—	
2010	29910	49006	76480	96843	—	139418	179266	247952	—	325504	350738	387370	—	—	688810	—	—	—	—	
2020	30082	49287	76919	97398	—	140218	180294	249375	—	327372	352750	389593	—	—	692762	—	—	—	—	
2030	30254	49569	77359	97955	—	141020	181326	250801	—	329244	354768	391821	—	—	696724	—	—	—	—	
2040	30426	49852	77800	98514	—	141824	182359	252231	—	331121	356790	394055	—	—	700696	—	—	—	—	
2050	30599	50135	78242	99074	—	142630	183396	253664	—	333003	358818	396295	—	—	704679	—	—	—	—	
2060	30773	50419	78686	99635	—	143438	184435	255102	—	334890	360851	398540	—	—	708671	—	—	—	—	
2070	30946	50704	79130	100198	—	144249	185477	256543	—	336781	362889	400791	—	—	712674	—	—	—	—	
2080	31121	50989	79576	100762	—	145061	186521	257987	—	338678	364933	403048	—	—	716688	—	—	—	—	
2090	31295	51276	80023	101328	—	145875	187569	259436	—	340580	366982	405311	—	—	720712	—	—	—	—	
2100	31471	51563	80471	101895	—	146692	188619	260889	—	342487	369037	407581	—	—	724747	—	—	—	—	
2110	31646	51851	80920	102464	—	147511	189672	262345	—	344399	371097	409856	—	—	728793	—	—	—	—	
2120	31823	52139	81370	103034	—	148332	190728	263805	—	346316	373163	412138	—	—	732851	—	—	—	—	
2130	31999	52429	81822	103606	—	149156	191787	265270	—	348238	375235	414426	—	—	736919	—	—	—	—	
2140	32176	52719	82275	104180	—	149981	192848	266739	—	350166	377312	416720	—	—	740999	—	—	—	—	
2150	32354	53010	82729	104755	—	150810	193913	268211	—	352100	379395	419021	—	—	745090	—	—	—	—	
2160	32532	53302	83185	105332	—	151640	194981	269688	—	354039	381484	421328	—	—	749193	—	—	—	—	
2170	32711	53595	83642	105911	—	152473	196052	271169	—	355983	383579	423642	—	—	753307	—	—	—	—	
2180	32890	53888	84100	106491	—	153308	197126	272655	—	357933	385681	425963	—	—	757434	—	—	—	—	
2190	33070	54183	84559	107073	—	154146	198203	274145	—	359889	387788	428290	—	—	761573	—	—	—	—	
2200	33250	54478	85020	107656	—	154986	199283	275639	—	361851	389902	430625	—	—	765724	—	—	—	—	

Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors in accordance with the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers.

For superheated steam, multiply the saturated steam capacities by Superheat Correction Factor  $K_{sh}$ , page 40. Capacities for the HCI-R valves: Valves adjust to a minimum of 30% of full rated capacity. Restricted capacity = [% of restricted lift] x ASME rated capacity.

\* Refer to Capacity Formula, page 34.



**Saturated Steam Capacities\*: Styles HE, HCI and HSJ - USCS (United States Customary System) Units**

Pounds per hour at 3% overpressure

Saturated Steam Capacities - Set Pressures 2210-2750 psig																			
Orifice Designation and Area (sq. in.)																			
HE HCI HSJ	F 0.307	G 0.503	H 0.785	H2 0.994	J 1.288	J2 1.431	K 1.840	K2 2.545	L 2.853	L2 3.341	M 3.60	M2 3.976	N 4.341	P 6.38	P2 7.07	Q 11.045	Q2 12.25	R 16.00	RR 19.29
2210	33431	54774	85483	108242	—	155829	200367	277138	—	363818	392022	432966	—	—	769887	—	—	—	—
2220	33612	55071	85946	108829	—	156674	201454	278641	—	365792	394148	435315	—	—	774064	—	—	—	—
2230	33794	55369	86411	109418	—	157522	202544	280149	—	367771	396281	437671	—	—	778253	—	—	—	—
2240	33976	55668	86878	110008	—	158372	203637	281661	—	369757	398421	440034	—	—	782454	—	—	—	—
2250	34159	55968	87346	110601	—	159225	204734	283179	—	371749	400567	442404	—	—	786669	—	—	—	—
2260	34343	56269	87815	111196	—	160081	205835	284701	—	373747	402720	444782	—	—	790898	—	—	—	—
2270	34527	56571	88286	111792	—	160940	206939	286228	—	375751	404880	447168	—	—	795140	—	—	—	—
2280	34712	56874	88759	112390	—	161801	208046	287760	—	377762	407047	449561	—	—	799395	—	—	—	—
2290	34897	57177	89233	112990	—	162665	209157	289296	—	379780	409221	451962	—	—	803664	—	—	—	—
2300	35083	57482	89708	113593	—	163532	210272	290838	—	381804	411402	454371	—	—	807948	—	—	—	—
2310	35270	57788	90186	114197	—	164402	211391	292385	—	383835	413590	456787	—	—	812245	—	—	—	—
2320	35457	58095	90664	114803	—	165275	212513	293938	—	385872	415786	459212	—	—	816557	—	—	—	—
2330	35645	58402	91145	115411	—	166151	213639	295495	—	387917	417989	461646	—	—	820884	—	—	—	—
2340	35834	58711	91627	116022	—	167029	214769	297058	—	389969	420200	464087	—	—	825226	—	—	—	—
2350	36023	59021	92111	116634	—	167911	215903	298626	—	392027	422418	466537	—	—	829582	—	—	—	—
2360	36213	59332	92596	117249	—	168796	217040	300200	—	394093	424644	468996	—	—	833954	—	—	—	—
2370	36403	59644	93083	117866	—	169684	218182	301779	—	396167	426878	471463	—	—	838341	—	—	—	—
2380	36594	59958	93572	118485	—	170575	219328	303364	—	398247	429120	473939	—	—	842744	—	—	—	—
2390	36786	60272	94063	119106	—	171470	220478	304955	—	400336	431370	476425	—	—	847163	—	—	—	—
2400	36979	60588	94555	119730	—	172367	221632	306551	—	402432	433629	478919	—	—	851599	—	—	—	—
2410	37172	60904	95049	120356	—	173268	222791	308154	—	404535	435895	481422	—	—	856050	—	—	—	—
2420	37366	61222	95546	120984	—	174173	223954	309762	—	406647	438171	483935	—	—	860518	—	—	—	—
2430	37561	61541	96044	121614	—	175081	225121	311377	—	408766	440454	486457	—	—	865003	—	—	—	—
2440	37756	61862	96543	122247	—	175992	226293	312997	—	410894	442747	488989	—	—	869505	—	—	—	—
2450	37953	62183	97045	122883	—	176907	227469	314624	—	413029	445048	491531	—	—	874025	—	—	—	—
2460	38150	62506	97549	123521	—	177825	228650	316258	—	415173	447358	494083	—	—	878562	—	—	—	—
2470	38348	62830	98055	124161	—	178747	229835	317897	—	417326	449678	496644	—	—	883117	—	—	—	—
2480	38546	63155	98563	124804	—	179673	231026	319543	—	419487	452006	499216	—	—	887691	—	—	—	—
2490	38745	63482	99072	125450	—	180602	232221	321196	—	421657	454345	501798	—	—	892282	—	—	—	—
2500	38946	63810	99584	126098	—	181535	233420	322856	—	423836	456692	504391	—	—	896893	—	—	—	—
2510	39147	64139	100098	126749	—	182472	234625	324522	—	426023	459049	506995	—	—	901522	—	—	—	—
2520	39349	64470	100614	127402	—	183413	235835	326196	—	428220	461417	509609	—	—	906171	—	—	—	—
2530	39551	64802	101133	128059	—	184358	237050	327876	—	430426	463794	512234	—	—	910839	—	—	—	—
2540	39755	65136	101653	128718	—	185307	238270	329564	—	432642	466181	514871	—	—	915527	—	—	—	—
2550	39959	65471	102176	129380	—	186260	239496	331259	—	434867	468578	517519	—	—	920236	—	—	—	—
2560	40165	65807	102701	130045	—	187217	240726	332961	—	437101	470986	520178	—	—	924965	—	—	—	—
2570	40371	66145	103229	130712	—	188178	241962	334671	—	439346	473405	522849	—	—	929714	—	—	—	—
2580	40578	66485	103758	131383	—	189144	243204	336388	—	441601	475834	525532	—	—	934485	—	—	—	—
2590	40786	66826	104290	132057	—	190114	244451	338113	—	443865	478274	528228	—	—	939278	—	—	—	—
2600	40995	67168	104825	132734	—	191089	245704	339846	—	446140	480726	530935	—	—	944092	—	—	—	—
2610	41205	67512	105362	133414	—	192067	246963	341588	—	448426	483189	533655	—	—	948929	—	—	—	—
2620	41416	67858	105901	134097	—	193051	248228	343337	—	450722	485663	536388	—	—	953788	—	—	—	—
2630	41628	68205	106444	134783	—	194039	249498	345094	—	453029	488149	539133	—	—	958670	—	—	—	—
2640	41841	68554	106988	135473	—	195032	250775	346860	—	455347	490646	541892	—	—	963575	—	—	—	—
2650	42055	68905	107535	136166	—	196030	252058	348634	—	457676	493156	544664	—	—	968504	—	—	—	—
2660	42270	69257	108085	136862	—	197032	253347	350417	—	460017	495678	547449	—	—	973457	—	—	—	—
2670	42486	69611	108638	137562	—	198040	254642	352209	—	462369	498213	550248	—	—	978435	—	—	—	—
2680	42704	69967	—	138265	—	199052	255944	354010	—	464733	500760	553062	—	—	983437	—	—	—	—
2690	42922	70325	—	138972	—	200070	257253	355819	—	467109	503320	555889	—	—	988465	—	—	—	—
2700	43141	70685	—	139683	—	201093	258568	357639	—	469497	505893	558731	—	—	993518	—	—	—	—
2710	—	—	—	140397	—	202121	259890	359467	—	471898	508480	561588	—	—	998598	—	—	—	—
2720	—	—	—	141115	—	203154	261219	361305	—	474311	511080	564459	—	—	1003704	—	—	—	—
2730	—	—	—	141837	—	204193	262555	363153	—	476736	513694	567346	—	—	1008838	—	—	—	—
2740	—	—	—	142562	—	205238	263898	365011	—	479175	516322	570249	—	—	1013998	—	—	—	—
2750	—	—	—	143292	—	206288	265248	366879	—	481627	518964	573167	—	—	1019187	—	—	—	—

Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors in accordance with the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers.

For superheated steam, multiply the saturated steam capacities by Superheat Correction Factor  $K_{sh}$ , page 40. Capacities for the HCI-R valves: Valves adjust to a minimum of 30% of full rated capacity. Restricted capacity = (% of restricted lift) x ASME rated capacity.

\* Refer to Capacity Formula, page 34.

**Saturated Steam Capacities\*: Styles HE, HCI and HSJ - USCS (United States Customary System) Units**

Pounds per hour at 3% overpressure

**Saturated Steam Capacities - Set Pressures 2760-3090 psig**

		Orifice Designation and Area (sq. in.)																	
HE	HCI																		
HSJ																			
Orifice (sq. in.)																			
(psig) Set Pres.	F 0.307	G 0.503	H 0.785	H2 0.994	J 1.288	J2 1.431	K 1.840	K2 2.545	L 2.853	L2 3.341	M 3.60	M2 3.976	N 4.341	P 6.38	P2 7.07	Q 11.045	Q2 12.25	R 16.00	RR 19.29
2760	—	—	—	144025	—	207344	266606	368757	—	484093	521620	576101	—	—	1024404	—	—	—	—
2770	—	—	—	144763	—	208406	267971	370645	—	486572	524292	579051	—	—	1029651	—	—	—	—
2780	—	—	—	145505	—	209474	269344	372544	—	489065	526978	582018	—	—	1034927	—	—	—	—
2790	—	—	—	146251	—	210548	270725	374454	—	491572	529680	585002	—	—	1040232	—	—	—	—
2800	—	—	—	147001	—	211628	272114	376375	—	494094	532397	588003	—	—	1045569	—	—	—	—
2810	—	—	—	147755	—	212714	273511	378307	—	496631	535130	591022	—	—	1050936	—	—	—	—
2820	—	—	—	148515	—	213807	274916	380251	—	499182	537880	594058	—	—	1056336	—	—	—	—
2830	—	—	—	149278	—	214906	276330	382206	—	501749	540645	597113	—	—	1061767	—	—	—	—
2840	—	—	—	150046	—	216012	277752	384173	—	504331	543428	600186	—	—	1067231	—	—	—	—
2850	—	—	—	150819	—	217125	279183	386152	—	506929	546227	603277	—	—	1072729	—	—	—	—
2860	—	—	—	151597	—	218245	280622	388143	—	509543	549044	606388	—	—	1078261	—	—	—	—
2870	—	—	—	152380	—	219372	282071	390147	—	512174	551878	609519	—	—	1083827	—	—	—	—
2880	—	—	—	153167	—	220505	283529	392164	—	514821	554731	612669	—	—	1089429	—	—	—	—
2890	—	—	—	153960	—	221647	284996	394193	—	517485	557601	615840	—	—	1095067	—	—	—	—
2900	—	—	—	154758	—	222795	286473	396236	—	520167	560491	619031	—	—	1100742	—	—	—	—
2910	—	—	—	155561	—	223951	287960	398292	—	522866	563399	622243	—	—	1106454	—	—	—	—
2920	—	—	—	156369	—	225115	289456	400362	—	525583	566327	625477	—	—	1112204	—	—	—	—
2930	—	—	—	157183	—	226287	290963	402446	—	528319	569275	628733	—	—	1117993	—	—	—	—
2940	—	—	—	158003	—	227467	292480	404544	—	531073	572243	632011	—	—	1123822	—	—	—	—
2950	—	—	—	158828	—	228654	294007	406657	—	533847	575231	635311	—	—	1129691	—	—	—	—
2960	—	—	—	159659	—	229851	295545	408784	—	536640	578241	638635	—	—	1135601	—	—	—	—
2970	—	—	—	160496	—	231055	297094	410927	—	539452	581272	641982	—	—	1141553	—	—	—	—
2980	—	—	—	161338	—	232269	298655	413085	—	542285	584324	645354	—	—	1147548	—	—	—	—
2990	—	—	—	162187	—	233491	300226	415259	—	545139	587399	648750	—	—	1153587	—	—	—	—
3000	—	—	—	163043	—	234722	301809	417448	—	548014	590497	652171	—	—	1159670	—	—	—	—
3010	—	—	—	—	—	—	303405	419655	—	—	593618	655618	—	—	1165799	—	—	—	—
3020	—	—	—	—	—	—	305012	421878	—	—	596762	659091	—	—	1171974	—	—	—	—
3030	—	—	—	—	—	—	306631	424118	—	—	599931	662590	—	—	1178197	—	—	—	—
3040	—	—	—	—	—	—	308263	426375	—	—	603124	666117	—	—	1184468	—	—	—	—
3050	—	—	—	—	—	—	309908	428650	—	—	606342	669671	—	—	1190789	—	—	—	—
3060	—	—	—	—	—	—	311566	430944	—	—	609586	673254	—	—	1197160	—	—	—	—
3070	—	—	—	—	—	—	313238	433256	—	—	612857	676866	—	—	1203582	—	—	—	—
3080	—	—	—	—	—	—	314923	435586	—	—	616154	680508	—	—	1210057	—	—	—	—
3090	—	—	—	—	—	—	316622	437937	—	—	619478	684179	—	—	1216586	—	—	—	—

Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors in accordance with the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers.

For superheated steam, multiply the saturated steam capacities by Superheat Correction Factor  $K_{sh}$ , page 40. Capacities for the HCI-R valves: Valves adjust to a minimum of 30% of full rated capacity. Restricted capacity = (% of restricted lift) x ASME rated capacity.

Note: For steam capacities at 10% overpressure up to absolute pressure of 1500 psia, multiply the capacity from above table by ratio  $\frac{1.10p + 14.7}{1.03p + 14.7}$  where p is set pressure (psig).

\* Capacity formula:

$$W = [51.5 \times AP \times K]$$

For pressures over 1500 psig and up to 3200 psig the value of W shall be multiplied by

$$\frac{0.1906P - 1000}{0.2292P - 1061}$$

Where:

W = Rated capacity, lbs/hr.

P = [1.03 x set pressure] + 14.7  
 = absolute pressure, psia

K = 0.878 = average coefficient of discharge

A = nozzle throat (orifice) area, sq.in.

**Saturated Steam Capacities: Styles HE, HCI and HSJ - Metric Units**

Kilograms per hour at 3% overpressure

**Saturated Steam Capacities - Set Pressures 1-43 barg**

		Orifice Designation and Area [sq. mm.]																	
HE	HCI	•																	
HSJ	•																		
Orifice [sq. mm.]	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
[barg] Set Pres.	198.1	324.5	506.5	641.3	830.0	923.2	1187.1	1641.9	1840.6	2155.5	2322.6	2565.2	2800.6	4116.1	4561.3	7125.8	7903.2	10322.6	12445.1
1.034	200	327	510	—	837	—	1196	—	1855	—	2341	—	2822	4148	—	7181	—	—	—
2	288	472	736	—	1207	—	1725	—	2674	—	3375	—	4069	5981	—	10354	—	—	—
3	379	621	969	—	1591	—	2272	—	3523	—	4446	—	5361	7879	—	13639	—	—	—
4	470	771	1203	—	1974	—	2820	—	4372	—	5516	—	6652	9776	—	16925	—	—	—
5	563	922	1439	—	2361	—	3373	—	5231	—	6600	—	7959	11697	—	20250	—	—	—
6	657	1076	1680	—	2756	—	3937	—	6105	—	7703	—	9289	13652	—	23634	—	—	—
7	751	1230	1920	—	3151	—	4501	—	6979	—	8806	—	10619	15607	—	27018	—	—	—
8	845	1385	2161	—	3545	—	5065	—	7853	—	9909	—	11949	17561	—	30402	—	—	—
9	939	1539	2401	—	3940	—	5628	—	8727	—	11012	—	13279	19516	—	33786	—	—	—
10	1033	1693	2642	—	4335	—	6192	—	9601	—	12115	—	14609	21471	—	37170	—	—	—
11	1127	1847	2882	—	4729	—	6756	—	10475	—	13218	—	15939	23425	—	40554	—	—	—
12	1221	2001	3123	—	5124	—	7320	—	11349	—	14321	—	17269	25380	—	43938	—	—	—
13	1315	2155	3363	—	5518	—	7883	—	12224	—	15424	—	18599	27335	—	47322	—	—	—
14	1409	2309	3604	—	5913	—	8447	—	13098	—	16527	—	19929	29290	—	50706	—	—	—
15	1503	2463	3844	—	6308	—	9011	—	13972	—	17630	—	21259	31244	—	54090	—	—	—
16	1598	2617	4085	—	6702	—	9575	—	14846	—	18733	—	22589	33199	—	57474	—	—	—
17	1692	2772	4325	—	7097	—	10138	—	15720	—	19836	—	23919	35154	—	60858	—	—	—
18	1786	2926	4566	—	7491	—	10702	—	16594	—	20939	—	25249	37108	—	64242	—	—	—
19	1880	3080	4806	—	7886	—	11266	—	17468	—	22042	—	26579	39063	—	67626	—	—	—
20	1974	3234	5047	6391	8281	9200	11830	16362	18342	21480	23145	25562	27909	41018	45454	71010	78757	102866	124018
21	2068	3388	5287	6695	8675	9639	12393	17142	19216	22503	24248	26780	29239	42973	47620	74394	82510	107768	129928
22	2162	3542	5528	7000	9070	10077	12957	17922	20091	23527	25351	27999	30569	44927	49786	77778	86263	112670	135838
23	2256	3696	5768	7304	9465	10515	13521	18701	20965	24551	26454	29217	31899	46882	51952	81162	90016	117572	141748
24	2350	3850	6009	7609	9859	10954	14085	19481	21839	25574	27557	30435	33229	48837	54118	84546	93770	122474	147658
25	2444	4004	6249	7913	10254	11392	14648	20261	22713	26598	28660	31653	34559	50791	56285	87930	97523	127377	153568
26	2538	4159	6490	8218	10648	11831	15212	21041	23587	27621	29763	32871	35889	52746	58451	91314	101276	132279	159478
27	2632	4313	6730	8522	11043	12269	15776	21820	24461	28645	30866	34089	37219	54701	60617	94698	105029	137181	165389
28	2726	4467	6971	8827	11438	12708	16340	22600	25335	29669	31969	35308	38549	56656	62783	98082	108782	142083	171299
29	2820	4621	7211	9131	11832	13146	16903	23380	26209	30692	33072	36526	39879	58610	64949	101466	112535	146985	177209
30	2914	4775	7452	9436	12227	13584	17467	24160	27083	31716	34175	37744	41209	60565	67115	104850	116289	151887	183119
31	3008	4929	7692	9741	12622	14023	18031	24939	27957	32740	35278	38962	42539	62520	69281	108234	120042	156789	189029
32	3102	5083	7933	10045	13016	14461	18595	25719	28832	33763	36381	40180	43869	64474	71447	111618	123795	161691	194939
33	3197	5237	8173	10350	13411	14900	19158	26499	29706	34787	37484	41398	45199	66429	73613	115002	127548	166593	200849
34	3291	5391	8414	10654	13805	15338	19722	27279	30580	35810	38586	42617	46529	68384	75780	118386	131301	171496	206759
35	3385	5546	8655	10959	14200	15777	20286	28058	31454	36834	39689	43835	47859	70339	77946	121769	135054	176398	212669
36	3479	5700	8895	11263	14595	16215	20849	28838	32328	37858	40792	45053	49189	72293	80112	125153	138808	18129	218579
37	3573	5854	9136	11568	14989	16653	21413	29618	33202	38881	41895	46271	50519	74248	82278	128537	142561	186202	224490
38	3667	6008	9376	11872	15384	17092	21977	30397	34076	39905	42998	47489	51849	76203	84444	131921	146314	191104	230400
39	3761	6162	9617	12177	15778	17530	22541	31177	34950	40929	44101	48708	53179	78157	86610	135305	150067	196006	236310
40	3855	6316	9857	12481	16173	17969	23104	31957	35824	41952	45204	49926	54509	80112	88776	138689	153820	200908	242220
41	3949	6470	10098	12786	16568	18407	23668	32737	36699	42976	46307	51144	55839	82067	90942	142073	157573	205810	248130
42	4043	6624	10338	13091	16962	18846	24232	33516	37573	43999	47410	52362	57169	84022	93109	145457	161327	210712	254040
43	4137	6778	10579	13395	17357	19284	24796	34296	38447	45023	48513	53580	58499	85976	95275	—	165080	215614	259950

Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors in accordance with the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers.

For superheated steam, multiply the saturated steam capacities by Superheat Correction Factor  $K_{sh}$ , page 40. Capacities for the HCI-R valves: Valves adjust to a minimum of 30% of full rated capacity. Restricted capacity = (% of restricted lift) x ASME rated capacity.

Capacity formula: Capacity is calculated by converting valve set pressure in Barg or kPag psig, calculating in pounds per hour by ASME Section I capacity formula, and converting to kilograms per hour.

**Saturated Steam Capacities: Styles HE, HCI and HSJ - Metric Units**

Kilograms per hour at 3% overpressure

**Saturated Steam Capacities - Set Pressures 44-86 barg**

		Orifice Designation and Area [sq. mm.]																	
HE	HCI	•																	
HSJ	•																		
Orifice [sq mm]	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
[barg] Set Pres.	198.1	324.5	506.5	641.3	830.0	923.2	1187.1	1641.9	1840.6	2155.5	2322.6	2565.2	2800.6	4116.1	4561.3	7125.8	7903.2	10322.6	12445.1
44	4231	6932	10819	13700	17752	19722	25359	35076	39321	46047	49616	54798	59829	87931	97441	—	168833	220517	265860
45	4325	7087	11060	14004	18146	20161	25923	35856	40195	47070	50719	56017	61159	89886	99607	—	172586	225419	271770
46	4419	7241	11300	14309	18541	20599	26487	36635	41069	48094	51822	57235	62489	91840	101773	—	176339	230321	277680
47	4513	7395	11541	14613	18935	21038	27051	37415	41943	49117	52925	58453	63819	93795	103939	—	180093	235223	283591
48	4607	7549	11781	14918	19330	21476	27614	38195	42817	50141	54028	59671	65149	95750	106105	—	183846	240125	289501
49	4701	7703	12022	15222	19725	21915	28178	38975	43691	51165	55131	60889	66479	97705	108271	—	187599	245027	295411
50	4796	7857	12262	15527	20119	22353	28742	39754	44566	52188	56234	62107	67809	99659	110437	—	191352	249929	301321
51	4890	8011	12503	15831	20514	22791	29306	40534	45440	53212	57337	63326	69139	101614	112604	—	195105	254831	307231
52	4984	8165	12743	16136	20909	23230	29869	41314	46314	54236	58440	64544	70469	103569	114770	—	198858	259733	313141
53	5078	8319	12984	16440	21303	23668	30433	42094	47188	55259	59543	65762	71799	105523	116936	—	202612	264636	319051
54	5172	8474	13224	16745	21698	24107	30997	42873	48062	56283	60646	66980	73129	107478	119102	—	206365	269538	324961
55	5266	8628	13465	17050	22092	24545	31561	43653	48936	57306	61749	68198	74459	109433	121268	—	210118	27443	330871
56	5360	8782	13705	17354	22487	24984	32124	44433	49810	58330	62852	69416	75789	111388	123434	—	213871	279342	336781
57	5454	8936	13946	17659	22882	25422	32688	45213	50684	59354	63955	70635	77119	113342	125600	—	217624	284244	342692
58	5548	9090	14186	17963	23276	25860	33252	45992	51558	60377	65058	71853	78449	115297	127766	—	221377	289146	348602
59	5642	9244	14427	18268	23671	26299	33816	46772	52432	61401	66161	73071	79779	117252	129933	—	225131	294048	354512
60	5736	9398	14667	18572	24065	26737	34379	47552	53307	62425	67264	74289	81109	119206	132099	—	228884	298950	360422
61	5830	9552	14908	18877	24460	27176	34943	48332	54181	63448	68367	75507	82439	121161	134265	—	232637	303852	366332
62	5924	9706	15148	19181	24855	27614	35507	49111	55055	64472	69470	76725	83769	123116	136431	—	236390	308754	372242
63	6018	9861	15389	19486	25249	28053	36071	49891	55929	65495	70573	77944	85099	125071	138597	—	240143	313657	378152
64	6112	10015	15629	19790	25644	28491	36634	50671	—	66519	—	79162	—	—	140763	—	243896	318559	—
65	6206	10169	15870	20095	26039	28930	37198	51450	—	67543	—	80380	—	—	142929	—	247650	323461	—
66	6300	10323	16110	20400	26433	29368	37762	52230	—	68566	—	81598	—	—	145095	—	251403	328363	—
67	6395	10477	16351	20704	26828	29806	38325	53010	—	69590	—	82816	—	—	147261	—	255156	333265	—
68	6489	10631	16591	21009	27222	30245	38889	53790	—	70614	—	84035	—	—	149428	—	258909	338167	—
69	6583	10785	16832	21313	27617	30683	39453	54569	—	71637	—	85253	—	—	151594	—	262662	343069	—
70	6677	10939	17072	21618	28012	31122	40017	55349	—	72661	—	86471	—	—	153760	—	266416	347971	—
71	6771	11093	17313	21922	28406	31560	40580	56129	—	73684	—	87689	—	—	155926	—	270169	352873	—
72	6865	11248	17553	22227	28801	31999	41144	56909	—	74708	—	88907	—	—	158092	—	273922	357775	—
73	6959	11402	17794	22531	29196	32437	41708	57688	—	75732	—	90125	—	—	160258	—	277675	362678	—
74	7053	11556	18034	22836	29590	32875	42272	58468	—	76755	—	91344	—	—	162424	—	281428	367580	—
75	7147	11710	18275	23140	29985	33314	42835	59248	—	77779	—	92562	—	—	164590	—	285181	372482	—
76	7241	11864	18515	23445	30379	33752	43399	60028	—	78802	—	93780	—	—	166757	—	288935	377384	—
77	7335	12018	18756	23750	30774	34191	—	60807	—	79826	—	94998	—	—	168923	—	292688	382286	—
78	7429	12172	18996	24054	31169	34629	—	61587	—	80850	—	96216	—	—	171089	—	296441	387188	—
79	7523	12326	19237	24359	31563	35068	—	62367	—	81873	—	97434	—	—	173255	—	300194	392090	—
80	7617	12480	19477	24663	31958	35506	—	63147	—	82897	—	98653	—	—	175421	—	303947	396992	—
81	7711	12635	19718	24968	32353	35944	—	63926	—	83921	—	99871	—	—	177587	—	307700	401894	—
82	7805	12789	19958	25272	32747	36383	—	64706	—	84944	—	101089	—	—	179753	—	311454	406797	—
83	7899	12943	20199	25577	33142	36821	—	65486	—	85968	—	102307	—	—	181919	—	315207	411699	—
84	7994	13097	20439	25881	33536	37260	—	66266	—	86991	—	103525	—	—	184085	—	318960	—	—
85	8088	13251	20680	26186	33931	37698	—	67045	—	88015	—	104743	—	—	186252	—	322713	—	—
86	8182	13405	20920	26490	34326	38137	—	67825	—	89039	—	105962	—	—	188418	—	326466	—	—

Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors in accordance with the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers.

For superheated steam, multiply the saturated steam capacities by Superheat Correction Factor  $K_{sh}$ , page 40. Capacities for the HCI-R valves: Valves adjust to a minimum of 30% of full rated capacity. Restricted capacity = (% of restricted lift) x ASME rated capacity.

Capacity formula: Capacity is calculated by converting valve set pressure in Barg or kPag psig, calculating in pounds per hour by ASME Section I capacity formula, and converting to kilograms per hour.

**Saturated Steam Capacities: Styles HE, HCI and HSJ - Metric Units**

Kilograms per hour at 3% overpressure

Saturated Steam Capacities - Set Pressures 87-129 barg																			
Orifice Designation and Area [sq. mm.]																			
HE	HCI	HSJ	Orifice Designation and Area [sq. mm.]																
Orifice [sq. mm.]	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
[barg] Set Pres.	198.1	324.5	506.5	641.3	830.0	923.2	1187.1	1641.9	1840.6	2155.5	2322.6	2565.2	2800.6	4116.1	4561.3	7125.8	7903.2	10322.6	12445.1
87	8276	13559	21161	26795	34720	38575	—	68605	—	90062	—	107180	—	—	190584	—	330219	—	—
88	8370	13713	21402	27099	35115	39013	—	69385	—	91086	—	108398	—	—	192750	—	333973	—	—
89	8464	13867	21642	27404	35509	39452	—	70164	—	92120	—	109616	—	—	194916	—	337726	—	—
90	8558	14022	21883	27709	35904	39890	—	70944	—	93133	—	110834	—	—	197082	—	341479	—	—
91	8652	14176	22123	28013	36299	40329	—	71724	—	94157	—	112052	—	—	199248	—	345232	—	—
92	8746	14330	22364	28318	36693	40767	—	72503	—	95180	—	113271	—	—	201414	—	348985	—	—
93	8840	14484	22604	28622	37088	41206	—	73283	—	96204	—	114489	—	—	203581	—	352739	—	—
94	8934	14638	22845	28927	37483	41644	—	74063	—	97228	—	115707	—	—	205747	—	356492	—	—
95	9028	14792	23085	29231	37877	42082	—	74843	—	98251	—	116925	—	—	207913	—	360245	—	—
96	9122	14946	23326	29536	38272	42521	—	75622	—	99275	—	118143	—	—	210079	—	363998	—	—
97	9216	15100	23566	29840	38666	42959	—	76402	—	100299	—	119362	—	—	212245	—	367751	—	—
98	9310	15254	23807	30145	39061	43398	—	77182	—	101322	—	120580	—	—	214411	—	371504	—	—
99	9404	15409	24047	30449	39456	43836	—	77962	—	102346	—	121798	—	—	216577	—	375258	—	—
100	9498	15563	24288	30754	39850	44275	—	78741	—	103369	—	123016	—	—	218743	—	379011	—	—
101	9593	15717	24528	31059	40245	44713	—	79521	—	104393	—	124234	—	—	220909	—	382764	—	—
102	9687	15871	24769	31363	40640	45152	—	80301	—	105417	—	125452	—	—	223076	—	386517	—	—
103	9781	16025	25009	31668	41034	45590	—	81081	—	106440	—	126671	—	—	225242	—	390270	—	—
104	9868	16168	25233	31951	41401	45998	—	81806	—	107393	—	127804	—	—	227257	—	393762	—	—
105	9970	16336	25494	32282	41830	46474	—	82653	—	108505	—	129128	—	—	229611	—	—	—	—
106	10073	16504	25756	32614	42260	46952	—	83502	—	109620	—	130454	—	—	231970	—	—	—	—
107	10175	16672	26019	32946	42691	47430	—	84354	—	110737	—	131784	—	—	234334	—	—	—	—
108	10278	16840	26282	33279	43122	47910	—	85207	—	111857	—	133117	—	—	236704	—	—	—	—
109	10382	17010	26546	33613	43555	48391	—	86062	—	112980	—	134453	—	—	239080	—	—	—	—
110	10485	17179	26810	33948	43989	48873	—	86919	—	114105	—	135792	—	—	241462	—	—	—	—
111	10589	17349	27075	34284	44424	49356	—	87779	—	115233	—	137135	—	—	243849	—	—	—	—
112	10693	17519	27341	34620	—	49841	—	88640	—	116364	—	138481	—	—	246242	—	—	—	—
113	10797	17690	27607	34958	—	50326	—	89504	—	117498	—	139830	—	—	248642	—	—	—	—
114	10901	17861	27874	35296	—	50813	—	90370	—	118635	—	141183	—	—	251048	—	—	—	—
115	11006	18033	28142	35635	—	51301	—	91238	—	119775	—	142540	—	—	253459	—	—	—	—
116	11111	18205	28411	35975	—	51791	—	92109	—	120917	—	143899	—	—	255877	—	—	—	—
117	11216	18377	28680	36316	—	52282	—	92981	—	122063	—	145263	—	—	258302	—	—	—	—
118	11322	18550	28950	36658	—	52774	—	93857	—	123212	—	146630	—	—	260733	—	—	—	—
119	11428	18723	29221	37000	—	53267	—	94734	—	124364	—	148001	—	—	263171	—	—	—	—
120	11534	18897	29492	37344	—	53762	—	95614	—	125519	—	149376	—	—	265615	—	—	—	—
121	11640	19072	29764	37689	—	54258	—	96496	—	126678	—	150754	—	—	268067	—	—	—	—
122	11747	19247	30037	38034	—	54755	—	97381	—	127839	—	152137	—	—	270525	—	—	—	—
123	11854	19422	30311	38381	—	55254	—	98269	—	129004	—	153523	—	—	272990	—	—	—	—
124	11961	19598	30585	38728	—	55755	—	99159	—	130173	—	154914	—	—	275463	—	—	—	—
125	12069	19774	30861	39077	—	56257	—	100052	—	131345	—	156308	—	—	277943	—	—	—	—
126	12177	19951	31137	39427	—	56760	—	100947	—	132520	—	157707	—	—	280430	—	—	—	—
127	12285	20129	31414	39778	—	57265	—	101845	—	133699	—	159110	—	—	282925	—	—	—	—
128	12394	20307	31692	40129	—	57772	—	102746	—	134882	—	160517	—	—	285427	—	—	—	—
129	12503	20486	31970	40482	—	58280	—	103649	—	136068	—	161929	—	—	287937	—	—	—	—

Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors in accordance with the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers.

For superheated steam, multiply the saturated steam capacities by Superheat Correction Factor  $K_{sh}$ , page 40. Capacities for the HCI-R valves: Valves adjust to a minimum of 30% of full rated capacity. Restricted capacity = (% of restricted lift) x ASME rated capacity.

Capacity formula: Capacity is calculated by converting valve set pressure in Barg or kPag psig, calculating in pounds per hour by ASME Section I capacity formula, and converting to kilograms per hour.

**Saturated Steam Capacities: Styles HE, HCI and HSJ - Metric Units**

Kilograms per hour at 3% overpressure

**Saturated Steam Capacities - Set Pressures 130-172 barg**

		Orifice Designation and Area [sq. mm.]																	
HE	HCI																		
HSJ																			
Orifice [sq mm]	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
[barg] Set Pres.	198.1	324.5	506.5	641.3	830.0	923.2	1187.1	1641.9	1840.6	2155.5	2322.6	2565.2	2800.6	4116.1	4561.3	7125.8	7903.2	10322.6	12445.1
130	12612	20665	32250	40836	—	58790	—	104556	—	137258	—	163345	—	—	290456	—	—	—	—
131	12722	20844	32531	41192	—	59301	—	105465	—	138452	—	164766	—	—	292982	—	—	—	—
132	12832	21025	32812	41548	—	59814	—	106378	—	139649	—	166191	—	—	295516	—	—	—	—
133	12943	21206	33094	41905	—	60329	—	107293	—	140851	—	167621	—	—	298059	—	—	—	—
134	13053	21387	33378	42264	—	60845	—	108211	—	142056	—	169056	—	—	300610	—	—	—	—
135	13165	21569	33662	42624	—	61363	—	109133	—	143266	—	170496	—	—	303170	—	—	—	—
136	13276	21752	33947	42985	—	61883	—	110057	—	144480	—	171940	—	—	305739	—	—	—	—
137	13388	21935	34233	43347	—	62405	80241	110985	—	145698	156993	173390	—	—	308316	—	—	—	—
138	13500	22119	34520	43711	—	62928	80914	111916	—	146920	158310	174845	—	—	310903	—	—	—	—
139	13613	22304	34809	44076	—	63454	81590	112851	—	148147	159632	176304	—	—	313499	—	—	—	—
140	13726	22489	35098	44442	—	63981	82268	113789	—	149378	160958	177770	—	—	316104	—	—	—	—
141	13840	22675	35388	44810	—	64510	82948	114730	—	150614	162290	179240	—	—	318719	—	—	—	—
142	13954	22862	35680	45179	—	65041	83631	115675	—	151854	163626	180716	—	—	321344	—	—	—	—
143	14068	23050	35972	45549	—	65575	84317	116623	—	153099	164968	182198	—	—	323978	—	—	—	—
144	14183	23238	36266	45921	—	66110	85005	117575	—	154349	166314	183685	—	—	326623	—	—	—	—
145	14298	23427	36561	46295	—	66647	85696	118531	—	155604	167666	185178	—	—	329278	—	—	—	—
146	14414	23616	36857	46669	—	67187	86390	119490	—	156863	169024	186677	—	—	331943	—	—	—	—
147	14530	23807	37154	47046	—	67729	87086	120454	—	158128	170386	188182	—	—	334620	—	—	—	—
148	14647	23998	37452	47423	—	68272	87786	121421	—	159398	171754	189693	—	—	337307	—	—	—	—
149	14764	24190	37752	47803	—	68818	88488	122392	—	160673	173128	191211	—	—	340005	—	—	—	—
150	14882	24383	38052	48184	—	69367	89193	123367	—	161953	174508	192734	—	—	342714	—	—	—	—
151	15000	24576	38355	48566	—	69918	89901	124347	—	163239	175893	194264	—	—	345435	—	—	—	—
152	15118	24771	38658	48950	—	70471	90612	125330	—	164530	177285	195801	—	—	348167	—	—	—	—
153	15238	24966	38963	49336	—	71026	91326	126318	—	165827	178682	197345	—	—	350912	—	—	—	—
154	15357	25162	39269	49724	—	71584	92044	127311	—	167130	180086	198895	—	—	353669	—	—	—	—
155	15478	25359	39576	50113	—	72145	92765	128308	—	168438	181496	200452	—	—	356438	—	—	—	—
156	15598	25557	39885	50504	—	72708	93489	129309	—	169753	182912	202017	—	—	359220	—	—	—	—
157	15720	25756	40195	50897	—	73273	94216	130315	—	171073	184335	203588	—	—	362014	—	—	—	—
158	15842	25956	40507	51292	—	73842	94947	131326	—	172400	185765	205167	—	—	364822	—	—	—	—
159	15964	26156	40820	51688	—	74413	95681	132341	—	173734	187202	206754	—	—	367643	—	—	—	—
160	16087	26358	41135	52087	—	74986	96419	133362	—	175073	188645	208348	—	—	370478	—	—	—	—
161	16211	26561	41451	52488	—	75563	97160	134387	—	176420	190096	209950	—	—	373327	—	—	—	—
162	16335	26764	41769	52890	—	76143	97905	135418	—	177773	191554	211561	—	—	376190	—	—	—	—
163	16460	26969	42089	53295	—	76725	98654	136454	—	179133	193019	213179	—	—	379068	—	—	—	—
164	16586	27175	42410	53701	—	77311	99407	137495	—	180499	194492	214806	—	—	381961	—	—	—	—
165	16712	27382	42733	54110	—	77899	100164	138542	—	181874	195973	216441	—	—	384869	—	—	—	—
166	16839	27590	43058	54521	—	78491	100925	139594	—	183255	197461	218085	—	—	387792	—	—	—	—
167	16967	27799	43384	54934	—	79086	101690	140652	—	184644	198958	219738	—	—	390731	—	—	—	—
168	17095	28009	43712	55350	—	79684	102459	141716	—	186040	200463	221400	—	—	393686	—	—	—	—
169	17224	28221	44042	55768	—	80285	103232	142786	—	187445	201976	223071	—	—	396658	—	—	—	—
170	17354	28433	44374	56188	—	80890	104010	143861	—	188857	203498	224752	—	—	399647	—	—	—	—
171	17484	28647	44708	56611	—	81499	104792	144943	—	190277	205028	226442	—	—	402652	—	—	—	—
172	17616	28862	45043	57036	—	82111	105579	146032	—	191706	206568	228142	—	—	405676	—	—	—	—

Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors in accordance with the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers.

For superheated steam, multiply the saturated steam capacities by Superheat Correction Factor  $K_{sh}$ , page 40. Capacities for the HCI-R valves: Valves adjust to a minimum of 30% of full rated capacity. Restricted capacity = (% of restricted lift) x ASME rated capacity.

Capacity formula: Capacity is calculated by converting valve set pressure in Barg or kPag psig, calculating in pounds per hour by ASME Section I capacity formula, and converting to kilograms per hour.

**Saturated Steam Capacities: Styles HE, HCI and HSJ - Metric Units**

Kilograms per hour at 3% overpressure

Saturated Steam Capacities - Set Pressures 173-213 barg																			
Orifice Designation and Area [sq. mm.]																			
HE HCI HSJ	F 198.1	G 324.5	H 506.5	H2 641.3	J 830.0	J2 923.2	K 1187.1	K2 1641.9	L 1840.6	L2 2155.5	M 2322.6	M2 2565.2	N 2800.6	P 4116.1	P2 4561.3	Q 7125.8	Q2 7903.2	R 10322.6	RR 12445.1
173	17748	29078	45381	57463	—	82726	106371	147127	—	193143	208116	229853	—	—	408717	—	—	—	—
174	17881	29296	45721	57893	—	83346	107167	148228	—	194589	209674	231574	—	—	411777	—	—	—	—
175	18014	29515	46062	58326	—	83969	107968	149336	—	196044	211242	233305	—	—	414856	—	—	—	—
176	18149	29736	46406	58762	—	84596	108774	150451	—	197508	212819	235047	—	—	417953	—	—	—	—
177	18284	29957	46753	59200	—	85227	109586	151574	—	198981	214407	236800	—	—	421071	—	—	—	—
178	18420	30181	47101	59641	—	85862	110402	152703	—	200464	216004	238565	—	—	424208	—	—	—	—
179	18557	30405	47452	60085	—	86501	111224	153840	—	201956	217612	240341	—	—	427366	—	—	—	—
180	18696	30631	47805	60532	—	87144	112051	154984	—	203459	219231	242129	—	—	430546	—	—	—	—
181	18835	30859	48160	60982	—	87792	112884	156136	—	204971	220861	243929	—	—	433746	—	—	—	—
182	18974	31088	48518	61435	—	88445	113723	157297	—	206494	222502	245741	—	—	436969	—	—	—	—
183	19115	31319	48878	61892	—	89101	114568	158465	—	208028	224154	247566	—	—	440214	—	—	—	—
184	19257	31552	49241	62351	—	89763	115418	159641	—	209572	225819	249404	—	—	443483	—	—	—	—
185	19400	31786	49607	62814	—	90429	116275	160826	—	211128	227495	251256	—	—	446775	—	—	—	—
186	19544	32022	—	63280	—	91101	117138	162020	—	212695	229184	253121	—	—	450092	—	—	—	—
187	19689	32260	—	63750	—	91777	118008	163223	—	214274	230885	255000	—	—	453433	—	—	—	—
188	—	—	—	64223	—	92458	118884	164435	—	215865	232600	256893	—	—	456800	—	—	—	—
189	—	—	—	64700	—	93145	119767	165656	—	217469	234327	258801	—	—	460192	—	—	—	—
190	—	—	—	65181	—	93837	120657	166887	—	219085	236068	260724	—	—	463612	—	—	—	—
191	—	—	—	65666	—	94535	121554	168128	—	220714	237824	262663	—	—	467059	—	—	—	—
192	—	—	—	66154	—	95238	122459	169379	—	222356	239593	264617	—	—	470534	—	—	—	—
193	—	—	—	66647	—	95948	123371	170640	—	224012	241377	266588	—	—	474039	—	—	—	—
194	—	—	—	67144	—	96663	124290	171913	—	225682	243177	268575	—	—	477572	—	—	—	—
195	—	—	—	67645	—	97384	125218	173196	—	227366	244992	270580	—	—	481137	—	—	—	—
196	—	—	—	68150	—	98112	126154	174490	—	229065	246822	272602	—	—	484732	—	—	—	—
197	—	—	—	68660	—	98846	127098	175796	—	230779	248670	274642	—	—	488359	—	—	—	—
198	—	—	—	69175	—	99587	128050	177113	—	232509	250533	276700	—	—	492020	—	—	—	—
199	—	—	—	69694	—	100335	129012	178443	—	234255	252415	278778	—	—	495714	—	—	—	—
200	—	—	—	70219	—	101090	129982	179785	—	236017	254313	280875	—	—	499443	—	—	—	—
201	—	—	—	70748	—	101852	130962	181141	—	237796	256230	282992	—	—	503208	—	—	—	—
202	—	—	—	71282	—	102621	131951	182509	—	239592	258166	285130	—	—	507009	—	—	—	—
203	—	—	—	71822	—	103398	132951	183891	—	241407	260121	287289	—	—	510849	—	—	—	—
204	—	—	—	72368	—	104183	133960	185287	—	243239	262096	289470	—	—	514727	—	—	—	—
205	—	—	—	72918	—	104976	134980	186697	—	245091	264091	291673	—	—	518645	—	—	—	—
206	—	—	—	73475	—	105777	136010	188123	—	246962	266107	293900	—	—	522604	—	—	—	—
207	—	—	—	74038	—	106587	137051	189563	—	248853	268144	296150	—	—	526605	—	—	—	—
208	—	—	—	—	—	—	138104	191019	—	—	270204	298425	—	—	530651	—	—	—	—
209	—	—	—	—	—	—	139169	192492	—	—	272287	300725	—	—	534741	—	—	—	—
210	—	—	—	—	—	—	140245	193981	—	—	274393	303052	—	—	538877	—	—	—	—
211	—	—	—	—	—	—	141334	195487	—	—	276523	305405	—	—	543061	—	—	—	—
212	—	—	—	—	—	—	142436	197011	—	—	278679	307785	—	—	547294	—	—	—	—
213	—	—	—	—	—	—	143551	198553	—	—	280860	310195	—	—	551578	—	—	—	—

Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors in accordance with the ASME Boiler and Pressure Vessel Code, Section I, Power Boilers.

For superheated steam, multiply the saturated steam capacities by Superheat Correction Factor  $K_{sh}$ , page 40. Capacities for the HCI-R valves: Valves adjust to a minimum of 30% of full rated capacity. Restricted capacity = (% of restricted lift) x ASME rated capacity.

Capacity formula: Capacity is calculated by converting valve set pressure in Barg or kPag psig, calculating in pounds per hour by ASME Section I capacity formula, and converting to kilograms per hour.

Note: For steam capacities at 10% overpressure up to absolute pressure of 103.4 barg, multiply the capacity from above table by ratio  $1.10p + 1.014$  where p is set pressure [barg].

$$\frac{1.10p + 1.014}{1.03p + 1.014}$$

**Superheat Correction Factor -K<sub>sh</sub>**

Flowing* Pressure psia [bara]	Total Temperature Superheated Steam														
	400°F [204°C]	450°F [232°C]	500°F [260°C]	550°F [288°C]	600°F [316°C]	650°F [343°C]	700°F [371°C]	750°F [399°C]	800°F [427°C]	850°F [454°C]	900°F [482°C]	950°F [510°C]	1000°F [538°C]	1050°F [566°C]	1100°F [593°C]
50 [3.4]	.987	.957	.930	.905	.882	.861	.841	.823	.805	.789	.774	.759	.745	.732	.719
100 [6.9]	.998	.963	.935	.909	.885	.864	.843	.825	.807	.790	.775	.760	.746	.733	.720
150 [10.3]	.984	.970	.940	.913	.888	.866	.846	.826	.808	.792	.776	.761	.747	.733	.721
200 [13.8]	.979	.977	.945	.917	.892	.869	.848	.828	.810	.793	.777	.762	.748	.734	.721
250 [17.2]		.972	.951	.921	.895	.871	.850	.830	.812	.794	.778	.763	.749	.735	.722
300 [20.7]		.968	.957	.926	.898	.874	.852	.832	.813	.796	.780	.764	.750	.736	.723
350 [24.1]		.968	.963	.930	.902	.877	.854	.834	.815	.797	.781	.765	.750	.736	.723
400 [27.6]			.963	.935	.906	.880	.857	.836	.816	.798	.782	.766	.751	.737	.724
450 [31.0]			.961	.940	.909	.883	.859	.838	.818	.800	.783	.767	.752	.738	.725
500 [34.5]			.961	.946	.914	.886	.862	.840	.820	.801	.784	.768	.753	.739	.725
550 [37.9]			.962	.952	.918	.889	.864	.842	.822	.803	.785	.769	.754	.740	.726
600 [41.4]			.964	.958	.922	.892	.867	.844	.823	.804	.787	.770	.755	.740	.727
650 [44.8]			.968	.958	.927	.896	.869	.846	.825	.806	.788	.771	.756	.741	.728
700 [48.3]				.958	.931	.899	.872	.848	.827	.807	.789	.772	.757	.742	.728
750 [51.7]				.958	.936	.903	.875	.850	.828	.809	.790	.774	.758	.743	.729
800 [55.2]				.960	.942	.906	.878	.852	.830	.810	.792	.774	.759	.744	.730
850 [58.6]				.962	.947	.910	.880	.855	.832	.812	.793	.776	.760	.744	.730
900 [62.1]				.965	.953	.914	.883	.857	.834	.813	.794	.777	.760	.745	.731
950 [65.5]				.969	.958	.918	.886	.860	.836	.815	.796	.778	.761	.746	.732
1000 [69.0]				.974	.959	.923	.890	.862	.838	.816	.797	.779	.762	.747	.732
1050 [72.4]					.960	.927	.893	.864	.840	.818	.798	.780	.763	.748	.733
1100 [75.8]					.962	.931	.896	.867	.842	.820	.800	.781	.764	.749	.734
1150 [79.3]					.964	.936	.899	.870	.844	.821	.801	.782	.765	.749	.735
1200 [82.7]					.966	.941	.903	.872	.846	.823	.802	.784	.766	.750	.735
1250 [86.2]					.969	.946	.906	.875	.848	.825	.804	.785	.767	.751	.736
1300 [89.6]					.973	.952	.910	.878	.850	.826	.805	.786	.768	.752	.737
1350 [93.1]					.977	.958	.914	.880	.852	.828	.807	.787	.769	.753	.737
1400 [96.5]					.982	.963	.918	.883	.854	.830	.808	.788	.770	.754	.738
1450 [100.0]					.987	.968	.922	.886	.857	.832	.809	.790	.771	.754	.739
1500 [103.4]					.993	.970	.926	.889	.859	.833	.811	.791	.772	.755	.740
1550 [106.9]						.972	.930	.892	.861	.835	.812	.792	.773	.756	.740
1600 [110.3]						.973	.934	.894	.863	.836	.813	.792	.774	.756	.740
1650 [113.8]						.973	.936	.895	.863	.836	.812	.791	.772	.755	.739
1700 [117.2]						.973	.938	.895	.863	.835	.811	.790	.771	.754	.738
1750 [120.7]						.974	.940	.896	.862	.835	.810	.789	.770	.752	.736
1800 [124.1]						.975	.942	.897	.862	.834	.810	.788	.768	.751	.735
1850 [127.6]						.976	.944	.897	.852	.833	.809	.787	.767	.749	.733
1900 [131.0]						.977	.946	.898	.862	.832	.807	.785	.766	.748	.731
1950 [134.5]						.979	.949	.898	.861	.832	.806	.784	.764	.746	.729
2000 [137.9]						.982	.952	.899	.861	.831	.805	.782	.762	.744	.728
2050 [141.3]						.985	.954	.899	.860	.830	.804	.781	.761	.742	.726
2100 [144.8]						.988	.956	.900	.860	.828	.802	.779	.759	.740	.724
2150 [148.2]							.956	.900	.859	.827	.801	.778	.757	.738	.722
2200 [151.7]							.955	.901	.859	.826	.799	.776	.755	.736	.720
2250 [155.1]							.954	.901	.858	.825	.797	.774	.753	.734	.717
2300 [158.6]							.953	.901	.857	.823	.795	.772	.751	.732	.725
2350 [162.0]							.952	.902	.856	.822	.794	.769	.748	.729	.712
2400 [165.5]							.952	.902	.855	.820	.791	.767	.746	.727	.710
2450 [168.9]							.951	.902	.854	.818	.789	.765	.743	.724	.707
2500 [172.4]							.951	.902	.852	.816	.787	.762	.740	.721	.704
2550 [175.8]							.951	.902	.851	.814	.784	.759	.738	.718	.701
2600 [179.3]							.951	.903	.849	.812	.782	.756	.735	.715	.698
2650 [182.7]							.952	.903	.848	.809	.779	.754	.731	.712	.695
2700 [186.2]							.952	.903	.846	.807	.776	.750	.728	.708	.691
2750 [189.6]							.953	.903	.844	.804	.773	.747	.724	.705	.687
2800 [193.1]							.956	.903	.842	.801	.769	.743	.721	.701	.684
2850 [196.5]							.959	.902	.839	.798	.766	.739	.717	.697	.679
2900 [200.0]							.963	.902	.836	.794	.762	.735	.713	.693	.675
2950 [203.4]								.902	.834	.790	.758	.731	.708	.688	.671
3000 [206.9]								.899	.831	.786	.753	.726	.704	.684	.666
3050 [210.3]								.899	.827	.782	.749	.722	.699	.679	.661
3100 [213.7]								.896	.823	.777	.744	.716	.693	.673	.656
3150 [217.2]								.894	.819	.772	.738	.711	.688	.668	.650
3200 [220.6]								.889	.815	.767	.733	.705	.682	.662	.644

For superheated steam, multiply the saturated steam capacity by Correction Factor - K<sub>sh</sub>, ASME Section III, Division I - Appendices Table XVIII-1110-1

\* Flowing pressure is the valve set pressure plus the overpressure plus the atmospheric pressure 14.7 psia [1.014 bara].



## Sizing ASME Section I Safety Valves

ASME Section I safety valves are devices designed to protect power boilers during an overpressure event. The proper sizing, selection, manufacturing, assembly, testing and maintenance are all critical to obtain optimum protection.

### ASME Code Section I

#### 1. Boilers-Safety Valve requirements (PG-67)

- a. Boilers having more than 500 sq. ft. of bare tube and boilers having combined bare tube and extended water heating surfaces exceeding 500 sq. ft. as well as a design steam generating capacity exceeding 4000 lb/hr [1814 kg/hr] must have two or more safety valves. If only two safety valves are used, the relieving capacity of the smaller must not be less than 50% of that of the larger, so if only two valves are used, select valves so that each will relieve approximately half of the total boiler capacity.

#### 2. Superheater Safety Valve Requirements (PG-68)

- a. Boilers having attached superheaters must have at least one valve on the superheater. The valves on the drum must be large enough to relieve at least 75% of the total boiler capacity. It is good practice to size the superheater valve to relieve approximately 20% of the total boiler capacity to protect the tubes against overheating.

#### 3. Reheater Safety Valve Requirements (PG-68)

- a. Boilers having reheaters must have at least one safety valve on the reheater outlet capable of relieving a minimum of 15% of the flow through the reheater. The remainder of the flow through the reheater may be discharged by safety valves on the reheater inlet.

#### 4. Economizer Safety Relief Valves Requirements (PG-67) (Closed bonnet type valve)

- a. Any economizer which may be shut off from the boiler, thereby permitting the economizer to become a fired pressure vessel, shall have one or more safety relief valves with a total discharge capacity, in lbs/hr, calculated from the maximum expected heat absorption in BTU/hr, as determined by the Manufacturer, divided by 1000. Safety Relief valves in hot water service are more susceptible to damage and subsequent leakage than safety valves relieving steam. It is recommended that the maximum allowable working pressure of the boiler and the safety relief valve setting be selected substantially higher than the desired operating pressure so as to minimize the times the safety valve must lift.

#### 5. Organic Fluid Vaporizer Safety Valve Requirements (Dowtherm Service, PVG-12)

- a. Safety valves shall be totally enclosed and shall not discharge to atmosphere, except through an escape pipe that will carry such vapors to a safe point of discharge outside of the building. The safety valve shall not have a lifting lever and valve body drains are not mandatory. A rupture disc may be installed between the safety valve and the vaporizer.

The required minimum safety valve relieving capacity shall be determined from the formula.

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

where:

- h = latent heat of heat transfer fluid at relieving pressure, Btu/lb
- W = weight of organic fluid vapor generated per hour, lb
- C = maximum total weight or volume of fuel burned per hour, lb or cu ft
- H = heat of combustion of fuel, Btu/lb or Btu/cu ft

The sum of the safety valve capacities marked on the valves shall be equal to or greater than W.

#### 6. Sample Calculations - Boiler Set Sizing

Boiler Specifications:

- Total steam generation: 1,450,000 lbs/hr.
- Design Pressure (MAWP): 3000 psig
- Drum Operating Pressure: 2835 psig
- S.H. Outlet Temperature: 1000°F
- S.H. Outlet Operating Pressure: 2680 psig

The superheater valve should relieve between 15% and 20% of the total generation capacity, or 217,500 lbs/hr. to 290,000 lbs/hr.

The superheater safety valve should be set to operate before the low set drum valve.

To determine superheater safety valve set pressure:

2835 psig	-	2680 psig	=	155 psi
Drum Operating Pressure		Superheater Outlet Operating Pressure		SH Pressure Drop

$$3000 \text{ psig} - 155 \text{ psi} - 20 \text{ psig}^* = 2825 \text{ psig}$$

Design Pressure		SH Pressure Drop		Set Pressure Pressure**
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\* The 20 psig subtracted from the superheater pressure drop is done to ensure that the superheater safety valve opens before the low set drum safety valve.

\*\* Can round set pressure up or down for even number.

The Superheat Correction Factor  $K_{sh}$  is found on page 40. First convert Set Pressure Gauge to Flowing Pressure Absolute by:

$$2825 \text{ psig} \times 1.03 + 14.7 = 2924.45 \text{ psia.}$$

At 2924.45 psia and 1000F the  $K_{sh} = 0.711$

To relieve 217,500 lbs/hr. superheated steam, the superheater valve must relieve  $217,500/0.711 = 305,907 \text{ lb/hr.}$  saturated steam.

From Capacity Table, page 34, a K2 orifice valve set at 2825 psig will relieve 381,228 lbs/hr. saturated steam or  $381,228 \times 0.711 = 271,053 \text{ lbs/hr.}$  superheated steam.

A 2 1/2 x K2 x 6 HCI-98W with welded inlet is required.

The balance of steam to be relieved by drum valves;  $1,450,000 - 271,053 = 1,178,947 \text{ lbs/hr.}$  (Drum valves must relieve a minimum of 75% total boiler capl.)

Low set drum valve must = 3000 psig (MAWP-PG-67.3).

High set drum valve =  $1.03 \times 3000 = 3090 \text{ psig}$  (PG-67.2).

The average set pressure for drum valve = 3045 psig.

From Capacity Table, page 34, at 3045 psig; two M orifice valves will discharge  $604,733 \times 2 + 1,209,466 \text{ lbs/hr.}$  Selection should be based on price comparison and also on using as many valves as practical of the same size. In this case, two M orifice valves should be used.

Actual valve capacities from Capacity Table, page 34:

1st drum valve, 3 x M x 6 HE-96W  
3000 psig - 590,497 lbs/hr.

2nd drum valve, 3 x M x 6 HE-96W  
3090 psig - 619,478 lbs/hr.

Total capacity drum valves: 1,209,975 lbs/hr. (83.4%)

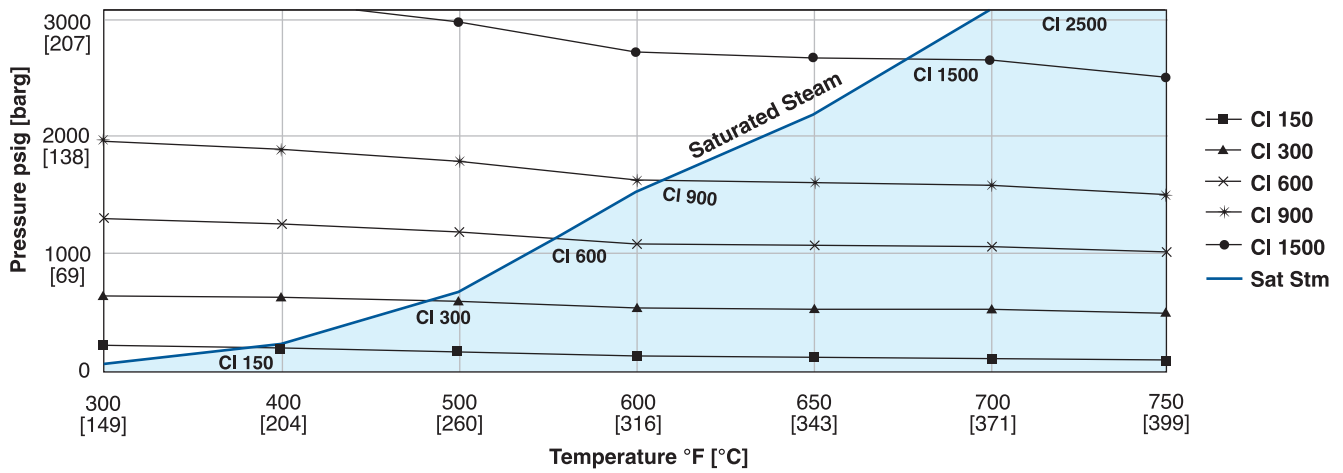
Capacity of superheater valve:  
271,053 lbs/hr. (18.7%)

Total safety valve capacity:  
1,481,028 (102%)

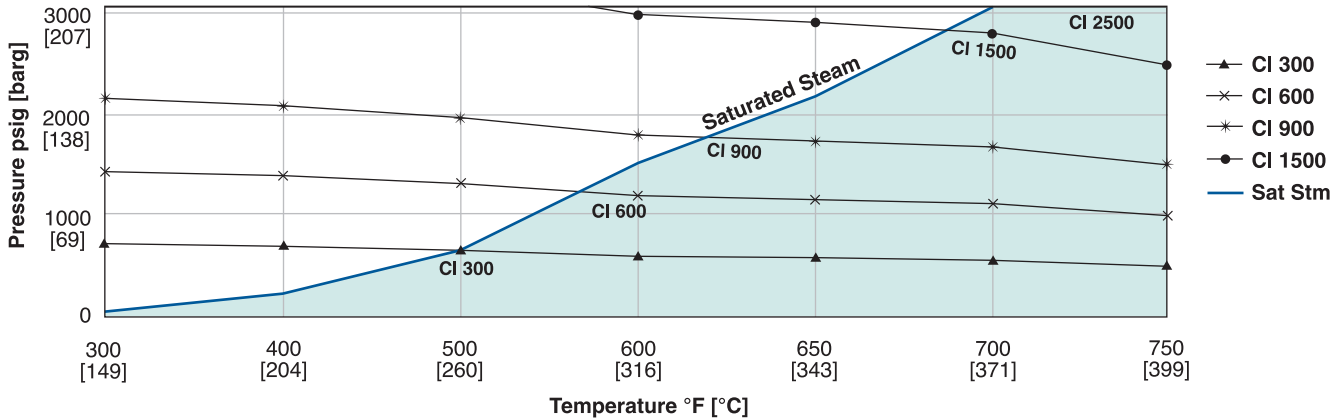
Rechecking, the drum valves relieve 83.4% of total boiler capacity [complying with ASME Code requirement that drum valves relieve at least 75% of boiler capacity]. Superheater valve relieves 18.7% of total boiler capacity — within the desirable range of 15% to 20% of total boiler capacity.

**Pressure/Temperature Limits - Standard Class Valves (Reference ASME/ANSI B16.34 - 1996)**

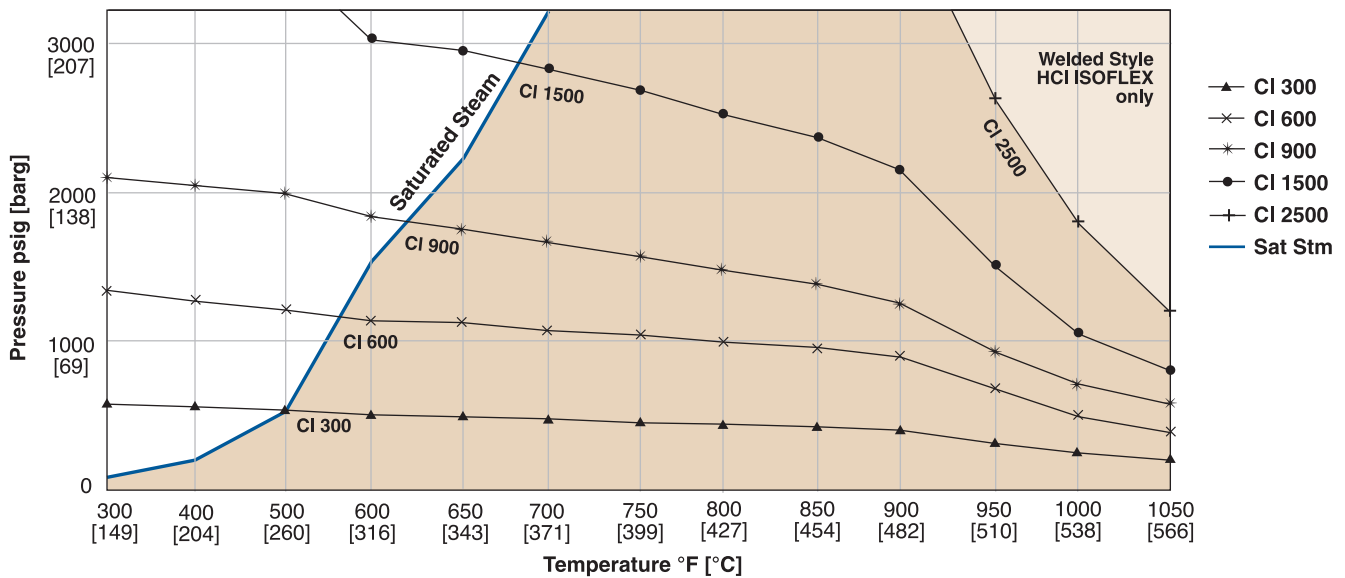
**Pressure/Temperature Limits — Body Material: SA 216 Gr. WCB**



**Pressure/Temperature Limits — Body Material: SA 216 Gr. WCC**



**Pressure/Temperature Limits — Body Material: SA 217 Gr. WC6**



**Pressure/Temperature Limits - Standard Class Valves - Reference ASME/ANSI B16.34 - 1996**

**Pressure/Temperature limits for Style HSJ-( )6 Valves**

**Body Material: SA 216 Gr. WCB**

Temperature °F [°C]	Working Pressure by Classes psig [barg]					
	ANSI Standard Class					
	150	300	600	900	1500	2500
300 [149]	230 [15.9]	655 [45.2]	1315 [90.7]	1970 [135.8]	3280 [226.2]	5470 [377.2]
400 [204]	200 [13.8]	635 [43.8]	1270 [87.6]	1900 [131.0]	3170 [218.6]	5280 [364.1]
500 [260]	170 [11.7]	600 [41.4]	1200 [82.7]	1795 [123.8]	2995 [206.5]	4990 [344.1]
600 [316]	140 [9.7]	550 [37.9]	1095 [75.5]	1640 [113.1]	2735 [188.6]	4560 [314.4]
650 [343]	125 [8.6]	535 [36.9]	1075 [74.1]	1610 [111.0]	2685 [185.1]	4475 [308.6]
700 [371]	110 [7.6]	535 [36.9]	1065 [73.4]	1600 [110.3]	2665 [183.8]	4440 [306.1]
750 [399]	95 [6.6]	505 [34.8]	1010 [69.6]	1510 [104.1]	2520 [173.8]	4200 [289.6]

**Pressure/Temperature limits for Style HCI-( )6 Valves**

**Body Material: SA 216 Gr. WCC**

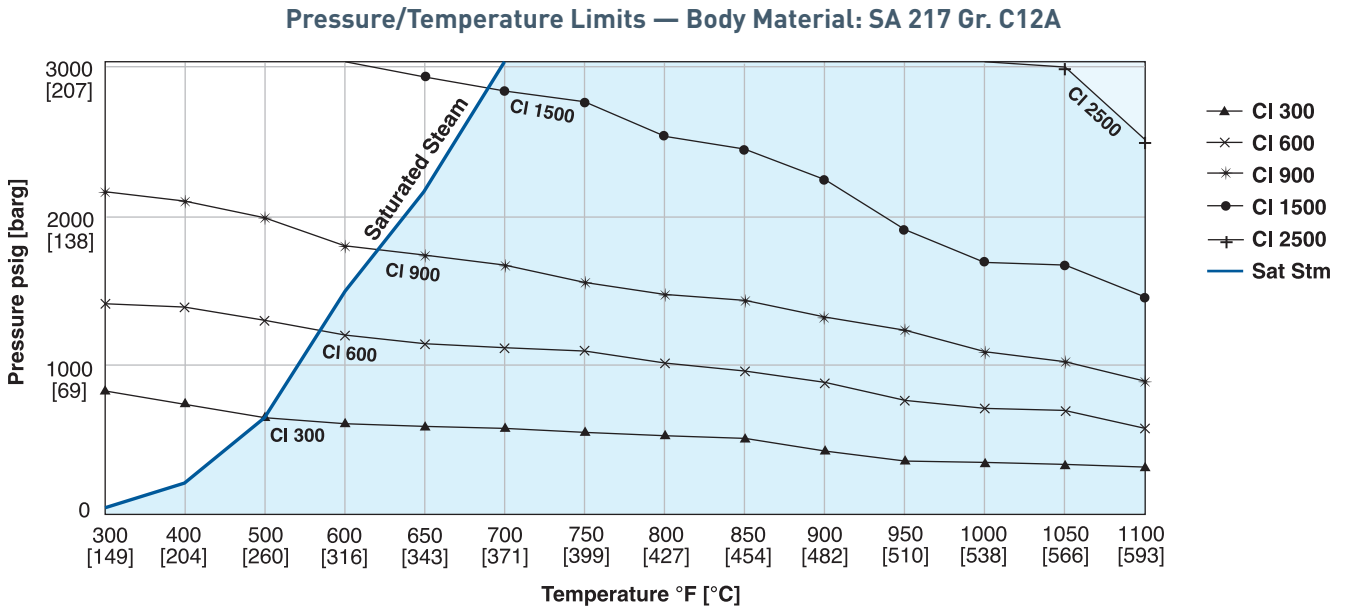
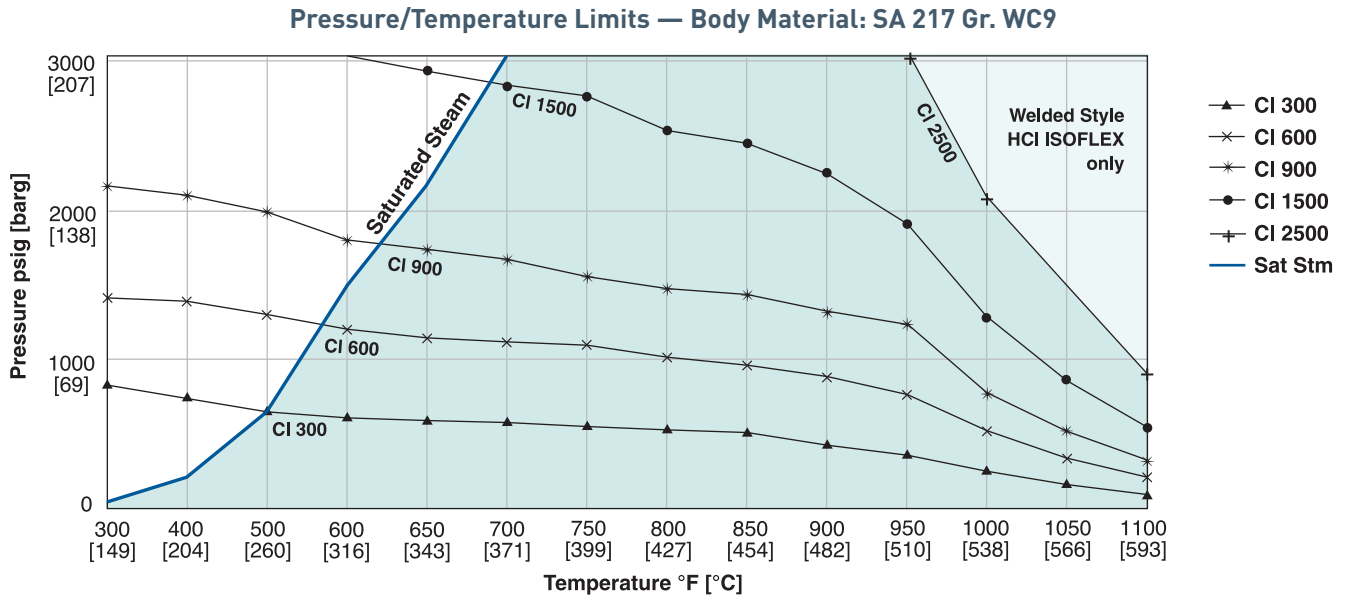
Temperature °F [°C]	Working Pressure by Classes psig [barg]				
	ANSI Standard Class				
	300	600	900	1500	2500
300 [149]	730 [50.3]	1455 [100.3]	2185 [150.7]	3640 [251.0]	6070 [418.5]
400 [204]	705 [48.6]	1410 [97.2]	2115 [145.8]	3530 [243.4]	5880 [405.4]
500 [260]	665 [45.9]	1330 [91.7]	1995 [137.6]	3325 [229.3]	5540 [382.0]
600 [316]	605 [41.7]	1210 [83.4]	1815 [125.1]	3025 [208.6]	5040 [347.5]
650 [343]	590 [40.7]	1175 [81.0]	1765 [121.7]	2940 [202.7]	4905 [338.2]
700 [371]	570 [39.3]	1135 [78.3]	1705 [117.6]	2840 [195.8]	4730 [326.1]
750 [399]	505 [34.8]	1010 [69.6]	1510 [104.1]	2520 [173.8]	4200 [289.6]

**Pressure/Temperature limits for Style HSJ-( )7 and HCI-( )8 Valves**

**Body Material: SA 216 Gr. WC6**

Temperature °F [°C]	Working Pressure by Classes psig [barg]				
	ANSI Standard Class				
	300	600	900	1500	2500
300 [149]	720 [49.6]	1445 [99.6]	2165 [149.3]	3610 [248.9]	6015 [414.7]
400 [204]	695 [47.9]	1385 [95.5]	2080 [143.4]	3465 [238.9]	5775 [398.2]
500 [260]	665 [45.9]	1330 [91.7]	1995 [137.6]	3325 [229.3]	5540 [382.0]
600 [316]	605 [41.7]	1210 [83.4]	1815 [125.1]	3025 [208.6]	5040 [347.5]
650 [343]	590 [40.7]	1175 [81.0]	1765 [121.7]	2940 [202.7]	4905 [338.2]
700 [371]	570 [39.3]	1135 [78.3]	1705 [117.6]	2840 [195.8]	4730 [326.1]
750 [399]	530 [36.5]	1065 [73.4]	1595 [110.0]	2660 [183.4]	4430 [305.4]
800 [427]	510 [35.2]	1015 [70.0]	1525 [105.1]	2540 [175.1]	4230 [291.7]
850 [454]	485 [33.4]	975 [67.2]	1460 [100.7]	2435 [167.9]	4060 [279.9]
900 [482]	450 [31.0]	900 [62.1]	1350 [93.1]	2245 [154.8]	3745 [258.2]
950 [510]	320 [22.1]	640 [44.1]	955 [65.8]	1595 [110.0]	2655 [183.1]
1000 [538]	215 [14.8]	430 [29.6]	650 [44.8]	1080 [74.5]	1800 [124.1]
1050 [566]	145 [10.0]	290 [20.0]	430 [29.6]	720 [49.6]	1200 [82.7]

**Pressure/Temperature Limits - Standard Class Valves (Reference ASME/ANSI B16.34 - 1996)**



**Pressure/Temperature Limits - Standard Class Valves (Reference ASME/ANSI B16.34 - 1996)**

**Pressure/Temperature limits for Styles HCI- ( ) Valves**

**Body Material: SA 217 Gr. WC9**

Temperature °F [°C]	Working Pressure by Classes (psig) [barg] per ASME/ANSI B16.34 - 1996									
	Inlet Flange: ANSI Standard Class									
	CL 300		CL 600		CL 900		CL 1500		CL 2500	
300 [149]	730 [50.3]	1455 [100.3]	2185 [150.7]	3640 [251.0]	6070 [418.5]					
400 [204]	705 [48.6]	1410 [97.2]	2115 [145.8]	3530 [243.4]	5880 [405.4]					
500 [260]	665 [45.9]	1330 [91.7]	1995 [137.6]	3325 [229.3]	5540 [382.0]					
600 [316]	605 [41.7]	1210 [83.4]	1815 [125.1]	3025 [208.6]	5040 [347.5]					
650 [343]	590 [40.7]	1175 [81.0]	1765 [121.7]	2940 [202.7]	4905 [338.2]					
700 [371]	570 [39.3]	1135 [78.3]	1705 [117.6]	2840 [195.8]	4730 [326.1]					
750 [399]	530 [36.5]	1065 [73.4]	1595 [110.0]	2660 [183.4]	4430 [305.4]					
800 [427]	510 [35.2]	1015 [70.0]	1525 [105.1]	2540 [175.1]	4230 [291.6]					
850 [454]	485 [33.4]	975 [67.2]	1460 [100.7]	2435 [167.9]	4060 [279.9]					
900 [482]	450 [31.0]	900 [62.1]	1350 [93.1]	2245 [154.8]	3745 [258.2]					
950 [510]	375 [25.9]	755 [52.1]	1130 [77.9]	1885 [130.0]	3145 [216.8]					
1000 [538]	260 [17.9]	520 [35.9]	780 [53.8]	1305 [90.0]	2170 [149.6]					
1050 [566]	175 [12.1]	350 [24.1]	525 [36.2]	875 [60.3]	1455 [100.3]					
1100 [593]	110 [7.6]	220 [15.2]	330 [22.8]	550 [37.9]	915 [63.1]					

**Body Material: SA 217 Gr. C12A**

Temperature °F [°C]	Working Pressure by Classes (psig) [barg] per ASME/ANSI B16.34 - 1996									
	Inlet Flange: ANSI Standard Class									
	CL 300		CL 600		CL 900		CL 1500		CL 2500	
300 [149]	730 [50.3]	1455 [100.3]	2185 [150.7]	3640 [251.0]	6070 [418.5]					
400 [204]	705 [48.6]	1410 [97.2]	2115 [145.8]	3530 [243.4]	5880 [405.4]					
500 [260]	665 [45.9]	1330 [91.7]	1995 [137.6]	3325 [229.3]	5540 [382.0]					
600 [316]	605 [41.7]	1210 [83.4]	1815 [125.1]	3025 [208.6]	5040 [347.5]					
650 [343]	590 [40.7]	1175 [81.0]	1765 [121.7]	2940 [202.7]	4905 [338.2]					
700 [371]	570 [39.3]	1135 [78.3]	1705 [117.6]	2840 [195.8]	4730 [326.1]					
750 [399]	530 [36.5]	1065 [73.4]	1595 [110.0]	2660 [183.4]	4430 [305.4]					
800 [427]	510 [35.2]	1015 [70.0]	1525 [105.1]	2540 [175.1]	4230 [291.6]					
850 [454]	485 [33.4]	975 [67.2]	1460 [100.7]	2435 [167.9]	4060 [279.9]					
900 [482]	450 [31.0]	900 [62.1]	1350 [93.1]	2245 [154.8]	3745 [258.2]					
950 [510]	385 [26.5]	775 [53.4]	1160 [80.0]	1930 [133.1]	3220 [222.0]					
1000 [538]	365 [25.2]	725 [50.0]	1090 [75.2]	1820 [125.5]	3030 [208.9]					
1050 [566]	360 [24.8]	720 [49.6]	1080 [74.5]	1800 [124.1]	3000 [206.8]					
1100 [593]	300 [20.7]	605 [41.7]	905 [62.4]	1510 [104.1]	2515 [173.4]					

**Outlet Reaction Forces Styles HE, HCI, HSJ**

**Total Resultant Force at Outlet Elbow\***

The figure below shows a safety valve open and discharging at full capacity, with a 90° outlet elbow. The horizontal reaction force (F<sub>h</sub>) is balanced by the force of discharging steam acting on the 90° elbow.

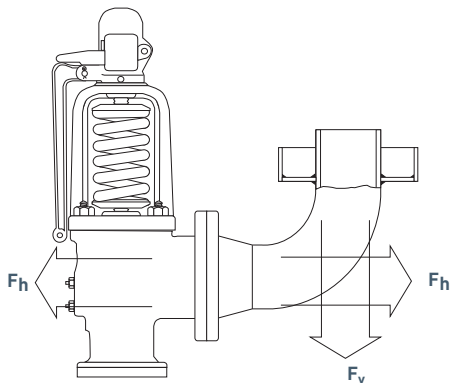
The vertical force (F<sub>v</sub>) at the 90° elbow is unbalanced and exerts a bending moment on the valve. The vertical force (F<sub>v</sub>) is the resultant of the reaction due to velocity and the static pressure of the steam acting on the area of the elbow when the valve is open and discharging.

The basic equation for this is:

$$F_v = \frac{WV}{g_c} + (AP_e)$$

Where:

- F<sub>v</sub> = Vertical force
- W = Flow in lbs./sec.
- V = Velocity, ft./sec
- A = Area of outlet, sq. in.
- P<sub>e</sub> = Static pressure in outlet elbow, psig
- g<sub>c</sub> = Gravitational Constant



\* Determination of Outlet Reaction Forces is the responsibility of the designer of the vessel and/or piping.

Total Outlet Reaction Force - lbs (Styles HE, HCI, HSJ)													
Flowing Press. <sup>1</sup> (psia)	Orifice Designation												
	F	F	G	G	H	H2	H2	J	J	J2	J2	K	K
	Outlet Diameter												
	2"	2.5"	2.5"	3"	3"	3"	4"	3"	4"	4"	6"	4"	6"
	Total Outlet Reaction Force - lbs (Styles HE, HCI, HSJ)												
100	23	24	37	39	57	—	—	84	95	—	—	126	—
200	46	49	75	79	115	—	—	210	229	—	—	262	—
300	69	74	113	120	185	262	233	372	290	342	356	493	—
400	106	99	176	160	284	387	311	534	453	523	476	725	—
500	144	124	240	209	383	513	434	—	615	703	596	957	—
600	183	158	303	273	482	638	559	—	778	884	715	1189	—
700	222	197	367	336	581	763	685	—	940	1064	844	1421	—
800	260	236	430	400	680	888	809	—	1102	1243	1025	1652	—
900	299	274	493	463	778	1012	935	—	1263	1422	1208	1882	—
1000	337	313	555	526	876	1135	1059	—	1423	1600	1387	2111	—
1100	375	351	617	588	973	1258	1182	—	1583	1777	1566	2338	—
1200	412	389	679	650	1069	1380	1305	—	1741	1953	1743	2564	—
1300	—	427	740	712	1165	1501	1426	—	1899	2128	1919	—	—
1400	—	464	801	773	1260	1621	1547	—	2055	2301	2094	—	—
1500	—	501	862	834	1354	1740	1667	—	2209	2472	2268	—	—
1600	—	539	922	895	1449	1860	1787	—	2365	2645	2443	—	—
1700	—	579	988	960	1551	1989	1917	—	2532	2831	2631	—	—
1800	—	619	1053	1026	1653	—	2047	—	—	—	2819	—	—
1900	—	660	1119	1093	1756	—	2178	—	—	—	3010	—	—
2000	—	700	1186	1160	1860	—	2309	—	—	—	3201	—	—
2100	—	742	1252	1227	1964	—	2443	—	—	—	3396	—	4465
2200	—	783	1320	1295	2070	—	2577	—	—	—	3590	—	4714
2300	—	825	1388	1363	2176	—	2712	—	—	—	3787	—	4965
2400	—	867	1456	1432	2282	—	2847	—	—	—	3984	—	5217
2500	—	910	1525	1501	2389	—	2984	—	—	—	4183	—	5472
2600	—	953	1594	1572	2498	—	3123	—	—	—	4385	—	5731
2700	—	996	1665	1643	2607	—	3263	—	—	—	4590	—	5991
2800	—	1040	—	1714	2717	—	3403	—	—	—	4795	—	6253
2900	—	—	—	—	—	—	3543	—	—	—	4999	—	6514
3000	—	—	—	—	—	—	3678	—	—	—	5198	—	6767
3100	—	—	—	—	—	—	3796	—	—	—	5373	—	6989
3200	—	—	—	—	—	—	3804	—	—	—	5394	—	7011

**Note:**

1. Flowing pressure is the valve set pressure plus the overpressure plus the atmospheric pressure (14.7 psia).

*continued, page 47*

**Outlet Reaction Forces Styles HE, HCI, HSJ**

Total Outlet Reaction Force - lbs (Styles HE, HCI, HSJ)															
Flowing Press. <sup>1</sup> (psia)	Orifice Designation														
	K2	L	L	L2	M	M2	N	P	P2	P2	Q	Q2	R	R	RR
	Outlet Diameter														
	6"	4"	6"	6"	6"	6"	6"	6"	6"	8"	8"	8"	8"	10"	10"
	Total Outlet Reaction Force - lbs (Styles HE, HCI, HSJ)														
100	—	175	210	—	254	—	295	393	—	—	686	—	—	—	—
200	—	514	426	—	515	—	639	1145	—	—	1961	—	—	—	—
300	584	875	642	814	908	1048	1183	1952	2220	—	3356	3825	5347	4763	6030
400	844	1237	995	1234	1361	1549	1730	2763	3124	—	4759	5389	7435	6789	8500
500	1166	1601	1356	1656	1815	2050	2278	3575	4028	—	6164	6955	9525	8818	10960
600	1487	1964	1715	2077	2268	2552	2826	4387	4932	—	7568	8519	11612	10846	13430
700	1808	2326	2075	2497	2721	3052	3372	5197	5833	—	8968	10080	13693	12870	15880
800	2127	—	2433	2916	3172	3551	3917	6004	6731	—	—	11635	15763	14887	18330
900	2446	—	2790	3333	3621	4048	4460	6806	7625	—	—	13182	17822	16894	20770
1000	2763	—	3145	3748	4069	4542	5000	7605	8513	—	—	14719	19865	18890	23190
1100	3078	—	—	4161	—	5033	—	—	9394	—	—	16246	—	20872	—
1200	3392	—	—	4571	—	5521	—	—	10269	—	—	17761	—	22841	—
1300	3703	—	—	4978	—	6005	—	—	11136	—	—	19263	—	24793	—
1400	4011	—	—	5382	—	6486	—	—	11994	—	—	20750	—	—	—
1500	4317	—	—	5782	—	6961	—	—	12844	12376	—	22221	—	—	—
1600	4625	—	—	6185	—	7441	—	—	13699	13228	—	23704	—	—	—
1700	4956	—	—	6618	—	7955	—	—	14619	14143	—	25297	—	—	—
1800	5289	—	—	7052	—	8473	—	—	—	15062	—	—	—	—	—
1900	5624	—	—	7489	—	8993	—	—	—	15987	—	—	—	—	—
2000	5961	—	—	7929	—	9516	—	—	—	16918	—	—	—	—	—
2100	6300	—	—	8376	9048	10043	—	—	—	17854	—	—	—	—	—
2200	6642	—	—	8823	9529	10573	—	—	—	18797	—	—	—	—	—
2300	6987	—	—	9273	10013	11108	—	—	—	19748	—	—	—	—	—
2400	7332	—	—	9722	10497	11642	—	—	—	20697	—	—	—	—	—
2500	7682	—	—	10178	10988	12184	—	—	—	21660	—	—	—	—	—
2600	8036	—	—	10639	11484	12730	—	—	—	22631	—	—	—	—	—
2700	8393	—	—	11103	11983	13281	—	—	—	23610	—	—	—	—	—
2800	8750	—	—	11568	12482	13831	—	—	—	24588	—	—	—	—	—
2900	9106	—	—	12029	12978	14376	—	—	—	25558	—	—	—	—	—
3000	9451	—	—	12475	13456	14902	—	—	—	26493	—	—	—	—	—
3100	9750	—	—	12858	13866	15351	—	—	—	27290	—	—	—	—	—
3200	9767	—	—	12858	13865	15339	—	—	—	27269	—	—	—	—	—

**Note:**

1. Flowing pressure is the valve set pressure plus the overpressure plus the atmospheric pressure (14.7 psia).

**Outlet Reaction Forces\* Styles HE, HCI, HSJ**

**Total Resultant Force at Outlet Elbow**

The figure below shows a safety valve open and discharging at full capacity, with a 90° outlet elbow. The horizontal reaction force (F<sub>h</sub>) is balanced by the force of discharging steam acting on the 90° elbow.

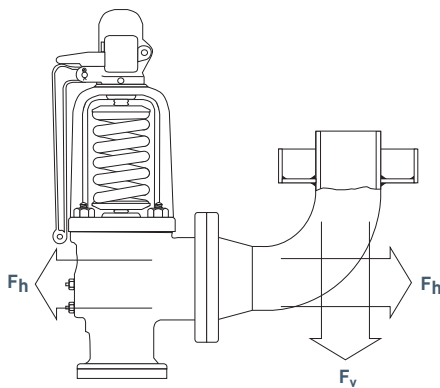
The vertical force (F<sub>v</sub>) at the 90° elbow is unbalanced and exerts a bending moment on the valve. The vertical force (F<sub>v</sub>) is the resultant of the reaction due to velocity and the static pressure of the steam acting on the area of the elbow when the valve is open and discharging.

The basic equation for this is:

$$F_v = \frac{WV + (AP_e)}{g_c}$$

Where:

- F<sub>v</sub> = Vertical force - [kN]
- W = Flow in
- V = Velocity
- A = Area of outlet, sq. mm.
- P<sub>e</sub> = Static pressure in outlet elbow, barg
- g<sub>c</sub> = Gravitational Constant



\* Determination of Outlet Reaction Forces is the responsibility of the designer of the vessel and/or piping.

**Total Outlet Reaction Force - kN (Styles HE, HCI, HSJ)**

	Orifice Designation													
	F	F	G	G	H	H2	H2	J	J	J2	J2	K	K	
	Outlet Diameter													
	2"	2.5"	2.5"	3"	3"	3"	4"	3"	4"	4"	6"	4"	6"	
<b>Flowing Press.<sup>1</sup> (psia)</b>	<b>Total Outlet Reaction Force - lbs (Styles HE, HCI, HSJ)</b>													
6.9	0.1	0.1	0.2	0.2	0.3	—	—	0.4	0.4	—	—	0.6	—	
13.8	0.2	0.2	0.3	0.4	0.5	—	—	0.9	0.6	—	—	1.2	—	
20.7	0.3	0.3	0.5	0.5	0.8	1.2	1.0	1.7	1.3	1.5	1.6	2.2	—	
27.6	0.5	0.4	0.8	0.7	1.3	1.7	1.4	2.4	2.0	2.3	2.1	3.2	—	
34.5	0.6	0.6	1.1	0.9	1.7	2.3	1.9	—	2.7	3.1	2.7	4.3	—	
41.4	0.8	0.7	1.3	1.2	2.1	2.8	2.5	—	3.5	3.9	3.2	5.3	—	
48.3	1.0	0.9	1.6	1.5	2.6	3.4	3.0	—	4.2	4.7	3.8	6.3	—	
55.2	1.2	1.0	1.9	1.8	3.0	3.9	3.6	—	4.9	5.5	4.6	7.3	—	
62.1	1.3	1.2	2.2	2.1	3.5	4.5	4.2	—	5.6	6.3	5.4	8.4	—	
69.0	1.5	1.4	2.5	2.3	3.9	5.1	4.7	—	6.3	7.1	6.2	9.4	—	
75.8	1.7	1.6	2.7	2.6	4.3	5.6	5.3	—	7.0	7.9	7.0	10.4	—	
82.7	1.8	1.7	3.0	2.9	4.8	6.1	5.8	—	7.7	8.7	7.8	11.4	—	
89.6	—	1.9	3.3	3.2	5.2	6.7	6.3	—	8.4	9.5	8.5	—	—	
96.5	—	2.1	3.6	3.4	5.6	7.2	6.9	—	9.1	10.2	9.3	—	—	
103.4	—	2.2	3.8	3.7	6.0	7.7	7.4	—	9.8	11.0	10.1	—	13.4	
110.3	—	2.4	4.1	4.0	6.4	8.3	7.9	—	10.5	11.8	10.9	—	14.4	
117.2	—	2.6	4.4	4.3	6.9	8.8	8.5	—	11.3	12.6	11.7	—	15.5	
124.1	—	2.8	4.7	4.6	7.4	9.4	9.1	—	—	13.4	12.5	—	16.6	
131.0	—	2.9	5.0	4.9	7.8	10.0	9.7	—	—	14.3	13.4	—	17.7	
137.9	—	3.1	5.3	5.2	8.3	10.6	10.3	—	—	15.1	14.2	—	18.8	
144.8	—	3.3	5.6	5.5	8.7	11.2	10.9	—	—	15.9	15.1	—	19.9	
151.7	—	3.5	5.9	5.8	9.2	11.8	11.5	—	—	16.8	16.0	—	21.0	
158.6	—	3.7	6.2	6.1	9.7	12.4	12.1	—	—	17.7	16.8	—	22.1	
165.5	—	3.9	6.5	6.4	10.1	12.9	12.7	—	—	18.5	17.7	—	23.2	
172.4	—	4.0	6.8	6.7	10.6	13.5	13.3	—	—	19.4	18.6	—	24.3	
179.3	—	4.2	7.1	7.0	11.1	14.2	13.9	—	—	20.3	19.5	—	25.5	
186.2	—	4.4	7.4	7.3	11.6	14.8	14.5	—	—	21.2	20.4	—	26.7	
193.1	—	4.6	—	7.6	12.1	15.4	15.1	—	—	22.0	21.3	—	27.8	
200.0	—	—	—	—	—	16.0	15.8	—	—	22.9	22.2	—	29.0	
206.8	—	—	—	—	—	16.6	16.4	—	—	23.8	23.1	—	30.1	
213.7	—	—	—	—	—	17.1	16.9	—	—	24.5	23.9	—	31.1	
220.6	—	—	—	—	—	17.1	16.9	—	—	24.5	24.0	—	31.2	

*continued, page 49*

**Note:**

1. Flowing pressure is the valve set pressure plus the overpressure plus the atmospheric pressure [1.014 bara].



**Outlet Reaction Forces Styles HE, HCI, HSJ**

Total Outlet Reaction Force - kN (Styles HE, HCI, HSJ)															
	Orifice Designation														
	K2	L	L	L2	M	M2	N	P	P2	P2	Q	Q2	R	R	RR
	Outlet Diameter														
	6"	4"	6"	6"	6"	6"	6"	6"	6"	8"	8"	8"	8"	10"	10"
Flowing Press. <sup>1</sup> (psia)	Total Outlet Reaction Force - lbs (Styles HE, HCI, HSJ)														
	6.9	—	0.8	0.9	—	1.1	—	1.3	1.7	—	—	3.1	—	—	—
13.8	—	2.3	1.9	—	2.3	—	2.8	5.1	—	—	8.7	—	—	—	—
20.7	2.6	3.9	2.9	3.6	4.0	4.7	5.3	8.7	9.9	—	14.9	17.0	23.8	21.2	26.8
27.6	3.8	5.5	4.4	5.5	6.1	6.9	7.7	12.3	13.9	—	21.2	24.0	33.1	30.2	37.8
34.5	5.2	7.1	6.0	7.4	8.1	9.1	10.1	15.9	17.9	—	27.4	30.9	42.4	39.2	48.8
41.4	6.6	8.7	7.6	9.2	10.1	11.4	12.6	19.5	21.9	—	33.7	37.9	51.7	48.2	59.7
48.3	8.0	10.3	9.2	11.1	12.1	13.6	15.0	23.1	25.9	—	39.9	44.8	60.9	57.2	70.6
55.2	9.5	—	10.8	13.0	14.1	15.8	17.4	26.7	29.9	—	—	51.8	70.1	66.2	81.5
62.1	10.9	—	12.4	14.8	16.1	18.0	19.8	30.3	33.9	—	—	58.6	79.3	75.1	92.4
69.0	12.3	—	14.0	16.7	18.1	20.2	22.2	33.8	37.9	—	—	65.5	88.4	84.0	103.2
75.8	13.7	—	—	18.5	—	22.4	—	—	41.8	—	—	72.3	—	92.8	—
82.7	15.1	—	—	20.3	—	24.6	—	—	45.7	—	—	79.0	—	101.6	—
89.6	16.5	—	—	22.1	—	26.7	—	—	49.5	—	—	85.7	—	110.3	—
96.5	17.8	—	—	23.9	—	28.8	—	—	53.4	—	—	92.3	—	—	—
103.4	19.2	—	—	25.7	27.8	31.0	—	—	57.1	55.1	—	98.8	—	—	—
110.3	20.6	—	—	27.5	29.8	33.1	—	—	60.9	58.8	—	105.4	—	—	—
117.2	22.0	—	—	29.4	31.8	35.4	—	—	65.0	62.9	—	112.5	—	—	—
124.1	23.5	—	—	31.4	33.9	37.7	—	—	—	67.0	—	—	—	—	—
131.0	25.0	—	—	33.3	36.0	40.0	—	—	—	71.1	—	—	—	—	—
137.9	26.5	—	—	35.3	38.1	42.3	—	—	—	75.3	—	—	—	—	—
144.8	28.0	—	—	37.3	40.2	44.7	—	—	—	79.4	—	—	—	—	—
151.7	29.5	—	—	39.2	42.4	47.0	—	—	—	83.6	—	—	—	—	—
158.6	31.1	—	—	41.2	44.5	49.4	—	—	—	87.8	—	—	—	—	—
165.5	32.6	—	—	43.2	46.7	51.8	—	—	—	92.1	—	—	—	—	—
172.4	34.2	—	—	45.3	48.9	54.2	—	—	—	96.3	—	—	—	—	—
179.3	35.7	—	—	47.3	51.1	56.6	—	—	—	100.7	—	—	—	—	—
186.2	37.3	—	—	49.4	53.3	59.1	—	—	—	105.0	—	—	—	—	—
193.1	38.9	—	—	51.5	55.5	61.5	—	—	—	109.4	—	—	—	—	—
200.0	40.5	—	—	53.5	57.7	63.9	—	—	—	113.7	—	—	—	—	—
206.8	42.0	—	—	55.5	59.9	66.3	—	—	—	117.8	—	—	—	—	—
213.7	43.4	—	—	57.2	61.7	68.3	—	—	—	121.4	—	—	—	—	—
220.6	43.4	—	—	57.2	61.7	68.2	—	—	—	121.3	—	—	—	—	—

**Note:**  
 1. Flowing pressure is the valve set pressure plus the overpressure plus the atmospheric pressure [1.014 bara].

**Optional Equipment**

**Drip Pan Elbows**

For optimum safety valve performance, discharge piping should be supported independently of the valve. This can best be accomplished by installing a slip joint arrangement at the inlet to the riser pipe, using a drip pan elbow.

The riser should be sized sufficiently larger than the slip joint to provide clearance during expansion of the boiler, and should be located with enough clearance at the lower end to prevent “bottoming” on the drip pan.

Drain lines should be installed from the discharge elbow and the safety valve body, and piped separately from any other drain or vent line. The size of the drip pan elbow should be at least equal to that of the safety valve outlet size.

The Flanged Model EFS Drip Pan Elbow should be used without any intermediary connection.

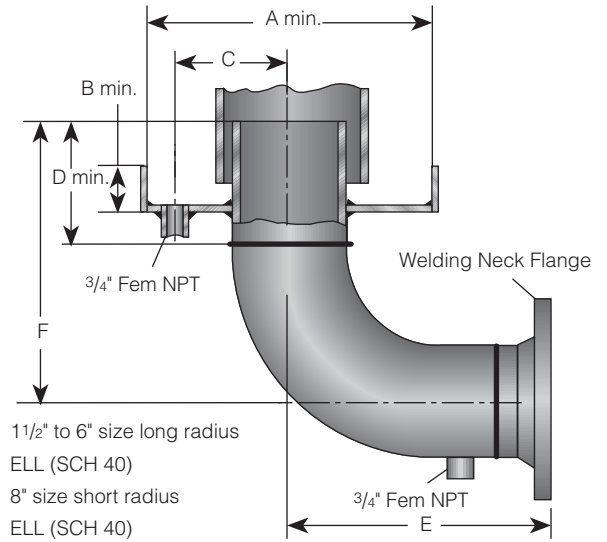
**Specifications**

**Model:** EFS

**Sizes:** 2", 2½", 3", 4", 6", 8" and 10"

**Flange ANSI Class:** 150 [2" to 10"]  
 300 [3" to 10"]  
 600 [3"]

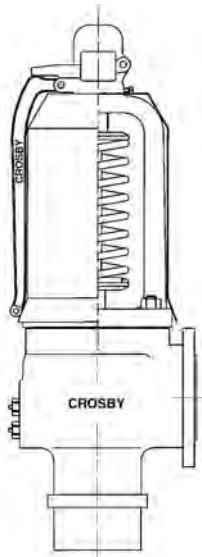
**Material:** Carbon Steel



**Dimensions - inches**

Valve Outlet Size	A		B		C		D		E 150 ANSI Class		E 300 ANSI Class		E 600 ANSI Class		F	
	in	[mm]	in	[mm]	in	[mm]	in	[mm]	in	[mm]	in	[mm]	in	[mm]	in	[mm]
2	9	[228.6]	2½	[63.5]	3	[76.2]	6	[152.4]	5½	[139.7]	—	—	—	—	9	[228.6]
2½	9	[228.6]	2½	[63.5]	3	[76.2]	7	[177.8]	6½	[165.1]	—	—	—	—	10¾	[273]
3	9	[228.6]	3	[76.2]	3	[76.2]	8	[203.2]	7¼	[184.1]	75/8	[193.7]	8	[203.2]	12½	[317.5]
4	12	[304.8]	3	[76.2]	4	[101.6]	8	[203.2]	9	[228.6]	93/8	[238.1]	—	—	14	[355.6]
6	14	[355.6]	4	[101.6]	5	[127]	8	[203.2]	12½	[317.5]	127/8	[327.0]	—	—	17	[431.8]
8	16	[406.4]	4	[101.6]	6½	[165.1]	8	[203.2]	12	[304.8]	123/8	[314.3]	—	—	16	[406.4]
10	20	[508]	5	[127]	8	[203.2]	10	[254]	14	[355.6]	145/8	[371.5]	—	—	20	[508]

## Optional Equipment



Weatherhood



Reseating Machine

### Weatherhoods

Safety valves for outdoor installations should be supplied with weatherhoods to protect the exposed spring and upper structure from weather and thermal effects. Weatherhoods are available for all Crosby Series H valves. Contact your local sales representative.

### Reseating Machines

Crosby reseating machines will remachine the nozzle seats in place without removing the safety valve from the installation. Form cutters are used to cut a new seat to exact dimensions. Reseating machines, cutters and auxiliary equipment may be rented or purchased. Contact your local sales representative.

### Jacking Devices

When a safety valve is to be disassembled and it is desired to retain spring compression, i.e., the set pressure, a mechanical or hydraulic jacking device may be used. Jacking devices are used to lift the lower spring washer sufficiently to allow the disc insert to lift clear of the nozzle (permitting the entire bonnet assembly to be removed). Jacking devices may be rented or purchased. Contact your local sales representative.

### Air (ASPD) and Hydraulic (HSPD) Set Pressure Devices

The set pressure of safety valves may be determined without raising system pressure to the popping pressure of the valves by using a Crosby set pressure device which may be rented or purchased.

The apparatus consists of a lifting device mounted on the bonnet and connected to the spindle of the safety valve. The differential force, required to open the safety valve when the system (steam) pressure is less than the valve set pressure, is applied by the operator. The differential force at which the valve opens is determined and the safety valve set pressure is calculated from this measurement. Contact your local sales representative.

Also available from Crosby:

- Lapping Blocks
- Lapping Block Resurfacing Plates

**Ordering Information**

Safety valves listed in this catalog are for steam service on steam generators, unfired pressure vessels and pipe lines. To assist customers in selecting proper safety valves, Crosby will recommend the most suitable safety valve, size and style. In order to do this, the following information is required:

**Steam Generators**

- Type
- Service
- Valve Inlet (Welded or Flanged)
- Maximum Rate of Steam Generation
- Design Pressure
- Drum Operating Pressure
- Superheater Outlet Temperature
- Superheater Outlet Operating Pressure
- Reheater Steam Flow (if any)
- Reheater Inlet Operating Pressure
- Reheater Inlet Temperature
- Reheater Outlet Operating Pressure
- Reheater Outlet Temperature
- Applicable Code (ASME Section I or Section VIII)

Indicate if for outdoor service.

**Unfired Pressure Vessel Service**

- Required Capacity
- Design Pressure of Vessel
- Operating Pressure
- Maximum Operating Temperature
- Applicable Code

**Existing Boilers**

- Design Pressure (or Maximum Allowable Working Pressure if below Design Pressure)
- Maximum Operating Pressure (Drum and Superheater)
- Maximum Rate of Steam Generation or Heating Surface and Type of Firing
- Number and Size of Openings for Safety Valves (if special flanges - diameter of bolt circle, number and size of holes)

**Organic Fluid Vaporizer (Dowtherm) Service**

- Name of Fluid
- Molecular weight or Specific Gravity
- Required capacity lbs/hr of Organic Fluid

**For customers who wish to size their own safety valves, orders should include the following data:**

Data	Example
Code Requirements	ASME Section I
Quantity of Valves	Two
Size - Inlet x Orifice x Outlet	2 1/2" x K2 x 6"
Style	HCI-46W
Set Pressure	1 @ 1150 psig [79 barg] 1 @ 1200 psig [83 barg]
Required Capacity (Total) (or indicate actual valve capacity)	280,000 lbs/hr. [127,000 kg/hr.] (Total)
Temperature - Saturated or °F [°C]	Saturated
Maximum Operating Pressure	
Drum	1000 psig [69 barg]
Superheater	None
Connections (Rating and Facing)	Buttweld Inlet ANSI CI 150 Outlet - RF

## Safety Valve Installation

Safety valves are intended to open and close within a narrow pressure range; therefore, valve installations require careful and accurate design both as to inlet and discharge piping. The higher the operating pressure and the greater the valve capacity, the more critical becomes the need for proper design of the installation. (ASME/ANSI Power Piping Code B31.1)

### Inlet Piping

Safety valves should always be mounted in a vertical position directly on nozzles having a well rounded approach that provides smooth, unobstructed flow from the vessel or line to the valve. **A safety valve should NEVER be installed on a nozzle having an inside diameter smaller than the inlet connection to the valve, or on excessively long nozzles.**

The pressure drop occurring in the inlet piping between the valve and pressure source should be computed at actual flow of the valve. It is well to remember that the ASME Boiler Code, Section I rating for safety valves is only 90% of the actual flow. The safety valve or safety relief valve(s) shall be connected to the boiler independent of any other connection, and attached as close as possible to the boiler or the normal steam flow path without any unnecessary intervening pipe or fitting. Such intervening pipe or fitting shall not be longer than the face-to-face dimension of the corresponding tee fitting of the same diameter and pressure under the applicable American National Standard. **The wall thickness of the inlet piping must be heavy enough to resist bending moments due to reaction when the valve discharges.**

Ask for paper by J.R. Zahorsky entitled, "Degradation of Pressure Relief Valve Performance caused by Inlet Piping Configuration."

### Outlet Reaction Forces

The forces created by the steam discharging from a safety valve will impose a reactive load on the inlet of the valve, the mounting nozzle, and the adjacent supporting vessel. The precise nature of the loading and the resulting stresses will depend on the configuration of the valve and the discharge piping. This must be taken into consideration by those responsible for the installation of the safety valve and associated vessel or piping.

**Determination of Outlet Reaction Forces is the responsibility of the designer of the vessel and/or piping.**

(See pages 46-49).

### Boilers

Crosby recommends that the absolute minimum differential pressure, i.e., the pressure between the valve set pressure and operating pressure, be not less than 5% to ensure seat tightness.

**Nozzles for safety valves on boiler steam drums must have inside diameters equal to the valve nominal size. Nominal diameter plus 1/2" or more is recommended, particularly for valves mounted off the center line of the drum.**

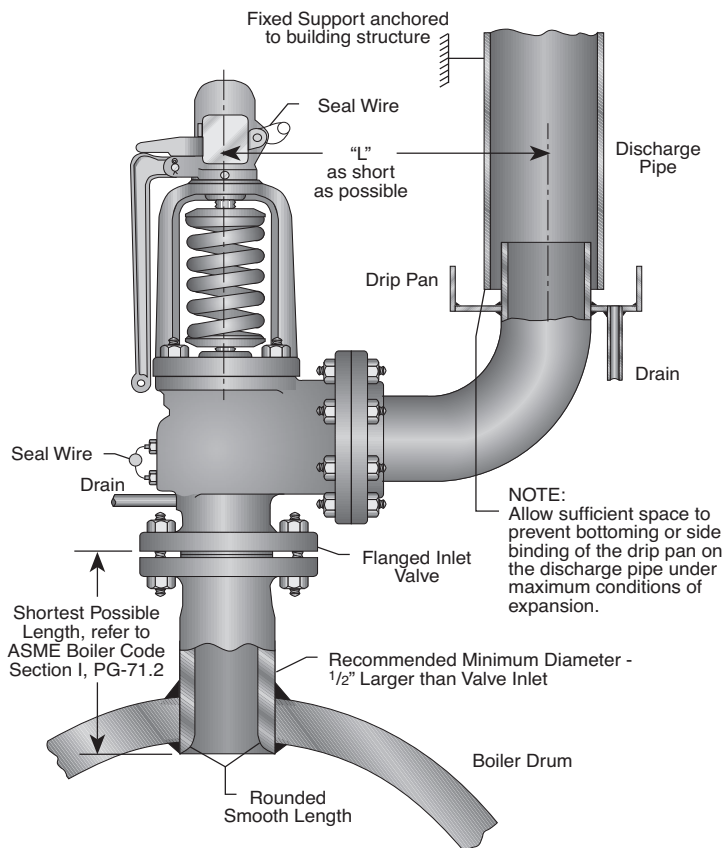
### Headers

On superheaters and reheater headers, inlet nozzle connections for safety valves should be as short as possible. It is desirable to use piping nozzles having a rounded entrance and larger ID than the valve nominal size.

This is often necessary to keep the inlet pressure drop within limits. Such connections should be away from turns or branches which can cause turbulence.

### Pipe Lines

Where safety valves are installed to protect a piping system, as on the low pressure side of a reducing valve or on a turbine bypass, the pipe or header must be of sufficient size to maintain flow under the safety valve while it is discharging. On a pressure reducing valve installation, the safety valves should be located at least eight pipe diameters downstream from the pressure reducing valve. Where nozzles are used, they must be as short as possible and preferably one pipe size larger than the valve inlet. Nozzles must be designed to counterbalance the reaction when the valve discharges. Several smaller valves are better than one large valve, and the set pressure of each valve should be staggered within ASME Boiler and Pressure Vessel Code limitations.



When safety valves are installed on a header or vertical riser, the connection should be as close and as short as possible. The exit from the header or riser should be larger than the valve inlet, have a well rounded approach and a uniform reduction of diameter with no abrupt changes, preferably with a smooth, gradual taper (similar to a seamless reducing or Y fitting). The design should also result in minimum pressure drop from the header or riser to the safety valve.

## Recommendations

### Discharge Piping

**The discharge piping from safety valves should be equal in size to, or larger than, the nominal valve outlet and should be as simple and direct as possible.**

Connections with generous clearances are preferred. The discharge pipe above the drip pan should be sized adequately to avoid “blow back” of steam from around the drip pan into the boiler room when the valve is discharging. Where piping extends to a considerable length, it may be necessary to increase the pipe size at the upper part of the stack.

Where flexible hose connections are used in place of or in conjunction with drip pans, they must be of sufficient length and flexibility so as to absorb expansion and impose no strains on the valve outlet when the pressure vessel is at normal operating pressure.

Where solid piping must be used, expansion bends should be employed to accomplish the same purpose.

### Discharge Manifolds

Discharge manifold lines are satisfactory if the following “good practices” are observed:

The area of the manifold should be equal to or larger than the areas leading into it. “Stepping up” the size of the manifold at each point where another valve discharge line enters permits smoother flow than simply sizing the manifold to the total area required.

The manifold should be independently supported and not on the valves.

The same precautions should be observed in providing drip pans, flexible connections and expansion bends on the individual discharge valve lines leading into the manifold.

The manifold should be adequately anchored to prevent it from swaying and adequate drains should be provided.

The discharge lines should be led into the manifold at an angle of 45 degrees (less if possible) to the direction of the steam flow.

The manifold should be checked for possible back pressure which might cause steam “blow back” out of individual drip pans. If closed systems are used, back pressure in the manifold resulting when one valve discharges can affect the popping point and the performance of other valves connected to the same system.

**Note: All discharge piping in the discharge system must be vented to a safe disposal area to prevent personnel injury when the valve discharges.**

Design considerations are included in the following articles: “Steam Flow Through Safety Valve Vent Pipes” by H.E. Brandmaier and M.E. Knebel (December 1975), “Analysis of Power Plant Safety and Relief Valve Vent Stacks” by G.S. Liao (November 1974), and “Safety Valve Vent Pipe Sizing for Open Discharge Systems” by J.W. Sale (June 1979). The latter papers are ASME publications.

### Drains

Provisions for drains are located in the valve bodies and should be piped to a drainage system to remove condensate

from the valve bodies. Separate drains are recommended to drain the drip pan and on certain types of installations additional drainage from the discharge piping may be provided. This is especially true in marine installations where it is essential that the main atmospheric exhaust stack be provided with a drain pocket at the lowest point, and that a separate drain line be carried from this pocket to the bilge.

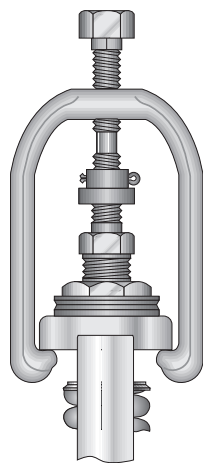
**Note: All drains and piping in the discharge system must be piped to a safe disposal area to prevent possible personnel injury when the valve discharges.**

### Hydrostatic Testing of Boilers

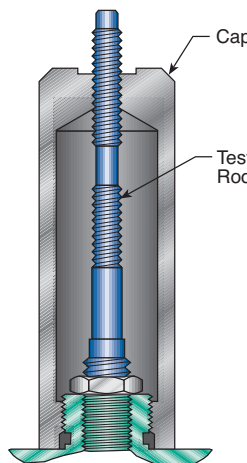
Hydrostatic test plugs are recommended by Crosby for use on welded inlet valves. If flanged inlet valves are to be installed, we recommend that the hydrostatic test be completed prior to installing the safety valve by blanking off the boiler opening. A hydrostatic test plug is supplied for all welded inlet valves. Hydrostatic test plugs can be supplied on request for any flanged inlet safety valve.

Technical literature is provided for Crosby Series H valves which describes the specific type and use of hydrostatic test equipment available.

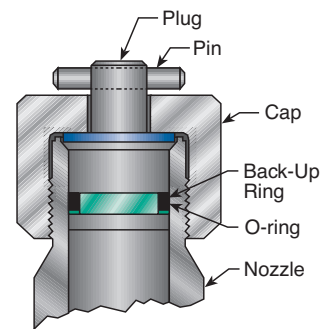
### Test Clamps



Style HE ISOFLEX and  
HCI ISOFLEX



Style HSJ



Hydrostatic Test Plug



**VALVES & CONTROLS**

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