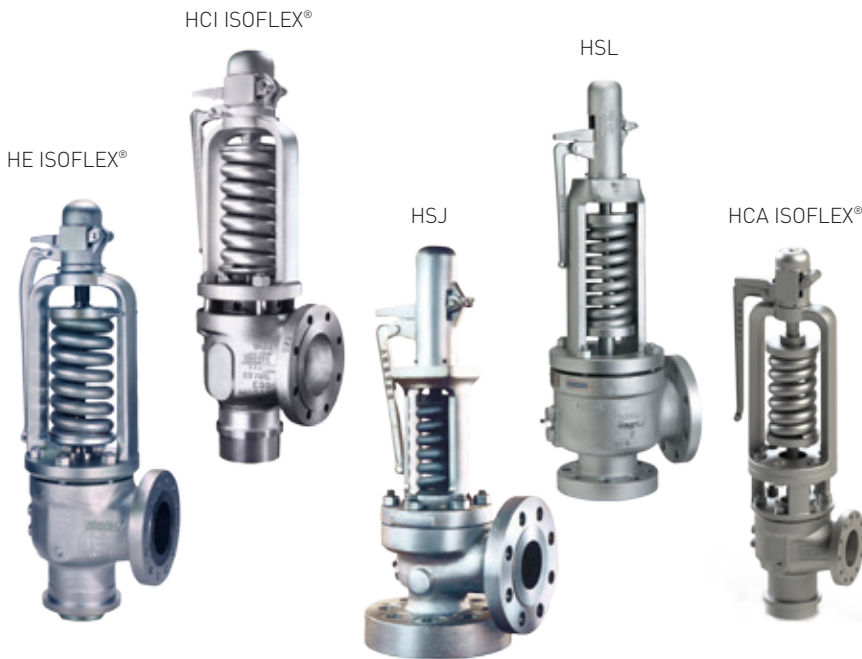




CROSBY H-SERIES
DIRECT SPRING SAFETY VALVES

Direct spring safety valves that provide comprehensive overpressure protection for ASME I and ASME VIII off-boiler steam safety applications



FEATURES

- ASME/NB certified capacities for steam.
- Set and tested on steam.
- Full nozzle flanged option.
- Restricted lift for customized capacity.
- Long service life.
- Low maintenance.
- Two ring set pressure and blowdown control.
- ISOFLEX seat tightness up to 93%. For seat tightness greater than 93% consult factory.

GENERAL APPLICATION

H-Series direct spring operated safety valves are the proven solution for comprehensive overpressure protection for steam safety applications including economizers, steam drums, superheaters, reheaters and more.

TECHNICAL DATA

Sizes:	1¼" F 1½" to 6" RR 10"
Orifices:	0.307 to 19.29 in ² (1.98 to 124.45 cm ²)
Connections:	Flanged or welded inlet
Temperature range:	Up to 1100°F [593°C]
Set pressures:	15 to 5000 psig (1 to 345 barg)
Code:	ASME I and VIII

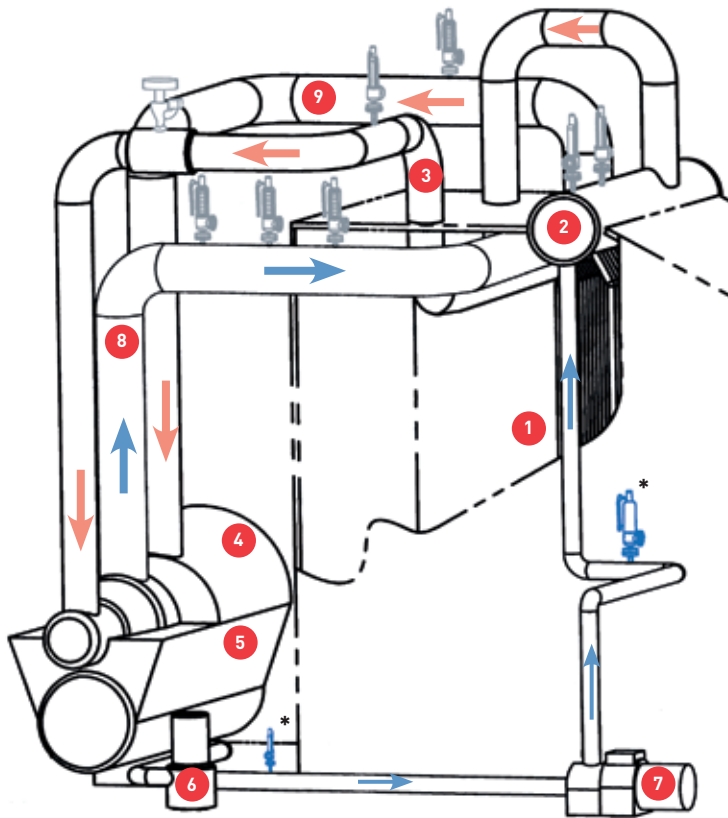
CROSBY H-SERIES

DIRECT SPRING SAFETY VALVES

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APPLICATION



Complete overpressure protection for ASME* code Section I

A complete safety valve package for utility and industrial steam generators and steam systems.

- Boilers with design pressures to 3,000 psig (207 barg).
- Valves designed to increase plant up-times, extend maintenance intervals and increase total valve life.

Steam System Components

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



* A complete line of ASME Section VIII 'off-boiler' safety and pressure relief valves is available. Contact your local sales representative.

VALVE SELECTION

APPLICATIONS AND RECOMMENDED^[1] VALVE SELECTION

Steam system	Crosby valve style, design pressure - psig (barg)			
	15-600 [1-41]	300-2000 [21-138]	2001-3000 ^[2] [139-207]	3001-5000 [207-345]
Drum	HSJ/HSL	HCI	HE	-
Superheater outlet	HSJ/HSL	HCI	HCI	HCA-I
Reheater inlet	HSJ	HCI	HCI	-
Reheater outlet	HSJ	HCI	HCI	-
Economizer (Section I)	HSJ	HSJ	HSJ	-

NOTES

1. Selection matrix 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.

CROSBY H-SERIES

STYLE HE ISOFLEX DIRECT SPRING SAFETY VALVE

STYLE HE ISOFLEX®

Style HE ISOFLEX® safety valves are high pressure, high capacity reaction type valves designed specifically for saturated steam service on boiler drums with design pressures above 2000 psig [138 barg] up to critical pressure.

FEATURES

- Extends Up-time
 - ISOFLEX® seat tightness to 93% of set pressure ensures maximum generating times, extending maintenance intervals. For seat tightness greater than 93% consult factory.
- Reduces Maintenance Costs
 - Exceptional seat tightness minimizes maintenance resources and repair times and reduces spare parts purchase and inventory costs.
- Easily Adjustable for ASME I Code Requirements
 - Advanced trim design with backpressure assist closing feature and patented eductor control eliminates complex adjustments to obtain ASME Code Section I required blowdown.
- Minimizes Installation Costs
 - Weld end valves shipped as two assemblies to minimize installation time and labor and no special vent discharge piping is required, saving costs.
- Installation and Maintenance Efficiencies
 - Packaging designed for quick and easy installation.
 - Ease of adjustment and maintenance with fewer parts.
 - Two-ring blowdown control is easy to set and adjustable in the field.

TECHNICAL DATA

Sizes:	2½" x 6" to 4" x 8" (DN 65 x DN 150 to DN 100 x DN 200)
Orifices:	1.840 to 7.070 in ² (11.87 to 45.61 cm ²)
Connections:	ANSI flanged or butt weld inlet and ANSI flanged outlet
Maximum temperature:	Up to 750°F (399°C)
Maximum set pressure:	Up to 3,060 psig (211 barg)
Code:	ASME I



CROSBY H-SERIES

STYLE HE ISOFLEX

PRODUCT OVERVIEW

The HE ISOFLEX incorporates our latest field proven seat tightness design which allows boilers to operate close to set pressure without leakage across the valve seat. The HE ISOFLEX also has a unique patented eductor control that permits the valve to attain full capacity lift at a pressure 3% above popping pressure to the requirements of Section I of the ASME Boiler and Pressure Vessel Code.

APPLICATION

The HE ISOFLEX safety valve is a high pressure, high capacity reaction type valve, designed specifically for saturated steam service on boiler drums having design pressures above 2000 psig (138 barg) up to critical pressure.

LOW FRICTION SET POINT ADJUSTMENT

Springs on drum safety valves 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) which engage the bonnet (17) to prevent rotation of the spring (20), spindle (12) and disc insert (5).

PRECISE POPPING AND BLOWDOWN ACTION

A dual-stage, controlled flow passage is formed by the eductor (9), disc holder (6) and the adjustable guide ring (10).

These 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 ensure full opening without warning and also assist in positive blowdown of between 2% and 4%, as required by ASME I code, which is obtained by adjusting the guide ring. The adjustable nozzle ring (3) ensures accurate, warn-free and sharp pop action on opening.

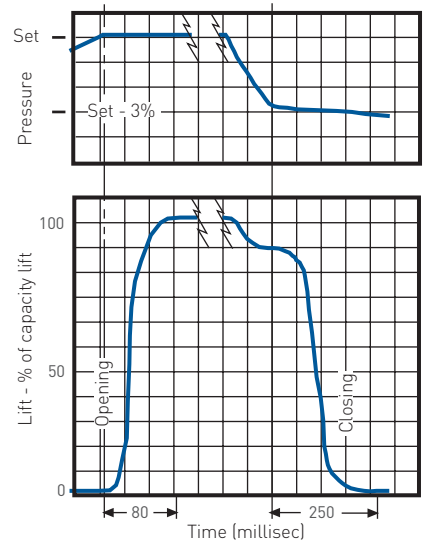
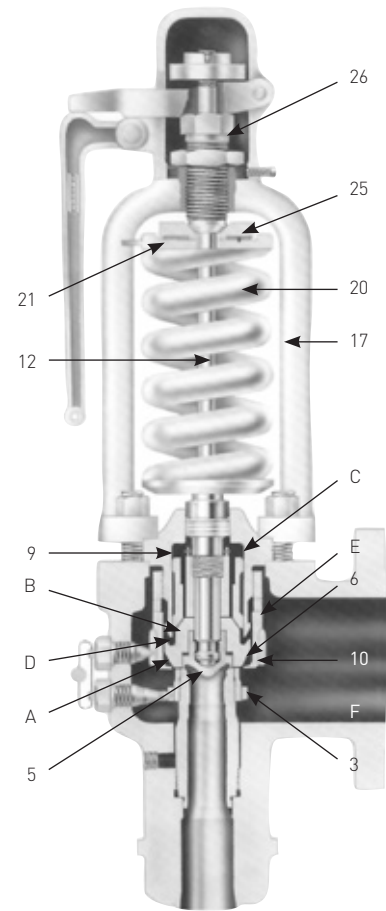
TIGHT SHUT-OFF WITH ISOFLEX® DESIGN

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

As pressure in the boiler increases to the safety valve set point, the valve will pop open. Steam then 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 drops, 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.



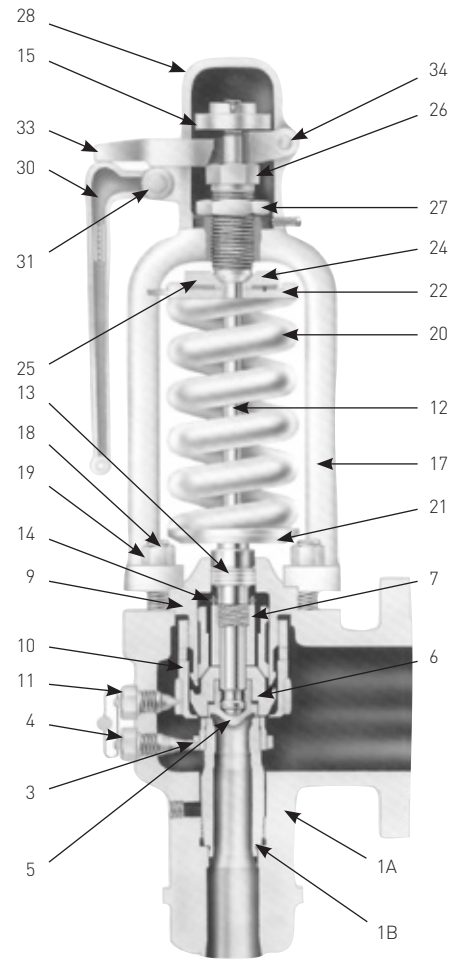
Typical valve opening and closing curve

CROSBY H-SERIES

STYLE HE ISOFLEX

MATERIALS

Part ref. no.	Part name	Material	Spare parts designation ^[1,2,3]
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	Steel	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	Steel	
24	Bearing adapter	Alloy steel	
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	



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

NOTES

- Consumable spare parts: valve parts which should be replaced as part of any disassembly. (Disc inserts must be replaced if seats are severely damaged)
- 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.
- Insurance spare parts: valve parts exposed to process or environmental wear and/or corrosion and may require replacement as part of a major repair.

Emerson 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, refer to Instruction No. IS-V3155B, 'Installation, Operating and Maintenance Instruction for Crosby Style HE Design III Self-Actuated Safety Valves'.

CROSBY H-SERIES

STYLE HE ISOFLEX

STYLE HE ISOFLEX® - SPECIFICATIONS

USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

Valve size inlet x orifice x outlet	HE valve style ⁽¹⁾	Orifice area sq. in. (sq. mm)	Connections in. (mm)		Dimensions in. (mm)								Approx. height ⁽⁴⁾ in. (mm)		Approx. weight lbs. (kg)	
			Butt weld inlet	ANSI Class flanged outlet	Inlet ID		Bw ⁽²⁾ inlet O.D.	Center to face of				Ew	E	Welded	Flanged	
					Aw ⁽²⁾	A		Inlet Cw	C	Outlet ⁽³⁾ Dw	D					
2500 psig maximum pressure																
2½ K 6	HE-86W	1.840	2½	6"-300	2½	2½	5¼	11	8¼	8½	8½	36 ¹⁵ / ₁₆	34 ³ / ₁₆	350	375	
2½ K2 6	HE-86W	2.545	2½	6"-300	2½	2½	6	12	8 ¹³ / ₁₆	8½	8½	44¼	4 ¹¹ / ₁₆	410	435	
3 M 6	HE-86W	3.600	3	6"-300	3	3	8	12	8 ⁷ / ₈	10	10	49½	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	13¼	14½	13	13	64	65	1100	1185	

3060 psig maximum pressure

2½ K 6	HE-96W	1.840	2½	6"-300	2½	2½	5¼	11	8¼	8½	8½	36 ¹⁵ / ₁₆	34 ³ / ₁₆	350	375
2½ K2 6	HE-96W	2.545	2½	6"-300	2½	2½	6	12	8 ¹³ / ₁₆	8½	8½	44¼	4 ¹¹ / ₁₆	410	435
3 M 6	HE-96W	3.600	3	6"-300	3	3	8	12	8 ⁷ / ₈	10	10	49½	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	13¼	14½	13	13	64	65	1100	1185

METRIC UNITS

172 barg maximum pressure

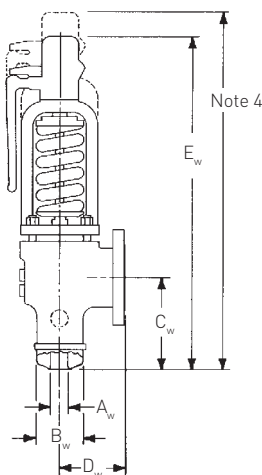
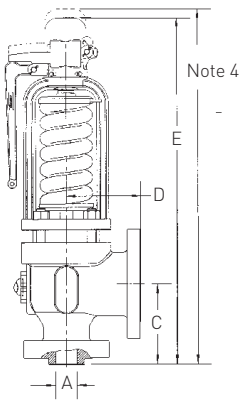
2½ K 6	HE-86W	1187.1	63.5	6"-300	63.5	63.5	133	279	210	216	216	938	868	159	170
2½ K2 6	HE-86W	1641.9	63.5	6"-300	63.5	63.5	152	305	224	216	216	1124	1043	186	193
3 M 6	HE-86W	2322.6	76.2	6"-300	76.2	76.2	203	305	225	254	254	1257	1178	286	284
3 M26	HE-86W	2565.2	76.2	6"-300	76.2	76.2	203	305	225	254	254	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

211 barg maximum pressure

2½ K 6	HE-96W	1187.1	63.5	6"-300	63.5	63.5	133	279	210	216	216	938	868	159	170
2½ 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 M26	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

- These style designations are for standard welded inlets. For optional CL 2500 flanged inlet valves, the "W" is dropped from the style designation.
 - 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.
 - Bolt holes straddle centerline on flanged connections.
 - Dismantling height: an additional 20 inches (508 mm) is required.
- Drain: main valve drain is ½" NPT.



CROSBY H-SERIES

STYLE HCI ISOFLEX DIRECT SPRING SAFETY VALVE

STYLE HCI ISOFLEX®

Style HCI ISOFLEX® has been designed for 300 to 3,000 psig (21 to 207 barg) steam generators for use on drum service, superheater outlets, reheater inlets and outlets.

FEATURES

- Increases Operating Efficiency
 - Restricted Lift Option for customized capacity, reduced reaction forces, and boiler design standardization
 - Seat tightness up to 93% of valve set pressure. For seat tightness greater than 93% consult factory
 - Two ring control to adjust overpressure and blowdown independently
 - May also be used for ASME VIII off boiler steam applications for higher operating pressures
- Reduces Maintenance Costs
 - Interchangeable spare parts minimizes inventory levels
 - Higher nozzle seat step to extend valve service life
- Minimizes Installation Costs
 - Packaging designed for quick and easy installation
 - Easy to set and adjust set pressure while in service

TECHNICAL DATA

Sizes:	1½" x 3" to 6" x 10" (DN 40 x DN 80 to DN 150 x DN 250)
Orifices:	0.994 to 19.29 in ² (6.41 to 124.45 cm ²)
Connections:	ANSI flanged or butt weld inlet and ANSI flanged outlet
Maximum temperature:	1,120°F (604°C)
Maximum set pressure:	3,000 psig (207 barg)
Codes:	ASME I and VIII



CROSBY H-SERIES

STYLE HCI ISOFLEX

PRODUCT OVERVIEW

The HCI ISOFLEX safety valve is a high capacity nozzle type valve suitable for saturated and superheated steam service. The valves are available in inlet sizes of 1½", 2", 2½", 3", 4" and 6" and in orifice sizes H2 to RR specifically designed for the power industry. Welded inlets and flanged outlets are standard, with flanged inlets (1) with full (removable) nozzles (2) also available.

The valves' relieving capacities have been determined by tests conducted in accordance with ASME code, Section I rules. They are certified by the National Board of Boiler and Pressure Vessel Inspectors and listed in their 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 valves.

TIGHT SHUT-OFF

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

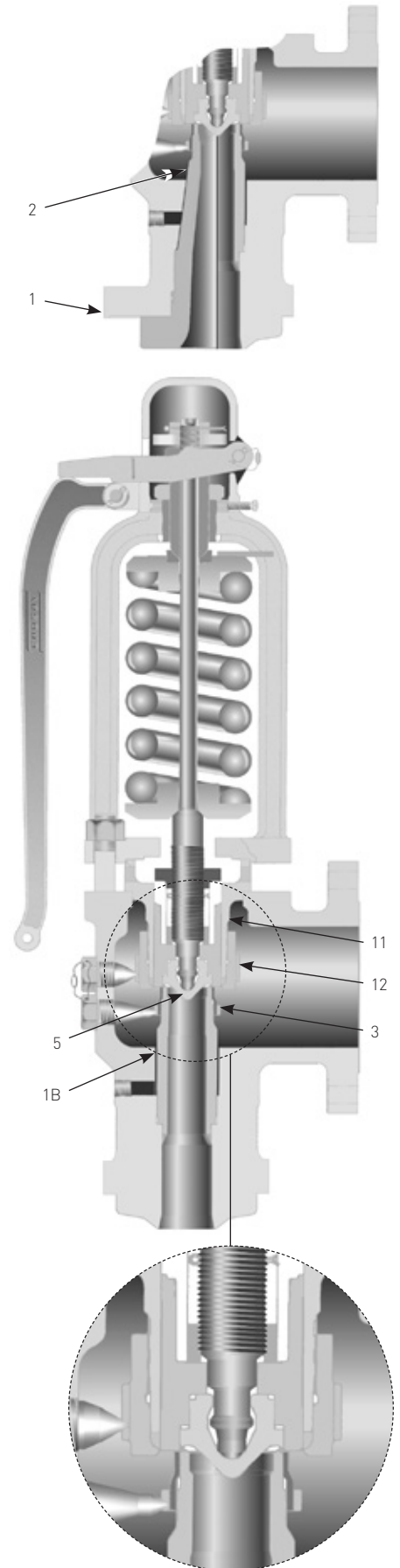
Blowdown control is precise with two adjustable rings (3 and 12) - one each on the nozzle (1B or 2) and guide (11). Blowdown may be adjusted from 2 to 4% under operating conditions.

PRECISE POPPING POINT

Close machining tolerances ensure that the disc insert (5) is centered precisely 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.

NOTE

Full (removable) nozzles not available in P2 (8" outlet) R and RR sizes.

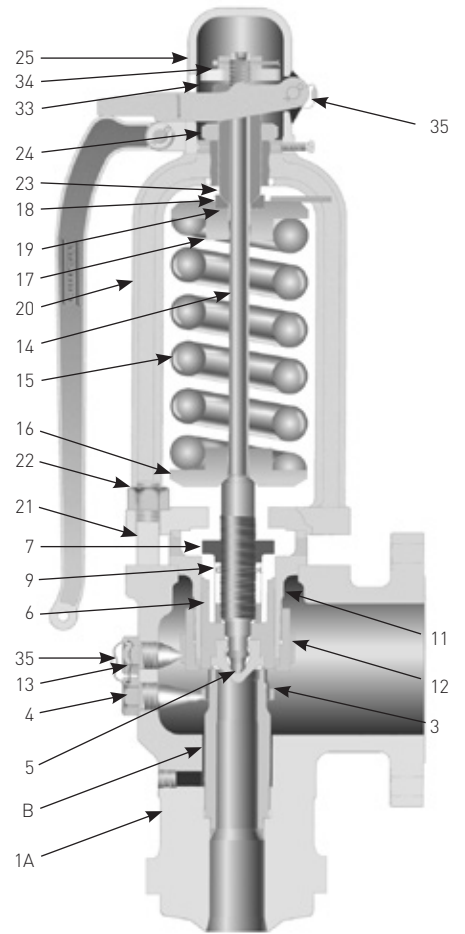


CROSBY H-SERIES

STYLE HCI ISOFLEX

MATERIALS

Part ref.	Part name	Material and maximum temperature			Spare parts designation ^[1,2,3]
		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 and wire	Lead and SS	Lead and SS	Lead and SS	



* Semi-nozzle design for welded inlet and P2 (8" outlet), R and RR orifice flanged inlet valves.
Full nozzle design for remaining H2 through Q2 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.

NOTES

- 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.
- 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.
- Insurance spare parts: valve parts exposed to process or environmental wear and/or corrosion and may require replacement as part of a major repair.

Emerson 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, refer to instruction No. IS-V3143A, 'Installation, maintenance and adjustment instruction for Crosby style HCI ISOFLEX® safety valves'.

CROSBY H-SERIES

STYLE HCI ISOFLEX

STYLE HCI ISOFLEX® - SPECIFICATIONS*

USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

Valve size inlet x orifice x outlet	Orifice area (sq. in.)	Maximum set pressure (psig) and temperature ^[2] 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 1120°F	SA217 Gr. WC9 1120°F	SA217 Gr. C12A 1120°F		
Class 300 - ANSI raised face flange or welded CL 300 inlet										
		HCI-36	HCI-38	HCI-36W	HCI-38W					
1½ H2 3	0.994	665	665	665	665	-	-	-	3" Cl 150	3" Cl 300
2 J2 4	1.431	665	665	665	665	-	-	-	4" Cl 150	4" Cl 300
2½ K2 6	2.545	665	665	665	665	-	-	-	6" Cl 150	6" Cl 300
3 L2 6	3.341	665	665	665	665	-	-	-	6" Cl 150	6" Cl 300
3 M2 6	3.976	665	665	665	665	-	-	-	6" Cl 150	6" Cl 300
4 P2 6	7.070	665	665	665	665	-	-	-	6" Cl 300	-
6 Q2 8	12.250	665	665	665	665	-	-	-	8" Cl 300	-
6 R 8	16.000	665	665	665	665	-	-	-	8" Cl 300	-
6 RR 10	19.290	665	665	665	665	-	-	-	10" Cl 300	-
Class 600 - ANSI raised face flange or welded CL 600 inlet										
		HCI-46	HCI-48	HCI-46W	HCI-48W					
1½ H2 3	0.994	1250	1250	1250	1250	-	-	-	3" Cl 150	3" Cl 300
2 J2 4	1.431	1250	1250	1250	1250	-	-	-	4" Cl 150	4" Cl 300
2½ K2 6	2.545	1250	1250	1250	1250	-	-	-	6" Cl 150	6" Cl 300
3 L2 6	3.341	1250	1250	1250	1250	-	-	-	6" Cl 150	6" Cl 300
3 M2 6	3.976	1250	1250	1250	1250	-	-	-	6" Cl 150	6" Cl 300
4 P2 6	7.070	1250	1250	1250	1250	-	-	-	6" Cl 300	-
6 Q2 8	12.250	1250	1250	1250	1250	-	-	-	8" Cl 300	-
6 R 8	16.000	750	750	750	750	-	-	-	8" Cl 300	-
6 R 10	16.000	900	900	900	900	-	-	-	10" Cl 300	-
6 RR 10	19.290	900	900	900	900	-	-	-	10" Cl 300	-
Class 900 - 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		
1½ H2 3	0.994	1500	1500	1500	1500	-	-	-	3" Cl 150	3" Cl 300
2 J2 4	1.431	1500	1500	1500	1500	-	-	-	4" Cl 150	4" Cl 300
2½ K2 6	2.545	1500	1500	1500	1500	-	-	-	6" Cl 150	6" Cl 300
3 L2 6	3.341	1500	1500	1500	1500	-	-	-	6" Cl 150	6" Cl 300
3 M2 6	3.976	1500	1500	1500	1500	-	-	-	6" Cl 150	6" Cl 300
4 P2 6	7.070	1500	1500	1500	1500	-	-	-	6" Cl 300	-
6 Q2 8	12.250	1500	1500	1500	1500	-	-	-	8" Cl 300	-
6 R 8	16.000	750	750	750	750	-	-	-	8" Cl 300	-
6 R 10	16.000	900	900	900	900	-	-	-	10" Cl 300	-
6 RR 10	19.290	900	900	900	900 ^[1]	750 ^[1]	750 ^[1]	575 ^[1]	10" Cl 300	-
		HCI-76	HCI-78	HCI-76W	HCI-78W	HCI-78W -C12A	HCI-79W	HCI-79W -C12A		
1½ H2 4	0.994	1795	1795	1795	1795	1795	1080	1080	4" Cl 300	-
2 J2 6	1.431	1795	1795	1795	1795	1795	1080	1080	6" Cl 300	-
2½ K2 6	2.545	1795	1795	1795	1795	1795	1080	1080	6" Cl 300	-
3 L2 6	3.341	1795	1795	1795	1795	1795	1080	1080	6" Cl 300	-
3 M2 6	3.976	1795	1795	1795	1795	1795	1080	1080	6" Cl 300	-
4 P2 8	7.070	1795	1795	1795	1795	1795	1080	1080	8" Cl 300	-

* Select appropriate class to meet pressure/temperature requirements for each application.

Refer to pages 72-75 for pressure/temperature limits for standard class valves per ASME/ANSI B16.34.

CROSBY H-SERIES

STYLE HCI ISOFLEX

STYLE HCI ISOFLEX® - SPECIFICATIONS*

USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

Valve size inlet x orifice x outlet	Orifice area (sq. in.)	Maximum set pressure (psig) and temperature ^[2] 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 1120°F	SA217 Gr. C12A 1120°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		
1½ H2 3	0.994	1500	1500	1500	1500	-	-	-	3" Cl 150	3" Cl 300
2 J2 4	1.431	1500	1500	1500	1500	-	-	-	4" Cl 150	4" Cl 300
2½ K2 6	2.545	1500	1500	1500	1500	-	-	-	6" Cl 150	6" Cl 300
3 L2 6	3.341	1500	1500	1500	1500	-	-	-	6" Cl 150	6" Cl 300
3 M2 6	3.976	1500	1500	1500	1500	-	-	-	6" Cl 150	6" Cl 300
4 P2 6	7.070	1500	1500	1500	1500 ^[1]	950 ^[1]	950 ^[1]	750 ^[1]	6" Cl 300	-
6 Q2 8	12.250	1500	1500	1500	1500 ^[1]	1250 ^[1]	1300 ^[1]	950 ^[1]	8" Cl 300	-
6 R 8	16.000	750	750	750	750 ^[1]	750 ^[1]	750 ^[1]	650 ^[1]	8" Cl 300	-
6 R 10	16.000	1200	1200	1200	1200 ^[1]	1200 ^[1]	1200 ^[1]	1000 ^[1]	10" Cl 300	-
		HCI-86	HCI-88	HCI-86W	HCI-88W	HCI-88W -C12A	HCI-89W	HCI-89W -C12A		
1½ H2 4	0.994	2000 ^[3]	2000	2000 ^[3]	2865	2865	1800	1800	4" Cl 300	-
2 J2 6	1.431	2000 ^[3]	2865	2000 ^[3]	2865	2865	1800	1800	6" Cl 300	-
2½ K2 6	2.545	2000 ^[3]	2865	2000 ^[3]	2865	2865	1800	1800	6" Cl 300	-
3 L2 6	3.341	2000 ^[3]	2000	2000 ^[3]	2865	2865	1800	1800	6" Cl 300	-
3 M2 6	3.976	2000 ^[3]	1800	2000 ^[3]	2865	2865	1800	1800	6" Cl 300	-
4 P2 8	7.070	2000 ^[3]	2000	2000 ^[3]	2865	2865	1800	1800	8" Cl 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		
1½ H2 4	0.994	2000 ^[3]	2000	2000 ^[3]	3000 ^[1]	2500 ^[1]	2500 ^[1]	2000 ^[1]	4" Cl 300	-
2 J2 6	1.431	2000 ^[3]	3000	2000 ^[3]	3000 ^[1]	2750 ^[1]	2900 ^[1]	2100 ^[1]	6" Cl 300	-
2½ K2 6	2.545	2000 ^[3]	3000	2000 ^[3]	3000 ^[1]	3000 ^[1]	3000 ^[1]	2750 ^[1]	6" Cl 300	-
3 L2 6	3.341	2000 ^[3]	3000	2000 ^[3]	3000 ^[1]	3000 ^[1]	3000 ^[1]	3000 ^[1]	6" Cl 300	-
3 M2 6	3.976	2000 ^[3]	2800	2000 ^[3]	3000 ^[1]	3000 ^[1]	3000 ^[1]	2500 ^[1]	6" Cl 300	-
4 P2 8	7.070	2000 ^[3]	3000	2000 ^[3]	3000 ^[1]	2900 ^[1]	2000 ^[1]	2000 ^[1]	8" Cl 300	-

* Select appropriate class to meet pressure/temperature requirements for each application.
Refer to pages 72 - 75 for pressure/temperature limits for standard class valves per ASME/ANSI B16.34.

NOTES

- 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.
- Set pressure is limited to either the inlet pressure limit per ASME/ANSI B16.34 (pages 72 - 75) or the maximum set pressure, whichever is lower.
- Style HE ISOFLEX® Safety valves (page 6) are recommended for high pressure drum saturated steam service between 2000-3000 psig.

CROSBY H-SERIES

STYLE HCI ISOFLEX

STYLE HCI ISOFLEX® - DIMENSIONS AND WEIGHTS

USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

Valve size inlet x orifice x outlet	HCI valve style ⁽¹⁾	General dimensions - inches												Approx. weight (lbs)			
		Inlet ID		Inlet neck OD ⁽³⁾ (welded) Bw	Center-to-face				Used to find bolt length (flanged) ⁽⁴⁾ X	Approx. height ⁽²⁾		Class 150 outlet					
		Aw	A		Inlet Cw	C	Outlet			Ew	E	Welded	Flanged	Welded	Flanged		
Class 300 - ANSI raised face flange or welded CL 300 inlet																	
1½ H2 3	3 ()W	1½	1½	3½	6¾	5⅞	6	6	6	6	1⅞	25½	25	105	108	110	113
2 J2 4	3 ()W	2	2	4½	8⅞	6½	7	7	7	7	1¾	30⅞	28⅞	135	132	144	141
2½ K2 6	3 ()W	2½	2½	5¼	8⅞	8⅞	7	7	7⅞	7⅞	1⅞	34⅞	33⅞	230	230	249	249
3 L2 6	3 ()W	3	3	6	9⅞	8¾	7½	7½	8¼	8¼	2⅞	39⅞	39	340	360	359	359
3 M2 6	3 ()W	3	3	6	9⅞	8¾	7½	7½	8¼	8¼	2⅞	40⅞	39⅞	400	400	419	419
4 P2 6	3 ()W	4	4	6⅞	9⅞	9⅞	-	-	10	10	2⅞	45⅞	45⅞	-	-	575	617
6 Q2 8	3 ()W	6	6	9	11½	12	-	-	11	11½	2¼	61⅞	61⅞	-	-	850	906
6 R 8	3 ()W	6	6	9	11½	11½	-	-	11	11½	-	61⅞	61⅞	-	-	902	937
6 RR 10	3 ()W	6	6	9	12	12	-	-	12	12	-	63	63	-	-	1179	1214
Class 600 - ANSI raised face flange or welded CL 600 inlet																	
1½ H2 3	4 ()W	1½	1½	3½	6¾	5⅞	6	6	6	6	1⅞	25½	25	105	108	110	113
2 J2 4	4 ()W	2	2	4½	8⅞	6½	7	7	7	7	1¾	30⅞	28⅞	135	132	144	141
2½ K2 6	4 ()W	2½	2½	5¼	8⅞	8⅞	7	7	7⅞	7⅞	1⅞	34⅞	33⅞	230	230	249	249
3 L2 6	4 ()W	3	3	6	9⅞	8¾	7½	7½	8¼	8¼	2⅞	39⅞	39	340	360	359	359
3 M2 6	4 ()W	3	3	6	9⅞	8¾	7½	7½	8¼	8¼	2⅞	40⅞	39⅞	400	400	419	419
4 P2 6	4 ()W	4	4	6⅞	9⅞	9⅞	-	-	10	10	2⅞	45⅞	45⅞	-	-	575	606
6 Q2 8	4 ()W	6	6	9	11½	12	-	-	11	11½	2⅞	61⅞	61⅞	-	-	850	927
6 R 8	4 ()W	6	6	9	11½	11⅞	-	-	11	11½	-	61⅞	61⅞	-	-	902	958
6 R 10	4 ()W	6	6	10	12	13	-	-	11½	11½	-	62¾	63¾	-	-	1065	1126
6 RR 10	4 ()W	6	6	9	12	12	-	-	12	12	-	63	63	-	-	1179	1234
Class 900 - ANSI raised face flange or welded CL 900 inlet																	
1½ H2 3	5 ()W	1½	1½	3½	6¾	5⅞	6	6	6	6	1⅞	25½	25	105	114	110	119
1½ H2 4	7 ()W	1½	1½	4½	8	7¾	-	-	6¼	6¼	2	28⅞	27⅞	-	-	140	146
2 J2 4	5 ()W	2	2	4½	8⅞	6½	7	7	7	7	2¼	30⅞	28⅞	135	146	144	155
2 J2 6	7 ()W	2	2	5¼	11	8¼	-	-	8½	8½	2¼	36¼	33½	-	-	220	223
2½ K2 6	5 ()W	2½	2½	5¼	8⅞	8⅞	7	7	7⅞	7⅞	2⅞	34⅞	33⅞	230	250	249	269
2½ K2 6	7 ()W	2½	2½	7	12	9¼	-	-	8½	8½	2⅞	42⅞	39⅞	-	-	420	403
3 L2 6	5 ()W	3	3	6	9⅞	8¾	7½	7½	8¼	8¼	2⅞	39⅞	39	340	350	359	369
3 L2 6	7 ()W	3	3	8	12	9⅞	-	-	10	10	2⅞	48¼	45⅞	-	-	570	522
3 M2 6	5 ()W	3	3	6	9⅞	8¾	7½	7½	8¼	8¼	2⅞	40⅞	39⅞	400	410	419	429
3 M2 6	7 ()W	3	3	8	12	9⅞	-	-	10	10	2⅞	48¼	45⅞	-	-	570	522
4 P2 6	5 ()W	4	4	6⅞	9⅞	9⅞	-	-	10	10	2⅞	45⅞	45⅞	-	-	575	617
4 P2 8	7 ()W	4	4	9	13¼	13¼	-	-	13	13	-	65	65½	-	-	1100	1080
6 Q2 8	5 ()W	6	6	9	11½	12	-	-	11	11½	3	61⅞	61⅞	-	-	850	931
6 R 8	5 ()W	6	6	9	11½	11⅞	-	-	11	11½	-	61⅞	61⅞	-	-	902	975
6 R 10	5 ()W	6	6	10	12	13	-	-	11½	11½	-	62¾	63¾	-	-	1065	1149
6 RR 10	5 ()W	6	6	9	12	12	-	-	12	12	-	63	63	-	-	1179	1260

CROSBY H-SERIES

STYLE HCI ISOFLEX

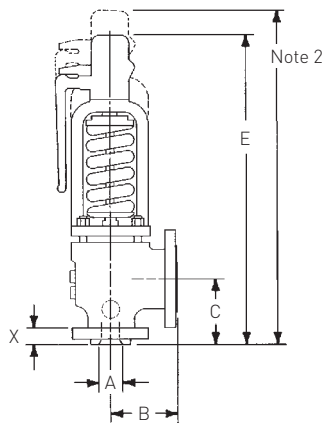
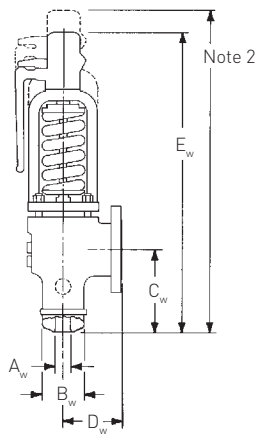
STYLE HCI ISOFLEX® - DIMENSIONS AND WEIGHTS

USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

Valve size inlet x orifice x outlet	HCI valve style ⁽¹⁾	General dimensions - inches												Approx. weight (lbs)			
		Inlet ID		Inlet neck OD ⁽³⁾ (welded) Bw	Center-to-face				Used to find bolt length (flanged) ⁽⁴⁾ X	Approx. height ⁽²⁾		Class 150 outlet		Class 300 outlet			
		Aw	A		Inlet Cw	C	Outlet			Ew	E	Class 150 outlet Welded	Class 150 outlet Flanged	Class 300 outlet Welded	Class 300 outlet Flanged		
Class 1500 - ANSI raised face flange or welded CL 1500 inlet																	
1½ H2 3	6(J)W	1½	1½	3½	6¾	5⅞	6	6	6	6	1⅝	25½	25	105	114	110	119
1½ H2 4	8(J)W	1½	1½	4½	8	7¾	-	-	6¼	6¼	2	28⅞	27⅞	-	-	140	146
2 J2 4	6(J)W	2	2	4½	8⅞	6½	7	7	7	7	2¼	30⅞	28⅞	135	146	144	155
2 J2 6	8(J)W	2	2	5¼	11	8¼	-	-	8½	8½	2¼	36¼	33½	-	-	220	223
2½ K2 6	6(J)W	2½	2½	5¼	8⅝	8⅞	7	7	7⅞	7⅞	2⅞	34⅝	33⅞	230	250	249	269
2½ K2 6	8(J)W	2½	2½	7	12	9¼	-	-	8½	8½	2⅞	42⅝	39⅞	-	-	420	403
3 L2 6	6(J)W	3	3	6	9⅞	8¾	7½	7½	8¼	8¼	2⅞	39⅝	39	340	366	359	385
3 L2 6	8(J)W	3	3	8	12	9¾	-	-	10	10	2⅞	48½	45⅞	-	-	570	534
3 M2 6	6(J)W	3	3	6	9⅞	8¾	7½	7½	8¼	8¼	2⅞	40⅞	39⅞	400	426	419	445
3 M2 6	8(J)W	3	3	8	12	9¾	-	-	10	10	2⅞	48¼	45⅞	-	-	570	534
4 P2 6	6(J)W	4	4	6⅞	9¾	9⅞	-	-	10	10	2⅝	45⅞	45⅞	-	-	575	632
4 P2 8	8(J)W	4	4	9	13¼	13¼	-	-	13	13	-	65	65½	-	-	1100	1100
6 Q2 8	6(J)W	6	6	9	11½	12	-	-	11	11½	4⅞	61⅞	61⅞	-	-	850	978
6 R 8	6(J)W	6	6	9	11½	11⅞	-	-	11	11½	-	61⅞	61½	-	-	902	1044
6 R 10	6(J)W	6	6	10	12	13	-	-	11½	11½	-	62¾	63¾	-	-	1065	1189
Class 2500 - ANSI raised face flange or welded CL 2500 inlet																	
1½ H2 4	9(J)W	1½	1½	4½	8	7¾	-	-	6¼	6¼	2⅞	28⅞	27⅞	-	-	140	162
2 J2 6	9(J)W	2	2	5¼	11	8¼	-	-	8½	8½	2⅞	36¼	33½	-	-	220	233
2½ K2 6	9(J)W	2½	2½	7	12	9¼	-	-	8½	8½	3⅞	42⅝	39⅞	-	-	420	420
3 L2 6	9(J)W	3	3	8	12	9¾	-	-	10	10	3⅞	48¼	45⅞	-	-	570	572
3 M2 6	9(J)W	3	3	8	12	9¾	-	-	10	10	3⅞	48¼	45⅞	-	-	570	572
4 P2 8	9(J)W	4	4	9	13¼	14½	-	-	13	13	-	65	66¼	-	-	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: ½" NPT for inlet sizes 1½" to 4" and ¾" NPT for 6" inlet size.



CROSBY H-SERIES

STYLE HCI ISOFLEX

STYLE HCI ISOFLEX® - SPECIFICATIONS*

METRIC UNITS

Valve size inlet x orifice x outlet	Orifice area (sq. mm)	Maximum set pressure (barg) and temperature ^[2] for standard body material listed							Standard flanged outlet class	Optional flanged outlet class
		Flanged inlet		Welded inlet						
		SA216 Gr. WCC 399°C	SA217 Gr. WC6 566°C	SA216 Gr. WCC 399°C	SA217 Gr. WC6 566°C	SA217 Gr. C12A	SA217 Gr. WC9 604°C	SA217 Gr. C12A 604°C		
Class 300 - 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" Cl 150	3" Cl 300
2 J2 4	923.2	45.9	45.9	45.9	45.9	-	-	-	4" Cl 150	4" Cl 300
2½ K2 6	1641.9	45.9	45.9	45.9	45.9	-	-	-	6" Cl 150	6" Cl 300
3 L2 6	2155.5	45.9	45.9	45.9	45.9	-	-	-	6" Cl 150	6" Cl 300
3 M2 6	2565.2	45.9	45.9	45.9	45.9	-	-	-	6" Cl 150	6" Cl 300
4 P2 6	4561.3	45.9	45.9	45.9	45.9	-	-	-	6" Cl 300	-
6 Q2 8	7903.2	45.9	45.9	45.9	45.9	-	-	-	8" Cl 300	-
6 R 8	10322.6	45.9	45.9	45.9	45.9	-	-	-	8" Cl 300	-
6 RR 10	12445.1	45.9	45.9	45.9	45.9	-	-	-	10" Cl 300	-
Class 600 - 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" Cl 150	3" Cl 300
2 J2 4	923.2	86.2	86.2	86.2	86.2	-	-	-	4" Cl 150	4" Cl 300
2½ K2 6	1641.9	86.2	86.2	86.2	86.2	-	-	-	6" Cl 150	6" Cl 300
3½ 6	2155.5	86.2	86.2	86.2	86.2	-	-	-	6" Cl 150	6" Cl 300
3 M2 6	2565.2	86.2	86.2	86.2	86.2	-	-	-	6" Cl 150	6" Cl 300
4 P2 6	4561.3	86.2	86.2	86.2	86.2	-	-	-	6" Cl 300	-
6 Q2 8	7903.2	86.2	86.2	86.2	86.2	-	-	-	8" Cl 300	-
6 R 8	10322.6	51.7	51.7	51.7	51.7	-	-	-	8" Cl 300	-
6 R 10	10322.6	62.1	62.1	62.1	62.1	-	-	-	10" Cl 300	-
6 RR 10	12445.1	62.1	62.1	62.1	62.1	-	-	-	10" Cl 300	-
Class 900 - 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" Cl 150	3" Cl 300
2 J2 4	923.2	103.4	103.4	103.4	103.4	-	-	-	4" Cl 150	4" Cl 300
2½ K2 6	1641.9	103.4	103.4	103.4	103.4	-	-	-	6" Cl 150	6" Cl 300
3 L2 6	2155.5	103.4	103.4	103.4	103.4	-	-	-	6" Cl 150	6" Cl 300
3 M2 6	2565.2	103.4	103.4	103.4	103.4	-	-	-	6" Cl 150	6" Cl 300
4 P2 6	4561.3	103.4	103.4	103.4	103.4	-	-	-	6" Cl 300	-
6 Q2 8	7903.2	103.4	103.4	103.4	103.4	-	-	-	8" Cl 300	-
6 R 8	10322.6	51.7	51.7	51.7	51.7	-	-	-	8" Cl 300	-
6 R 10	10322.6	62.1	62.1	62.1	62.1	-	-	-	10" Cl 300	-
6 RR 10	12445.1	62.1	62.1	62.1	62.1 ^[1]	51.7 ^[1]	51.7 ^[1]	39.6 ^[1]	10" Cl 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	123.80	74.5	74.50	4" Cl 300	-
2 J2 6	923.2	123.8	123.8	123.8	123.8	123.80	74.5	74.50	6" Cl 300	-
2½ K2 6	1641.9	123.8	123.8	123.8	123.8	123.80	74.5	74.50	6" Cl 300	-
3 L2 6	2155.5	123.8	123.8	123.8	123.8	123.80	74.5	74.50	6" Cl 300	-
3 M2 6	2565.2	123.8	123.8	123.8	123.8	123.80	74.5	74.50	6" Cl 300	-
4 P2 8	4561.3	123.8	123.8	123.8	123.8	123.80	74.5	74.50	8" Cl 300	-

* Select appropriate class to meet pressure/temperature requirements for each application.

Refer to pages 72 - 75 for pressure/temperature limits for standard class valves per ASME/ANSI B16.34.

CROSBY H-SERIES

STYLE HCI ISOFLEX

STYLE HCI ISOFLEX® - SPECIFICATIONS*

METRIC UNITS

Valve size inlet x orifice x outlet	Orifice area (sq. mm)	Maximum set pressure (barg) and temperature ^[2] for standard body material listed								Standard flanged outlet class	Optional flanged outlet class
		Flanged inlet		Welded inlet							
		SA216 Gr. WCC 399°C	SA217 Gr. WC6 566°C	SA216 Gr. WCC 399°C	SA217 Gr. WC6 566°C	SA217 Gr. C12A	SA217 Gr. WC9 604°C	SA217 Gr. C12A	SA217 Gr. C12A		
Class 1500 - 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			
1½ H2 3	641.3	103.4	103.4	103.4	103.4	-	-	-	3" Cl 150	3" Cl 300	
2 J2 4	923.2	103.4	103.4	103.4	103.4	-	-	-	4" Cl 150	4" Cl 300	
2½ K2 6	1641.9	103.4	103.4	103.4	103.4	-	-	-	6" Cl 150	6" Cl 300	
3 L2 6	2155.5	103.4	103.4	103.4	103.4	-	-	-	6" Cl 150	6" Cl 300	
3 M2 6	2565.2	103.4	103.4	103.4	103.4	-	-	-	6" Cl 150	6" Cl 300	
4 P2 6	4561.3	103.4	103.4	103.4	103.4 ^[1]	65.5 ^[1]	65.5 ^[1]	51.7 ^[1]	6" Cl 300	-	
6 Q2 8	7903.2	103.4	103.4	103.4	103.4 ^[1]	86.2 ^[1]	89.6 ^[1]	65.5 ^[1]	8" Cl 300	-	
6 R 8	10322.6	51.7	51.7	51.7	51.7 ^[1]	51.7 ^[1]	51.7 ^[1]	44.8 ^[1]	8" Cl 300	-	
6 R 10	10322.6	82.7	82.7	82.7	82.7 ^[1]	82.7 ^[1]	82.7 ^[1]	68.9 ^[1]	10" Cl 300	-	
		HCI-86	HCI-88	HCI-86W	HCI-88W	HCI-88W -C12A	HCI-89W	HCI-89W -C12A			
1½ H2 4	641.3	137.9 ^[3]	137.9	137.9 ^[3]	197.5	197.5	124.1	124.1	4" Cl 300	-	
2 J2 6	923.2	137.9 ^[3]	197.5	137.9 ^[3]	197.5	197.5	124.1	124.1	6" Cl 300	-	
2½ K2 6	1641.9	137.9 ^[3]	197.5	137.9 ^[3]	197.5	197.5	124.1	124.1	6" Cl 300	-	
3 L2 6	2155.5	137.9 ^[3]	137.9	137.9 ^[3]	197.5	197.5	124.1	124.1	6" Cl 300	-	
3 M2 6	2565.2	137.9 ^[3]	124.1	137.9 ^[3]	197.5	197.5	124.1	124.1	6" Cl 300	-	
4 P2 8	4561.3	137.9 ^[3]	137.9	137.9 ^[3]	197.5	197.5	124.1	124.1	8" Cl 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			
1½ H2 4	641.3	137.9 ^[3]	137.9	137.9 ^[3]	206.8 ^[1]	172.4 ^[1]	172.4 ^[1]	137.9 ^[1]	4" Cl 300	-	
2 J2 6	923.2	137.9 ^[3]	206.8	137.9 ^[3]	206.8 ^[1]	189.6 ^[1]	199.9 ^[1]	144.8 ^[1]	6" Cl 300	-	
2½ K2 6	1641.9	137.9 ^[3]	206.8	137.9 ^[3]	206.8 ^[1]	206.8 ^[1]	206.8 ^[1]	189.6 ^[1]	6" Cl 300	-	
3 L2 6	2155.5	137.9 ^[3]	206.8	137.9 ^[3]	206.8 ^[1]	206.8 ^[1]	206.8 ^[1]	206.8 ^[1]	6" Cl 300	-	
3 M2 6	2565.2	137.9 ^[3]	193.1	137.9 ^[3]	206.8 ^[1]	206.8 ^[1]	206.8 ^[1]	172.4 ^[1]	6" Cl 300	-	
4 P2 8	4561.3	137.9 ^[3]	206.8	137.9 ^[3]	206.8 ^[1]	199.9 ^[1]	137.9 ^[1]	137.9 ^[1]	8" Cl 300	-	

* Select appropriate class to meet pressure/temperature requirements for each application.

Refer to pages 72 - 75 for pressure/temperature limits for standard class valves per ASME/ANSI B16.34.

NOTES

- 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.
- Set pressure is limited to either the inlet pressure limit per ASME/ANSI B16.34 (pages 72 - 75) or the maximum set pressure, whichever is lower.
- Style HE ISOFLEX® safety valves (page 6) are recommended for high pressure drum saturated steam service between 138-207 barg.

CROSBY H-SERIES

STYLE HCI ISOFLEX

STYLE HCI ISOFLEX® - DIMENSIONS AND WEIGHTS

METRIC UNITS

Valve size inlet x orifice x outlet	HCI valve style ⁽¹⁾	General dimensions - millimeters												Approx. weight (kg)			
		Inlet ID		Inlet neck OD ⁽³⁾ (welded) Bw	Center-to-face				Used to find bolt length (flanged) ⁽⁴⁾ X	Approx. height ⁽²⁾		Class 150 outlet		Class 300 outlet			
		Aw	A		Inlet	Outlet		Ew		E	Welded	Flanged	Welded	Flanged			
				Cw	C	Dw	D	Dw	D								
Class 300 - ANSI raised face flange or welded CL 300 inlet																	
1½ H2 3	3(J)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(J)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
2½ K2 6	3(J)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(J)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(J)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(J)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(J)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(J)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(J)W	152.4	152.4	228.6	304.8	304.8	-	-	304.8	304.8	-	1600.2	1600.2	-	-	535	551
Class 600 - ANSI raised face flange or welded CL 600 inlet																	
1½ H2 3	4(J)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(J)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
2½ K2 6	4(J)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(J)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(J)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(J)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(J)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(J)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(J)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(J)W	152.4	152.4	228.6	304.8	304.8	-	-	304.8	304.8	-	1600.2	1600.2	-	-	535	560
Class 900 - ANSI raised face flange or welded CL 900 inlet																	
1½ H2 3	5(J)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
1½ H2 4	7(J)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(J)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(J)W	50.8	50.8	133.4	279.4	209.6	-	-	215.9	215.9	57.2	920.8	850.9	-	-	100	101
2½ K2 6	5(J)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
2½ K2 6	7(J)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(J)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(J)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(J)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(J)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(J)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(J)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(J)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(J)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(J)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(J)W	152.4	152.4	228.6	304.8	304.8	-	-	304.8	304.8	-	1600.2	1600.2	-	-	535	572

CROSBY H-SERIES

STYLE HCI ISOFLEX

STYLE HCI ISOFLEX® - DIMENSIONS AND WEIGHTS

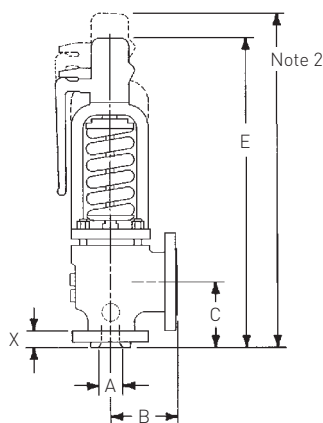
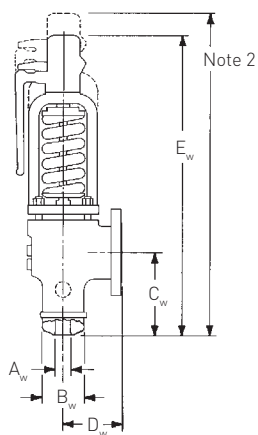
METRIC UNITS

Valve size inlet x orifice x outlet	HCI valve style ^[1]	General dimensions - mm												Approx. weight (kg)			
		Inlet ID		Inlet neck OD ^[3] (welded) Bw	Center-to-face				Used to find bolt length (flanged) ^[4] X	Approx. height ^[2]		Class 150 outlet		Class 300 outlet			
		Aw	A		Inlet	Outlet		Ew		E	Welded	Flanged	Welded	Flanged			
Class 1500 - ANSI raised face flange or welded CL 1500 inlet																	
1½ H2 3	6(J)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
1½ H2 4	8(J)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	6(J)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	8(J)W	50.8	50.8	133.4	279.4	209.6	-	-	215.9	215.9	57.2	920.8	850.9	-	-	100	101
2½ K2 6	6(J)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
2½ K2 6	8(J)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	6(J)W	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(J)W	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(J)W	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(J)W	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(J)W	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(J)W	101.6	101.6	228.6	336.6	349.3	-	-	330.2	330.2	-	1651.0	1663.7	-	-	499	499
6 Q2 8	6(J)W	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(J)W	152.4	152.4	228.6	292.1	293.7	-	-	279.4	292.1	-	1560.5	1562.1	-	-	409	474
6 R 10	6(J)W	152.4	152.4	254.0	304.8	330.2	-	-	292.1	292.1	-	1593.9	1619.3	-	-	483	539
Class 2500 - ANSI raised face flange or welded CL 2500 inlet																	
1½ H2 4	9(J)W	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(J)W	50.8	50.8	133.4	279.4	209.6	-	-	215.9	215.9	71.4	920.8	850.9	-	-	100	101
2½ K2 6	9(J)W	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(J)W	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(J)W	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(J)W	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: ½" NPT for inlet sizes 1½" to 4" and ¾" NPT for 6" inlet size.



CROSBY H-SERIES

STYLE HCI-R ISOFLEX

STYLE HCI-R ISOFLEX®

Restricted lift feature

A restricted lift option is available on all HCI ISOFLEX® valve sizes with either flanged or weld end connections.

Style HCI-R's capacities may be adjusted 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 that prevents erroneous changes in capacity.

NOTE

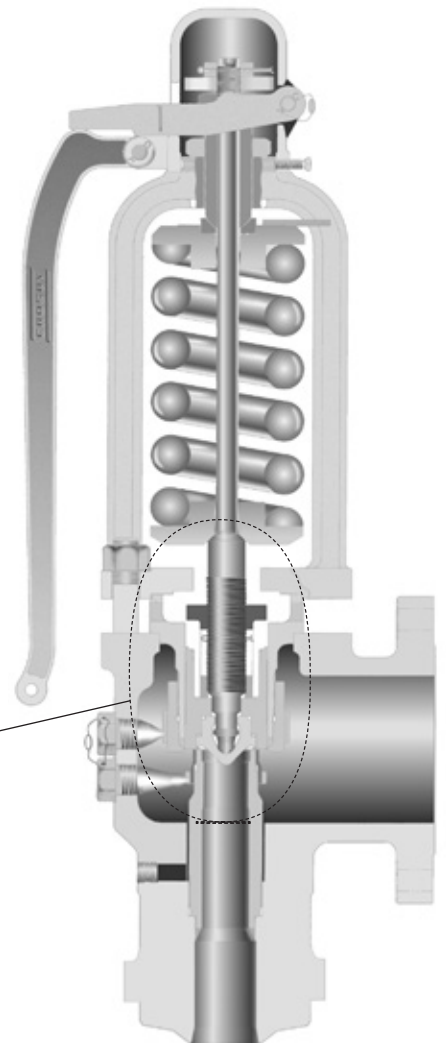
For information on installation and care, see instruction No. IS-V3143A, 'Installation, maintenance and adjustment instruction for Crosby style HCI ISOFLEX® safety valves'.

HCI-R ISOFLEX®

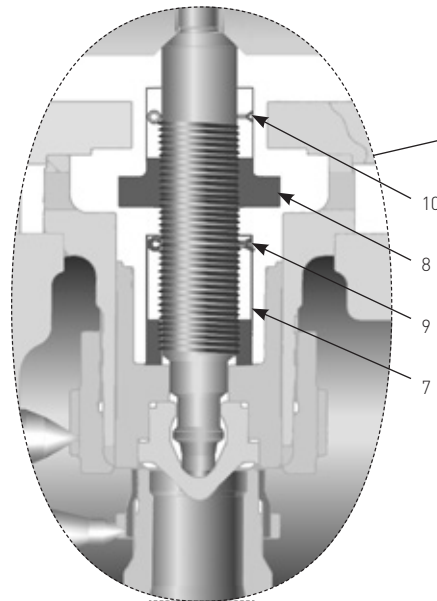
Part ref. no.	Part name	Material
7	Disc holder retainer	Stainless steel
8	Lift stop	Stainless steel
9	Disc holder retainer cotter	Stainless steel
10	Lift stop cotter	Stainless steel

Complete list of parts and materials on page 5.

STYLE HCI ISOFLEX®



STYLE HCI-R ISOFLEX® (RESTRICTED LIFT)



CROSBY H-SERIES

STYLE HSJ DIRECT SPRING SAFETY VALVE

STYLE HSJ

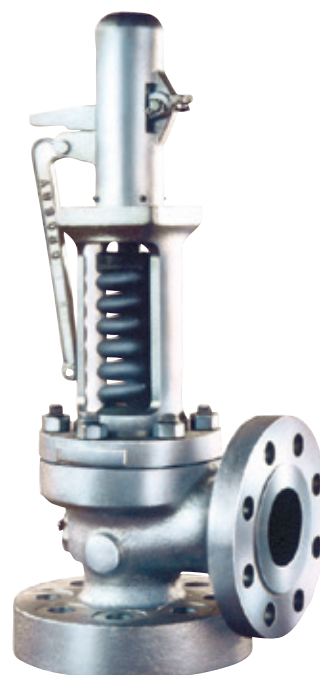
Style HSJ is a full nozzle reaction type safety valve designed for saturated and superheated steam service on drums, superheater outlets, reheater inlets and outlets and economizer applications.

FEATURES

- Increases Operating Efficiency
 - FLEXI-DISC seat design is recessed for pressure and temperature equalization, ensuring a flat and tight seal.
 - FLEXI-DISC seat tightness up to 93%. For seat tightness greater than 93% consult factory.
 - Meets the requirements of ASME Code Section I, Power Boilers and Section VIII for steam service.
 - May also be used for ASME VIII off boiler steam applications for higher operating pressures.
- Reduces Maintenance Costs
 - Replaceable full nozzle design requiring no special tools facilitates ease of maintenance and longer service life.
 - Single bonnet design allows set pressure changes simply by changing-out the spring.
- Minimizes Installation Costs
 - High discharge coefficient results in the most economical valve selection.

TECHNICAL DATA

Sizes:	1½" x 2" to 6" x 8" (DN 40 x DN 50 to DN 150 x DN 200)
Orifices:	0.307 to 11.045 in ² (1.98 to 71.25 cm ²)
Inlet ratings:	ANSI Class 150 to 2500
Maximum temperature:	1000°F (538°)
Maximum set pressure:	2700 psig (186.2 barg)
Codes:	ASME I and VIII
Bonnet:	Open or closed (heat transfer fluid)



CROSBY H-SERIES

STYLE HSJ

PRODUCT OVERVIEW

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 valves are designed for pressures to 2,700 psig (186 barg) and temperatures to 1,000°F (538°C).

HSJ valves are available in sizes 1½" F 2" to 6" Q 8" with ANSI Class 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 valves.

TWO RING DESIGN

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

SHUT TIGHT - STAY TIGHT

The FLEXI-DISC® (6) is recessed for pressure and temperature equalization ensuring a flat, tight seal capable of containing system pressure at 93% of the valve's set pressure.

PRECISE POPPING POINT

Centering of the disc (6) through the low friction guide (8) ensures that the 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. 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. Specify open or closed bonnet when ordering.

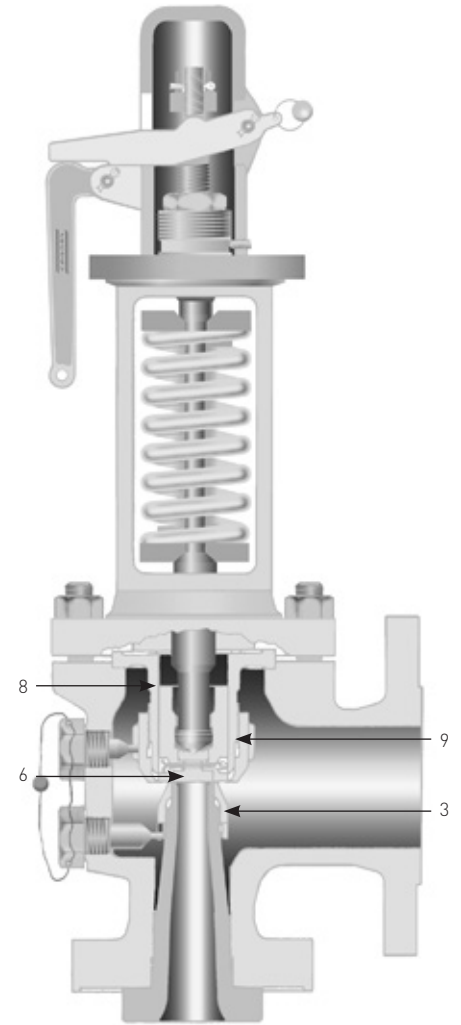
Note: bonnet vents are essential for proper valve operation and should not be plugged (except for Style HSJ-DOW).

STYLE HSJ-DOW FOR DOWTHERM® SERVICE

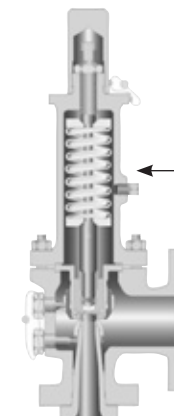
Style HSJ-DOW has been designed to cope with the severe demands placed on a Dowtherm® vaporizer safety relief valve, where temperatures are high and absolute seat tightness is required. This valve is furnished with an unvented closed bonnet, a type A screwed cap and has an alloy steel spring for high 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



STYLE HSJ-DOW



NOTE
Bonnet vent plugged only in HSJ-DOW

CROSBY H-SERIES

STYLE HSJ

MATERIALS

Part ref.		Material and maximum temperature		Spare parts designation ^(1,2,3)
No.	Part name	750°F (399°C)	1000°F (538°C)	
1	Body	Carbon steel	Alloy steel	
2	Nozzle	SA-216 Gr. WCB	SA-217 Gr. WC6	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	Alloy steel	
		Corrosion resistant coating	Corrosion resistant coating	
13	Spring washers	Steel	Steel	
14	Bonnet	Carbon steel	Alloy steel	
		SA-216 Gr. WCB	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	

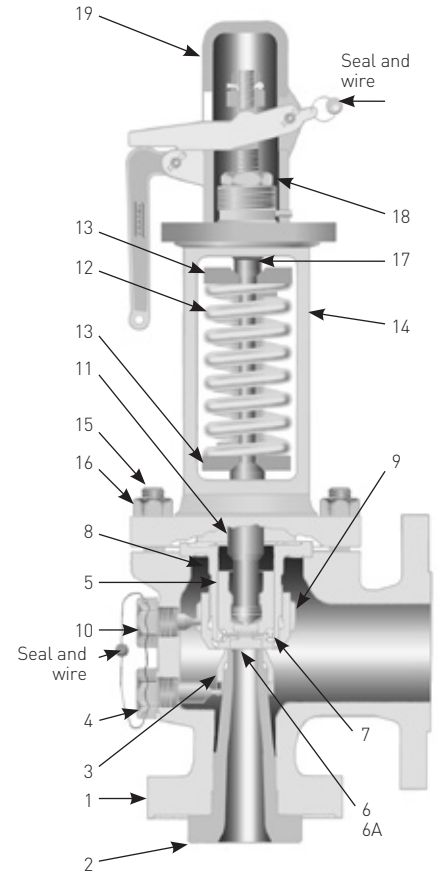
* One piece disc (6A) replaces part reference numbers 5, 6 and 7 in orifice sizes F, G, H and J (Class 150, 300, 600 only)

NOTES

- 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.
- 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.
- Insurance spare parts: valve parts exposed to process or environmental wear and/or corrosion and may require replacement as part of a major repair.

Emerson 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, instruction No. IS-V3146, 'Installation, maintenance and adjustment instruction for Crosby Style HSJ safety valves' is available on request.



CROSBY H-SERIES

STYLE HSJ

STYLE HSJ - SPECIFICATIONS*

USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

Valve size inlet x orifice x outlet	Orifice area sq. in. (sq. mm)		Maximum set pressure ^[1] psig (barg)		Style designation		Standard outlet class
					Standard body material and maximum temperature ^[2] flanged		
					SA216 Gr. WCB 750°F (399°C)	SA217 Gr. WC6 1000°F (538°C)	
Class 150 - ANSI raised face flange or welded CL 150 inlet							
1½ F 2	0.307	(198.1)	200	(13.8)	HSJ-16	-	Cl 150
1½ G 2½	0.503	(324.5)	200	(13.8)	HSJ-16	-	Cl 150
1½ H 3	0.785	(506.5)	200	(13.8)	HSJ-16	-	Cl 150
2 J 3	1.288	(831.0)	200	(13.8)	HSJ-16	-	Cl 150
2½ K 4	1.840	(1187.1)	200	(13.8)	HSJ-16	-	Cl 150
3 K 4	1.840	(1187.1)	200	(13.8)	HSJ-16	-	Cl 150
3 L 4	2.853	(1840.6)	200	(13.8)	HSJ-16	-	Cl 150
3 M 6	3.600	(2322.6)	200	(13.8)	HSJ-16	-	Cl 150
4 M 6	3.600	(2322.6)	200	(13.8)	HSJ-16	-	Cl 150
4 N 6	4.341	(2800.6)	200	(13.8)	HSJ-16	-	Cl 150
4 P 6	6.380	(4116.1)	200	(13.8)	HSJ-16	-	Cl 150
6 Q 8	11.045	(7125.8)	165	(11.4)	HSJ-16	-	Cl 150
Class 300 - ANSI raised face flange or welded CL 300 inlet							
1½ F 2	0.307	(198.1)	600	(41.4)	HSJ-46	HSJ-47	Cl 150
1½ G 2½	0.503	(324.5)	600	(41.4)	HSJ-46	HSJ-47	Cl 150
1½ H 3	0.785	(506.5)	600	(41.4)	HSJ-36	HSJ-37	Cl 150
2 J 3	1.288	(831.0)	285	(19.7)	HSJ-26	-	Cl 150
2 J 4	1.288	(831.0)	600	(41.4)	HSJ-36	HSJ-37	Cl 150
2½ J 4	1.288	(831.0)	600	(41.4)	HSJ-36	HSJ-37	Cl 150
2½ K 4	1.840	(1187.1)	600	(41.4)	HSJ-36	HSJ-37	Cl 150
3 K 4	1.840	(1187.1)	600	(41.4)	HSJ-36	HSJ-37	Cl 150
3 L 4	2.853	(1840.6)	600	(41.4)	HSJ-36	HSJ-37	Cl 150
3 M 6	3.600	(2322.6)	600	(41.4)	HSJ-36	HSJ-37	Cl 150
4 M 6	3.600	(2322.6)	600	(41.4)	HSJ-36	HSJ-37	Cl 150
4 N 6	4.341	(2800.6)	600	(41.4)	HSJ-36	HSJ-37	Cl 150
4 P 6	6.380	(4116.1)	600	(41.4)	HSJ-36	HSJ-37	Cl 150
6 Q 8	11.045	(7125.8)	300	(20.7)	HSJ-36	-	Cl 150
6 Q 8	11.045	(7125.8)	165	(11.4)	-	HSJ-37	Cl 150
Class 600 - ANSI raised face flange or welded CL 600 inlet							
1½ F 2	0.307	(198.1)	1095	(75.5)	HSJ-46	HSJ-47	Cl 150
1½ G 2½	0.503	(324.5)	1095	(75.5)	HSJ-46	HSJ-47	Cl 150
1½ H 3	0.785	(506.5)	900	(62.1)	HSJ-46	HSJ-47	Cl 150
2 H 3	0.785	(506.5)	900	(62.1)	HSJ-46	HSJ-47	Cl 150
2 J 4	1.288	(831.0)	1095	(75.5)	HSJ-46	HSJ-47	Cl 150
2½ J 4	1.288	(831.0)	1095	(75.5)	HSJ-46	HSJ-47	Cl 150
2½ K 4	1.840	(1187.1)	1095	(75.5)	HSJ-46	HSJ-47	Cl 150
3 K 4	1.840	(1187.1)	1095	(75.5)	HSJ-46	HSJ-47	Cl 150
3 L 6	2.853	(1840.6)	900	(62.1)	HSJ-46	HSJ-47	Cl 150
4 L 6	2.853	(1840.6)	900	(62.1)	HSJ-46	HSJ-47	Cl 150
3 M 6	3.600	(2322.6)	900	(62.1)	HSJ-46	HSJ-47	Cl 150
4 M 6	3.600	(2322.6)	900	(62.1)	HSJ-46	HSJ-47	Cl 150
4 N 6	4.341	(2800.6)	900	(62.1)	HSJ-46	HSJ-47	Cl 150
4 P 6	6.380	(4116.1)	900	(62.1)	HSJ-46	HSJ-47	Cl 150
6 Q 8	11.045	(7125.8)	600	(41.4)	HSJ-46	HSJ-47	Cl 150

* Select appropriate class to meet pressure/temperature requirements for each application.

Refer to pages 72-75 for pressure/temperature limits for standard class valves per ASME/ANSI B16.34.

CROSBY H-SERIES

STYLE HSJ

STYLE HSJ - SPECIFICATIONS*

USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

Valve size inlet x orifice x outlet	Orifice area sq. in. (sq. mm)		Maximum set pressure ⁽¹⁾ psig (barg)		Style designation		Standard outlet class
					Standard body material and maximum temperature ⁽²⁾ flanged		
					SA216 Gr. WCB 750°F (399°C)	SA217 Gr. WC6 1000°F (538°C)	
Class 900 - ANSI raised face flange or welded CL 900 inlet							
1½ F 2½	0.307	(198.1)	1970	(135.8)	HSJ-66	HSJ-67	Cl 300
1½ G 2½	0.503	(324.5)	1970	(135.8)	HSJ-66	HSJ-67	Cl 300
1½ H 3	0.785	(506.5)	1610	(111.0)	HSJ-56	HSJ-57	Cl 150
2 H 3	0.785	(506.5)	1610	(111.0)	HSJ-56	HSJ-57	Cl 150
2 J 4	1.288	(831.0)	1600	(110.3)	HSJ-56	HSJ-57	Cl 150
2½ J 4	1.288	(831.0)	1600	(110.3)	-	HSJ-57	Cl 150
3 J 4	1.288	(831.0)	1600	(110.3)	HSJ-56	-	Cl 150
2½ K 4	1.840	(1187.1)	1095	(75.5)	HSJ-56	HSJ-57	Cl 150
3 K 4	1.840	(1187.1)	1095	(75.5)	HSJ-56	HSJ-57	Cl 150
3 L 6	2.853	(1840.6)	900	(62.1)	HSJ-56	HSJ-57	Cl 150
4 L 6	2.853	(1840.6)	900	(62.1)	HSJ-56	HSJ-57	Cl 150
3 M 6	3.600	(2322.6)	900	(62.1)	HSJ-56	HSJ-57	Cl 150
4 M 6	3.600	(2322.6)	900	(62.1)	HSJ-56	HSJ-57	Cl 150
Class 1500 - ANSI raised face flange or welded CL 1500 inlet							
1½ F 2½	0.307	(198.1)	2520	(173.7)	HSJ-66	-	Cl 300
1½ F 2½	0.307	(198.1)	2540	(175.1)	-	HSJ-67	Cl 300
1½ G 2½	0.503	(324.5)	2520	(173.7)	HSJ-66	-	Cl 300
1½ G 2½	0.503	(324.5)	2540	(175.1)	-	HSJ-67	Cl 300
1½ H 3	0.785	(506.5)	2665	(183.8)	HSJ-66	HSJ-67	Cl 300
2 H 3	0.785	(506.5)	2665	(183.8)	HSJ-66	HSJ-67	Cl 300
2 J 4	1.288	(831.0)	1600	(110.3)	HSJ-66	HSJ-67	Cl 300
3 J 4	1.288	(831.0)	1600	(110.3)	HSJ-66	HSJ-67	Cl 300
2½ K 4	1.840	(1187.1)	1095	(75.5)	-	HSJ-67	Cl 150
3 K 4	1.840	(1187.1)	1095	(75.5)	-	HSJ-67	Cl 150
Class 2500 - ANSI raised face flange or welded CL 2500 inlet							
1½ F 2½	0.307	(198.1)	2700	(186.2)	HSJ-76	HSJ-77	Cl 300
2 G 3	0.503	(324.5)	2700	(186.2)	HSJ-76	HSJ-77	Cl 300

* Select appropriate class to meet pressure/temperature requirements for each application.

Refer to pages 72-75 for pressure/temperature limits for standard class valves per ASME/ANSI B16.34.

NOTES

- Set pressure is limited to either the inlet flange pressure limit per ASME/ANSI B16.34 (pages 72-75) or the maximum set pressure, whichever is lower.
- SA-217 Gr. WC6 is Crosby's standard high temperature material. SA-217 Gr. WC9 is available as an alternative.

CROSBY H-SERIES

STYLE HSJ

STYLE HSJ - SPECIFICATIONS

USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

Valve size inlet x orifice x outlet	HSJ valve style ^[1]	General dimensions - inches							Approx. weight Type C (lbs)
		Inlet ID ^[1] A	Center-to-face		Used to find bolt length ^[3] X	Approx. height ^[2] Valve (cap) type			
			Inlet C	Outlet D		A/B	C	D/E	
Class 150 - ANSI raised face flange or welded CL 150 inlet									
1½ F 2	16	1½	47⁄8	4¾	1¾	20¼	22½	23¼	50
1½ G 2½	16	1½	47⁄8	4¾	1¾	20¼	22½	23¼	50
1½ H 3	16	1½	5½	47⁄8	111⁄16	20½	22¾	23½	50
2 J 3	16	2	5¾	47⁄8	111⁄16	21	23¼	24	65
2½ K 4	16	2½	6½	6¾	17⁄8	26	29¼	30	110
3 K 4	16	3	6½	6¾	2½	26	29¼	30	115
3 L 4	16	3	6½	6½	2	30¼	33½	34¼	150
3 M 6	16	3	7	7¼	113⁄16	29¾	33	33¾	192
4 M 6	16	4	7	7¼	2½	29¾	33	33¾	200
4 N 6	16	4	7¾	8¼	2½	37¾	42¼	43	260
4 P 6	16	4	7½	9	2½	37	41½	42¼	270
6 Q 8	16	6	97⁄16	9½	25⁄16	42¼	46¾	47½	475
Class 300 - ANSI raised face flange or welded CL 300 inlet									
1½ F 2	4()	1½	47⁄8	6	1¾	20¼	22½	23¼	50
1½ G 2½	4()	1½	47⁄8	6	1¾	20¼	22½	23¼	50
1½ H 3	3()	1½	5½	47⁄8	111⁄16	20½	22¾	23½	55
2 J 3	26	2	5¾	47⁄8	111⁄16	21	23¼	24	65
2 J 4	3()	2	57⁄8	55⁄8	17⁄8	23½	26¾	27½	83
2½ J 4	3()	2½	5¾	55⁄8	21⁄16	23	26¼	27	90
2½ K 4	3()	2½	6½	6¾	17⁄8	26	29¼	30	110
3 K 4	3()	3	6½	6¾	2½	26	29¼	30	115
3 L 4	3()	3	6½	6½	2	30¼	33½	34¼	150
3 M 6	3()	3	7½	7¼	2½	32¾	36	36¾	215
4 M 6	3()	4	7	7¼	2½	32¼	35½	36¼	225
4 N 6	3()	4	7¾	8¼	2½	37¾	42¼	43	270
4 P 6	3()	4	87⁄8	10	2½	38¾	43¼	44	290
6 Q 8	3()	6	97⁄16	9½	25⁄16	42¼	46¾	47½	495
Class 600 - ANSI raised face flange or welded CL 600 inlet									
1½ F 2	4()	1½	47⁄8	6	1¾	20¼	22½	23¼	50
1½ G 2½	4()	1½	47⁄8	6	1¾	20¼	22½	23¼	50
1½ H 3	4()	1½	5½	47⁄8	113⁄16	20½	22¾	23½	55
2 H 3	4()	2	5½	47⁄8	113⁄16	20½	22¾	23½	60
2 J 4	4()	2	6½	6¾	17⁄8	25¾	29	29¾	106
2½ J 4	4()	2½	6½	6¾	2½	25¾	29	29¾	115
2½ K 4	4()	2½	7¼	7½	2	29¼	32½	33¼	155
3 K 4	4()	3	7¼	7½	2½	29¼	32½	33¼	160
3 L 6	4()	3	8	8	2½	32½	35¾	36½	205
4 L 6	4()	4	71⁄16	8	2¾	31½	34¾	35½	225
3 M 6	4()	3	7½	7¼	2½	32¾	36	36¾	215
4 M 6	4()	4	7	8	27⁄16	32¼	35½	36¼	225
4 N 6	4()	4	7¾	8¾	2¾	37¾	42¼	43	285
4 P 6	4()	4	87⁄8	10	29⁄16	41	45½	46¼	405
6 Q 8	4()	6	97⁄16	9½	215⁄16	46¼	50¾	51½	570

CROSBY H-SERIES

STYLE HSJ

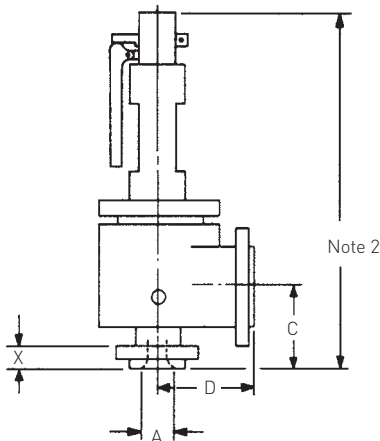
STYLE HSJ - SPECIFICATIONS

USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

Valve size inlet x orifice x outlet	HSJ valve style ^[1]	General dimensions - inches							Approx. weight Type C (lbs)
		Inlet ID ^[1] A	Center-to-face		Used to find bolt length ^[3] X	Approx. height ^[2] Valve (cap) type			
			Inlet C	Outlet D		A/B	C	D/E	
Class 900 - ANSI raised face flange or welded CL 900 inlet									
1½ F 2½	6 ()	1½	4⅞	6	2	20	22¼	23	65
1½ G 2½	6 ()	1½	4⅞	6	2	22¼	25¼	26¼	70
1½ H 3	5 ()	1½	6⅞/16	6⅞	2⅞/16	25	28	28¾	94
2 H 3	5 ()	2	6⅞/16	6⅞	2⅞/8	24½	27½	28¼	110
2 J 4	56	2	7¼	7⅞	2⅞/8	29	32¼	33	130
2 J 4	57	2	6⅞	6¾	2⅞/8	25¾	29	29¾	115
2½ J 4	57	2½	6⅞	6¾	2½	25¾	29	29¾	140
3 J 4	56	3	7¼	7⅞	2¾	29	32¼	33	155
2½ K 4	5 ()	2½	7¼	7⅞	2½	29¼	32½	33¼	170
3 K 4	5 ()	3	7¼	7⅞	2⅞/16	29¼	32½	33¼	175
3 L 6	5 ()	3	8	8	2⅞/8	32½	35¾	36½	210
4 L 6	5 ()	4	7¾	8¾	2⅞/8	32¼	35½	36¼	230
3 M 6	5 ()	3	7¾	7¼	2⅞/8	33	36½	37¼	220
4 M 6	5 ()	4	7¾	8¾	2⅞/16	33	36¼	37	230
Class 1500 - ANSI raised face flange or welded CL 1500 inlet									
1½ F 2½	6 ()	1½	4⅞	6	2	20	22¼	23	65
1½ G 2½	6 ()	1½	4⅞	6	2	22¼	25¼	26¼	70
1½ H 3	6 ()	1½	6⅞/16	6⅞	2⅞/16	25	28	28¾	96
2 H 3	6 ()	2	6⅞/16	6⅞	2⅞/8	24½	27½	28¼	110
2 J 4	6 ()	2	7¼	7⅞	2⅞/8	29	32¼	33	130
3 J 4	6 ()	3	7¼	7⅞	2¾	29	32¼	33	155
2½ K 4	67	2½	7¼	7⅞	2½	29¼	32½	33¼	170
3 K 4	67	3	7¼	7⅞	2¾	29¼	32½	33¼	175
Class 2500 - ANSI raised face flange or welded CL 2500 inlet									
1½ F 2½	7 ()	1½	5½	6½	2½	20¾	23	23¾	65
2 G 3	7 ()	2	6⅞	6¾	2¾	23¼	26½	27¼	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 ½" NPT for F-N orifices
¾" NPT for P and Q orifices



CROSBY H-SERIES

STYLE HSJ

STYLE HSJ - SPECIFICATIONS

METRIC UNITS

Valve size inlet x orifice x outlet	HSJ valve style ^[1]	General dimensions - millimeters							Approx. weight Type C (kg)
		Inlet ID ^[1] A	Center-to-face Inlet C Outlet D		Used to find bolt length ^[3] X	Approx. height ^[2] Valve (cap) type A/B C D/E			
Class 150 - ANSI raised face flange or welded CL 150 inlet									
1½ F 2	16	38.1	123.8	120.7	44.5	514.4	571.5	590.6	23
1½ G 2½	16	38.1	123.8	120.7	44.5	514.4	571.5	590.6	23
1½ 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
2½ 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
Class 300 - ANSI raised face flange or welded CL 300 inlet									
1½ F 2	4()	38.1	123.8	152.4	44.5	514.4	571.5	590.6	23
1½ G 2½	4()	38.1	123.8	152.4	44.5	514.4	571.5	590.6	23
1½ 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
2½ J 4	3()	63.5	136.5	142.9	52.4	584.2	666.8	685.8	41
2½ 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
Class 600 - ANSI raised face flange or welded CL 600 inlet									
1½ F 2	4()	38.1	123.8	152.4	44.5	514.4	571.5	590.6	23
1½ G 2½	4()	38.1	123.8	152.4	44.5	514.4	571.5	590.6	23
1½ 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
2½ J 4	4()	63.5	155.6	171.5	54.0	654.1	736.6	755.7	52
2½ 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

CROSBY H-SERIES

STYLE HSJ

STYLE HSJ - SPECIFICATIONS

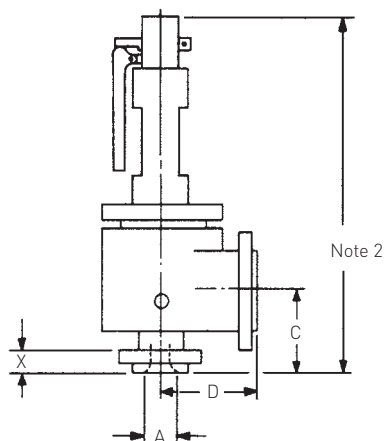
METRIC UNITS

Valve size inlet x orifice x outlet	HSJ valve style ^[1]	General dimensions - millimeters							Approx. weight Type C (kg)
		Inlet ID ^[1] A	Center-to-face		Used to find bolt length ^[3] X	Approx. height ^[2] Valve (cap) type			
			Inlet C	Outlet D		A/B	C	D/E	
Class 900 - ANSI raised face flange or welded CL 900 inlet									
1½ F 2½	6 ()	38.1	123.8	152.4	50.8	508.0	565.2	584.2	29
1½ G 2½	6 ()	38.1	123.8	152.4	50.8	565.2	641.4	666.8	32
1½ 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
2½ 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
2½ 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
Class 1500 - ANSI raised face flange or welded CL 1500 inlet									
1½ F 2½	6 ()	38.1	123.8	152.4	50.8	508.0	565.2	584.2	29
1½ G 2½	6 ()	38.1	123.8	152.4	50.8	565.2	641.4	666.8	32
1½ 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
2½ 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
Class 2500 - ANSI raised face flange or welded CL 2500 inlet									
1½ F 2½	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

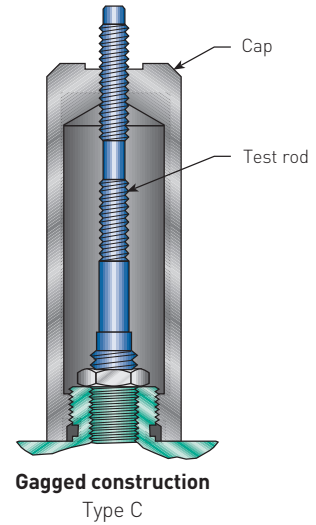
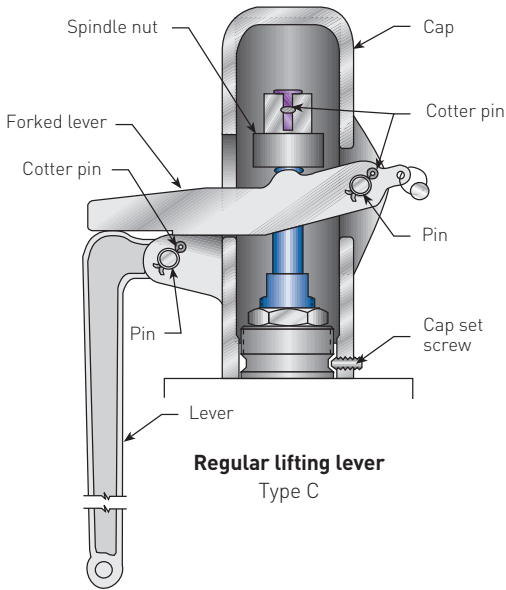
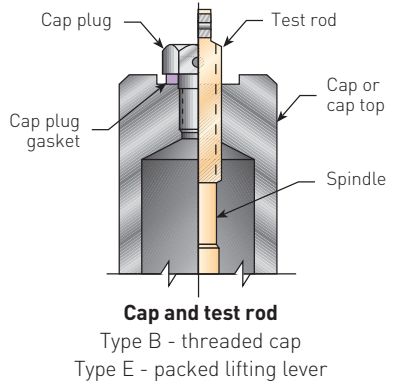
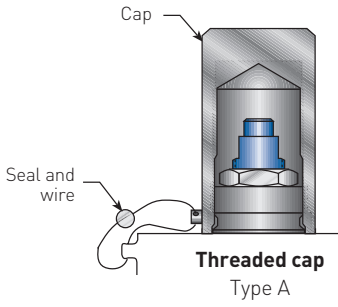
- Safety valves must be mounted on a nozzle with an inlet diameter equal to or greater than the nominal valve inlet size, dimension A. See ASME boiler and pressure code Section I and ANSI/ASME B31.1 for recommended installation.
- Dismantling height: an additional 20 inches (508 mm) is required.
- Bolt holes straddle center line.

Drain: body drain is ½" NPT for F-N orifices
¾" NPT for P and Q orifices

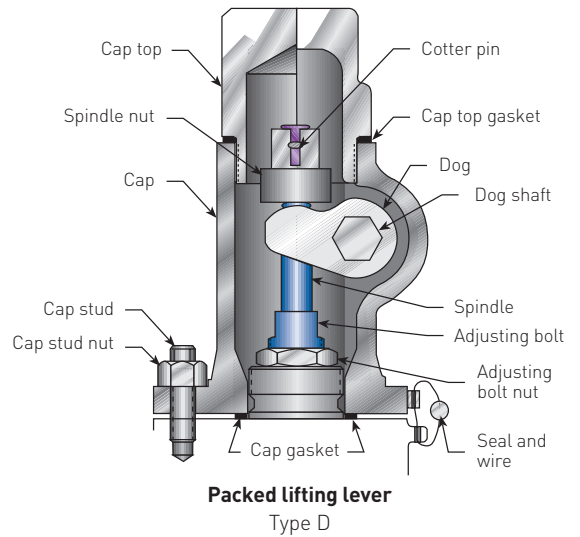
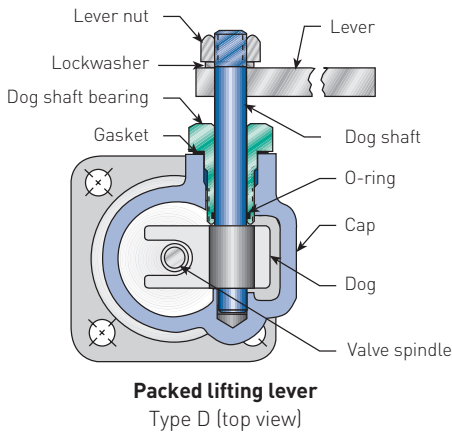


CROSBY H-SERIES
 STYLE HSJ - CAPS AND LIFTING LEVERS

STYLE HSJ CAPS AND LIFTING LEVERS



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



CROSBY H-SERIES

STYLE HSL DIRECT SPRING SAFETY VALVE

STYLE HSL

The Style HSL is a high capacity full nozzle reaction type flanged steel safety valve designed for saturated and superheated steam service up to 725 psig (50 barg) and 1000°F (538°C).

FEATURES

- Increases Operating Efficiency
 - FLEXI-DISC seat design is recessed for pressure and temperature equalization, ensuring a flat and tight seal.
 - FLEXI-DISC seat tightness up to 93%. For seat tightness greater than 93% consult factory.
 - Meets the requirements of ASME Code Section I, Power Boilers and Section VIII for steam service.
 - May also be used for ASME VIII off boiler steam applications for higher operating pressures.
- Reduces Maintenance Costs
 - Replaceable full nozzle design requiring no special tools facilitates ease of maintenance and longer service life.
 - Single bonnet design allows set pressure changes simply by changing-out the spring.
- Minimizes Installation Costs
 - High discharge coefficient results in the most economical valve selection.

TECHNICAL DATA

Sizes:	1¼" x 1½" to 6" x 8" (DN 32 x DN 40 to DN 150 x DN 200)
Connections:	Flanged inlet to ASME Classes 300 and 600
Temperature rating: Max set pressure:	To 1,000°F (538°C) 725 psig (50 barg)
Codes:	ASME I and VIII



CROSBY H-SERIES

STYLE HSL

PRODUCT OVERVIEW

The HSL's adjustable nozzle ring and guide ring (Figure 1) utilize the reactive and expansive forces of flowing steam to provide full lift. With a high K x A, positive overpressure protection is achieved with the fewest valves.

The two-ring design provides precise blowdown control, which can be adjusted while the valve is installed in the system.

Style HSL safety valves incorporate the FLEXI-DISC design. Centering of the disc through a low friction guide ensures the valve opens precisely at set pressure, even after repeated cycling.

There is a choice of inlet flange ratings: The set pressure range for Cl300# valves is 15 psig (1.034 barg) to 330 psig (22.75 barg) and 15 psig (1.034 barg) to 725 psig (50 barg) for Cl600#. Style HSL safety valves are available with optional test gags, weatherhoods for outdoor applications and Class 150# drip pan elbows. A ring-type joint inlet connection is also available. The entire HSL range of F through Q orifices uses a full nozzle design (Figure 1) to facilitate removal and ease of maintenance.

Certification and type approvals

- ASME Boiler and Pressure Vessel Code Section I and VIII
- National Board of Boiler and Pressure Vessel Inspectors Capacity Certifications
- Canadian Registration Number
- Pressure Equipment Directive (97/27/EC) (ISO 4126-1) (CE)
- China Manufacturing License (TS)

BILL OF MATERIALS (F THRU J ORIFICE)

Part ref. No.	Part name	Material and maximum temperature	
		750°F (399°C)	1000°F (538°C)
1	Body	Carbon steel SA-216 Gr. WCB/WCC	Alloy steel SA-217 Gr. WC6
2	Nozzle	Stainless steel	Stainless steel
3	Drain plug	Carbon steel	Carbon steel
4	Nozzle ring	Stainless steel	Stainless steel
5	Nozzle ring set screw	Stainless steel	Stainless steel
6	Disc*	Stainless steel	Stainless steel
7	Guide	Monel®	Nickel alloy
8	Guide ring	Stainless steel	Stainless steel
9	Guide ring set screw	Stainless steel	Stainless steel
10	Bonnet stud nut	SA-194 Gr. 2H	SA-194 Gr. 2H
11	Bonnet stud	SA-193 Gr. B7	SA-193 Gr. B7
12	Spring washers	Carbon steel	Steel
13	Bonnet	Carbon steel SA-216 Gr. WCB/WCC	Alloy steel SA-217 Gr. WC6
14	Spindle	Stainless steel	Stainless steel
15	Adjusting bolt	Stainless steel	Stainless steel
16	Adjusting bolt nut	Steel	Steel
17	Cap	Iron	Iron
18	Cap set screw	Stainless steel	Stainless steel
19	Lever	Iron	Iron
20	Forked lever	Iron	Iron
21	Spindle nut	Steel	Steel
22	Spindle nut cotter pin	Steel	Steel
23	Cotter pin	Steel	Steel
24	Forked lever pin	Steel	Steel
28	Spring	Alloy steel Corrosion resistant coating**	Alloy steel Corrosion resistant coating**
29	Lever pin	Steel	Steel
30	Cotter pin	Steel	Steel
***	Nameplate	Stainless steel	Stainless steel

* Recommended spare part

** Crosby may upgrade to Inconel® X 750

*** Not shown

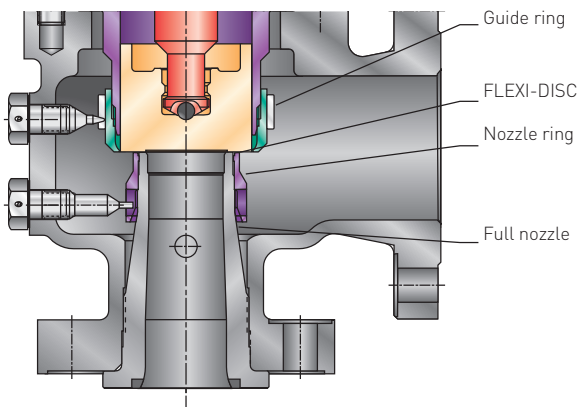
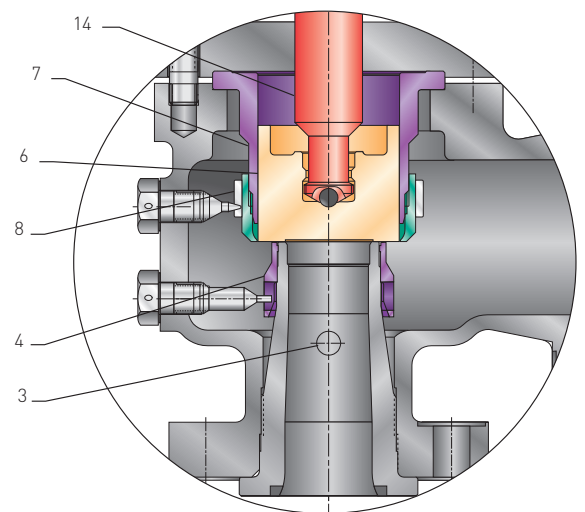


FIGURE 1 - HSL FULL NOZZLE

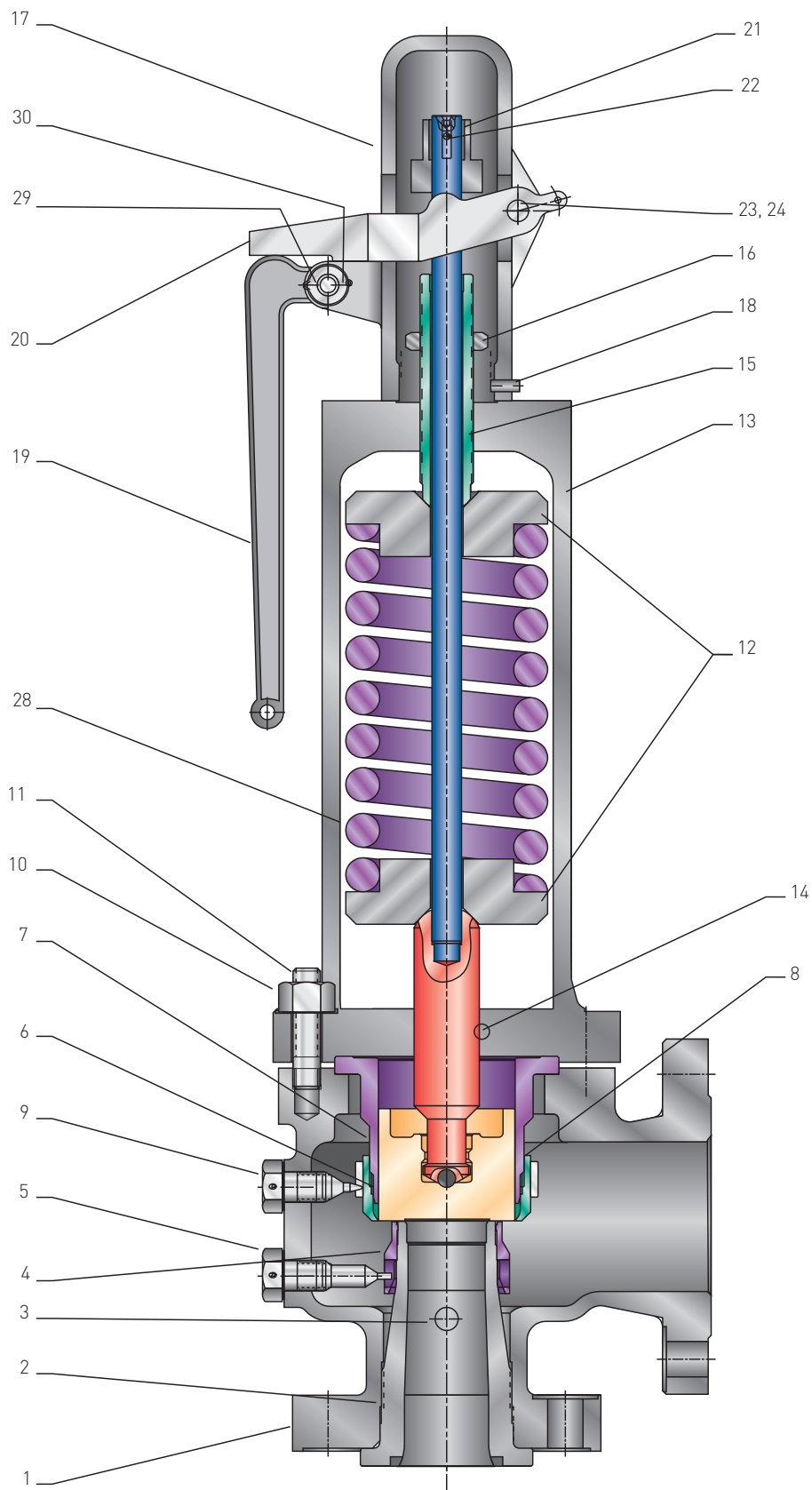


F - J ORIFICE CONSTRUCTION

CROSBY H-SERIES

STYLE HSL

F THRU J ORIFICE



CROSBY H-SERIES

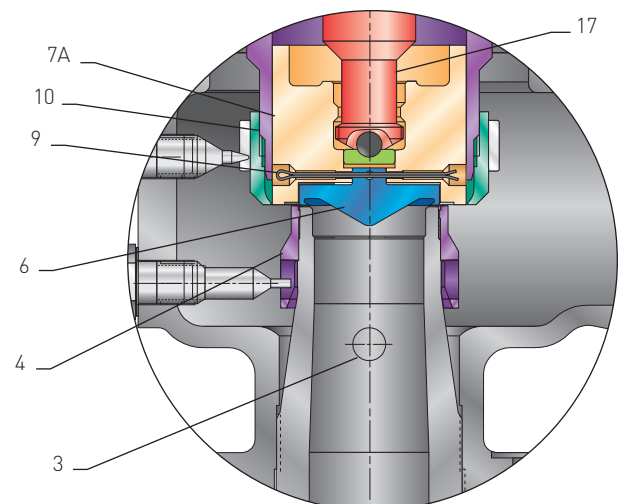
STYLE HSL

BILL OF MATERIALS (K THRU Q ORIFICE)

Part ref. no.	Part name	Material and maximum temperature	
		750°F (399°C)	1000°F (538°C)
1	Body	Carbon steel SA-216 Gr. WCB/WCC	Alloy steel SA-217 Gr. WC6
2	Nozzle	Stainless steel	Stainless steel
3	Drain plug	Carbon steel	Carbon steel
4	Nozzle ring	Stainless steel	Stainless steel
5	Nozzle ring set screw	Stainless steel	Stainless steel
6	Disc insert*	Stainless steel	Stainless steel
7A and B	Disc holder and bushing	Monel®/Stainless steel	Nickel alloy
9	Disc insert cotter pin*	Stainless steel	Stainless steel
10	Guide	Monel®	Nickel alloy
11	Guide ring	Stainless steel	Stainless steel
12	Guide ring set screw	Stainless steel	Stainless steel
13	Bonnet stud nut	SA-194 Gr. 2H	SA-194 Gr. 2H
14	Bonnet stud	SA-193 Gr. B7	SA-193 Gr. B7
15	Spring washers	Carbon steel	Steel
16	Bonnet	Carbon steel SA-216 Gr. WCB/WCC	Alloy steel SA-217 Gr. WC6
17	Spindle	Stainless steel	Stainless steel
18	Adjusting bolt	Stainless steel	Stainless steel
19	Adjusting bolt nut	Steel	Steel
20	Cap	Iron	Iron
21	Cap set screw	Stainless steel	Stainless steel
22	Lever	Iron	Iron
23	Forked lever	Iron	Iron
24	Spindle nut	Steel	Steel
25	Spindle nut cotter pin	Steel	Steel
26	Cotter pin	Steel	Steel
27	Forked lever pin	Steel	Steel
28	Spring	Alloy steel Corrosion resistant coating	Alloy steel Corrosion resistant coating
32	Lever pin	Steel	Steel
33	Cotter pin	Steel	Steel
**	Nameplate	Stainless steel	Stainless steel

* Recommended spare parts

** Not shown

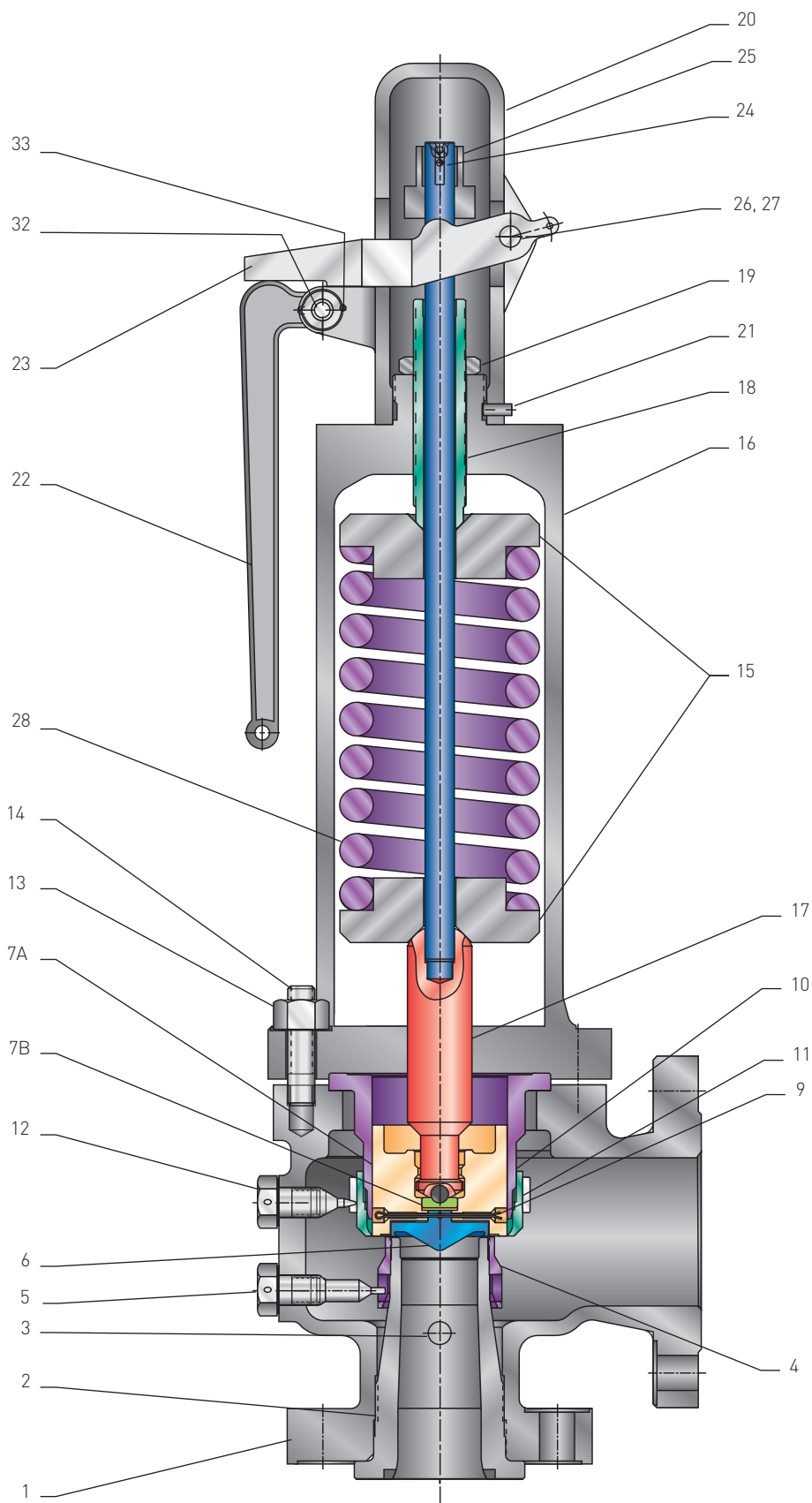


K - Q ORIFICE CONSTRUCTION

CROSBY H-SERIES

STYLE HSL

K THRU Q ORIFICE



CROSBY H-SERIES

STYLE HSL

CL 300 - ANSI RAISED FACE FLANGE

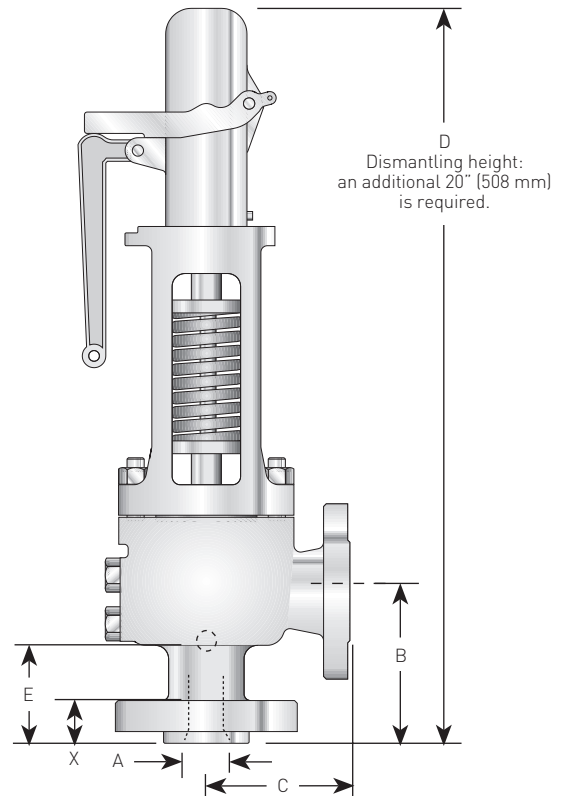
Valve size inlet orifice outlet	HSL valve style	Center-to-face			Used to find bolt Length 'X' ⁽¹⁾ in (mm)	Approx. height 'D' in (mm)	Drain height 'E' in (mm)	NPT drain size	Approx. weight lb (kg)
		Inlet ID 'A' in (mm)	Inlet 'B' in (mm)	Outlet 'C' in (mm)					
1 1/4 F 1 1/2	3 ()	1 1/4 [31.8]	4 13/32 [111.9]	4 3/16 [106.4]	1 3/16 [30.2]	21 1/2 [546]	21 1/16 [68]	1/4	41 [18.6]
1 1/4 G 1 1/2	3 ()	1 1/4 [31.8]	4 13/32 [111.9]	4 3/16 [106.4]	1 3/16 [30.2]	21 1/2 [546]	21 1/16 [68]	1/4	41 [18.6]
1 1/2 H 2 1/2	3 ()	1 1/2 [38.1]	4 3/4 [120.7]	4 7/8 [123.8]	1 1/4 [31.75]	22 1/4 [565]	2 5/8 [66]	3/8	56 [25.4]
1 1/2 J 2 1/2	3 ()	1 1/2 [38.1]	4 3/4 [120.7]	4 7/8 [123.8]	1 1/4 [31.75]	26 3/4 [679]	2 5/8 [66]	3/8	71 [32.2]
2 K 3	3 ()	2 [50.8]	5 1/4 [133.4]	5 9/16 [141.3]	1 1/2 [38.1]	30 1/8 [765]	3 1/8 [80]	3/8	90 [40.8]
2 1/2 L 4	3 ()	2 1/2 [63.5]	6 1/8 [155.6]	6 5/16 [160.3]	1 13/16 [46]	32 7/8 [835]	3 7/8 [98]	1/2	138 [62.6]
3 M 4	3 ()	3 [76.2]	6 1/2 [165.1]	6 7/16 [163.5]	1 7/8 [47.6]	33 3/16 [852]	4 3/16 [107]	1/2	156 [70.8]
4 N 6	3 ()	4 [101.6]	7 1/4 [184.2]	7 7/16 [188.9]	2 1/8 [54]	40 3/4 [1035]	4 1/4 [108]	3/4	261 [118.4]
4 P 6	3 ()	4 [101.6]	7 7/16 [188.9]	8 3/16 [207.9]	2 1/8 [54]	41 1/4 [1048]	4 7/16 [113]	3/4	281 [127.5]
6 QQ 8	3 ()	6 [152.4]	9 7/8 [250.8]	9 9/16 [238.1]	2 1/2 [63.5]	47 1/16 [1195]	4 13/16 [122]	3/4	494 [224.1]

CL 600 - ANSI RAISED FACE FLANGE

Valve size inlet orifice outlet	HSL valve style	Center-to-face			Used to find bolt Length 'X' ⁽¹⁾ in (mm)	Approx. height 'D' in (mm)	Drain height 'E' in (mm)	NPT drain size	Approx. weight lb (kg)
		Inlet ID 'A' in (mm)	Inlet 'B' in (mm)	Outlet 'C' in (mm)					
1 1/4 F 1 1/2	4 ()	1 1/4 [31.8]	4 13/32 [111.9]	4 3/16 [106.4]	1 3/16 [30.2]	21 1/2 [546]	21 1/16 [68]	1/4	41 [18.6]
1 1/4 G 1 1/2	4 ()	1 1/4 [31.8]	4 13/32 [111.9]	4 3/16 [106.4]	1 3/16 [30.2]	21 1/2 [546]	21 1/16 [68]	1/4	41 [18.6]
1 1/2 H 2 1/2	4 ()	1 1/2 [38.1]	4 3/4 [120.7]	4 7/8 [123.8]	1 1/4 [31.75]	22 1/4 [565]	2 5/8 [66]	3/8	56 [25.4]
1 1/2 J 2 1/2	4 ()	1 1/2 [38.1]	4 3/4 [120.7]	4 7/8 [123.8]	1 1/4 [31.75]	26 3/4 [679]	2 5/8 [66]	3/8	72 [32.7]
2 K 3	4 ()	2 [50.8]	5 1/4 [133.4]	5 9/16 [141.3]	1 1/2 [38.1]	30 1/8 [765]	3 1/8 [80]	3/8	90 [40.8]
2 1/2 L 4	4 ()	2 1/2 [63.5]	6 1/8 [155.6]	6 5/16 [160.3]	1 13/16 [46]	32 7/8 [835]	3 7/8 [98]	1/2	138 [62.6]
3 M 4	4 ()	3 [76.2]	6 1/2 [165.1]	6 7/16 [163.5]	1 7/8 [47.6]	33 3/16 [852]	4 3/16 [107]	1/2	156 [70.8]
4 N 6	4 ()	4 [101.6]	7 11/16 [195.2]	7 7/16 [188.9]	2 1/16 [62]	41 3/8 [1051]	4 3/4 [121]	3/4	261 [118.4]
4 P 6	4 ()	4 [101.6]	7 11/16 [195.2]	8 3/16 [207.9]	2 7/16 [62]	41 1/2 [1054]	4 3/4 [121]	3/4	298 [135.2]
6 QQ 8	4 ()	6 [152.4]	10 5/16 [261.9]	9 9/16 [238.1]	2 7/8 [73]	47 1/2 [1207]	5 3/8 [137]	3/4	494 [224.1]

NOTE

1. Bolt holes straddle centerline on flanged connections.



CROSBY H-SERIES

PRESSURE / TEMPERATURE LIMITS - STYLE HSL

CL 300 - ANSI RAISED FACE FLANGE

Valve size inlet orifice outlet	Orifice area square inch (mm)	Maximum set pressure			Style designation - standard body mat. and max. temp.		Standard flanged outlet Class
		at 900°F (482°C) or less psig (barg)	at 950°F (510°C) psig (barg)	at 1000°F (538°C) psig (barg)	SA216 Gr. WCB 750°F (399°C)	SA217 Gr. WC6 1000°F (538°C)	
1¼ F 1½	0.339 [218.7]	330 [22.76]	320 [22.07]	215 [14.83]	HSL-36	HSL-38	150
1¼ G 1½	0.553 [356.8]	330 [22.76]	320 [22.07]	215 [14.83]	HSL-36	HSL-38	150
1½ H 2½	0.868 [600.0]	330 [22.76]	320 [22.07]	215 [14.83]	HSL-36	HSL-38	150
1½ J 2½	1.327 [856.1]	330 [22.76]	320 [22.07]	215 [14.83]	HSL-36	HSL-38	150
2 K 3	2.046 [1320.0]	330 [22.76]	320 [22.07]	215 [14.83]	HSL-36	HSL-38	150
2½ L 4	3.167 [2043.2]	330 [22.76]	320 [22.07]	215 [14.83]	HSL-36	HSL-38	150
3 M 4	3.955 [2551.6]	330 [22.76]	320 [22.07]	215 [14.83]	HSL-36	HSL-38	150
4 N 6	4.831 [3116.8]	330 [22.76]	320 [22.07]	215 [14.83]	HSL-36	HSL-38	150
4 P 6	7.031 [4536.1]	330 [22.76]	320 [22.07]	215 [14.83]	HSL-36	HSL-38	150
6 QQ 8	11.045 [7125.8]	330 [22.76]	320 [22.07]	215 [14.83]	HSL-36	HSL-38	150

CL 600 - ANSI RAISED FACE FLANGE

Valve size inlet orifice outlet	Orifice area square inch (mm)	Maximum set pressure			Style designation - standard body mat. and max. temp.		Standard flanged outlet Class
		at 900°F (482°C) or less psig (barg)	at 950°F (510°C) psig (barg)	at 1000°F (538°C) psig (barg)	SA216 Gr. WCB 750°F (399°C)	SA217 Gr. WC6 1000°F (538°C)	
1¼ F 1½	0.339 [218.7]	725 [50]	640 [44.14]	430 [29.66]	HSL-46	HSL-48	150
1¼ G 1½	0.553 [356.8]	725 [50]	640 [44.14]	430 [29.66]	HSL-46	HSL-48	150
1½ H 2½	0.868 [600.0]	725 [50]	640 [44.14]	430 [29.66]	HSL-46	HSL-48	150
1½ J 2½	1.327 [856.1]	725 [50]	640 [44.14]	430 [29.66]	HSL-46	HSL-48	150
2 K 3	2.046 [1320.0]	725 [50]	640 [44.14]	430 [29.66]	HSL-46	HSL-48	150
2½ L 4	3.167 [2043.2]	725 [50]	640 [44.14]	430 [29.66]	HSL-46	HSL-48	150
3 M 4	3.955 [2551.6]	725 [50]	640 [44.14]	430 [29.66]	HSL-46	HSL-48	150
4 N 6	4.831 [3116.8]	725 [50]	640 [44.14]	430 [29.66]	HSL-46	HSL-48	150
4 P 6	7.031 [4536.1]	725 [50]	640 [44.14]	430 [29.66]	HSL-46	HSL-48	150
6 QQ 8	11.045 [7125.8]	725 [50]	640 [44.14]	430 [29.66]	HSL-46	HSL-48	150

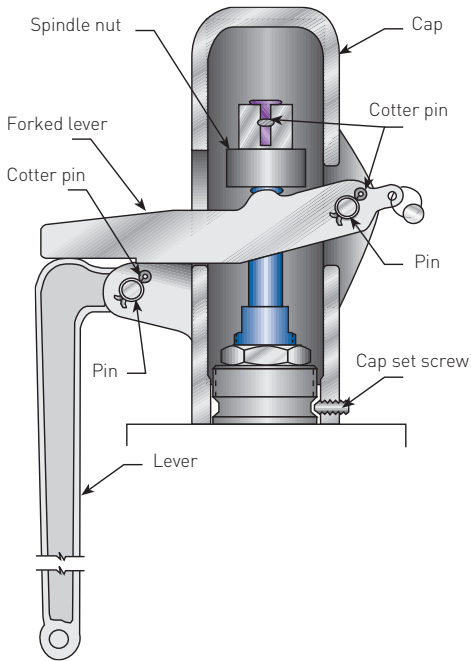
NOTE

Set pressure is limited to either the inlet pressure limit per ASME B16.34 or the maximum set pressure listed in the tables above, whichever is lower.

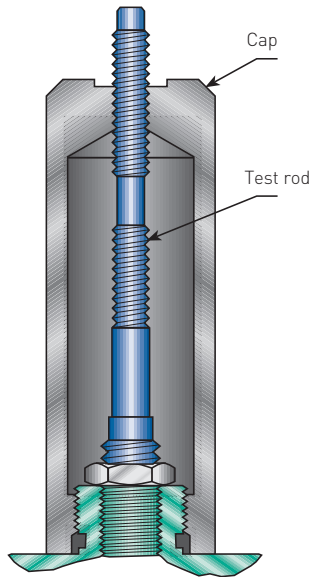
CROSBY H-SERIES

STYLE HSL - CAPS AND LIFTING LEVERS

REGULAR LIFTING LEVER TYPE C (standard)

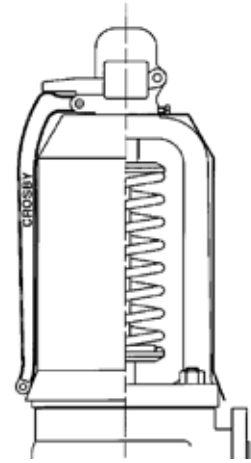


OPTIONAL TEST GAG TYPE C



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

SAFETY VALVE WITH OPTIONAL WEATHERHOOD FOR OUTDOOR SERVICE



OPTIONAL 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.

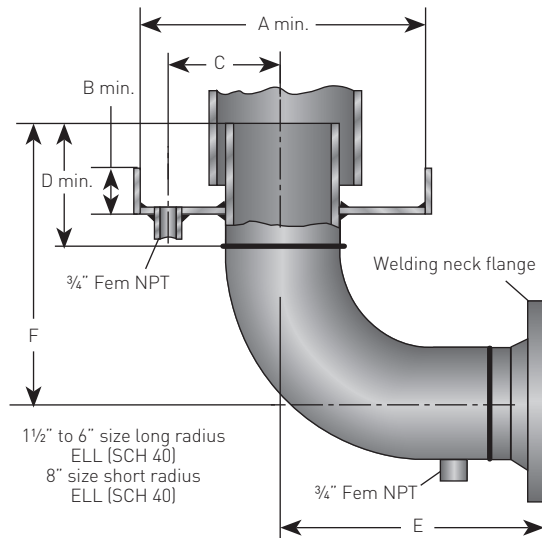
The flanged model EFS drip pan elbow should be used without any intermediary connection.

Specifications

- Model: EFS
- Sizes: 1½", 2½", 3", 4", 6", 8"
- Flange ANSI Class: 150 (1½" to 8")
- Material: Carbon steel

DIMENSIONS (inches)

Valve outlet size	A	B	C	D	E 150 ANSI Class	F
1½	7	2½	2½	6	4 ¹¹ / ₁₆	9
2½	9	2½	3	7	6½	10¾
3	9	3	3	8	7¼	12½
4	12	3	4	8	9	14
6	14	4	5	8	12½	17
8	16	4	6½	8	12	16



CROSBY H-SERIES

STYLE HCA-I-118W ISOFLEX SUPERCRITICAL SERVICE

STYLE HCA-I-118W

Style HCA-I-118W are high capacity reaction type safety valves specially designed to withstand the severe operating conditions on supercritical pressure steam generators.

FEATURES

- Increases Operating Efficiency
 - Restricted lift option for customized capacity, reduced reaction forces and boiler design standardization.
 - Seat tightness up to 93%. For seat tightness greater than 93% consult factory.
 - Two ring control to adjust overpressure and blowdown independently.
 - May also be used for ASME VIII off boiler steam applications for higher operating pressures.
- Reduces Maintenance Costs
 - Interchangeable spare parts minimizes inventory levels.
 - Higher nozzle seat step to extend valve service life.
- Minimizes Installation Costs
 - Packaging designed for quick and easy installation.
 - Easy to set and adjust set pressure while in service.

Certification and type Approvals

- ASME Boiler and Pressure Vessel Code, Section I
- National Board of Boiler and Pressure Vessel Inspectors Capacity Certifications
- Pressure Equipment Directive (97/27/EC) (ISO 4126-1) (CE)
- China Manufacturing License (TS)

TECHNICAL DATA

Inlet sizes:	2½" and 3"
Inlet rating:	CL 4500# butt weld
Outlet rating:	CL 300#
Maximum set pressures:	5,000 psig (344.8 barg)
Temperature range:	to 1100°F (593°C)
Four (4) orifices:	K, K2, M and M2
Blowdown:	4%

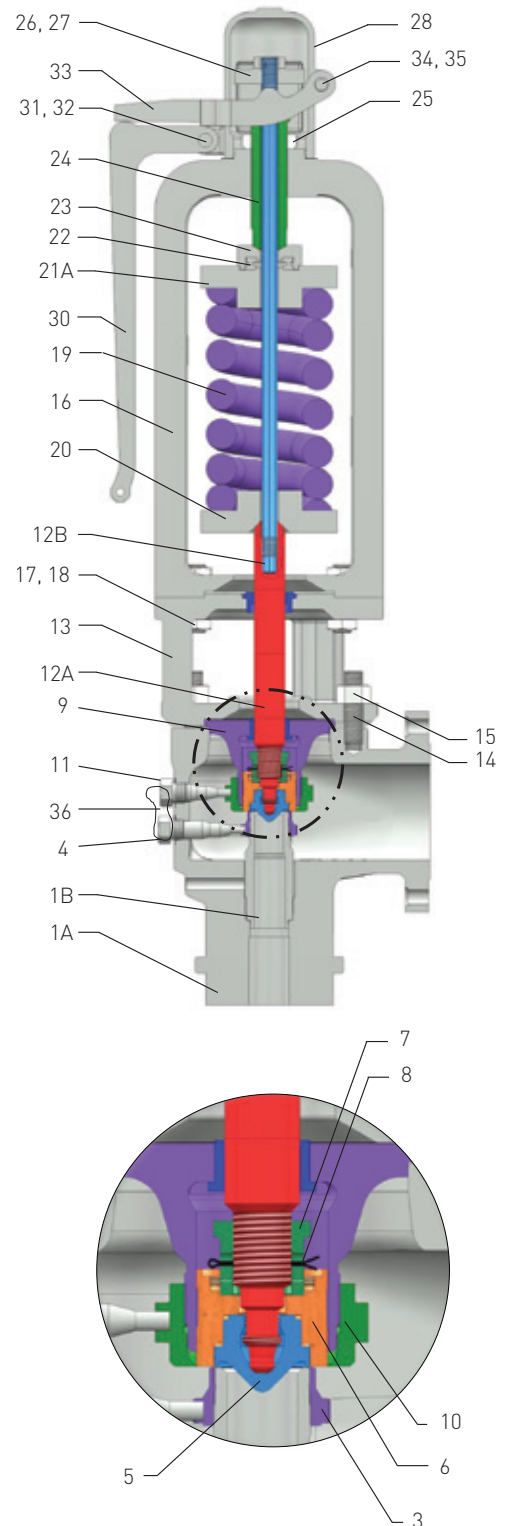


CROSBY H-SERIES

STYLE HCA-I

STYLE HCA-I-118W ISOFLEX MATERIALS

Part ref. No.	Part name	Material and Maximum Temperature	
		Style HCA-I-118W-C 1050°F [566C]	Style HCA-1-18W-C12A-C 1100°F [593C]
1A	Body	ASME SA217 Grade WC9	ASME SA217 Grade C12A
1B	Nozzle	ASME SB564 N06625	ASME SB564 N06625
3	Nozzle ring	316 Stainless steel	316 Stainless steel
4	Nozzle ring set screw	416 Stainless steel	416 Stainless steel
5	Disc insert	ASME SB637 UNS N07718	ASME SB637 UNS N07718
6	Disc holder	NI-CU Alloy	NI-CU Alloy
7	Disc holder retainer	Stainless steel	Stainless steel
8	Disc holder retainer cotter	Stainless steel	Stainless steel
9	Guide	NI-CU Alloy	NI-CU Alloy
10	Guide ring	316 Stainless steel	316 Stainless steel
11	Guide ring set screw	416 Stainless steel	416 Stainless steel
12A	Spindle point	ASTM A565 GR 616 COND. HT	ASTM A565 GR 616 COND. HT
12B	Spindle rod	Stainless steel	Stainless steel
12C	Spindle rod pin	Stainless steel	Stainless steel
13	Cooling spool	ASME SA217 Grade WC9	ASME SA217 Grade WC9
14	Cooling spool studs	ASTM A193 B16	ASTM A193 B16
15	Cooling spool stud nut	ASME SA194 GR 2H	ASME SA194 GR 2H
16	Bonnet	ASME SA217 Grade WC9	ASME SA217 Grade WC9
17	Bonnet studs	Alloy Steel SA-193 Gr. B16	Alloy Steel SA-193 Gr. B16
18	Bonnet stud nuts	ASME SA194 GR 2H	ASME SA194 GR 2H
19	Spring	A681-H12 (Cor. Res. Coating)	A681-H12 (Cor. Res. Coating)
20	Bottom spring washer	Steel	Steel
21A	Top spring washer	Steel	Steel
21B	Locking rod	Steel	Steel
21C	Pin	Steel	Steel
22	Thrust bearing	Bronze	Bronze
23	Bearing adapter	Alloy Steel	Alloy Steel
24	Adjusting bolt	ASTM A582 TP 416 COND. T	ASTM A582 TP 416 COND. T
25	Adjusting bolt nut	Stainless steel	Stainless steel
26	Spindle nut	416 Steel	416 Steel
27	Spindle nut cotter	Stainless steel	Stainless steel
28	Cap	Malleable Iron	Malleable Iron
29	Cap set screw	High Grade Alloy Steel	High Grade Alloy Steel
30	Lever	Malleable Iron	Malleable Iron
31	Lever pin	Steel	Steel
32	Lever pin cotter	Steel	Steel
33	Forked lever	Malleable Iron	Malleable Iron
34	Forked lever pin	Steel	Steel
35	Forked lever pin cotter	Steel	Steel
36	Seal and wire	Stainless steel	Stainless steel
37	Nameplate	Stainless steel	Stainless steel
38	Drive screw	Stainless steel	Stainless steel
39	Drain plug	Steel	Steel
40	Test clamp ^[1]	Steel	Steel
41	Gag screw ^[1]	Stainless steel	Stainless steel
42	Hydrostatic cap ^[1]	Stainless steel	Stainless steel
43	Hydrostatic plug ^[1]	Stainless steel	Stainless steel
44	Hydrostatic plug pin ^[1]	Stainless steel	Stainless steel
45	O-ring ^[1]	Ethylene Propylene	Ethylene Propylene
46	Back-up ring ^[1]	BUNA-N	BUNA-N



NOTES

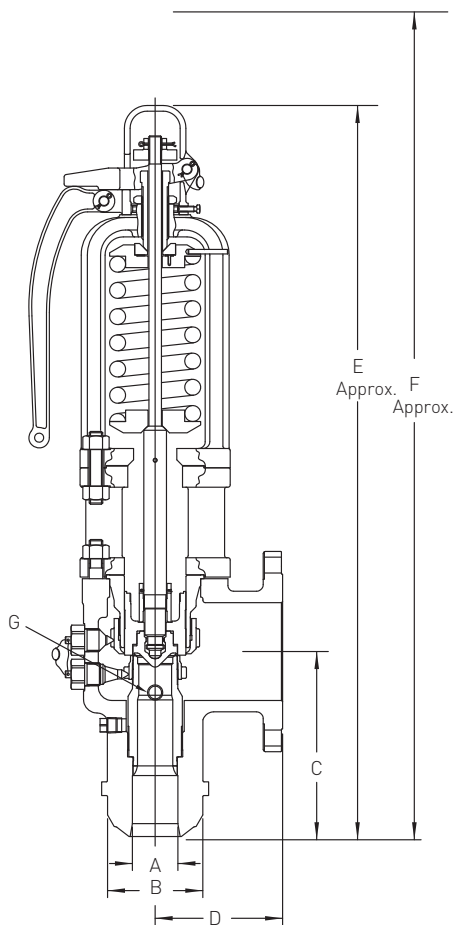
1. Not shown

CROSBY H-SERIES

STYLE HCA-I

HCA-I DIMENSIONS AND WEIGHTS

Standard Connections				Dimensions - inches (mm)								
Valve size Inlet x orifice x outlet	Orifice letter designat.	Area Sq. In. (Sq. mm.)	Butt weld inlet Inches (mm)	Flanged outlet size (in.) and ANSI Class	'A' Inlet I.D. in. (mm)	'B' Max. inlet O.D. in. (mm)	Center to face		'E' Approx. in. (mm)	'F' Dismantling height in. (mm)	'G' Drain (NPT)	Approx. Weight Lbs (kg)
							'C' of Inlet in. (mm)	'D' of Outlet in. (mm)				
2.5 x K x 6	K	1.840 (1186)	2½ (63.5)	6" Cl 300#	2½ (63.5)	8 (203)	12 (305)	10 (254)	60 (1524)	80 (2032)	½	660 (299)
2.5 x K2 x 6	K2	2.545 (1642)	2½ (63.5)	6" Cl 300#	2½ (63.5)	8 (203)	12 (305)	10 (254)	60 (1524)	80 (2032)	½	680 (308)
3 x M x 8	M	3.600 (2323)	3 (76.2)	8" Cl 300#	3 (76.2)	9¼ (235)	13 (330)	10½ (267)	62 (1575)	82 (2082)	½	900 (408)
3 x M2 x 8	M2	3.976 (2565)	3 (76.2)	8" Cl 300#	3 (76.2)	9¼ (235)	13 (330)	10½ (267)	62 (1575)	82 (2082)	½	930 (422)



CROSBY H-SERIES
SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 15-550 psig

		Orifice designation and area (sq. in.)																		
HE																				
HCI																				
HSJ																				
Set	Orifice (sq. in.)																			
pres. (psig)	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	-	-	-	

* Refer to capacity formula, page 50.

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} , pages 60-61. 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.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 15-550 psig (continued)

		Orifice designation and area (sq. in.)																		
HE																				
HCI																				
HSJ																				
Set	Orifice (sq. in.)																			
pres. psig	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR	
	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	
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	

* Refer to capacity formula, page 50.

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} , pages 60-61. 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.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 560-1100 psig

HE HCI HSJ Set	Orifice designation and area (sq. in.)																		
	Orifice (sq. in.)																		
pres. psig	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
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

* Refer to capacity formula, page 50.

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} , pages 60-61. 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.

CROSBY H-SERIES
SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 560-1100 psig (continued)

		Orifice designation and area (sq. in.)																	
HE																			
HCI																			
HSJ																			
Set	Orifice (sq. in.)																		
pres.	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
psig	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
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	-

* Refer to capacity formula, page 50.

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} , pages 60-61. 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.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 1100-1650 psig

		Orifice designation and area (sq. in.)																		
HE																				
HCI																				
HSJ																				
Set		Orifice (sq. in.)																		
pres.		F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
psig		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	-	-

* Refer to capacity formula, page 50.

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 60-61. 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.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 1100-1650 psig (continued)

		Orifice designation and area (sq. in.)																		
HE																				
HCI																				
HSJ																				
Set	Orifice (sq. in.)																			
pres.	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR	
psig	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	
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	21782	35688	55696	70525	91384	101530	-	180569	-	237045	-	282099	-	-	501619	-	-	-	-	
1520	21937	35943	56093	71028	92036	102254	-	181856	-	238736	-	284111	-	-	505197	-	-	-	-	
1530	22093	36197	56491	71531	92689	102979	-	183146	-	240429	-	286126	-	-	508780	-	-	-	-	
1540	22249	36453	56890	72036	93342	103706	-	184438	-	242125	-	288144	-	-	512368	-	-	-	-	
1550	22405	36709	57289	72541	93997	104433	-	185732	-	243824	-	290165	-	-	515963	-	-	-	-	
1560	22561	36965	57688	73048	94653	105162	-	187028	-	245525	-	292190	-	-	519563	-	-	-	-	
1570	22718	37221	58089	73555	95310	105892	-	188326	-	247229	-	294218	-	-	523170	-	-	-	-	
1580	22874	37478	58490	74062	95968	106623	-	189627	-	248936	-	296250	-	-	526782	-	-	-	-	
1590	23032	37736	58892	74571	96627	107355	-	190929	-	250646	-	298285	-	-	530401	-	-	-	-	
1600	23189	37994	59294	75081	97288	108089	-	192234	-	252359	-	300323	-	-	534025	-	-	-	-	
1610	23347	38252	59697	75591	-	108824	-	193541	-	254075	-	302365	-	-	537656	-	-	-	-	
1620	23505	38511	60101	76103	-	109560	-	194850	-	255793	-	304410	-	-	541293	-	-	-	-	
1630	23663	38770	60506	76615	-	110298	-	196162	-	257515	-	306459	-	-	544936	-	-	-	-	
1640	23821	39030	60911	77128	-	111036	-	197475	-	259240	-	308512	-	-	548586	-	-	-	-	
1650	23980	39290	61317	77642	-	111776	-	198791	-	260967	-	310568	-	-	552242	-	-	-	-	

* Refer to capacity formula, page 50.

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} , pages 60-61. 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.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 1650-2200 psig

		Orifice designation and area (sq. in.)																	
HE																			
HCI																			
HSJ																			
Set	Orifice (sq. in.)																		
pres.	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
psig	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
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	-	-	-	-

* Refer to capacity formula, page 50.

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} , pages 60-61. 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.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 1650-2200 psig (continued)

		Orifice designation and area (sq. in.)																	
HE																			
HCI																			
HSJ																			
Set	Orifice (sq. in.)																		
pres.	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
psig	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
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	-	-	-	-

* Refer to capacity formula, page 50.

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} , pages 60-61. 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.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 2210-2750 psig

		Orifice designation and area (sq. in.)																	
HE																			
HCI																			
HSJ																			
Set	Orifice (sq. in.)																		
pres.	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
psig	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
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	-	-	-	-

* Refer to capacity formula, page 50.

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} , pages 60-61. 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.

CROSBY H-SERIES
SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 2210-2750 psig (continued)

HE HCI HSJ Set pres. psig	Orifice designation and area (sq. in.)																		
	Orifice (sq. in.)																		
	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
	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
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	-	-	-	-

* Refer to capacity formula, page 50.

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 60-61. 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.

CROSBY H-SERIES
SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 2760-3090 psig

		Orifice designation and area (sq. in.)																	
HE																			
HCI																			
HSJ																			
Set	Orifice (sq. in.)																		
pres. psig	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} , pages 60-61. 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.

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
 $P = [1.03 \times \text{set pressure}] + 14.7 = \text{absolute pressure, psia}$
 $K = 0.878 = \text{average coefficient of discharge}$
 A = Nozzle throat (orifice) area, sq.in.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - METRIC UNITS - SATURATED STEAM CAPACITIES

Kilograms per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 87-129 barg

		Orifice designation and area (sq. mm)																	
HE																			
HCI																			
HSJ																			
Set	Orifice (sq. mm)																		
pres.	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
barg	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} , pages 60-61. 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.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - METRIC UNITS - SATURATED STEAM CAPACITIES

Kilograms per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 130-172 barg

HE HCI HSJ Set	Orifice designation and area (sq. mm)																		
	Orifice (sq. mm)																		
pres. barg	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
	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} , pages 60-61. 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.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLES HE, HCI AND HSJ - METRIC UNITS - SATURATED STEAM CAPACITIES

Kilograms per hour at 3% overpressure

SATURATED STEAM CAPACITIES - SET PRESSURES 173-213 barg

Set	Orifice designation and area (sq. mm)																		
	Orifice (sq. mm)																		
pres. barg	F	G	H	H2	J	J2	K	K2	L	L2	M	M2	N	P	P2	Q	Q2	R	RR
	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
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} , pages 60-61. 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.

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) $1.03p + 1.014$

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLE HSL - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SET PRESSURES 15 - 725 PSIG

Set pressure (psig)	Orifice area (sq in)									
	F 0.339	G 0.553	H 0.868	J 1.327	K 2.046	L 3.167	M 3.955	N 4.831	P 7.031	Q 12.174
15	481	785	1231	1883	2903	4493	5611	6854	9975	17271
20	557	908	1426	2180	3360	5202	6496	7935	11548	19995
30	709	1156	1814	2773	4276	6619	8266	10097	14695	25444
40	860	1403	2203	3367	5192	8036	10036	12259	17841	30892
50	1012	1651	2591	3961	6107	9454	11806	14421	20988	36340
60	1164	1898	2979	4555	7023	10871	13576	16583	24135	41788
70	1317	2148	3372	5155	7948	12303	15364	18767	27313	47291
80	1473	2403	3772	5767	8891	13762	17187	20993	30554	52903
90	1629	2658	4172	6378	9834	15222	19010	23220	33795	58515
100	1786	2913	4572	6990	10777	16682	20833	25447	37036	64126
110	1942	3168	4972	7602	11720	18142	22656	27674	40277	69738
120	2098	3423	5372	8213	12664	19602	24479	29901	43518	75350
130	2254	3678	5773	8825	13607	21062	26302	32128	46759	80962
140	2411	3933	6173	9437	14550	22522	28125	34355	50000	86573
150	2567	4187	6573	10048	15493	23981	29948	36582	53241	92185
160	2723	4442	6973	10660	16436	25441	31772	38809	56482	97797
170	2880	4697	7373	11272	17379	26901	33595	41036	59723	103409
180	3036	4952	7773	11884	18322	28361	35418	43262	62964	109020
190	3192	5207	8173	12495	19265	29821	37241	45489	66205	114632
200	3348	5462	8573	13107	20209	31281	39064	47716	69446	120244
210	3505	5717	8973	13719	21152	32741	40887	49943	72687	125856
220	3661	5972	9374	14330	22095	34200	42710	52170	75928	131467
230	3817	6227	9774	14942	23038	35660	44533	54397	79169	137079
240	3973	6482	10174	15554	23981	37120	46356	56624	82410	142691
250	4130	6737	10574	16165	24924	38580	48179	58851	85651	148302
260	4286	6992	10974	16777	25867	40040	50003	61078	88892	153914
270	4442	7246	11374	17389	26810	41500	51826	63305	92133	159526
280	4598	7501	11774	18000	27754	42960	53649	65531	95374	165138
290	4755	7756	12174	18612	28697	44420	55472	67758	98615	170749
300	4911	8011	12574	19224	29640	45879	57295	69985	101856	176361
310	5067	8266	12975	19836	30583	47339	59118	72212	105097	181973
320	5224	8521	13375	20447	31526	48799	60941	74439	108338	187585
330	5380	8776	13775	21059	32469	50259	62764	76666	111579	193196
340	5536	9031	14175	21671	33412	51719	64587	78893	114820	198808
350	5692	9286	14575	22282	34355	53179	66410	81120	118061	204420
360	5849	9541	14975	22894	35299	54639	68234	83347	121302	210032
370	6005	9796	15375	23506	36242	56098	70057	85574	124543	215643
380	6161	10050	15775	24117	37185	57558	71880	87801	127784	221255
390	6317	10305	16175	24729	38128	59018	73703	90027	131025	226867

NOTES

- For steam capacities at 10% overpressure, multiply the capacity from the above table by the ratio $\frac{1.10p + 14.7}{1.03p + 14.7}$ where 'p' is set pressure (psig).
- For superheated steam, multiply the saturated steam capacities by Superheat correction factor K_{sh} on pages 60-61.

* Capacities certified by the national board and pressure vessel inspectors in accordance with the ASME boiler and pressure vessel code. Section I power boilers.

Capacity formula:

$$W = (51.5 \times AP \times K)$$

where:

- W Rated capacity, lbs/hr.
- P $(1.03 \times \text{set pressure}) + 14.7 = \text{absolute pressure, psia}$
- K 0.869 = average coefficient of discharge
- A Nozzle throat (orifice) area, sq. in.

CROSBY H-SERIES

STYLE HSL

STYLE HSL - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS - SATURATED STEAM CAPACITIES*

Pounds per hour at 3% overpressure

SET PRESSURES 15 - 725 psig (continued)

Set pressure (psig)	Orifice area (sq in)									
	F 0.339	G 0.553	H 0.868	J 1.327	K 2.046	L 3.167	M 3.955	N 4.831	P 7.031	Q 12.174
400	6474	10560	16576	25341	39071	60478	75526	92254	134266	232479
410	6630	10815	16976	25953	40014	61938	77349	94481	137507	238090
420	6786	11070	17376	26564	40957	63398	79172	96708	140748	243702
430	6942	11325	17776	27176	41900	64858	80995	98935	143989	249314
440	7099	11580	18176	27788	42844	66317	82818	101162	147230	254926
450	7255	11835	18576	28399	43787	67777	84641	103389	150471	260537
460	7411	12090	18976	29011	44730	69237	86465	105616	153712	266149
470	7568	12345	19376	29623	45673	70697	88288	107843	156953	271761
480	7724	12600	19777	30234	46616	72157	90111	110070	160194	277372
490	7880	12854	20177	30846	47559	73617	91934	112296	163435	282984
500	8036	13109	20577	31458	48502	75077	93757	114523	166676	288596
510	8193	13364	20977	32069	49445	76537	95580	116750	169917	294208
520	8349	13619	21377	32681	50389	77996	97403	118977	173158	299819
530	8505	13874	21777	33293	51332	79456	99226	121204	176399	305431
540	8661	14129	22177	33905	52275	80916	101049	123431	179640	311043
550	8818	14384	22577	34516	53218	82376	102872	125658	182881	316655
560	8974	14639	22977	35128	54161	83836	104696	127885	186122	322266
570	9130	14894	23378	35740	55104	85296	106519	130112	189364	327878
580	9286	15149	23778	36351	56047	86756	108342	132339	192605	333490
590	9443	15404	24178	36963	56990	88215	110165	134565	195846	339102
600	9599	15658	24578	37575	57934	89675	111988	136792	199087	344713
610	9755	15913	24978	38186	58877	91135	113811	139019	202328	350325
620	9911	16168	25378	38798	59820	92595	115634	141246	205569	355937
630	10068	16423	25778	39410	60763	94055	117457	143473	208810	361549
640	10224	16678	26178	40022	61706	95515	119280	145700	212051	367160
650	10380	16933	26578	40634	62649	96975	121103	147927	215292	372771
660	10536	17188	26978	41246	63592	98435	122926	150154	218533	378382
670	10692	17443	27378	41858	64535	99895	124749	152381	221774	383993
680	10848	17698	27778	42470	65478	101355	126572	154608	225015	389604
690	11004	17953	28178	43082	66421	102815	128395	156835	228256	395215
700	11160	18208	28578	43694	67364	104275	130218	159062	231497	400826
710	11316	18463	28978	44306	68307	105735	132041	161289	234738	406437
720	11472	18718	29378	44915	69250	107195	133864	163516	237979	412048
725	11550	18845	29578	45221	69721	107924	134775	164629	239599	414853

* Capacities certified by the national board and pressure vessel inspectors in accordance with the ASME boiler and pressure vessel code, Section I power boilers

Capacity formula:

$$W = (51.5 \times AP \times K)$$

where:

W Rated capacity, lbs/hr.

P $(1.03 \times \text{set pressure}) + 14.7 =$ absolute pressure, psia

K 0.869 = average coefficient of discharge

A Nozzle throat (orifice) area, sq. in.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLE HSL - METRIC UNITS - SATURATED STEAM CAPACITIES

Kilograms per hour at 3% overpressure

SET PRESSURES 1.034 - 50 barg

Set pressure (barg)	Orifice area (sq mm)									
	F (218.7)	G (356.8)	H (560.0)	J (856.1)	K (1320.0)	L (2043.2)	M (2551.6)	N (3116.8)	P (4536.1)	Q (7854.2)
1.034	218	356	559	854	1317	2038	2545	3109	4524	7834
2	315	513	805	1231	1898	2938	3670	4482	6524	11295
3	414	676	1061	1622	2501	3871	4834	5905	8594	14879
4	514	839	1316	2013	3103	4803	5998	7327	10664	18464
5	615	1003	1575	2408	3713	5747	7177	8766	12759	22091
6	718	1171	1838	2810	4333	6707	8376	10231	14891	25783
7	821	1339	2102	3213	4954	7668	9575	11696	17023	29474
8	924	1507	2365	3615	5574	8628	10775	13161	19155	33166
9	1026	1674	2628	4018	6194	9588	11974	14626	21287	36858
10	1129	1842	2891	4420	6815	10549	13173	16091	23419	40549
11	1232	2010	3154	4822	7435	11509	14373	17556	25551	44241
12	1335	2177	3418	5225	8056	12469	15572	19021	27678	47933
13	1438	2345	3681	5627	8676	13430	16771	20486	29815	51624
14	1540	2513	3944	6030	9297	14390	17971	21951	31947	55316
15	1643	2680	4207	6432	9917	15351	19170	23416	34079	59008
16	1746	2848	4470	6834	10537	16311	20369	24881	36211	62699
17	1849	3016	4734	7237	11158	17271	21569	26346	38344	66391
18	1952	3183	4997	7639	11778	18232	22768	27811	40476	70083
19	2054	3351	5260	8042	12399	19192	23967	29276	42608	73774
20	2157	3519	5523	8444	13019	20152	25167	30741	44740	77466
21	2260	3687	5786	8846	13640	21113	26366	32206	46872	81158
22	2363	3854	6050	9249	14260	22073	27565	33671	49004	84849
23	2466	4022	6313	9651	14880	23033	28765	35136	51136	88541
24	2568	4190	6576	10054	15501	23994	29964	36601	53268	92233
25	2671	4357	6839	10456	16121	24954	31163	38066	55400	95924
26	2774	4525	7103	10858	16742	25915	32362	39530	57532	99616
27	2877	4693	7366	11261	17362	26875	33562	40995	59664	103308
28	2980	4860	7629	11663	17983	27835	34761	42460	61797	106999
29	3082	5028	7892	12066	18603	28796	35960	43925	63929	110691
30	3185	5196	8155	12468	19223	29756	37160	45390	66061	114382
31	3288	5363	8419	12870	19844	30716	38359	46855	68193	118074
32	3391	5531	8682	13273	20464	31677	39558	48320	70325	121766
33	3494	5699	8945	13675	21085	32637	40758	49785	72457	125457
34	3596	5867	9208	14078	21705	33597	41957	51250	74589	129149
35	3699	6034	9471	14480	22326	34558	43156	52715	76721	132841
36	3802	6202	9735	14882	22946	35518	44356	54180	78853	136532
37	3905	6370	9998	15285	23566	36479	45555	55645	80985	140224
38	4008	6537	10261	15687	24187	37439	46754	57110	83117	143916
39	4110	6705	10524	16090	24807	38399	47954	58575	85250	147607
40	4213	6873	10788	16492	25428	39360	49153	60040	87382	151299

NOTES

- For steam capacities at 10% overpressure, multiply the capacity from the above table by the ratio $\frac{1.10p + 14.7}{1.03p + 14.7}$ where 'p' is set pressure (psig).
- For superheated steam, multiply the saturated steam capacities by Superheat correction factor K_{sh} on pages 60-61.

Capacity formula

Capacity is calculated by converting valve set pressure in barg to psig, calculating in pounds per hour by ASME Section I Capacity formula, and converting to kilograms per hour.

CROSBY H-SERIES

SATURATED STEAM CAPACITIES

STYLE HSL - METRIC UNITS - SATURATED STEAM CAPACITIES

Kilograms per hour at 3% overpressure

SET PRESSURES 1.034 - 50 barg (continued)

Set pressure (barg)	Orifice area (sq mm)									
	F (218.7)	G (356.8)	H (560.0)	J (856.1)	K (1320.0)	L (2043.2)	M (2551.6)	N (3116.8)	P (4536.1)	Q (7854.2)
41	4316	7040	11051	16894	26048	40320	50352	61505	89514	154991
42	4419	7208	11314	17297	26669	41280	51552	62970	91646	158682
43	4522	7376	11577	17699	27289	42241	52751	64435	93778	162374
44	4624	7543	11840	18102	27910	43201	53950	65900	95910	166066
45	4727	7711	12104	18504	28530	44161	55150	67365	98042	169757
46	4830	7879	12367	18907	29150	45121	56350	68830	100174	173448
47	4933	8047	12630	19310	29770	46081	57550	70295	102306	177139
48	5036	8215	12893	19713	30390	47041	58750	71760	104438	180830
49	5139	8383	13156	20116	31010	48001	59950	73225	106570	184521
50	5242	8551	13419	20519	31630	48961	61150	74690	108702	188212

NOTES

- For steam capacities at 10% overpressure, multiply the capacity from the above table by the ratio $\frac{1.10p + 14.7}{1.03p + 14.7}$ where 'p' is set pressure (psig).
- For superheated steam, multiply the saturated steam capacities by Superheat correction factor K_{sh} on pages 60-61.

Capacity formula

Capacity is calculated by converting valve set pressure in barg to psig, calculating in pounds per hour by ASME Section I Capacity formula, and converting to kilograms per hour.

CROSBY H-SERIES

SUPERHEAT CORRECTION FACTOR

Superheat correction factor -K_{sh}

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	.862	.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

* Flowing pressure is the valve set pressure plus the overpressure plus the atmospheric pressure 14.7 psia (1.014 bara).

For superheated steam, multiply the saturated steam capacity by correction factor - K_{sh} ASME Section III, division I - appendices Table XVIII-1110-1.

CROSBY H-SERIES

SUPERHEAT CORRECTION FACTOR

Superheat correction factor - K_{sh}

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)
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	

* Flowing pressure is the valve set pressure plus the overpressure plus the atmospheric pressure 14.7 psia (1.014 bara).

For superheated steam, multiply the saturated steam capacity by correction factor - K_{sh} ASME Section III, division I - appendices Table XVIII-1110-1.

CROSBY H-SERIES

STYLE HCA-I STEAM CAPACITIES - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

STEAM CAPACITY (lb/hr) – K - ORIFICE (1.840 in²)

Inlet pressure, P1 (PSIA)	Steam relieving temperature, T - (°F)							
	750	800	850	900	950	1000	1050	1100
3208.2	282.668	259.179	243.697	232.754	223.945	216.472	210.332	204.727
3250	287.703	263.637	247.684	236.327	227.404	219.833	213.073	207.395
3300	293.776	269.066	252.318	240.512	231.177	223.489	216.900	210.860
3350	300.178	274.536	256.977	244.714	235.237	227.154	220.465	214.333
3400	306.639	280.048	261.661	249.215	239.314	231.110	224.039	217.815
450	313.157	285.889	266.657	253.454	243.407	234.796	227.620	221.305
3500	320.317	291.779	271.396	257.709	247.226	238.490	231.210	224.804
3550	327.551	297.720	276.159	262.277	251.349	242.488	234.809	228.311
3600	334.860	303.710	281.246	266.570	255.488	246.203	238.415	231.826
3650	342.851	309.750	286.367	271.183	259.644	250.230	242.030	235.349
3700	351.242	316.148	291.214	275.514	263.816	253.965	245.962	238.573
3750	359.732	322.605	296.397	280.173	268.005	258.021	249.597	242.109
3800	369.271	329.119	301.614	284.541	272.211	261.778	253.241	245.654
3850	379.896	335.692	306.863	289.246	276.113	265.863	256.894	249.206
3900	390.995	342.647	312.147	293.976	280.348	269.640	260.555	252.767
3950	403.237	349.669	317.463	298.402	284.599	273.754	264.224	256.336
4000	416.329	356.758	322.813	303.178	288.867	277.552	268.234	259.914
4050	430.968	363.913	328.196	307.978	293.152	281.696	271.924	263.500
4100	446.863	371.476	333.612	312.463	297.454	285.514	275.622	267.094
4150	463.707	379.114	339.407	317.309	301.772	289.687	279.329	270.697
4200	487.464	386.826	344.894	322.180	306.106	293.527	283.043	274.308
4250	510.593	394.614	350.768	327.077	310.458	297.728	287.120	277.927
4300	533.415	402.476	356.683	331.998	315.183	301.946	290.856	281.554
4350	556.628	410.775	362.640	336.944	319.572	305.819	294.600	285.190
4400	-	419.524	368.639	341.915	323.977	310.067	298.352	288.834
4450	-	428.363	374.679	346.911	328.400	313.960	302.483	292.487
4500	-	437.669	380.761	351.932	332.838	318.237	306.256	296.147
4550	-	447.075	386.884	356.978	337.672	322.530	310.037	299.816
4600	-	456.963	393.050	362.432	342.148	326.457	313.827	303.494
4650	-	466.960	399.643	367.532	346.641	330.779	318.012	307.180
4700	-	477.064	405.896	372.657	351.150	335.118	321.823	310.874
4750	-	487.672	412.585	378.203	355.676	339.078	325.641	314.576
4800	-	498.396	419.324	383.382	360.618	343.446	329.868	318.287
4850	-	509.641	426.113	388.586	365.182	347.831	333.708	322.006
4900	-	521.010	432.952	394.223	370.170	351.824	337.556	325.733
4950	-	532.916	440.253	399.481	374.771	356.238	341.824	329.469
5000	-	544.955	447.196	405.180	379.388	360.668	345.693	333.213
5050	-	557.127	454.609	410.912	384.443	365.115	349.570	337.385
5100	-	569.856	461.656	416.254	389.098	369.579	353.879	341.150
5150	-	582.727	469.181	422.049	394.198	373.631	357.777	344.923
5200	-	595.740	476.765	427.877	398.890	378.124	362.116	348.704
5250	-	608.457	484.407	433.738	404.036	382.633	366.035	352.494
5300	-	622.189	492.107	439.633	408.766	387.159	369.962	356.292
5350	-	635.180	499.865	445.561	413.958	391.702	374.342	360.098
5400	-	648.305	508.131	451.073	419.174	396.261	378.290	363.913
5450	-	662.016	516.463	457.517	423.962	400.837	382.700	367.736
5500	-	675.411	524.405	463.544	429.225	405.430	386.668	371.567

NOTES

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

CROSBY H-SERIES

STYLE HCA-I STEAM CAPACITIES - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

STEAM CAPACITY (lb/hr) – K2 - ORIFICE (2.545 in²)

Inlet pressure, P1 (PSIA)	Steam relieving temperature, T - (°F)							
	750	800	850	900	950	1000	1050	1100
3208.2	390.973	358.484	337.071	321.934	309.751	299.413	290.922	283.169
3250	397.937	364.651	342.585	326.876	314.534	304.062	294.712	286.858
3300	406.337	372.159	348.994	332.665	319.753	309.120	300.006	291.651
3350	415.193	379.726	355.439	338.476	325.369	314.189	304.937	296.456
3400	424.128	387.350	361.917	344.702	331.008	319.661	309.880	301.272
3450	433.145	395.428	368.828	350.565	336.670	324.759	314.834	306.099
3500	443.047	403.575	375.382	356.451	341.952	329.868	319.799	310.938
3550	453.053	411.792	381.970	362.769	347.654	335.398	324.776	315.789
3600	463.162	420.078	389.007	368.707	353.379	340.536	329.765	320.651
3650	474.216	428.432	396.090	375.088	359.127	346.106	334.765	325.524
3700	485.821	437.282	402.793	381.078	364.898	351.273	340.202	329.984
3750	497.565	446.212	409.962	387.522	370.692	356.883	345.231	334.874
3800	510.758	455.222	417.178	393.564	376.509	362.079	350.272	339.777
3850	525.454	464.313	424.439	400.071	381.906	367.729	355.324	344.690
3900	540.805	473.934	431.746	406.614	387.764	372.953	360.387	349.616
3950	557.739	483.646	439.100	412.736	393.644	378.644	365.462	354.553
4000	575.846	493.451	446.499	419.341	399.548	383.897	371.009	359.501
4050	596.094	503.347	453.945	425.981	405.474	389.628	376.112	364.461
4100	618.079	513.808	461.436	432.184	411.424	394.910	381.227	369.432
4150	641.377	524.372	469.451	438.887	417.396	400.681	386.354	374.415
4200	674.237	535.040	477.041	445.625	423.392	405.992	391.492	379.409
4250	706.229	545.811	485.165	452.397	429.410	411.803	397.131	384.415
4300	737.794	556.686	493.347	459.204	435.947	417.638	402.298	389.432
4350	769.901	568.165	501.587	466.045	442.017	422.995	407.477	394.461
4400	-	580.265	509.884	472.921	448.110	428.869	412.667	399.502
4450	-	592.492	518.238	479.831	454.227	434.255	418.380	404.554
4500	-	605.363	526.651	486.776	460.366	440.170	423.599	409.617
4550	-	618.373	535.120	493.756	467.052	446.108	428.829	414.692
4600	-	632.050	543.648	501.299	473.243	451.540	434.071	419.778
4650	-	645.876	552.767	508.353	479.457	457.518	439.859	424.876
4700	-	659.853	561.415	515.442	485.695	463.519	445.130	429.986
4750	-	674.525	570.668	523.112	491.955	469.997	450.412	435.107
4800	-	689.358	579.989	530.276	498.790	475.038	456.258	440.239
4850	-	704.911	589.379	537.474	505.102	481.103	461.569	445.383
4900	-	720.636	598.839	545.270	512.001	486.627	466.891	450.539
4950	-	737.104	608.937	552.543	518.365	492.732	472.794	455.705
5000	-	753.756	618.540	560.426	524.752	498.859	478.146	460.884
5050	-	770.591	628.793	568.355	531.743	505.010	483.508	466.655
5100	-	788.198	638.540	575.743	538.181	511.184	489.469	471.862
5150	-	806.001	648.949	583.758	545.236	516.788	494.861	477.081
5200	-	823.999	659.438	591.819	551.726	523.003	500.862	482.311
5250	-	841.588	670.008	599.926	558.843	529.240	506.282	487.553
5300	-	860.582	680.659	608.079	565.386	535.500	511.714	492.806
5350	-	878.551	691.389	616.279	572.566	541.783	517.772	498.071
5400	-	896.705	702.822	623.902	579.782	548.089	523.233	503.347
5450	-	915.669	714.347	632.815	586.404	554.419	529.332	508.635
5500	-	934.197	725.332	641.152	593.683	560.771	534.821	513.935

NOTES

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

CROSBY H-SERIES

STYLE HCA-I STEAM CAPACITIES - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

STEAM CAPACITY (lb/hr) – M - ORIFICE (3.600 in²)

Inlet pressure, P1 (PSIA)	Steam relieving temperature, T - (°F)							
	750	800	850	900	950	1000	1050	1100
3208.2	553.046	507.089	476.800	455.388	438.154	423.532	411.520	400.553
3250	562.897	515.812	484.599	462.379	444.921	430.108	416.882	405.772
3300	574.780	526.434	493.666	470.567	452.303	437.262	424.370	412.552
3350	587.306	537.137	502.782	478.788	460.247	444.433	431.345	419.348
3400	599.946	547.921	511.946	487.594	468.223	452.173	438.337	426.161
3450	612.700	559.348	521.721	495.888	476.232	459.384	445.344	432.989
3500	626.707	570.873	530.992	504.214	483.704	466.612	452.368	439.834
3550	640.861	582.496	540.311	513.151	491.770	474.433	459.409	446.696
3600	655.161	594.216	550.265	521.550	499.868	481.702	466.465	453.573
3650	670.796	606.034	560.284	530.577	507.999	489.580	473.538	460.467
3700	687.213	618.552	569.766	539.049	516.162	496.889	481.230	466.775
3750	703.825	631.184	579.908	548.165	524.358	504.825	488.343	473.693
3800	722.488	643.929	590.114	556.711	532.587	512.174	495.473	480.627
3850	743.275	656.789	600.385	565.916	540.221	520.167	502.619	487.578
3900	764.990	670.398	610.722	575.171	548.507	527.557	509.781	494.545
3950	788.943	684.136	621.124	583.831	556.825	535.607	516.960	501.528
4000	814.557	698.005	631.591	593.174	565.176	543.038	524.806	508.528
4050	843.198	712.004	642.122	602.567	573.559	551.144	532.025	515.544
4100	874.297	726.801	652.720	611.341	581.975	558.616	539.261	522.576
4150	907.252	741.745	664.057	620.823	590.423	566.779	546.513	529.624
4200	953.735	756.834	674.793	630.353	598.904	574.292	553.781	536.689
4250	998.988	772.071	686.285	639.933	607.418	582.512	561.757	543.770
4300	1043.639	787.454	697.859	649.562	616.664	590.765	569.066	550.867
4350	1089.055	803.691	709.514	659.239	625.250	598.342	576.391	557.981
4400	-	820.807	721.250	668.965	633.869	606.652	583.733	565.111
4450	-	838.103	733.068	678.740	642.521	614.271	591.815	572.257
4500	-	856.310	744.968	688.564	651.206	622.638	599.197	579.419
4550	-	874.712	756.948	698.437	660.663	631.037	606.596	586.598
4600	-	894.059	769.010	709.107	669.421	638.720	614.010	593.793
4650	-	913.617	781.911	719.085	678.211	647.177	622.198	601.004
4700	-	933.387	794.144	729.113	687.034	655.666	629.653	608.231
4750	-	954.142	807.231	739.962	695.889	663.414	637.125	615.475
4800	-	975.124	820.417	750.095	705.558	671.960	645.394	622.735
4850	-	997.124	833.700	760.277	714.487	680.539	652.907	630.012
4900	-	1019.368	847.080	771.306	724.246	688.352	660.435	637.304
4950	-	1042.662	861.364	781.593	733.247	696.988	668.786	644.613
5000	-	1066.216	874.948	792.744	742.282	705.656	676.355	651.938
5050	-	1090.031	889.452	803.960	752.171	714.357	683.941	660.102
5100	-	1114.937	903.240	814.410	761.278	723.090	692.373	667.468
5150	-	1140.119	917.963	825.748	771.257	731.017	699.999	674.850
5200	-	1165.578	932.801	837.151	780.438	739.807	708.488	682.248
5250	-	1190.459	947.752	848.619	790.506	748.630	716.155	689.663
5300	-	1217.326	962.818	860.152	799.760	757.486	723.839	697.094
5350	-	1242.744	977.997	871.750	809.917	766.373	732.409	704.541
5400	-	1268.423	994.169	882.534	820.124	775.294	740.133	712.004
5450	-	1295.250	1010.472	895.141	829.492	784.247	748.760	719.484
5500	-	1321.457	1026.009	906.935	839.788	793.232	756.525	726.980

CROSBY H-SERIES

STYLE HCA-I STEAM CAPACITIES - USCS (UNITED STATES CUSTOMARY SYSTEM) UNITS

STEAM CAPACITY (lb/hr) – M2 - ORIFICE (3.976 in²)

Inlet pressure, P1 (PSIA)	Steam relieving temperature, T - (°F)							
	750	800	850	900	950	1000	1050	1100
3208.2	610.809	560.052	526.599	502.951	483.917	467.767	454.501	442.389
3250	621.688	569.686	535.213	510.673	491.391	475.031	460.423	448.153
3300	634.813	581.417	545.227	519.716	499.544	482.932	468.693	455.641
3350	648.647	593.238	555.295	528.795	508.317	490.851	476.397	463.147
3400	662.607	605.148	565.416	538.521	517.127	499.400	484.119	470.671
3450	676.693	617.769	576.212	547.681	525.972	507.365	491.858	478.213
3500	692.163	630.498	586.451	556.877	534.224	515.347	499.616	485.773
3550	707.795	643.334	596.744	566.747	543.132	523.985	507.391	493.350
3600	723.589	656.279	607.737	576.024	552.076	532.013	515.185	500.946
3650	740.857	669.331	618.803	585.993	561.057	540.714	522.997	508.560
3700	758.989	683.156	629.275	595.350	570.073	548.786	531.491	515.527
3750	777.335	697.107	640.476	605.418	579.125	557.551	539.348	523.167
3800	797.947	711.184	651.748	614.857	588.213	565.668	547.222	530.826
3850	820.906	725.387	663.092	625.023	596.645	574.495	555.115	538.503
3900	844.889	740.417	674.509	635.244	605.796	582.658	563.025	546.198
3950	871.344	755.591	685.997	644.808	614.982	591.548	570.954	553.910
4000	899.633	770.908	697.557	655.128	624.205	599.755	579.619	561.641
4050	931.265	786.369	709.189	665.501	633.464	608.708	587.593	569.390
4100	965.613	802.712	720.893	675.192	642.759	616.960	595.584	577.156
4150	1002.010	819.216	733.414	685.664	652.090	625.976	603.593	584.941
4200	1053.347	835.882	745.271	696.190	661.456	634.273	611.621	592.743
4250	1103.326	852.709	757.964	706.771	670.859	643.352	620.430	600.564
4300	1152.641	869.699	770.746	717.405	681.071	652.467	628.502	608.402
4350	1202.800	887.632	783.619	728.093	690.554	660.836	636.592	616.259
4400	-	906.536	796.581	738.835	700.074	670.014	644.701	624.133
4450	-	925.638	809.633	749.631	709.629	678.428	653.627	632.026
4500	-	945.747	822.775	760.481	719.221	687.669	661.780	639.936
4550	-	966.071	836.007	771.385	729.666	696.945	669.951	647.865
4600	-	987.439	849.329	783.169	739.338	705.431	678.140	655.811
4650	-	1009.039	863.577	794.190	749.047	714.771	687.183	663.776
4700	-	1030.874	877.088	805.265	758.791	724.147	695.417	671.758
4750	-	1053.796	891.542	817.247	768.571	732.704	703.669	679.758
4800	-	1076.970	906.105	828.439	779.250	742.143	712.802	687.777
4850	-	1101.268	920.775	839.684	789.111	751.617	721.099	695.813
4900	-	1125.835	935.553	851.864	799.889	760.247	729.414	703.867
4950	-	1151.562	951.329	863.227	809.831	769.784	738.637	711.939
5000	-	1177.577	966.332	875.542	819.809	779.358	746.997	720.030
5050	-	1203.879	982.351	887.929	830.731	788.967	755.375	729.046
5100	-	1231.386	997.578	899.471	840.790	798.613	764.688	737.181
5150	-	1259.198	1013.840	911.993	851.810	807.368	773.110	745.334
5200	-	1287.316	1030.227	924.586	861.950	817.076	782.486	753.505
5250	-	1314.796	1046.740	937.252	873.070	826.821	790.954	761.694
5300	-	1344.469	1063.379	949.990	883.290	836.601	799.440	769.901
5350	-	1372.542	1080.144	962.799	894.509	846.417	808.905	778.126
5400	-	1400.903	1098.005	974.710	905.781	856.269	817.436	786.369
5450	-	1430.531	1116.010	988.634	916.128	866.157	826.964	794.630
5500	-	1459.476	1133.170	1001.659	927.499	876.081	835.540	802.909

CROSBY H-SERIES

STYLE HCA-I STEAM CAPACITIES – SI (METRIC) UNITS

STEAM CAPACITY (kg/hr) – K - ORIFICE (1187.1 mm²)

Inlet pressure, P1 (bara)	Steam relieving temperature, T - [°C]								
	400	425	450	475	500	525	550	575	600
221.2	127.817	118.134	111.598	106.878	103.004	99.736	96.952	94.532	92.232
222.5	128.812	119.072	112.498	107.628	103.732	100.444	97.644	95.087	92.896
225.0	130.875	120.902	114.008	109.083	105.020	101.696	98.864	96.279	93.939
227.5	132.827	122.619	115.648	110.420	106.436	102.950	99.963	97.473	95.108
230.0	134.916	124.470	117.171	111.885	107.732	104.208	101.187	98.544	96.153
232.5	137.019	126.332	118.826	113.355	109.157	105.595	102.414	99.742	97.325
235.0	139.135	128.205	120.489	114.831	110.459	106.859	103.644	100.944	98.500
237.5	141.265	130.088	122.031	116.313	111.764	108.125	104.877	102.017	99.548
240.0	143.540	132.114	123.710	117.800	113.203	109.395	106.112	103.223	100.727
242.5	145.831	134.021	125.396	119.292	114.515	110.667	107.350	104.431	101.909
245.0	148.273	135.939	127.091	120.790	115.964	111.942	108.591	105.641	102.960
247.5	150.599	138.004	128.659	122.294	117.283	113.220	109.834	106.855	104.146
250.0	153.214	140.082	130.369	123.803	118.741	114.500	111.080	107.934	105.198
252.5	155.852	142.173	132.087	125.317	120.067	115.922	112.329	109.151	106.388
255.0	158.511	144.279	133.813	126.837	121.534	117.209	113.581	110.372	107.581
257.5	161.333	146.398	135.548	128.362	122.867	118.499	114.835	111.595	108.636
260.0	164.322	148.673	137.433	129.893	124.344	119.792	116.093	112.678	109.833
262.5	167.482	150.820	139.186	131.429	125.684	121.087	117.353	113.905	111.032
265.0	170.817	153.127	140.946	132.971	127.171	122.530	118.615	115.135	112.090
267.5	174.478	155.450	142.715	134.518	128.663	123.833	119.881	116.368	113.294
270.0	178.177	157.789	144.640	136.071	130.013	125.138	121.149	117.603	114.500
272.5	182.213	160.144	146.426	137.778	131.515	126.446	122.270	118.692	115.560
275.0	186.443	162.667	148.221	139.343	132.872	127.907	123.543	119.931	116.771
277.5	191.023	165.209	150.176	140.913	134.384	129.221	124.818	121.173	117.985
280.0	195.808	167.770	151.989	142.489	135.901	130.539	126.249	122.418	119.047
282.5	200.957	170.350	153.964	144.225	137.269	132.013	127.530	123.666	120.265
285.0	206.322	172.949	155.950	145.813	138.796	133.337	128.815	124.916	121.485
287.5	213.009	175.724	157.947	147.407	140.328	134.664	130.102	126.012	122.551
290.0	220.574	178.681	159.797	149.165	141.707	135.994	131.392	127.266	123.775
292.5	227.917	181.501	161.815	150.771	143.248	137.487	132.685	128.523	125.002
295.0	235.192	184.506	163.843	152.544	144.796	138.823	133.980	129.783	126.071
297.5	242.557	187.371	165.883	154.162	146.348	140.162	135.279	131.046	127.302
300.0	-	190.095	167.934	155.950	147.742	141.668	136.580	132.311	128.536
302.5	-	181.748	170.161	157.581	149.305	143.015	137.883	133.414	129.772
305.0	-	180.746	172.235	159.384	150.872	144.363	139.190	134.684	130.845
307.5	-	183.406	174.320	161.027	152.445	145.883	140.499	135.956	132.086
310.0	-	186.423	176.585	162.845	154.024	147.239	141.811	137.231	133.329
312.5	-	189.295	178.864	164.671	155.608	148.768	143.125	138.508	134.404
315.0	-	192.188	180.984	166.506	157.025	150.131	144.443	139.789	135.652
317.5	-	195.277	183.289	168.175	158.619	151.496	145.763	141.072	136.902
320.0	-	198.391	185.608	170.024	160.218	153.039	147.086	142.183	137.980
322.5	-	201.529	187.941	171.882	161.823	154.411	148.411	143.470	139.235
325.0	-	204.692	190.287	173.748	163.433	155.964	149.917	144.760	140.492
327.5	-	207.879	192.646	175.622	165.049	157.343	151.250	146.053	141.752
330.0	-	211.272	195.020	177.504	166.670	158.724	152.585	147.348	142.834
332.5	-	214.691	197.407	179.395	168.296	160.291	153.923	148.647	144.098
335.0	-	218.139	199.991	181.110	169.928	161.679	155.263	149.948	145.365
337.5	-	221.798	202.407	183.200	171.566	163.255	156.607	151.251	146.450
340.0	-	225.302	205.023	185.116	173.209	164.651	157.953	152.558	147.720
342.5	-	229.020	207.655	187.039	174.857	166.236	159.302	153.679	148.994
345.0	-	232.768	210.303	188.971	176.511	167.638	160.842	154.990	150.270
347.5	-	236.546	212.778	190.910	178.170	169.233	162.198	156.303	151.359
350.0	-	240.355	215.458	192.858	179.835	170.642	163.556	157.619	152.640
352.5	-	244.386	218.154	195.008	181.506	172.247	164.917	158.938	153.923
355.0	-	248.256	220.867	196.973	183.376	173.663	166.281	160.259	155.209
357.5	-	252.352	223.791	198.947	185.058	175.277	167.843	161.584	156.302
360.0	-	256.284	226.538	201.127	186.746	176.897	169.214	162.911	157.592
362.5	-	260.444	229.302	203.118	188.440	178.324	170.588	164.240	158.885
365.0	-	264.437	232.081	205.118	190.139	179.953	171.964	165.573	160.180
367.5	-	268.661	235.079	207.328	192.044	181.387	173.343	166.908	161.277
370.0	-	272.716	237.892	209.345	193.756	183.025	174.927	168.246	162.577
372.5	-	276.801	240.927	211.575	195.473	184.670	176.313	169.586	163.879
375.0	-	280.916	243.775	213.816	197.195	186.114	177.701	170.930	165.184
377.5	-	285.061	246.846	215.861	199.129	187.768	179.092	172.276	166.285
380.0	-	289.236	249.728	218.122	200.864	189.220	180.486	173.417	167.595

CROSBY H-SERIES

STYLE HCA-I STEAM CAPACITIES – SI (METRIC) UNITS

STEAM CAPACITY (kg/hr) – K2 - ORIFICE (1641.9 mm²)

Inlet pressure, P1 (bara)	Steam relieving temperature, T - [°C]								
	400	425	450	475	500	525	550	575	600
221.2	176.787	163.394	154.354	147.824	142.467	137.947	134.097	130.748	127.568
222.5	178.162	164.691	155.597	148.862	143.473	138.926	135.053	131.517	128.486
225.0	181.016	167.222	157.686	150.875	145.255	140.658	136.741	133.165	129.929
227.5	183.716	169.597	159.955	152.723	147.214	142.393	138.260	134.817	131.545
230.0	186.605	172.157	162.061	154.750	149.005	144.131	139.954	136.298	132.991
232.5	189.513	174.732	164.350	156.784	150.977	146.050	141.651	137.956	134.612
235.0	192.440	177.322	166.651	158.825	152.778	147.798	143.352	139.617	136.238
237.5	195.386	179.928	168.783	160.874	154.583	149.550	145.057	141.102	137.687
240.0	198.533	182.730	171.105	162.931	156.574	151.306	146.765	142.769	139.318
242.5	201.702	185.368	173.438	164.995	158.388	153.066	148.478	144.440	140.953
245.0	205.079	188.020	175.782	167.067	160.392	154.829	150.194	146.114	142.406
247.5	208.296	190.875	177.951	169.147	162.216	156.596	151.914	147.793	144.046
250.0	211.913	193.749	180.316	171.234	164.233	158.367	153.637	149.285	145.501
252.5	215.561	196.642	182.692	173.328	166.066	160.333	155.365	150.969	147.147
255.0	219.240	199.554	185.080	175.430	168.097	162.114	157.096	152.657	148.797
257.5	223.143	202.485	187.479	177.540	169.939	163.898	158.831	154.349	150.256
260.0	227.277	205.632	190.086	179.657	171.983	165.686	160.570	155.847	151.912
262.5	231.648	208.602	192.510	181.782	173.835	167.478	162.312	157.544	153.571
265.0	236.261	211.792	194.945	183.914	175.892	169.474	164.059	159.245	155.034
267.5	241.324	215.005	197.392	186.054	177.956	171.275	165.809	160.950	156.699
270.0	246.440	218.241	200.054	188.202	179.824	173.080	167.563	162.659	158.367
272.5	252.022	221.499	202.525	190.563	181.901	174.889	169.115	164.165	159.834
275.0	257.872	224.988	205.007	192.728	183.778	176.910	170.874	165.879	161.508
277.5	264.207	228.503	207.711	194.900	185.869	178.728	172.638	167.597	163.187
280.0	270.825	232.045	210.218	197.080	187.967	180.550	174.617	169.319	164.657
282.5	277.947	235.614	212.950	199.481	189.859	182.590	176.390	171.044	166.341
285.0	285.368	239.209	215.698	201.677	191.971	184.421	178.166	172.774	168.028
287.5	294.616	243.048	218.460	203.882	194.090	186.257	179.947	174.289	169.502
290.0	305.080	247.137	221.018	206.313	195.997	188.096	181.731	176.024	171.196
292.5	315.236	251.038	223.809	208.534	198.130	190.160	183.519	177.763	172.893
295.0	325.299	255.193	226.615	210.986	200.270	192.009	185.311	179.506	174.371
297.5	335.486	259.157	229.436	213.225	202.417	193.861	187.106	181.252	176.074
300.0	-	262.924	232.272	215.698	204.345	195.944	188.906	183.002	177.780
302.5	-	251.379	235.353	217.953	206.506	197.806	190.709	184.527	179.491
305.0	-	249.994	238.221	220.447	208.674	199.672	192.516	186.283	180.974
307.5	-	253.672	241.105	222.719	210.850	201.774	194.327	188.043	182.690
310.0	-	257.846	244.238	225.234	213.034	203.649	196.141	189.806	184.410
312.5	-	261.817	247.390	227.760	215.225	205.764	197.959	191.574	185.897
315.0	-	265.819	250.323	230.297	217.185	207.649	199.781	193.345	187.623
317.5	-	270.091	253.511	232.605	219.389	209.537	201.607	195.119	189.352
320.0	-	274.398	256.718	235.163	221.601	211.671	203.437	196.656	190.843
322.5	-	278.738	259.944	237.733	223.820	213.569	205.270	198.436	192.578
325.0	-	283.113	263.189	240.314	226.047	215.717	207.354	200.220	194.317
327.5	-	287.521	266.453	242.906	228.282	217.624	209.196	202.008	196.060
330.0	-	292.214	269.736	245.509	230.524	219.535	211.043	203.800	197.556
332.5	-	296.944	273.037	248.124	232.774	221.701	212.894	205.596	199.305
335.0	-	301.712	276.611	250.497	235.031	223.622	214.748	207.395	201.057
337.5	-	306.773	279.953	253.388	237.296	225.801	216.606	209.198	202.557
340.0	-	311.619	283.570	256.037	239.568	227.731	218.468	211.005	204.315
342.5	-	316.761	287.211	258.697	241.848	229.924	220.333	212.557	206.076
345.0	-	321.946	290.874	261.369	244.136	231.864	222.464	214.369	207.842
347.5	-	327.172	294.297	264.052	246.431	234.070	224.339	216.186	209.348
350.0	-	332.439	298.003	266.746	248.733	236.019	226.218	218.006	211.119
352.5	-	338.015	301.733	269.719	251.044	238.238	228.100	219.830	212.894
355.0	-	343.368	305.485	272.437	253.630	240.196	229.987	221.658	214.672
357.5	-	349.033	309.530	275.168	255.957	242.429	232.147	223.489	216.184
360.0	-	354.471	313.329	278.182	258.292	244.669	234.043	225.325	217.968
362.5	-	360.225	317.151	280.937	260.635	246.643	235.943	227.164	219.756
365.0	-	365.748	320.996	283.703	262.985	248.896	237.846	229.007	221.548
367.5	-	371.590	325.141	286.759	265.620	250.879	239.754	230.853	223.065
370.0	-	377.198	329.033	289.549	267.987	253.146	241.945	232.704	224.863
372.5	-	382.848	333.230	292.634	270.362	255.420	243.861	234.558	226.664
375.0	-	388.540	337.169	295.733	272.744	257.418	245.782	236.416	228.469
377.5	-	394.273	341.417	298.561	275.419	259.706	247.706	238.278	229.992
380.0	-	400.047	345.404	301.689	277.819	261.713	249.634	239.856	231.803

CROSBY H-SERIES

STYLE HCA-I STEAM CAPACITIES – SI (METRIC) UNITS

STEAM CAPACITY (kg/hr) – M - ORIFICE [2322.6 mm²]

Inlet pressure, P1 (bara)	Steam relieving temperature, T - [°C]								
	400	425	450	475	500	525	550	575	600
221.2	250.079	231.134	218.346	209.110	201.531	195.137	189.691	184.954	180.455
222.5	252.025	232.968	220.105	210.577	202.954	196.522	191.044	186.041	181.754
225.0	256.061	236.550	223.060	213.425	205.475	198.971	193.431	188.373	183.796
227.5	259.881	239.909	226.269	216.040	208.246	201.426	195.580	190.709	186.081
230.0	263.968	243.530	229.248	218.906	210.780	203.886	197.976	192.805	188.126
232.5	268.082	247.173	232.487	221.783	213.569	206.600	200.377	195.149	190.420
235.0	272.222	250.837	235.741	224.671	216.117	209.073	202.783	197.499	192.719
237.5	276.389	254.522	238.758	227.570	218.671	211.551	205.194	199.600	194.769
240.0	280.840	258.486	242.042	230.479	221.486	214.035	207.611	201.958	197.077
242.5	285.324	262.217	245.342	233.399	224.053	216.524	210.033	204.322	199.389
245.0	290.101	265.970	248.658	236.330	226.887	219.019	212.461	206.691	201.445
247.5	294.651	270.009	251.725	239.272	229.468	221.518	214.894	209.065	203.765
250.0	299.769	274.074	255.071	242.224	232.321	224.024	217.332	211.176	205.823
252.5	304.929	278.167	258.433	245.187	234.914	226.804	219.776	213.558	208.152
255.0	310.132	282.286	261.810	248.160	237.786	229.323	222.225	215.946	210.486
257.5	315.654	286.432	265.204	251.145	240.393	231.847	224.679	218.339	212.549
260.0	321.502	290.883	268.893	254.140	243.284	234.376	227.139	220.458	214.891
262.5	327.685	295.085	272.321	257.145	245.904	236.911	229.604	222.859	217.239
265.0	334.210	299.597	275.766	260.162	248.813	239.735	232.074	225.265	219.308
267.5	341.372	304.142	279.227	263.189	251.733	242.283	234.550	227.677	221.663
270.0	348.610	308.719	282.992	266.227	254.375	244.836	237.031	230.094	224.024
272.5	356.505	313.328	286.488	269.567	257.314	247.395	239.226	232.224	226.098
275.0	364.781	318.263	289.999	272.629	259.969	250.253	241.715	234.649	228.467
277.5	373.742	323.236	293.824	275.702	262.927	252.825	244.210	237.080	230.841
280.0	383.104	328.247	297.371	278.785	265.895	255.403	247.009	239.515	232.920
282.5	393.179	333.295	301.235	282.181	268.571	258.288	249.517	241.956	235.302
285.0	403.676	338.380	305.122	285.289	271.558	260.879	252.031	244.402	237.690
287.5	416.759	343.811	309.029	288.407	274.556	263.475	254.549	246.546	239.775
290.0	431.560	349.595	312.648	291.846	277.254	266.077	257.073	249.001	242.170
292.5	445.927	355.113	316.596	294.988	280.270	268.997	259.602	251.460	244.571
295.0	460.161	360.991	320.565	298.457	283.297	271.612	262.137	253.925	246.661
297.5	474.571	366.598	324.556	301.624	286.335	274.232	264.677	256.396	249.070
300.0	-	371.927	328.568	305.122	289.063	277.179	267.222	258.872	251.485
302.5	-	355.595	332.925	308.312	292.119	279.813	269.773	261.029	253.904
305.0	-	353.636	336.983	311.840	295.187	282.452	272.329	263.513	256.002
307.5	-	358.839	341.062	315.054	298.264	285.425	274.891	266.002	258.430
310.0	-	364.744	345.494	318.611	301.353	288.078	277.457	268.496	260.863
312.5	-	370.362	349.953	322.184	304.453	291.070	280.029	270.996	262.967
315.0	-	376.022	354.102	325.774	307.225	293.736	282.607	273.501	265.408
317.5	-	382.066	358.612	329.039	310.344	296.407	285.190	276.012	267.854
320.0	-	388.158	363.148	332.658	313.472	299.426	287.778	278.185	269.963
322.5	-	394.298	367.712	336.292	316.612	302.111	290.371	280.704	272.417
325.0	-	400.486	372.302	339.943	319.762	305.148	293.318	283.228	274.877
327.5	-	406.722	376.919	343.610	322.923	307.846	295.925	285.757	277.342
330.0	-	413.360	381.563	347.293	326.095	310.550	298.537	288.292	279.459
332.5	-	420.051	386.233	350.992	329.277	313.614	301.155	290.832	281.932
335.0	-	426.796	391.289	354.348	332.470	316.331	303.778	293.377	284.411
337.5	-	433.955	396.016	358.438	335.674	319.414	306.406	295.928	286.533
340.0	-	440.810	401.133	362.185	338.889	322.144	309.040	298.484	289.020
342.5	-	448.085	406.283	365.948	342.114	325.246	311.679	300.679	291.512
345.0	-	455.418	411.465	369.727	345.350	327.990	314.693	303.243	294.009
347.5	-	462.811	416.306	373.522	348.596	331.111	317.345	305.812	296.139
350.0	-	470.262	421.550	377.334	351.854	333.867	320.003	308.387	298.645
352.5	-	478.150	426.825	381.539	355.122	337.007	322.666	310.967	301.155
355.0	-	485.722	432.133	385.385	358.780	339.777	325.335	313.553	303.671
357.5	-	493.735	437.855	389.247	362.072	342.935	328.391	316.144	305.810
360.0	-	501.427	443.229	393.511	365.375	346.104	331.073	318.740	308.334
362.5	-	509.567	448.636	397.408	368.689	348.896	333.760	321.341	310.863
365.0	-	517.379	454.075	401.321	372.013	352.084	336.453	323.948	313.397
367.5	-	525.644	459.939	405.643	375.741	354.889	339.151	326.561	315.544
370.0	-	533.578	465.444	409.591	379.090	358.095	342.250	329.178	318.087
372.5	-	541.570	471.381	413.954	382.449	361.312	344.961	331.801	320.635
375.0	-	549.621	476.953	418.338	385.818	364.139	347.678	334.429	323.188
377.5	-	557.730	482.962	422.339	389.603	367.375	350.400	337.063	325.343
380.0	-	565.899	488.602	426.764	392.997	370.214	353.128	339.295	327.904

CROSBY H-SERIES

STYLE HCA-I STEAM CAPACITIES – SI (METRIC) UNITS

STEAM CAPACITY (kg/hr) – M2 - ORIFICE (2565.2 mm²)

Inlet pressure, P1 (bara)	Steam relieving temperature, T - [°C]								
	400	425	450	475	500	525	550	575	600
221.2	276.200	255.276	241.152	230.952	222.582	215.520	209.504	204.273	199.304
222.5	278.350	257.302	243.096	232.572	224.153	217.050	210.999	205.474	200.738
225.0	282.807	261.258	246.359	235.717	226.938	219.754	213.635	208.048	202.993
227.5	287.026	264.968	249.903	238.605	229.997	222.465	216.009	210.629	205.518
230.0	291.540	268.967	253.194	241.771	232.797	225.182	218.655	212.944	207.776
232.5	296.083	272.990	256.770	244.949	235.877	228.179	221.306	215.533	210.310
235.0	300.656	277.037	260.365	248.139	238.691	230.911	223.964	218.129	212.849
237.5	305.259	281.108	263.696	251.340	241.511	233.648	226.627	220.449	215.113
240.0	310.175	285.486	267.324	254.553	244.621	236.391	229.297	223.053	217.662
242.5	315.126	289.606	270.968	257.778	247.456	239.140	231.972	225.664	220.216
245.0	320.403	293.751	274.631	261.015	250.586	241.895	234.653	228.280	222.486
247.5	325.428	298.212	278.019	264.264	253.436	244.656	237.340	230.902	225.049
250.0	331.080	302.702	281.714	267.525	256.587	247.423	240.033	233.234	227.322
252.5	336.779	307.222	285.427	270.797	259.452	250.495	242.732	235.865	229.894
255.0	342.526	311.771	289.157	274.081	262.623	253.276	245.437	238.502	232.471
257.5	348.624	316.350	292.905	277.377	265.503	256.064	248.147	241.145	234.751
260.0	355.083	321.266	296.979	280.685	268.695	258.857	250.864	243.486	237.337
262.5	361.912	325.907	300.766	284.005	271.589	261.657	253.587	246.137	239.930
265.0	369.119	330.891	304.570	287.336	274.802	264.775	256.315	248.795	242.215
267.5	377.029	335.910	308.392	290.679	278.027	267.590	259.049	251.458	244.816
270.0	385.023	340.965	312.551	294.035	280.945	270.410	261.790	254.128	247.423
272.5	393.743	346.056	316.412	297.724	284.191	273.236	264.214	256.481	249.714
275.0	402.883	351.507	320.290	301.106	287.123	276.393	266.963	259.159	252.330
277.5	412.780	356.999	324.515	304.499	290.390	279.234	269.718	261.843	254.952
280.0	423.120	362.533	328.431	307.904	293.668	282.080	272.810	264.533	257.249
282.5	434.247	368.108	332.700	311.656	296.624	285.267	275.580	267.229	259.880
285.0	445.841	373.724	336.992	315.088	299.923	288.128	278.356	269.931	262.517
287.5	460.290	379.722	341.308	318.532	303.234	290.996	281.137	272.299	264.820
290.0	476.637	386.110	345.305	322.330	306.214	293.869	283.925	275.009	267.465
292.5	492.505	392.206	349.665	325.801	309.545	297.094	286.718	277.726	270.117
295.0	508.226	398.697	354.049	329.632	312.888	299.982	289.518	280.448	272.426
297.5	524.141	404.890	358.456	333.129	316.244	302.876	292.323	283.177	275.086
300.0	-	410.776	362.887	336.992	319.256	306.131	295.134	285.911	277.753
302.5	-	392.738	367.700	340.516	322.632	309.040	297.951	288.294	280.425
305.0	-	390.574	372.181	344.412	326.019	311.954	300.774	291.037	282.742
307.5	-	396.321	376.686	347.962	329.419	315.239	303.603	293.786	285.424
310.0	-	402.842	381.582	351.891	332.830	318.168	306.438	296.541	288.111
312.5	-	409.047	386.506	355.837	336.253	321.473	309.279	299.302	290.434
315.0	-	415.299	391.088	359.801	339.316	324.417	312.126	302.069	293.130
317.5	-	421.973	396.069	363.408	342.760	327.367	314.978	304.842	295.832
320.0	-	428.701	401.080	367.404	346.215	330.702	317.837	307.242	298.161
322.5	-	435.483	406.120	371.419	349.683	333.667	320.701	310.024	300.872
325.0	-	442.317	411.190	375.451	353.162	337.022	323.956	312.812	303.589
327.5	-	449.205	416.289	379.501	356.653	340.002	326.835	315.605	306.311
330.0	-	456.536	421.418	383.568	360.156	342.987	329.720	318.404	308.649
332.5	-	463.926	426.576	387.653	363.671	346.372	332.611	321.210	311.381
335.0	-	471.375	432.160	391.360	367.197	349.372	335.508	324.021	314.118
337.5	-	479.283	437.380	395.877	370.736	352.778	338.411	326.838	316.462
340.0	-	486.853	443.032	400.016	374.286	355.793	341.320	329.661	319.209
342.5	-	494.888	448.720	404.172	377.848	359.219	344.235	332.085	321.961
345.0	-	502.988	454.443	408.346	381.422	362.249	347.563	334.917	324.719
347.5	-	511.152	459.790	412.538	385.008	365.696	350.493	337.755	327.072
350.0	-	519.382	465.581	416.747	388.605	368.740	353.428	340.599	329.839
352.5	-	528.093	471.408	421.391	392.215	372.208	356.369	343.448	332.611
355.0	-	536.456	477.270	425.639	396.256	375.267	359.317	346.304	335.390
357.5	-	545.307	483.590	429.905	399.892	378.756	362.692	349.165	337.752
360.0	-	553.802	489.526	434.614	403.539	382.256	365.654	352.033	340.540
362.5	-	562.792	495.497	438.918	407.199	385.339	368.622	354.906	343.333
365.0	-	571.421	501.504	443.239	410.870	388.859	371.596	357.785	346.132
367.5	-	580.549	507.980	448.013	414.988	391.957	374.576	360.670	348.503
370.0	-	589.311	514.061	452.374	418.686	395.499	377.999	363.561	351.311
372.5	-	598.138	520.618	457.192	422.396	399.052	380.993	366.458	354.126
375.0	-	607.029	526.772	462.034	426.118	402.174	383.994	369.361	356.946
377.5	-	615.986	533.408	466.453	430.298	405.748	387.000	372.270	359.325
380.0	-	625.008	539.637	471.340	434.046	408.884	390.012	374.735	362.154

CROSBY H-SERIES

SIZING

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.

CROSBY H-SERIES

SIZING

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:

$2835 \text{ psig (drum operating pressure)} - 2680 \text{ psig (superheater outlet operating pressure)} = 155 \text{ psi (SH pressure drop)}$.

$3000 \text{ psig (design pressure)} - 155 \text{ psi} - 20 \text{ psig* (SH pressure drop)} = 2825 \text{ psig (set pressure)**}$.

* 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 pages 60-61. 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 50, 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 2½ 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 cap).

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 50, 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 50:

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%)

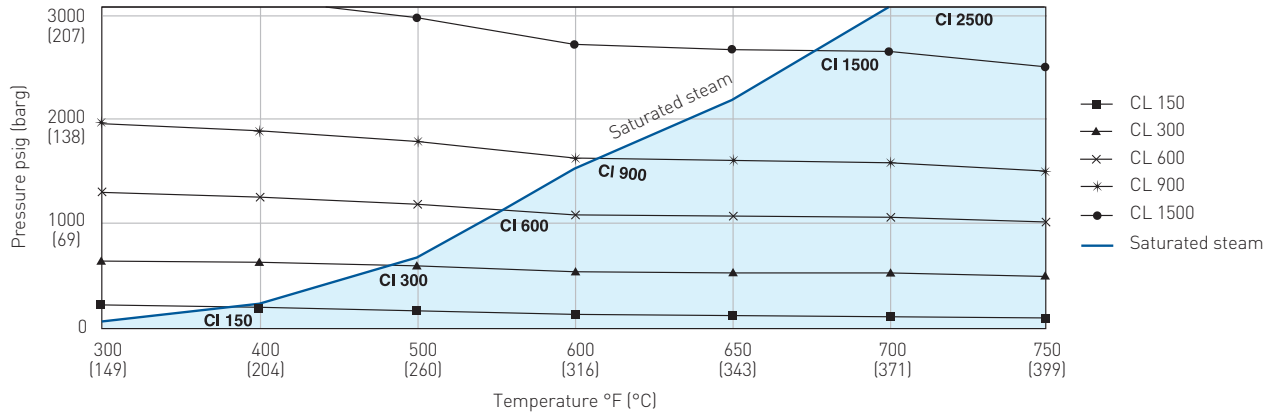
Rechecking, the drum valves relieve 83.4% of total boiler capacity [complying with ASME code requirement that drum valves relieve at least 75% of boiler capacity]. Superheater valve relieves 18.7% of total boiler capacity - within the desirable range of 15% to 20% of total boiler capacity.

CROSBY H-SERIES

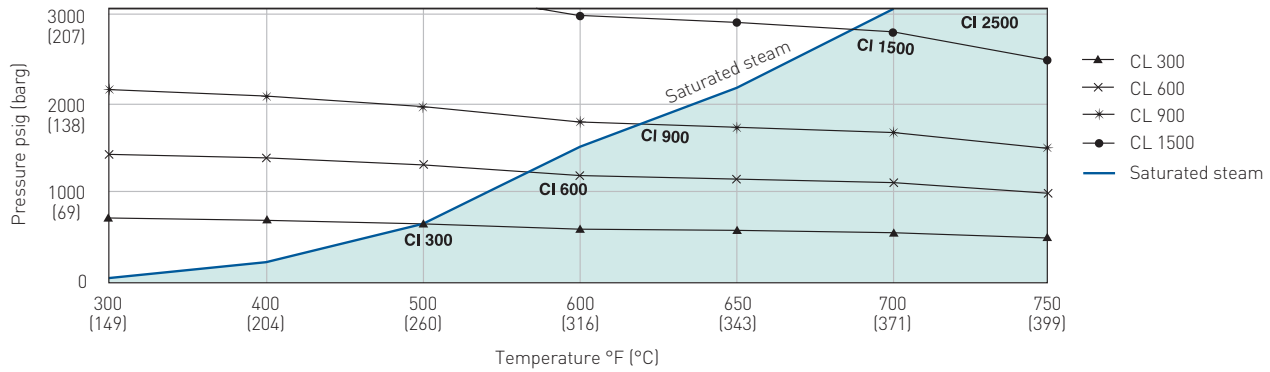
PRESSURE / TEMPERATURE LIMITS

Pressure/temperature limits - Standard class valves (reference ASME/ANSI B16.34 - 1996)

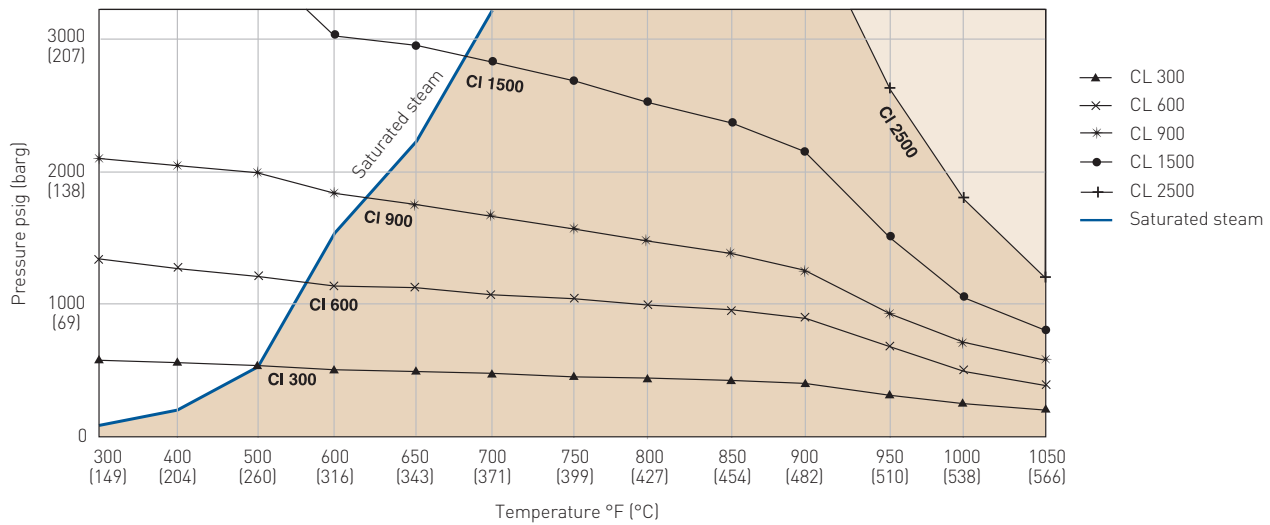
PRESSURE/TEMPERATURE LIMITS - BODY MATERIAL: SA 216 GR. WCB



PRESSURE/TEMPERATURE LIMITS - BODY MATERIAL: SA 216 GR. WCC



PRESSURE/TEMPERATURE LIMITS - BODY MATERIAL: SA 217 GR. WC6



CROSBY H-SERIES
 PRESSURE / TEMPERATURE LIMITS

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

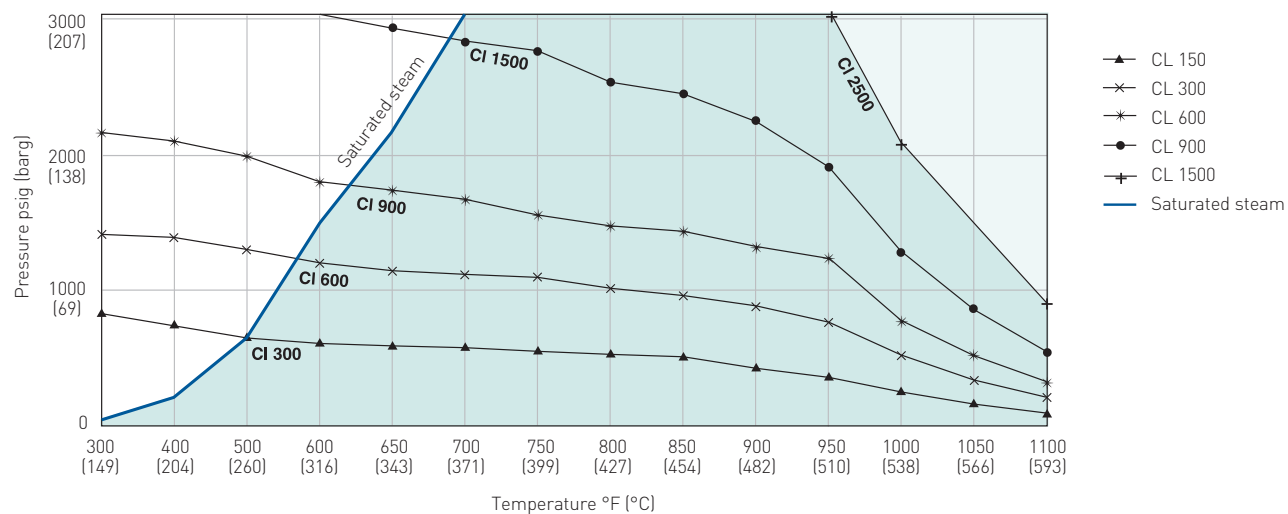
Body material: SA 216 Gr. WC6											
Temperature °F [°C]		Working pressure by classes psig (barg)									
		ANSI Standard class									
		300		600		900		1500		2500	
300	[149]	720	[49.6]	1445	[99.6]	2165	[149.3]	3610	[248.9]	6015	[414.7]
400	[204]	695	[47.9]	1385	[95.5]	2080	[143.4]	3465	[238.9]	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]

CROSBY H-SERIES

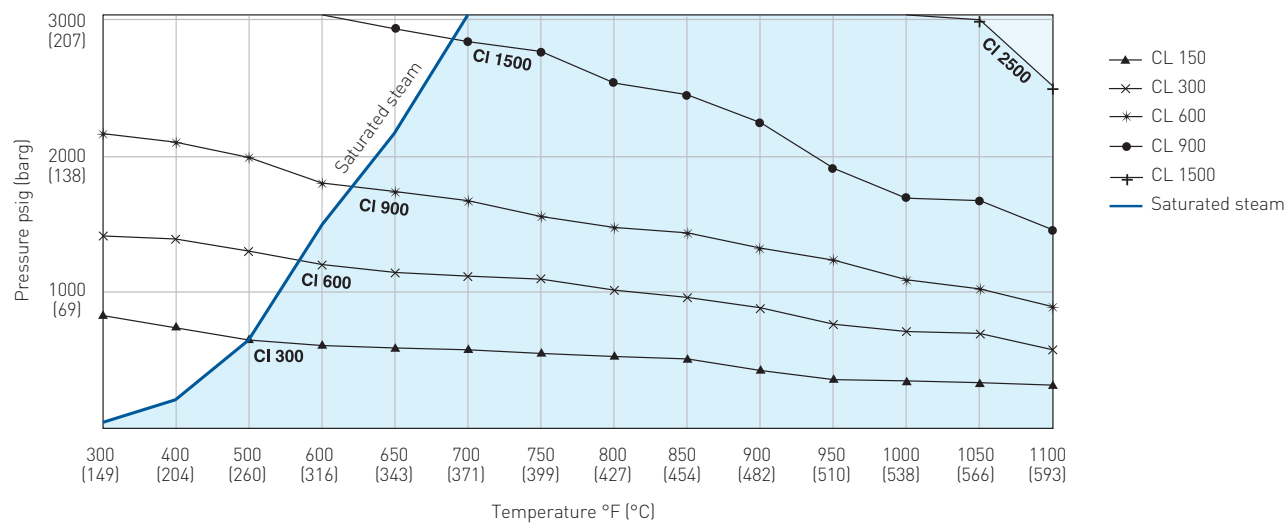
PRESSURE / TEMPERATURE LIMITS

Pressure/temperature limits - Standard class valves (reference ASME/ANSI B16.34 - 1996)

PRESSURE/TEMPERATURE LIMITS - BODY MATERIAL: SA 217 GR. WC9



PRESSURE/TEMPERATURE LIMITS - BODY MATERIAL: SA 217 GR. C12A



CROSBY H-SERIES

PRESSURE / TEMPERATURE LIMITS

Pressure/temperature limits - Standard class valves - reference ASME/ANSI B16.34 - 1996

PRESSURE/TEMPERATURE LIMITS FOR STYLES HCI-()9 VALVES

Body material: SA 217 Gr. WC9											
Working pressure by classes psig (barg) per ASME/ANSI B16.34 - 1996											
Temperature		Inlet flange: ANSI Standard class									
°F	(°C)	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											
Working pressure by classes psig (barg) per ASME/ANSI B16.34 - 1996											
Temperature		Inlet flange: ANSI Standard class									
°F	(°C)	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)

CROSBY H-SERIES

OUTLET REACTION FORCES

OUTLET REACTION FORCES STYLES HE, HCI, HSJ

Total resultant force at outlet elbow*

The figure (right) shows a safety valve open and discharging at full capacity, with a 90° outlet elbow. The horizontal reaction force (F_h) is balanced by the force of discharging steam acting on the 90° elbow.

The vertical force (F_v) at the 90° elbow is unbalanced and exerts a bending moment on the valve. The vertical force (F_v) 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.

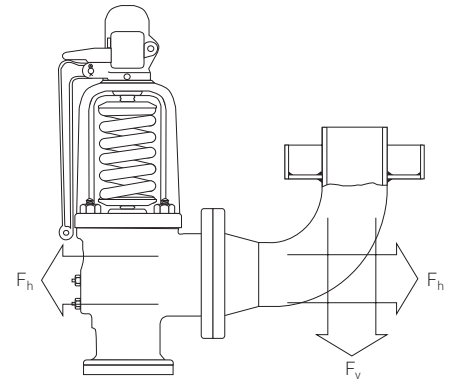
The basic equation for this is:

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

where:

- F_v = Vertical force
- W = Flow in lbs/sec
- V = Velocity, ft/sec
- A = Area of outlet, sq. in.
- P_e = Static pressure in outlet elbow, psig
- g_c = 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. ⁽¹⁾ (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	129	-	-	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).

CROSBY H-SERIES

OUTLET REACTION FORCES

OUTLET REACTION FORCES STYLES HE, HCI, HSJ

TOTAL OUTLET REACTION FORCE - lbs (STYLES HE, HCI, HSJ) (continued)

Flowing press. ^[1] (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).

CROSBY H-SERIES

OUTLET REACTION FORCES

OUTLET REACTION FORCES* STYLES HE, HCI, HSJ

Total resultant force at outlet elbow

The figure (right) shows a safety valve open and discharging at full capacity, with a 90° outlet elbow. The horizontal reaction force (F_h) is balanced by the force of discharging steam acting on the 90° elbow.

The vertical force (F_v) at the 90° elbow is unbalanced and exerts a bending moment on the valve. The vertical force (F_v) 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.

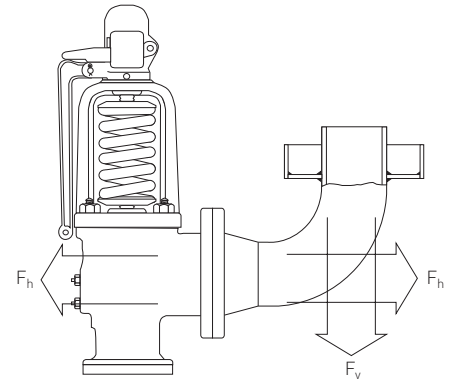
The basic equation for this is:

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

where:

- F_v = Vertical force - (kN)
- W = Flow in
- V = Velocity
- A = Area of outlet, sq. mm
- P_e = Static pressure in outlet elbow, barg
- g_c = 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)

Flowing press. ⁽¹⁾ (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]													
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

NOTE

1. Flowing pressure is the valve set pressure plus the overpressure plus the atmospheric pressure (1.014 bara).

CROSBY H-SERIES
OUTLET REACTION FORCES

OUTLET REACTION FORCES STYLES HE, HCI, HSJ

TOTAL OUTLET REACTION FORCE - kN (STYLES HE, HCI, HSJ) (continued)

Flowing press. ^[1] (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)															
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).

CROSBY H-SERIES

OUTLET REACTION FORCE - STYLE HSL

TOTAL OUTLET REACTION FORCE - lbs (N)

Flowing press. psig (barg)	Orifice designation									
	F	G	H	J	K	L	M	N	P	Q
	Outlet dia.									
	1½"	1½"	2½"	2½"	3"	4"	4"	6"	6"	8"
25 (1.72)	9.1 (40.5)	14.9 (66.3)	23.4 (104.1)	35.8 (159.2)	55.2 (245.5)	85.4 (379.9)	106.6 (474.2)	130.3 (579.6)	189.6 (843.4)	328.3 (1460.4)
50 (3.45)	14.8 (65.8)	24.2 (107.6)	37.9 (168.6)	58.0 (258.0)	89.4 (397.7)	138.5 (616.1)	172.9 (769.1)	211.2 (939.5)	307.4 (1367.4)	532.2 (2367.3)
75 (5.17)	20.6 (91.6)	33.6 (149.5)	52.7 (234.4)	80.6 (358.5)	124.3 (552.9)	192.4 (855.8)	240.3 (1068.9)	293.5 (1305.6)	427.2 (1900.3)	739.7 (3290.3)
100 (6.89)	26.5 (117.9)	46.6 (207.3)	67.9 (302.0)	113.4 (504.4)	174.6 (776.7)	251.4 (1118.3)	360.5 (1603.6)	378.1 (1681.9)	550.2 (2447.4)	952.7 (4237.8)
125 (8.62)	32.5 (144.6)	63.8 (283.8)	83.2 (370.1)	154.5 (687.3)	238.1 (1059.1)	349.6 (1555.1)	483.2 (2149.4)	462.8 (2058.6)	767.0 (3411.8)	1327.9 (5906.8)
150 (10.34)	38.4 (170.8)	81.0 (360.3)	103.8 (461.7)	195.9 (871.4)	301.8 (1342.5)	448.3 (1994.1)	606.3 (2697.0)	547.8 (2436.7)	985.9 (4385.5)	1707.0 (7593.1)
175 (12.07)	48.6 (216.2)	98.2 (436.8)	130.8 (581.8)	237.2 (1055.1)	365.5 (1625.8)	546.8 (2432.3)	729.5 (3245.0)	695.0 (3091.5)	1204.8 (5359.2)	2086.1 (9279.4)
200 (13.79)	59.2 (263.3)	115.5 (513.8)	157.9 (702.4)	278.6 (1239.3)	429.4 (1910.1)	645.7 (2872.2)	852.9 (3793.9)	845.8 (3762.3)	1424.3 (6335.6)	2466.1 (10969.8)
225 (15.51)	69.8 (310.5)	132.7 (590.3)	184.9 (822.5)	319.9 (1423.0)	493.1 (2193.4)	744.4 (3311.3)	976.1 (4341.9)	996.3 (4431.8)	1643.3 (7309.8)	2845.3 (12656.5)
250 (17.24)	80.4 (357.6)	150.0 (667.2)	212.0 (943.0)	361.4 (1607.6)	557.0 (2477.7)	843.2 (3750.7)	1099.6 (4891.3)	1147.1 (5102.6)	1862.8 (8286.1)	3225.4 (14347.3)
275 (18.96)	90.9 (404.3)	167.2 (743.7)	239.0 (1063.1)	402.7 (1791.3)	620.7 (2761.0)	941.8 (4189.3)	1222.7 (5438.8)	1297.5 (5771.6)	2081.7 (9259.9)	3604.3 (16032.7)
300 (20.68)	101.5 (451.5)	184.4 (820.3)	266.1 (1183.7)	444.0 (1975.0)	684.4 (3044.4)	1040.5 (4628.4)	1346.0 (5987.3)	1448.1 (6441.5)	2300.8 (10234.5)	3983.8 (17720.8)
325 (22.41)	112 (498.2)	201.6 (896.8)	293.0 (1303.3)	485.2 (2158.3)	748.0 (3327.3)	1138.9 (5066.1)	1468.8 (6533.5)	1598.1 (7108.7)	2519.1 (11205.5)	4361.8 (19402.3)
350 (24.13)	122.6 (545.4)	218.8 (973.3)	320.1 (1423.9)	526.5 (2342.0)	811.6 (3610.2)	1237.4 (5504.2)	1591.8 (7080.7)	1748.4 (7777.3)	2737.9 (12178.8)	4740.5 (21086.8)
375 (25.86)	133.1 (592.1)	235.9 (1049.3)	346.9 (1543.1)	567.6 (2524.8)	875.0 (3892.2)	1335.5 (5940.6)	1714.3 (7625.6)	1898.0 (8442.7)	2955.6 (13147.2)	5117.5 (22763.8)
400 (27.58)	143.6 (638.8)	253.1 (1125.8)	373.8 (1662.7)	608.7 (2707.6)	938.4 (4174.2)	1433.6 (6377.0)	1836.9 (8170.9)	2047.7 (9108.6)	3173.6 (14116.9)	5494.9 (24442.5)
425 (29.30)	154 (685.0)	270.1 (1201.5)	400.6 (1782.0)	649.7 (2890.0)	1001.5 (4454.9)	1531.4 (6812.0)	1958.9 (8713.6)	2196.8 (9771.9)	3390.5 (15081.7)	5870.5 (26113.3)
450 (31.03)	164.5 (731.7)	287.2 (1277.5)	427.4 (1901.2)	690.7 (3072.4)	1064.7 (4736.0)	1629.2 (7247.0)	2081.1 (9257.2)	2346.0 (10435.5)	3607.7 (16047.9)	6246.5 (27785.8)
475 (32.75)	174.9 (778.0)	304.2 (1353.1)	454.1 (2019.9)	731.4 (3253.4)	1127.6 (5015.8)	1726.5 (7679.9)	2202.6 (9797.7)	2494.4 (11095.6)	3823.7 (17008.7)	6620.6 (29449.9)
500 (34.47)	185.3 (824.3)	321.2 (1428.8)	480.8 (2138.7)	772.2 (3434.9)	1190.5 (5295.6)	1823.8 (8112.7)	2324.1 (10338.1)	2642.9 (11756.2)	4039.7 (17969.5)	6994.7 (31114.0)
525 (36.20)	195.7 (870.5)	338.1 (1503.9)	507.3 (2256.6)	812.8 (3615.5)	1253.1 (5574.1)	1920.7 (8543.7)	2445.1 (10876.3)	2790.7 (12413.7)	4254.8 (18926.3)	7367.1 (32770.5)
550 (37.92)	206.1 (916.8)	355.0 (1579.1)	533.9 (2374.9)	853.4 (3796.1)	1315.6 (5852.1)	2017.5 (8974.3)	2566.1 (11414.6)	2938.4 (13070.7)	4469.8 (19882.7)	7739.3 (34426.1)
575 (39.64)	216.4 (962.6)	371.9 (1654.3)	560.3 (2492.3)	893.8 (3975.8)	1377.9 (6129.2)	2113.9 (9403.1)	2686.4 (11949.7)	3085.4 (13724.5)	4683.8 (20834.6)	8109.8 (36074.2)
600 (41.37)	226.7 (1008.4)	388.7 (1729.0)	586.7 (2609.8)	934.1 (4155.1)	1440.1 (6405.9)	2210.2 (9831.5)	2806.6 (12484.4)	3232.2 (14377.5)	4897.5 (21785.2)	8479.8 (37720.0)
625 (43.09)	236.9 (1053.8)	405.4 (1803.3)	612.9 (2726.3)	974.3 (4333.9)	1502.0 (6681.2)	2306.0 (10257.6)	2926.4 (13017.3)	3378.5 (15028.3)	5110.4 (22732.2)	8848.4 (39359.6)
650 (44.82)	247.2 (1099.6)	422.1 (1877.6)	639.2 (2843.3)	1014.4 (4512.3)	1563.8 (6956.1)	2401.7 (10683.3)	3045.8 (13548.4)	3524.4 (15677.3)	5322.8 (23677.0)	9216.2 (40995.7)
675 (46.54)	257.4 (1145.0)	438.8 (1951.9)	665.3 (2959.4)	1054.3 (4689.8)	1625.4 (7230.1)	2497.0 (11107.2)	3164.8 (14077.7)	3669.8 (16324.1)	5534.3 (24617.8)	9582.5 (42625.1)
700 (48.26)	267.6 (1190.3)	455.4 (2025.7)	691.3 (3075.1)	1049.1 (4666.6)	1686.8 (7503.3)	2592.1 (11530.2)	3283.6 (14606.2)	3814.8 (16969.1)	5745.4 (25556.8)	9947.9 (44250.5)
725 (49.99)	277.7 (1235.3)	471.9 (2099.1)	717.3 (3190.7)	1133.8 (5043.4)	1748.0 (7775.5)	2686.8 (11951.5)	3401.9 (15132.4)	3959.3 (17611.8)	5955.7 (26492.3)	10312.0 (45870.1)

Total resultant force at outlet elbow²

The figure (right) shows a safety valve open and discharging at full capacity, with a 90° outlet elbow. The horizontal reaction force (F_H) is balanced by the force of discharging steam acting on the 90° elbow.

The vertical force (F_V) at the 90° elbow is unbalanced and exerts a bending moment on the valve. Vertical force (F_V) 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.

NOTES

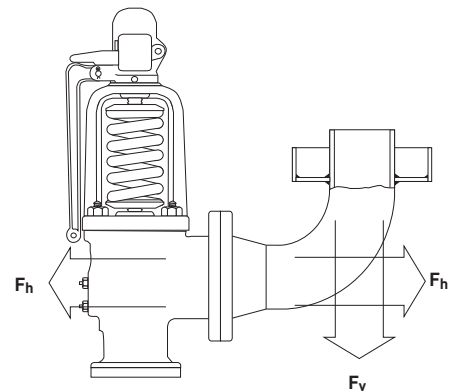
- Flowing pressure is the valve set pressure plus the overpressure plus the atmospheric pressure (14.7 psia) in psia or bara.
- Determination of outlet reaction forces is the responsibility of the designer of the vessel and/or piping.

The basic equation for this is:

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

where:

- F Vertical force
- W Flow in lbs/sec
- V Velocity, ft/sec
- A Area of outlet, sq. in.
- P_e Static pressure in outlet elbow, psia
- g_c Gravitational constant



CROSBY H-SERIES

OPTIONAL EQUIPMENT

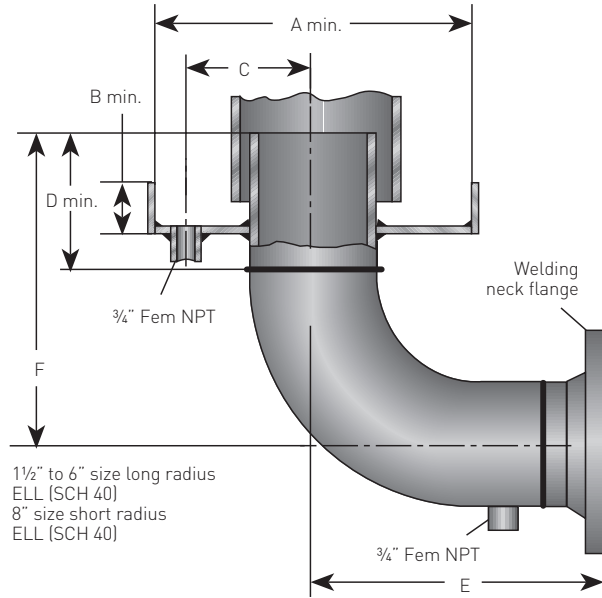
OPTIONAL EQUIPMENT

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. The flanged Model EFS drip pan elbow should be used without any intermediary connection.



Specifications

Model: EFS

Sizes: 1½", 2", 2½", 3", 4", 6", 8" and 10"

Flange

ANSI class: 150 (1½" to 10")

300 (3" to 10")

600 (3")

Material: Carbon steel

DIMENSIONS - inches

Valve outlet size	A		B		C		D		E		E		E		F	
	in	(mm)	in	(mm)	in	(mm)	in	(mm)	150 ANSI class	300 ANSI class	600 ANSI class	in	(mm)	in	(mm)	
1½	8.5	(215.9)	2½	(63.5)	3	(76.2)	6	(152.4)	5½	(139.7)	-	-	-	-	8½	(215.9)
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	(273.0)
3	9	(228.6)	3	(76.2)	3	(76.2)	8	(203.2)	7¼	(184.1)	7⅝	(193.7)	8	(203.2)	12½	(317.5)
4	12	(304.8)	3	(76.2)	4	(101.6)	8	(203.2)	9	(228.6)	9⅞	(238.1)	-	-	14	(355.6)
6	14	(355.6)	4	(101.6)	5	(127.0)	8	(203.2)	12½	(317.5)	12⅞	(327.0)	-	-	17	(431.8)
8	16	(406.4)	4	(101.6)	6½	(165.1)	8	(203.2)	12	(304.8)	12⅞	(314.3)	-	-	16	(406.4)
10	20	(508.0)	5	(127.0)	8	(203.2)	10	(254.0)	14	(355.6)	14⅞	(371.5)	-	-	20	(508.0)

CROSBY H-SERIES

OPTIONAL EQUIPMENT

Weatherhoods

Safety valves for outdoor installations should be supplied with weatherhoods to protect the exposed spring and upper structure from weather and thermal effects. They are available for all series H valves.

Reseating machines

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.

Jacking devices

When a safety valve is to be disassembled, the spring compression, i.e. the set pressure, can be retained by use of a mechanical or hydraulic jacking device. These 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.

Air (ASPD) and hydraulic (HSPD) set pressure devices

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

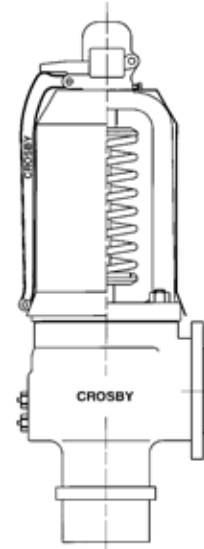
The apparatus consists of a lifting device mounted on the bonnet and connected to the spindle of the safety valve. The differential force, required to open the safety valve when the system (steam) pressure is less than the valve set pressure, is applied by the operator. The differential force at which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

For details of all the optional equipment available, contact your local sales representative.

Also available:

- Lapping blocks
- Lapping block resurfacing plates

WEATHERHOOD



RESEATING MACHINE



CROSBY H-SERIES

ORDERING INFORMATION

ORDERING INFORMATION

H Series safety valves are for steam service on steam generators, unfired pressure vessels and pipe lines. To assist customers in selecting the right safety valves to suit a specific application, Crosby will recommend the most suitable safety valve, size and style. To enable us 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	2½" x K2 x 6"
Style	HCI-46W
Set pressure	1 at 1150 psig (79 barg) 1 at 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 CL 150 outlet - RF

CROSBY H-SERIES

ORDERING INFORMATION

SELECTION GUIDE - Style HE ISOFLEX®

Example:	2½ K 6	HE	-W	-8	6	-C
Size (Inlet x orifice x outlet)						
2½ K 6 to 4 P2 8						
Valve series						
HE		HE ISOFLEX® High capacity safety valve				
Inlet connection type⁽¹⁾						
None		Flanged inlet connection				
-W		Butt weld inlet connection				
Pressure rating						
-8		2500 psig maximum pressure (172 barg)				
-9		3000 psig maximum pressure (207 barg)				
Temperature limit / body material						
6		750°F / SA216 WCC (399°C)				
Cap and lifting lever type						
-C		(Standard) Regular lifting lever				

NOTES

- Welded inlets are standard for HE valves.
For optional 2500# flanged inlet valves, the 'W' is dropped from model #.

Model # examples:

- 2½ K 6 HE-W-86-C
- 3 M2 6 HE-W-96-C
- 4 P2 8 HE-W-86-C

SELECTION GUIDE - Style HCI ISOFLEX®

Example:	3 M2 6	HCI	-8	6	W	-C
Size (Inlet x orifice x outlet)						
1½ H2 3 to 6 RR 10						
Valve series						
HCI		HCI ISOFLEX® High capacity safety valve				
HCI-R		HCI ISOFLEX® Restricted lift high capacity safety valve				
Pressure rating						
-3		ANSI CL 300 inlet				
-4		ANSI CL 600 inlet				
-5		ANSI CL 900 inlet				
-6		ANSI CL 1500 inlet				
-7		ANSI CL 900 inlet				
-8		ANSI CL 1500 inlet				
-9		ANSI CL 2500 inlet				
Temperature limit / body material						
6		750°F / SA216 WCC (399°C)				
8		1050°F / SA217 WC6 (566°C)				
9		1100°F / SA217 WC9 (399°C)				
-C12A		1100°F / SA217 C12A (399°C)				
Inlet connection type⁽¹⁾						
None		Flanged inlet connection				
W		Butt weld inlet connection				
Cap and lifting lever type						
-C		(Standard) Regular lifting lever				

NOTES

- Welded inlets are standard for HCI valves.
For optional flanged inlet valves, the 'W' is dropped from model #.

Model # examples:

- 3 M2 6 HCI-79W-C
- 2 J2 4 HCI-R-46-C
- 1½ H2 4 HCI-86W-C

CROSBY H-SERIES

ORDERING INFORMATION

SELECTION GUIDE - Style HSJ

Example:	1½ F 2	HSJ	-4	6	-C
Size (Inlet x orifice x outlet)					
1½ F 2 to 6 Q 8					
Valve series					
HSJ		HSJ High capacity safety valve			
HSJ-DOW		HSJ High capacity safety valve for Dowtherm service			
HSJ-ECO		HSJ High capacity safety valve for economizer service			
Pressure rating					
-1		ANSI CL 150 inlet			
-2		ANSI CL 300 inlet			
-3		ANSI CL 300 inlet			
-4		ANSI CL 600 inlet ^[2]			
-5		ANSI CL 900 inlet			
-6		ANSI CL 1500 inlet			
-7		ANSI CL 900 inlet			
Temperature limit / body material					
6		750°F / SA216 WCC (399°C)			
7		1000°F / SA217 WC6 ^[1] (538°C)			
Cap and lifting lever type					
-A		Threaded cap (restricted height)			
-C		(Standard) Regular lifting lever			
-D		Packed lifting lever			
-E		Packed lifting lever with test rod			
-T		Lifting lever with test gag			

NOTES

- SA217 WC6 is Crosby's standard high temperature material. SA-217 WC9 is available as an alternative
- Orifices F and G with a '-4' pressure rating set below 600 psig (41.4 barg) have an ANSI CL 300 inlet flange.

Model # examples:

- 1½ F 2 HSJ-46-C
- 3 J 4 HSJ-67-C
- 3 M 6 HSJ-DOW-36-D

SELECTION GUIDE - Style HSL

Example:	2½ L 4	HSL	-3	8	-C
Size (Inlet x orifice x outlet)					
1¼ F 1½					
1¼ G 1½					
1½ H 2½					
1½ J 2½					
2 K 3					
2½ L 4					
3 M 4					
4 N 6					
4 P 6					
6 Q 8					
Valve series					
HSL		HSL High capacity flanged steel safety valve			
Inlet flange rating					
-3		300#			
-4		600#			
Temperature limit / body material					
6		750°F / SA216 WCB (399°C)			
8		1000°F / SA217 WC6 (538°C)			
Cap and lifting lever type					
-C		(Standard) Regular lifting lever			

Available options

Accessories

- Test gag
- Weatherhood
- CL 150# Drip pan elbow

Other

- Ring type joint (RTJ) inlet

Model # examples:

- 2½ L 4 HSL-38-C
- 6 Q 8 HSL-46-C

CROSBY H-SERIES

ORDERING INFORMATION

SELECTION GUIDE - STYLE HCA-I

Example:	3 M2 8	HCA	-I	-W	-118	-C12A	-C	-TS
Size (Inlet x orifice x outlet)	2½ K 6 to 3 M2 8							
Valve series	HCA							
HCA	HCA Supercritical safety valve							
Disc design	-I							
-I	Isoflex design							
Inlet connection type⁽¹⁾	-W							
-W	Butt weld inlet connection							
Pressure rating	-118							
-118	Butt weld inlet x ANSI CL 300 outlet							
Temperature limit / body material	-C12A							
None	1000°F / SA217 WC9 [338°C]							
-C12A	1050°F / SA217 C12A [566°C]							
XX	593							
Cap and lifting lever type	-C							
-C	(Standard) Regular lifting lever (test gag is included)							
XX	593							
Model number supplements⁽¹⁾	None							
None	No model # supplements							
P	CE / PED certification							
TS	China TS manufacturing license							

NOTES

1. Include '-' if model # supplement(s) apply.

Model # examples:

3 M2 8 HCA-I-W-118-C12A-C

2.5 K2 6 HCA-I-W-118-C

2.5 K2 6 HCA-I-W-118-C-TS

Available options

- Weatherhood
- Limit switch
- Materials of construction for applications above 1100°F/594°C

CROSBY H-SERIES

INSTALLATION RECOMMENDATIONS

SAFETY VALVE INSTALLATION RECOMMENDATIONS

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^[1]

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 with 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, bearing in mind 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) should be connected to the boiler independently 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. Any intervening pipe or fitting should be no 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.

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 vessel and/or piping designer (see pages 65-69).

Boilers

It is recommended that the absolute minimum differential pressure, i.e. the pressure between the valve set pressure and operating pressure, is 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" (15 mm) or more is recommended, particularly for valves mounted off the center line of the drum.

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, preferably one pipe size larger than the valve inlet and 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.

1. Request paper by J.R. Zahorsky titled: 'Degradation of pressure relief valve performance caused by inlet piping configuration'.

CROSBY H-SERIES

INSTALLATION RECOMMENDATIONS

Discharge piping^[2]

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.

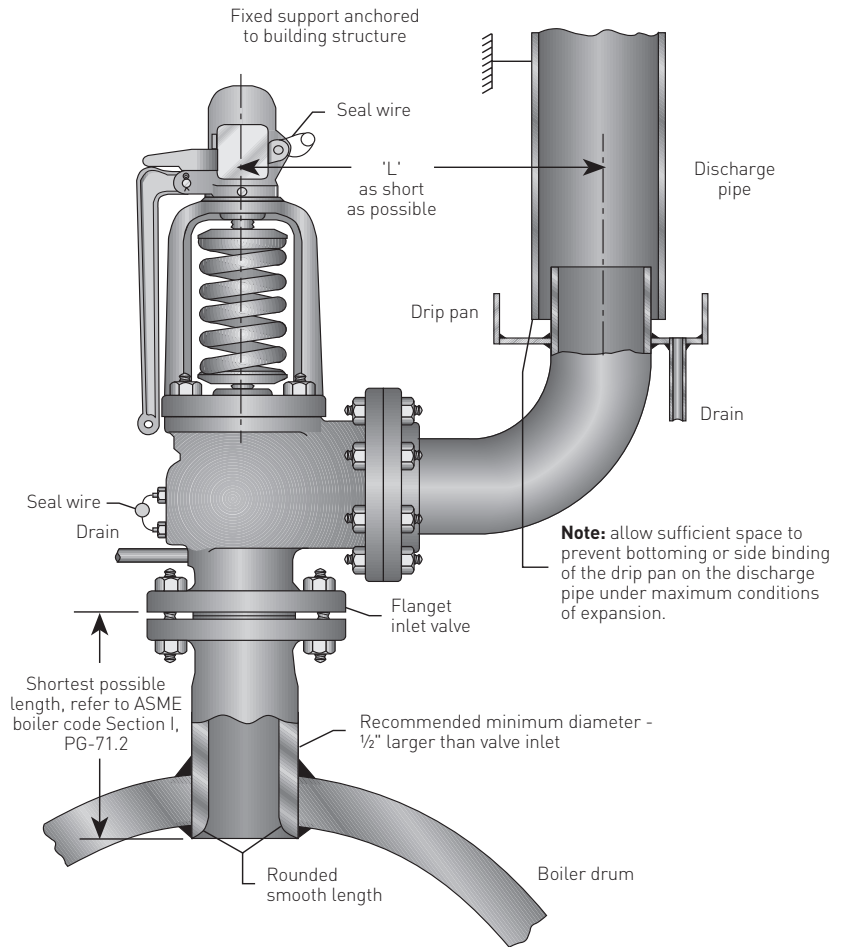
Where flexible hose connections are used in place of or in conjunction with drip pans, they must be of sufficient length and flexibility to absorb expansion and impose no strains on the valve outlet when the pressure vessel is at normal operating pressure.

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

Headers

On superheater and reheater headers, inlet nozzle connections for safety valves should be as short as possible. Piping nozzles should have 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. 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.

- 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.



CROSBY H-SERIES

INSTALLATION RECOMMENDATIONS

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 supported independently 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 anchored adequately to prevent it from swaying and with adequate drains provided.

The discharge lines should be led into the manifold at an angle of 45° (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 piping in the discharge system must be vented to a safe disposal area to prevent personnel injury when the valve discharges.

Drains

Provisions for drains are located in the valve bodies and should be piped to a drainage system to remove condensate. 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 is provided with a drain pocket at the lowest point and that a separate drain line is 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.

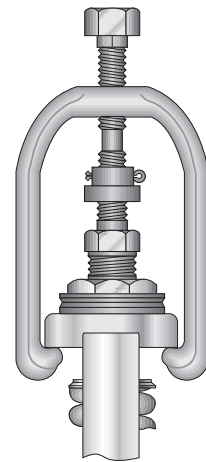
Hydrostatic testing of boilers

Hydrostatic test plugs are recommended for use on welded inlet valves. If flanged inlet valves are to be installed, we recommend that the hydrostatic test is 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.

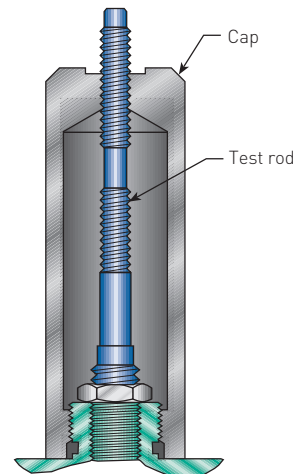
Technical literature describing the specific type and use of hydrostatic test equipment available is provided for series H valves.

TEST CLAMPS

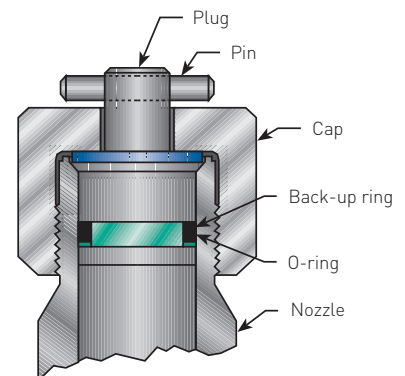
STYLE HE ISOFLEX AND HCI ISOFLEX



STYLE HSJ



HYDROSTATIC TEST PLUG



CROSBY H-SERIES

PRESSURE RELIEF DEVICE SIZING AND SELECTION SOFTWARE



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