Total Safety Solution Provider!

JOKWANG

Total Safety Solution Provider! JOKWANG Cat No. FF200 Vol.1

JOKWANG I.L.I. CO.,LTD.

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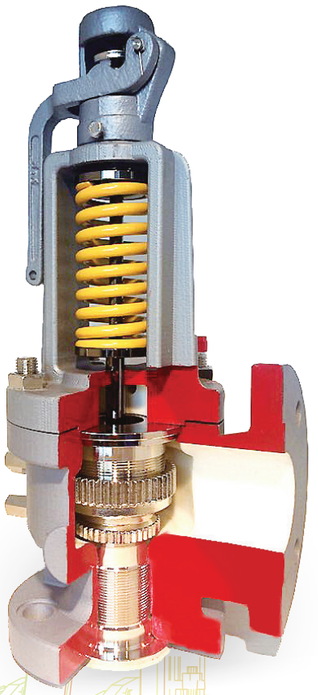
Cat No.
FF200 **Vol.1**

Think Safety!

JOKWANG

Pressure Relief Valves for V & UV Stamp

JSV-FF200



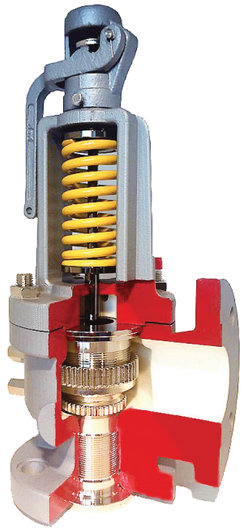
JOKWANG I.L.I CO., LTD.

INTRODUCTION OF COMPANY

Since its establishment in 1968, JOKWANG I.L.I CO., LTD. with its JK trademark has put every effort in pioneering and specializing as one of the leading valve manufacturing companies. Its devotion has concentrated especially in the area of safety & relief valve, pressure reducing valve, stop valve and steam trap.

With almost half a century of experience, we have earned over a good reputation for quality, reliability, reasonable price and excellent performance.

We determined to contribute to serve your need for your heat control and energy saving effort through our precision design, strict testing, and precision processing. Your kind inquiries would be much appreciated, and we will do our best to give you our business suggestions on them, which can be competitive in your market. In closing, we promise for our continuous endeavor, for more research, and for development work to pay back your positive supports and encouragement.



COMPANY HISTORY

Nov. 1968	Founded JOKWANG Industries Company in Busan, Korea
May. 1987	Acquired K.S(Korean Industrial Standard) Mark
Apr. 1989	Acquired Type approval from KR(Korea)
Dec. 1992	Technical Collaboration with VENN in Japan
Dec. 1998	Acquired ISO 9001 Certificate
Dec. 1999	Changed Company name to JOKWANG I.L.I Co., Ltd.
Oct. 2000	Moved to Noksan Industrial Complex in Busan, Korea
Nov. 2003	Acquired Type approval from DNV(Norway)
Mar. 2004	Acquired Type approval from BV(France)
Apr. 2004	Acquired KEPIC Certificate
Jun. 2004	Acquired Type approval from LR(UK)
May. 2006	Acquired Safety Relief Valve ASME "UV" Stamp
Nov. 2006	Patent registered for Pilot-Operated Safety Valve
May. 2010	Acquired Type approval from GL(Germany)
Apr. 2011	Acquired Safety Relief Valve ASME "UV" Stamp(Up to 6,000psig)
Dec. 2011	Awarded Export Tower of 3 Mil. U.S Dollar
Dec. 2011	Acquired Type approval from CCS(China)
Dec. 2011	Acquired ISO14001 Certificate
Mar. 2012	Acquired OHSAS18001 Certificate
Mar. 2013	Acquired Pilot type Safety Relief Valve ASME "UV"Stamp
Jun. 2014	Acquired Safety Relief Valve ASME "V"Stamp
Jun. 2015	Acquired Safety Relief Valve C-Sel(China)
May. 2016	Renewed ASME "UV"Stamp
Jan. 2016	Moved to Sanmak Complex in Yangsan, Korea
Sep. 2016	Renewed ASME "V"Stamp

Certificate

Quality System Certificate

- 'V' Stamp of ASME Sec.I
- 'UV' Stamp of ASME Sec.VIII
- Certificate of NBBI Safety Valve Capacity
- ISO 9001 Certificate
- ISO 14001 Certificate
- OHSAS 18001 Certificate
- C-SEL China Special Equipment License

Type Approval

- LR - Lloyd's Register
- BV - Bureau Veritas
- KR - Korean Register
- CCS - China Classification Society
- DNV · GL - Det norske Veritas
  · Germanischer Veritas

General information

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01 About SRV(Safety Relief Valve)

01 General Definition of Safety Relief Valve(SRV)

A pressure relief device is any device that can purge a system from an overpressure condition. More particularly, an SRV is a pressure relief device that is self-actuated, and whose primary purpose is the protection of life and equipment. Through a controlled discharge of a required(rated) amount of fluid at a predetermined pressure, an SRV must prevent overpressure in pressurized vessels and systems, and it operates within limits which are determined by international codes. An SRV is often the final control device in the prevention of accidents or explosions caused by overpressure.

The SRV must close at a predetermined pressure when the system pressure has returned to a safe lever at values determined by the codes.

SRVs must be designed with materials compatible with many process fluids, from simple air and water to the most corrosive and toxic media. They must also be designed to operate in a consistently smooth manner on a variety of fluids and fluid phases. These design parameters lead to a wide array of SRV products available in the market today, with the on constant being that they all must comply with the internationally recognized codes.

02 Where do SRVs fit in the process?

Every industrial process system is designed to work against a certain maximum pressure and temperature called its rating or design pressure. It is in the economic interest of the users to work as close as possible towards the maximum limits of this design pressure in order to optimize the process output, hence increase the profitability of the system.

Nowadays, pressures and flow in the process industry are controlled by electronic process systems and highly sophisticated instrumentation devices. Almost all control systems are powered by an outside power source(electric, pneumatic, hydraulic). The law requires that when everything fails regardless of the built-in redundancies, there is still an independent working device powered only by the medium it protects. This is the function of the SRV, which, when everything else works correctly in the system, should never have to work. However, practice proves the contrary, and there are a variety of incidents which will allow the system pressure to exceed the design pressure.

Although many pressure relief devices are called SRVs, not every SRV has the same characteristics of or operational precision. Only the choice of the correct pressure safety device for the right application will assure the safety of the system and allow the user to maximize process output and minimize down-time for maintenance purposes. Making the correct choice also means avoiding interference between the process instrumentation set points in the control loop and the pressure relief device limits selected. There SRV operation al limits can vary greatly even when all are complying with the codes.

03 Pressure Relief Devices

Pressure relief device

Actuated by inlet static pressure and designed to open during emergency or abnormal conditions to prevent a rise of internal fluid pressure in excess of a specified design value. The device also may be designed to prevent excessive internal vacuum. The device may be designed to prevent excessive internal vacuum. The device may be a pressure relief valve, a non-reclosing pressure relief device, or a vacuum relief valve.

Pressure relief valve

A pressure relief device designed to open and relieve excess pressure and to reclose and prevent the further flow of fluid after normal conditions have been restored.

a A relief valve

It is a spring loaded pressure relief valve actuated by the static pressure upstream of the valve. The valve opens normally in proportion to the pressure increase over the opening pressure. A relief valve is used primarily with incompressible fluids.

b A safety valve

It is a spring loaded pressure relief valve actuated by the static pressure upstream of the valve and characterized by rapid opening or pop action. A safety valve is normally used with compressible fluids.

c A safety relief valve

It is a spring loaded pressure relief valve that may be used as either a safety or reliefvalve depending on the application.

d A conventional pressure relief valve

It is a spring loaded pressure relief valve whose operational characteristics are directly affected by changes in the back pressure.

e A balanced pressure relief valve

A It is spring loaded pressure relief valve that incorporates a bellows or other means for minimizing the effect of back pressure on the operational characteristics of the valve.

f A pilot operated pressure relief valve

It is a pressure relief valve in which the major relieving device or main valve is combined with and controlled by a self actuated auxiliary pressure relief valve(pilot).

Non-reclosing pressure relief device

A pressure relief device which remains open after operation. A manual resetting means may be provided.

Rupture disk device

A non-reclosing pressure relief device actuated by static differential pressure between the inlet and outlet of the device and designed to function by the bursting of a rupture disk. A rupture disk device includes a rupture disk and a rupture disk holder.

About SRV(Safety Relief Valve)

a A rupture disk

It is a pressure containing, pressure and temperature sensitive element of a rupture disk device.

b A rupture disk holder

It is the structure which encloses and clamps the rupture disk in position.(Some disks are designed to be installed between standard flanges without holders.)

c A non fragmenting rupture disk

It is a rupture disk designed and manufactured to be installed upstream of other piping components, such as pressure relief valves, and will not impair the function of those components when the disk ruptures.

Pin-actuated device

A non-reclosing pressure relief device actuated by static pressure and designed to function by buckling or breaking a pin which holds a piston or a plug in place. Upon buckling or breaking of the pin, the piston or plug instantly moves to the full open position.

* Reference
- The Safety Relief Valve Handbook - API STD 520 Part 2.

02 Sizing Program Basis

Instruction of Sizing Program

After receiving the inquiry or P/O(purchase order) from our precious customers, we input the data for specification of PSV in the COMPUTER SIZING PROGRAM(see fig. 1).

This helps calculate the valve capacity and select the exact size compared than required capacity.

When we calculate the capacity, must-have information such as fluid name & states, temperature, pressure, required capacity and allowable overpressure condition(3%) are considered and reflected in the system according to the calculation standard as ASME Sec.I and API STD 520 and so on.

Also the variety of pressure unit including Kg/cm²g, Barg, MPag, kPag, pisg and so on could be used in the system.

The whole information for the each PSV is saved in our system and the data sheet with calculation sheet(see fig. 2) based on it could be printed out automatically.

It is possible to trace the saved information of each PSV with customer's name and serial number on the customer's request.

20	010200	Tag No(O)	PSV-001	
30	010300	Service Line		
40	010600	Design Type	C	Conventional
100	010700	Bonnet-Type(*)	C	Close
101	041900	Lever-Type(*)	L	Plain Lever
102	020901	Inlet Connect Code(*)	ANSI	ANSI
103	020902	Inlet-Rating(*)	150	150LB
104	020903	Inlet-Facing(*)	R	RF
105	021001	Outlet Connect Code(*)	ANSI	ANSI
106	021002	Outlet-Rating(*)	150	150LB
107	021003	Outlet-Facing(*)	R	RF
110	020803	Size(inch)(*)	025050	1¼2"
112	074400	Orifice Designation(*)	E	E(12.7)
200	031101	Body(*)	S-WCB	SA216 WCB
201	031200	Seat(*)	S-CF8M-S	SA351 CF8M(STELLITED)
202	031301	Disc(*)	SA316-S	SA 276 316(STELLITED)
203	031701	Bellows-M	NA	none
300	010100	Model No	JSV-FF100	
400	052200	Code(*)	A8	ASME sec. VIII
401	062502	Fluid State(*)	A	AIR
402	062501	Fluid Name(*)	Air	
403	062700	Mol.weight or specificGravity*	28.96	
404	063900	Compressibility Factor(*)	1	
405	064000	Specific Heat(*)	1.4	
407	069902	Pressure Unit(*)	KG	Kgf/cm²g
409	069903	Temp. Unit	°C	°C
410	063100	Operating Temp.		
411	063200	Blowout Temp.(*:Gas/Air)	20	
413	062900	Operating pressure		
414	063000	Setting pressure(*)	5	
430	063600	Closing Pressure(*)	4.65	
432	063700	Hydrostatic Test(*)	7.5	
440	063300	Constant Back Pressure		
441	063400	Variable Back Pressure		
450	063800	Allowable Overpressure(%)	10	10
490	069901	Capacity Unit	KG	kg/h
491	069904	Area Unit	MM	㎟
492	062600	Required Capacity	120	
494	074200	Calculated Area	26.593	
496	074300	Selected Area	126.677	
498	074500	Valve Capacity(*)	572	
550	042100	Paint Color(*)	S	Silver
551	042000	GAG	Y	Yes
574	999997	Remark		
580	052400	Other	NA	
581	052300	Fire	N	No
582	062800	Viscosity(Cp)		

Fig. 1 - Sizing Program – ERP System

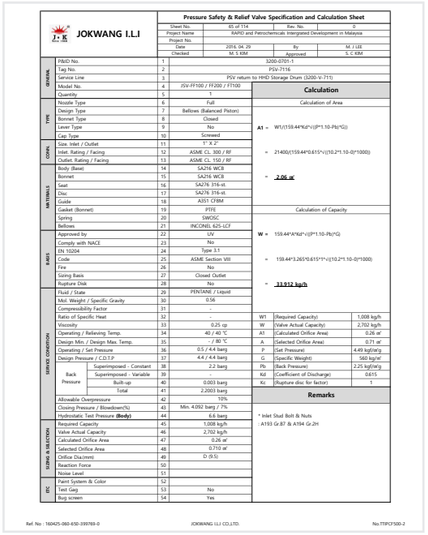
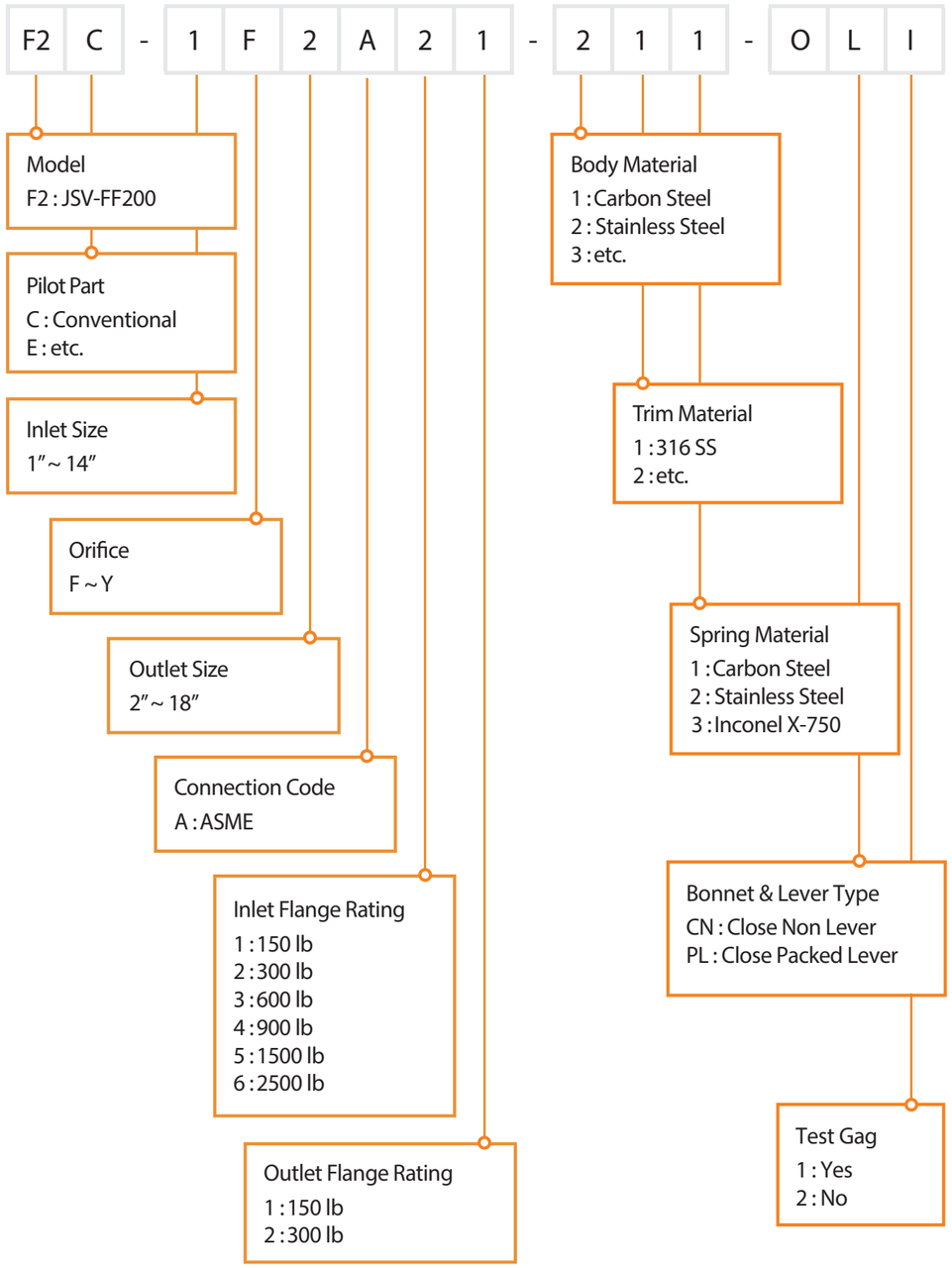


Fig. 2 - Data & Calculation Sheet

03 Numbering System



JSV-FF200

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01 Product Information

INTRODUCTION :

Over almost half a century, we have been supplying a variety of safety relief valves to satisfy the highly variable requirements of customers.

JSV-FF200 as representative POSRV of Jokwang is designed and produced based on the accumulated technology of long experience.

We strongly recommend JSV-FF200 to protect overpressure of the Power Boiler and process line using in the various industries.

APPLICABLE CODES, STANDARD and AUTHORIZATIONS :

The JSV-FF200 series is compliant with the following codes and standards.

- ASME SEC. I
- RELIEVING CAPACITY tested & certifi ed by NBBI
- API STD 527 / SEAT TIGHTNESS OF PRESSURE RELIEF VALVES
- ASME B16.34 / VALVES – FLANGED, THREADED, AND WELDING END

DESIGN FEATURE :

- Certified Discharge Capacity

  JSV-FF200 is designed and manufactured in accordance with ASME Sec. I.

  Also the discharge capacity is certied by NBBI(National Board OF Boiler and Pressure Vessel Inspections) as well.

- Excellent Seat Tightness

  Disc construction of JSV-FF200 is composed of a disc and disc holder.

  This kind of simple shaped disc permits a uniform pressure distribution not to make any distortion of seat, thus maintaining excellent seat tightness.

  In addition, the seat is machined and lapped with a high precision to enhance the seat tightness.

02 Specification

Type	Conventional & Bellows
Applicable Code	ASME Sec. I
Size	1" × 2" ~ 8" × 12"
Orifice	F(0.438in^2) ~ Y(76.078 in^2)
Set Pressure Range	15 ~ 5020 psig(1.03 ~ 346.2 bar)
Allowable Leakage	API STD 527

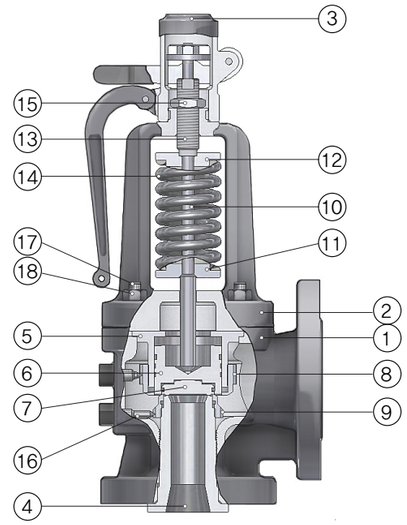
Orifice	F	G	H	J	L	N	P	Inlet Flange Rating ASME B 16.34	Outlet Flange Rating ASME B 16.34
Inlet × Outlet Size (inch)	1"×2"	1 1/2"×2 1/2"	1 1/2"×2 1/2"	2"×3"	2 1/2"×4"	3"×6"	4"×6"	300	150
	1"×2"	1 1/2"×3"	1 1/2"×3"	2"×4"	2 1/2"×6"	3"×6"	4"×8"	600	
	1"×2"	1 1/2"×3"	1 1/2"×3"	2"×4"	2 1/2"×6"	3"×6"	4"×8"	900	
	1 1/2×3	1 1/2"×3"	2"×3"	3"×6"	3"×6"	4"×6"	4"×8"	1500	
	1 1/2×3	1 1/2"×3"	2"×3"	3"×6"	3"×6"	4"×6"	4"×8"	2500	300

Orifice	Q	R	T	Inlet Flange Rating ASME B 16.34	Outlet Flange Rating ASME B 16.34
Inlet × Outlet Size (inch)	6"×8"	6"×8"	8"×10"	300	150
	6"×8"	6"×10"	8"×12"	600	
	6"×8"	6"×10"	8"×12"	900	
	6"×8"	6"×10"		1500	

03 Orifice Designation

Orifice	Area		Diameter	
	Sq. in	Sq. mm	In	mm
F	0.439	283.23	0.748	19.0
G	0.701	452.26	0.945	24.0
H	1.095	706.45	1.181	30.0
J	1.758	1134.19	1.496	38.0
L	2.922	1885.16	1.929	49.0
N	4.531	2923.22	2.402	61.0
P	7.031	4,536.12	2.992	76.0
Q	10.986	7,087.73	3.74	95.0
R	16.103	10,389.01	4.528	116.4
T	27.395	17,674.16	5.906	150.0
V	39.447	25,449.63	7.087	180.0
W	55.748	35,966.38	8.425	214.0
Y	76.078	49,082.48	9.842	250.0

04 Part Name & Material



No	Part Name	Material			
		400˚C (752˚F)	500˚C (932˚F)	538˚C (1,000 ˚F)	604˚C (1,120 ˚F)
1	Body	A216 WCB	A217 WC6	A217 WC9	A217 C12A
2	Bonnet	A216 WCB	A217 WC6		
3	Cap	A216 WCB			
4	Seat	A351 CF8M	A182 F22		A182 F91
5	Guide	316 Stainless Steel			
6	Holder	316 Stainless Steel			
7	Disc	A564 630 / Inconel			
8	Upper Adjust Ring	316 Stainless Steel			
9	Lower Adjust Ring	316 Stainless Steel			
10	Stem	Stainless Steel			
11	Lower Spring Seat	Stainless Steel			
12	Upper Spring Seat	Stainless Steel			
13	Adjust Screw	Stainless Steel			
14	Spring	Carbon Steel	Alloy Steel		
15	Lock Nut	Stainless Steel			
16	Set Screw	316 Stainless Steel			
17	Stud Bolt	A193 B7			
18	Nut	A194 2H			

05 Valve Selection

F orifice

Area = 0.439 sq. in.
Diameter : 0.748 in.

USC Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Psig)				Standard Materials	
	Inlet	Outlet	752 ℉	932 ℉	1000 ℉	1120 ℉	Body / Bonnet	Spring
1 × 2	300	150	435				Carbon Steel	Carbon Steel
1 × 2	600	150	870					
1 × 2	900	150	1450					
1 1/2 × 2	1500	150	2320					
1 1/2 × 2	2500	300	4061					
1 × 2	300	150		362	261	203	Chrome Moly Steel	Stainless Steel or Alloy Steel
1 × 2	600	150		725	522	420		
1 × 2	900	150		1087	797	623		
1 1/2 × 2	1500	150		1812	1334	1058		
1 1/2 × 2	2500	300		2900	2219	1754		

Metric Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Bar)				Standard Materials	
	Inlet	Outlet	400℃	500℃	538℃	604℃	Body / Bonnet	Spring
1 × 2	300	150	30				Carbon Steel	Carbon Steel
1 × 2	600	150	60					
1 × 2	900	150	100					
1 1/2 × 2	1500	150	160					
1 1/2 × 2	2500	300	280					
1 × 2	300	150		25	18	14	Chrome Moly Steel	Stainless Steel or Alloy Steel
1 × 2	600	150		50	36	29		
1 × 2	900	150		75	55	43		
1 1/2 × 2	1500	150		125	92	73		
1 1/2 × 2	2500	300		200	153	121		

G orifice

Area = 0.701 sq. in.
Diameter : 0.945 in.

USC Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Psig)				Standard Materials	
	Inlet	Outlet	752 ℉	932 ℉	1000 ℉	1120 ℉	Body / Bonnet	Spring
1 1/2 × 2 1/2	300	150	435				Carbon Steel	Carbon Steel
1 1/2 × 3	600	150	870					
1 1/2 × 3	900	150	1450					
1 1/2 × 3	1500	150	2320					
1 1/2 × 3	2500	300	4061					
1 1/2 × 2 1/2	150	150		362	261	203	Chrome Moly Steel	Stainless Steel or Alloy Steel
1 1/2 × 3	600	150		725	522	420		
1 1/2 × 3	900	300		1087	797	623		
1 1/2 × 3	1500	300		1812	1334	1058		
1 1/2 × 3	2500	300		2900	2219	1754		

Metric Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Bar)				Standard Materials	
	Inlet	Outlet	400℃	500℃	538℃	604℃	Body / Bonnet	Spring
1 1/2 × 2 1/2	300	150	30				Carbon Steel	Carbon Steel
1 1/2 × 3	600	150	60					
1 1/2 × 3	900	150	100					
1 1/2 × 3	1500	150	160					
1 1/2 × 3	2500	300	280					
1 1/2 × 2 1/2	150	150		25	18	14	Chrome Moly Steel	Stainless Steel or Alloy Steel
1 1/2 × 3	600	150		50	36	29		
1 1/2 × 3	900	300		75	55	43		
1 1/2 × 3	1500	300		125	92	73		
1 1/2 × 3	2500	300		200	153	121		

H orifice

Area = 1.095 sq. in.
Diameter : 1.181 in.

USC Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Psig)				Standard Materials	
	Inlet	Outlet	752 ℉	932 ℉	1000 ℉	1120 ℉	Body / Bonnet	Spring
1 1/2 × 2 1/2	300	150	435				Carbon Steel	Carbon Steel
1 1/2 × 3	600	150	870					
1 1/2 × 3	900	150	1450					
2 × 3	1500	150	2320					
2 × 3	2500	300	4061					
1 1/2 × 2 1/2	150	150		362	261	203	Chrome Moly Steel	Stainless Steel or Alloy Steel
1 1/2 × 3	600	150		725	522	420		
1 1/2 × 3	900	300		1087	797	623		
2 × 3	1500	300		1812	1334	1058		
2 × 3	2500	300		2900	2219	1754		

Metric Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Bar)				Standard Materials	
	Inlet	Outlet	400℃	500℃	538℃	604℃	Body / Bonnet	Spring
1 1/2 × 2 1/2	300	150	30				Carbon Steel	Carbon Steel
1 1/2 × 3	600	150	60					
1 1/2 × 3	900	150	100					
2 × 3	1500	150	160					
2 × 3	2500	300	280					
1 1/2 × 2 1/2	150	150		25	18	14	Austenitic Stainless Steel	Stainless Steel or Alloy Steel
1 1/2 × 3	600	150		50	36	29		
1 1/2 × 3	900	300		75	55	43		
2 × 3	1500	300		125	92	73		
2 × 3	2500	300		200	153	121		

J orifice

Area = 1.758 sq. in.
Diameter : 1.496 in.

USC Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Psig)				Standard Materials	
	Inlet	Outlet	752 ℉	932 ℉	1000 ℉	1120 ℉	Body / Bon-	Spring
2 × 3	300	150	435				Carbon Steel	Carbon Steel
2 × 4	600	150	870					
2 × 4	900	150	1450					
3 × 6	1500	150	2320					
3 × 6	2500	300	4061					
2 × 3	150	150		362	261	203	Chrome Moly Steel	Stainless Steel or Alloy Steel
2 × 4	600	150		725	522	420		
2 × 4	900	300		1087	797	623		
3 × 6	1500	300		1812	1334	1058		
3 × 6	2500	300		2900	2219	1754		

Metric Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Bar)				Standard Materials	
	Inlet	Outlet	400℃	500℃	538℃	604℃	Body / Bon-	Spring
2 × 3	300	150	30				Carbon Steel	Carbon Steel
2 × 4	600	150	60					
2 × 4	900	150	100					
3 × 6	1500	150	160					
3 × 6	2500	300	280					
2 × 3	150	150		25	18	14	Chrome Moly Steel	Stainless Steel or Alloy Steel
2 × 4	600	150		50	36	29		
2 × 4	900	300		75	55	43		
3 × 6	1500	300		125	92	73		
3 × 6	2500	300		200	153	121		

L orifice

Area = 2.922 sq. in.
Diameter : 1.929 in.

USC Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Psig)				Standard Materials	
	Inlet	Outlet	752 ℉	932 ℉	1000 ℉	1120 ℉	Body / Bonnet	Spring
2 1/2 × 4	300	150	435				Carbon Steel	Carbon Steel
2 1/2 × 6	600	150	870					
2 1/2 × 6	900	150	1450					
3 × 6	1500	150	2320					
3 × 6	2500	300	4061					
2 1/2 × 4	150	150		362	261	203	Chrome Moly Steel	Stainless Steel or Alloy Steel
2 1/2 × 6	600	150		725	522	420		
2 1/2 × 6	900	300		1087	797	623		
3 × 6	1500	300		1812	1334	1058		
3 × 6	2500	300		2900	2219	1754		

Metric Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Bar)				Standard Materials	
	Inlet	Outlet	400℃	500℃	538℃	604℃	Body / Bonnet	Spring
2 1/2 × 4	300	150	30				Carbon Steel	Carbon Steel
2 1/2 × 6	600	150	60					
2 1/2 × 6	900	150	100					
3 × 6	1500	150	160					
3 × 6	2500	300	280					
2 1/2 × 4	150	150		25	18	14	Chrome Moly Steel	Stainless Steel or Alloy Steel
2 1/2 × 6	600	150		50	36	29		
2 1/2 × 6	900	300		75	55	43		
3 × 6	1500	300		125	92	73		
3 × 6	2500	300		200	153	121		

N orifice

Area = 4.531 sq. in.
Diameter : 2.402 in.

USC Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Psig)				Standard Materials	
	Inlet	Outlet	752 ℉	932 ℉	1000 ℉	1120 ℉	Body / Bonnet	Spring
3 × 6	300	150	435				Carbon Steel	Carbon Steel
3 × 6	600	150	870					
3 × 6	900	150	1450					
4 × 6	1500	150	2320					
4 × 6	2500	300	2987					
3 × 6	150	150		362	261	203	Chrome Moly Steel	Stainless Steel or Alloy Steel
3 × 6	600	150		725	522	420		
3 × 6	900	300		1087	797	623		
4 × 6	1500	300		1812	1334	1058		
4 × 6	2500	300		2900	2219	1754		

Metric Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Bar)				Standard Materials	
	Inlet	Outlet	400℃	500℃	538℃	604℃	Body / Bonnet	Spring
3 × 6	300	150	30				Carbon Steel	Carbon Steel
3 × 6	600	150	60					
3 × 6	900	150	100					
4 × 6	1500	150	160					
4 × 6	2500	300	206					
3 × 6	150	150		25	18	14	Chrome Moly Steel	Stainless Steel or Alloy Steel
3 × 6	600	150		50	36	29		
3 × 6	900	300		75	55	43		
4 × 6	1500	300		125	92	73		
4 × 6	2500	300		200	153	121		

P orifice

Area = 7.031 sq. in.
Diameter : 2.992 in.

USC Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Psig)				Standard Materials	
	Inlet	Outlet	752 ℉	932 ℉	1000 ℉	1120 ℉	Body / Bonnet	Spring
4 × 6	300	150	435				Carbon Steel	Carbon Steel
4 × 8	600	150	870					
4 × 8	900	150	1450					
4 × 8	1500	150	2320					
4 × 8	2500	300	2987					
4 × 6	150	150		362	261	203	Chrome Moly Steel	Stainless Steel or Alloy Steel
4 × 8	600	150		725	522	420		
4 × 8	900	300		1087	797	623		
4 × 8	1500	300		1812	1334	1058		
4 × 8	2500	300		2900	2219	1754		

Metric Units

Size	Connections		Maximum Set Pressure. (Bar)				Standard Materials	
	Inlet	Outlet	400℃	500℃	538℃	604℃	Body / Bonnet	Spring
4 × 6	300	150	30				Carbon Steel	Carbon Steel
4 × 8	600	150	60					
4 × 8	900	150	100					
4 × 8	1500	150	160					
4 × 8	2500	300	206					
4 × 6	150	150		25	18	14	Chrome Moly Steel	Stainless Steel or Alloy Steel
4 × 8	600	150		50	36	29		
4 × 8	900	300		75	55	43		
4 × 8	1500	300		125	92	73		
4 × 8	2500	300		200	153	121		

Q orifice

Area = 10.986 sq. in.
Diameter : 3.74 in.

USC Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Psig)				Standard Materials	
	Inlet	Outlet	752 ℉	932 ℉	1000 ℉	1120 ℉	Body / Bonnet	Spring
6 × 8	300	150	435				Carbon Steel	Carbon Steel
6 × 8	600	150	870					
6 × 8	900	150	1450					
6 × 8	1500	150	1987					
6 × 8	300	150		362	261	203	Chrome Moly Steel	Stainless Steel or Alloy Steel
6 × 8	600	150		725	522	420		
6 × 8	900	150		1087	797	623		
6 × 8	1500	150		1812	1334	1058		

Metric Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Bar)				Standard Materials	
	Inlet	Outlet	400℃	500℃	538℃	604℃	Body / Bonnet	Spring
6 × 8	300	150	30				Carbon Steel	Carbon Steel
6 × 8	600	150	60					
6 × 8	900	150	100					
6 × 8	1500	150	137					
6 × 8	300	150		25	18	14	Chrome Moly Steel	Stainless Steel or Alloy Steel
6 × 8	600	150		50	36	29		
6 × 8	900	150		75	55	43		
6 × 8	1500	150		125	92	73		

R orifice

Area = 16.103 sq. in.
Diameter : 4.528 in.

USC Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Psig)				Standard Materials	
	Inlet	Outlet	752 ℉	932 ℉	1000 ℉	1120 ℉	Body / Bonnet	Spring
6 × 8	300	150	435				Carbon Steel	Carbon Steel
6 × 10	600	150	870					
6 × 10	900	150	1450					
6 × 10	1500	150	1987					
6 × 8	300	150		362	261	203	Chrome Moly Steel	Stainless Steel or Alloy Steel
6 × 10	600	150		725	522	420		
6 × 10	900	150		1087	797	623		
6 × 10	1500	150		1812	1334	1058		

Metric Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Bar)				Standard Materials	
	Inlet	Outlet	400℃	500℃	538℃	604℃	Body / Bonnet	Spring
6 × 8	300	150	30				Carbon Steel	Carbon Steel
6 × 10	600	150	60					
6 × 10	900	150	100					
6 × 10	1500	150	137					
6 × 8	300	150		25	18	14	Chrome Moly Steel	Stainless Steel or Alloy Steel
6 × 10	600	150		50	36	29		
6 × 10	900	150		75	55	43		
6 × 10	1500	150		125	92	73		

T orifice

Area = 27.395 sq. in.
Diameter : 5.906 in.

USC Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Psig)				Standard Materials	
	Inlet	Outlet	752 ℉	932 ℉	1000 ℉	1120 ℉	Body / Bonnet	Spring
8 × 10	300	150	435				Carbon Steel	Carbon Steel
8 × 12	600	150	870					
8 × 12	900	150	1450					
8 × 10	300	150		362	261	203	Chrome Moly Steel	Stainless Steel or Alloy Steel
8 × 12	600	150		725	522	420		
8 × 12	900	150		1087	797	623		

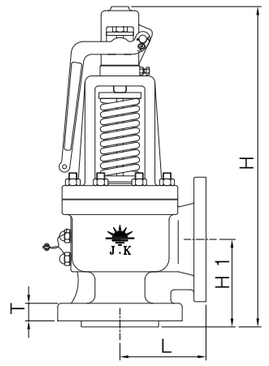
Metric Units

Size	Connections ASME Flanges		Maximum Set Pressure. (Bar)				Standard Materials	
	Inlet	Outlet	400℃	500℃	538℃	604℃	Body / Bonnet	Spring
8 × 10	300	150	30				Carbon Steel	Carbon Steel
8 × 12	600	150	60					
8 × 12	900	150	100					
8 × 10	300	150		25	18	14	Chrome Moly Steel	Stainless Steel or Alloy Steel
8 × 12	600	150		50	36	29		
8 × 12	900	150		75	55	43		

06 Dimension

Safety Relief Vlave Dimension	L [in]	H1 [in]	H [in]	T [in]	L [in]	H1 [in]	H [in]	T [in]
Flange Rating Class	300 × 150				600 × 150			
Valve Size	1 F 2				1 F 2			
F	4	4	14 2/3	6/7	7 5/7	4	16 2/3	1
Valve Size	1 1/2 G 1 1/2				1 1/2 G 3			
G	4 5/7	4 2/3	17 5/9	9 4/9	6 1/7	5 1/2	25 5/6	1 1/9
Valve Size	1 1/2 H 1 1/2				1 1/2 H 3			
H	4 5/7	4 2/3	17 5/9	1	6 1/7	5 1/2	25 5/6	1 1/9
Valve Size	2 J 3				2 J 4			
J	5 1/4	5 1/9	21 3/8	1	7 1/8	6	27 7/8	1 1/6
Valve Size	2 1/2 L 4				2 1/2 L 6			
L	6	6	24	1 1/6	8 5/8	7 7/8	32 1/4	1 1/3
Valve Size	3 N 6				3 N 6			
N	6 7/8	6 4/9	27	1 1/8	8 1/4	7 1/3	35 5/8	1 2/5
Valve Size	4 P 6				4 P 8			
P	7 5/8	8	31	1 2/5	10 1/3	9	40 2/3	1 4/7
Valve Size	6 Q 8				6 Q 8			
Q	9 1/8	9	40 3/7	1 2/3	12	10	49 5/9	2
Valve Size	6 R 8				6 R 10			
R	10 5/8	8 4/7	46 1/2	1 3/7	14	11	56 2/3	2
Valve Size	8 T 10				8 T 12			
T	13 3/8	10 5/9	57	1 5/8	15 5/9	13	72 1/4	2 1/4

L [in]	H1 [in]	H [in]	T [in]	L [in]	H1 [in]	H [in]	T [in]	L [in]	H1 [in]	H [in]	T [in]
900 × 300				1500 × 300				2500 × 300			
1 F 2				1 1/2 F 3				1 1/2 F 3			
4 5/7	4 1/4	16 7/8	1 1/8	6 2/3	6 1/4	24	1 1/3	6 2/3	6 1/4	24	1 4/5
1 1/2 G 3				1 1/2 G 3				1 1/2 G 3			
6 1/7	5 2/3	29	1 1/4	6 7/8	4 1/2	26 4/5	1 1/3	6 7/8	4 1/2	26 4/5	1 4/5
1 1/2 H 3				2 H 3				2 H 3			
6 1/7	5 2/3	26	1 1/4	7 2/3	6 2/3	28 1/7	1 5/9	7 2/3	6 2/3	28 1/7	2
2 J 4				3 J 6				3 J 6			
7 1/8	6 2/5	28 1/6	1 1/2	9 4/9	9	36 1/2	2	9 4/9	9	36 1/2	2 2/3
2 1/2 L 6				3 L 6				3 L 6			
8 5/8	8 1/7	32 1/2	1 3/5	10 5/8	9	42 1/5	2	10 5/8	9	42 1/5	2 2/3
3 N 6				4 N 6				4 N 6			
8 1/4	7 4/9	35 5/7	1 1/2	12 1/3	9 5/6	46 2/9	2 1/6	12 1/3	9 5/6	46 2/9	3
4 P 8				4 P 8				4 P 8			
10 1/3	9 1/7	40 5/6	1 3/4	14 3/8	11	53 1/6	2 1/6	14 3/8	11	53 1/6	3
6 Q 8				6 Q 8							
12	10	51	2 1/4	13	11 2/5	55 8/9	3 1/3				
6 R 10				6 R 10							
14	11	63 8/9	2 1/4	14	12 1/2	65 3/7	3 1/3				
8 T 12											
15 5/9	13	72 1/4	2 5/9								



07 Steam Capacity (USC Units)

Set Pressure psig	Orifice Letter and Effective Area (in^2)														Set Pressure psig
	F	G	H	J	L	N	P	Q	R	T	V	W	Y	
API	0.75	0.95	1.18	1.5	1.93	2.4	2.99	3.74	4.53	5.91	7.09	8.43	9.84	API
Actual	0.44	0.70	1.10	1.76	2.92	4.53	7.03	10.99	16.10	27.40	39.45	55.75	76.10	Actual
15	624	993	1,561	2,497	4,143	6,427	9,973	15,591	22,841	38,872	55,967	79,092	107,962	15
28	880	1,400	2,201	3,521	5,841	9,062	14,063	21,985	32,208	54,813	78,919	111,527	152,237	28
43	1,176	1,870	2,939	4,702	7,802	12,103	18,783	29,363	43,016	73,207	105,402	148,952	203,323	43
57	1,451	2,309	3,628	5,805	9,631	14,941	23,187	36,249	53,103	90,374	130,119	183,882	251,003	57
71	1,730	2,751	4,324	6,918	11,478	17,806	27,633	43,198	63,284	107,701	155,066	219,137	299,126	71
85	2,013	3,203	5,034	8,054	13,362	20,729	32,170	50,291	73,674	125,384	180,525	255,115	348,237	85
100	2,318	3,687	5,794	9,271	15,381	23,862	37,030	57,890	84,807	144,329	207,802	293,662	400,856	100
114	2,602	4,139	6,504	10,407	17,265	26,785	41,567	64,982	95,197	162,012	233,261	329,640	449,967	114
128	2,886	4,591	7,214	11,542	19,150	29,709	46,104	72,074	105,587	179,694	258,720	365,618	499,077	128
142	3,170	5,042	7,924	12,678	21,034	32,632	50,641	79,167	115,977	197,377	284,179	401,596	548,188	142
156	3,454	5,494	8,634	13,814	22,919	35,555	55,178	86,259	126,367	215,059	309,638	437,574	597,299	156
171	3,758	5,978	9,394	15,031	24,938	38,688	60,038	93,858	137,499	234,005	336,915	476,122	649,918	171
185	4,042	6,430	10,104	16,167	26,822	41,611	64,575	100,950	147,889	251,687	362,374	512,100	699,028	185
199	4,326	6,882	10,814	17,303	28,707	44,534	69,112	108,043	158,279	269,369	387,833	548,078	748,139	199
213	4,610	7,333	11,524	18,438	30,591	47,458	73,649	115,135	168,669	287,052	413,292	584,056	797,250	213
228	4,914	7,817	12,285	19,655	32,610	50,590	78,510	122,734	179,801	305,997	440,569	622,604	849,869	228
242	5,198	8,269	12,994	20,791	34,494	53,513	83,046	129,826	190,191	323,680	466,028	658,582	898,979	242
256	5,482	8,721	13,704	21,927	36,379	56,437	87,583	136,919	200,582	341,362	491,487	694,560	948,090	256
270	5,766	9,173	14,414	23,063	38,263	59,360	92,120	144,011	210,972	359,045	516,946	730,538	997,201	270
284	6,050	9,624	15,124	24,199	40,148	62,284	96,657	151,103	221,362	376,727	542,405	766,516	1,046,312	284
299	6,354	10,108	15,885	25,415	42,167	65,416	101,518	158,702	232,494	395,673	569,682	805,064	1,098,931	299
313	6,638	10,560	16,595	26,551	44,051	68,339	106,054	165,795	242,884	413,355	595,141	841,042	1,148,041	313
327	6,922	11,012	17,304	27,687	45,935	71,263	110,591	172,887	253,274	431,038	620,600	877,020	1,197,152	327
341	7,206	11,464	18,014	28,823	47,820	74,186	115,128	179,979	263,664	448,720	646,059	912,998	1,246,263	341
356	7,510	11,948	18,775	30,040	49,839	77,318	119,989	187,578	274,796	467,666	673,336	951,546	1,298,882	356
370	7,794	12,399	19,485	31,176	51,723	80,242	124,525	194,671	285,186	485,348	698,795	987,524	1,347,992	370
384	8,078	12,851	20,195	32,311	53,608	83,165	129,062	201,763	295,576	503,031	724,254	1,023,502	1,397,103	384
398	8,362	13,303	20,905	33,447	55,492	86,089	133,599	208,855	305,966	520,713	749,713	1,059,480	1,446,214	398
412	8,646	13,755	21,614	34,583	57,376	89,012	138,136	215,948	316,356	538,396	775,172	1,095,458	1,495,325	412
427	8,950	14,239	22,375	35,800	59,395	92,144	142,997	223,547	327,489	557,341	802,449	1,134,006	1,547,944	427
569	11,830	18,821	29,575	47,320	78,509	121,796	189,013	295,483	432,874	736,692				569
711	14,710	23,403	36,775	58,841	97,622	151,448	235,028	367,420	538,259	916,042				711
853	17,590	27,984	43,976	70,361	116,735	181,100	281,044	439,357	643,643	1,095,393				853
996	20,491	32,599	51,227	81,962	135,983	210,960	327,384	511,800	749,771	1,276,007				996
1138	23,371	37,181	58,427	93,483	155,097	240,612	373,400	583,737	855,155	1,455,358				1138
1280	26,251	41,763	65,627	105,003	174,210	270,264	419,416	655,673	960,540	1,634,708				1280
1422	29,131	46,345	72,827	116,524	193,323	299,916	465,432	727,610	1,065,925	1,814,059				1422
1565	32,004	50,916	80,011	128,017	212,392	329,499	511,341	799,380	1,171,066					1565
1707	35,166	55,946	87,916	140,665	233,376	362,052	561,860	878,357	1,286,764					1707
1849	38,407	61,101	96,016	153,626	254,880	395,413	613,631	959,290	1,405,329					1849
1991	41,738	66,401	104,344	166,951	276,987	429,710	666,856	1,042,496	1,527,224					1991
2134	45,200	71,909	113,001	180,801	299,965	465,357	722,176							2134
2276	48,765	77,580	121,912	195,059	323,621	502,056	779,128							2276
2418	52,480	83,490	131,199	209,918	348,273	540,301	838,480							2418
2560	56,375	89,688	140,939	225,502	374,128	580,411	900,726							2560
2702	60,493	96,238	151,231	241,970	401,451	622,798	966,506							2702
2845	64,916	103,275	162,289	259,663	430,804	668,336	1,037,175							2845
2987	69,654	110,814	174,136	278,618	462,252	717,124	1,112,888							2987
3200	77,636	123,512	194,090	310,543	515,220									3200

08 Steam Capacities (Metric Units)

Set Pressure Bar	Orifice Letter and Effective Area (mm^2)														Set Pressure Bar
	F	G	H	J	L	N	P		Q	R	T	V	W	Y	
API	19	24	30	38	49	61	76		95	115	150	180	214	250	API
Actual	283.2	452.3	706.5	1134.2	1885.2	2923.2	4536.1		7087.7	10389.0	17674.2	25449.6	35966.4	49082.5	Actual
1.055	282	450	704	1,129	1,877	2,911	4,517		7,058	10,345	17,599	25,342	35,814	48,874	1.055
2	402	642	1,002	1,609	2,674	4,147	6,435		10,054	14,737	25,072	36,102	51,020	69,626	2
3	528	844	1,318	2,116	3,518	5,455	8,464		13,225	19,385	32,979	47,488	67,112	91,586	3
4	655	1,046	1,634	2,624	4,361	6,762	10,494		16,396	24,034	40,887	58,874	83,203	113,546	4
5	783	1,251	1,953	3,136	5,212	8,082	12,542		19,597	28,725	48,868	70,366	99,444	135,709	5
6	914	1,459	2,279	3,659	6,081	9,429	14,632		22,863	33,512	57,012	82,094	116,018	158,328	6
7	1,044	1,667	2,605	4,181	6,950	10,777	16,723		26,129	38,300	65,157	93,822	132,593	180,946	7
8	1,175	1,876	2,930	4,704	7,819	12,124	18,813		29,395	43,087	73,302	105,550	149,167	203,565	8
9	1,305	2,084	3,256	5,227	8,687	13,471	20,903		32,662	47,875	81,447	117,277	165,741	226,183	9
10	1,436	2,293	3,581	5,749	9,556	14,818	22,994		35,928	52,662	89,591	129,005	182,315	248,802	10
11	1,566	2,501	3,907	6,272	10,425	16,165	25,084		39,194	57,450	97,736	140,733	198,890	271,420	11
12	1,697	2,710	4,232	6,795	11,294	17,512	27,174		42,460	62,237	105,881	152,461	215,464	294,038	12
13	1,827	2,918	4,558	7,317	12,162	18,859	29,265		45,726	67,025	114,026	164,189	232,038	316,657	13
14	1,958	3,126	4,884	7,840	13,031	20,206	31,355		48,993	71,812	122,170	175,917	248,612	339,275	14
15	2,088	3,335	5,209	8,363	13,900	21,553	33,445		52,259	76,600	130,315	187,644	265,187	361,894	15
16	2,219	3,543	5,535	8,885	14,769	22,900	35,536		55,525	81,387	138,460	199,372	281,761	384,512	16
17	2,349	3,752	5,860	9,408	15,637	24,247	37,626		58,791	86,175	146,604	211,100	298,335	407,131	17
18	2,480	3,960	6,186	9,931	16,506	25,595	39,717		62,057	90,963	154,749	222,828	314,909	429,749	18
19	2,610	4,169	6,511	10,453	17,375	26,942	41,807		65,324	95,750	162,894	234,556	331,484	452,368	19
20	2,741	4,377	6,837	10,976	18,244	28,289	43,897		68,590	100,538	171,039	246,284	348,058	474,986	20
21	2,871	4,585	7,163	11,499	19,112	29,636	45,988		71,856	105,325	179,183	258,011	364,632	497,605	21
22	3,002	4,794	7,488	12,021	19,981	30,983	48,078		75,122	110,113	187,328	269,739	381,206	520,223	22
23	3,132	5,002	7,814	12,544	20,850	32,330	50,168		78,388	114,900	195,473	281,467	397,781	542,842	23
24	3,263	5,211	8,139	13,067	21,719	33,677	52,259		81,655	119,688	203,618	293,195	414,355	565,460	24
25	3,393	5,419	8,465	13,589	22,587	35,024	54,349		84,921	124,475	211,762	304,923	430,929	588,079	25
26	3,524	5,628	8,790	14,112	23,456	36,371	56,439		88,187	129,263	219,907	316,651	447,503	610,697	26
27	3,654	5,836	9,116	14,635	24,325	37,718	58,530		91,453	134,050	228,052	328,378	464,078	633,316	27
28	3,785	6,044	9,442	15,157	25,194	39,065	60,620		94,719	138,838	236,197	340,106	480,652	655,934	28
29	3,915	6,253	9,767	15,680	26,062	40,412	62,710		97,986	143,625	244,341	351,834	497,226	678,553	29
30	4,046	6,461	10,093	16,203	26,931	41,760	64,801		101,252	148,413	252,486	363,562	513,800	701,171	30
40	5,351	8,546	13,348	21,429	35,619	55,230	85,704		133,914	196,288	333,933				40
50	6,656	10,630	16,604	26,656	44,306	68,701	106,608		166,576	244,163	415,381				50
60	7,961	12,714	19,860	31,883	52,994	82,172	127,511		199,238	292,038	496,828				60
70	9,266	14,799	23,116	37,109	61,681	95,643	148,415		231,900	339,914	578,275				70
80	10,571	16,883	26,371	42,336	70,369	109,114	169,318		264,562	387,789	659,723				80
90	11,876	18,967	29,627	47,563	79,056	122,585	190,222		297,224	435,664	741,170				90
100	13,181	21,052	32,883	52,790	87,744	136,056	211,125		329,886	483,539	822,617				100
110	14,512	23,177	36,202	58,119	96,601	149,790	232,438		363,187	532,352					110
120	15,956	25,484	39,806	63,903	106,216	164,700	255,574		399,337	585,339					120
130	17,439	27,852	43,505	69,843	116,088	180,007	279,327		436,452	639,742					130
140	18,967	30,293	47,318	75,963	126,261	195,780	303,804		474,696	695,799					140
150	20,549	32,818	51,263	82,296	136,788	212,103	329,133								150
160	22,193	35,445	55,366	88,884	147,737	229,082	355,480								160
170	23,915	38,195	59,660	95,778	159,196	246,850	383,052								170
180	25,730	41,093	64,188	103,046	171,276	265,582	412,118								180
190	27,660	44,176	69,003	110,776	184,125	285,505	443,035								190
200	29,735	47,490	74,181	119,088	197,941	306,928	476,278								200
210	31,997	51,102	79,823	128,146	212,996	330,273	512,504								210
220	34,503	55,104	86,074	138,181	229,677										220

09 Super Heat Correction Factor, K_{SH} (USC Units)

Flowing Pressure (psia)	SUPERHEAT CORRECTION FACTOR, K_{SH} Total Temperature, °F, of Superheated Steam										SUPERHEAT CORRECTION FACTOR, K_{SH} Total Temperature, °F, of Superheated Steam								Flowing Pressure (psia)
	400	450	500	550	600	650	700	750	800		850	900	950	1000	1050	1100	1150	1200	
50	0.987	0.957	0.930	0.905	0.882	0.861	0.841	0.823	0.805		0.789	0.774	0.759	0.745	0.732	0.719	0.708	0.696	50
100	0.998	0.963	0.935	0.909	0.885	0.864	0.843	0.825	0.807		0.790	0.775	0.760	0.746	0.733	0.720	0.708	0.697	100
150	0.984	0.970	0.940	0.913	0.888	0.866	0.846	0.826	0.808		0.792	0.776	0.761	0.747	0.733	0.721	0.709	0.697	150
200	0.979	0.977	0.945	0.917	0.892	0.869	0.848	0.828	0.810		0.793	0.777	0.762	0.748	0.734	0.721	0.709	0.698	200
250	...	0.972	0.951	0.921	0.895	0.871	0.850	0.830	0.812		0.794	0.778	0.763	0.749	0.735	0.722	0.710	0.698	250
300	...	0.968	0.957	0.926	0.898	0.874	0.852	0.832	0.813		0.796	0.780	0.764	0.750	0.736	0.723	0.710	0.699	300
350	...	0.968	0.963	0.930	0.902	0.877	0.854	0.834	0.815		0.797	0.781	0.765	0.750	0.736	0.723	0.711	0.699	350
400	...	...	0.963	0.935	0.906	0.880	0.857	0.836	0.816		0.798	0.782	0.766	0.751	0.737	0.724	0.712	0.700	400
450	...	...	0.961	0.940	0.909	0.883	0.859	0.838	0.818		0.800	0.783	0.767	0.752	0.738	0.725	0.712	0.700	450
500	...	...	0.961	0.946	0.914	0.886	0.862	0.840	0.820		0.801	0.784	0.768	0.753	0.739	0.725	0.713	0.701	500
550	...	...	0.962	0.952	0.918	0.889	0.864	0.842	0.822		0.803	0.785	0.769	0.754	0.740	0.726	0.713	0.701	550
600	...	...	0.964	0.958	0.922	0.892	0.867	0.844	0.823		0.804	0.787	0.770	0.755	0.740	0.727	0.714	0.702	600
650	...	...	0.968	0.958	0.927	0.896	0.869	0.846	0.825		0.806	0.788	0.771	0.756	0.741	0.728	0.715	0.702	650
700	...	...	...	0.958	0.931	0.899	0.872	0.848	0.827		0.807	0.789	0.772	0.757	0.742	0.728	0.715	0.703	700
750	...	...	...	0.958	0.936	0.903	0.875	0.850	0.828		0.809	0.790	0.774	0.758	0.743	0.729	0.716	0.703	750
800	...	...	...	0.960	0.942	0.906	0.878	0.852	0.830		0.810	0.792	0.774	0.759	0.744	0.730	0.716	0.704	800
850	...	...	...	0.962	0.947	0.910	0.880	0.855	0.832		0.812	0.793	0.776	0.760	0.744	0.730	0.717	0.704	850
900	...	...	...	0.965	0.953	0.914	0.883	0.857	0.834		0.813	0.794	0.777	0.760	0.745	0.731	0.718	0.705	900
950	...	...	...	0.969	0.958	0.918	0.886	0.860	0.836		0.815	0.796	0.778	0.761	0.746	0.732	0.718	0.705	950
1000	...	...	...	0.974	0.959	0.923	0.890	0.862	0.838		0.816	0.797	0.779	0.762	0.747	0.732	0.719	0.706	1000
1050	...	...	...	...	0.960	0.927	0.893	0.864	0.840		0.818	0.798	0.780	0.763	0.748	0.733	0.719	0.707	1050
1100	...	...	...	...	0.962	0.931	0.896	0.867	0.842		0.820	0.800	0.781	0.764	0.749	0.734	0.720	0.707	1100
1150	...	...	...	...	0.964	0.936	0.899	0.870	0.844		0.821	0.801	0.782	0.765	0.749	0.735	0.721	0.708	1150
1200	...	...	...	...	0.966	0.941	0.903	0.872	0.846		0.823	0.802	0.784	0.766	0.750	0.735	0.721	0.708	1200
1250	...	...	...	...	0.969	0.946	0.906	0.875	0.848		0.825	0.804	0.785	0.767	0.751	0.736	0.722	0.709	1250
1300	...	...	...	...	0.973	0.952	0.910	0.878	0.850		0.826	0.805	0.786	0.768	0.752	0.737	0.723	0.709	1300
1350	...	...	...	...	0.977	0.958	0.914	0.880	0.852		0.828	0.807	0.787	0.769	0.753	0.737	0.723	0.710	1350
1400	...	...	...	...	0.982	0.963	0.918	0.883	0.854		0.830	0.808	0.788	0.770	0.754	0.738	0.724	0.710	1400
1450	...	...	...	...	0.987	0.968	0.922	0.886	0.857		0.832	0.809	0.790	0.771	0.754	0.739	0.724	0.711	1450
1500	...	...	...	...	0.993	0.970	0.926	0.889	0.859		0.833	0.811	0.791	0.772	0.755	0.740	0.725	0.711	1500
1550	...	...	...	...	...	0.972	0.930	0.892	0.861		0.835	0.812	0.792	0.773	0.756	0.740	0.726	0.712	1550
1600	...	...	...	...	...	0.973	0.934	0.894	0.863		0.836	0.813	0.792	0.774	0.756	0.740	0.726	0.712	1600
1650	...	...	...	...	...	0.973	0.936	0.895	0.863		0.836	0.812	0.791	0.772	0.755	0.739	0.724	0.710	1650
1700	...	...	...	...	...	0.973	0.938	0.895	0.863		0.835	0.811	0.790	0.771	0.754	0.738	0.723	0.709	1700
1750	...	...	...	...	...	0.974	0.940	0.896	0.862		0.835	0.810	0.789	0.770	0.752	0.736	0.721	0.707	1750
1800	...	...	...	...	...	0.975	0.942	0.897	0.862		0.834	0.810	0.788	0.768	0.751	0.735	0.720	0.705	1800
1850	...	...	...	...	...	0.976	0.944	0.897	0.862		0.833	0.809	0.787	0.767	0.749	0.733	0.718	0.704	1850
1900	...	...	...	...	...	0.977	0.946	0.898	0.862		0.832	0.807	0.785	0.766	0.748	0.731	0.716	0.702	1900
1950	...	...	...	...	...	0.979	0.949	0.898	0.861		0.832	0.806	0.784	0.764	0.746	0.729	0.714	0.700	1950
2000	...	...	...	...	...	0.982	0.952	0.899	0.861		0.831	0.805	0.782	0.762	0.744	0.728	0.712	0.698	2000
2050	...	...	...	...	...	0.985	0.954	0.899	0.860		0.830	0.804	0.781	0.761	0.742	0.726	0.710	0.696	2050
2100	...	...	...	...	...	0.988	0.956	0.900	0.860		0.828	0.802	0.779	0.759	0.740	0.724	0.708	0.694	2100
2150	...	...	...	...	...	...	0.956	0.900	0.859		0.827	0.801	0.778	0.757	0.738	0.722	0.706	0.692	2150
2200	...	...	...	...	...	...	0.955	0.901	0.859		0.826	0.799	0.776	0.755	0.736	0.720	0.704	0.690	2200
2250	...	...	...	...	...	...	0.954	0.901	0.858		0.825	0.797	0.774	0.753	0.734	0.717	0.702	0.687	2250
2300	...	...	...	...	...	...	0.953	0.901	0.857		0.823	0.795	0.772	0.751	0.732	0.715	0.699	0.685	2300
2350	...	...	...	...	...	...	0.952	0.902	0.856		0.822	0.794	0.769	0.748	0.729	0.712	0.697	0.682	2350
2400	...	...	...	...	...	...	0.952	0.902	0.855		0.820	0.791	0.767	0.746	0.727	0.710	0.694	0.679	2400
2450	...	...	...	...	...	...	0.951	0.902	0.854		0.818	0.789	0.765	0.743	0.724	0.707	0.691	0.677	2450
2500	...	...	...	...	...	...	0.951	0.902	0.852		0.816	0.787	0.762	0.740	0.721	0.704	0.688	0.674	2500
2550	...	...	...	...	...	...	0.951	0.902	0.851		0.814	0.784	0.759	0.738	0.718	0.701	0.685	0.671	2550
2600	...	...	...	...	...	...	0.951	0.903	0.849		0.812	0.782	0.756	0.735	0.715	0.698	0.682	0.664	2600
2650	...	...	...	...	...	...	0.952	0.903	0.848		0.809	0.779	0.754	0.731	0.712	0.695	0.679	0.664	2650
2700	...	...	...	...	...	...	0.952	0.903	0.846		0.807	0.776	0.750	0.728	0.708	0.691	0.675	0.661	2700
2750	...	...	...	...	...	...	0.953	0.903	0.844		0.804	0.773	0.747	0.724	0.705	0.687	0.671	0.657	2750
2800	...	...	...	...	...	...	0.956	0.903	0.842		0.801	0.769	0.743	0.721	0.701	0.684	0.668	0.653	2800
2850	...	...	...	...	...	...	0.959	0.902	0.839		0.798	0.766	0.739	0.717	0.697	0.679	0.663	0.649	2850
2900	...	...	...	...	...	...	0.963	0.902	0.836		0.794	0.762	0.735	0.713	0.693	0.675	0.659	0.645	2900
2950	...	...	...	...	...	...	...	0.902	0.834		0.790	0.758	0.731	0.708	0.688	0.671	0.655	0.640	2950
3000	...	...	...	...	...	...	...	0.901	0.831		0.786	0.753	0.726	0.704	0.684	0.666	0.650	0.635	3000
3050	...	...	...	...	...	...	...	0.899	0.827		0.782	0.749	0.722	0.699	0.679	0.661	0.645	0.630	3050
3100	...	...	...	...	...	...	...	0.896	0.823		0.777	0.744	0.716	0.693	0.673	0.656	0.640	0.625	3100
3150	...	...	...	...	...	...	...	0.894	0.819		0.772	0.738	0.711	0.688	0.668	0.650	0.634	0.620	3150
3200	...	...	...	...	...	...	...	0.889	0.815		0.767	0.733	0.705	0.682	0.662	0.644	0.628	0.614	3200

10 Super Heat Correction Factor, Ksh (Metric Units)

Flowing Pressure (Mpa)	SUPERHEAT CORRECTION FACTOR, Ksh Total Temperature , ˚C, of Superheated Steam										SUPERHEAT CORRECTION FACTOR, Ksh Total Temperature , ˚C, of Superheated Steam										Flowing Pressure (Mpa)
	205	225	250	275	300	325	350	375	400		425	450	475	500	525	550	575	600	625		
0.50	0.991	0.968	0.942	0.919	0.896	0.876	0.857	0.839	0.823		0.807	0.792	0.778	0.765	0.752	0.740	0.728	0.717	0.706		0.50
0.75	0.995	0.972	0.946	0.922	0.899	0.878	0.859	0.841	0.824		0.808	0.793	0.779	0.766	0.753	0.740	0.729	0.717	0.707		0.75
1.00	0.985	0.973	0.950	0.925	0.902	0.880	0.861	0.843	0.825		0.809	0.794	0.780	0.766	0.753	0.741	0.729	0.718	0.707		1.00
1.25	0.981	0.976	0.954	0.928	0.905	0.883	0.863	0.844	0.827		0.810	0.795	0.781	0.767	0.754	0.741	0.729	0.718	0.707		1.25
1.50	...	...	0.957	0.932	0.907	0.885	0.865	0.846	0.828		0.812	0.796	0.782	0.768	0.755	0.742	0.730	0.718	0.708		1.50
1.75	...	...	0.959	0.935	0.910	0.887	0.866	0.847	0.829		0.813	0.797	0.782	0.769	0.756	0.743	0.731	0.719	0.708		1.75
2.00	...	...	0.960	0.939	0.913	0.889	0.868	0.849	0.831		0.814	0.798	0.784	0.769	0.756	0.744	0.731	0.720	0.708		2.00
2.25	...	...	0.963	0.943	0.916	0.892	0.870	0.850	0.832		0.815	0.799	0.785	0.770	0.757	0.744	0.732	0.720	0.709		2.25
2.50	...	...	...	0.946	0.919	0.894	0.872	0.852	0.834		0.816	0.800	0.785	0.771	0.757	0.744	0.732	0.720	0.710		2.50
2.75	...	...	...	0.948	0.922	0.897	0.874	0.854	0.835		0.817	0.801	0.786	0.772	0.758	0.745	0.733	0.721	0.710		2.75
3.00	...	...	...	0.949	0.925	0.899	0.876	0.855	0.837		0.819	0.802	0.787	0.772	0.759	0.746	0.733	0.722	0.710		3.00
3.25	...	...	...	0.951	0.929	0.902	0.879	0.857	0.838		0.820	0.803	0.788	0.773	0.759	0.746	0.734	0.722	0.711		3.25
3.50	...	...	...	0.953	0.933	0.905	0.881	0.859	0.840		0.822	0.804	0.789	0.774	0.760	0.747	0.734	0.722	0.711		3.50
3.75	...	...	...	0.956	0.936	0.908	0.883	0.861	0.841		0.823	0.806	0.790	0.775	0.761	0.748	0.735	0.723	0.711		3.75
4.00	...	...	...	0.959	0.940	0.910	0.885	0.863	0.842		0.824	0.807	0.791	0.776	0.762	0.748	0.735	0.723	0.712		4.00
4.25	...	...	...	0.961	0.943	0.913	0.887	0.864	0.844		0.825	0.808	0.792	0.776	0.762	0.749	0.736	0.724	0.713		4.25
4.50	...	...	...	...	0.944	0.917	0.890	0.866	0.845		0.826	0.809	0.793	0.777	0.763	0.749	0.737	0.725	0.713		4.50
4.75	...	...	...	...	0.946	0.919	0.892	0.868	0.847		0.828	0.810	0.793	0.778	0.764	0.750	0.737	0.725	0.713		4.75
5.00	...	...	...	...	0.947	0.922	0.894	0.870	0.848		0.829	0.811	0.794	0.779	0.765	0.751	0.738	0.725	0.714		5.00
5.25	...	...	...	...	0.949	0.926	0.897	0.872	0.850		0.830	0.812	0.795	0.780	0.765	0.752	0.738	0.726	0.714		5.25
5.50	...	...	...	...	0.952	0.930	0.899	0.874	0.851		0.831	0.813	0.797	0.780	0.766	0.752	0.739	0.727	0.714		5.50
5.75	...	...	...	...	0.954	0.933	0.902	0.876	0.853		0.833	0.815	0.798	0.782	0.767	0.753	0.739	0.727	0.715		5.75
6.00	...	...	...	...	0.957	0.937	0.904	0.878	0.855		0.834	0.816	0.798	0.783	0.768	0.753	0.740	0.727	0.716		6.00
6.25	...	...	...	...	0.960	0.940	0.907	0.880	0.856		0.836	0.817	0.799	0.783	0.768	0.754	0.740	0.728	0.716		6.25
6.50	...	...	...	...	0.964	0.944	0.910	0.882	0.859		0.837	0.818	0.801	0.784	0.769	0.754	0.741	0.729	0.716		6.50
6.75	...	...	...	...	0.966	0.946	0.913	0.885	0.860		0.839	0.819	0.802	0.785	0.769	0.755	0.742	0.729	0.717		6.75
7.00	...	...	...	...	...	0.947	0.916	0.887	0.862		0.840	0.820	0.802	0.786	0.770	0.756	0.742	0.729	0.717		7.00
7.25	...	...	...	...	...	0.949	0.919	0.889	0.863		0.842	0.822	0.803	0.787	0.771	0.756	0.743	0.730	0.717		7.25
7.50	...	...	...	...	...	0.951	0.922	0.891	0.865		0.843	0.823	0.805	0.788	0.772	0.757	0.744	0.730	0.718		7.50
7.75	...	...	...	...	...	0.953	0.925	0.893	0.867		0.844	0.824	0.806	0.788	0.772	0.758	0.744	0.731	0.719		7.75
8.00	...	...	...	...	...	0.955	0.928	0.896	0.869		0.846	0.825	0.806	0.789	0.773	0.758	0.744	0.732	0.719		8.00
8.25	...	...	...	...	...	0.957	0.932	0.898	0.871		0.847	0.827	0.807	0.790	0.774	0.759	0.745	0.732	0.719		8.25
8.50	...	...	...	...	...	0.960	0.935	0.901	0.873		0.849	0.828	0.809	0.791	0.775	0.760	0.746	0.732	0.720		8.50
8.75	...	...	...	...	...	0.963	0.939	0.903	0.875		0.850	0.829	0.810	0.792	0.776	0.760	0.746	0.733	0.721		8.75
9.00	...	...	...	...	...	0.966	0.943	0.906	0.877		0.852	0.830	0.811	0.793	0.776	0.761	0.747	0.734	0.721		9.00
9.25	...	...	...	...	...	0.970	0.947	0.909	0.879		0.853	0.832	0.812	0.794	0.777	0.762	0.747	0.734	0.721		9.25
9.50	...	...	...	...	...	0.973	0.950	0.911	0.881		0.855	0.833	0.813	0.795	0.778	0.763	0.748	0.734	0.722		9.50
9.75	...	...	...	...	...	0.977	0.954	0.914	0.883		0.857	0.834	0.814	0.796	0.779	0.763	0.749	0.735	0.722		9.75
10.00	...	...	...	...	...	0.981	0.957	0.917	0.885		0.859	0.836	0.815	0.797	0.780	0.764	0.749	0.735	0.722		10.00
10.25	...	...	...	...	...	0.984	0.959	0.920	0.887		0.860	0.837	0.816	0.798	0.780	0.764	0.750	0.736	0.723		10.25
10.50	...	...	...	...	...	...	0.961	0.923	0.889		0.862	0.838	0.817	0.799	0.781	0.765	0.750	0.737	0.723		10.50
10.75	...	...	...	...	...	...	0.962	0.925	0.891		0.863	0.839	0.818	0.799	0.782	0.766	0.751	0.737	0.724		10.75
11.00	...	...	...	...	...	...	0.963	0.928	0.893		0.865	0.840	0.819	0.780	0.782	0.766	0.751	0.737	0.724		11.00
11.25	...	...	...	...	...	...	0.964	0.930	0.893		0.865	0.840	0.819	0.799	0.781	0.765	0.750	0.736	0.723		11.25
11.50	...	...	...	...	...	...	0.964	0.931	0.894		0.865	0.840	0.818	0.798	0.780	0.764	0.749	0.735	0.722		11.50
11.75	...	...	...	...	...	...	0.965	0.932	0.894		0.865	0.839	0.817	0.797	0.780	0.763	0.748	0.734	0.721		11.75
12.00	...	...	...	...	...	...	0.966	0.933	0.894		0.864	0.839	0.817	0.797	0.779	0.762	0.747	0.733	0.719		12.00
12.25	...	...	...	...	...	...	0.967	0.935	0.895		0.864	0.839	0.816	0.796	0.778	0.761	0.746	0.732	0.718		12.25
12.50	...	...	...	...	...	...	0.967	0.936	0.896		0.864	0.838	0.816	0.796	0.777	0.760	0.745	0.731	0.717		12.50
12.75	...	...	...	...	...	...	0.968	0.937	0.896		0.864	0.838	0.815	0.795	0.776	0.759	0.744	0.729	0.716		12.75
13.00	...	...	...	...	...	...	0.969	0.939	0.896		0.864	0.837	0.814	0.794	0.775	0.758	0.743	0.728	0.715		13.00
13.25	...	...	...	...	...	...	0.971	0.940	0.897		0.864	0.837	0.813	0.792	0.774	0.757	0.741	0.727	0.713		13.25
13.50	...	...	...	...	...	...	0.972	0.942	0.897		0.863	0.837	0.813	0.792	0.773	0.756	0.740	0.725	0.712		13.50
14.00	...	...	...	...	...	...	0.976	0.946	0.897		0.863	0.835	0.811	0.790	0.771	0.753	0.737	0.723	0.709		14.00
14.25	...	...	...	...	...	...	0.978	0.947	0.898		0.862	0.834	0.810	0.789	0.770	0.752	0.736	0.721	0.707		14.25
14.50	...	...	...	...	...	...	0.000	0.948	0.898		0.862	0.833	0.809	0.787	0.768	0.751	0.734	0.720	0.706		14.50
14.75	...	...	...	...	...	...	...	0.948	0.898		0.862	0.832	0.808	0.786	0.767	0.749	0.733	0.719	0.704		14.75
15.00	...	...	...	...	...	...	...	0.948	0.899		0.861	0.832	0.807	0.785	0.766	0.748	0.732	0.717	0.703		15.00
15.25	...	...	...	...	...	...	...	0.947	0.899		0.861	0.831	0.806	0.784	0.764	0.746	0.730	0.716	0.702		15.25
15.50	...	...	...	...	...	...	...	0.947	0.899		0.861	0.830	0.804	0.782	0.763	0.745	0.728	0.714	0.700		15.50
15.75	...	...	...	...	...	...	...	0.946	0.899		0.860	0.829	0.803	0.781	0.761	0.743	0.727	0.712	0.698		15.75
16.00	...	...	...	...	...	...	...	0.945	0.900		0.859	0.828	0.802	0.779	0.759	0.741	0.725	0.710	0.696		16.00
16.25	...	...	...	...	...	...	...	0.945	0.900		0.859	0.827	0.801	0.778	0.757	0.739	0.723	0.708	0.694		16.25
16.50	...	...	...	...	...	...	...	0.945	0.900		0.858	0.826	0.799	0.776	0.756	0.738	0.721	0.706	0.692		16.50
16.75	...	...	...	...	...	...	...	0.944	0.900		0.857	0.825	0.797	0.774	0.754	0.736	0.719	0.704	0.690		16.75
17.00	...	...	...	...	...	...	...	0.944	0.900		0.856	0.823	0.796	0.773	0.752	0.734	0.717	0.702	0.688		17.00
17.25	...	...	...	...	...	...	...	0.944	0.900		0.855	0.822	0.794	0.771	0.750	0.732	0.715	0.700	0.686		17.25
17.50	...	...	...	...	...	...	...	0.944	0.900		0.854	0.820	0.792	0.769	0.748	0.730	0.713	0.698	0.684		17.50
17.75	...	...	...	...	...	...	...	0.944	0.900		0.853	0.819	0.791	0.767	0.746	0.728	0.711	0.696	0.681		17.75
18.00	...	...	...	...	...	...	...	0.944	0.901		0.852	0.817	0.789	0.765	0.744	0.725	0.709	0.694	0.679		18.00
18.25	...	...	...	...	...	...	...	0.945	0.901		0.851	0.815	0.787	0.763	0.742	0.723	0.706	0.691	0.677		18.25
18.50	...	...	...	...	...	...	...	0.945	0.901		0.850	0.814	0.785	0.761	0.739	0.720	0.704	0.689	0.674		18.50
18.75	...	...	...	...	...	...	...	0.945	0.901		0.849	0.812	0.783	0.758	0.737	0.718	0.701	0.686	0.671		18.75
19.00	...	...	...	...	...	...	...	0.946	0.901		0.847	0.810	0.781	0.756	0.734	0.715	0.698	0.683	0.669		19.00
19.25	...	...	...	...	...	...	...	0.948	0.901		0.846	0.808	0.778	0.753	0.732	0.713	0.696	0.681	0.666		19.25
19.50	...	...	...	...	...	...	...	0.950	0.900		0.844	0.806	0.776	0.750	0.729	0.710	0.693	0.677	0.663		19.50
19.75	...	...	...	...	...	...	...	0.952	0.899		0.842	0.803	0.773	0.748	0.726	0.707	0.690	0.674	0.660		19.75
20.00	...	...	...	...	...	...	...	...	0.899		0.840	0.801	0.770	0.745	0.723	0.704	0.687	0.671	0.657		20.00
20.25	...	...	...	...	...	...	...	...	0.899		0.839	0.798	0.767	0.742	0.720	0.701	0.683	0.668	0.654		20.25
20.50	...	...	...	...	...	...	...	...	0.899		0.837	0.795	0.764	0.738	0.717	0.697	0.680	0.665	0.651		20.50
20.75	...	...	...	...	...	...	...	...	0.898		0.834	0.792	0.761	0.735	0.713	0.694	0.677	0.661	0.647		20.75
21.00	...	...	...	...	...	...	...	...	0.896		0.832	0.790	0.758	0.732	0.710	0.691	0.673	0.658	0.643		21.00
21.25	...	...	...	...	...	...	...	...	0.894		0.829	0.786	0.754	0.728	0.706	0.686	0.669	0.654	0.640		21.25
21.50	...	...	...	...	...	...	...	...	0.892		0.826	0.783	0.750	0.724	0.702	0.682	0.665	0.650	0.636		21.50
21.75	...	...	...	...	...	...	...	...	0.891		0.823	0.779	0.746	0.720	0.698	0.679	0.661	0.646	0.631		21.75
22.00	...	...	...	...	...	...	...	...	0.887		0.820	0.776	0.730	0.716	0.694	0.674	0.657	0.641	0.627		22.00

11 Super Critical Correction Factor, Ksc (USC Units)

Flowing Pressure (psia)	SUPERCRITICAL CORRECTION FACTOR, Ksc Total Temperature , °F, of Supercritical Steam						SUPERCRITICAL CORRECTION FACTOR, Ksc Total Temperature , °F, of Supercritical Steam					Flowing Pressure (psia)
	750	800	850	900	950		1,000	1,050	1,100	1,150	1,200	
3,208.2	1.059	0.971	0.913	0.872	0.839		0.811	0.788	0.767	0.748	0.731	3,208.2
3,250	1.064	0.975	0.916	0.874	0.841		0.813	0.788	0.767	0.748	0.731	3,250
3,300	1.070	0.980	0.919	0.876	0.842		0.814	0.790	0.768	0.749	0.732	3,300
3,350	1.077	0.985	0.922	0.878	0.844		0.815	0.791	0.769	0.750	0.732	3,350
3,400	1.084	0.990	0.925	0.881	0.846		0.817	0.792	0.770	0.750	0.733	3,400
3,450	1.091	0.996	0.929	0.883	0.848		0.818	0.793	0.771	0.751	0.734	3,450
3,500	1.100	1.002	0.932	0.885	0.849		0.819	0.794	0.772	0.752	0.734	3,500
3,550	1.109	1.008	0.935	0.888	0.851		0.821	0.795	0.773	0.753	0.735	3,550
3,600	1.118	1.014	0.939	0.890	0.853		0.822	0.796	0.774	0.754	0.735	3,600
3,650	1.129	1.020	0.943	0.893	0.855		0.824	0.797	0.775	0.754	0.736	3,650
3,700	1.141	1.027	0.946	0.895	0.857		0.825	0.799	0.775	0.755	0.737	3,700
3,750	1.153	1.034	0.950	0.898	0.859		0.827	0.800	0.776	0.756	0.737	3,750
3,800	1.168	1.041	0.954	0.900	0.861		0.828	0.801	0.777	0.757	0.738	3,800
3,850	1.186	1.048	0.958	0.903	0.862		0.830	0.802	0.778	0.757	0.739	3,850
3,900	1.205	1.056	0.962	0.906	0.864		0.831	0.803	0.779	0.758	0.739	3,900
3,950	1.227	1.064	0.966	0.908	0.866		0.833	0.804	0.780	0.759	0.740	3,950
4,000	1.251	1.072	0.970	0.911	0.868		0.834	0.806	0.781	0.760	0.741	4,000
4,050	1.279	1.080	0.974	0.914	0.870		0.836	0.807	0.782	0.760	0.741	4,050
4,100	1.310	1.089	0.978	0.916	0.872		0.837	0.808	0.783	0.761	0.742	4,100
4,150	1.343	1.098	0.983	0.919	0.874		0.839	0.809	0.784	0.762	0.743	4,150
4,200	1.395	1.107	0.987	0.922	0.876		0.840	0.810	0.785	0.763	0.743	4,200
4,250	1.444	1.116	0.992	0.925	0.878		0.842	0.812	0.786	0.764	0.744	4,250
4,300	1.491	1.125	0.997	0.928	0.881		0.844	0.813	0.787	0.765	0.745	4,300
4,350	1.538	1.135	1.002	0.931	0.883		0.845	0.814	0.788	0.765	0.745	4,350
4,400	...	1.146	1.007	0.934	0.885		0.847	0.815	0.789	0.766	0.746	4,400
4,450	...	1.157	1.012	0.937	0.887		0.848	0.817	0.790	0.767	0.746	4,450
4,500	...	1.169	1.017	0.940	0.889		0.850	0.818	0.791	0.768	0.747	4,500
4,550	...	1.181	1.022	0.943	0.892		0.852	0.819	0.792	0.768	0.748	4,550
4,600	...	1.194	1.027	0.947	0.894		0.853	0.820	0.793	0.769	0.749	4,600
4,650	...	1.207	1.033	0.950	0.896		0.855	0.822	0.794	0.770	0.749	4,650
4,070	...	1.220	1.038	0.953	0.898		0.857	0.823	0.795	0.771	0.750	4,070
4,570	...	1.234	1.044	0.957	0.900		0.858	0.824	0.796	0.772	0.751	4,570
4,800	...	1.248	1.050	0.960	0.903		0.860	0.826	0.797	0.773	0.751	4,800
4,850	...	1.263	1.056	0.963	0.905		0.862	0.827	0.798	0.774	0.752	4,850
4,900	...	1.278	1.062	0.967	0.908		0.863	0.828	0.799	0.774	0.753	4,900
4,950	...	1.294	1.069	0.970	0.910		0.865	0.830	0.800	0.775	0.753	4,950
5,000	...	1.310	1.075	0.974	0.912		0.867	0.831	0.801	0.776	0.754	5,000
5,050	...	1.326	1.082	0.978	0.915		0.869	0.832	0.803	0.777	0.755	5,050
5,100	...	1.343	1.088	0.981	0.917		0.871	0.834	0.804	0.778	0.755	5,100
5,150	...	1.360	1.095	0.985	0.920		0.872	0.835	0.805	0.779	0.756	5,150
5,200	...	1.377	1.102	0.989	0.922		0.874	0.837	0.806	0.780	0.757	5,200
5,250	...	1.393	1.109	0.993	0.925		0.876	0.838	0.807	0.780	0.758	5,250
5,300	...	1.411	1.116	0.997	0.927		0.878	0.839	0.808	0.781	0.758	5,300
5,350	...	1.427	1.123	1.001	0.930		0.880	0.841	0.809	0.782	0.759	5,350
5,400	...	1.443	1.131	1.004	0.933		0.882	0.842	0.810	0.783	0.760	5,400
5,450	...	1.460	1.139	1.009	0.935		0.884	0.844	0.811	0.784	0.760	5,450
5,500	...	1.476	1.146	1.013	0.938		0.886	0.845	0.812	0.785	0.761	5,500
5,550	...	1.491	1.154	1.017	0.941		0.887	0.846	0.813	0.786	0.762	5,550
5,600	...	1.507	1.162	1.021	0.943		0.889	0.848	0.815	0.787	0.763	5,600
5,650	...	1.522	1.171	1.025	0.946		0.891	0.849	0.816	0.788	0.763	5,650
5,700	...	1.536	1.179	1.030	0.949		0.893	0.851	0.817	0.788	0.764	5,700
5,750	...	1.551	1.187	1.034	0.952		0.895	0.852	0.818	0.789	0.765	5,750
5,800	...	1.565	1.195	1.038	0.955		0.897	0.854	0.819	0.790	0.765	5,800
5,850	...	1.578	1.204	1.043	0.957		0.899	0.855	0.820	0.791	0.766	5,850
5,900	...	1.591	1.212	1.047	0.960		0.901	0.857	0.821	0.792	0.767	5,900
5,950	...	1.603	1.221	1.052	0.963		0.903	0.858	0.823	0.793	0.768	5,950
6,000	...	1.615	1.229	1.057	0.966		0.906	0.860	0.824	0.794	0.768	6,000

12 Super Critical Correction Factor, Ksc (Metric Units)

Flowing Pressure MPa	Supercritical Correction Factor, Ksc Total Temperature, °C, of Supercritical Steam												Flowing Pressure MPa
	400	425	450	475	500	525		550	575	600	625	650	
22.12	1.056	0.976	0.922	0.883	0.851	0.824		0.801	0.781	0.762	0.745	0.730	22.12
22.25	1.058	0.978	0.924	0.884	0.852	0.825		0.802	0.781	0.763	0.746	0.730	22.25
22.50	1.063	0.982	0.926	0.886	0.853	0.826		0.803	0.782	0.763	0.746	0.731	22.50
22.75	1.067	0.985	0.929	0.887	0.855	0.827		0.803	0.783	0.764	0.747	0.731	22.75
23.00	1.072	0.989	0.931	0.889	0.856	0.828		0.804	0.783	0.764	0.747	0.732	23.00
23.25	1.077	0.993	0.934	0.891	0.858	0.830		0.805	0.784	0.765	0.748	0.732	23.25
23.50	1.082	0.997	0.937	0.893	0.859	0.831		0.806	0.785	0.766	0.748	0.732	23.50
23.75	1.087	1.001	0.939	0.895	0.860	0.832		0.807	0.785	0.766	0.749	0.733	23.75
24.00	1.093	1.006	0.942	0.897	0.862	0.833		0.808	0.786	0.767	0.749	0.733	24.00
24.25	1.099	1.010	0.945	0.899	0.863	0.834		0.809	0.787	0.768	0.750	0.734	24.25
24.50	1.106	1.014	0.948	0.901	0.865	0.835		0.810	0.788	0.768	0.751	0.734	24.50
24.75	1.112	1.019	0.950	0.903	0.866	0.836		0.811	0.789	0.769	0.751	0.735	24.75
25.00	1.120	1.024	0.953	0.905	0.868	0.837		0.812	0.789	0.769	0.752	0.735	25.00
25.25	1.128	1.029	0.956	0.907	0.869	0.839		0.813	0.790	0.770	0.752	0.736	25.25
25.50	1.136	1.034	0.959	0.909	0.871	0.840		0.814	0.791	0.771	0.753	0.736	25.50
25.75	1.145	1.039	0.962	0.911	0.872	0.841		0.815	0.792	0.771	0.753	0.737	25.75
26.00	1.155	1.045	0.966	0.913	0.874	0.842		0.816	0.792	0.772	0.754	0.737	26.00
26.25	1.166	1.050	0.969	0.915	0.875	0.843		0.817	0.793	0.773	0.754	0.737	26.25
26.50	1.178	1.056	0.972	0.917	0.877	0.845		0.818	0.794	0.773	0.755	0.738	26.50
26.75	1.192	1.062	0.975	0.919	0.879	0.846		0.819	0.795	0.774	0.755	0.738	26.75
27.00	1.206	1.068	0.979	0.921	0.880	0.847		0.820	0.796	0.775	0.756	0.739	27.00
27.25	1.222	1.074	0.982	0.924	0.882	0.848		0.820	0.796	0.775	0.756	0.739	27.25
27.50	1.239	1.081	0.985	0.926	0.883	0.850		0.821	0.797	0.776	0.757	0.740	27.50
27.75	1.258	1.088	0.989	0.928	0.885	0.851		0.822	0.798	0.777	0.758	0.740	27.75
28.00	1.278	1.095	0.992	0.930	0.887	0.852		0.824	0.799	0.777	0.758	0.741	28.00
28.25	1.300	1.102	0.996	0.933	0.888	0.854		0.825	0.800	0.778	0.759	0.741	28.25
28.50	1.323	1.109	1.000	0.935	0.890	0.855		0.826	0.801	0.779	0.759	0.742	28.50
28.75	1.354	1.117	1.004	0.937	0.892	0.856		0.827	0.801	0.779	0.760	0.742	28.75
29.00	1.390	1.126	1.007	0.940	0.893	0.857		0.828	0.802	0.780	0.760	0.743	29.00
29.25	1.424	1.134	1.011	0.942	0.895	0.859		0.829	0.803	0.781	0.761	0.743	29.25
29.50	1.457	1.143	1.015	0.945	0.897	0.860		0.830	0.804	0.781	0.762	0.744	29.50
29.75	1.490	1.151	1.019	0.947	0.899	0.861		0.831	0.805	0.782	0.762	0.744	29.75
30.00	...	1.158	1.023	0.950	0.900	0.863		0.832	0.806	0.783	0.763	0.745	30.00
30.25	...	1.098	1.028	0.952	0.902	0.864		0.833	0.806	0.784	0.763	0.745	30.25
30.50	...	1.083	1.032	0.955	0.904	0.865		0.834	0.807	0.784	0.764	0.746	30.50
30.75	...	1.090	1.036	0.957	0.906	0.867		0.835	0.808	0.785	0.764	0.746	30.75
31.00	...	1.099	1.041	0.960	0.908	0.868		0.836	0.809	0.786	0.765	0.746	31.00
31.25	...	1.107	1.046	0.963	0.910	0.870		0.837	0.810	0.786	0.766	0.747	31.25
31.50	...	1.115	1.050	0.966	0.911	0.871		0.838	0.811	0.787	0.766	0.748	31.50
31.75	...	1.124	1.055	0.968	0.913	0.872		0.839	0.812	0.788	0.767	0.748	31.75
32.00	...	1.133	1.060	0.971	0.915	0.874		0.840	0.812	0.788	0.767	0.748	32.00
32.25	...	1.142	1.065	0.974	0.917	0.875		0.841	0.813	0.789	0.768	0.749	32.25
32.50	...	1.151	1.070	0.977	0.919	0.877		0.843	0.814	0.790	0.769	0.750	32.50
32.75	...	1.160	1.075	0.980	0.921	0.878		0.844	0.815	0.791	0.769	0.750	32.75
33.00	...	1.170	1.080	0.983	0.923	0.879		0.845	0.816	0.791	0.770	0.750	33.00
33.25	...	1.180	1.085	0.986	0.925	0.881		0.846	0.817	0.792	0.770	0.751	33.25
33.50	...	1.190	1.091	0.988	0.927	0.882		0.847	0.818	0.793	0.771	0.751	33.50
33.75	...	1.201	1.096	0.992	0.929	0.884		0.848	0.819	0.793	0.772	0.752	33.75
34.00	...	1.211	1.102	0.995	0.931	0.885		0.849	0.820	0.794	0.772	0.752	34.00
34.25	...	1.222	1.108	0.998	0.933	0.887		0.850	0.820	0.795	0.773	0.753	34.25
34.50	...	1.233	1.114	1.001	0.935	0.888		0.852	0.821	0.796	0.773	0.753	34.50
34.75	...	1.244	1.119	1.004	0.937	0.890		0.853	0.822	0.796	0.774	0.754	34.75
35.00	...	1.255	1.125	1.007	0.939	0.891		0.854	0.823	0.797	0.775	0.754	35.00
35.25	...	1.267	1.131	1.011	0.941	0.893		0.855	0.824	0.798	0.775	0.755	35.25
35.50	...	1.278	1.137	1.014	0.944	0.894		0.856	0.825	0.799	0.776	0.755	35.50
35.75	...	1.290	1.144	1.017	0.946	0.896		0.858	0.826	0.799	0.776	0.756	35.75
36.00	...	1.301	1.150	1.021	0.948	0.898		0.859	0.827	0.800	0.777	0.757	36.00
36.25	...	1.313	1.156	1.024	0.950	0.899		0.860	0.828	0.801	0.778	0.757	36.25
36.50	...	1.324	1.162	1.027	0.952	0.901		0.861	0.829	0.802	0.778	0.758	36.50
36.75	...	1.336	1.169	1.031	0.955	0.902		0.862	0.830	0.802	0.779	0.758	36.75
37.00	...	1.347	1.175	1.034	0.957	0.904		0.864	0.831	0.803	0.779	0.759	37.00
37.25	...	1.358	1.182	1.038	0.959	0.906		0.865	0.832	0.804	0.780	0.759	37.25
37.50	...	1.369	1.188	1.042	0.961	0.907		0.866	0.833	0.805	0.781	0.760	37.50
37.75	...	1.380	1.195	1.045	0.964	0.909		0.867	0.834	0.805	0.781	0.760	37.75
38.00	...	1.391	1.201	1.049	0.966	0.910		0.868	0.834	0.806	0.782	0.761	38.00
38.25	...	1.402	1.208	1.053	0.968	0.912		0.870	0.835	0.807	0.783	0.761	38.25
38.50	...	1.412	1.215	1.056	0.971	0.914		0.871	0.836	0.808	0.783	0.762	38.50
38.75	...	1.422	1.222	1.060	0.973	0.915		0.872	0.837	0.809	0.784	0.762	38.75
39.00	...	1.433	1.228	1.064	0.975	0.917		0.873	0.838	0.809	0.784	0.763	39.00
39.25	...	1.443	1.235	1.068	0.978	0.919		0.875	0.839	0.810	0.785	0.763	39.25
39.50	...	1.453	1.242	1.072	0.980	0.921		0.876	0.840	0.811	0.786	0.764	39.50
39.75	...	1.463	1.248	1.076	0.983	0.922		0.877	0.841	0.812	0.786	0.764	39.75
40.00	...	1.472	1.255	1.080	0.985	0.924		0.879	0.842	0.812	0.787	0.765	40.00
40.25	...	1.481	1.262	1.084	0.988	0.926		0.880	0.843	0.813	0.788	0.765	40.25
40.50	...	1.490	1.268	1.088	0.990	0.928		0.881	0.844	0.814	0.788	0.766	40.50
40.75	...	1.499	1.275	1.092	0.993	0.929		0.882	0.845	0.815	0.789	0.766	40.75
41.00	...	1.507	1.282	1.096	0.995	0.931		0.884	0.846	0.816	0.790	0.767	41.00
41.25	...	1.515	1.288	1.100	0.998	0.933		0.885	0.847	0.816	0.790	0.767	41.25

13 Technical Data

A Regulation Code, or Standard & Example

ASME Sec. I (POWER BOILER)	
PG ≤ 10.3 MPag	$W = 5.25\ A \cdot P_1 \cdot K_d \cdot K_{sh}$
10.3 < PG ≤ 22.1 MPag	$W = 5.25\ A \cdot P_1 \cdot K_d \cdot K_{sh} \cdot (27.6P\text{-}1{,}000/33.2P\text{-}1{,}061)$
22.1 MPag < PG	$W = 5.25\ A \cdot P_1 \cdot K_d \cdot K_{SC}$

Nomenclature

W = Steam discharge capacity (kg/hr)
A = Nozzle throat area (mm^2)
P = Set pressure*1.03 (MPa)
P_1 = Set pressure+0.014+0.101 or 1.03xset pressure+0.101 whichever is Larger (MPa)
K_d = Coefficient of discharge 0.869
K_{sh} = Superheated steam correction facotr
K_{sc} = Supercritical Correction Factor

Example #1

Set Pressure 3 MPa	3 MPa	$P_1 = 3+0.014+0.101=3.115$
Over Pressure	3 %	$P_1 = 3\times1.03+0.101=3.191$
Orifice	H	
Nozzle throat area	706.5 mm^2	
K_{sh}	1	$W = 5.25\times706.5\times(3\times1.03+0.101)\times0.869\times1$
K_d	0.869	$= 10{,}285.33$ (kg/hr)

Example #2

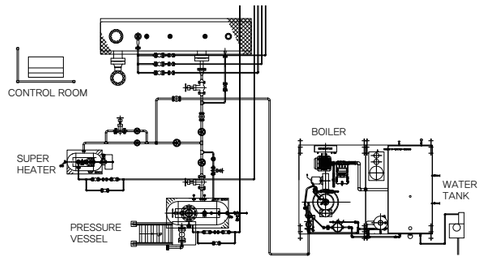
Set Pressure	11 MPa	$P_1 = 11+0.014+0.101=11.115$
Over Pressure	3 %	$P_1 = 11\times1.03+0.101=11.431$
Orifice	H	$P = 11\times1.03=11.33$
Nozzle throat area	706.5 mm^2	
K_{sh}	1	$W = 5.25\times706.5\times(11\times1.03+0.101)\times0.869\times1$
K_d	0.869	$\times\{(27.6P-1{,}000)/(33.2P-1{,}061)\}$
		$=36{,}976.44$ (kg/hr)

B Testing System of JOKWANG I.L.I

Our company carry out test according to ASME code by using equipment below.

Steam Test System

- Max. operating pressure : 225kgf/cm^2
- Max. operating temperature : 600℃

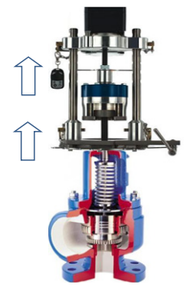


Testing With Auxiliary Lift-Assist Devices

This test system has the ability to test relief valves and identify those in need of adjustment or full service with no operational interruptions.

- Totally automated operation produces accurate, consistent, reproducible results within all ASME codes.
- Temperature compensated load and pressure sensors provide wide range of valve sizes and line pressures.
- Standard load rig allows for lift forces up to 4,500 kgf(10,000 lbf).

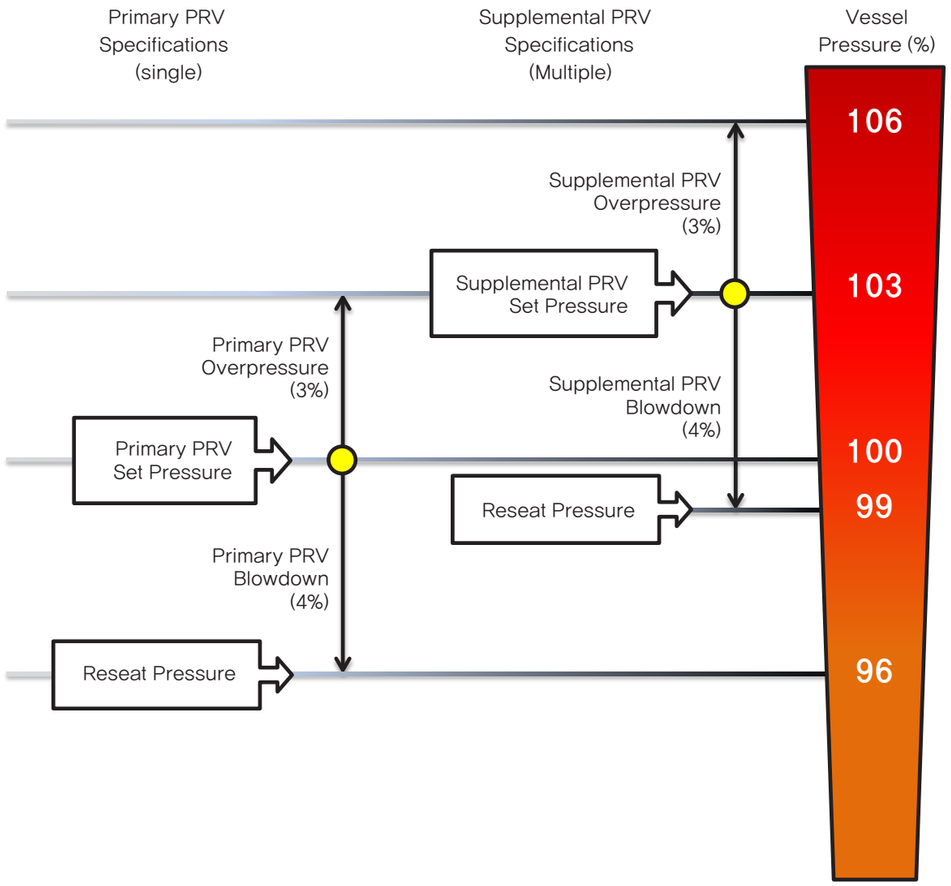
Force exerted against
Valve Spring



Essential Parameters:

1- Seat Area
2- Line Pressure
3- Set Pressure

C Single & Multiple Installation (by_ASME Sec.I)



D Noise (by_API STD 521 7.3.4.3.1-2007)

7.3.4.3.1 The noise level at 30m (100ft) from the point of discharge to the atmosphere can be approximated by Equation :

$$L_{30(100)} = L + 10Log(0.5qm \cdot c^2)$$

$c = 223\{(k \cdot T)/M\}^{0.5}$ [US Unit]

$c = 91.2(k \cdot T)/M\}^{0.5}$ [Metric Unit]

$L_{30(100)}$ = the noise level at 30m(100ft) from the point of discharge, expressed in decibels;

L = the noise level from Figure, expressed in decibels;

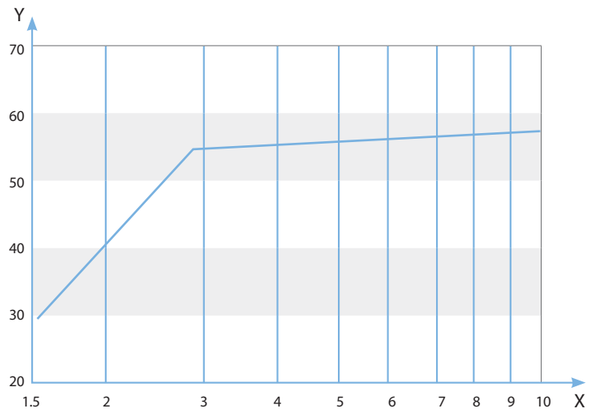
qm = the mass flow through the valve, expressed in kilograms persecond (pound per second)

c = the speed of sound in the gas at the valve, expressed in meters per second (feet per second)

k = the ratio of the specific heats in the gas

M = the relative molecular mass of the gas

T = the gas tamperature, expressed in kelvin (degrees rankin)



$$RP = \frac{\text{Absolute Relieving Pressure}}{\text{Absolute Back Pressure}}$$

X = pressure ratio, PR

Y = sound pressure level = L

E Reaction Force (by_API STD 520 5.8.2_6 edition)

The following formula is based on a condition of critical steady-state flow of a compressible fluid that discharges to the atmosphere through an elbow and a vertical discharge pipe.
The reaction force (F) includes the effects of both momentum and static pressure; thus, for any gas, vapor, or steam.

$$F = \frac{W}{366}\sqrt{\frac{kT}{(k+1)M}} + AP \qquad \text{[USC Units]}$$

$$F = 129W\sqrt{\frac{kT}{(k+1)M}} + 0.1\,(AP) \qquad \text{[Metric Units]}$$

F = reaction force at the point of discharge to the atmosphere, lbs [N]

k = flow of any gas or vapor, lbs [kg/s]

C_p = specific heat at constant pressure

C_v = specific heat at constant volume

T = temperature at the outlet, °R [°K]

M = molecular weight of the process fluid

A = area of the outlet at the point of discharge, in^2 [mm^2]

P = static pressure within the outlet at the point of discharge, psig [barg]

F Safety Valve Installation (by_ASME B31.1-2012)

An installation where the fluid is discharged directly to the atmosphere or to a vent pipe that is uncoupled from the safety valve. Figure 1 shows a typical open discharge installation with an elbow installed at the valve discharge to direct the flow into a vent pipe.
The values for '*l* ' and '*m*' on Figure 1 are upper limits for which the rules for open discharge systems may be used. '*l* ' shall be limited to a value less than or equal to 4Do ; '*m*' shall be limited to a value less than or equal 6Do.

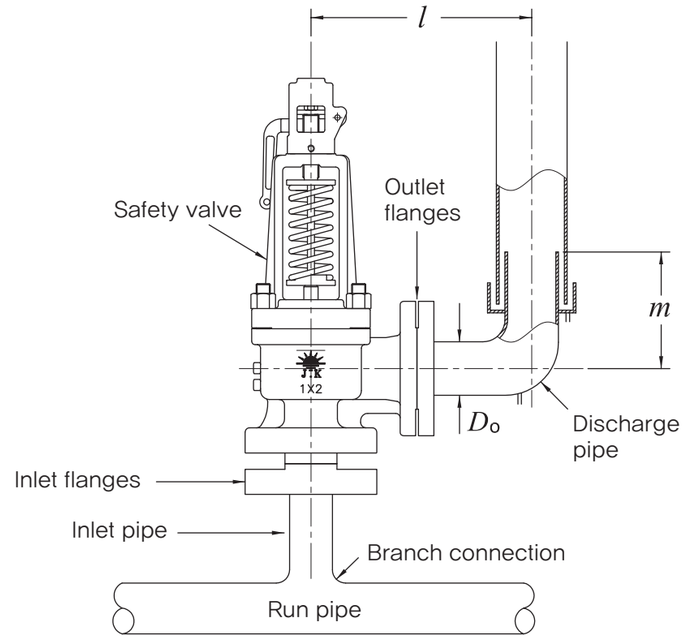


Figure 1

$l \le 4Do,\ m \le 6Do$

Memo