



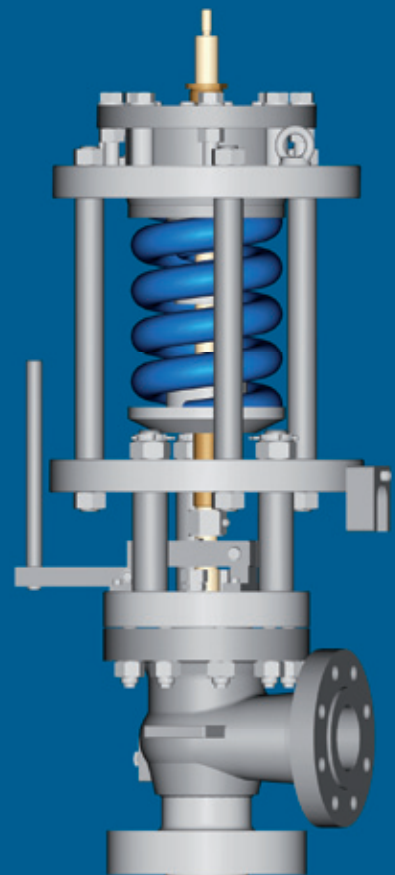
Safety Valves

Si 91/95

acc. ASME Sec. I, Sec. III and Sec. VIII

Type L

Type H



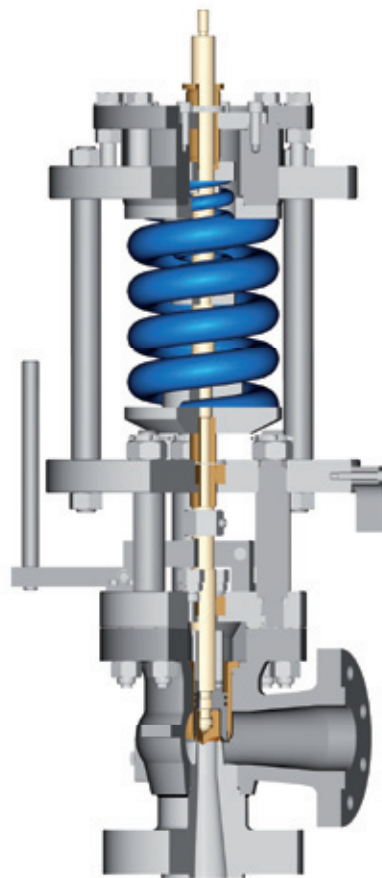


General

- Spring loaded Safety Valve
- Certified according to
 - ASME Code Sec. I (V-Stamp)
 - ASME Code Sec. III (NV-Stamp)
 - ASME Code Sec. VIII (UV-Stamp)
- NBBI (National Board of Boiler and Pressure Vessel Inspectors) certified capacity for steam
- PED 97/23/EC certified
- Overpressure 3 % of set pressure

Features and Benefits

- High capacity
- Without nozzle rings, this means no adjustment for blow down required
- Stable position of the disc by mechanical lift stop at full lift
- Optimized disc/spindle connection for high seat tightness
- Forged monoblock inlet nozzle for welding connection
- Special disk spring design for high pressures and large orifice diameters
- Hard faced seat areas on nozzle and disc
- Easy maintenance
- New setting after maintenance of the valve is not necessary because of an integrated locking device for the spring
- Locking possibility for hydrostatic test without valve disassembly
- Valve function is stable up to 25 % built up backpressure



Type Coding

Example

1	Product group	Si 9	Spring loaded safety valve, with bolting connection between body and bonnet
2	Main spring	1	Coil spring
		5	Belleville spring
3	Pressure class, Inlet × outlet	01	ASME class 150 × 150
		02	ASME class 300 × 150
		03	ASME class 600 × 150
		04	ASME class 900 × 300
		05	ASME class 1500 × 300
		06	ASME class 2500 × 600 up to orifice diameter 79 ASME class 1500 × 600 from orifice diameter 86
		07	ASME class 2500 × 600 up to orifice diameter 79 ASME class 1500 × 600 from orifice diameter 86
4	Type	H	Heavy with Intermediate piece
		L	Light with yoke
5	Options	.A	Lifting lever
		.B	Test gag
		.59	Disc hardfaced (option at type L)
6	Material code	00	SA-216 WCB up to 800 °F /427 °C
		01	SA-217 WC9 up to 1094 °F /590 °C
		31	body SA-217 WC9 nozzle SA-182 F91 up to 1094 °F /590 °C
		04	SA-217 C12A up to 1202 °F /650 °C
7	End connections	RF	Flanged, raised face
		BW	Butt weld end
			Other end connections on request

	Si 9
	1
	06
	H
	.A.B.59
	.00
	Class 2500 RF × class 600 RF

The example specifies a safety valve with a flanged 3" class 2500, an orifice diameter of 52 mm and a 4" class 600 flanged outlet. The valve has a coil spring, a lifting device and the valve is blockable for the hydrostatic test without any disassembling. The disc of the valve is hardfaced and the body material is SA-216 WCB.

Order code:

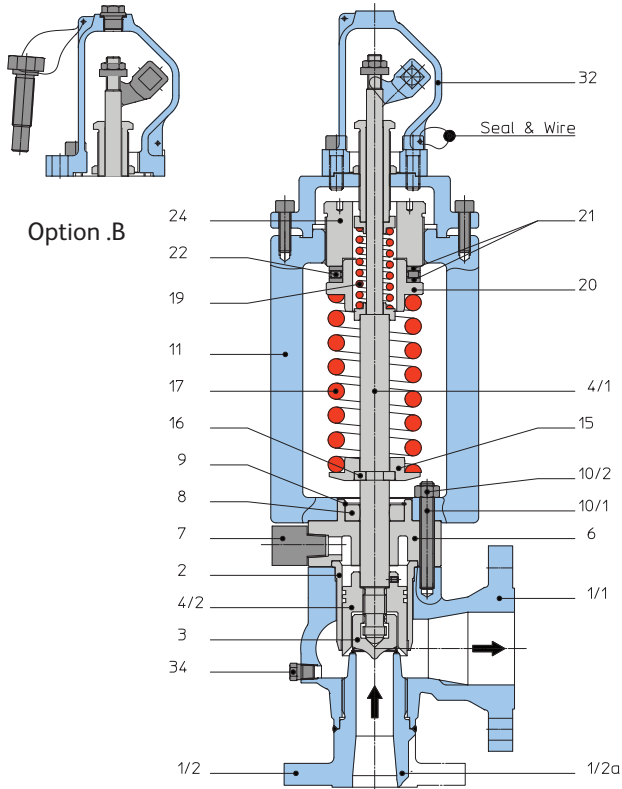
Please specify:

Si 9106 H.A.B.59 00

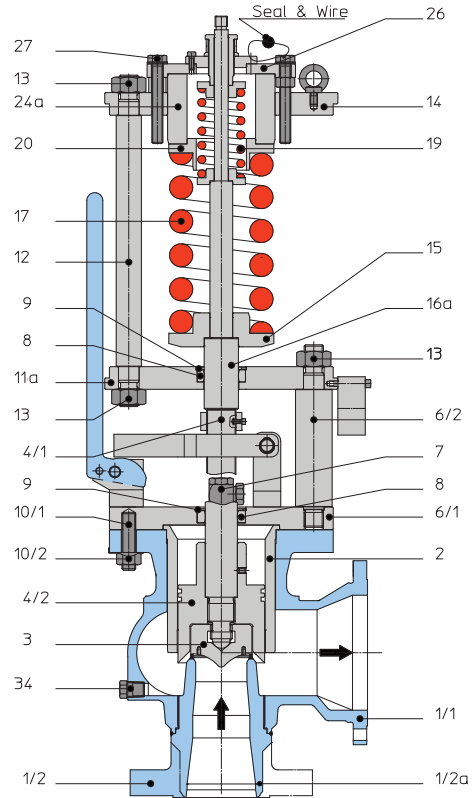
Orifice diameter 40 mm
Inlet size 3" RF
Outlet 4" RF
Set pressure 19MPa (g)
Temperature 362 °C
Medium Sat. Steam
Code stamp ASME I (V-Stamp)



Si 91.. Type L



Si 91.. Type H



Saturated Steam Capacity Calculation acc. ASME Sec. I

Capacity formula for USCS Units:

$$W = 51.5 \times A \times P$$

For pressures over 1500 psig and up to 3200 psig, the value W shall be multiplied by the correction factor:

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

where:

$$K = 0.826$$

$$A = \text{Flow area, in sq.in} = (d0/25,4)^2\pi/4$$

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

or:

$$P = (\text{set pressure} + 2 + 14.7)$$

whichever is greater, in psia.

Capacity formula for SI Units:

$$W = 5.25 \times A \times P$$

For pressures over 10.3 MPa and up to 22.1 MPa, the value W shall be multiplied by the correction factor:

$$\frac{27.6P - 1000}{33.2P - 1061}$$

where:

$$K = 0.826$$

$$A = \text{Flow area, in mm}^2 = d0^2\pi/4$$

$$P = (1.03 \times \text{set pressure} + 0.101)$$

or:

$$P = (\text{set pressure} + 0.014 + 0.101)$$

whichever is greater, in MPa.

Material Code			00	01	31	04
Pos.	Spares	Part name	800 °F / 427 °C	1094 °F / 590 °C	1094 °F / 590 °C	1202 °F / 620 °C
1/1		Body	Carbon steel SA-216 WCB	Alloy steel SA-217 WC9	Alloy steel SA-217 WC9	Alloy steel SA-217 C12A
1/2		Inlet nozzle (flanged)	Carbon steel SA-105 / HF ¹⁾	Alloy steel SA-182 F22 Cl.3 / HF ¹⁾	Alloy steel SA-182 F91 / HF ¹⁾	Alloy steel SA-182 F91 / HF ¹⁾
1/2a		Inlet nozzle (welded)	Carbon steel SA-105 / HF ¹⁾	Alloy steel SA-182 F22 Cl.3 / HF ¹⁾	Alloy steel SA-182 F91 / HF ¹⁾	Alloy steel SA-182 F91 / HF ¹⁾
2	*1	Guide bushing	Stainless steel	Stainless steel	Stainless steel	Stainless steel
3	*2	Disc	Stainless steel HF ¹⁾ optional	Stainless steel/HF ¹⁾	Stainless steel/HF ¹⁾	Stainless steel/HF ¹⁾
4/1	*3	Spindle	Stainless steel	Stainless steel	Stainless steel	Stainless steel
4/2	*3	Lifting collar	Stainless steel	Stainless steel	Stainless steel	Stainless steel
6		Intermediate piece (Type L)	Carbon steel SA-105	Alloy steel SA-182 F2203	Alloy steel SA-182 F2203	Alloy steel SA-182 F91
6/1		Intermediate bottom plate (Type H)	Steel	Steel	Steel	Steel
6/2		Intermediate column (Type H)	Steel	Stainless steel	Stainless steel	Stainless steel
7		Degasing connection	Stainless steel	Stainless steel	Stainless steel	Stainless steel
8	*1	Sliding bushing	Stainless steel	Stainless steel	Stainless steel	Stainless steel
9	*1	Circlip	Spring steel	Spring steel	Spring steel	Spring steel
10/1		Stud	Alloy steel SA-193 Gr. B7	Alloy steel SA-193 Gr. B16	Alloy steel SA-193 Gr. B16	Alloy steel SA-193 Gr. B16
10/2		Nut	Steel SA-194 Gr. 2H	Steel SA-194 Gr. 2H	Steel SA-194 Gr. 2H	Steel SA-194 Gr. 2H
11		Yoke (Type L)	Carbon steel SA-216 WCB	Carbon steel SA-216 WCB	Carbon steel SA-216 WCB	Carbon steel SA-216 WCB
11a		Yoke bottom plate (Type H)	Carbon steel SA-105	Carbon steel SA-105	Carbon steel SA-105	Carbon steel SA-105
12		Yoke column (Type H)	Stainless steel SA-479 Type 304	Stainless steel SA-479 Type 304	Stainless steel SA-479 Type 304	Stainless steel SA-479 Type 304
13		Nut (Type H)	Steel SA-194 Gr. 2H	Steel SA-194 Gr. 2H	Steel SA-194 Gr. 2H	Steel SA-194 Gr. 2H
14		Yoke top plate (Type H)	Carbon steel SA-105	Carbon steel SA-105	Carbon steel SA-105	Carbon steel SA-105
15		Spring washer	Carbon steel	Carbon steel	Carbon steel	Carbon steel
16	*1	Holding ring (Type L)	Stainless steel	Stainless steel	Stainless steel	Stainless steel
16a	*1	Bushing (Type H)	Stainless steel	Stainless steel	Stainless steel	Stainless steel
17	*3	Spring	Alloy steel Corrosion resist. coating	Alloy steel Corrosion resist. coating	Alloy steel Corrosion resist. coating	Alloy steel Corrosion resist. coating
19	*3	Spring	Alloy steel Corrosion resist. coating	Alloy steel Corrosion resist. coating	Alloy steel Corrosion resist. coating	Alloy steel Corrosion resist. coating
20		Spring washer	Steel	Steel	Steel	Steel
21	*3	Washer disc (Type L)	Steel	Steel	Steel	Steel
22	*3	Thrust bearing (Type L)	Steel	Steel	Steel	Steel
24		Adjusting screw	Steel	Steel	Steel	Steel
24a		Pressure ring (Type H)	Steel	Steel	Steel	Steel
26		Backing plate (Type H)	Steel	Steel	Steel	Steel
27		Screw (Type H)	Alloy steel SA-193 Gr. B7	Alloy steel SA-193 Gr. B7	Alloy steel SA-193 Gr. B7	Alloy steel SA-193 Gr. B7
32		Cap (Type L)	Cast iron	Cast iron	Cast iron	Cast iron
34		Drain plug	Stainless steel	Stainless steel	Stainless steel	Stainless steel

Notes: HF¹⁾ Part is hardfaced

Spares: *1 Expendable parts, should be replaced as part of any revision if a damage is visible.

*2 Rework spare parts, should be replaced if a rework is no longer possible.

*3 Long life spare parts, replacement may be required after several years of operation.



Valve Data: Maximum Set Pressure

Inlet size	Orifice diameter mm	Outlet size	Max. set pressure barg			Max. set pressure barg		Max. set pressure barg		Max. set pressure psig			Max. set pressure psig		Max. set pressure psig	
			Inlet Cl. 01	Inlet Cl. 02	Inlet Cl. 03	Inlet Cl. 04	Inlet Cl. 05	Inlet Cl. 06	Inlet Cl. 07	Inlet Cl. 01	Inlet Cl. 02	Inlet Cl. 03	Inlet Cl. 04	Inlet Cl. 05	Inlet Cl. 06	Inlet Cl. 07
1.5	20	2.5	20	50	90	130	180	300	...	290	725	1305	1885	2610	4351	...
1.5	20	3.0	20	50	90	130	180	300	...	290	725	1305	1885	2610	4351	...
1.5	25	2.5	20	50	90	130	180	300	...	290	725	1305	1885	2610	4351	...
1.5	25	3.0	20	50	90	130	180	300	...	290	725	1305	1885	2610	4351	...
1.5	32	2.5	20	50	90	130	160	300	...	290	725	1305	1885	2320	4351	...
1.5	32	3.0	20	50	90	130	160	300	...	290	725	1305	1885	2320	4351	...
2.0	36	3.0	20	50	90	120	150	250	...	290	725	1305	1740	2175	3625	...
2.0	40	3.0	20	50	90	120	150	250	...	290	725	1305	1740	2175	3625	...
2.5	45	4.0	20	50	90	110	130	200	330	290	725	1305	1595	1885	2900	4786
3.0	45	4.0	20	50	90	110	130	200	330	290	725	1305	1595	1885	2900	4786
2.5	52	4.0	20	50	90	100	110	200	330	290	725	1305	1450	1595	2900	4786
3.0	52	4.0	20	50	90	100	110	200	330	290	725	1305	1450	1595	2900	4786
3.0	58	6.0	20	50	85	100	110	180	270	290	725	1232	1450	1595	2610	3916
3.0	63	6.0	20	50	85	100	110	180	270	290	725	1232	1450	1595	2610	3916
4.0	68	6.0	20	50	85	100	110	160	250	290	725	1232	1450	1595	2320	3625
4.0	73	6.0	20	50	85	100	110	160	250	290	725	1232	1450	1595	2320	3625
4.0	79	6.0	20	50	85	100	110	160	250	290	725	1232	1450	1595	2320	3625
6.0	86	8.0	15	50	60	70	80	140	180	217	725	870	1015	1160	2030	2610
6.0	95	8.0	15	50	60	70	80	140	180	217	725	870	1015	1160	2030	2610
6.0	105	8.0	15	50	60	70	80	140	180	217	725	870	1015	1160	2030	2610
6.0	112	10.0	15	40	50	60	70	100	150	217	580	725	870	1015	1450	2175
6.0	120	10.0	15	40	50	60	70	100	150	217	580	725	870	1015	1450	2175
8.0	132	12.0	...	...	30	40	60	90	...	...	...	435	580	870	1305	...
8.0	145	12.0	...	...	30	40	60	90	...	...	...	435	580	870	1305	...
8.0	158	12.0	...	...	30	40	60	90	...	...	...	435	580	870	1305	...
10.0	170	16.0	...	...	...	30	60	...	...	...	...	...	435	870	...	...
10.0	183	16.0	...	...	...	30	60	...	...	...	...	...	435	870	...	...
10.0	197	16.0	...	...	...	30	60	...	...	...	...	...	435	870	...	...
12.0	218	20.0	...	...	...	20	50	...	...	...	...	...	290	725	...	...
12.0	235	20.0	...	...	...	20	50	...	...	...	...	...	290	725	...	...

Valve Data: Flange Pressure Rating

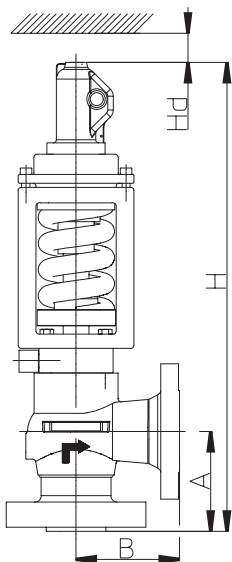
Inlet size	Orifice diameter mm	Outlet size	ASME Inlet class			ASME Inlet class		ASME Inlet class		ASME Outlet class		ASME Outlet class		ASME Outlet class	
			Inlet Cl. 01	Inlet Cl. 02	Inlet Cl. 03	Inlet Cl. 04	Inlet Cl. 05	Inlet Cl. 06	Inlet Cl. 07	Inlet Cl. 01-03		Inlet Cl. 04-05		Inlet Cl. 06-07	
1.5	20	2.5	150	300	600	900	1500	2500	...	150		300		600	
1.5	20	3.0	150	300	600	900	1500	2500	...	150		300		600	
1.5	25	2.5	150	300	600	900	1500	2500	...	150		300		600	
1.5	25	3.0	150	300	600	900	1500	2500	...	150		300		600	
1.5	32	2.5	150	300	600	900	1500	2500	...	150		300		600	
1.5	32	3.0	150	300	600	900	1500	2500	...	150		300		600	
2.0	36	3.0	150	300	600	900	1500	2500	...	150		300		600	
2.0	40	3.0	150	300	600	900	1500	2500	...	150		300		600	
2.5	45	4.0	150	300	600	900	1500	2500	2500	150		300		600	
3.0	45	4.0	150	300	600	900	1500	2500	2500	150		300		600	
2.5	52	4.0	150	300	600	900	1500	2500	2500	150		300		600	
3.0	52	4.0	150	300	600	900	1500	2500	2500	150		300		600	
3.0	58	6.0	150	300	600	900	1500	2500	2500	150		300		600	
3.0	63	6.0	150	300	600	900	1500	2500	2500	150		300		600	
4.0	68	6.0	150	300	600	900	1500	2500	2500	150		300		600	
4.0	73	6.0	150	300	600	900	1500	2500	2500	150		300		600	
4.0	79	6.0	150	300	600	900	1500	2500	2500	150		300		600	
6.0	86	8.0	150	300	600	900	1500	1500	1500	150		300		300	
6.0	95	8.0	150	300	600	900	1500	1500	1500	150		300		300	
6.0	105	8.0	150	300	600	900	1500	1500	1500	150		300		300	
6.0	112	10.0	150	300	600	900	1500	1500	1500	150		300		300	
6.0	120	10.0	150	300	600	900	1500	1500	1500	150		300		300	
8.0	132	12.0	...	...	...	900	1500	1500	1500	150		300		300	
8.0	145	12.0	...	...	...	900	1500	1500	1500	150		300		300	
8.0	158	12.0	...	...	...	900	1500	1500	1500	150		300		300	
10.0	170	16.0	...	...	...	900	1500	...	...	...		300		...	
10.0	183	16.0	...	...	...	900	1500	...	...	...		300		...	
10.0	197	16.0	...	...	...	900	1500	...	...	...		300		...	
12.0	218	20.0	...	...	...	900	1500	...	...	...		300		...	
12.0	235	20.0	...	...	...	900	1500	...	...	...		300		...	

Valve Data

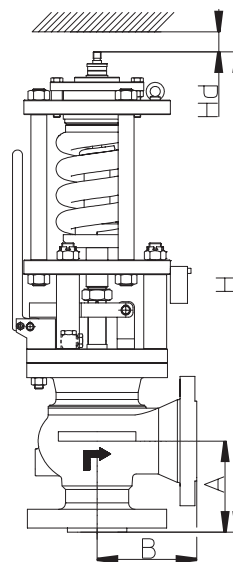
Inlet diameter	Orifice diameter	Outlet diameter	End connections	End connections	End connections	Complete height	Complete height	Complete height	Dismantling height	Dismantling height	Complete weight	Complete weight	Complete weight
	mm		A × B mm in	A × B mm in	A × B mm in	H mm in	H mm in	H mm in	Hd mm in	Hd mm in	kg lb _m	kg lb _m	kg lb _m
NPS	d0	NPS	Inlet Cl. 01-03	Inlet Cl. 04-05	Inlet Cl. 06-07	Inlet Cl. 01-03	Inlet Cl. 04-05	Inlet Cl. 06-07	Inlet Cl. 01-05	Inlet Cl. 06-07	Inlet Cl. 01-03	Inlet Cl. 04-05	Inlet Cl. 06-07
1.5	20	2.5											
1.5	20	3.0											
1.5	25	2.5	130 × 120	145 × 140	155 × 170	730	735	920	120	130	55	60	140
1.5	25	3.0	5.12 × 4.72	5.71 × 5.51	6.10 × 6.69	28.74	28.94	36.22	4.72	5.12	121	132	309
1.5	32	2.5											
1.5	32	3.0											
2.0	36	3.0	130 × 125	155 × 160	160 × 180	790	815	960	140	160	80	90	160
2.0	40	3.0	5.12 × 4.92	6.10 × 6.30	6.30 × 7.09	31.10	32.09	37.8	5.51	6.30	176	198	353
2.5	45	4.0											
3.0	45	4.0	155 × 160	185 × 185	215 × 230	1005	1035	1300	160	190	160	175	440
2.5	52	4.0	6.10 × 6.30	7.28 × 7.28	8.47 × 9.06	39.567	40.75	51.18	6.30	7.48	353	386	970
3.0	52	4.0											
3.0	58	6.0											
3.0	63	6.0											
4.0	68	6.0	190 × 190	225 × 215	265 × 270	1300	1330	1450	200	260	340	365	600
4.0	73	6.0	7.48 × 7.48	8.86 × 8.47	10.43 × 10.63	51.18	52.36	57.09	7.87	10.24	750	805	1323
4.0	79	6.0											
6.0	86	8.0											
6.0	95	8.0	240 × 240	285 × 290	285 × 290	1420	1465	1400	250	290	480	540	840
6.0	105	8.0	9.45 × 9.45	11.22 × 11.42	11.22 × 11.42	55.91	57.68	55.12	9.84	19.42	1058	1190	1852
6.0	112	10.0											
6.0	120	10.0	295 × 280	315 × 295	315 × 325	1545	1565	1480	265	350	595	655	920
			11.61 × 11.02	12.40 × 11.61	12.40 × 12.80	60.83	61.61	58.27	10.43	13.78	1312	1444	2028
8.0	132	12.0											
8.0	145	12.0	375 × 390	375 × 390	375 × 390	1620	1620	1620	390	380	1310	1350	1310
8.0	158	12.0	14.76 × 15.35	14.76 × 15.35	14.76 × 15.35	63.78	63.78	63.78	15.35	14.96	2888	2976	2888
10.0	170	16.0											
10.0	183	16.0	...	460 × 470	...	*1	*1	*1	*1	*1	*1	*1	*1
10.0	197	16.0		18.11 × 18.50									
12.0	218	20.0		530 × 550	...	*1	*1	*1	*1	*1	*1	*1	*1
12.0	235	20.0		20.87 × 21.65									

*1 subject to detail engineering

Si 91xx Type L



Si 91xx Type H



Bopp & Reuther makes industrial processes safe and efficient. We develop and manufacture shut off valves, safety and control valves for the process industry, conventional power stations, the nuclear industry and other applications. Our products are supported by a worldwide service network.



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