

# Si 6106



*Engineering  
GREAT Solutions*

**Steam Safety Valves  
to PED and DIN/EN standards**

# Si 6106

## Features

The IMI Bopp & Reuther high pressure steam safety valve:

- > Solid inlet nozzle, screwed in and welded
  - > Manages the high forces in the pressure adjustment via clamping plate and upper pressure ring
  - > Material designs for high temperatures with the option to select the material at
- the inlet in accordance with customer specifications
  - > Ideal for combination with the pneumatic actuator AK as well as the PC 50/53 control unit for "controlling" the discharge process

### Inlet sizes

DN 80 to DN 300

### Inlet pressure rating

PN 40 to PN 400

### Set pressures

15 bar g to 200 bar g

### Temperature range

Up to 550 °C

### Overpressure

Vapours / gases 5%

### Blow down

Vapours / gases 10%

### Allowable built-up back pressure

15% of the set pressure

## Applications

- > Steam boiler
  - > Superheater
  - > Power plants and industrial steam generators
- > Steam temperatures above 500 °C
  - > Large flow diameter with high pressures

## Approvals and standards

### EC type examination

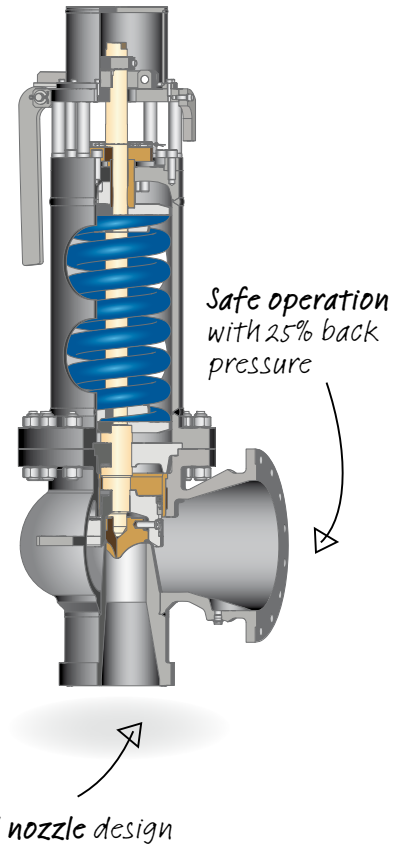
- Pressure Equipment Directive 97 / 23 / EC
- DIN EN ISO 4126-1
- AD 2000-Merkblatt A2
- VdTÜV Merkblatt "Sicherheitsventil 100"

### VdTÜV type approval acc. to

TÜV.SV.10-138.d<sub>0</sub>.D / G.α<sub>w</sub>.p

IMI Bopp & Reuther will not renew the existing VdTÜV type approvals. The requirements by VdTÜV and applicable standards are completely considered by the EC type examination.

*Engineered specific for HP steam application*



*Full nozzle design*

The design, manufacture, testing and labelling meet the requirements of DIN EN ISO 4126-7, DIN EN 12266-1 / -2 (insofar as applicable to safety valves), DIN EN 1092 parts I and II Flanges, AD 2000-Merkblatt A4, AD 2000-Merkblatt HP0, technical rules for steam boiler TRD 110, TRD 421

# Si 6106

## Type code

Type code				Order example
1	Series	Si 6	DIN/EN Full lift valve	Si 6
2	Design	1	Conventional, open bonnet	1
3	Characteristic	0	High capacity "High Flow"	0
4	Pressure class	6	Up to PN 400	6
5	Cap	AB	Lifting lever with test gag	AK
		AK	Pneumatic actuator	
6	Material code <sup>2)</sup>	00	GP240GH / 1.0619	00
		01	G17CrMo5-5 / 1.7357	
		11	G17CrMo9-10 / 1.7379	
7	Options	.09	Locking sleeve (government ring)	.22a
		.14a	Lift indication with inductive proximity switch in the cap	
		.14b	Lift indication with inductive proximity switch in the auxiliary housing	
		.14c	Lift indication with inductive proximity switch for exposed spindle with actuator AK	
		.22a	Weld end at inlet	
		.22b	Weld end at outlet	
		.25	Block body design	
		.35	Lift restriction ring	
		.59	Stellited disc	
		.60	Stellited seat	

<sup>1)</sup> For valves with weld ends, please state the pipe's outer diameter, wall thickness and joint type code in your order. See page 5 for information on standard dimensions.

<sup>2)</sup> The standard materials of the material codes can be changed by selecting trim codes. Please see brochure "IMI Bopp & Reuther High Flow Safety Valves", page 44 for information on our trim codes T1, T2, T3.

Type ▶	<b>Si 6106 AK 00 .22a</b>
Please state ▶	Set pressure 105 bar g
	Fluid temp. 400 °C
	Fluid and State Superheated steam, Steam
	Inlet DN 100, weldend
	Weld end dimensions <sup>1)</sup> 117 x 14.2 mm
	Outlet DN 150, PN 100, B2
	Flow diameter 63 mm
	Approval 97 / 23 / EG (CE)

# Si 6106

## Sizes, pressure ranges and dimensions

Fluid group	Inlet size	Flow diameter	$h/d_0 \geq$	$p_b/p_0 \leq$	$\alpha_w$
Vapours / gases (D / G)	DN 80 to DN 200	56 mm up to 140 mm	0.36	0.25	0.81
	DN 250 to DN 300	155 mm up to 200 mm	0.38	0.3	0.78

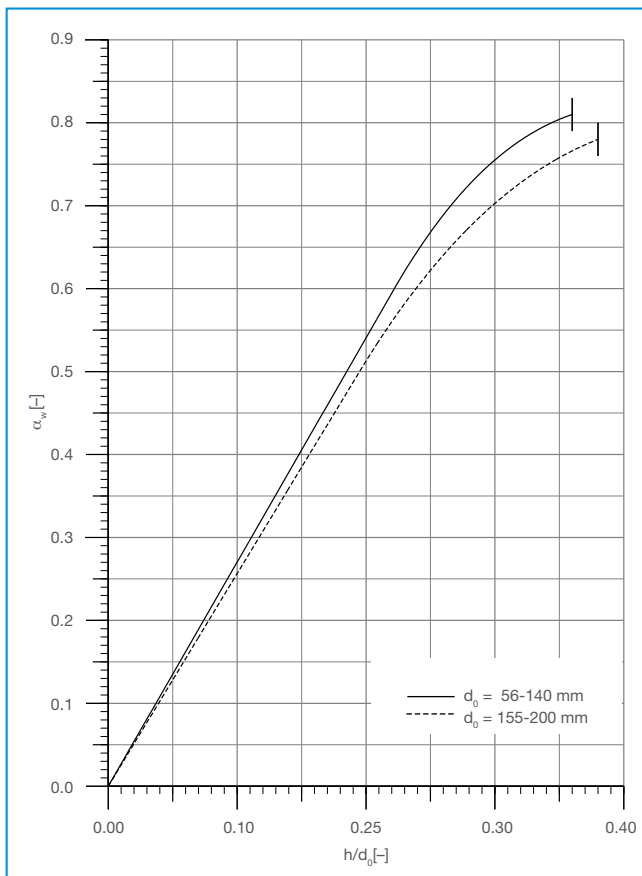
The coefficient of discharge for gases/vapours in a pressure ratio of  $p_b/p_0 > 0.25$  and/or  $p_b/p_0 > 0.3$  is shown in the diagram below.

The capacity of the selected safety valves can be adjusted to the required capacity by reducing the lift, thus reducing undesirable extra performance. The following applies:

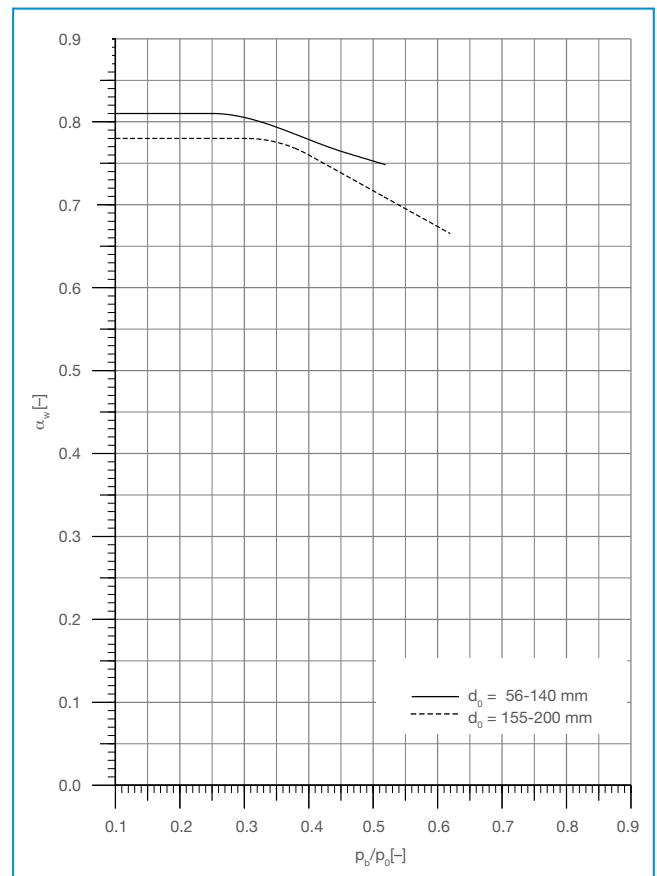
$\alpha_{w(\text{reduced})} = \alpha_w \times q_m/q_{mc}$ . The required ratio  $h/d_0$  is shown in the diagram below, and the reduced lift calculated with  $h_{(\text{reduced})} = d_0 \times (h/d_0)$ .

- $h$  = Lift [mm]
- $d_0$  = Flow diameter of the selected safety valve [mm]
- $h/d_0$  = Lift/Flow diameter ratio
- $p_b$  = Absolute back pressure [bar a]
- $p_0$  = Absolute relieving pressure [bar a]

- $p_b/p_0$  = Absolute back pressure / absolute relieving pressure ratio
- $\alpha_w$  = Coefficient of discharge acc. to AD 2000-Merkblatt A2
- $q_m$  = Required mass flow [kg/hr]
- $q_{mc}$  = Certified mass flow [kg/hr]



Si 6106 coefficient of discharge  $\alpha_w$  depending on  $h/d_0$  for gases and vapours



Si 6106 coefficient of discharge  $\alpha_w$  depending on  $p_b/p_0$  for gases and vapours

# Weld end

## Weld end (option .22) for Si 6106, as well as the series Si 6303, Si 6304 and Si 6305

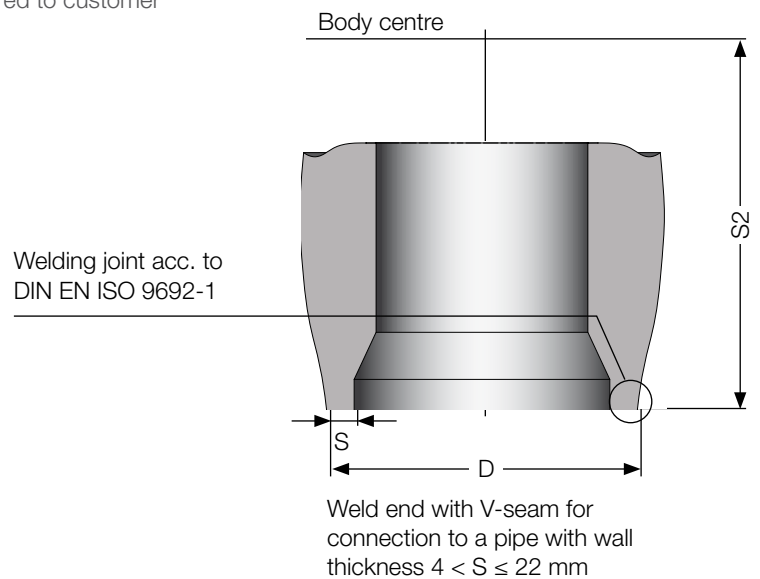
Weld ends are mainly used for applications with high pressure and high temperatures. The following table shows the standard IMI Bopp & Reuther dimensions acc. to DIN EN 12627. This European standard defines the dimensions for weld ends of steel valves that are welded to standardized pipes. The outside diameters and wall thicknesses of the standardized pipes are described in DIN EN 1092-1.

The shape and dimensions of weld ends can be changed upon request.

The centre to face dimensions S2 for safety valves with weld end are as a standard identical with the centre to face dimensions of the same type with flange at the inlet. The centre to face dimensions can also be tailored to customer specifications.

### Example:

Weld end P 250 GH (1.0460);  
114.3 x 3.6 (acc. to DN 100 PN 40)



### Specification of the weld end

(must be stated in your order)

1. Inlet nozzle material
2. Weld end dimensions
  2. 1 Outer diameter D
  2. 2 Wall thickness S

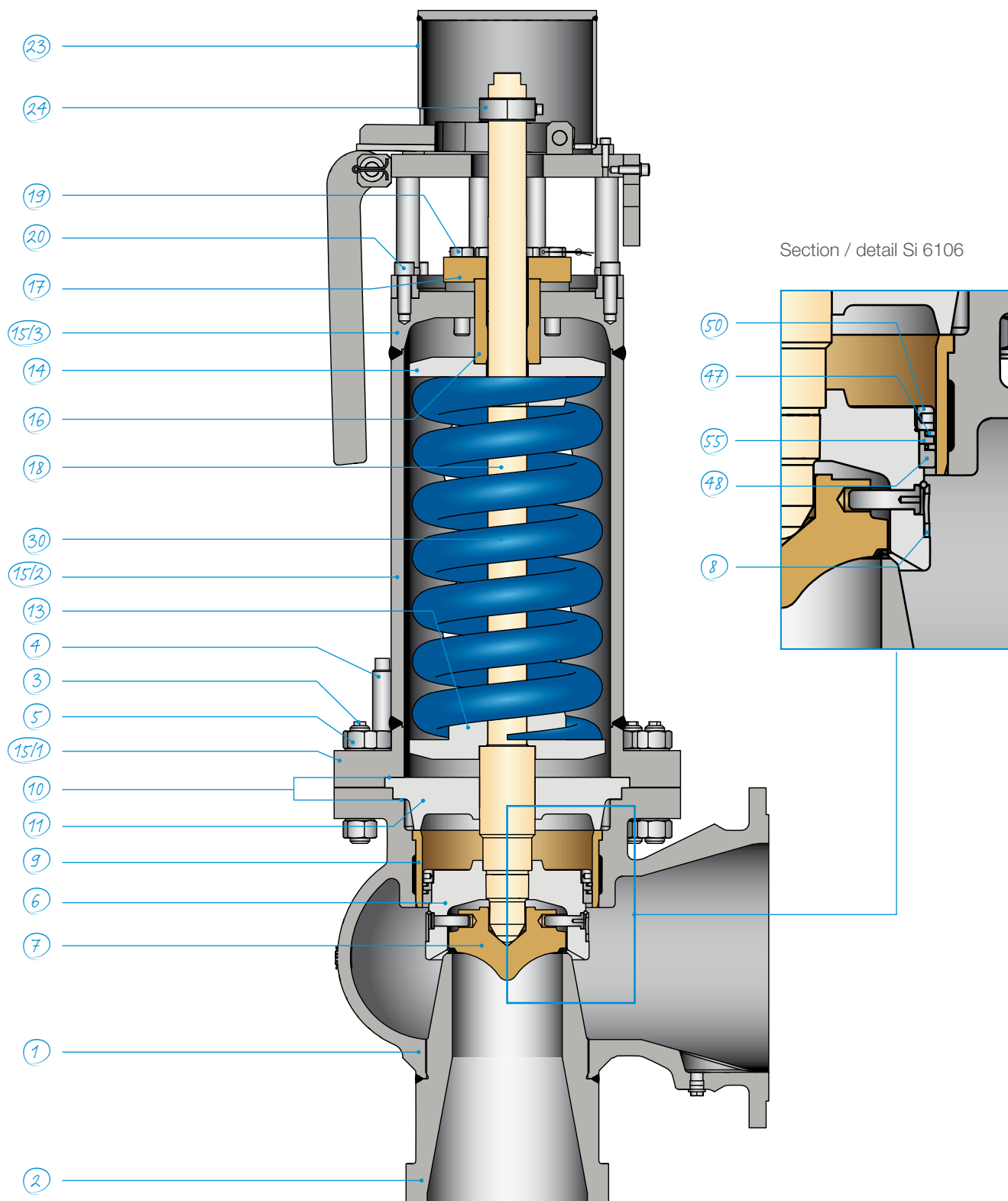
### Standard dimensions

DN	ØD [mm] DIN EN 1267	PipeØ [mm] DIN EN 1092-1	Wall thickness S [mm]							
			PN 16	PN 25	PN 40	PN 63	PN 100	PN 160	PN 250	PN 320
15	22	21.3	2.0	2.0	2.0	2.0	3.2	3.2	3.2	3.2
20	28	26.9	2.3	2.3	2.3	2.6	3.2	n. v.	n. v.	n. v.
25	35	33.7	2.6	2.6	2.6	2.6	3.6	3.6	3.6	5.0
32	44	42.4	2.6	2.6	2.6	2.9	3.6	n. v.	n. v.	n. v.
40	50	48.3	2.6	2.6	2.6	2.9	3.6	3.6	5.0	6.3
50	62	60.3	2.9	2.9	2.9	4.0	4.0	4.0	6.3	8.0
65	77	76.1	2.9	2.9	2.9	4.0	4.0	5.0	8.0	11.0
80	91	88.9	3.2	3.2	3.2	4.5	5.0	6.3	11.0	12.5
100	117	114.3	3.6	3.6	3.6	4.5	5.6	8.0	14.2	16.0
125	144	139.7	4.0	4.0	4.0	5.6	6.3	10.0	16.0	20.0
150	172	168.3	4.5	4.5	4.5	6.3	8.0	12.5	17.5	25.0
200	223	219.1	6.3	6.3	6.3	7.1	8.8	16.0	25.0	30.0
250	278	273.0	6.3	7.1	7.1	8.8	10.0	20.0	32.0	40.0
300	329	323.9	7.1	8.0	8.0	11.0	12.5	22.2	n. v.	n. v.
350	362	355.6	8.0	8.0	8.8	12.5	14.2	n. v.	n. v.	n. v.
400	413	406.4	8.0	8.8	11.0	14.2	16.0	n. v.	n. v.	n. v.

n. a. not available

## Si 6106

## Material code



# Si 6106

Material code			00	01	11
Temperature application range			-10 to +450 °C	Max. 530 °C	Max. 600 °C
Part	Name	Spare part	Material	Material	Material
1	Body		GP240GH / 1.0619	G17CrMo5-5 / 1.7357	G17CrMo9-10 / 1.7379
2	Inlet nozzle		P250GH / 1.0460 Seat surface hard-faced with Stellite	13CrMo4-5 / 1.7335 Seat surface hard-faced with Stellite	10CrMo9-10 / 1.7380 Seat surface hard-faced with Stellite
3	Stud, short		1.7709	1.7709	1.7709
4	Stud, long		1.7709	1.7709	1.7709
5	Hexagon nut		1.7258	1.7258	1.7258
6	Lift collar		1.0460	1.4122	1.4122
7	Disc <sup>1)</sup>	*2	1.4122 Hardened	1.4122 Hardened	1.4122 Hardened
8	Locking ring		1.7380	1.7380	1.7380
9	Guiding bush	*3	1.4122 Hardened	1.4122 Hardened	1.4122 Hardened
10	Flat gasket		1.4401 / graphite	1.4401 / graphite	1.4401 / graphite
11	Intermediate cover		1.4122	1.4122	1.4122
13	Spring washer, bottom		1.4122	1.4122	1.4122
14	Spring washer, top		1.4122	1.4122	1.4122
15 / 1	Lower bonnet flange		1.0425	1.0425	1.0425
15 / 2	Bonnet cylinder		1.0305	1.0305	1.0305
15 / 3	Upper bonnet flange		1.0425	1.0425	1.0425
16	Holding bushing		1.4122	1.4122	1.4122
17	Clamping plate		1.4122	1.4122	1.4122
18	Spindle		1.4122	1.4122	1.4122
19	Hexagon nut		8.8	8.8	8.8
20	Cylinder bolt		1.0109	1.0109	1.0109
23	Lifting lever (cap)		1.0460	1.0460	1.0460
24	Lifting nut		1.4122	1.4122	1.4122
30	Spring		1.8159	1.8159	1.8159
47	Piston ring	*2	1.4086	1.4086	1.4086
48	Guide ring	*3	1.4086	1.4086	1.4086
50	Cap nut		1.4122	1.4122	1.4122
55	Piston ring guide		1.4122	1.4122	1.4122

<sup>1)</sup> 1.4122 hardened, running surfaces hard chrome plated

Spare Parts:  
\*1 For start-up  
\*2 For 2 years of operation  
\*3 After several years of operation

IMI Bopp & Reuther reserve the right to technical changes or application of higher quality materials without prior notice. The material design can be tailored to customer specifications at any time upon request.

## Si 6106

## Sizes, pressure ranges and dimensions

Size	DN <sub>E</sub>	80	100	100	125	125	150	150	200	200	200	200	250	250	300	300
	DN <sub>A</sub>	150	150/200	150/200	250	250	250	250	250	250	300	300	350	350	400	400
Flow diameter [mm] d <sub>0</sub>		56	63	70	77	86	93	98	110	117	125	140	155	168	180	200
Flow area [mm <sup>2</sup> ] A <sub>0</sub>		2463	3117	3848	4657	5809	6793	7543	9503	10751	12272	15394	18869	22167	25447	31416
Min. set pressure [bar g]		70	60	60	50	50	40	40	30	30	25	25	15	15	15	15
Max. set pressure <sup>1)</sup> [bar g]		200	180	180	150	150	125	125	100	100	75	75	50	50	45	45
							(95) <sup>2)</sup>	(85) <sup>2)</sup>	(65) <sup>2)</sup>	(60) <sup>2)</sup>	(54) <sup>2)</sup>	(44) <sup>2)</sup>	(35) <sup>2)</sup>	(31) <sup>2)</sup>	(26) <sup>2)</sup>	(20) <sup>2)</sup>
Max. back pressure [bar g]		30	27	27	22.5	22.5	18.7	18.7	15	15	11.2	11.2	7.5	7.5	6.7	6.7
Inlet flange DIN EN <sup>3)</sup>		PN 100										PN 100		PN 40/63		
		PN 160														
		PN 250														
		PN 400														
Outlet flange DIN EN <sup>3)</sup>												PN 16		PN 16/10		
		PN 40					PN 25 / 40					PN 25				
		PN 63 / 100			PN 63											
Centre to face dimension S1 [mm]		290	290	330	300	300	295	295	340	340	305	305	400	400	455	455
Centre to face dimension S2 [mm]		260	270	280	330	330	400	400	335	335	360	360	375	375	440	440
Height H1 [mm]		1400	1400	1400	1400	1400	1400	1400	1600	1600	1600	1600	1850	1850	2000	2000
Additional height H3 f. actuator AK [mm]		490	490	490	490	490	490	490	490	490	490	490	490	490	490	490
Drain size E <sup>4)</sup>		G½	G½	G½	G½	G½	G½	G½	G½	G½	G½	G½	G½	G½	G½	G½
Weight Si 61 [kg]		220	250	250	285	285	305	305	305	355	400	400	510	510	890	910
Additional weight actuator AK [kg]		175	175	175	175	175	175	175	175	175	175	175	175	175	175	175

<sup>1)</sup> Stated pressures are maximum values corresponding to the spring forces. The component strength may need to be reviewed depending on the material and temperature.

<sup>2)</sup> Maximum set pressure if the pneumatic actuator AK is used. Up to this pressure, the actuator force is sufficient for obtaining the desired function improvement.

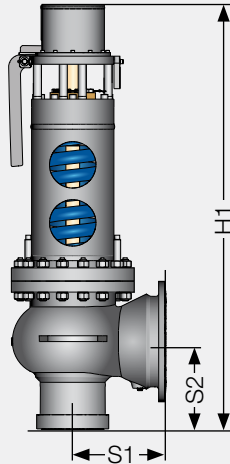
<sup>3)</sup> Flanges: acc. to DIN EN 1092-1; gasket facing up to PN 40 type B1, PN 63 and above type B2.

<sup>4)</sup> Drain E is only drilled into the body if condensate formation is to be expected.

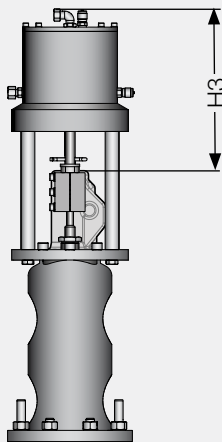


# Si 6106

Si 6106



Actuator AK



## Support brackets

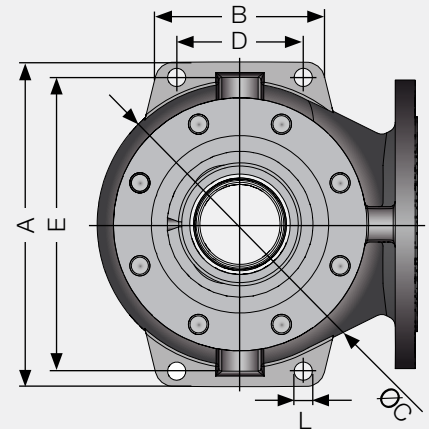
Size DN <sub>E</sub> × DN <sub>A</sub>	A	B	C	D	E	L	Support bracket thickness	Number of screws
80 x 150	350	120	265	75	305	22	20	4 x M 20
100 x 150	460	160	350	130	420	22	25	4 x M 20
100 x 200	450	140	340	90	390	27	25	4 x M 24
125 x 250	560	170	405	100	480	30	30	4 x M 27
150 x 250	550	210	420	150	480	33	35	4 x M 30
200 x 250	580	210	420	150	500	33	25	4 x M 30
200 x 300	600	210	420	150	530	33	25	4 x M 30
250 x 350	690	210	520	150	600	33	25	4 x M 30
300 x 400	820	270	660	200	730	39	35	4 x M 36

Dimensions in mm

The height from the inlet to the lower edge of the support bracket is identical with the centre to face dimension S2.

Support brackets will only be drilled if specified by the customer.

Support brackets



**IMI Bopp & Reuther**

Bopp & Reuther Sicherheits-  
und Regelarmaturen GmbH  
Carl-Reuther-Straße 1  
68305 Mannheim  
Deutschland

Tel: +49 (0)621 76220-100  
Fax: +49 (0)621 76220-120

[www.imi-critical.com](http://www.imi-critical.com)  
[imibur.sales@imi-critical.com](mailto:imibur.sales@imi-critical.com)

**IMI Critical Engineering**

Lakeside, Solihull Parkway  
Birmingham Business Park  
Birmingham B37 7XZ  
United Kingdom

Tel: +44 (0)121 717 3700  
Fax: +44 (0)121 717 3701

[www.imi-critical.com](http://www.imi-critical.com)

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