

# Si 830



*Engineering  
GREAT Solutions*

**High Flow Safety Relief Valves  
designed acc. to API Standard 526  
manufactured to ASME VIII and PED**

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**Россия** +7(495)268-04-70

**Казахстан** +7(7172)727-132

**Киргизия** +996(312)96-26-47

<https://imibr.nt-rt.ru/> || [irb@nt-rt.ru](mailto:irb@nt-rt.ru)

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46 Material code orifice V and W

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48 V orifice

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52 Air capacities USCS units

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53 Air Capacities SI units

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54 Saturated steam capacities USCS units

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55 Saturated steam capacities SI units

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56 Water capacities USCS units

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57 Water capacities SI units

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58 Heating jacket (option .18)

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# Si 8301

## Features

The IMI Bopp & Reuther API safety valve:

- > Full nozzle design
- > Orifice sizes D – T are in full compliance to API Standard 526
- > Additional orifice sizes V and W for very large flow application
- > Capacities certified by the National Board of Boiler and Pressure Vessel Inspectors
- > Large range of materials and design options meeting all specifications
- > One-trim design for gas, vapour and liquids
- > Long-life cycle bellows design
- > Positive lift stop at full capacity
- > Optimized disc bearing for high seat tightness
- > Nozzle ring always set to lowest position because valve designed to operate optimum without ring adjustment
- > Easy maintenance by one-part spindle, simplified disc retention clip, rugged guide design

### Inlet sizes

NPS 1 to NPS 8 acc. API 526  
and larger sizes NPS 10 as well as NPS 12

### Inlet pressure rating

Class 150 to Class 2500

### Set pressures

0.5 bar g up to 414 bar g  
7 psig up to 6000 psig

### Temperature range

- 268 °C to + 538 °C  
- 450 °F to + 1000 °F

### Overpressure

Vapours / gases 10%  
Liquid 10%  
(ASME type classification: Safety Relief Valve)

### Blow down

Vapours / gases 7%  
Liquids 20%

### Allowable built-up back pressure

15% of the set pressure

Engineered in full compliance with API 526

High quality overpressure protection

One-trim design for gas, vapour and liquid

Designed with excellence, proven in tests up to 280 bar

## Applications

- > Vapours, gases, steam, liquids and two-phase applications
- > Applications in accordance with API Standard 521 and API Standard 520
- > Technical design in accordance with API Standard 526
- > Closed pressure systems, back pressures, high pressures
- > Oil/gas – onshore and offshore
- > Petrochemicals, refineries and tank farm
- > Chemical industry
- > Boiler and steam systems to ASME Sec. VIII
- > Nuclear facilities to ASME Sec. III

## Approvals and standards

### ASME Certification

- ASME Boiler & Pressure Vessel Code Section VIII
- ASME Boiler & Pressure Vessel Code Section III

### 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.10-1006.d<sub>0</sub>.D / G / F.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.

The design, manufacture, testing and labelling meet the requirements of ASME B16.5, ASME VIII, API 526 and 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 HPO, technical rules for steam boiler TRD 108, TRD 110, TRD 421.

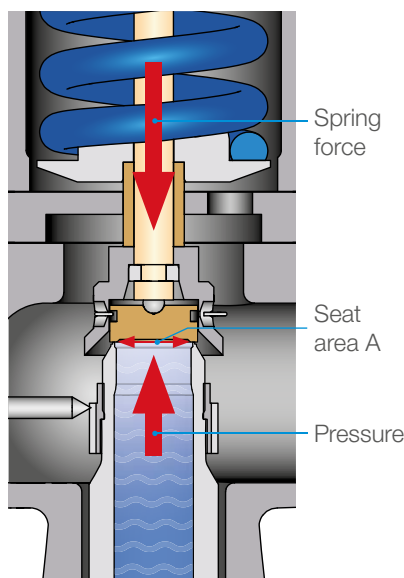
# General information

Safety valves have the function of preventing inadmissible overpressure in pipe systems, pressure vessels and boilers, in order to avoid danger to people, plant and the environment. They are set to a higher pressure than the operating pressure of the system to be protected.

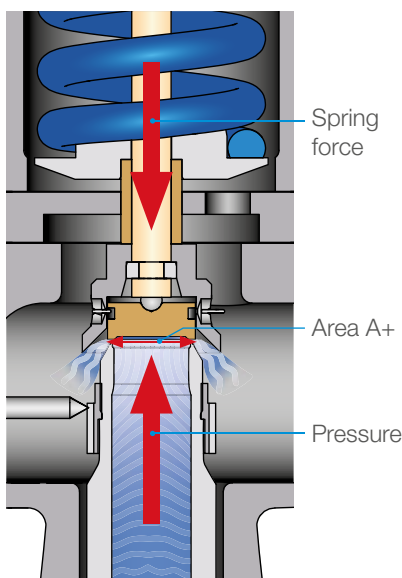
## Safety valves ...

- ... open once the set pressure is reached.
- ... steady discharge the required mass flow.
- ... close after the pressure has dropped.

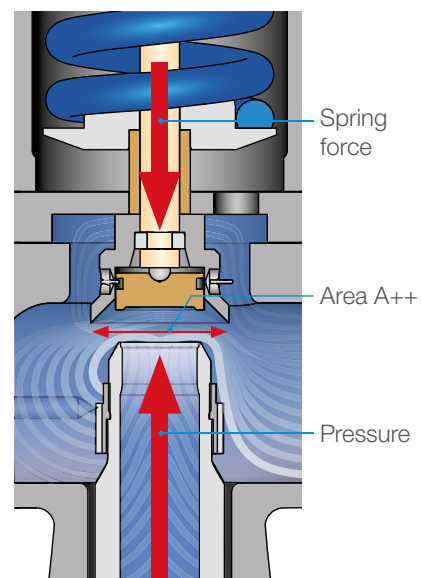
The Si 8 series is part of the IMI Bopp & Reuther **High Flow** application category and the required capacity is usually the most important criteria for selection. The standard valve is of the direct spring loaded type, a safety valve where the opening force generated by the fluid pressure under the disc is counteractive to the mechanical load of a spring.



During normal operation the spring force applies a higher load to the disc than the opening force generated by the pressure and the disc closes the valve nozzle seat. In case the system pressure increases the pressure force tends to balance the spring force.



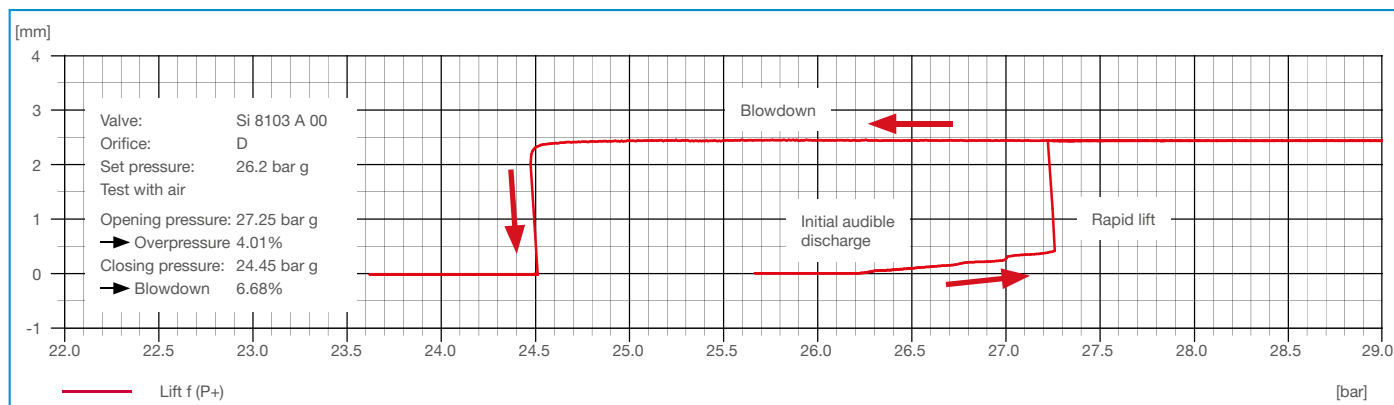
In gas or vapour service the disc typically lifts slightly before it will rapidly open ("simmering"). An initial audible sound is caused by the fluid passing the seat. Pressure now builds up past the seat and acts on larger areas of the disc and disc holder A+. This flow area is optimum designed for all IMI Bopp & Reuther safety valves and no ring adjustment is required.



Once the pressure has built-up further past the seat and is fully acting on the disc holder flow area A++, the additional forces overcome the spring force and the safety valve will rapidly open to full lift.

Allowing the disc to reclose the system pressure has drop to a level that the spring force can overcome the force of the additional disc holder flow area A++. The difference between opening and closing pressure is the blowdown.

## Lift-pressure-Graph (typical)



# General information

## What is an API safety valve?

API is the acronym for “American Petroleum Institute” – the largest US trade association for the oil and gas industry with its headquarters in Washington, D.C. One important aspect of its work is the establishment of technical standards for the oil and gas industry such as:

### > API Standard 520 – Sizing, Selection, and Installation of Pressure-relieving Devices

Covers the sizing and selection of pressure-relief devices to protect unfired pressure vessels against overpressure in refineries and chemical plants.

### > API Standard 526 – Flanged Steel Pressure-relief Valves

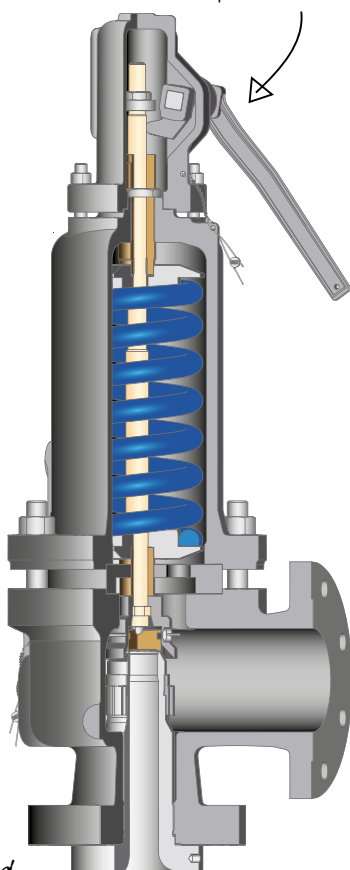
Purchase specification and basic requirements for direct spring-loaded pressure-relief valves and pilot-operated pressure-relief valves.

The IMI Bopp & Reuther valve series Si 8 is designed in accordance with the requirements set forth in API Standard 526 including:

- > Orifice designation and area
- > Valve size and pressure rating
- > Materials
- > Pressure-temperature limits
- > Center-to-face dimensions

and the Si 8 series meets the capacities for gas, vapours and liquids calculated on the basis of orifice sizes given in API Standard 526 and effective coefficients of discharge detailed in API Standard 520 as a minimum.

*Conventional safety valve Si 830*



### Conventional safety valve Si 830

The IMI Bopp & Reuther series Si 830 are most commonly used in process plants. The closed spring bonnet traps the process fluid in the valve and prevents a release to the environment. The straightforward construction and reliable guidance of the stainless steel inside parts ensure free and repeated discharge cycles.

As specified in API 520 and ASME Sec. VIII the safety valves shall have an adjusting ring to adjust the blowdown in order to meet the specified limits. However IMI Bopp & Reuther design philosophy builds on optimized flow geometry and suitable spring selection ensuring the required functional characteristic of the safety valve. The Si 8 series nozzle ring does not require adjustment and is always screwed to the lowest position. The plant benefit is added operation reliability and ease of maintenance.

The Si 8 series is a One-trim design for gas, vapour and liquids. Flow forces generated by the fluid pressure are optimized regardless media allowing utilization of suitable springs to comply with functional requirements. The one-trim design makes the Si 8 series especially suitable where installation see gas and liquid relief cases or on 2-phase flow applications.

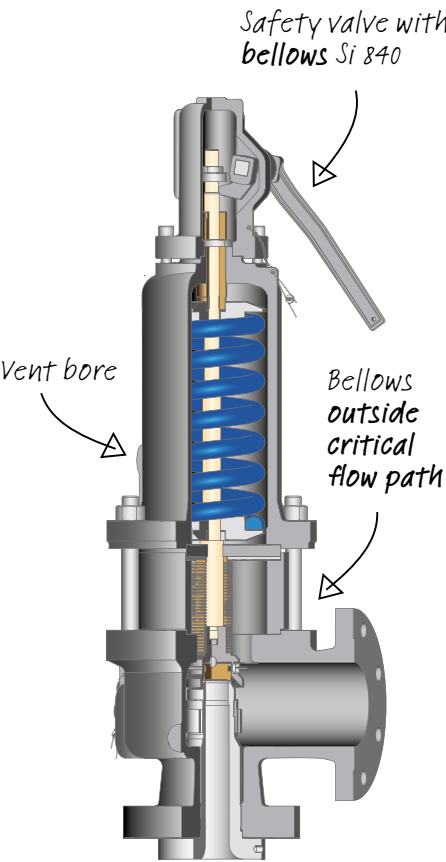
Conventional safety valves are usually selected where a short outlet pipe leads to the atmosphere, where the fluid is safely discharged into low pressure systems and where the fluid is non-critical.

The conventional safety valve limit for built-up back pressure is 15% of the set pressure. In case of constant superimposed back pressure, a conventional safety valve is set to the differential pressure ( $p - p_v$ ).

*No need for nozzle ring adjustment*

*One-trim design*

# General information



### Safety valve with bellows Si 840

The Si 84 and Si 85 series are equipped with a bellows between the body and bonnet. The following conditions require the selection of bellows:

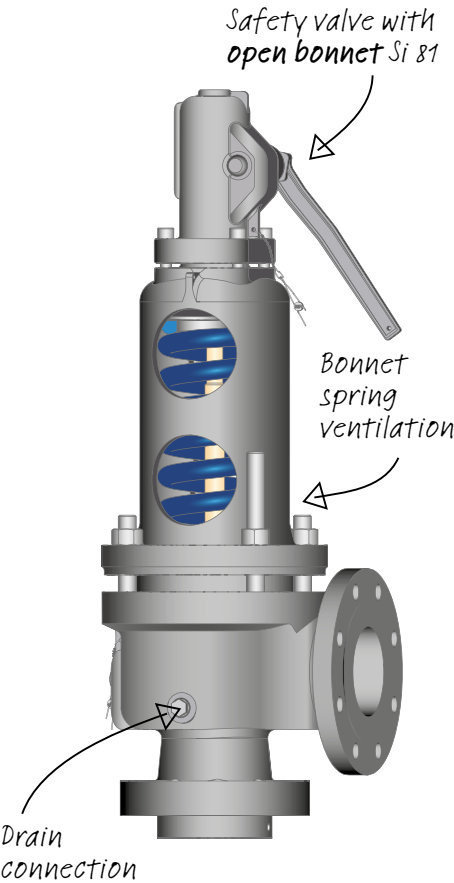
- > Excessive built-up back pressure or variable superimposed back pressure. The bellows has a balancing effect on the back pressure.
- > When the fluid is highly viscous or contains solid particles that could enter the guiding areas. The bellows protects the guides.
- > When the fluid could have a corrosive effect on the inner parts. The bellows separates the bonnet chamber from the flow.
- > In case of media with a very high temperature. The bellows shields the spring against overheating.

During relief the fluid passes the seat area and flows to the body outlet. The bellows is embedded in a bonnet spacer and outside the critical flow path. Thereby the impact of pressure pulsation, vibration or media itself is reduced significantly and the bellows operation life time increased.

Bellows safety valves have a vent bore in the bonnet and which needs to be open or connected to atmospheric tank to ensure bellows and safety valve function. The vent bore can be used for bellows integrity test.

| Vent size | Orifice size |
|-----------|--------------|
| G¼        | D to J       |
| G¾        | K to T       |

Retrofit kits are available at IMI Bopp & Reuther to convert conventional design Si 83 or Si 81 valves to bellows design Si 84 or Si 85.



### Safety valve with open bonnet Si 810

In the safety valve series Si 81 the spring bonnet has an open design. The resulting ventilation of the bonnet chamber permits a standard steel spring to be used in fluid temperatures up to 400 °C. In higher temperatures, a bonnet spacer between the body and bonnet can provide the spring with further protection from overheating (design option .15), or a bellows can be additionally integrated as the best possible measure (type Si 85).

Safety valves for steam application under ASME Sec. VIII require a lifting lever and hence cap type A shall be selected.

Si 81 safety valves have a drain connection to prevent condensate from lodging in the body discharge side. Drain lines shall lead to a safe place of discharge.

| Drain size | Valve inlet size |
|------------|------------------|
| G¼         | NPS 1 to NPS 2   |
| G¾         | NPS 3 to NPS 4   |
| G½         | NPS 6            |
| G¾         | NPS 8 and above  |

Steam applications under ASME Sec. VIII are limited to 2900 psi / 200 bar. For supercritical pressures or flow requirements exceeding the capacities of series Si 8 the IMI Bopp & Reuther series Si 910 offers a more extensive range of sizes, pressures and materials. Series Si 910 is fully approved to ASME Sec. I and ASME Sec. VIII. Please see catalogue Si 910 for more information.

# Si 830

## Type code

| Type code |                              |                    |                                                       | Order example |
|-----------|------------------------------|--------------------|-------------------------------------------------------|---------------|
| 1         | Series                       | Si 8               | API Safety Relief Valve                               | Si 8          |
| 2         | Design                       | 1                  | Conventional, open bonnet                             | 4             |
|           |                              | 3                  | Conventional, closed bonnet                           |               |
|           |                              | 4                  | Bellows, closed bonnet                                |               |
|           |                              | 5                  | Bellows, open bonnet                                  |               |
| 3         | Characteristic               | 0                  | High capacity "High Flow"                             | 0             |
| 4         | Pressure class <sup>1)</sup> | 1                  | Class 150 (PN 16)                                     | 3             |
|           |                              | 2 <sup>2)</sup>    | Class 300 (PN 25)                                     |               |
|           |                              | 3                  | Class 300 (PN 40)                                     |               |
|           |                              | 4                  | Class 600, class 300 at T orifice (PN 100)            |               |
|           |                              | 5                  | Class 900 (PN 160)                                    |               |
|           |                              | 6                  | Class 1500 (PN 250)                                   |               |
|           |                              | 7                  | Class 2500 (PN 400)                                   |               |
| 5         | Cap                          | G                  | Gastight cap                                          | G             |
|           |                              | GB                 | Gastight cap with test gag                            |               |
|           |                              | A                  | Packed lifting lever                                  |               |
|           |                              | AB                 | Packed lifting lever with test gag                    |               |
|           |                              | AK <sup>3)</sup>   | Pneumatic actuator                                    |               |
| 6         | Material code <sup>4)</sup>  | 00                 | SA-216 Gr. WCB                                        | 00N1          |
|           |                              | 01                 | SA-217 Gr. WC6                                        |               |
|           |                              | 04                 | SA-351 Gr. CF8M                                       |               |
|           |                              | 22                 | SA-352 Gr. LCB                                        |               |
| 7         | Options <sup>5)</sup>        | .09                | Locking sleeve (government ring)                      |               |
|           |                              | .11t               | Soft seal disc PTFE                                   |               |
|           |                              | .14a <sup>6)</sup> | Lift indicator, proximity switch in the cap           |               |
|           |                              | .14b <sup>6)</sup> | Lift indicator, proximity switch in auxiliary housing |               |
|           |                              | .15                | Bonnet insulation spacer                              |               |
|           |                              | .17                | Balancing piston                                      |               |
|           |                              | .18                | Heating jacket                                        |               |
|           |                              | .25                | Block body design                                     |               |
|           |                              | .28                | Oil and grease free                                   |               |
|           |                              | .32                | Purge connection                                      |               |
|           |                              | .59                | Stellited disc                                        |               |
|           |                              | .60                | Stellited nozzle                                      |               |

<sup>1)</sup> PN ratings acc. DIN/EN are for reference only and availability not detailed in this catalogue. In case DIN/EN flanges are required, please use the IMI Bopp & Reuther sizing software Si-Tech 4 or consult the factory.

<sup>2)</sup> Pressure class 2 valves are set pressure limited in accordance to API Standard 526 for low pressure applications where a class 300 inlet flange is preferred over a class 150 flange.

<sup>3)</sup> The design option pneumatic actuator is selectable for application acc. to European Standard PED or where no code marking is required. Acc. to ASME Sec. VIII Safety Relief Valves shall be of direct spring loaded type and pneumatic actuator is not permitted.

<sup>4)</sup> The standard materials of the material codes can be changed by selecting trim codes. Please see pages 14 – 17 for detailed information.

<sup>5)</sup> More design options are available in compliance to European Standard PED, but not approved under ASME Sec. VIII, e.g. lift restriction (.35), vibration damper (.38) and weight loading (.57). Please see IMI Bopp & Reuther sizing software Si-Tech 4 with calculation standard ISO 4126 or consult factory.

<sup>6)</sup> In combination with design option .14a/b the valve is not gastight anymore. Bellows design needs to be selected in case the valve shall be gastight.

Type ►  
Please state ►

### Si 8403 G 00N1

Set pressure 320 psig  
Fluid temp. 60° F  
Fluid and State Natural gas  
gas  
Inlet NPS 2, class 300  
Outlet NPS 3, class 150  
Orifice H  
Code stamp ASME VIII (UV)  
NACE MR0175  
(trim code N1)

# Si 830

## Certified coefficient of discharge acc. ASME Section VIII Div. 1

| Media                               | Inlet size      | Orifice designator | Set pressure range                | Cert. Coefficient of discharge K |
|-------------------------------------|-----------------|--------------------|-----------------------------------|----------------------------------|
| Gas, vapour and steam <sup>1)</sup> | NPS 1 to NPS 1½ | D                  | 15-6000 psi<br>1.03-414 bar       | 0.53 <sup>2)</sup>               |
|                                     | NPS 1 to NPS 12 | E-W                | Limits given in subsequent tables | 0.86                             |
| Liquid                              | NPS 1 to NPS 1½ | D                  | 15-6000 psi<br>1.03-414 bar       | 0.41 <sup>2)</sup>               |
|                                     | NPS 1 to NPS 12 | E-W                | Limits given in subsequent tables | 0.675                            |

<sup>1)</sup> The maximum set pressure for steam is 2900 psi / 200 bar or the range limit for each orifice, whichever is lower.

<sup>2)</sup> The coefficient of discharge for orifice D are calculated on the basis of the certified slope value 2.20 SCFM/PSIA for gas and the certified flow factor 3.51 GPM/SQ.RT.PSID for liquid.

The IMI Bopp & Reuther safety relief valve series Si 8 is designed, manufactured, tested and marked in accordance to ASME Boiler and Pressure Vessel Code, Section VIII. Capacities for gas, vapour, steam and liquids are certified by The National Board of Boiler and Pressure Vessel Inspectors. The basics of size and capacity calculation are described in the ASME Code Section VIII Division 1 Section UG-131 and in Appendix 11. The section UG-131 is also used to determine the

certified capacity for air, saturated steam and water. The formulas for calculating the capacity for other gases or vapors are given in Annex 11.

The standard effective orifice areas according to API 526 are valid only for the size calculation using the equations and effective discharge  $K_d = 0.975$  for gas / vapor or  $K_d = 0.65$  for liquids from API Standard 520. Irrespective of the later valve selection a preliminary sizing calculation can be done by use of the

standard effective orifice and effective coefficient of discharge. Once a safety valve is selected, the final calculation must be verified with the certified characteristics of this valve.

The orifice sizes V and W are not specified in API 526, the valve sizing calculation with the effective discharge coefficients  $K_d$  from API 520 is possible with the effective flow cross-sections provided below.

## Flow area

| Orifice designator | Certified flow area A<br>(use with certified coefficient of discharge K) |                    | API 526 Standard effective orifice area<br>(use with effective coefficient of discharge as per API 520, $K_d = 0.975$ for gas/vapour and $K_d = 0.65$ for liquid) |                    |
|--------------------|--------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
|                    | [in <sup>2</sup> ]                                                       | [mm <sup>2</sup> ] | [in <sup>2</sup> ]                                                                                                                                                | [mm <sup>2</sup> ] |
| D                  | 0.225                                                                    | 145                | 0.110                                                                                                                                                             | 71                 |
| E                  | 0.225                                                                    | 145                | 0.196                                                                                                                                                             | 126                |
| F                  | 0.352                                                                    | 227                | 0.307                                                                                                                                                             | 198                |
| G                  | 0.578                                                                    | 373                | 0.503                                                                                                                                                             | 324                |
| H                  | 0.901                                                                    | 581                | 0.785                                                                                                                                                             | 506                |
| J                  | 1.474                                                                    | 951                | 1.287                                                                                                                                                             | 830                |
| K                  | 2.107                                                                    | 1359               | 1.836                                                                                                                                                             | 1185               |
| L                  | 3.266                                                                    | 2107               | 2.853                                                                                                                                                             | 1840               |
| M                  | 4.123                                                                    | 2660               | 3.600                                                                                                                                                             | 2322               |
| N                  | 4.971                                                                    | 3207               | 4.340                                                                                                                                                             | 2800               |
| P                  | 7.312                                                                    | 4717               | 6.380                                                                                                                                                             | 4116               |
| Q                  | 12.665                                                                   | 8171               | 11.050                                                                                                                                                            | 7129               |
| R                  | 18.328                                                                   | 11824              | 16.000                                                                                                                                                            | 10322              |
| T                  | 29.778                                                                   | 19212              | 26.000                                                                                                                                                            | 16774              |
| V <sup>1)</sup>    | 50.911                                                                   | 32846              | 44.910                                                                                                                                                            | 28968              |
| W <sup>1)</sup>    | 73.070                                                                   | 47144              | 64.450                                                                                                                                                            | 41583              |

<sup>1)</sup> Orifices V and W are not specified in API Standard 526 and are a definition by IMI Bopp & Reuther.

# Si 830

## Sample size calculation for a safety valve in gas service acc. to API 520

### Fluid

Natural gas

### Temperature T

80 °C = 353,15 K

### Isentropic exponent k

1.27

### Molar mass M

19.0 kg / kmol

### Compressibility factor Z

1.0

### Set pressure

1500 kPa g

### Relieving pressure $P_1$ at 10% accumulation

$(1500 \times 1.1) + 101 = 1751$  kPa a

### Back pressure $P_2$

600 kPa g (superimposed var.)

### Required capacity W

24000 kg/hr

The following SI unit equation is used for sizing the required area for critical gas flow:

$$A = \frac{W}{C K_d P_1 K_b K_c} \sqrt{\frac{T Z}{M}}$$

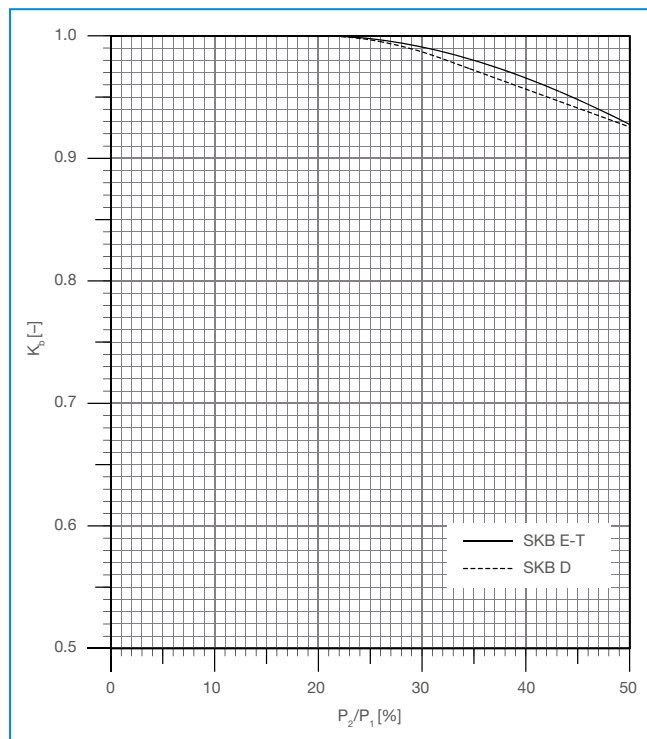
With no upstream rupture disc being used  $K_c = 1$ .

For Si 8 series the back pressure correction factor  $K_b$  can be read from below curve. With  $P_2/P_1 = 0.4$  the factor  $K_b$  is 0.965.

The value of coefficient C can be obtained from API 520, figure 32 or table 8, with  $k = 1.27$  the coefficient  $C = 0.0261$  for SI units.

$$A_{\text{required}} = \frac{24000}{0.0261 \times 0.86 \times 1751 \times 0.965 \times 1} \sqrt{\frac{353.15 \times 1}{19}} = 2728 \text{ mm}^2$$

The certified area 3207 mm<sup>2</sup> is greater than the required area and orifice N a suitable selection. Due to the superimposed back pressure a balanced bellows design is required and the safety valve Si 8403 G 00, NPS 4 Cl. 300 x NPS 6 Cl. 150, orifice N is suitable for the application.



This curve shows the capacity correction factor  $K_b$  due to backpressure for gas and vapour applicable to series Si 8 valves and is based on flow test results. The factor considers the capacity decreasing impact of back pressure during relief and shall be used for orifice sizing and capacity calculation acc. to API 520 und ASME VIII. The shown factor  $K_b$  is applicable also for relieving pressures below 50 psi (3.45 bar) and for conventional design Si 83 safety relief valves.

$P_1$  = Relieving pressure, absolute (Set pressure + allowable overpressure + atmospheric pressure)

$P_2$  = Back pressure, absolute

Back pressure correctur factor  $K_b$  for gas and vapours

# Si 830

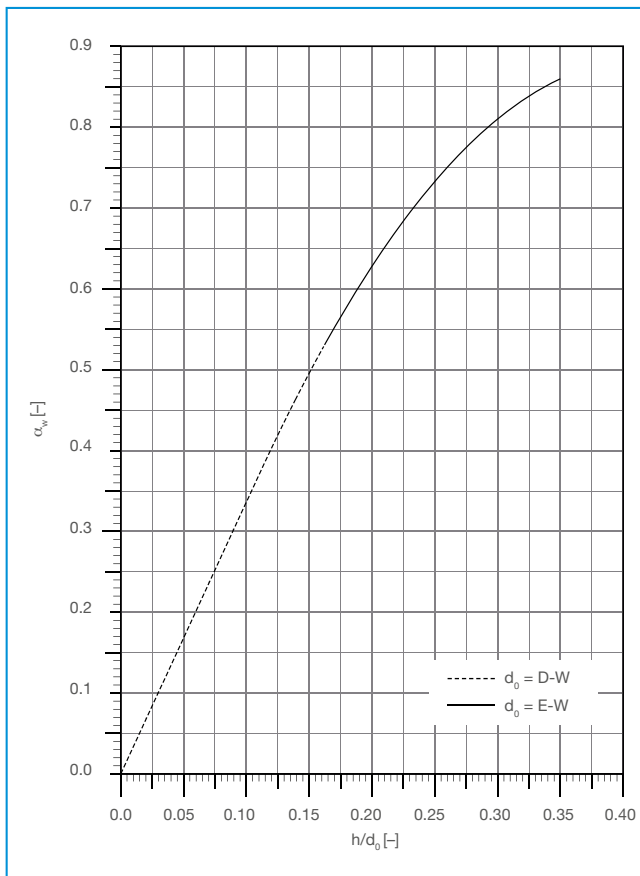
## Coefficient of discharge acc. VdTÜV and PED

| Fluid group             | Inlet size                          | Flow diameter                             | $h/d_0 \geq$  | $p_b/p_0 \leq$ | $\alpha_w$     |
|-------------------------|-------------------------------------|-------------------------------------------|---------------|----------------|----------------|
| Vapours / gases (D / G) | NPS 1 to NPS 1½<br>NPS 1 bis NPS 12 | 13.6 mm (D)<br>13.6 mm to 245 mm (E to W) | 0.162<br>0.35 | 0.2            | 0.53<br>0.86   |
| Liquids (F)             | NPS 1 to NPS 1½<br>NPS 1 bis NPS 12 | 13.6 mm (D)<br>13.6 mm to 245 mm (E to W) | 0.162<br>0.35 | 0.2            | 0.366<br>0.643 |

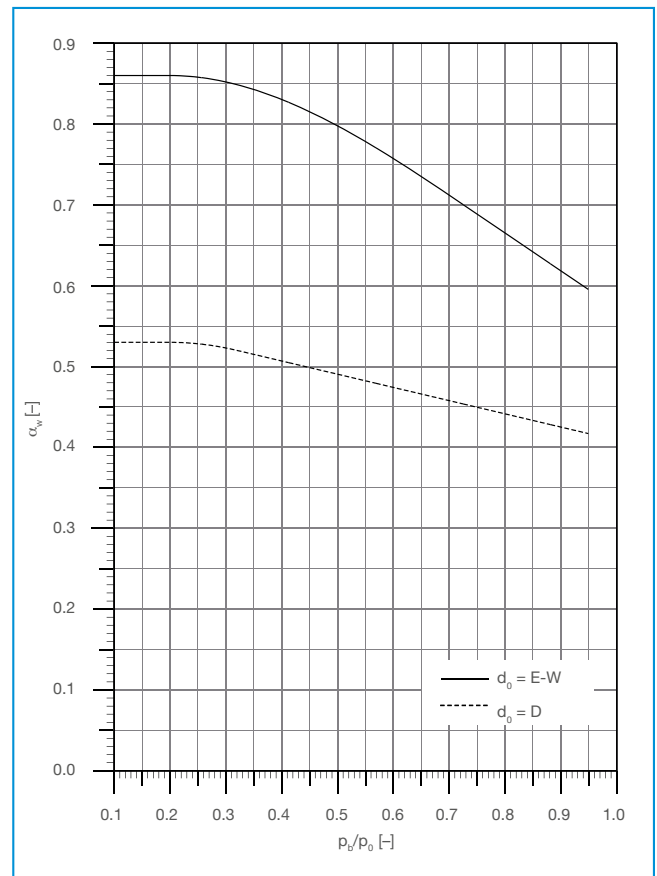
The flow areas and orifice designator detailed on previous page for API/ASME are as well applicable for certification and calculation acc. to DIN EN ISO 4126 and AD200-Merkblatt A2.

The coefficient of discharge for gases / vapours in a pressure ratio of  $p_b / p_0 > 0.2$  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 required ratio  $h/d_0$  is shown in the diagram below, and the reduced lift calculated with  $h_{(\text{reduced})} = d_0 \times (h/d_0)$ .



Si 830 coefficient of discharge  $\alpha_w$  depending on  $h/d_0$  for gases and vapours



Si 830 coefficient of discharge  $\alpha_w$  depending on  $p_b/p_0$  for gases and vapours

# Si 830

## Sample size calculation for a safety valve in gas service acc. to DIN EN ISO 4126-7

### Fluid

Natural gas

### Temperature $T_0$

80 °C = 353.15 K

### Isentropic exponent $k$

1.27

### Molar mass $M$

19.0 kg/kmol

### Compressibility factor $Z$

1.0

### Set pressure

15.0 bar g

### Relieving pressure $p_0$ at 10% accumulation

$(15.0 \times 1.1) + 1.01 = 17.51$  bar a

### Back pressure $p_b$

6.0 bar g (superimposed var.)

### Required capacity $q_m$

24000 kg/hr

As the condition for critical flow

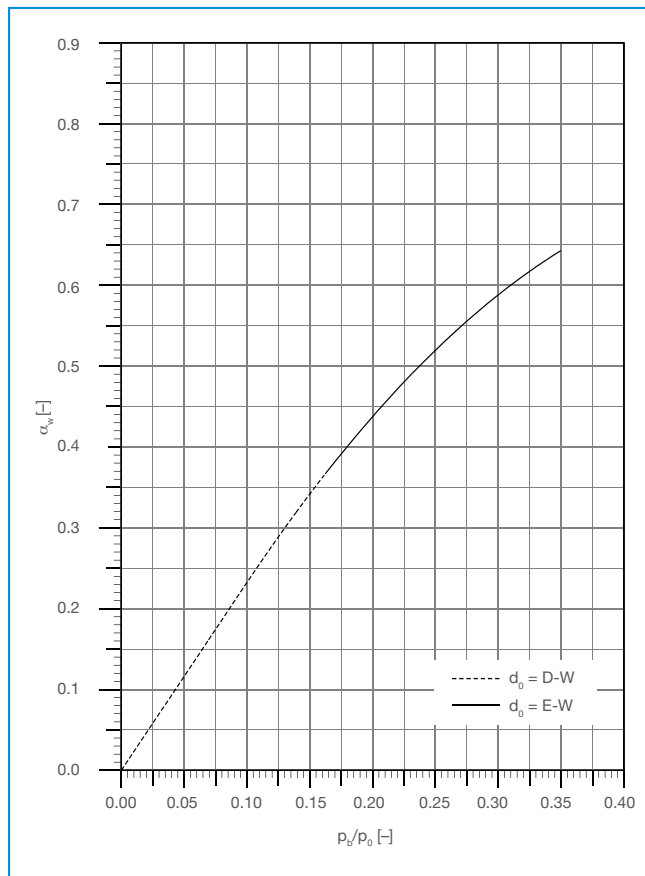
$$p_b \leq \left( \frac{2}{k+1} \right)^{\frac{k}{k-1}} p_0 \text{ is met in the example, the following applies: } A = \frac{q_m}{p_0 C K_{dr} \sqrt{\frac{M}{Z T_0}}}$$

The value of coefficient  $C$  can be obtained from DIN EN ISO 4126-7, figure 11 or table 3, with  $k = 1.27$  the coefficient  $C = 2.613$ .

Using the pressure ratio  $p_b/p_0 = 0.4$  the certified coefficient of discharge can be read as  $K_{dr} = 0.83$  in diagram "Si 830 coefficient of discharge  $\alpha_w$  depending on  $p_b/p_0$  for gases and vapours".

$$A = \frac{24000}{17.71 \times 2.613 \times 0.83 \sqrt{\frac{19}{1.0 \times 353.1}}} = 2725 \text{ mm}^2$$

The certified area 3207 mm<sup>2</sup> is greater than the required area and orifice N a suitable selection. Due to the superimposed back pressure a balanced bellows design is required and the safety valve Si 8403 G 00, NPS 4 Cl. 300 x NPS 6 Cl. 150, orifice N is suitable for the application.



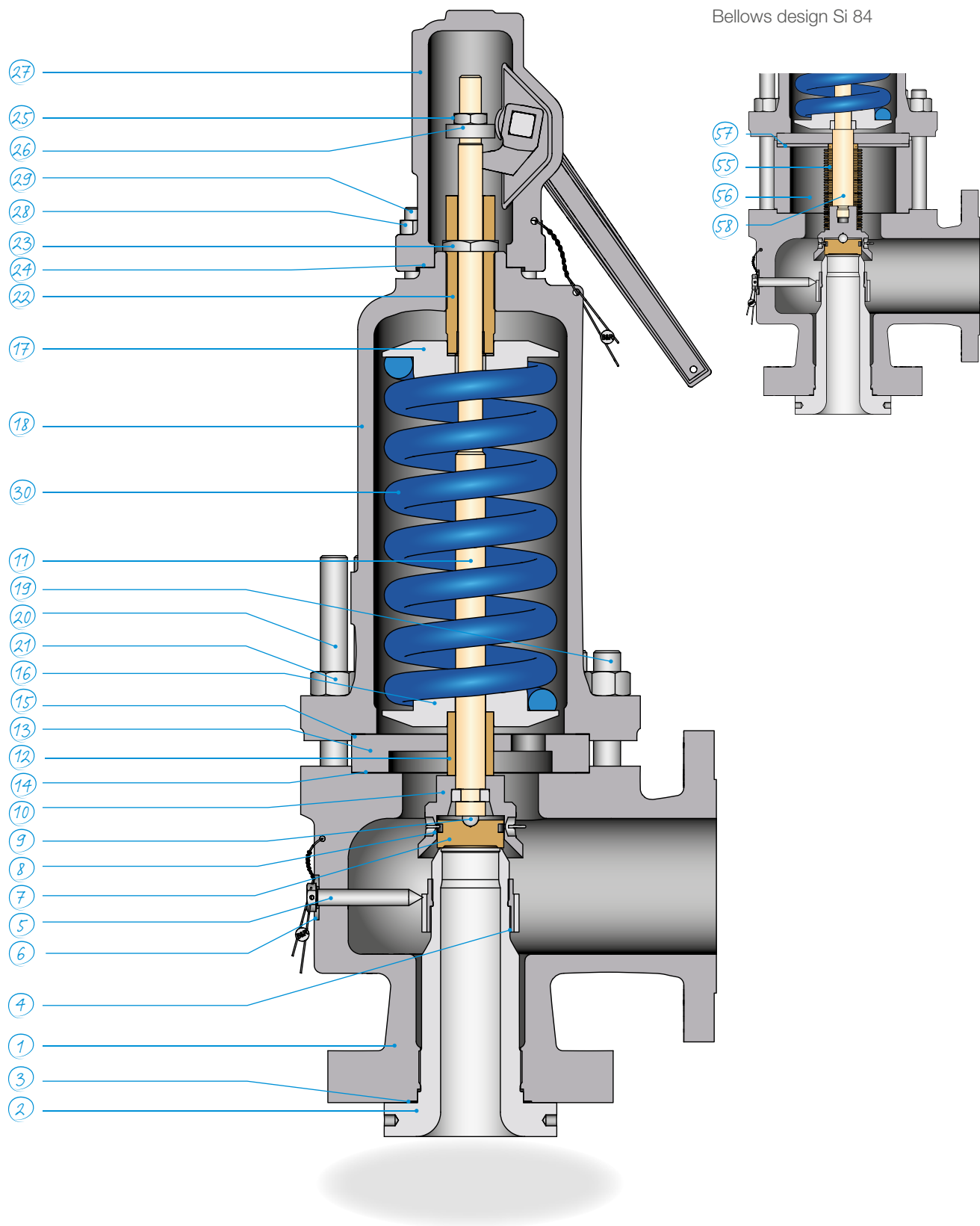
The coefficients of discharge  $K_{dr}$  acc. to DIN EN ISO 4126-1 for this valve series are identical with above coefficients of discharge  $\alpha_w$  and the values in the diagrams.

- $h$  = 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 830 coefficient of discharge  $\alpha_w$  depending on  $p_b/p_0$  for liquid

# Si 830

Material code



# Si 830

| Material code                 |                       |            | 00                                                     | 01                                                     | 22                                                     | 04                                                           |
|-------------------------------|-----------------------|------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------|
| Temperature application range |                       |            | Standard<br>20 °F to 800 °F<br>-29 °C to 427 °C        | High temp.<br>-20 °F to 1000 °F<br>-29 °C to 538 °C    | Low temp.<br>-51 °F to 800 °F<br>(-46 °C to 427 °C )   | Low temp.<br>-450 °F to 1000 °F<br>-268 °C to 538 °C         |
| Part                          | Name                  | Spare part | Material                                               | Material                                               | Material                                               | Material                                                     |
| 1                             | Body                  |            | SA-216 WCB 1.0619                                      | SA-217M WC6 1.7357                                     | SA 352 LCB 1.6220                                      | SA-351 CF8M 1.4408                                           |
| 2                             | Nozzle                | *3         | SA-182M Gr. 316L <sup>1)</sup><br>1.4404 <sup>1)</sup> | SA-479 Gr. 316Ti <sup>1)</sup><br>1.4571 <sup>1)</sup> | SA-182M Gr. 316L <sup>1)</sup><br>1.4404 <sup>1)</sup> | SA-182M Gr. 316L <sup>1) 4)</sup><br>1.4404 <sup>1) 4)</sup> |
| 3                             | Flat gasket           | *1, 2, 3   | 1.4401 / Graphite                                      | 1.4401 / Graphite                                      | 1.4401 / Graphite                                      | 1.4401 / Graphite                                            |
| 4                             | Nozzle ring           |            | SA-351 CF8M 1.4408                                     | SA-351 CF8M 1.4408                                     | SA-351 CF8M 1.4408                                     | SA-351 CF8M 1.4408                                           |
| 5                             | Set screw             |            | A4-70                                                  | A4-70                                                  | A4-70                                                  | A4-70                                                        |
| 6                             | Flat gasket           | *1, 2, 3   | 1.4401 / Graphite                                      | 1.4401 / Graphite                                      | 1.4401 / Graphite                                      | 1.4401 / Graphite                                            |
| 7                             | Disc                  | *2, 3      | SA-479M Type 316 L<br>1.4404                           | SA-479M Type 316 L<br>1.4404                           | SA-479M Type 316 L<br>1.4404                           | SA-479M Type 316 L<br>1.4404                                 |
| 8                             | Disc retainer         |            | SA-479M Type 316 L<br>1.4404                           | SA-479M Type 316 L<br>1.4404                           | SA-479M Type 316 L<br>1.4404                           | SA-479M Type 316 L<br>1.4404                                 |
| 9                             | Ball                  |            | Stainless steel                                        | Stainless steel                                        | Stainless steel                                        | Ceramic                                                      |
| 10                            | Disc holder           |            | MT 440 <sup>2) 5)</sup> 1.4122                         | MT 440 <sup>2) 5)</sup> 1.4122                         | MT 440 <sup>2) 5)</sup> 1.4122                         | SA-479M <sup>5)</sup> Type 316 L<br>1.4404                   |
| 11                            | Spindle               |            | 420 1.4021                                             | 420 1.4021                                             | 420 1.4021                                             | SA-479M Type 316 L<br>1.4404                                 |
| 12                            | Guide bushing         |            | MT 440 <sup>2)</sup> 1.4122                            | MT 440 <sup>2)</sup> 1.4122                            | MT 440 <sup>2)</sup> 1.4122                            | SA-479M Type 316 L<br>1.4404                                 |
| 13                            | Guide                 |            | MT 440 <sup>2)</sup> 1.4122                            | MT 440 <sup>2)</sup> 1.4122                            | MT 440 <sup>2)</sup> 1.4122                            | SA-479M Type 316 L<br>1.4404                                 |
| 14                            | Flat gasket           | *1, 2, 3   | 1.4401 / Graphite                                      | 1.4401 / Graphite                                      | 1.4401 / Graphite                                      | 1.4401 / Graphite                                            |
| 15                            | Flat gasket           | *1, 2, 3   | 1.4401 / Graphite                                      | 1.4401 / Graphite                                      | 1.4401 / Graphite                                      | 1.4401 / Graphite                                            |
| 16                            | Spring washer, bottom |            | Carbon steel                                           | Carbon steel                                           | Carbon steel                                           | Stainless steel                                              |
| 17                            | Spring washer, top    |            | Carbon steel                                           | Carbon steel                                           | Carbon steel                                           | Stainless steel                                              |
| 18                            | Bonnet                |            | SA-216 WCB 1.0619                                      | SA-217M WC6 1.7357                                     | SA 352 LCB 1.6220                                      | SA-351 CF8M 1.4408                                           |
| 19                            | Stud, short           |            | SA 193M Gr. B7                                         | SA 193M Gr. B7                                         | SA 193M Gr. B8M                                        | SA-193M Gr. B8M                                              |
| 20                            | Stud, long            |            | SA 193M Gr. B7                                         | SA 193M Gr. B7                                         | SA 193M Gr. B8M                                        | SA-193M Gr. B8M                                              |
| 21                            | Hex nut, bonnet       |            | SA-194M Gr. 2H                                         | SA-194M GRADE 2H                                       | SA-194M GRADE 8M                                       | SA-194M GRADE 8M                                             |
| 22                            | Adjusting screw       |            | MT 440 <sup>2)</sup> 1.4122                            | MT 440 <sup>2)</sup> 1.4122                            | MT 440 <sup>2)</sup> 1.4122                            | SA-479M Type 316 L<br>1.4404                                 |
| 23                            | Adj. screw nut        |            | MT 440 <sup>2)</sup> 1.4122                            | MT 440 <sup>2)</sup> 1.4122                            | MT 440 <sup>2)</sup> 1.4122                            | SA-479M Type 316 L<br>1.4404                                 |
| 24                            | Flat gasket           | *1, 2, 3   | 1.4401 / Graphite                                      | 1.4401 / Graphite                                      | 1.4401 / Graphite                                      | 1.4401 / Graphite                                            |
| 25                            | Spindle nut           |            | Carbon steel                                           | Carbon steel                                           | Carbon steel                                           | SA-479M Type 316 L<br>1.4404                                 |
| 26                            | Nut                   |            | SA-194M GRADE 2H                                       | SA-194M GRADE 2H                                       | SA-194M GRADE 2H                                       | SA-194M GRADE 8M                                             |
| 27                            | Cap                   |            | SA-216 WCB 1.0619                                      | SA-216 WCB 1.0619                                      | SA 352 LCB 1.6220                                      | SA-351 CF8M 1.4408                                           |
| 28                            | Stud                  |            | SA 193M Gr. B7                                         | SA 193M Gr. B7                                         | SA 193M Gr. B8M                                        | SA-193M Gr. B8M                                              |
| 29                            | Hex nut, cap          |            | SA-194M Gr. 2H                                         | SA-194M GRADE 2H                                       | SA-194M GRADE 8M                                       | SA-194M GRADE 8M                                             |
| 30                            | Spring                | *3         | Alloy steel                                            | Alloy steel                                            | Alloy steel                                            | ASTM 302 <sup>3)</sup> 1.4310 <sup>3)</sup>                  |
| 55                            | Bellows               | *3         | 1.4404<br>SA-479M Type 316 L                           | 1.4404<br>SA-479M Type 316 L                           | 1.4404<br>SA-479M Type 316 L                           | 1.4404<br>SA-479M Type 316 L                                 |
| 56                            | Intermediate bush     |            | 1.0619 SA-216 WCB                                      | 1.7357 SA-217M WC6                                     | 1.0417 SA 352 LCB                                      | 1.4408 SA-351 CF8M                                           |
| 57                            | Top plate             |            | 1.4404<br>SA-479M Type 316 L                           | 1.4404<br>SA-479M Type 316 L                           | 1.4404<br>SA-479M Type 316 L                           | 1.4404<br>SA-479M Type 316 L                                 |
| 58                            | Lift stop bushing     |            | 1.4404<br>SA-479M Type 316 L                           | 1.4404<br>SA-479M Type 316 L                           | 1.4404<br>SA-479M Type 316 L                           | 1.4404<br>SA-479M Type 316 L                                 |

<sup>1)</sup> For orifice Q; R; T the nozzle material is

CF8M / 1.4408

<sup>2)</sup> X 39 CrMo 17-1

<sup>3)</sup> In case of large valve size and high pressure spring material may be Chrome steel nickel plated

<sup>4)</sup> In case the Temperature is above 427 °C, the nozzle material is SA 479 Gr. 316Ti/1.4571

<sup>5)</sup> For orifice Q; R; T the disc holder material is CF8M / 1.4408

#### Spare Parts:

\*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.

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.

# Trim code

## Si 8 Monel

Monel is a nickel and copper based alloy mainly used in offshore applications and alkylation reactions. The material shows high corrosion resistance against fluids like sea-water, distilled water, most of organic acids, sulphuric and hydrofluoric acid, alkaline solution, ammonium sulfate (NH<sub>2</sub>SO<sub>4</sub> fertilizer),

ammonium chloride (NH<sub>4</sub>Cl salmiak), neutral and alkaline saline solution, hydrofluoric acid (HF) and mercury (Hg). The high temperature strength may be another reason to select Monel. The loss of heat resistance is small up to a temperature of 400° C.

At low pressure and low temperature the selection of Monel for medium wetted parts in closed safety valve position may be sufficient (trim code M1). Trim codes (M2) or (M3) are applicable at high corrosion resistance requirements.

| Trim code               |                   | M1                                                   |                             | M2                                                                                                        |                             | M3                                           |                             |
|-------------------------|-------------------|------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------|----------------------------------------------|-----------------------------|
|                         |                   | Monel for wetted parts in valve closed position only |                             | (For bellows valves Si 84 only)<br>Monel for all trim parts within the flow chamber sealed by the bellows |                             | All trim parts in Monel                      |                             |
| Ref. No. on the drawing | Part Name         | Material                                             | Material ASME               | Material                                                                                                  | Material ASME               | Material                                     | Material ASME               |
| 1                       | Body              |                                                      |                             |                                                                                                           |                             |                                              |                             |
| 2                       | Nozzle            | 2.4360                                               | SB-564 (N04400) (Monel 400) | 2.4360                                                                                                    | SB-564 (N04400) (Monel 400) | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 3                       | Flat gasket       |                                                      |                             |                                                                                                           | Monel/Graphite              |                                              | Monel/Graphite              |
| 4                       | Nozzle ring       |                                                      |                             | 2.4360                                                                                                    | SB-564 (N04400) (Monel 400) | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 5                       | Set screw         |                                                      |                             | 2.4360                                                                                                    | SB-564 (N04400) (Monel 400) | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 6                       | Gasket            |                                                      |                             | 2.4360                                                                                                    | SB-564 (N04400) (Monel 400) | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 7                       | Disc              | 2.4375                                               | B865 (N05500) (Monel 500)   | 2.4375                                                                                                    | B865 (N05500) (Monel 500)   | 2.4375                                       | B865 (N05500) (Monel 500)   |
| 8                       | Disc retainer     | 2.4375                                               | B865 (N05500) (Monel 500)   | 2.4375                                                                                                    | B865 (N05500) (Monel 500)   | 2.4375                                       | B865 (N05500) (Monel 500)   |
| 9                       | Ball              |                                                      | Ceramic                     | Ceramic (B865 (N05500) / (Monel 500) available upon request)                                              |                             |                                              |                             |
| 10                      | Disc holder       |                                                      |                             | 2.4360                                                                                                    | SB-564 (N04400) (Monel 400) | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 11                      | Spindle           | 1.4404                                               | SA-479M Type 316 L          |                                                                                                           |                             | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 12                      | Guide bushing     | 1.4404                                               | SA-479M Type 316 L          |                                                                                                           |                             | 2.4375                                       | B865 (N05500) (Monel 500)   |
| 13                      | Guide             | 1.4404                                               | SA-479M Type 316 L          |                                                                                                           |                             | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 14, 15                  | Flat gasket       |                                                      |                             |                                                                                                           | Monel/Graphite              |                                              | Monel/Graphite              |
| 16                      | Spring washer     |                                                      |                             |                                                                                                           |                             | 1.4404                                       | SA-479M Type 316 L          |
| 17                      | Spring            |                                                      |                             |                                                                                                           |                             | Inconel X750 or Monel available upon request |                             |
| 22                      | Adjusting screw   | 1.4404                                               | SA-479M Type 316 L          |                                                                                                           |                             | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 23                      | Adj. screw nut    |                                                      |                             |                                                                                                           |                             | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 24                      | Gasket            |                                                      |                             |                                                                                                           |                             |                                              | Monel/Graphite              |
| 25                      | Spindle nut       |                                                      |                             |                                                                                                           |                             | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 26                      | Nut               |                                                      |                             |                                                                                                           |                             | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 27                      | Cap               |                                                      |                             |                                                                                                           |                             |                                              |                             |
| 55                      | Bellows           |                                                      |                             | 2.4360                                                                                                    | SB-564 (N04400) (Monel 400) | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 56                      | Intermediate bush |                                                      |                             |                                                                                                           |                             |                                              |                             |
| 57                      | Top plate         |                                                      |                             | 2.4360                                                                                                    | SB-564 (N04400) (Monel 400) | 2.4360                                       | SB-564 (N04400) (Monel 400) |
| 58                      | Lift stop bushing |                                                      |                             |                                                                                                           |                             | 2.4360                                       | SB-564 (N04400) (Monel 400) |

The trim materials indicated above are the variations from standard materials of construction. The trim codes can be selected with any standard material class. Valve type Si 8303 G 00 with standard WCB body/bonnet design material class 00 will change to Si 8303 G 00M3 for trim parts in Monel.

# Trim code

## Si 8 Hastelloy

Hastelloy C is a highly corrosion resistant nickel-chromium-molybdenum alloy and is characterized by high resistance to crevice corrosion, pitting corrosion and stress corrosion cracking in oxidizing and reducing media. The material shows good corrosion resistance to strong oxidizing agents such

as iron (III) chloride and copper (II) chloride, hot media, such as sulfuric acid, nitric acid, phosphoric acid, chlorine (dry), formic acid and acetic acid. Hastelloy is also good resistant to moist chlorine gas, sodium hypochlorite and chlorine dioxide.

At low pressure and low temperature the selection of Hastelloy for medium wetted parts in closed safety valve position may be sufficient (trim code H1). Trim codes (H2) or (H3) are applicable at high corrosion resistance requirements.

| Trim code               |                   | H1                                                       | H2                                                                                                     |          | H3                          |                                                    |                       |
|-------------------------|-------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------|----------|-----------------------------|----------------------------------------------------|-----------------------|
|                         |                   | Hastelloy for wetted parts in valve closed position only | (For bellows valves only)<br>Hastelloy for all trim parts within the flow chamber sealed by the bellow |          | All trim parts in Hastelloy |                                                    |                       |
| Ref. No. on the drawing | Part Name         | Material                                                 | Material ASME                                                                                          | Material | Material ASME               | Material                                           | Material ASME         |
| 1                       | Body              |                                                          |                                                                                                        |          |                             |                                                    |                       |
| 2                       | Nozzle            | 2.4819                                                   | Hastelloy C-276                                                                                        | 2.4819   | Hastelloy C-276             | 2.4819                                             | Hastelloy C-276       |
| 3                       | Flat gasket       |                                                          |                                                                                                        |          | Monel/Graphite              |                                                    |                       |
| 4                       | Nozzle ring       |                                                          |                                                                                                        | 2.4819   | Hastelloy C-276             | 2.4819                                             | Hastelloy C-276       |
| 5                       | Set screw         |                                                          |                                                                                                        | 2.4819   | Hastelloy C-276             | 2.4819                                             | Hastelloy C-276       |
| 6                       | Gasket            |                                                          |                                                                                                        | 2.4360   | Monel / Graphite            | 2.4360                                             | Monel/Graphite        |
| 7                       | Disc              | 2.4819                                                   | Hastelloy C-276                                                                                        | 2.4819   | Hastelloy C-276             | 2.4819                                             | Hastelloy C-276       |
| 8                       | Disc retainer     |                                                          | Hastelloy C (Ni 6275)                                                                                  |          | Hastelloy C (Ni 6275)       | -                                                  | Hastelloy C (Ni 6275) |
| 9                       | Ball              | Ceramic                                                  |                                                                                                        |          |                             |                                                    |                       |
| 10                      | Disc holder       |                                                          |                                                                                                        | 2.4819   | Hastelloy C-276             | 2.4819                                             | Hastelloy C-276       |
| 11                      | Spindle           | 1.4404                                                   | SA-479M Type 316 L                                                                                     |          |                             | 2.4819                                             | Hastelloy C-276       |
| 12                      | Guide bushing     | 1.4404                                                   | SA-479M Type 316 L                                                                                     |          |                             | 2.4819                                             | Hastelloy C-276       |
| 13                      | Guide             | 1.4404                                                   | SA-479M Type 316 L                                                                                     |          |                             | 2.4819                                             | Hastelloy C-276       |
| 14, 15                  | Flat gasket       |                                                          |                                                                                                        |          | Monel/Graphite              |                                                    |                       |
| 16                      | Spring washer     |                                                          |                                                                                                        | 1.4404   | SA-479M Type 316 L          | 1.4404                                             | SA-479M Type 316 L    |
| 17                      | Spring            |                                                          |                                                                                                        |          |                             | Inconel X750 or Hastelloy C available upon request |                       |
| 22                      | Adjusting screw   | 1.4404                                                   | SA-479M Type 316 L                                                                                     |          |                             | 2.4819                                             | Hastelloy C-276       |
| 23                      | Adj. screw nut    |                                                          |                                                                                                        |          |                             | 2.4819                                             | Hastelloy C-276       |
| 24                      | Gasket            |                                                          |                                                                                                        |          |                             |                                                    | Monel/Graphite        |
| 25                      | Spindle nut       |                                                          |                                                                                                        |          |                             | 2.4819                                             | Hastelloy C-276       |
| 26                      | Nut               |                                                          |                                                                                                        |          |                             | 2.4819                                             | Hastelloy C-276       |
| 27                      | Cap               |                                                          |                                                                                                        |          |                             |                                                    |                       |
| 55                      | Bellows           |                                                          |                                                                                                        | 2.4819   | Hastelloy C-276             | 2.4819                                             | Hastelloy C-276       |
| 56                      | Intermediate bush |                                                          |                                                                                                        |          |                             |                                                    |                       |
| 57                      | Top plate         |                                                          |                                                                                                        | 2.4819   | Hastelloy C-276             | 2.4819                                             | Hastelloy C-276       |
| 58                      | Lift stop bushing |                                                          |                                                                                                        |          |                             | 2.4819                                             | Hastelloy C-276       |

The trim materials indicated above are the variations from standard materials of construction. The trim codes can be selected with any standard material class. Valve type Si 8403 G 00 with standard WCB body/bonnet design material class 00 will be change to Si 8403 G 00H2 for trim parts in Hastelloy.

# Trim code

## Si 8 Duplex

Duplex is frequently used in offshore installations in the oil and gas production as well as onshore plants. Duplex is resistant to corrosive media, such as CO<sub>2</sub>, H<sub>2</sub>S,

chlorides, low pH value fluids and corrosive environment. The increased strength may be another reason for selection.

At low pressure and low temperature, it may suffice that the wetted parts in the closed valve position are made of Duplex (code D1), at high risk of corrosion codes D2 or D3 are preferred.

| Trim code               |                   | D1                                                    |                                 | D2                                                                                                   |                                 | D3                       |                                 |
|-------------------------|-------------------|-------------------------------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------|---------------------------------|--------------------------|---------------------------------|
|                         |                   | Duplex for wetted parts in valve closed position only |                                 | (For bellows valves only)<br>Duplex for all trim parts within the flow chamber sealed by the bellows |                                 | All trim parts in Duplex |                                 |
| Ref. No. on the drawing | Part Name         | Material                                              | Material ASME                   | Material                                                                                             | Material ASME                   | Material                 | Material ASME                   |
| 1                       | Body              |                                                       |                                 |                                                                                                      |                                 |                          |                                 |
| 2                       | Nozzle            | 1.4462                                                | SA-182M Grade F51<br>UNS S31803 | 1.4462                                                                                               | SA-182M Grade F51<br>UNS S31803 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |
| 3                       | Flat gasket       |                                                       |                                 |                                                                                                      | Monel/Graphite                  |                          | Monel/Graphite                  |
| 4                       | Nozzle ring       |                                                       |                                 | 1.4462                                                                                               | SA-182M Grade F51<br>UNS S31803 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |
| 5                       | Set screw         |                                                       |                                 | 1.4462                                                                                               | SA-182M Grade F51<br>UNS S31803 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |
| 6                       | Gasket            |                                                       |                                 |                                                                                                      | Monel/Graphite                  |                          | Monel/Graphite                  |
| 7                       | Disc              | 1.4462                                                | SA-182M Grade F51<br>UNS S31803 | 1.4462                                                                                               | SA-182M Grade F51<br>UNS S31803 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |
| 8                       | Disc retainer     | 2.4669                                                | Inconel X750                    | 2.4669                                                                                               | Inconel X750                    | 2.4669                   | Inconel X750                    |
| 9                       | Ball              |                                                       |                                 |                                                                                                      | Ceramic                         |                          |                                 |
| 10                      | Disc holder       |                                                       |                                 |                                                                                                      | Inconel 625                     |                          | UNS S31803 or<br>Inconel 625    |
| 11                      | Spindle           | 1.4404                                                | SA-479M Type 316 L              |                                                                                                      |                                 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |
| 12                      | Guide bushing     | 1.4404                                                | SA-479M Type 316 L              |                                                                                                      |                                 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |
| 13                      | Guide             | 1.4404                                                | SA-479M Type 316 L              |                                                                                                      |                                 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |
| 14, 15                  | Flat gasket       |                                                       |                                 |                                                                                                      | Monel/Graphite                  |                          | Monel/Graphite                  |
| 16                      | Spring washer     |                                                       |                                 | 1.4404                                                                                               | SA-479M Type 316 L              |                          |                                 |
| 17                      | Spring            |                                                       |                                 |                                                                                                      |                                 |                          |                                 |
| 22                      | Adjusting screw   | 1.4404                                                | SA-479M Type 316 L              |                                                                                                      |                                 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |
| 23                      | Adj. screw nut    |                                                       |                                 |                                                                                                      |                                 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |
| 24                      | Gasket            |                                                       |                                 |                                                                                                      |                                 |                          | Monel/Graphite                  |
| 25                      | Spindle nut       |                                                       |                                 |                                                                                                      |                                 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |
| 26                      | Nut               |                                                       |                                 |                                                                                                      |                                 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |
| 27                      | Cap               |                                                       |                                 |                                                                                                      |                                 |                          |                                 |
| 55                      | Bellows           |                                                       |                                 | 2.4856                                                                                               | Inconel 625                     | 2.4856                   | Inconel 625                     |
| 56                      | Intermediate bush |                                                       |                                 |                                                                                                      |                                 |                          |                                 |
| 57                      | Top plate         |                                                       |                                 | 2.4856                                                                                               | Inconel 625                     | 2.4856                   | Inconel 625                     |
| 58                      | Lift stop bushing |                                                       |                                 |                                                                                                      |                                 | 1.4462                   | SA-182M Grade F51<br>UNS S31803 |

The trim materials indicated above are the variations from standard materials of construction. The trim codes can be selected with any standard material class. Valve type Si 8303 G 00 with standard WCB body/bonnet design material class 00 will be changed to Si 8303 G 00D3 for trim parts in Duplex.

# Trim code

## Si 8 NACE

NACE Standards MR0103-2012 and NACE MR0175/ISO 15156 can be applied to systems processing sour gas, provided the absolute pressure is equal or greater 65 psi (0,45 MPa) and H<sub>2</sub>S partial pressure is equal or greater 0.05 psi (0,3 kPa). In op-

tions N3 or N4 it behaves like the described absolute pressure and the H<sub>2</sub>S partial pressure in the outlet zone under operating (constant back pressure) or relieving conditions. Otherwise, Options Trim Code N1 or Trim Code N2 can be applied.

Note:

Guidance to calculation of H<sub>2</sub>S partial pressure:

P = is the total absolute pressure in the system (MPa)

C<sub>H<sub>2</sub>S</sub> = is the mole fraction of H<sub>2</sub>S (%)

$$P_{H_2S} = P \cdot \frac{C_{H_2S}}{100}$$

| Trim code               |                   | N1                                                                           |                  | N2                                                      |                  | N3                                                             |                  | N4                                                                 |                  |
|-------------------------|-------------------|------------------------------------------------------------------------------|------------------|---------------------------------------------------------|------------------|----------------------------------------------------------------|------------------|--------------------------------------------------------------------|------------------|
|                         |                   | (conventional valves)<br>Outlet not under sour gas exposure. See note above. |                  | (bellows valves)<br>Outlet not under sour gas exposure. |                  | (conventional valves)<br>Valve outlet under sour gas exposure. |                  | (bellows valves)<br>Valve outlet pressure under sour gas exposure. |                  |
| Ref. No. on the drawing | Part Name         | Material                                                                     | Material ASME    | Material                                                | Material ASME    | Material                                                       | Material ASME    | Material                                                           | Material ASME    |
| 1                       | Body              |                                                                              |                  |                                                         |                  |                                                                |                  |                                                                    |                  |
| 2                       | Nozzle            | 1.4404                                                                       | SA-182M Gr. 316L | 1.4404                                                  | SA-182M Gr. 316L | 1.4404                                                         | SA-182M Gr. 316L | 1.4404                                                             | SA-182M Gr. 316L |
| 3                       | Flat gasket       |                                                                              |                  |                                                         |                  |                                                                |                  |                                                                    |                  |
| 4                       | Nozzle ring       |                                                                              |                  |                                                         |                  | 1.4408                                                         | SA-351 CF8M      | 1.4408                                                             | SA-351 CF8M      |
| 5                       | Set screw         |                                                                              |                  |                                                         |                  | 1.4404                                                         | SA-182M Gr. 316L | 1.4404                                                             | SA-182M Gr. 316L |
| 6                       | Gasket            |                                                                              |                  |                                                         |                  |                                                                |                  |                                                                    |                  |
| 7                       | Disc              | 1.4404                                                                       | SA-182M Gr. 316L | 1.4404                                                  | SA-182M Gr. 316L | 1.4404                                                         | SA-182M Gr. 316L | 1.4404                                                             | SA-182M Gr. 316L |
| 8                       | Disc retainer     |                                                                              |                  |                                                         |                  |                                                                |                  |                                                                    |                  |
| 9                       | Ball              |                                                                              |                  |                                                         |                  |                                                                |                  | Ceramic                                                            |                  |
| 10                      | Disc holder       |                                                                              |                  |                                                         |                  | 1.4404                                                         | SA-182M Gr. 316L | 1.4404                                                             | SA-182M Gr. 316L |
| 11                      | Spindle           |                                                                              |                  |                                                         |                  | 1.4404                                                         | SA-182M Gr. 316L |                                                                    |                  |
| 12                      | Guide bushing     |                                                                              |                  |                                                         |                  | 1.4404                                                         | SA-182M Gr. 316L |                                                                    |                  |
| 13                      | Guide             |                                                                              |                  |                                                         |                  | 1.4404                                                         | SA-182M Gr. 316L |                                                                    |                  |
| 14, 15                  | Flat gasket       |                                                                              |                  |                                                         |                  |                                                                |                  | 1.4401/Graphite                                                    |                  |
| 16                      | Spring washer     |                                                                              |                  |                                                         |                  | 1.4404                                                         | SA-182M Gr. 316L |                                                                    |                  |
| 17                      | Spring            |                                                                              |                  |                                                         |                  | 2.4669                                                         | Inconel X750     |                                                                    |                  |
| 22                      | Adjusting screw   |                                                                              |                  |                                                         |                  | 1.4404                                                         | SA-182M Gr. 316L |                                                                    |                  |
| 23                      | Adj. screw nut    |                                                                              |                  |                                                         |                  | 1.4404                                                         | SA-182M Gr. 316L |                                                                    |                  |
| 24                      | Gasket            |                                                                              |                  |                                                         |                  |                                                                |                  |                                                                    |                  |
| 25                      | Spindle nut       |                                                                              |                  |                                                         |                  | 1.4404                                                         | SA-182M Gr. 316L |                                                                    |                  |
| 26                      | Nut               |                                                                              |                  |                                                         |                  |                                                                | A4-70            |                                                                    |                  |
| 27                      | Cap               |                                                                              |                  |                                                         |                  |                                                                |                  |                                                                    |                  |
| 55                      | Bellows           |                                                                              |                  |                                                         |                  |                                                                |                  | 2.4856                                                             | Inconel 625      |
| 56                      | Intermediate bush |                                                                              |                  |                                                         |                  |                                                                |                  |                                                                    |                  |
| 57                      | Top plate         |                                                                              |                  |                                                         |                  |                                                                |                  | 1.4404                                                             | SA-182M Gr. 316L |
| 58                      | Lift stop bushing |                                                                              |                  |                                                         |                  | 1.4404                                                         | SA-182M Gr. 316L |                                                                    |                  |

The trim materials indicated above are the variations from standard materials of construction. The trim codes can be selected with any standard material class. Valve type Si 8303 G 00 with standard WCB body/bonnet design material class 00 will be change to Si 8303 G 00N1 for trim parts for NACE applications.

# Orifice D

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 4  | psig | 0.24 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 22 | psig | 1.5  | bar g |

## Effective area 0.110 in<sup>2</sup> / 71 mm<sup>2</sup>

| Inlet class           | 01                          | 02        | 03        | 04        | 05          | 06          | 07          |               |
|-----------------------|-----------------------------|-----------|-----------|-----------|-------------|-------------|-------------|---------------|
| Class                 | 150 x 150                   | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 300   | 1500 x 300  | 2500 x 300  |               |
| NPS Inlet x outlet    | 1" x 2"                     | 1" x 2"   | 1" x 2"   | 1" x 2"   | 1 1/2" x 2" | 1 1/2" x 2" | 1 1/2" x 3" |               |
| S1 [in]               | 4.50                        | 4.50      | 4.50      | 4.50      | 5.50        | 5.50        | 7.00        |               |
| S2 [in]               | 4.13                        | 4.13      | 4.13      | 4.13      | 4.13        | 4.13        | 5.50        |               |
| X [in]                | 1.73                        | 1.73      | 1.73      | 1.73      | 2.24        | 2.24        | 2.83        |               |
| H1 Si 81/83 [in]      | 17.32                       | 17.32     | 17.32     | 17.32     | 20.67       | 20.67       | 26.57       |               |
| H2 Si 84/85 [in]      | 19.09                       | 19.09     | 19.09     | 19.09     | 22.64       | 22.64       | 28.74       |               |
| Weight Si 81/83 [lbs] | 34                          | 36        | 36        | 36        | 62          | 62          | 106         |               |
| Weight Si 84/85 [lbs] | 36                          | 38        | 38        | 38        | 69          | 69          | 113         |               |
| Inlet temperature     | Max. set pressure [psig]    |           |           |           |             |             |             | Material code |
| -51 °F to -21 °F      | 266                         | 266       | 696       | 1392      | 2089        | 3481        | 5801        | 22 LCB        |
| -20 °F to 100 °F      | 285                         | 285       | 740       | 1480      | 2220        | 3705        | 6000        | 00 WCB        |
| 101 °F to 450 °F      | 185                         | 285       | 615       | 1235      | 1845        | 3080        | 5135        |               |
| 451 °F to 800 °F      | 80                          | 285       | 410       | 825       | 1235        | 2060        | 3430        | 01 WC6        |
| 451 °F to 800 °F      |                             |           | 510       | 1015      | 1525        | 2540        | 4230        |               |
| 801 °F to 1000 °F     |                             |           | 215       | 430       | 650         | 1080        | 1800        | 04 CF8M       |
| -450 °F to -76 °F     | 275                         | 275       | 720       | 1440      | 2160        | 3600        | 4000        |               |
| -75 °F to -21 °F      | 275                         | 275       | 720       | 1440      | 2160        | 3600        | 6000        |               |
| -20 °F to -100 °F     | 275                         | 275       | 720       | 1440      | 2160        | 3600        | 6000        |               |
| 101 °F to 450 °F      | 180                         | 275       | 495       | 975       | 1485        | 2480        | 4130        |               |
| 451 °F to 800 °F      | 80                          | 275       | 420       | 845       | 1265        | 2110        | 3520        |               |
| 801 °F to 1000 °F     | 20                          | 275       | 350       | 700       | 1050        | 1750        | 2915        |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |           |           |             |             |             |               |
| Si 81/83@100 °F       | 265                         | 265       | 265       | 265       | 600         | 600         | 695         | 22            |
| Si 81/83@100 °F       | 285                         | 285       | 285       | 285       | 600         | 600         | 740         | 00/01         |
| Si 81/83@100 °F       | 275                         | 275       | 275       | 275       | 600         | 600         | 720         | 04            |
| Si 84/85@100 °F       | 230                         | 230       | 230       | 230       | 500         | 500         | 500         | all           |

| Inlet class          | 01                           | 02        | 03        | 04        | 05          | 06          | 07          |               |
|----------------------|------------------------------|-----------|-----------|-----------|-------------|-------------|-------------|---------------|
| Class                | 150 x 150                    | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 300   | 1500 x 300  | 2500 x 300  |               |
| NPS Inlet x outlet   | 1" x 2"                      | 1" x 2"   | 1" x 2"   | 1" x 2"   | 1 1/2" x 2" | 1 1/2" x 2" | 1 1/2" x 3" |               |
| S1 [mm]              | 114.3                        | 114.3     | 114.3     | 114.3     | 139.7       | 139.7       | 177.8       |               |
| S2 [mm]              | 104.8                        | 104.8     | 104.8     | 104.8     | 104.8       | 104.8       | 139.7       |               |
| X [mm]               | 44                           | 44        | 44        | 44        | 57          | 57          | 72          |               |
| H1 Si 81/83 [mm]     | 440                          | 440       | 440       | 440       | 525         | 525         | 675         |               |
| H2 Si 84/85 [mm]     | 485                          | 485       | 485       | 485       | 575         | 575         | 730         |               |
| Weight Si 81/83 [kg] | 15                           | 16        | 16        | 16        | 28          | 28          | 48          |               |
| Weight Si 84/85 [kg] | 16                           | 17        | 17        | 17        | 31          | 31          | 51          |               |
| Inlet temperature    | Max. set pressure [bar g]    |           |           |           |             |             |             | Material code |
| -46 °C to -30 °C     | 18.3                         | 18.3      | 48.0      | 96.0      | 144.0       | 240.0       | 400.0       | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 19.7      | 51.0      | 102.0     | 153.1       | 255.5       | 413.7       | 00 WCB        |
| 39 °C to 232 °C      | 12.8                         | 19.7      | 42.4      | 85.2      | 127.2       | 212.4       | 354.0       |               |
| 233 °C to 427 °C     | 5.5                          | 19.7      | 28.3      | 56.9      | 85.2        | 142.0       | 236.5       | 01 WC6        |
| 233 °C to 427 °C     |                              |           | 35.2      | 70.0      | 105.1       | 175.1       | 291.6       |               |
| 428 °C to 538 °C     |                              |           | 14.8      | 29.6      | 44.8        | 74.5        | 124.1       | 04 CF8M       |
| -268 °C to -60 °C    | 19.0                         | 19.0      | 49.6      | 99.3      | 148.9       | 248.2       | 275.8       |               |
| -59 °C to -30 °C     | 19.0                         | 19.0      | 49.6      | 99.3      | 148.9       | 248.2       | 413.7       |               |
| -29 °C to 38 °C      | 19.0                         | 19.0      | 49.6      | 99.3      | 148.9       | 248.2       | 413.7       |               |
| 39 °C to 232 °C      | 12.4                         | 19.0      | 34.1      | 67.2      | 102.4       | 171.0       | 284.8       |               |
| 233 °C to 427 °C     | 5.5                          | 19.0      | 29.0      | 58.3      | 87.2        | 145.5       | 242.7       |               |
| 428 °C to 538 °C     | 1.4                          | 19.0      | 24.1      | 48.3      | 72.4        | 120.7       | 201.0       |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |           |           |             |             |             |               |
| Si 81/83@38 °C       | 18.3                         | 18.3      | 18.3      | 18.3      | 41.4        | 41.4        | 47.9        | 22            |
| Si 81/83@38 °C       | 19.7                         | 19.7      | 19.7      | 19.7      | 41.4        | 41.4        | 51.0        | 00/01         |
| Si 81/83@38 °C       | 19.0                         | 19.0      | 19.0      | 19.0      | 41.4        | 41.4        | 49.6        | 04            |
| Si 84/85@38 °C       | 15.9                         | 15.9      | 15.9      | 15.9      | 34.5        | 34.5        | 34.5        | all           |

**Si 81/83**

conventional

**Si 84/85**

with bellows

**Set Pressure [bar g]**

**Set Pressure [psig]**

**Inlet temperature [°F]**

**Inlet temperature [°C]**

**01 WC6**

**00 WCB**

**04 CF8M**

**07 Inconel 600**

**02**

**03**

**04**

**05**

**06**

**07**

# Orifice E

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 4  | psig | 0.24 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 22 | psig | 1.5  | bar g |

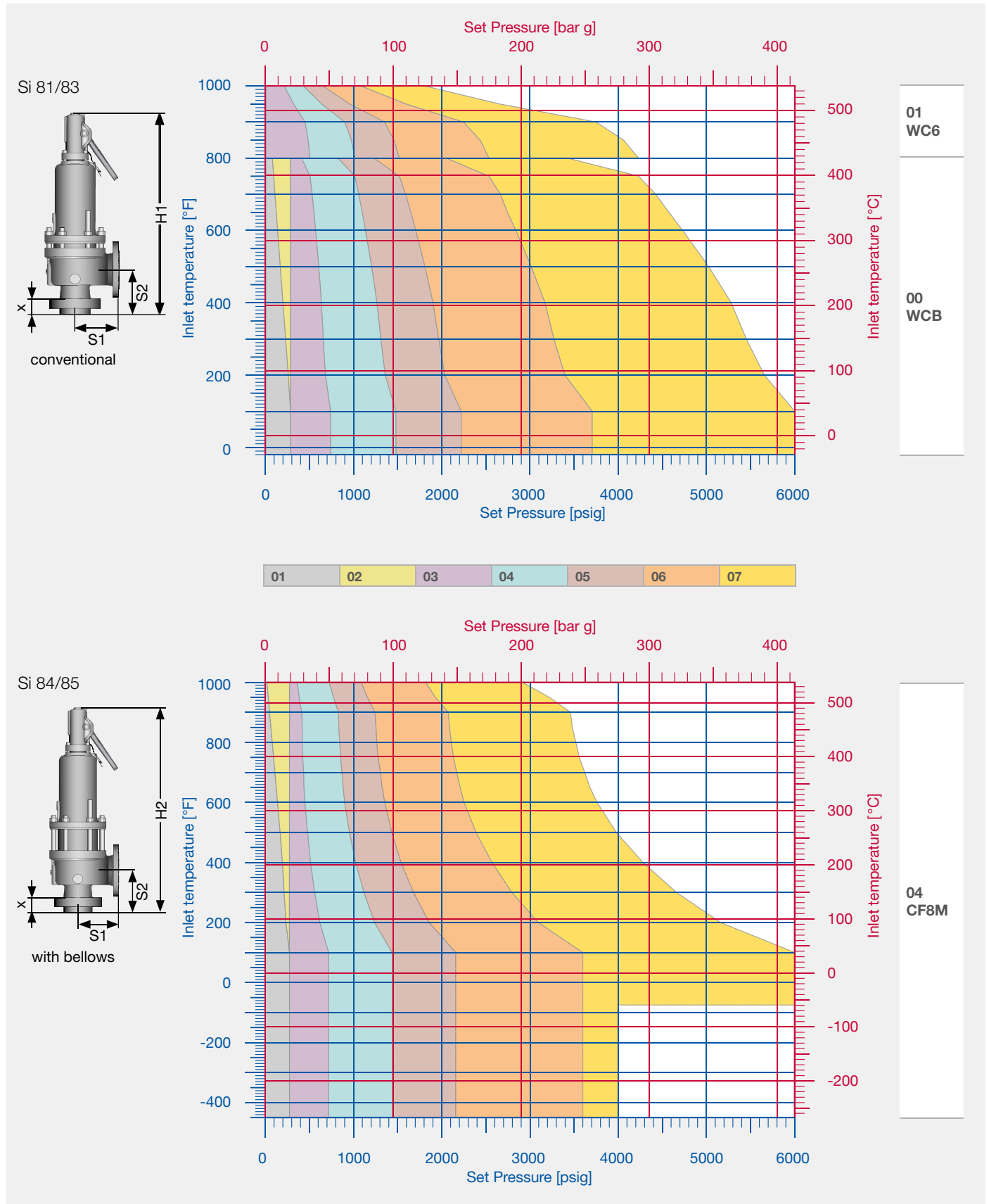
## Effective area 0.196 in<sup>2</sup> / 126 mm<sup>2</sup>

| Inlet class           | 01                          | 02        | 03        | 04        | 05          | 06          | 07          |               |
|-----------------------|-----------------------------|-----------|-----------|-----------|-------------|-------------|-------------|---------------|
| Class                 | 150 x 150                   | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 300   | 1500 x 300  | 2500 x 300  |               |
| NPS Inlet x outlet    | 1" x 2"                     | 1" x 2"   | 1" x 2"   | 1" x 2"   | 1 1/2" x 2" | 1 1/2" x 2" | 1 1/2" x 3" |               |
| S1 [in]               | 4.50                        | 4.50      | 4.50      | 4.50      | 5.50        | 5.50        | 7.00        |               |
| S2 [in]               | 4.13                        | 4.13      | 4.13      | 4.13      | 4.13        | 4.13        | 5.50        |               |
| X [in]                | 1.73                        | 1.73      | 1.73      | 1.73      | 2.24        | 2.24        | 2.83        |               |
| H1 Si 81/83 [in]      | 17.32                       | 17.32     | 17.32     | 17.32     | 20.67       | 20.67       | 26.57       |               |
| H2 Si 84/85 [in]      | 19.09                       | 19.09     | 19.09     | 19.09     | 22.64       | 22.64       | 28.74       |               |
| Weight Si 81/83 [lbs] | 34                          | 36        | 36        | 36        | 62          | 62          | 106         |               |
| Weight Si 84/85 [lbs] | 36                          | 38        | 38        | 38        | 69          | 69          | 113         |               |
| Inlet temperature     | Max. set pressure [psig]    |           |           |           |             |             |             | Material code |
| -51 °F to -21 °F      | 266                         | 266       | 696       | 1392      | 2089        | 3481        | 5801        | 22 LCB        |
| -20 °F to 100 °F      | 285                         | 285       | 740       | 1480      | 2220        | 3705        | 6000        | 00 WCB        |
| 101 °F to 450 °F      | 185                         | 285       | 615       | 1235      | 1845        | 3080        | 5135        |               |
| 451 °F to 800 °F      | 80                          | 285       | 410       | 825       | 1235        | 2060        | 3430        | 01 WC6        |
| 451 °F to 800 °F      |                             |           | 510       | 1015      | 1525        | 2540        | 4230        |               |
| 801 °F to 1000 °F     |                             |           | 215       | 430       | 650         | 1080        | 1800        | 04 CF8M       |
| -450 °F to -76 °F     | 275                         | 275       | 720       | 1440      | 2160        | 3600        | 4000        |               |
| -75 °F to -21 °F      | 275                         | 275       | 720       | 1440      | 2160        | 3600        | 6000        |               |
| -20 °F to -100 °F     | 275                         | 275       | 720       | 1440      | 2160        | 3600        | 6000        |               |
| 101 °F to 450 °F      | 180                         | 275       | 495       | 975       | 1485        | 2480        | 4130        |               |
| 451 °F to 800 °F      | 80                          | 275       | 420       | 845       | 1265        | 2110        | 3520        |               |
| 801 °F to 1000 °F     | 20                          | 275       | 350       | 700       | 1050        | 1750        | 2915        |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |           |           |             |             |             |               |
| Si 81/83@100 °F       | 265                         | 265       | 265       | 265       | 600         | 600         | 695         | 22            |
| Si 81/83@100 °F       | 285                         | 285       | 285       | 285       | 600         | 600         | 740         | 00/01         |
| Si 81/83@100 °F       | 275                         | 275       | 275       | 275       | 600         | 600         | 720         | 04            |
| Si 84/85@100 °F       | 230                         | 230       | 230       | 230       | 500         | 500         | 500         | all           |

| Inlet class          | 01                           | 02        | 03        | 04        | 05          | 06          | 07          |               |
|----------------------|------------------------------|-----------|-----------|-----------|-------------|-------------|-------------|---------------|
| Class                | 150 x 150                    | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 300   | 1500 x 300  | 2500 x 300  |               |
| NPS Inlet x outlet   | 1" x 2"                      | 1" x 2"   | 1" x 2"   | 1" x 2"   | 1 1/2" x 2" | 1 1/2" x 2" | 1 1/2" x 3" |               |
| S1 [mm]              | 114.3                        | 114.3     | 114.3     | 114.3     | 139.7       | 139.7       | 177.8       |               |
| S2 [mm]              | 104.8                        | 104.8     | 104.8     | 104.8     | 104.8       | 104.8       | 139.7       |               |
| X [mm]               | 44                           | 44        | 44        | 44        | 57          | 57          | 72          |               |
| H1 Si 81/83 [mm]     | 440                          | 440       | 440       | 440       | 525         | 525         | 675         |               |
| H2 Si 84/85 [mm]     | 485                          | 485       | 485       | 485       | 575         | 575         | 730         |               |
| Weight Si 81/83 [kg] | 15                           | 16        | 16        | 16        | 28          | 28          | 48          |               |
| Weight Si 84/85 [kg] | 16                           | 17        | 17        | 17        | 31          | 31          | 51          |               |
| Inlet temperature    | Max. set pressure [bar g]    |           |           |           |             |             |             | Material code |
| -46 °C to -30 °C     | 18.3                         | 18.3      | 48.0      | 96.0      | 144.0       | 240.0       | 400.0       | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 19.7      | 51.0      | 102.0     | 153.1       | 255.5       | 413.7       | 00 WCB        |
| 39 °C to 232 °C      | 12.8                         | 19.7      | 42.4      | 85.2      | 127.2       | 212.4       | 354.0       |               |
| 233 °C to 427 °C     | 5.5                          | 19.7      | 28.3      | 56.9      | 85.2        | 142.0       | 236.5       | 01 WC6        |
| 233 °C to 427 °C     |                              |           | 35.2      | 70.0      | 105.1       | 175.1       | 291.6       |               |
| 428 °C to 538 °C     |                              |           | 14.8      | 29.6      | 44.8        | 74.5        | 124.1       | 04 CF8M       |
| -268 °C to -60 °C    | 19.0                         | 19.0      | 49.6      | 99.3      | 148.9       | 248.2       | 275.8       |               |
| -59 °C to -30 °C     | 19.0                         | 19.0      | 49.6      | 99.3      | 148.9       | 248.2       | 413.7       |               |
| -29 °C to 38 °C      | 19.0                         | 19.0      | 49.6      | 99.3      | 148.9       | 248.2       | 413.7       |               |
| 39 °C to 232 °C      | 12.4                         | 19.0      | 34.1      | 67.2      | 102.4       | 171.0       | 284.8       |               |
| 233 °C to 427 °C     | 5.5                          | 19.0      | 29.0      | 58.3      | 87.2        | 145.5       | 242.7       |               |
| 428 °C to 538 °C     | 1.4                          | 19.0      | 24.1      | 48.3      | 72.4        | 120.7       | 201.0       |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |           |           |             |             |             |               |
| Si 81/83@38 °C       | 18.3                         | 18.3      | 18.3      | 18.3      | 41.4        | 41.4        | 47.9        | 22            |
| Si 81/83@38 °C       | 19.7                         | 19.7      | 19.7      | 19.7      | 41.4        | 41.4        | 51.0        | 00/01         |
| Si 81/83@38 °C       | 19.0                         | 19.0      | 19.0      | 19.0      | 41.4        | 41.4        | 49.6        | 04            |
| Si 84/85@38 °C       | 15.9                         | 15.9      | 15.9      | 15.9      | 34.5        | 34.5        | 34.5        | all           |

# Orifice E

## Selection chart



# Orifice F

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 3  | psig | 0.16 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 15 | psig | 1    | bar g |

## Effective area 0.307 in<sup>2</sup> / 198 mm<sup>2</sup>

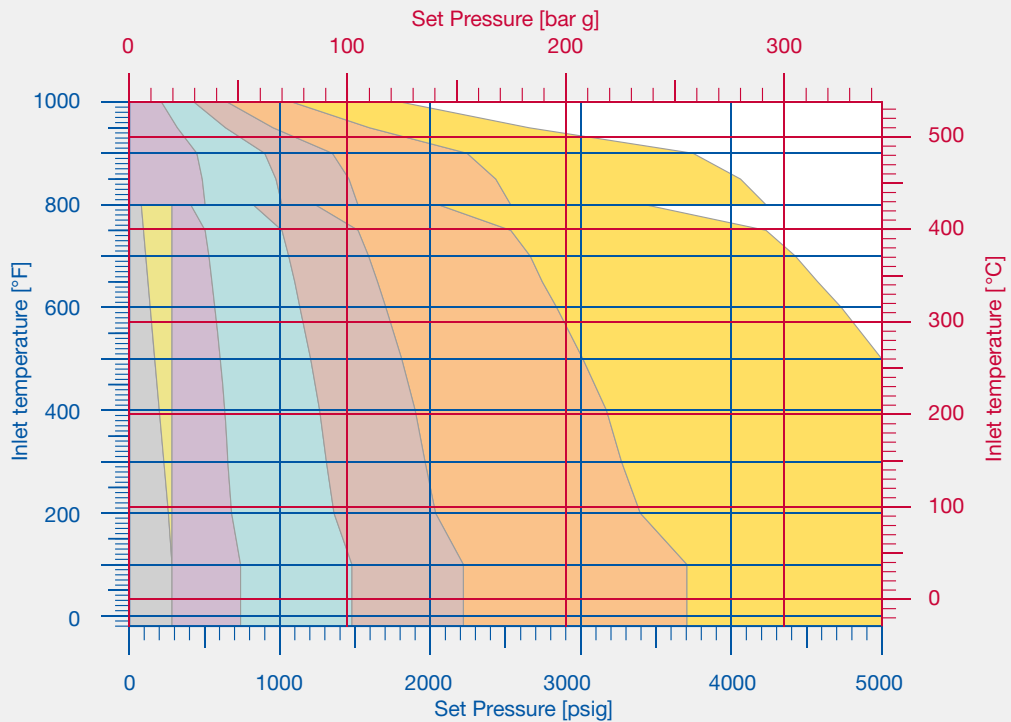
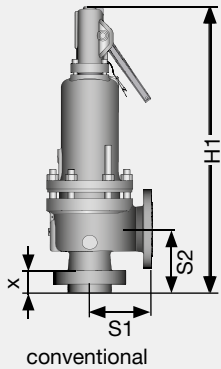
| Inlet class           | 01                       | 02          | 03          | 04          | 05          | 06          | 07          |               |
|-----------------------|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| Class                 | 150 x 150                | 300 x 150   | 300 x 150   | 600 x 150   | 900 x 300   | 1500 x 300  | 2500 x 300  |               |
| NPS Inlet x outlet    | 1 1/2" x 2"              | 1 1/2" x 2" | 1 1/2" x 2" | 1 1/2" x 2" | 1 1/2" x 3" | 1 1/2" x 3" | 1 1/2" x 3" |               |
| S1 [in]               | 4.75                     | 4.75        | 6.00        | 6.00        | 6.50        | 6.50        | 7.00        |               |
| S2 [in]               | 4.87                     | 4.87        | 4.87        | 4.87        | 4.87        | 4.87        | 5.50        |               |
| X [in]                | 1.65                     | 1.65        | 1.81        | 1.81        | 2.09        | 2.09        | 2.83        |               |
| H1 Si 81/83 [in]      | 18.11                    | 18.11       | 20.47       | 20.47       | 26.18       | 26.18       | 26.57       |               |
| H2 Si 84/85 [in]      | 20.47                    | 20.47       | 22.24       | 22.24       | 29.13       | 29.13       | 29.53       |               |
| Weight Si 81/83 [lbs] | 38                       | 40          | 34          | 56          | 71          | 71          | 111         |               |
| Weight Si 84/85 [lbs] | 42                       | 45          | 60          | 60          | 80          | 80          | 117         |               |
| Inlet temperature     | Max. set pressure [psig] |             |             |             |             |             |             | Material code |
| -51 °F to -21 °F      | 266                      | 266         | 696         | 1392        | 2089        | 3481        | 5000        | 22 LCB        |
| -20 °F to 100 °F      | 285                      | 285         | 740         | 1480        | 2220        | 3705        | 5000        | 00 WCB        |
| 101 °F to 450 °F      | 185                      | 285         | 615         | 1235        | 1845        | 3080        | 5000        |               |
| 451 °F to 800 °F      | 80                       | 285         | 410         | 825         | 1235        | 2060        | 3430        | 01 WC6        |
| 451 °F to 800 °F      |                          |             | 510         | 1015        | 1525        | 2540        | 4230        |               |
| 801 °F to 1000 °F     |                          |             | 215         | 430         | 650         | 1080        | 1800        | 04 CF8M       |
| -450 °F to -76 °F     | 275                      | 275         | 720         | 1440        | 2160        | 2200        | 3400        |               |
| -75 °F to -21 °F      | 275                      | 275         | 720         | 1440        | 2160        | 3600        | 5000        |               |
| -20 °F to -100 °F     | 275                      | 275         | 720         | 1440        | 2160        | 3600        | 5000        |               |
| 101 °F to 450 °F      | 180                      | 275         | 495         | 975         | 1485        | 2480        | 4130        |               |
| 451 °F to 800 °F      | 80                       | 275         | 420         | 845         | 1265        | 2110        | 3520        |               |
| 801 °F to 1000 °F     | 20                       | 275         | 350         | 700         | 1050        | 1750        | 2915        |               |
| Outlet temperature    | Max. set pressure [psig] |             |             |             |             |             |             |               |
| Si 81/83@100 °F       | 265                      | 265         | 265         | 265         | 695         | 695         | 695         | 22            |
| Si 81/83@100 °F       | 285                      | 285         | 285         | 285         | 740         | 740         | 740         | 00/01         |
| Si 81/83@100 °F       | 275                      | 275         | 275         | 275         | 600         | 600         | 720         | 04            |
| Si 84/85@100 °F       | 230                      | 230         | 230         | 230         | 500         | 500         | 500         | all           |

| Inlet class          | 01                           | 02          | 03          | 04          | 05          | 06          | 07          |               |
|----------------------|------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| Class                | 150 x 150                    | 300 x 150   | 300 x 150   | 600 x 150   | 900 x 300   | 1500 x 300  | 2500 x 300  |               |
| NPS Inlet x outlet   | 1 1/2" x 2"                  | 1 1/2" x 2" | 1 1/2" x 2" | 1 1/2" x 2" | 1 1/2" x 3" | 1 1/2" x 3" | 1 1/2" x 3" |               |
| S1 [mm]              | 120.7                        | 120.7       | 152.4       | 152.4       | 165.1       | 165.1       | 177.8       |               |
| S2 [mm]              | 123.8                        | 123.8       | 123.8       | 123.8       | 123.8       | 123.8       | 139.7       |               |
| X [mm]               | 42                           | 42          | 46          | 46          | 53          | 53          | 72          |               |
| H1 Si 81/83 [mm]     | 460                          | 460         | 520         | 520         | 665         | 665         | 675         |               |
| H2 Si 84/85 [mm]     | 520                          | 520         | 565         | 565         | 740         | 740         | 750         |               |
| Weight Si 81/83 [kg] | 17                           | 18          | 25          | 25          | 32          | 32          | 50          |               |
| Weight Si 84/85 [kg] | 19                           | 20          | 27          | 27          | 36          | 36          | 53          |               |
| Inlet temperature    | Max. set pressure [bar g]    |             |             |             |             |             |             | Material code |
| -46 °C to -30 °C     | 18.3                         | 18.3        | 48.0        | 96.0        | 144.0       | 240.0       | 344.7       | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 19.7        | 51.0        | 102.0       | 153.1       | 255.5       | 344.7       | 00 WCB        |
| 39 °C to 232 °C      | 12.8                         | 19.7        | 42.4        | 85.2        | 127.2       | 212.4       | 344.7       |               |
| 233 °C to 427 °C     | 5.5                          | 19.7        | 28.3        | 56.9        | 85.2        | 142.0       | 236.5       | 01 WC6        |
| 233 °C to 427 °C     |                              |             | 35.2        | 70.0        | 105.1       | 175.1       | 291.6       |               |
| 428 °C to 538 °C     |                              |             | 14.8        | 29.6        | 44.8        | 74.5        | 124.1       | 04 CF8M       |
| -268 °C to -60 °C    | 19.0                         | 19.0        | 49.6        | 99.3        | 148.9       | 151.7       | 234.4       |               |
| -59 °C to -30 °C     | 19.0                         | 19.0        | 49.6        | 99.3        | 148.9       | 248.2       | 344.7       |               |
| -29 °C to 38 °C      | 19.0                         | 19.0        | 49.6        | 99.3        | 148.9       | 248.2       | 344.7       |               |
| 39 °C to 232 °C      | 12.4                         | 19.0        | 34.1        | 67.2        | 102.4       | 171.0       | 284.8       |               |
| 233 °C to 427 °C     | 5.5                          | 19.0        | 29.0        | 58.3        | 87.2        | 145.5       | 242.7       |               |
| 428 °C to 538 °C     | 1.4                          | 19.0        | 24.1        | 48.3        | 72.4        | 120.7       | 201.0       |               |
| Outlet temperature   | Max. outlet pressure [bar g] |             |             |             |             |             |             |               |
| Si 81/83@38 °C       | 18.3                         | 18.3        | 18.3        | 18.3        | 47.9        | 47.9        | 47.9        | 22            |
| Si 81/83@38 °C       | 19.7                         | 19.7        | 19.7        | 19.7        | 51.0        | 51.0        | 51.0        | 00/01         |
| Si 81/83@38 °C       | 19.0                         | 19.0        | 19.0        | 19.0        | 41.4        | 41.4        | 49.6        | 04            |
| Si 84/85@38 °C       | 15.9                         | 15.9        | 15.9        | 15.9        | 34.5        | 34.5        | 34.5        | all           |

# Orifice F

## Selection chart

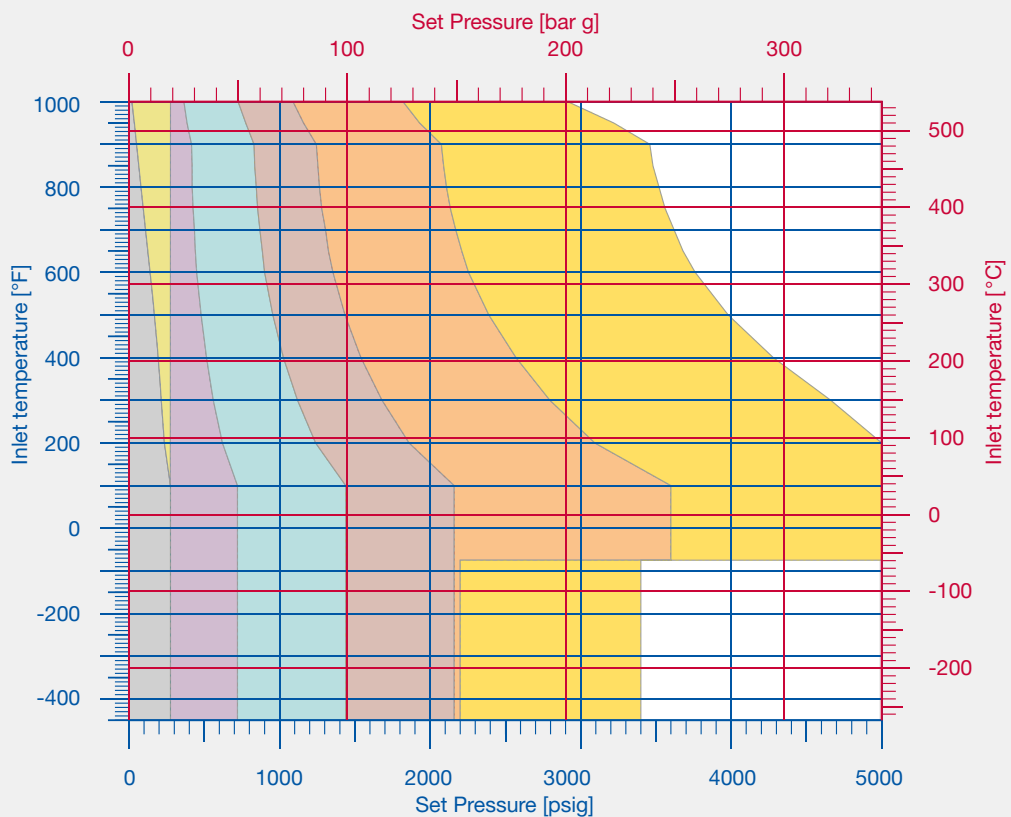
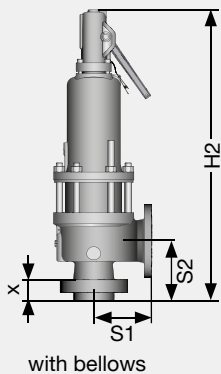
Si 81/83



01  
WC6

00  
WCB

Si 84/85



04  
CF8M

# Orifice G

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 2  | psig | 0.13 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 21 | psig | 1.4  | bar g |

## Effective area 0.503 in<sup>2</sup> / 324 mm<sup>2</sup>

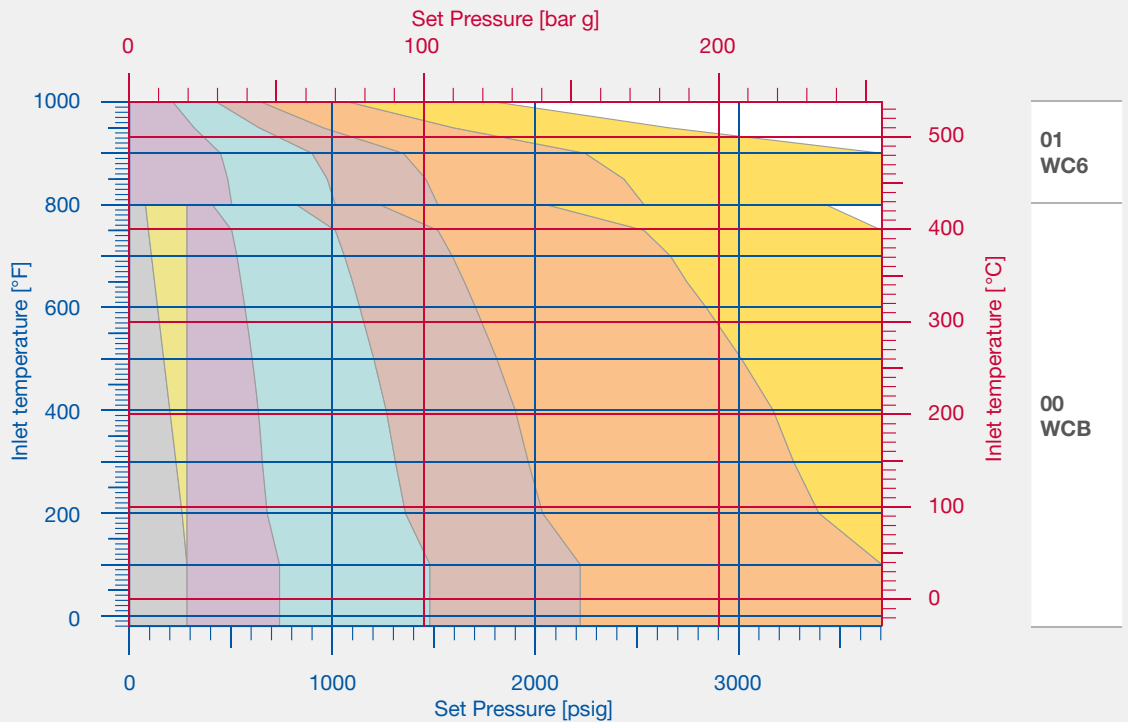
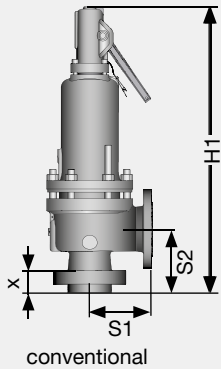
| Inlet class           | 01                          | 02          | 03          | 04          | 05          | 06         | 07         |               |
|-----------------------|-----------------------------|-------------|-------------|-------------|-------------|------------|------------|---------------|
| Class                 | 150 x 150                   | 300 x 150   | 300 x 150   | 600 x 150   | 900 x 300   | 1500 x 300 | 2500 x 300 |               |
| NPS Inlet x outlet    | 1 1/2" x 3"                 | 1 1/2" x 3" | 1 1/2" x 3" | 1 1/2" x 3" | 1 1/2" x 3" | 2" x 3"    | 2" x 3"    |               |
| S1 [in]               | 4.75                        | 4.75        | 6.00        | 6.00        | 6.50        | 6.75       | 6.75       |               |
| S2 [in]               | 4.87                        | 4.87        | 4.87        | 4.87        | 4.87        | 6.13       | 6.13       |               |
| X [in]                | 1.65                        | 1.65        | 1.81        | 1.81        | 2.09        | 3.15       | 3.15       |               |
| H1 Si 81/83 [in]      | 18.31                       | 18.31       | 22.05       | 22.05       | 26.18       | 27.95      | 27.95      |               |
| H2 Si 84/85 [in]      | 20.08                       | 20.08       | 23.82       | 23.82       | 29.13       | 30.91      | 30.91      |               |
| Weight Si 81/83 [lbs] | 40                          | 42          | 67          | 67          | 89          | 100        | 115        |               |
| Weight Si 84/85 [lbs] | 45                          | 51          | 84          | 84          | 95          | 111        | 124        |               |
| Inlet temperature     | Max. set pressure [psig]    |             |             |             |             |            |            | Material code |
| -51 °F to -21 °F      | 266                         | 266         | 696         | 1392        | 2089        | 3481       | 3705       | 22 LCB        |
| -20 °F to 100 °F      | 285                         | 285         | 740         | 1480        | 2220        | 3705       | 3705       | 00 WCB        |
| 101 °F to 450 °F      | 185                         | 285         | 615         | 1235        | 1845        | 3080       | 3705       |               |
| 451 °F to 800 °F      | 80                          | 285         | 410         | 825         | 1235        | 2060       | 3430       |               |
| 451 °F to 800 °F      |                             |             | 510         | 1015        | 1525        | 2540       | 3705       | 01 WC6        |
| 801 °F to 1000 °F     |                             |             | 215         | 430         | 650         | 1080       | 1800       | 04 CF8M       |
| -450 °F to -76 °F     | 275                         | 275         | 720         | 1440        | 2160        | 2450       | 2600       |               |
| -75 °F to -21 °F      | 275                         | 275         | 720         | 1440        | 2160        | 3600       | 3705       |               |
| -20 °F to -100 °F     | 275                         | 275         | 720         | 1440        | 2160        | 3600       | 3705       |               |
| 101 °F to 450 °F      | 180                         | 275         | 495         | 975         | 1485        | 2480       | 3705       |               |
| 451 °F to 800 °F      | 80                          | 275         | 420         | 845         | 1265        | 2110       | 3520       |               |
| 801 °F to 1000 °F     | 20                          | 275         | 350         | 700         | 1050        | 1750       | 2915       |               |
| Outlet temperature    | Max. outlet pressure [psig] |             |             |             |             |            |            |               |
| Si 81/83@100 °F       | 265                         | 265         | 265         | 265         | 695         | 695        | 695        | 22            |
| Si 81/83@100 °F       | 285                         | 285         | 285         | 285         | 740         | 740        | 740        | 00/01         |
| Si 81/83@100 °F       | 275                         | 275         | 275         | 275         | 600         | 600        | 720        | 04            |
| Si 84/85@100 °F       | 230                         | 230         | 230         | 230         | 470 (500)   | 470 (500)  | 470 (500)  | 00/22 (01/04) |

| Inlet class          | 01                           | 02          | 03          | 04          | 05          | 06          | 07          |               |
|----------------------|------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| Class                | 150 x 150                    | 300 x 150   | 300 x 150   | 600 x 150   | 900 x 300   | 1500 x 300  | 2500 x 300  |               |
| NPS Inlet x outlet   | 1 1/2" x 3"                  | 1 1/2" x 3" | 1 1/2" x 3" | 1 1/2" x 3" | 1 1/2" x 3" | 2" x 3"     | 2" x 3"     |               |
| S1 [mm]              | 120.7                        | 120.7       | 152.4       | 152.4       | 165.1       | 171.5       | 171.5       |               |
| S2 [mm]              | 123.8                        | 123.8       | 123.8       | 123.8       | 123.8       | 155.6       | 155.6       |               |
| X [mm]               | 42                           | 42          | 46          | 46          | 53          | 80          | 80          |               |
| H1 Si 81/83 [mm]     | 465                          | 465         | 560         | 560         | 665         | 710         | 710         |               |
| H2 Si 84/85 [mm]     | 510                          | 510         | 605         | 605         | 740         | 785         | 785         |               |
| Weight Si 81/83 [kg] | 18                           | 19          | 30          | 30          | 40          | 45          | 52          |               |
| Weight Si 84/85 [kg] | 20                           | 23          | 38          | 38          | 43          | 50          | 56          |               |
| Inlet temperature    | Max. set pressure [bar g]    |             |             |             |             |             |             | Material code |
| -46 °C to -30 °C     | 18.3                         | 18.3        | 48.0        | 96.0        | 144.0       | 240.0       | 255.5       | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 19.7        | 51.0        | 102.0       | 153.1       | 255.5       | 255.5       | 00 WCB        |
| 39 °C to 232 °C      | 12.8                         | 19.7        | 42.4        | 85.2        | 127.2       | 212.4       | 255.5       |               |
| 233 °C to 427 °C     | 5.5                          | 19.7        | 28.3        | 56.9        | 85.2        | 142.0       | 236.5       |               |
| 233 °C to 427 °C     |                              |             | 35.2        | 70.0        | 105.1       | 175.1       | 255.5       | 01 WC6        |
| 428 °C to 538 °C     |                              |             | 14.8        | 29.6        | 44.8        | 74.5        | 124.1       | 04 CF8M       |
| -268 °C to -60 °C    | 19.0                         | 19.0        | 49.6        | 99.3        | 148.9       | 168.9       | 179.3       |               |
| -59 °C to -30 °C     | 19.0                         | 19.0        | 49.6        | 99.3        | 148.9       | 248.2       | 255.5       |               |
| -29 °C to 38 °C      | 19.0                         | 19.0        | 49.6        | 99.3        | 148.9       | 248.2       | 255.5       |               |
| 39 °C to 232 °C      | 12.4                         | 19.0        | 34.1        | 67.2        | 102.4       | 171.0       | 255.5       |               |
| 233 °C to 427 °C     | 5.5                          | 19.0        | 29.0        | 58.3        | 87.2        | 145.5       | 242.7       |               |
| 428 °C to 538 °C     | 1.4                          | 19.0        | 24.1        | 48.3        | 72.4        | 120.7       | 201.0       |               |
| Outlet temperature   | Max. outlet pressure [bar g] |             |             |             |             |             |             |               |
| Si 81/83@38 °C       | 18.3                         | 18.3        | 18.3        | 18.3        | 47.9        | 47.9        | 47.9        | 22            |
| Si 81/83@38 °C       | 19.7                         | 19.7        | 19.7        | 19.7        | 51.0        | 51.0        | 51.0        | 00/01         |
| Si 81/83@38 °C       | 19.0                         | 19.0        | 19.0        | 19.0        | 41.4        | 41.4        | 49.6        | 04            |
| Si 84/85@38 °C       | 15.9                         | 15.9        | 15.9        | 15.9        | 32.4 (34.5) | 32.4 (34.5) | 32.4 (34.5) | 00/22 (01/04) |

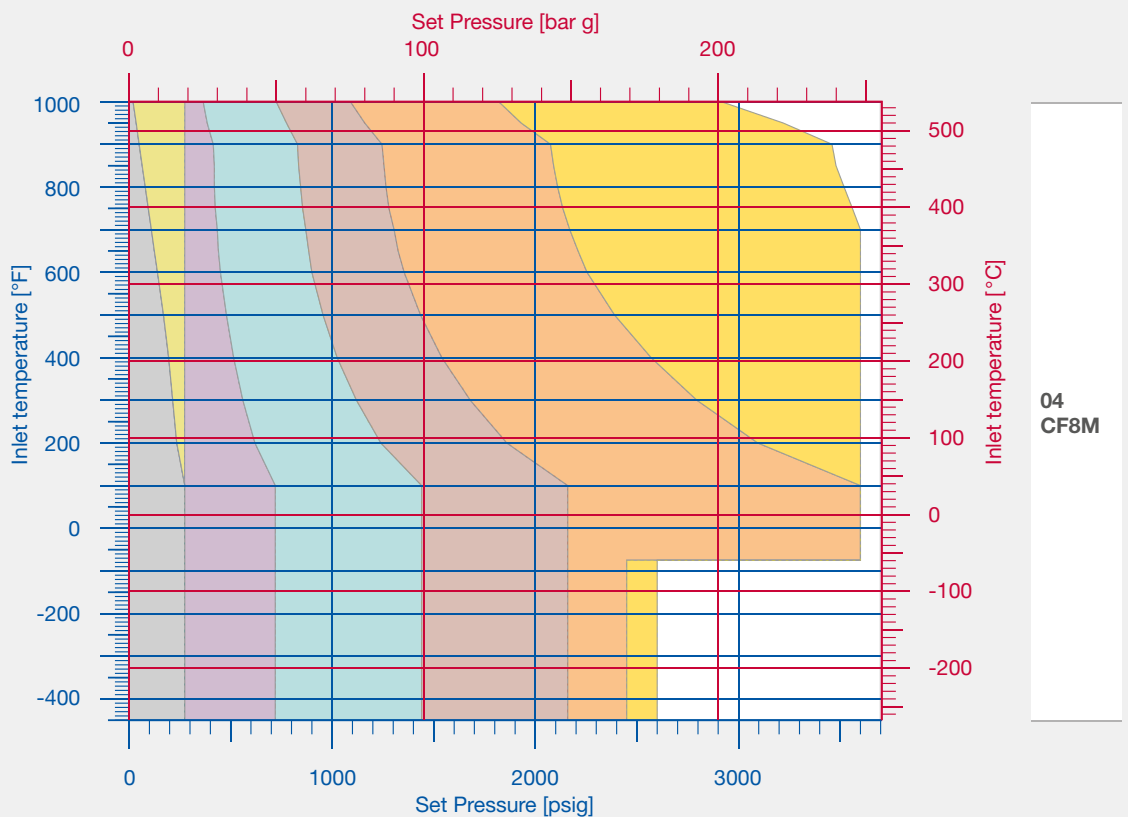
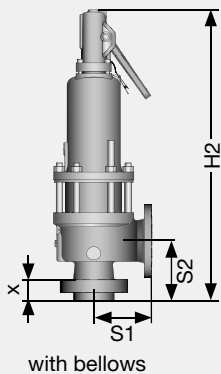
# Orifice G

## Selection chart

Si 81/83



Si 84/85



# Orifice H

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 4  | psig | 0.22 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 15 | psig | 1    | bar g |

## Effective area 0.785 in<sup>2</sup> / 506 mm<sup>2</sup>

| Inlet class           | 01                          | 02          | 03        | 04        | 05        | 06         |               |
|-----------------------|-----------------------------|-------------|-----------|-----------|-----------|------------|---------------|
| Class                 | 150 x 150                   | 300 x 150   | 300 x 150 | 600 x 150 | 900 x 150 | 1500 x 300 |               |
| NPS Inlet x outlet    | 1 1/2" x 3"                 | 1 1/2" x 3" | 2" x 3"   | 2" x 3"   | 2" x 3"   | 2" x 3"    |               |
| S1 [in]               | 4.87                        | 4.87        | 4.87      | 6.37      | 6.37      | 6.37       |               |
| S2 [in]               | 5.13                        | 5.13        | 5.13      | 6.06      | 6.06      | 6.06       |               |
| X [in]                | 1.73                        | 1.73        | 1.89      | 2.09      | 2.64      | 2.64       |               |
| H1 Si 81/83 [in]      | 21.26                       | 21.26       | 22.64     | 27.95     | 27.95     | 27.95      |               |
| H2 Si 84/85 [in]      | 23.03                       | 23.03       | 24.80     | 30.71     | 30.71     | 30.71      |               |
| Weight Si 81/83 [lbs] | 60                          | 62          | 80        | 115       | 139       | 150        |               |
| Weight Si 84/85 [lbs] | 64                          | 67          | 86        | 133       | 150       | 164        |               |
| Inlet temperature     | Max. set pressure [psig]    |             |           |           |           |            | Material code |
| -51 °F to -21 °F      | 266                         | 266         | 696       | 1392      | 2089      | 3481       | 22 LCB        |
| -20 °F to 100 °F      | 285                         | 285         | 740       | 1480      | 2220      | 3705       | 00 WCB        |
| 101 °F to 450 °F      | 185                         | 285         | 615       | 1235      | 1845      | 3080       |               |
| 451 °F to 800 °F      | 80                          | 285         | 410       | 825       | 1235      | 2060       | 01 WC6        |
| 451 °F to 800 °F      |                             |             | 510       | 1015      | 1525      | 2540       |               |
| 801 °F to 1000 °F     |                             |             | 215       | 430       | 650       | 1080       | 04 CF8M       |
| -450 °F to -76 °F     | 275                         | 275         | 720       | 1440      | 2160      | 2450       |               |
| -75 °F to -21 °F      | 275                         | 275         | 720       | 1440      | 2160      | 3600       |               |
| -20 °F to -100 °F     | 275                         | 275         | 720       | 1440      | 2160      | 3600       |               |
| 101 °F to 450 °F      | 180                         | 275         | 495       | 975       | 1485      | 2480       |               |
| 451 °F to 800 °F      | 80                          | 275         | 420       | 845       | 1265      | 2110       |               |
| 801 °F to 1000 °F     | 20                          | 275         | 350       | 700       | 1050      | 1750       |               |
| Outlet temperature    | Max. outlet pressure [psig] |             |           |           |           |            |               |
| Si 81/83@100 °F       | 265                         | 265         | 265       | 265       | 265       | 695        | 22            |
| Si 81/83@100 °F       | 285                         | 285         | 285       | 285       | 285       | 740        | 00/01         |
| Si 81/83@100 °F       | 275                         | 275         | 275       | 275       | 275       | 600        | 04            |
| Si 84/85@100 °F       | 230                         | 230         | 230       | 230       | 230       | 415        | all           |

| Inlet class          | 01                           | 02          | 03        | 04        | 05        | 06         |               |
|----------------------|------------------------------|-------------|-----------|-----------|-----------|------------|---------------|
| Class                | 150 x 150                    | 300 x 150   | 300 x 150 | 600 x 150 | 900 x 150 | 1500 x 300 |               |
| NPS Inlet x outlet   | 1 1/2" x 3"                  | 1 1/2" x 3" | 2" x 3"   | 2" x 3"   | 2" x 3"   | 2" x 3"    |               |
| S1 [mm]              | 123.8                        | 123.8       | 123.8     | 161.9     | 161.9     | 161.9      |               |
| S2 [mm]              | 130.2                        | 130.2       | 130.2     | 154.0     | 154.0     | 154.0      |               |
| X [mm]               | 44                           | 44          | 48        | 53        | 67        | 67         |               |
| H1 Si 81/83 [mm]     | 540                          | 540         | 575       | 710       | 710       | 710        |               |
| H2 Si 84/85 [mm]     | 585                          | 585         | 630       | 780       | 780       | 780        |               |
| Weight Si 81/83 [kg] | 27                           | 28          | 36        | 52        | 63        | 68         |               |
| Weight Si 84/85 [kg] | 29                           | 30          | 39        | 60        | 68        | 74         |               |
| Inlet temperature    | Max. set pressure [bar g]    |             |           |           |           |            | Material code |
| -46 °C to -30 °C     | 18.3                         | 18.3        | 48.0      | 96.0      | 144.0     | 189.6      | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 19.7        | 51.0      | 102.0     | 153.1     | 189.6      | 00 WCB        |
| 39 °C to 232 °C      | 12.8                         | 19.7        | 42.4      | 85.2      | 127.2     | 189.6      |               |
| 233 °C to 427 °C     | 5.5                          | 19.7        | 28.3      | 56.9      | 85.2      | 142.0      | 01 WC6        |
| 233 °C to 427 °C     |                              |             | 35.2      | 70.0      | 105.1     | 175.1      |               |
| 428 °C to 538 °C     |                              |             | 14.8      | 29.6      | 44.8      | 74.5       | 04 CF8M       |
| -268 °C to -60 °C    | 19.0                         | 19.0        | 49.6      | 99.3      | 102.4     | 110.3      |               |
| -59 °C to -30 °C     | 19.0                         | 19.0        | 49.6      | 99.3      | 148.9     | 189.6      |               |
| -29 °C to 38 °C      | 19.0                         | 19.0        | 49.6      | 99.3      | 148.9     | 189.6      |               |
| 39 °C to 232 °C      | 12.4                         | 19.0        | 34.1      | 67.2      | 102.4     | 171.0      |               |
| 233 °C to 427 °C     | 5.5                          | 19.0        | 29.0      | 58.3      | 87.2      | 145.5      |               |
| 428 °C to 538 °C     | 1.4                          | 19.0        | 24.1      | 48.3      | 72.4      | 120.7      |               |
| Outlet temperature   | Max. outlet pressure [bar g] |             |           |           |           |            |               |
| Si 81/83@38 °C       | 18.3                         | 18.3        | 18.3      | 18.3      | 18.3      | 47.9       | 22            |
| Si 81/83@38 °C       | 19.7                         | 19.7        | 19.7      | 19.7      | 19.7      | 51.0       | 00/01         |
| Si 81/83@38 °C       | 19.0                         | 19.0        | 19.0      | 19.0      | 19.0      | 41.4       | 04            |
| Si 84/85@38 °C       | 15.9                         | 15.9        | 15.9      | 15.9      | 15.9      | 28.6       | all           |

**Si 81/83**

conventional

**Si 84/85**

with bellows

**Set Pressure [bar g]**

**Set Pressure [psig]**

**Inlet temperature [°F]**

**Inlet temperature [°C]**

**01 WC6**

**00 WCB**

**04 CF8M**

**01 02 03 04 05 06**

# Orifice J

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 3  | psig | 0.14 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 21 | psig | 1.4  | bar g |

## Effective area 1.287 in<sup>2</sup> / 830 mm<sup>2</sup>

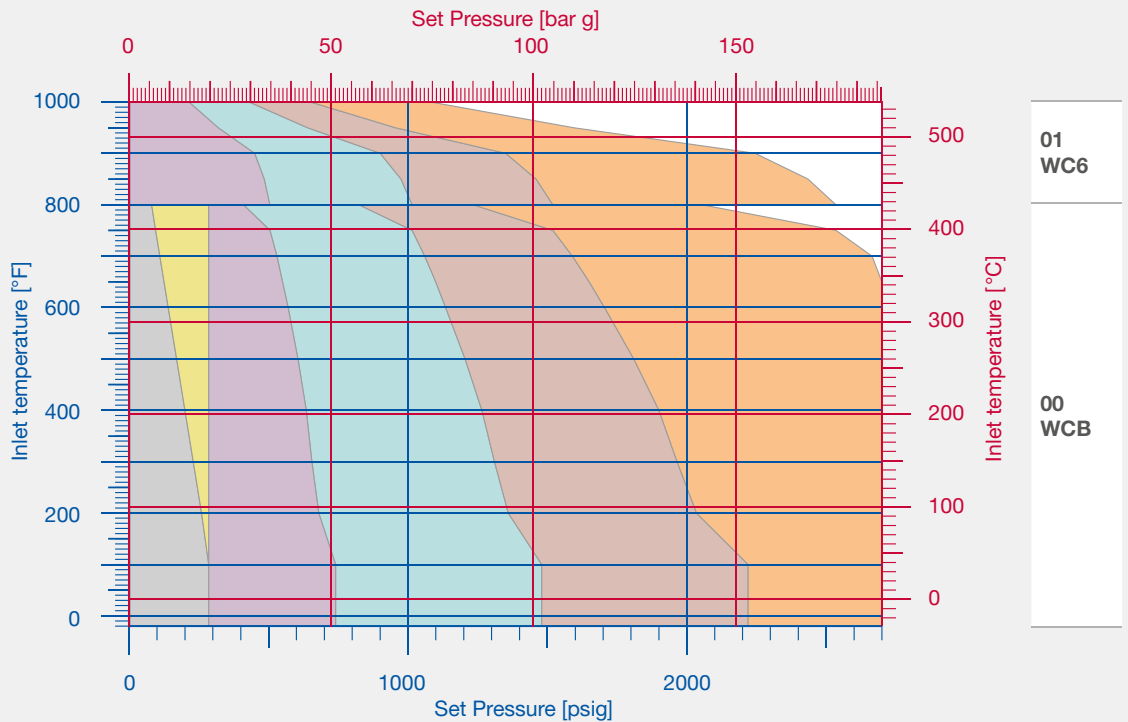
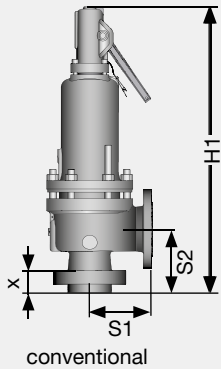
| Inlet class           | 01                          | 02        | 03        | 04        | 05        | 06         |               |
|-----------------------|-----------------------------|-----------|-----------|-----------|-----------|------------|---------------|
| Class                 | 150 x 150                   | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 150 | 1500 x 300 |               |
| NPS Inlet x outlet    | 2" x 3"                     | 2" x 3"   | 3" x 4"   | 3" x 4"   | 3" x 4"   | 3" x 4"    |               |
| S1 [in]               | 4.87                        | 4.87      | 7.13      | 7.13      | 7.13      | 7.13       |               |
| S2 [in]               | 5.37                        | 5.37      | 7.25      | 7.25      | 7.25      | 7.25       |               |
| X [in]                | 1.57                        | 1.57      | 2.64      | 2.64      | 3.23      | 3.23       |               |
| H1 Si 81/83 [in]      | 22.64                       | 22.64     | 29.13     | 29.53     | 32.68     | 32.68      |               |
| H2 Si 84/85 [in]      | 24.80                       | 24.80     | 31.89     | 31.89     | 35.63     | 35.63      |               |
| Weight Si 81/83 [lbs] | 69                          | 73        | 102       | 117       | 155       | 166        |               |
| Weight Si 84/85 [lbs] | 78                          | 82        | 111       | 128       | 170       | 181        |               |
| Inlet temperature     | Max. set pressure [psig]    |           |           |           |           |            | Material code |
| -51 °F to -21 °F      | 266                         | 266       | 696       | 1392      | 2089      | 2700       | 22 LCB        |
| -20 °F to 100 °F      | 285                         | 285       | 740       | 1480      | 2220      | 2700       | 00 WCB        |
| 101 °F to 450 °F      | 185                         | 285       | 615       | 1235      | 1845      | 2700       |               |
| 451 °F to 800 °F      | 80                          |           | 410       | 825       | 1235      | 2060       | 01 WC6        |
| 451 °F to 800 °F      |                             |           | 510       | 1015      | 1525      | 2540       |               |
| 801 °F to 1000 °F     |                             |           | 215       | 430       | 650       | 1080       | 04 CF8M       |
| -450 °F to -76 °F     | 275                         | 275       | 500       | 625       | 800       | 800        |               |
| -75 °F to -21 °F      | 275                         | 275       | 720       | 1440      | 2160      | 2750       |               |
| -20 °F to -100 °F     | 275                         | 275       | 720       | 1440      | 2160      | 2750       |               |
| 101 °F to 450 °F      | 180                         | 275       | 495       | 975       | 1485      | 2480       |               |
| 451 °F to 800 °F      | 80                          | 275       | 420       | 845       | 1265      | 2110       |               |
| 801 °F to 1000 °F     | 20                          | 275       | 350       | 700       | 1050      | 1750       |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |           |           |           |            |               |
| Si 81/83@100 °F       | 265                         | 265       | 265       | 265       | 265       | 600        | 22            |
| Si 81/83@100 °F       | 285                         | 285       | 285       | 285       | 285       | 600        | 00/01         |
| Si 81/83@100 °F       | 275                         | 275       | 275       | 275       | 275       | 600        | 04            |
| Si 84/85@100 °F       | 230                         | 230       | 230       | 230       | 230       | 230        | all           |

| Inlet class          | 01                           | 02        | 03        | 04        | 05        | 06         |               |
|----------------------|------------------------------|-----------|-----------|-----------|-----------|------------|---------------|
| Class                | 150 x 150                    | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 150 | 1500 x 300 |               |
| NPS Inlet x outlet   | 2" x 3"                      | 2" x 3"   | 3" x 4"   | 3" x 4"   | 3" x 4"   | 3" x 4"    |               |
| S1 [mm]              | 123.8                        | 123.8     | 181.0     | 181.0     | 181.0     | 181.0      |               |
| S2 [mm]              | 136.5                        | 136.5     | 184.2     | 184.2     | 184.2     | 184.2      |               |
| X [mm]               | 40                           | 40        | 67        | 67        | 82        | 82         |               |
| H1 Si 81/83 [mm]     | 575                          | 575       | 740       | 750       | 830       | 830        |               |
| H2 Si 84/85 [mm]     | 630                          | 630       | 810       | 810       | 905       | 905        |               |
| Weight Si 81/83 [kg] | 31                           | 33        | 46        | 53        | 70        | 75         |               |
| Weight Si 84/85 [kg] | 35                           | 37        | 50        | 58        | 77        | 82         |               |
| Inlet temperature    | Max. set pressure [bar g]    |           |           |           |           |            | Material code |
| -46 °C to -30 °C     | 18.3                         | 18.3      | 48.0      | 96.0      | 144.0     | 186.2      | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 19.7      | 51.0      | 102.0     | 153.1     | 186.2      | 00 WCB        |
| 39 °C to 232 °C      | 12.8                         | 19.7      | 42.4      | 85.2      | 127.2     | 186.2      |               |
| 233 °C to 427 °C     | 5.5                          | 19.7      | 28.3      | 56.9      | 85.2      | 142.0      | 01 WC6        |
| 233 °C to 427 °C     |                              |           | 35.2      | 70.0      | 105.1     | 175.1      |               |
| 428 °C to 538 °C     |                              |           | 14.8      | 29.6      | 44.8      | 74.5       | 04 CF8M       |
| -268 °C to -60 °C    | 19.0                         | 19.0      | 34.5      | 43.1      | 55.2      | 55.2       |               |
| -59 °C to -30 °C     | 19.0                         | 19.0      | 49.6      | 99.3      | 148.9     | 189.6      |               |
| -29 °C to 38 °C      | 19.0                         | 19.0      | 49.6      | 99.3      | 148.9     | 189.6      |               |
| 39 °C to 232 °C      | 12.4                         | 19.0      | 34.1      | 67.2      | 102.4     | 171.0      |               |
| 233 °C to 427 °C     | 5.5                          | 19.0      | 29.0      | 58.3      | 87.2      | 145.5      |               |
| 428 °C to 538 °C     | 1.4                          | 19.0      | 24.1      | 48.3      | 72.4      | 120.7      |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |           |           |           |            |               |
| Si 81/83@38 °C       | 18.3                         | 18.3      | 18.3      | 18.3      | 18.3      | 41.4       | 22            |
| Si 81/83@38 °C       | 19.7                         | 19.7      | 19.7      | 19.7      | 19.7      | 41.4       | 00/01         |
| Si 81/83@38 °C       | 19.0                         | 19.0      | 19.0      | 19.0      | 19.0      | 41.4       | 04            |
| Si 84/85@38 °C       | 15.9                         | 15.9      | 15.9      | 15.9      | 15.9      | 15.9       | all           |

# Orifice J

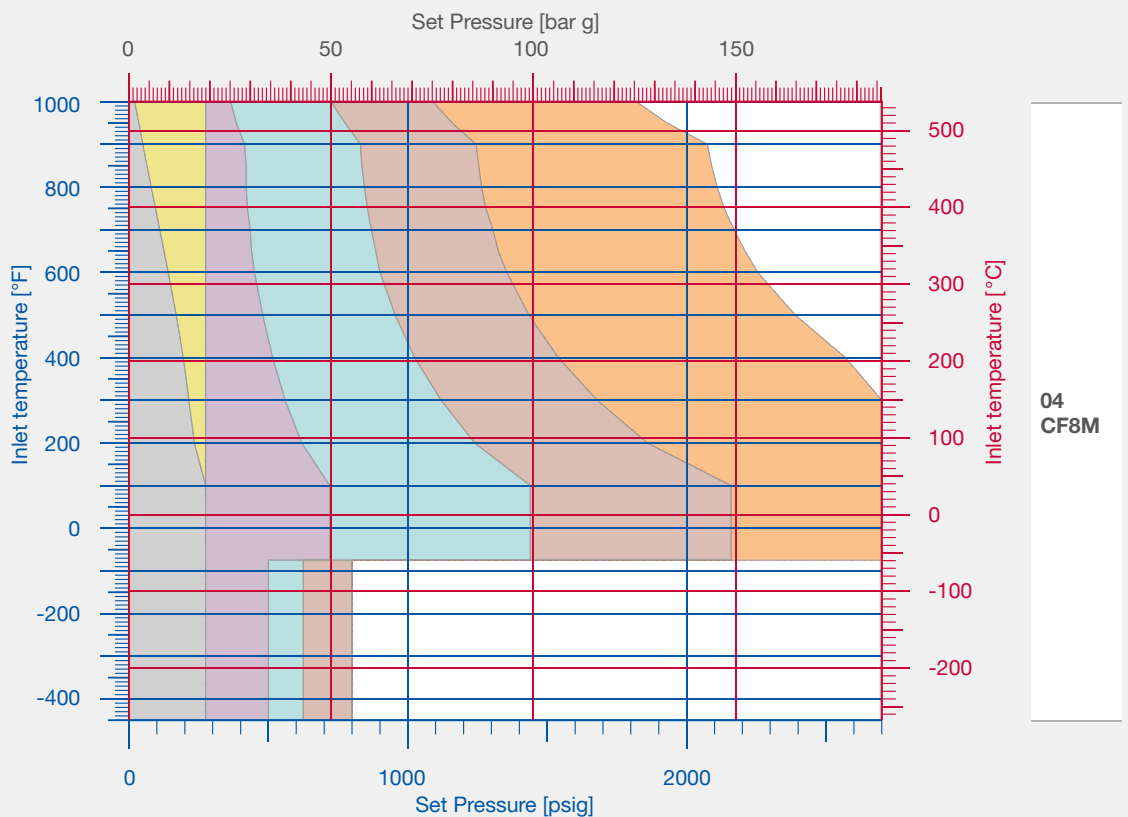
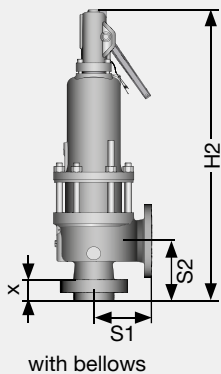
## Selection chart

Si 81/83



01 02 03 04 05 06

Si 84/85



# Orifice K

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 3  | psig | 0.18 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 22 | psig | 1.5  | bar g |

## Effective area 1.838 in<sup>2</sup> / 1185 mm<sup>2</sup>

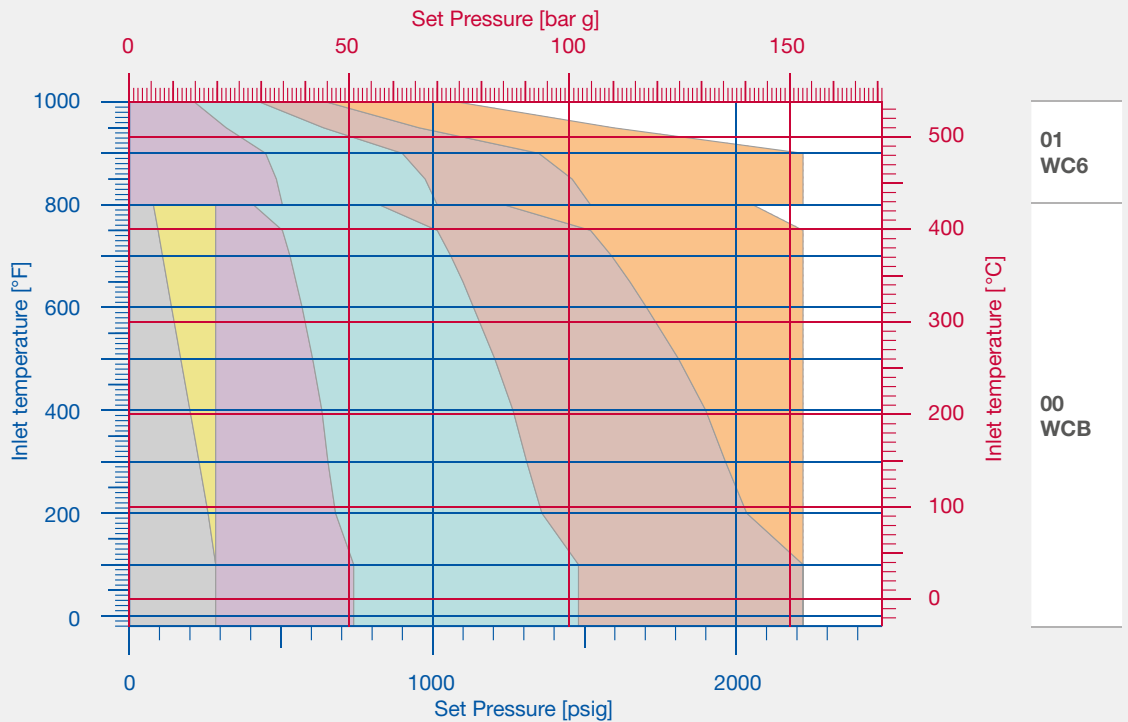
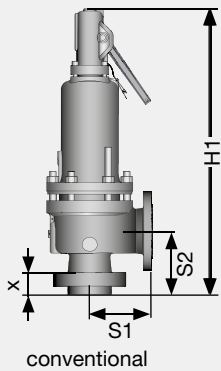
| Inlet class           | 01                          | 02        | 03        | 04        | 04        | 05        | 06         |               |
|-----------------------|-----------------------------|-----------|-----------|-----------|-----------|-----------|------------|---------------|
| Class                 | 150 x 150                   | 300 x 150 | 300 x 150 | 600 x 150 | 600 x 150 | 900 x 150 | 1500 x 300 |               |
| NPS Inlet x outlet    | 3" x 4"                     | 3" x 4"   | 3" x 4"   | 3" x 4"   | 3" x 4"   | 3" x 6"   | 3" x 6"    |               |
| S1 [in]               | 6.37                        | 6.37      | 6.37      | 6.37      | 7.13      | 8.50      | 8.50       |               |
| S2 [in]               | 6.13                        | 6.13      | 6.13      | 6.13      | 7.25      | 7.81      | 7.75       |               |
| X [in]                | 2.32                        | 2.32      | 2.32      | 2.32      | 2.64      | 2.99      | 2.99       |               |
| H1 Si 81/83 [in]      | 28.35                       | 28.35     | 28.35     | 28.35     | 32.68     | 38.98     | 38.98      |               |
| H2 Si 84/85 [in]      | 31.10                       | 31.10     | 31.10     | 31.10     | 35.83     | 42.32     | 42.32      |               |
| Weight Si 81/83 [lbs] | 137                         | 144       | 144       | 144       | 164       | 177       | 188        |               |
| Weight Si 84/85 [lbs] | 148                         | 157       | 157       | 157       | 172       | 199       | 210        |               |
| Inlet temperature     | Max. set pressure [psig]    |           |           |           |           |           |            | Material code |
| -51 °F to -21 °F      | 266                         | 266       | 696       |           | 1392      | 2089      | 2220       | 22 LCB        |
| -20 °F to 100 °F      | 285                         | 285       | 740       |           | 1480      | 2220      | 2220       | 00 WCB        |
| 101 °F to 450 °F      | 185                         | 285       | 615       |           | 1235      | 1845      | 2220       |               |
| 451 °F to 800 °F      | 80                          |           | 410       |           | 825       | 1235      | 2060       | 01 WC6        |
| 451 °F to 800 °F      |                             |           | 510       | 1015      |           | 1525      | 2220       |               |
| 801 °F to 1000 °F     |                             |           | 215       | 430       |           | 650       | 1080       | 04 CF8M       |
| -450 °F to -76 °F     | 275                         | 275       | 525       |           | 600       | 600       | 750        |               |
| -75 °F to -21 °F      | 275                         | 275       | 720       |           | 1440      | 2160      | 2220       |               |
| -20 °F to -100 °F     | 275                         | 275       | 720       |           | 1440      | 2160      | 2220       |               |
| 101 °F to 450 °F      | 180                         | 275       | 495       |           | 975       | 1485      | 2220       |               |
| 451 °F to 800 °F      | 80                          | 275       | 420       |           | 845       | 1265      | 2110       |               |
| 801 °F to 1000 °F     | 20                          | 275       | 350       |           | 700       | 1050      | 1750       |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |           |           |           |           |            |               |
| Si 81/83@100 °F       | 265                         | 265       | 265       |           | 265       | 265       | 600        | 22            |
| Si 81/83@100 °F       | 285                         | 285       | 285       | 285       | 285       | 285       | 600        | 00/01         |
| Si 81/83@100 °F       | 275                         | 275       | 275       |           | 275       | 275       | 600        | 04            |
| Si 84/85@100 °F       | 150 (230)                   | 150 (230) | 150 (230) | 200 (230) | 200 (230) | 200 (230) | 200 (230)  | 00/22 (01/04) |

| Inlet class          | 01                           | 02          | 03          | 04          | 04          | 05          | 06          |               |
|----------------------|------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| Class                | 150 x 150                    | 300 x 150   | 300 x 150   | 600 x 150   | 600 x 150   | 900 x 150   | 1500 x 300  |               |
| NPS Inlet x outlet   | 3" x 4"                      | 3" x 4"     | 3" x 4"     | 3" x 4"     | 3" x 4"     | 3" x 6"     | 3" x 6"     |               |
| S1 [mm]              | 161.9                        | 161.9       | 161.9       | 161.9       | 181.0       | 215.9       | 215.9       |               |
| S2 [mm]              | 155.6                        | 155.6       | 155.6       | 155.6       | 184.2       | 198.4       | 196.9       |               |
| X [mm]               | 59                           | 59          | 59          | 59          | 67          | 76          | 76          |               |
| H1 Si 81/83 [mm]     | 720                          | 720         | 720         | 720         | 830         | 990         | 990         |               |
| H2 Si 84/85 [mm]     | 790                          | 790         | 790         | 790         | 910         | 1075        | 1075        |               |
| Weight Si 81/83 [kg] | 62                           | 65          | 65          | 65          | 74          | 80          | 85          |               |
| Weight Si 84/85 [kg] | 67                           | 71          | 71          | 71          | 78          | 90          | 95          |               |
| Inlet temperature    | Max. set pressure [bar g]    |             |             |             |             |             |             | Material code |
| -46 °C to -30 °C     | 18.3                         | 18.3        | 48.0        |             | 96.0        | 144.0       | 153.1       | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 19.7        | 51.0        |             | 102.0       | 153.1       | 153.1       | 00 WCB        |
| 39 °C to 232 °C      | 12.8                         | 19.7        | 42.4        |             | 85.2        | 127.2       | 153.1       |               |
| 233 °C to 427 °C     | 5.5                          | 19.7        | 28.3        |             | 56.9        | 85.2        | 142.0       | 01 WC6        |
| 233 °C to 427 °C     |                              |             | 35.2        | 70.0        |             | 105.1       | 153.1       |               |
| 428 °C to 538 °C     |                              |             | 14.8        | 29.6        |             | 44.8        | 74.5        | 04 CF8M       |
| -268 °C to -60 °C    | 19.0                         | 19.0        | 36.2        |             | 41.4        | 41.4        | 51.7        |               |
| -59 °C to -30 °C     | 19.0                         | 19.0        | 49.6        |             | 99.3        | 148.9       | 153.1       |               |
| -29 °C to 38 °C      | 19.0                         | 19.0        | 49.6        |             | 99.3        | 148.9       | 153.1       |               |
| 39 °C to 232 °C      | 12.4                         | 19.0        | 34.1        |             | 67.2        | 102.4       | 153.1       |               |
| 233 °C to 427 °C     | 5.5                          | 19.0        | 29.0        |             | 58.3        | 87.2        | 145.5       |               |
| 428 °C to 538 °C     | 1.4                          | 19.0        | 24.1        |             | 48.3        | 72.4        | 120.7       |               |
| Outlet temperature   | Max. outlet pressure [bar g] |             |             |             |             |             |             |               |
| Si 81/83@38 °C       | 18.3                         | 18.3        | 18.3        |             | 18.3        | 18.3        | 41.4        | 22            |
| Si 81/83@38 °C       | 19.7                         | 19.7        | 19.7        | 19.7        | 19.7        | 19.7        | 41.4        | 00/01         |
| Si 81/83@38 °C       | 19.0                         | 19.0        | 19.0        |             | 19.0        | 19.0        | 41.4        | 04            |
| Si 84/85@38 °C       | 10.3 (15.9)                  | 10.3 (15.9) | 10.3 (15.9) | 13.8 (15.9) | 13.8 (15.9) | 13.8 (15.9) | 13.8 (15.9) | 00/22 (01/04) |

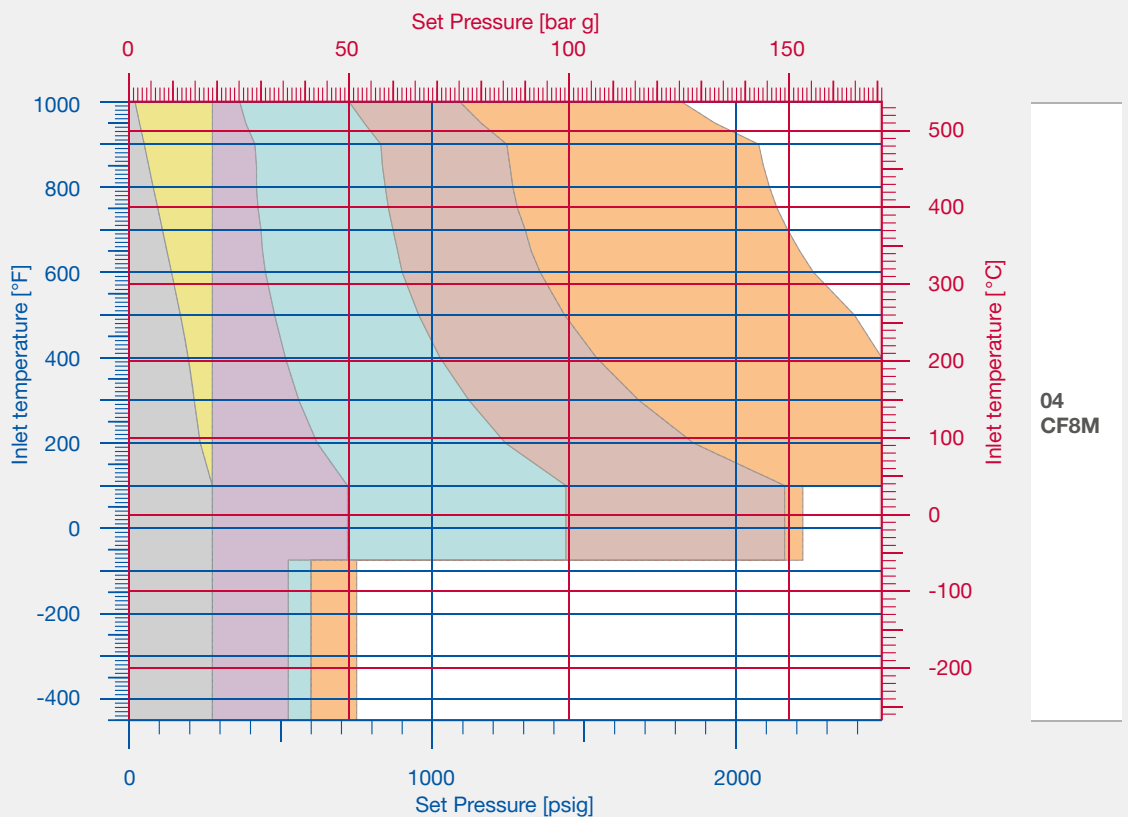
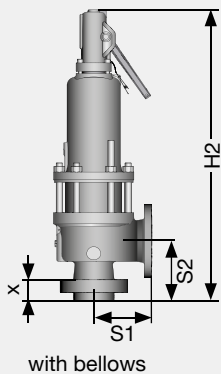
# Orifice K

## Selection chart

Si 81/83



Si 84/85



# Orifice L

| Minimum set pressures |    |      |      |       |
|-----------------------|----|------|------|-------|
| Si 830x.57            | 3  | psig | 0.14 | bar g |
| Si 830x               | 8  | psig | 0.5  | bar g |
| Si 840x               | 15 | psig | 1    | bar g |

## Effective area 2.853 in<sup>2</sup> / 1840 mm<sup>2</sup>

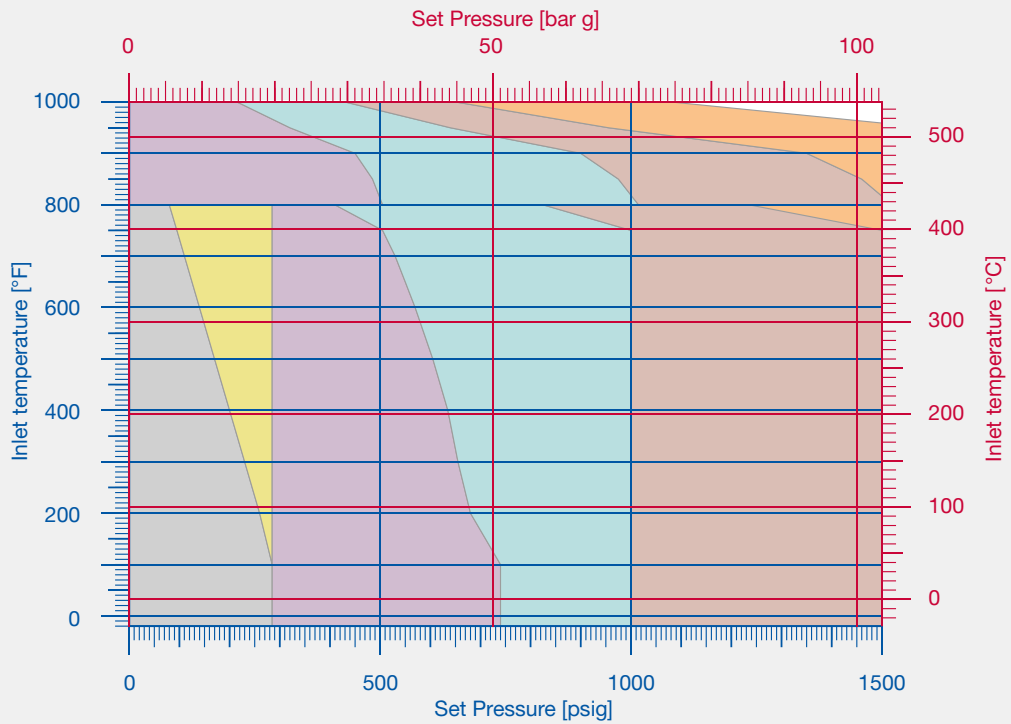
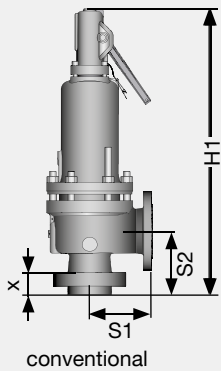
| Inlet class           | 01                          | 02        | 03        | 04        | 05        | 06         |               |
|-----------------------|-----------------------------|-----------|-----------|-----------|-----------|------------|---------------|
| Class                 | 150 x 150                   | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 150 | 1500 x 150 |               |
| NPS Inlet x outlet    | 3" x 4"                     | 3" x 4"   | 4" x 6"   | 4" x 6"   | 4" x 6"   | 4" x 6"    |               |
| S1 [in]               | 6.50                        | 6.50      | 7.13      | 8.00      | 8.75      | 8.75       |               |
| S2 [in]               | 6.13                        | 6.13      | 7.06      | 7.06      | 7.75      | 7.75       |               |
| X [in]                | 2.32                        | 2.32      | 2.32      | 2.36      | 3.23      | 3.23       |               |
| H1 Si 81/83 [in]      | 28.35                       | 28.35     | 33.46     | 38.78     | 38.78     | 38.78      |               |
| H2 Si 84/85 [in]      | 31.10                       | 31.10     | 36.61     | 42.52     | 42.52     | 42.52      |               |
| Weight Si 81/83 [lbs] | 137                         | 144       | 221       | 232       | 336       | 353        |               |
| Weight Si 84/85 [lbs] | 148                         | 155       | 221       | 265       | 362       | 371        |               |
| Inlet temperature     | Max. set pressure [psig]    |           |           |           |           |            | Material code |
| -51 °F to -21 °F      | 266                         | 266       | 696       | 1000      | 700       |            | 22 LCB        |
| -20 °F to 100 °F      | 285                         | 285       | 740       | 1000      | 1500      | 1500       | 00 WCB        |
| 101 °F to 450 °F      | 185                         | 285       | 615       | 1000      | 1500      | 1500       |               |
| 451 °F to 800 °F      | 80                          | 285       | 410       | 825       | 1235      | 1500       | 01 WC6        |
| 451 °F to 800 °F      |                             |           | 510       | 1000      | 1500      | 1500       |               |
| 801 °F to 1000 °F     |                             |           | 215       | 430       | 650       | 1080       | 04 CF8M       |
| -450 °F to -76 °F     | 275                         | 275       | 535       | 535       | 700       |            |               |
| -75 °F to -21 °F      | 275                         | 275       | 720       | 1000      | 1500      |            |               |
| -20 °F to -100 °F     | 275                         | 275       | 720       | 1000      | 1500      |            |               |
| 101 °F to 450 °F      | 180                         | 275       | 495       | 975       | 1485      |            |               |
| 451 °F to 800 °F      | 80                          | 275       | 420       | 845       | 1265      |            |               |
| 801 °F to 1000 °F     | 20                          | 275       | 350       | 700       | 1050      |            |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |           |           |           |            |               |
| Si 81/83@100 °F       | 265                         | 265       | 265       | 265       | 265       |            | 22            |
| Si 81/83@100 °F       | 285                         | 285       | 285       | 285       | 285       | 285        | 00/01         |
| Si 81/83@100 °F       | 275                         | 275       | 275       | 275       | 275       |            | 04            |
| Si 84/85@100 °F       | 100                         | 100       | 170       | 170       | 170       | 170        | all           |

| Inlet class          | 01                           | 02        | 03        | 04        | 05        | 06         |               |
|----------------------|------------------------------|-----------|-----------|-----------|-----------|------------|---------------|
| Class                | 150 x 150                    | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 150 | 1500 x 150 |               |
| NPS Inlet x outlet   | 3" x 4"                      | 3" x 4"   | 4" x 6"   | 4" x 6"   | 4" x 6"   | 4" x 6"    |               |
| S1 [mm]              | 165.1                        | 165.1     | 181.0     | 203.2     | 222.3     | 222.3      |               |
| S2 [mm]              | 155.6                        | 155.6     | 179.4     | 179.4     | 196.9     | 196.9      |               |
| X [mm]               | 59                           | 59        | 59        | 60        | 82        | 82         |               |
| H1 Si 81/83 [mm]     | 720                          | 720       | 850       | 985       | 985       | 985        |               |
| H2 Si 84/85 [mm]     | 790                          | 790       | 930       | 1080      | 1080      | 1080       |               |
| Weight Si 81/83 [kg] | 62                           | 65        | 100       | 105       | 152       | 160        |               |
| Weight Si 84/85 [kg] | 67                           | 70        | 100       | 120       | 164       | 168        |               |
| Inlet temperature    | Max. set pressure [bar g]    |           |           |           |           |            | Material code |
| -46 °C to -30 °C     | 18.3                         | 18.3      | 48.0      | 68.9      | 103.4     |            | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 19.7      | 51.0      | 68.9      | 103.4     | 103.4      | 00 WCB        |
| 39 °C to 232 °C      | 12.8                         | 19.7      | 42.4      | 68.9      | 103.4     | 103.4      |               |
| 233 °C to 427 °C     | 5.5                          | 19.7      | 28.3      | 56.9      | 85.2      | 103.4      | 01 WC6        |
| 233 °C to 427 °C     |                              |           | 35.2      | 68.9      | 103.4     | 103.4      |               |
| 428 °C to 538 °C     |                              |           | 14.8      | 29.6      | 44.8      | 74.5       | 04 CF8M       |
| -268 °C to -60 °C    | 19.0                         | 19.0      | 36.9      | 36.9      | 48.3      |            |               |
| -59 °C to -30 °C     | 19.0                         | 19.0      | 49.6      | 68.9      | 103.4     |            |               |
| -29 °C to 38 °C      | 19.0                         | 19.0      | 49.6      | 68.9      | 103.4     |            |               |
| 39 °C to 232 °C      | 12.4                         | 19.0      | 34.1      | 67.2      | 102.4     |            |               |
| 233 °C to 427 °C     | 5.5                          | 19.0      | 29.0      | 58.3      | 87.2      |            |               |
| 428 °C to 538 °C     | 1.4                          | 19.0      | 24.1      | 48.3      | 72.4      |            |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |           |           |           |            |               |
| Si 81/83@38 °C       | 18.3                         | 18.3      | 18.3      | 18.3      | 18.3      |            | 22            |
| Si 81/83@38 °C       | 19.7                         | 19.7      | 19.7      | 19.7      | 19.7      | 19.7       | 00/01         |
| Si 81/83@38 °C       | 19.0                         | 19.0      | 19.0      | 19.0      | 19.0      |            | 04            |
| Si 84/85@38 °C       | 6.9                          | 6.9       | 11.7      | 11.7      | 11.7      | 11.7       | all           |

# Orifice L

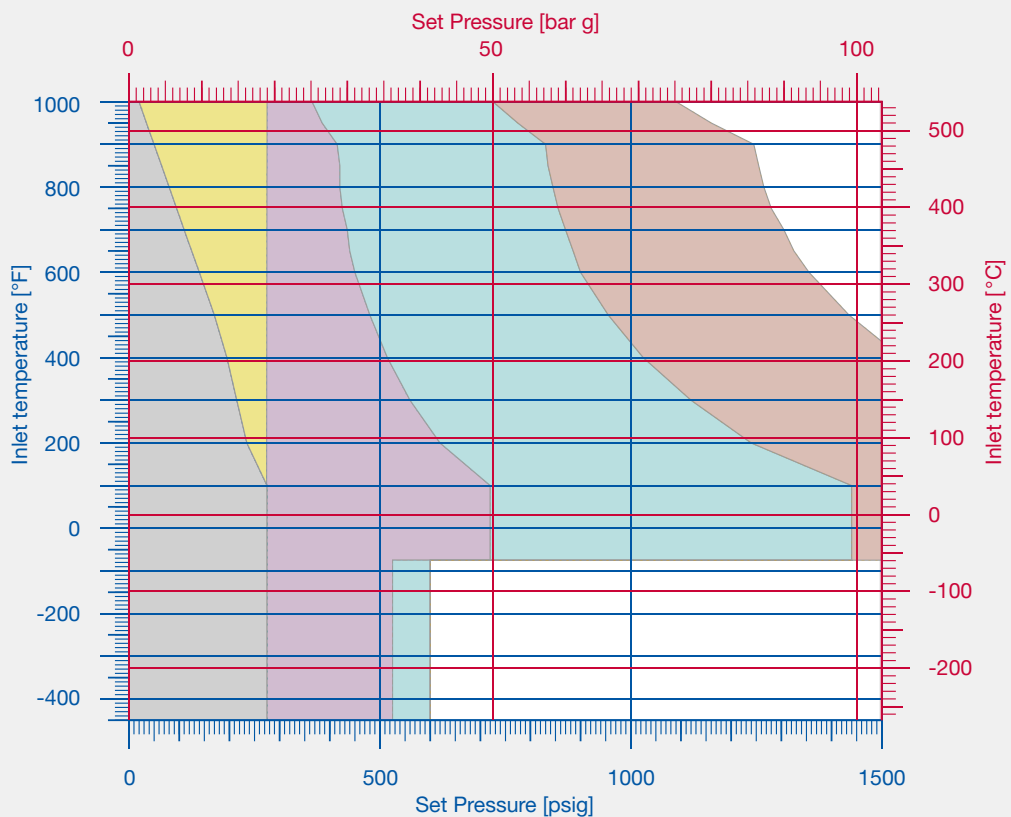
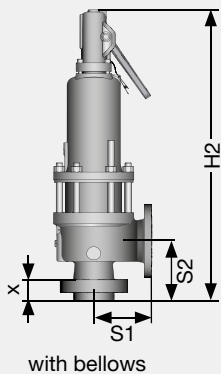
## Selection chart

Si 81/83



01 02 03 04 05 06

Si 84/85



# Orifice M

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 3  | psig | 0.17 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 18 | psig | 1.2  | bar g |

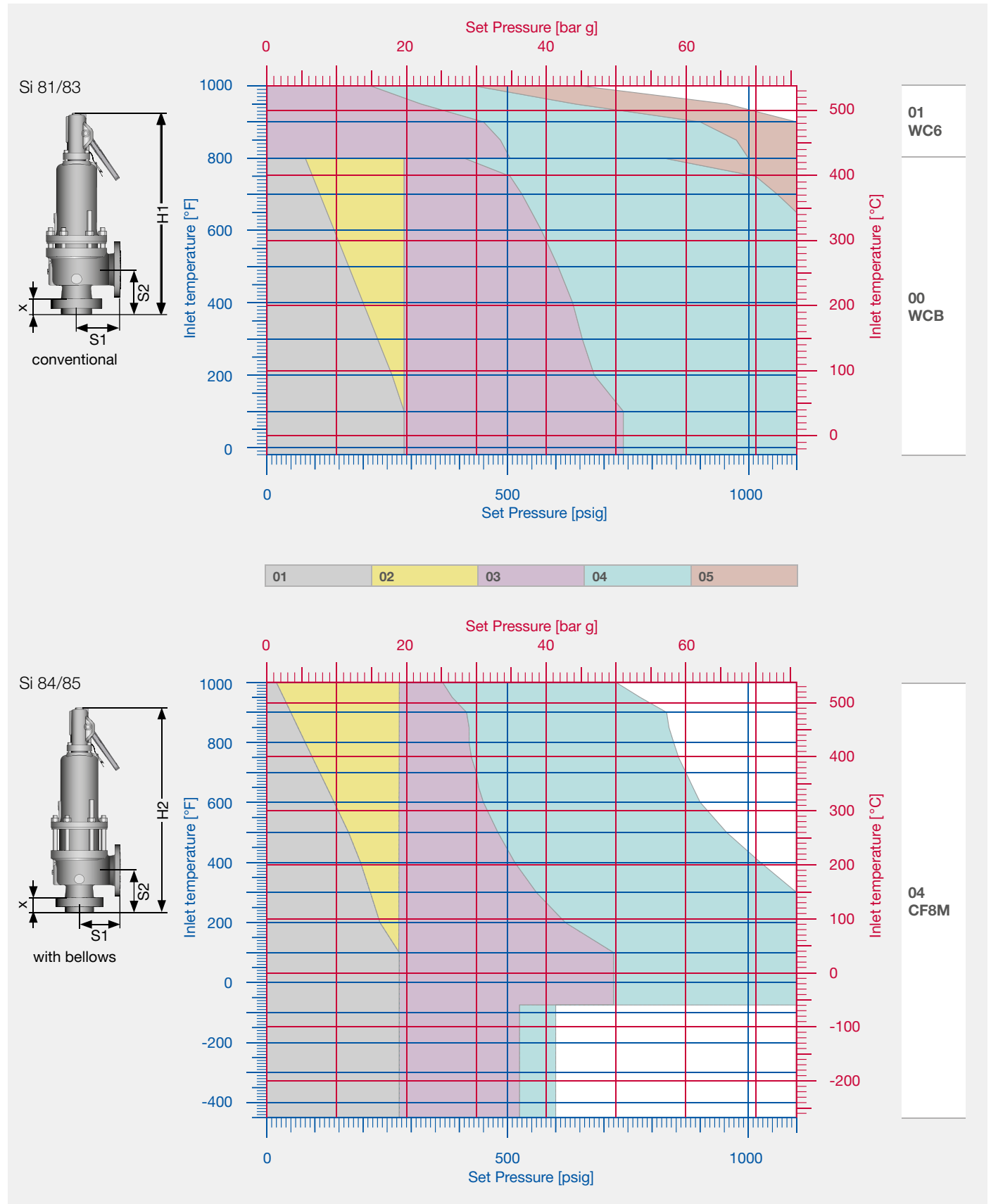
## Effective area 3.60 in<sup>2</sup> / 2322 mm<sup>2</sup>

| Inlet class           | 01                          | 02        | 03        | 04        | 05        |               |
|-----------------------|-----------------------------|-----------|-----------|-----------|-----------|---------------|
| Class                 | 150 x 150                   | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 150 |               |
| NPS Inlet x outlet    | 4" x 6"                     | 4" x 6"   | 4" x 6"   | 4" x 6"   | 4" x 6"   |               |
| S1 [in]               | 7.25                        | 7.25      | 7.25      | 8.00      | 8.75      |               |
| S2 [in]               | 7.00                        | 7.00      | 7.00      | 7.00      | 7.75      |               |
| X [in]                | 2.20                        | 2.20      | 2.20      | 2.44      | 3.23      |               |
| H1 Si 81/83 [in]      | 33.46                       | 33.46     | 33.46     | 38.78     | 39.57     |               |
| H2 Si 84/85 [in]      | 36.42                       | 36.42     | 36.42     | 41.14     | 41.73     |               |
| Weight Si 81/83 [lbs] | 212                         | 221       | 221       | 336       | 353       |               |
| Weight Si 84/85 [lbs] | 239                         | 247       | 247       | 362       | 375       |               |
| Inlet temperature     | Max. set pressure [psig]    |           |           |           |           | Material code |
| -51 °F to -21 °F      | 266                         | 266       | 696       | 1000      |           | 22 LCB        |
| -20 °F to 100 °F      | 285                         | 285       | 740       | 1100      | 1100      |               |
| 101 °F to 450 °F      | 185                         | 285       | 615       | 1100      | 1100      | 00 WCB        |
| 451 °F to 800 °F      | 80                          | 285       | 410       | 825       | 1100      |               |
| 451 °F to 800 °F      |                             |           | 510       | 1000      | 1100      | 01 WC6        |
| 801 °F to 1000 °F     |                             |           | 215       | 430       | 650       |               |
| -450 °F to -76 °F     | 275                         | 275       | 525       | 600       |           |               |
| -75 °F to -21 °F      | 275                         | 275       | 720       | 1100      |           |               |
| -20 °F to -100 °F     | 275                         | 275       | 720       | 1100      |           | 04 CF8M       |
| 101 °F to 450 °F      | 180                         | 275       | 495       | 975       |           |               |
| 451 °F to 800 °F      | 80                          | 275       | 420       | 845       |           |               |
| 801 °F to 1000 °F     | 20                          | 275       | 350       | 700       |           |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |           |           |           |               |
| Si 81/83@100 °F       | 265                         | 265       | 265       | 265       |           | 22            |
| Si 81/83@100 °F       | 285                         | 285       | 285       | 285       | 285       | 00/01         |
| Si 81/83@100 °F       | 275                         | 275       | 275       | 275       |           | 04            |
| Si 84/85@100 °F       | 80                          | 80        | 160       | 160       | 160       | all           |

| Inlet class          | 01                           | 02        | 03        | 04        | 05        |               |
|----------------------|------------------------------|-----------|-----------|-----------|-----------|---------------|
| Class                | 150 x 150                    | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 150 |               |
| NPS Inlet x outlet   | 4" x 6"                      | 4" x 6"   | 4" x 6"   | 4" x 6"   | 4" x 6"   |               |
| S1 [mm]              | 184.2                        | 184.2     | 184.2     | 203.2     | 222.3     |               |
| S2 [mm]              | 177.8                        | 177.8     | 177.8     | 177.8     | 196.9     |               |
| X [mm]               | 56                           | 56        | 56        | 62        | 82        |               |
| H1 Si 81/83 [mm]     | 850                          | 850       | 850       | 985       | 1005      |               |
| H2 Si 84/85 [mm]     | 925                          | 925       | 925       | 1045      | 1060      |               |
| Weight Si 81/83 [kg] | 96                           | 100       | 100       | 152       | 160       |               |
| Weight Si 84/85 [kg] | 108                          | 112       | 112       | 164       | 170       |               |
| Inlet temperature    | Max. set pressure [bar g]    |           |           |           |           | Material code |
| -46 °C to -30 °C     | 18.3                         | 18.3      | 48.0      | 68.9      |           | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 19.7      | 51.0      | 75.8      | 75.8      |               |
| 39 °C to 232 °C      | 12.8                         | 19.7      | 42.4      | 75.8      | 75.8      | 00 WCB        |
| 233 °C to 427 °C     | 5.5                          | 19.7      | 28.3      | 56.9      | 75.8      |               |
| 233 °C to 427 °C     |                              |           | 35.2      | 68.9      | 75.8      | 01 WC6        |
| 428 °C to 538 °C     |                              |           | 14.8      | 29.6      | 44.8      |               |
| -268 °C to -60 °C    | 19.0                         | 19.0      | 36.2      | 41.4      |           |               |
| -59 °C to -30 °C     | 19.0                         | 19.0      | 49.6      | 75.8      |           |               |
| -29 °C to 38 °C      | 19.0                         | 19.0      | 49.6      | 75.8      |           | 04 CF8M       |
| 39 °C to 232 °C      | 12.4                         | 19.0      | 34.1      | 67.2      |           |               |
| 233 °C to 427 °C     | 5.5                          | 19.0      | 29.0      | 58.3      |           |               |
| 428 °C to 538 °C     | 1.4                          | 19.0      | 24.1      | 48.3      |           |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |           |           |           |               |
| Si 81/83@38 °C       | 18.3                         | 18.3      | 18.3      | 18.3      |           | 22            |
| Si 81/83@38 °C       | 19.7                         | 19.7      | 19.7      | 19.7      | 19.7      | 00/01         |
| Si 81/83@38 °C       | 19.0                         | 19.0      | 19.0      | 19.0      |           | 04            |
| Si 84/85@38 °C       | 5.5                          | 5.5       | 11.0      | 11.0      | 11.0      | all           |

# Orifice M

## Selection chart



# Orifice N

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 4  | psig | 0.25 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 16 | psig | 1.1  | bar g |

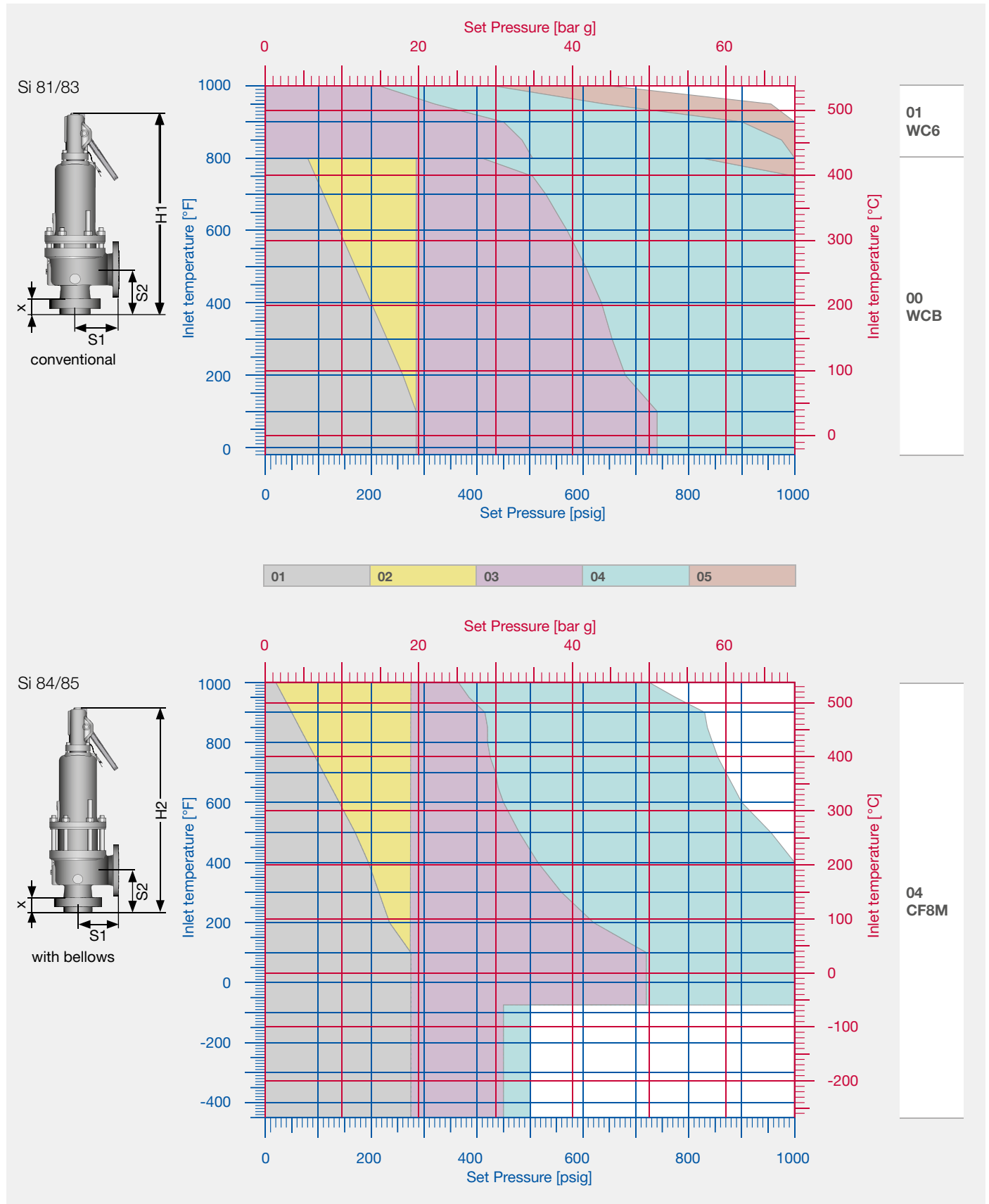
## Effective area 3.60 in<sup>2</sup> / 2322 mm<sup>2</sup>

| Inlet class           | 01                          | 02        | 03        | 04        | 05        |               |
|-----------------------|-----------------------------|-----------|-----------|-----------|-----------|---------------|
| Class                 | 150 x 150                   | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 150 |               |
| NPS Inlet x outlet    | 4" x 6"                     | 4" x 6"   | 4" x 6"   | 4" x 6"   | 4" x 6"   |               |
| S1 [in]               | 8.25                        | 8.25      | 8.25      | 8.75      | 8.75      |               |
| S2 [in]               | 7.75                        | 7.75      | 7.75      | 7.75      | 7.75      |               |
| X [in]                | 2.17                        | 2.17      | 2.17      | 3.23      | 3.23      |               |
| H1 Si 81/83 [in]      | 38.98                       | 38.98     | 38.98     | 38.98     | 38.98     |               |
| H2 Si 84/85 [in]      | 43.11                       | 43.11     | 43.11     | 43.11     | 43.11     |               |
| Weight Si 81/83 [lbs] | 305                         | 316       | 316       | 349       | 355       |               |
| Weight Si 84/85 [lbs] | 336                         | 347       | 347       | 375       | 397       |               |
| Inlet temperature     | Max. set pressure [psig]    |           |           |           |           | Material code |
| -51 °F to -21 °F      | 266                         | 266       | 696       | 1000      |           | 22 LCB        |
| -20 °F to 100 °F      | 285                         | 285       | 740       | 1000      | 1000      |               |
| 101 °F to 450 °F      | 185                         | 285       | 615       | 1000      | 1000      | 00 WCB        |
| 451 °F to 800 °F      | 80                          | 285       | 410       | 825       | 1000      |               |
| 451 °F to 800 °F      |                             |           | 510       | 1000      | 1000      | 01 WC6        |
| 801 °F to 1000 °F     |                             |           | 215       | 430       | 650       |               |
| -450 °F to -76 °F     | 275                         | 275       | 450       | 500       |           |               |
| -75 °F to -21 °F      | 275                         | 275       | 720       | 1000      |           |               |
| -20 °F to -100 °F     | 275                         | 275       | 720       | 1000      |           | 04 CF8M       |
| 101 °F to 450 °F      | 180                         | 275       | 495       | 975       |           |               |
| 451 °F to 800 °F      | 80                          | 275       | 420       | 845       |           |               |
| 801 °F to 1000 °F     | 20                          | 275       | 350       | 700       |           |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |           |           |           |               |
| Si 81/83@100 °F       | 265                         | 265       | 265       | 265       |           | 22            |
| Si 81/83@100 °F       | 285                         | 285       | 285       | 285       | 285       | 00/01         |
| Si 81/83@100 °F       | 275                         | 275       | 275       | 275       |           | 04            |
| Si 84/85@100 °F       | 80                          | 80        | 160       | 160       | 160       | all           |

| Inlet class          | 01                           | 02        | 03        | 04        | 05        |               |
|----------------------|------------------------------|-----------|-----------|-----------|-----------|---------------|
| Class                | 150 x 150                    | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 150 |               |
| NPS Inlet x outlet   | 4" x 6"                      | 4" x 6"   | 4" x 6"   | 4" x 6"   | 4" x 6"   |               |
| S1 [mm]              | 209.6                        | 209.6     | 209.6     | 222.3     | 222.3     |               |
| S2 [mm]              | 196.9                        | 196.9     | 196.9     | 196.9     | 196.9     |               |
| X [mm]               | 55                           | 55        | 55        | 82        | 82        |               |
| H1 Si 81/83 [mm]     | 990                          | 990       | 990       | 990       | 990       |               |
| H2 Si 84/85 [mm]     | 1095                         | 1095      | 1095      | 1095      | 1095      |               |
| Weight Si 81/83 [kg] | 138                          | 143       | 143       | 158       | 161       |               |
| Weight Si 84/85 [kg] | 152                          | 157       | 157       | 170       | 180       |               |
| Inlet temperature    | Max. set pressure [bar g]    |           |           |           |           | Material code |
| -46 °C to -30 °C     | 18.3                         | 18.3      | 48.0      | 68.9      |           | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 19.7      | 51.0      | 68.9      | 68.9      |               |
| 39 °C to 232 °C      | 12.8                         | 19.7      | 42.4      | 68.9      | 68.9      | 00 WCB        |
| 233 °C to 427 °C     | 5.5                          | 19.7      | 28.3      | 56.9      | 68.9      |               |
| 233 °C to 427 °C     |                              |           | 35.2      | 68.9      | 68.9      | 01 WC6        |
| 428 °C to 538 °C     |                              |           | 14.8      | 29.6      | 44.8      |               |
| -268 °C to -60 °C    | 19.0                         | 19.0      | 31.0      | 34.5      |           |               |
| -59 °C to -30 °C     | 19.0                         | 19.0      | 49.6      | 68.9      |           |               |
| -29 °C to 38 °C      | 19.0                         | 19.0      | 49.6      | 75.8      |           | 04 CF8M       |
| 39 °C to 232 °C      | 12.4                         | 19.0      | 34.1      | 67.2      |           |               |
| 233 °C to 427 °C     | 5.5                          | 19.0      | 29.0      | 58.3      |           |               |
| 428 °C to 538 °C     | 1.4                          | 19.0      | 24.1      | 48.3      |           |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |           |           |           |               |
| Si 81/83@38 °C       | 18.3                         | 18.3      | 18.3      | 18.3      |           | 22            |
| Si 81/83@38 °C       | 19.7                         | 19.7      | 19.7      | 19.7      | 19.7      | 00/01         |
| Si 81/83@38 °C       | 19.0                         | 19.0      | 19.0      | 19.0      |           | 04            |
| Si 84/85@38 °C       | 5.5                          | 5.5       | 11.0      | 11.0      | 11.0      | all           |

# Orifice N

## Selection chart



# Orifice P

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 4  | psig | 0.24 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 15 | psig | 1    | bar g |

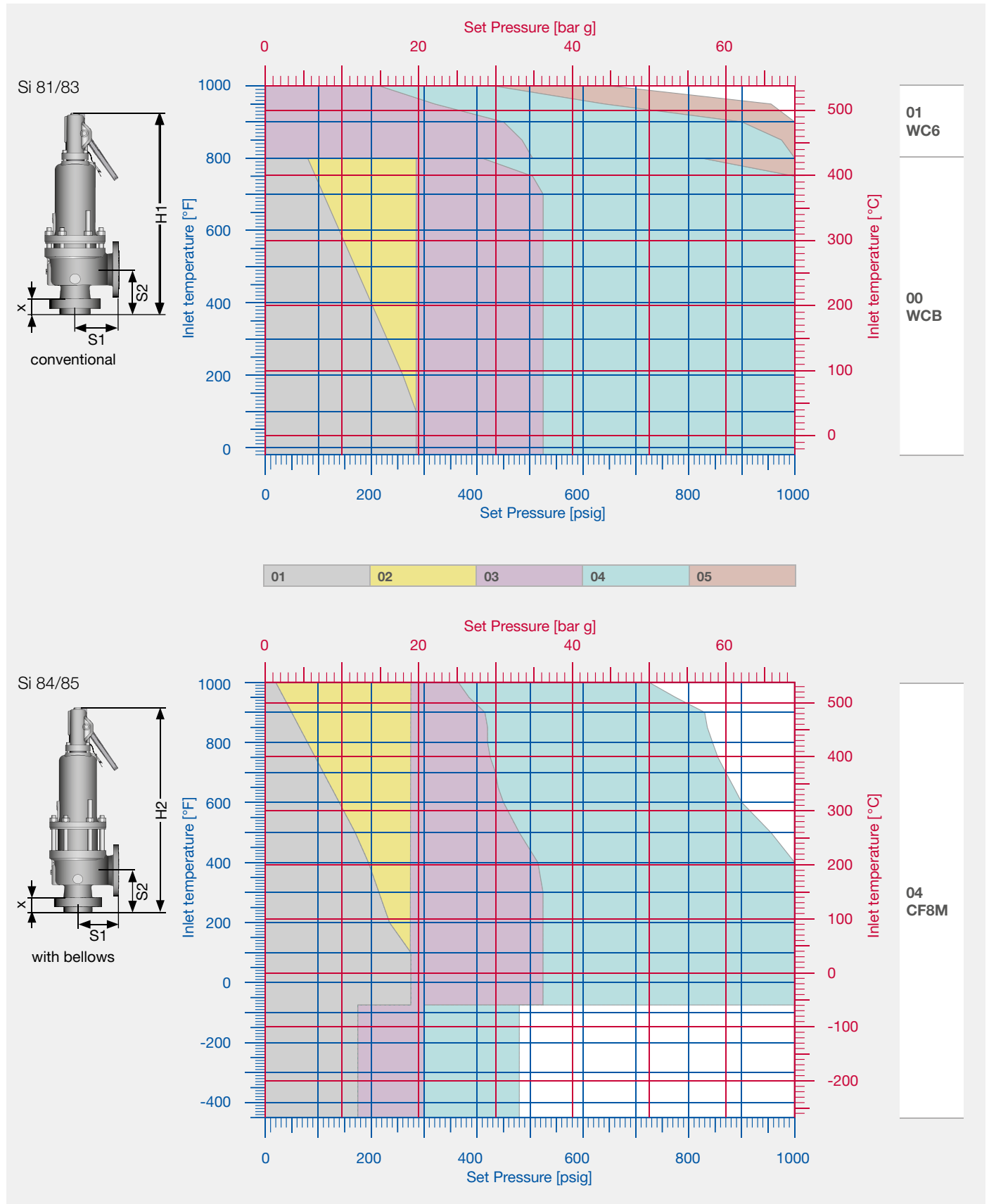
## Effective area 6.38 in<sup>2</sup> / 4116 mm<sup>2</sup>

| Inlet class           | 01                          | 02        | 03        | 04        | 05        |               |
|-----------------------|-----------------------------|-----------|-----------|-----------|-----------|---------------|
| Class                 | 150 x 150                   | 300 x 150 | 300 x 150 | 600 x 150 | 900 x 150 |               |
| NPS Inlet x outlet    | 4" x 6"                     | 4" x 6"   | 4" x 6"   | 4" x 6"   | 4" x 6"   |               |
| S1 [in]               | 9.00                        | 9.00      | 10.00     | 10.00     | 10.00     |               |
| S2 [in]               | 7.13                        | 7.13      | 8.87      | 8.87      | 8.87      |               |
| X [in]                | 2.13                        | 2.13      | 2.72      | 2.72      | 2.72      |               |
| H1 Si 81/83 [in]      | 38.58                       | 38.58     | 46.06     | 46.06     | 46.06     |               |
| H2 Si 84/85 [in]      | 42.72                       | 42.72     | 49.41     | 49.41     | 49.41     |               |
| Weight Si 81/83 [lbs] | 314                         | 325       | 386       | 393       | 530       |               |
| Weight Si 84/85 [lbs] | 344                         | 355       | 424       | 463       | 574       |               |
| Inlet temperature     | Max. set pressure [psig]    |           |           |           |           | Material code |
| -51 °F to -21 °F      | 266                         | 266       | 525       | 1000      |           | 22 LCB        |
| -20 °F to 100 °F      | 285                         | 285       | 525       | 1000      | 1000      |               |
| 101 °F to 450 °F      | 185                         | 285       | 525       | 1000      | 1000      | 00 WCB        |
| 451 °F to 800 °F      | 80                          | 285       | 410       | 825       | 1000      |               |
| 451 °F to 800 °F      |                             |           | 510       | 1000      | 1000      | 01 WC6        |
| 801 °F to 1000 °F     |                             |           | 215       | 430       | 650       |               |
| -450 °F to -76 °F     | 175                         | 175       | 300       | 480       |           |               |
| -75 °F to -21 °F      | 275                         | 275       | 525       | 1000      |           |               |
| -20 °F to -100 °F     | 275                         | 275       | 525       | 1000      |           | 04 CF8M       |
| 101 °F to 450 °F      | 180                         | 275       | 495       | 975       |           |               |
| 451 °F to 800 °F      | 80                          | 275       | 420       | 845       |           |               |
| 801 °F to 1000 °F     | 20                          | 20        | 350       | 700       |           |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |           |           |           |               |
| Si 81/83@100 °F       | 265                         | 265       | 265       | 265       |           | 22            |
| Si 81/83@100 °F       | 285                         | 285       | 285       | 285       | 285       | 00/01         |
| Si 81/83@100 °F       | 275                         | 275       | 275       | 275       |           | 04            |
| Si 84/85@100 °F       | 80                          | 80        | 150 (160) | 150 (160) | 150 (160) | 00/22 (01/04) |

| Inlet class          | 01                           | 02        | 03          | 04          | 05          |               |
|----------------------|------------------------------|-----------|-------------|-------------|-------------|---------------|
| Class                | 150 x 150                    | 300 x 150 | 300 x 150   | 600 x 150   | 900 x 150   |               |
| NPS Inlet x outlet   | 4" x 6"                      | 4" x 6"   | 4" x 6"     | 4" x 6"     | 4" x 6"     |               |
| S1 [mm]              | 228.6                        | 228.6     | 254.0       | 254.0       | 254.0       |               |
| S2 [mm]              | 181.0                        | 181.0     | 225.4       | 225.4       | 225.4       |               |
| X [mm]               | 54                           | 54        | 69          | 69          | 69          |               |
| H1 Si 81/83 [mm]     | 980                          | 980       | 1170        | 1170        | 1170        |               |
| H2 Si 84/85 [mm]     | 1085                         | 1085      | 1255        | 1255        | 1255        |               |
| Weight Si 81/83 [kg] | 142                          | 147       | 175         | 178         | 240         |               |
| Weight Si 84/85 [kg] | 156                          | 161       | 192         | 210         | 260         |               |
| Inlet temperature    | Max. set pressure [bar g]    |           |             |             |             | Material code |
| -46 °C to -30 °C     | 18.3                         | 18.3      | 36.2        | 68.9        |             | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 19.7      | 36.2        | 68.9        | 68.9        |               |
| 39 °C to 232 °C      | 12.8                         | 19.7      | 36.2        | 68.9        | 68.9        | 00 WCB        |
| 233 °C to 427 °C     | 5.5                          | 19.7      | 28.3        | 56.9        | 68.9        |               |
| 233 °C to 427 °C     |                              |           | 35.2        | 68.9        | 68.9        | 01 WC6        |
| 428 °C to 538 °C     |                              |           | 14.8        | 29.6        | 44.8        |               |
| -268 °C to -60 °C    | 12.1                         | 12.1      | 20.7        | 33.1        |             |               |
| -59 °C to -30 °C     | 19.0                         | 19.0      | 36.2        | 68.9        |             |               |
| -29 °C to 38 °C      | 19.0                         | 19.0      | 36.2        | 68.9        |             | 04 CF8M       |
| 39 °C to 232 °C      | 12.4                         | 19.0      | 34.1        | 67.2        |             |               |
| 233 °C to 427 °C     | 5.5                          | 19.0      | 29.0        | 58.3        |             |               |
| 428 °C to 538 °C     | 1.4                          | 19.0      | 24.1        | 48.3        |             |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |             |             |             |               |
| Si 81/83@38 °C       | 18.3                         | 18.3      | 18.3        | 18.3        |             | 22            |
| Si 81/83@38 °C       | 19.7                         | 19.7      | 19.7        | 19.7        | 19.7        | 00/01         |
| Si 81/83@38 °C       | 19.0                         | 19.0      | 19.0        | 19.0        |             | 04            |
| Si 84/85@38 °C       | 5.5                          | 5.5       | 10.3 (11.0) | 10.3 (11.0) | 10.3 (11.0) | 00/22 (01/04) |

# Orifice P

## Selection chart



# Orifice Q

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 3  | psig | 0.18 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 28 | psig | 1.9  | bar g |

## Effective area 11.05 in<sup>2</sup> / 7129 mm<sup>2</sup>

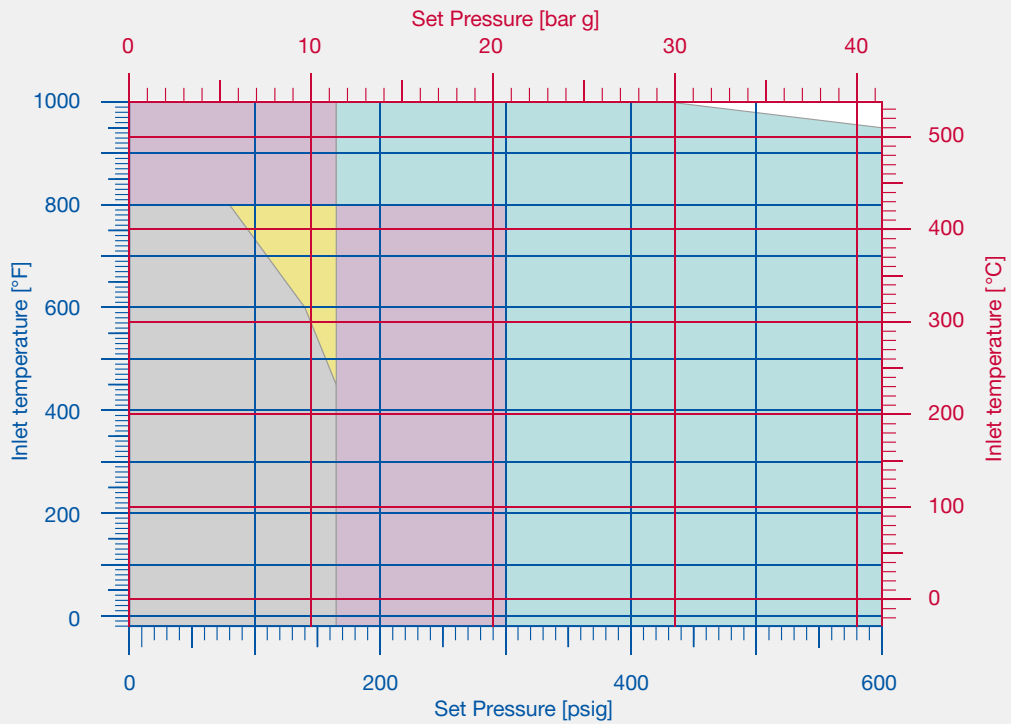
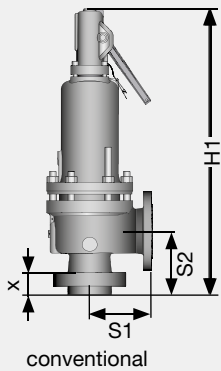
| Inlet class           | 01                          | 02        | 03        | 04        |               |
|-----------------------|-----------------------------|-----------|-----------|-----------|---------------|
| Class                 | 150 x 150                   | 300 x 150 | 300 x 150 | 600 x 150 |               |
| NPS Inlet x outlet    | 6" x 8"                     | 6" x 8"   | 6" x 8"   | 6" x 8"   |               |
| S1 [in]               | 9.50                        | 9.50      | 9.50      | 9.50      |               |
| S2 [in]               | 9.44                        | 9.44      | 9.44      | 9.44      |               |
| X [in]                | 2.36                        | 2.36      | 2.36      | 3.07      |               |
| H1 Si 81/83 [in]      | 46.26                       | 46.26     | 46.26     | 46.85     |               |
| H2 Si 84/85 [in]      | 51.38                       | 51.38     | 51.38     | 52.17     |               |
| Weight Si 81/83 [lbs] | 463                         | 486       | 486       | 640       |               |
| Weight Si 84/85 [lbs] | 497                         | 508       | 508       | 684       |               |
| Inlet temperature     | Max. set pressure [psig]    |           |           |           | Material code |
| -51 °F to -21 °F      | 165                         | 165       | 300       | 600       | 22 LCB        |
| -20 °F to 100 °F      | 165                         | 165       | 300       | 600       |               |
| 101 °F to 450 °F      | 165                         | 165       | 300       | 600       | 00 WCB        |
| 451 °F to 800 °F      | 80                          | 165       | 300       | 600       |               |
| 451 °F to 800 °F      |                             |           | 165       | 600       | 01 WC6        |
| 801 °F to 1000 °F     |                             |           | 165       | 430       |               |
| -450 °F to -76 °F     | 165                         | 165       | 250       | 300       |               |
| -75 °F to -21 °F      | 165                         | 165       | 300       | 600       |               |
| -20 °F to -100 °F     | 165                         | 165       | 300       | 600       | 04 CF8M       |
| 101 °F to 450 °F      | 165                         | 165       | 300       | 600       |               |
| 451 °F to 800 °F      | 80                          | 165       | 300       | 600       |               |
| 801 °F to 1000 °F     | 20                          | 165       | 300       | 600       |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |           |           |               |
| Si 81/83@100 °F       | 115                         | 115       | 115       | 115       | 22            |
| Si 81/83@100 °F       | 115                         | 115       | 115       | 115       | 00/01         |
| Si 81/83@100 °F       | 115                         | 115       | 115       | 115       | 04            |
| Si 84/85@100 °F       | 70                          | 70        | 115       | 115       | all           |

| Inlet class          | 01                           | 02        | 03        | 04        |               |
|----------------------|------------------------------|-----------|-----------|-----------|---------------|
| Class                | 150 x 150                    | 300 x 150 | 300 x 150 | 600 x 150 |               |
| NPS Inlet x outlet   | 6" x 8"                      | 6" x 8"   | 6" x 8"   | 6" x 8"   |               |
| S1 [mm]              | 241.3                        | 241.3     | 241.3     | 241.3     |               |
| S2 [mm]              | 239.7                        | 239.7     | 239.7     | 239.7     |               |
| X [mm]               | 60                           | 60        | 60        | 78        |               |
| H1 Si 81/83 [mm]     | 1175                         | 1175      | 1175      | 1190      |               |
| H2 Si 84/85 [mm]     | 1305                         | 1305      | 1305      | 1325      |               |
| Weight Si 81/83 [kg] | 210                          | 220       | 220       | 290       |               |
| Weight Si 84/85 [kg] | 225                          | 230       | 230       | 310       |               |
| Inlet temperature    | Max. set pressure [bar g]    |           |           |           | Material code |
| -46 °C to -30 °C     | 11.4                         | 11.4      | 20.7      | 41.4      | 22 LCB        |
| -29 °C to 38 °C      | 11.4                         | 11.4      | 20.7      | 41.4      |               |
| 39 °C to 232 °C      | 11.4                         | 11.4      | 20.7      | 41.4      | 00 WCB        |
| 233 °C to 427 °C     | 5.5                          | 11.4      | 20.7      | 41.4      |               |
| 233 °C to 427 °C     |                              |           | 11.4      | 41.4      | 01 WC6        |
| 428 °C to 538 °C     |                              |           | 11.4      | 29.6      |               |
| -268 °C to -60 °C    | 11.4                         | 11.4      | 17.2      | 20.7      |               |
| -59 °C to -30 °C     | 11.4                         | 11.4      | 20.7      | 41.4      |               |
| -29 °C to 38 °C      | 11.4                         | 11.4      | 20.7      | 41.4      | 04 CF8M       |
| 39 °C to 232 °C      | 11.4                         | 11.4      | 20.7      | 41.4      |               |
| 233 °C to 427 °C     | 5.5                          | 11.4      | 20.7      | 41.4      |               |
| 428 °C to 538 °C     | 1.4                          | 11.4      | 20.7      | 41.4      |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |           |           |               |
| Si 81/83@38 °C       | 7.9                          | 7.9       | 7.9       | 7.9       | 22            |
| Si 81/83@38 °C       | 7.9                          | 7.9       | 7.9       | 7.9       | 00/01         |
| Si 81/83@38 °C       | 7.9                          | 7.9       | 7.9       | 7.9       | 04            |
| Si 84/85@38 °C       | 4.8                          | 4.8       | 7.9       | 7.9       | all           |

# Orifice Q

## Selection chart

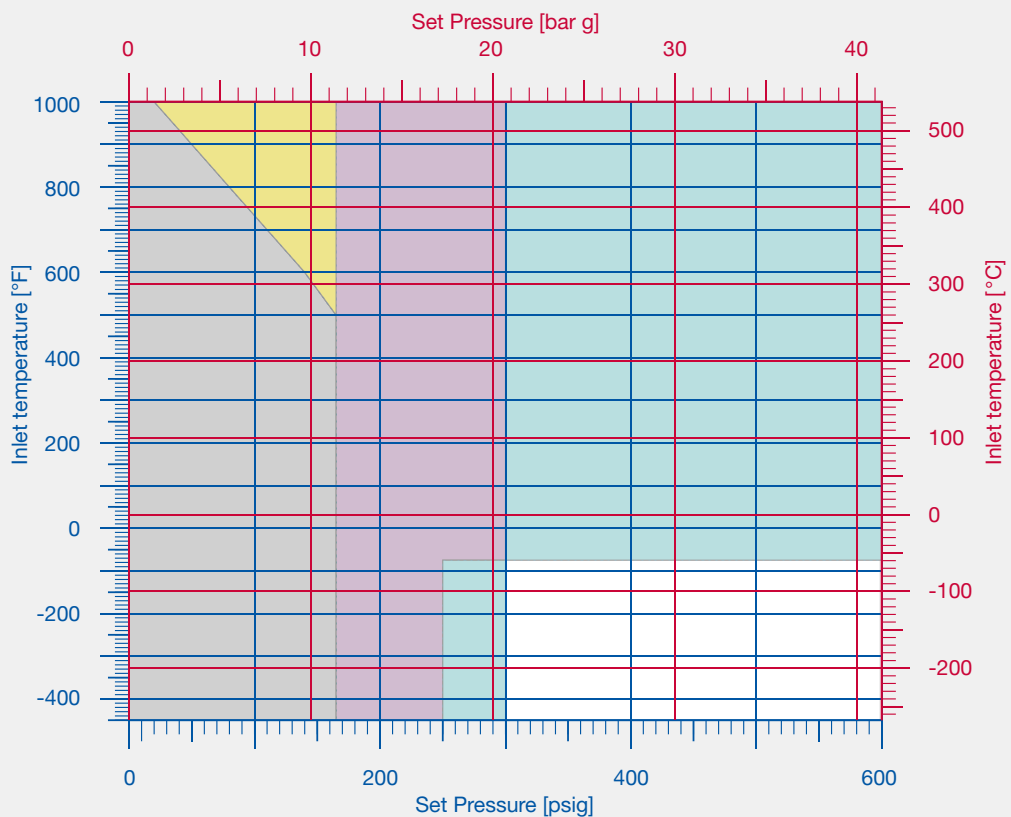
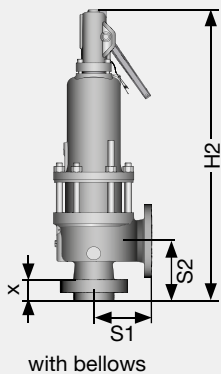
Si 81/83



01  
WC6

00  
WCB

Si 84/85



04  
CF8M

# Orifice R

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 3  | psig | 0.16 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 29 | psig | 2    | bar g |

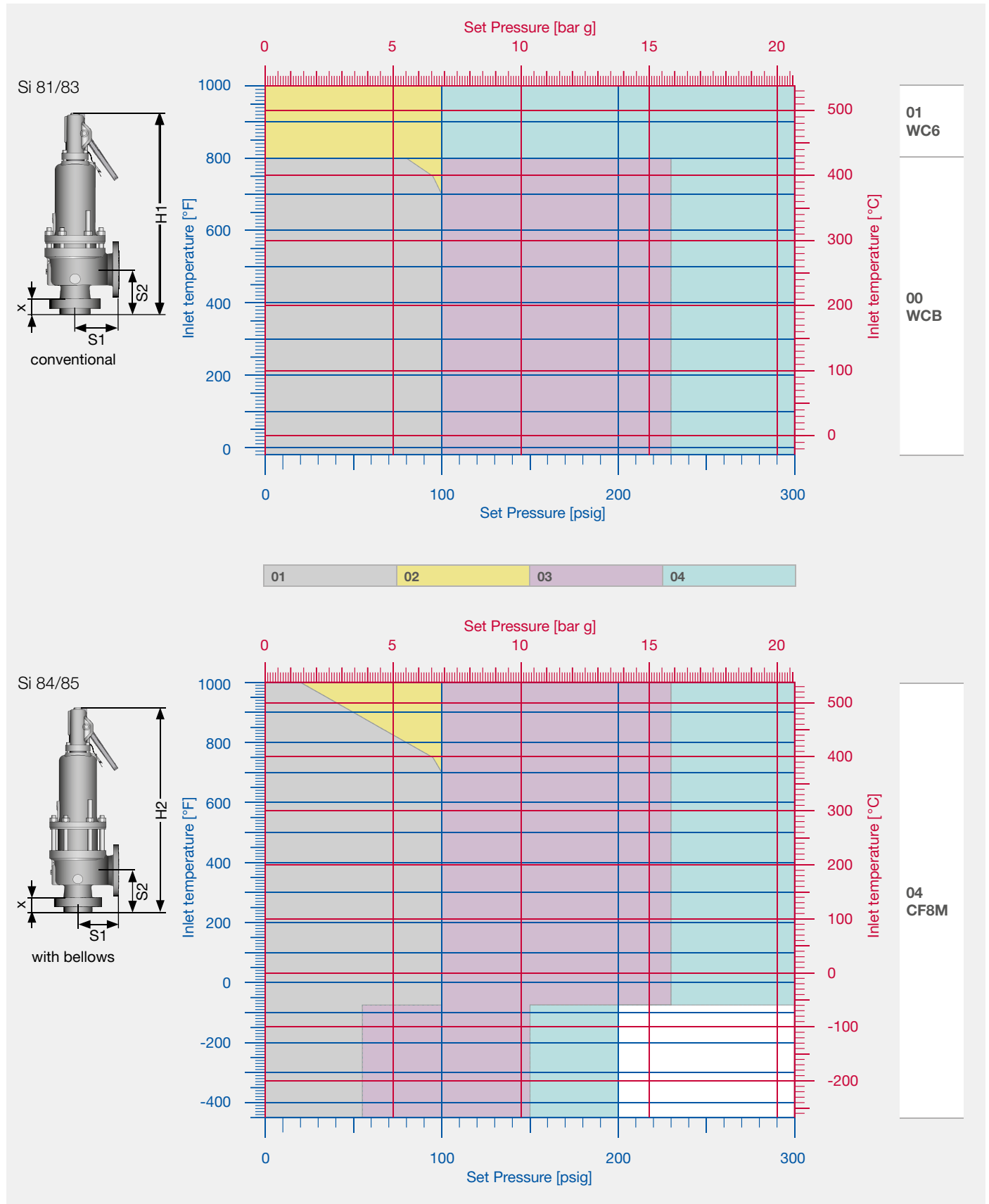
## Effective area 16.00 in<sup>2</sup> / 10322 mm<sup>2</sup>

| Inlet class           | 01                          | 02        | 03        | 04        |               |
|-----------------------|-----------------------------|-----------|-----------|-----------|---------------|
| Class                 | 150 x 150                   | 300 x 150 | 300 x 150 | 600 x 150 |               |
| NPS Inlet x outlet    | 6" x 8"                     | 6" x 8"   | 6" x 10"  | 6" x 10"  |               |
| S1 [in]               | 9.50                        | 9.50      | 10.50     | 10.50     |               |
| S2 [in]               | 9.44                        | 9.44      | 9.44      | 9.44      |               |
| X [in]                | 2.36                        | 2.36      | 2.99      | 2.99      |               |
| H1 Si 81/83 [in]      | 46.26                       | 46.26     | 48.82     | 48.82     |               |
| H2 Si 84/85 [in]      | 51.38                       | 51.38     | 55.71     | 55.71     |               |
| Weight Si 81/83 [lbs] | 470                         | 492       | 631       | 662       |               |
| Weight Si 84/85 [lbs] | 503                         | 530       | 735       | 757       |               |
| Inlet temperature     | Max. set pressure [psig]    |           |           |           | Material code |
| -51 °F to -21 °F      | 100                         | 100       | 230       | 300       | 22 LCB        |
| -20 °F to 100 °F      | 100                         | 100       | 230       | 300       |               |
| 101 °F to 450 °F      | 100                         | 100       | 230       | 300       | 00 WCB        |
| 451 °F to 800 °F      | 80                          | 100       | 230       | 300       |               |
| 451 °F to 800 °F      |                             | 100       |           | 300       | 01 WC6        |
| 801 °F to 1000 °F     |                             | 100       |           | 300       |               |
| -450 °F to -76 °F     | 55                          | 55        | 150       | 200       |               |
| -75 °F to -21 °F      | 100                         | 100       | 230       | 300       |               |
| -20 °F to -100 °F     | 100                         | 100       | 230       | 300       | 04 CF8M       |
| 101 °F to 450 °F      | 100                         | 100       | 230       | 300       |               |
| 451 °F to 800 °F      | 80                          | 100       | 230       | 300       |               |
| 801 °F to 1000 °F     | 20                          | 100       | 230       | 300       |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |           |           |               |
| Si 81/83@100 °F       | 60                          | 60        | 100       | 100       | 22            |
| Si 81/83@100 °F       | 60                          | 60        | 100       | 100       | 00/01         |
| Si 81/83@100 °F       | 60                          | 60        | 100       | 100       | 04            |
| Si 84/85@100 °F       | 60                          | 60        | 100       | 100       | all           |

| Inlet class          | 01                           | 02        | 03        | 04        |               |
|----------------------|------------------------------|-----------|-----------|-----------|---------------|
| Class                | 150 x 150                    | 300 x 150 | 300 x 150 | 600 x 150 |               |
| NPS Inlet x outlet   | 6" x 8"                      | 6" x 8"   | 6" x 10"  | 6" x 10"  |               |
| S1 [mm]              | 241.3                        | 241.3     | 266.7     | 266.7     |               |
| S2 [mm]              | 239.7                        | 239.7     | 239.7     | 239.7     |               |
| X [mm]               | 60                           | 60        | 76        | 76        |               |
| H1 Si 81/83 [mm]     | 1175                         | 1175      | 1240      | 1240      |               |
| H2 Si 84/85 [mm]     | 1305                         | 1305      | 1415      | 1415      |               |
| Weight Si 81/83 [kg] | 213                          | 223       | 286       | 300       |               |
| Weight Si 84/85 [kg] | 228                          | 240       | 333       | 343       |               |
| Inlet temperature    | Max. set pressure [bar g]    |           |           |           | Material code |
| -46 °C to -30 °C     | 6.9                          | 6.9       | 15.9      | 20.7      | 22 LCB        |
| -29 °C to 38 °C      | 6.9                          | 6.9       | 15.9      | 20.7      |               |
| 39 °C to 232 °C      | 6.9                          | 6.9       | 15.9      | 20.7      | 00 WCB        |
| 233 °C to 427 °C     | 5.5                          | 6.9       | 15.9      | 20.7      |               |
| 233 °C to 427 °C     |                              | 6.9       |           | 20.7      | 01 WC6        |
| 428 °C to 538 °C     |                              | 6.9       |           | 20.7      |               |
| -268 °C to -60 °C    | 3.8                          | 3.8       | 10.3      | 13.8      |               |
| -59 °C to -30 °C     | 6.9                          | 6.9       | 15.9      | 20.7      |               |
| -29 °C to 38 °C      | 6.9                          | 6.9       | 15.9      | 20.7      | 04 CF8M       |
| 39 °C to 232 °C      | 6.9                          | 6.9       | 15.9      | 20.7      |               |
| 233 °C to 427 °C     | 5.5                          | 6.9       | 15.9      | 20.7      |               |
| 428 °C to 538 °C     | 1.4                          | 6.9       | 15.9      | 20.7      |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |           |           |               |
| Si 81/83@38 °C       | 4.1                          | 4.1       | 6.9       | 6.9       | 22            |
| Si 81/83@38 °C       | 4.1                          | 4.1       | 6.9       | 6.9       | 00/01         |
| Si 81/83@38 °C       | 4.1                          | 4.1       | 6.9       | 6.9       | 04            |
| Si 84/85@38 °C       | 4.1                          | 4.1       | 6.9       | 6.9       | all           |

# Orifice R

## Selection chart



# Orifice T

| Minimum set pressures |    |      |      |       |
|-----------------------|----|------|------|-------|
| Si 830x.57            | 3  | psig | 0.15 | bar g |
| Si 830x               | 8  | psig | 0.5  | bar g |
| Si 840x               | 29 | psig | 2    | bar g |

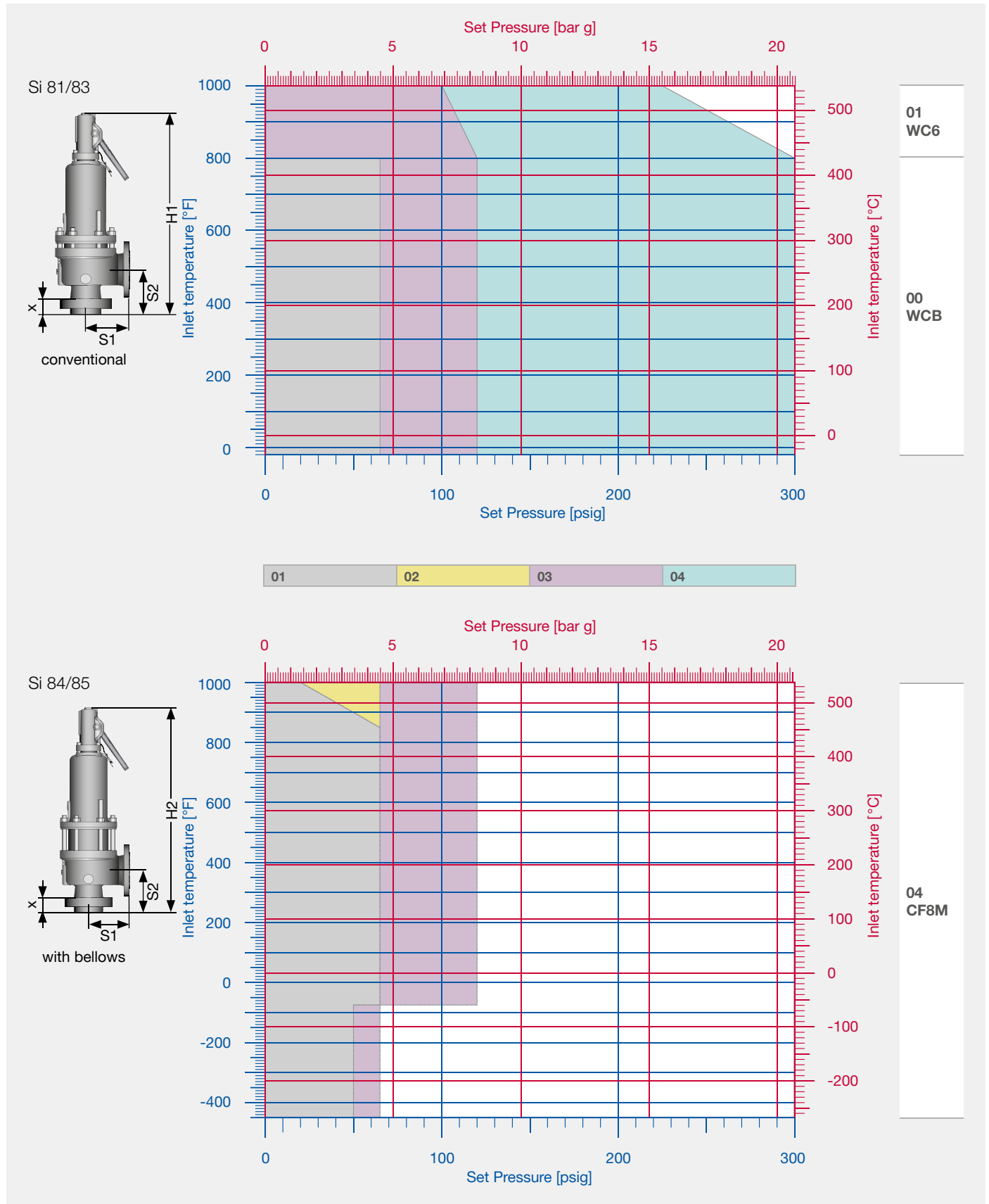
## Effective area 26.00 in<sup>2</sup> / 16774 mm<sup>2</sup>

| Inlet class           | 01                          | 02        | 03        | 04        |               |
|-----------------------|-----------------------------|-----------|-----------|-----------|---------------|
| Class                 | 150 x 150                   | 300 x 150 | 300 x 150 | 300 x 150 |               |
| NPS Inlet x outlet    | 8" x 10"                    | 8" x 10"  | 8" x 10"  | 8" x 10"  |               |
| S1 [in]               | 11.00                       | 11.00     | 11.00     | 11.00     |               |
| S2 [in]               | 10.87                       | 10.87     | 10.87     | 10.87     |               |
| X [in]                | 2.68                        | 2.68      | 2.68      | 2.68      |               |
| H1 Si 81/83 [in]      | 50.98                       | 50.98     | 50.98     | 53.94     |               |
| H2 Si 84/85 [in]      | 57.87                       | 57.87     | 57.87     | 60.83     |               |
| Weight Si 81/83 [lbs] | 704                         | 730       | 730       | 858       |               |
| Weight Si 84/85 [lbs] | 836                         | 836       | 836       | 971       |               |
| Inlet temperature     | Max. set pressure [psig]    |           |           |           | Material code |
| -51 °F to -21 °F      | 65                          | 65        | 120       | 300       | 22 LCB        |
| -20 °F to 100 °F      | 65                          | 65        | 120       | 300       |               |
| 101 °F to 450 °F      | 65                          | 65        | 120       | 300       | 00 WCB        |
| 451 °F to 800 °F      | 65                          | 65        | 120       | 300       |               |
| 801 °F to 1000 °F     |                             |           | 120       | 300       | 01 WC6        |
| 801 °F to 1000 °F     |                             |           | 100       | 215       |               |
| -450 °F to -76 °F     | 50                          | 50        | 65        |           |               |
| -75 °F to -21 °F      | 65                          | 65        | 120       |           |               |
| -20 °F to -100 °F     | 65                          | 65        | 120       |           | 04 CF8M       |
| 101 °F to 450 °F      | 65                          | 65        | 120       |           |               |
| 451 °F to 800 °F      | 65                          | 65        | 120       |           |               |
| 801 °F to 1000 °F     | 20                          | 65        | 120       |           |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |           |           |               |
| Si 81/83@100 °F       | 30                          | 30        | 60        | 100       | 22            |
| Si 81/83@100 °F       | 30                          | 30        | 60        | 100       | 00/01         |
| Si 81/83@100 °F       | 30                          | 30        | 60        |           | 04            |
| Si 84/85@100 °F       | 30                          | 30        | 60        | 100       | all           |

| Inlet class          | 01                           | 02        | 03        | 04        |               |
|----------------------|------------------------------|-----------|-----------|-----------|---------------|
| Class                | 150 x 150                    | 300 x 150 | 300 x 150 | 300 x 150 |               |
| NPS Inlet x outlet   | 8" x 10"                     | 8" x 10"  | 8" x 10"  | 8" x 10"  |               |
| S1 [mm]              | 279.4                        | 279.4     | 279.4     | 279.4     |               |
| S2 [mm]              | 276.2                        | 276.2     | 276.2     | 276.2     |               |
| X [mm]               | 68                           | 68        | 68        | 68        |               |
| H1 Si 81/83 [mm]     | 1295                         | 1295      | 1295      | 1370      |               |
| H2 Si 84/85 [mm]     | 1470                         | 1470      | 1470      | 1545      |               |
| Weight Si 81/83 [kg] | 319                          | 331       | 331       | 389       |               |
| Weight Si 84/85 [kg] | 379                          | 379       | 379       | 440       |               |
| Inlet temperature    | Max. set pressure [bar g]    |           |           |           | Material code |
| -46 °C to -30 °C     | 4.5                          | 4.5       | 8.3       | 20.7      | 22 LCB        |
| -29 °C to 38 °C      | 4.5                          | 4.5       | 8.3       | 20.7      |               |
| 39 °C to 232 °C      | 4.5                          | 4.5       | 8.3       | 20.7      | 00 WCB        |
| 233 °C to 427 °C     | 4.5                          | 4.5       | 8.3       | 20.7      |               |
| 233 °C to 427 °C     |                              |           | 8.3       | 20.7      | 01 WC6        |
| 428 °C to 538 °C     |                              |           | 6.9       | 14.8      |               |
| -268 °C to -60 °C    | 3.4                          | 3.4       | 4.5       |           |               |
| -59 °C to -30 °C     | 4.5                          | 4.5       | 8.3       |           |               |
| -29 °C to 38 °C      | 4.5                          | 4.5       | 8.3       |           | 04 CF8M       |
| 39 °C to 232 °C      | 4.5                          | 4.5       | 8.3       |           |               |
| 233 °C to 427 °C     | 4.5                          | 4.5       | 8.3       |           |               |
| 428 °C to 538 °C     | 1.4                          | 1.4       | 8.3       |           |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |           |           |               |
| Si 81/83@38 °C       | 2.1                          | 2.1       | 4.1       | 6.9       | 22            |
| Si 81/83@38 °C       | 2.1                          | 2.1       | 4.1       | 6.9       | 00/01         |
| Si 81/83@38 °C       | 2.1                          | 2.1       | 4.1       |           | 04            |
| Si 84/85@38 °C       | 2.1                          | 2.1       | 4.1       | 6.9       | all           |

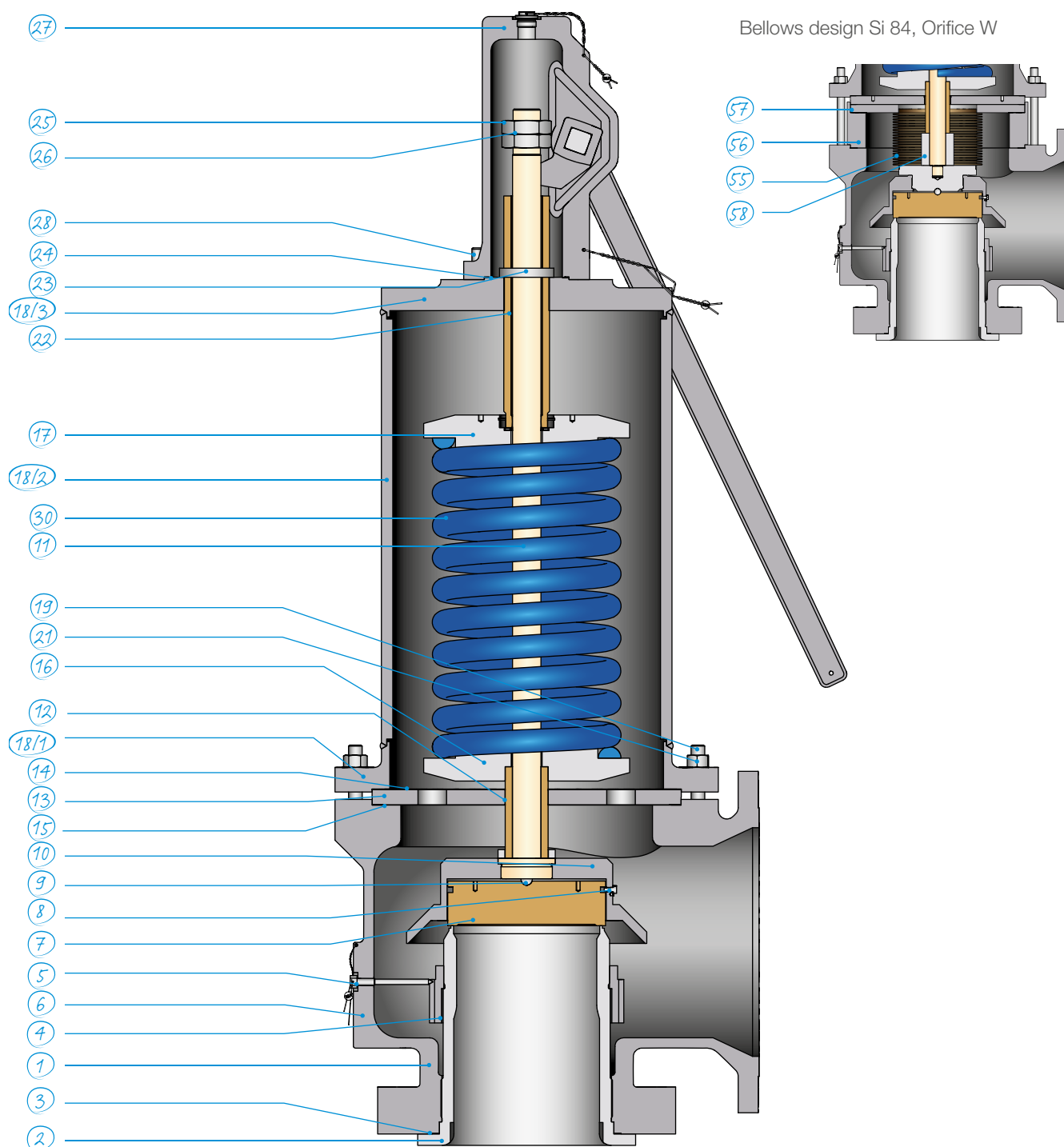
# Orifice T

## Selection chart



# Material code orifice V and W

## Material code



# Material code orifice V and W

| Material code                 |                       |            |                                                 |                                                     |                                                     |                                                      |
|-------------------------------|-----------------------|------------|-------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|------------------------------------------------------|
| Temperature application range |                       |            | Standard<br>20 °F to 800 °F<br>-29 °C to 427 °C | High temp.<br>-20 °F to 1000 °F<br>-29 °C to 538 °C | Low temp.<br>-51 °F to 800 °F<br>(-46 °C to 427 °C) | Low temp.<br>-450 °F to 1000 °F<br>-268 °C to 538 °C |
| Part                          | Name                  | Spare part | Material                                        | Material                                            | Material                                            | Material                                             |
| 1                             | Body                  |            | 1.0619 SA-216 WCB                               | 1.7357 SA-217M WC6                                  | 1.6220 SA 352 LCB                                   | 1.4408 SA-351 CF8M                                   |
| 2                             | Nozzle                | *3         | 1.4408 SA-351 CF8M                              | 1.4408 SA-351 CF8M                                  | 1.4408 SA-351 CF8M                                  | 1.4408 SA-351 CF8M                                   |
| 3                             | Flat gasket           | *1, 2, 3   | 1.4401 / Graphite                               | 1.4401 / Graphite                                   | 1.4401 / Graphite                                   | 1.4401 / Graphite                                    |
| 4                             | Nozzle ring           |            | 1.4408 SA-351 CF8M                              | 1.4408 SA-351 CF8M                                  | 1.4408 SA-351 CF8M                                  | 1.4408 SA-351 CF8M                                   |
| 5                             | Set screw             |            | A4-70                                           | A4-70                                               | A4-70                                               | A4-70                                                |
| 6                             | Flat gasket           | *1, 2, 3   | 1.4401 / Graphite                               | 1.4401 / Graphite                                   | 1.4401 / Graphite                                   | 1.4401 / Graphite                                    |
| 7                             | Disc                  | *2, 3      | 1.4404<br>SA-479M Type 316 L                    | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                         |
| 8                             | Disc retainer         |            | 1.4404<br>SA-479M Type 316 L                    | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                         |
| 9                             | Ball                  |            | 1.3541 Stainless steel                          | 1.3541 Stainless steel                              | 1.3541 Stainless steel                              | Ceramic                                              |
| 10                            | Disc holder           |            | 1.4404<br>SA-479M Type 316 L                    | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                         |
| 11                            | Spindle               |            | 1.4021<br>420                                   | 1.4021<br>420                                       | 1.4021<br>420                                       | 1.4404<br>SA-479M Type 316 L                         |
| 12                            | Guide bushing         |            | 1.4122 MT 440 <sup>1)</sup>                     | 1.4122 MT 440 <sup>1)</sup>                         | 1.4122 MT 440 <sup>1)</sup>                         | 1.4404<br>SA-479M Type 316 L                         |
| 13                            | Guide                 |            | 1.4122 MT 440 <sup>1)</sup>                     | 1.4122 MT 440 <sup>1)</sup>                         | 1.4122 MT 440 <sup>1)</sup>                         | 1.4404<br>SA-479M Type 316 L                         |
| 14                            | Flat gasket           | *1, 2, 3   | 1.4401 / Graphite                               | 1.4401 / Graphite                                   | 1.4401 / Graphite                                   | 1.4401 / Graphite                                    |
| 15                            | Flat gasket           | *1, 2, 3   | 1.4401 / Graphite                               | 1.4401 / Graphite                                   | 1.4401 / Graphite                                   | 1.4401 / Graphite                                    |
| 16                            | Spring washer, bottom |            | 1.4404<br>SA-479M Type 316 L                    | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                         |
| 17                            | Spring washer, top    |            | 1.4404<br>SA-479M Type 316 L                    | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                         |
| 18/1                          | Bonnet flange         |            | SA-105M                                         | SA-182M Gr.F11                                      | SA-350M Gr.LF2                                      | SA-182M Gr. F316                                     |
| 18/2                          | Bonnet pipe           |            | Carbon steel                                    | SA335 Gr. P11                                       | SA-350M Gr.LF2                                      | SA-312M Gr. TP316                                    |
| 18/3                          | Bonnet cover          |            | SA-105M                                         | SA-182M Gr.F11                                      | SA-350M Gr.LF2                                      | SA-182M Gr. F316                                     |
| 19                            | Stud, short           |            | SA 193M Gr. B7                                  | SA 193M Gr. B7                                      | SA 193M Gr. B8M                                     | SA-193M Gr. B8M                                      |
| 21                            | Hex Nut, bonnet       |            | SA-194M Gr. 2H                                  | SA-194M GRADE 2H                                    | SA-194M GRADE 8M                                    | SA-194M GRADE 8M                                     |
| 22                            | Adjusting screw       |            | 1.4122 MT 440 <sup>1)</sup>                     | 1.4122 MT 440 <sup>1)</sup>                         | 1.4122 MT 440 <sup>1)</sup>                         | 1.4404<br>SA-479M Type 316 L                         |
| 23                            | Adj. screw nut        |            | 1.4122 MT 440 <sup>1)</sup>                     | 1.4122 MT 440 <sup>1)</sup>                         | 1.4122 MT 440 <sup>1)</sup>                         | 1.4404<br>SA-479M Type 316 L                         |
| 24                            | Flat gasket           | *1, 2, 3   | 1.4401 / Graphite                               | 1.4401 / Graphite                                   | 1.4401 / Graphite                                   | 1.4401 / Graphite                                    |
| 25                            | Spindle nut           |            | Carbon steel                                    | Carbon steel                                        | Carbon steel                                        | 1.4404<br>SA-479M Type 316 L                         |
| 26                            | Nut                   |            | SA-194M GRADE 2H                                | SA-194M GRADE 2H                                    | SA-194M GRADE 2H                                    | SA-194M GRADE 8M                                     |
| 27                            | Cap                   |            | 1.0619 SA-216 WCB                               | 1.0619 SA-216 WCB                                   | 1.6220 SA 352 LCB                                   | 1.4408 SA-351 CF8M                                   |
| 28                            | Cylinder screw        |            | SA 193M Gr. B7                                  | SA 193M Gr. B7                                      | SA 193M Gr. B8M                                     | SA-193M Gr. B8M                                      |
| 30                            | Spring                | *3         | Alloy steel                                     | Alloy steel                                         | Alloy steel                                         | 1.4310 <sup>2)</sup> ASTM 302 <sup>2)</sup>          |
| 55                            | Bellows               | *3         | 1.4404<br>SA-479M Type 316 L                    | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                         |
| 56                            | Intermediate bush     |            | 1.0619 SA-216 WCB                               | 1.7357 SA-217M WC6                                  | 1.6220 SA 352 LCB                                   | 1.4408 SA-351 CF8M                                   |
| 57                            | Top plate             |            | 1.4404<br>SA-479M Type 316 L                    | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                         |
| 58                            | Lift stop bushing     |            | 1.4404<br>SA-479M Type 316 L                    | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                        | 1.4404<br>SA-479M Type 316 L                         |

<sup>1)</sup> X 39 CrMo 17-1

<sup>2)</sup> In case of large valve size and high pressure spring material may be chrome steel nickel plated

#### Spare Parts:

- \*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.

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.

# Orifice V

## Minimum set pressures

|            |    |      |      |       |
|------------|----|------|------|-------|
| Si 830x.57 | 3  | psig | 0.18 | bar g |
| Si 830x    | 8  | psig | 0.5  | bar g |
| Si 840x    | 15 | psig | 1    | bar g |

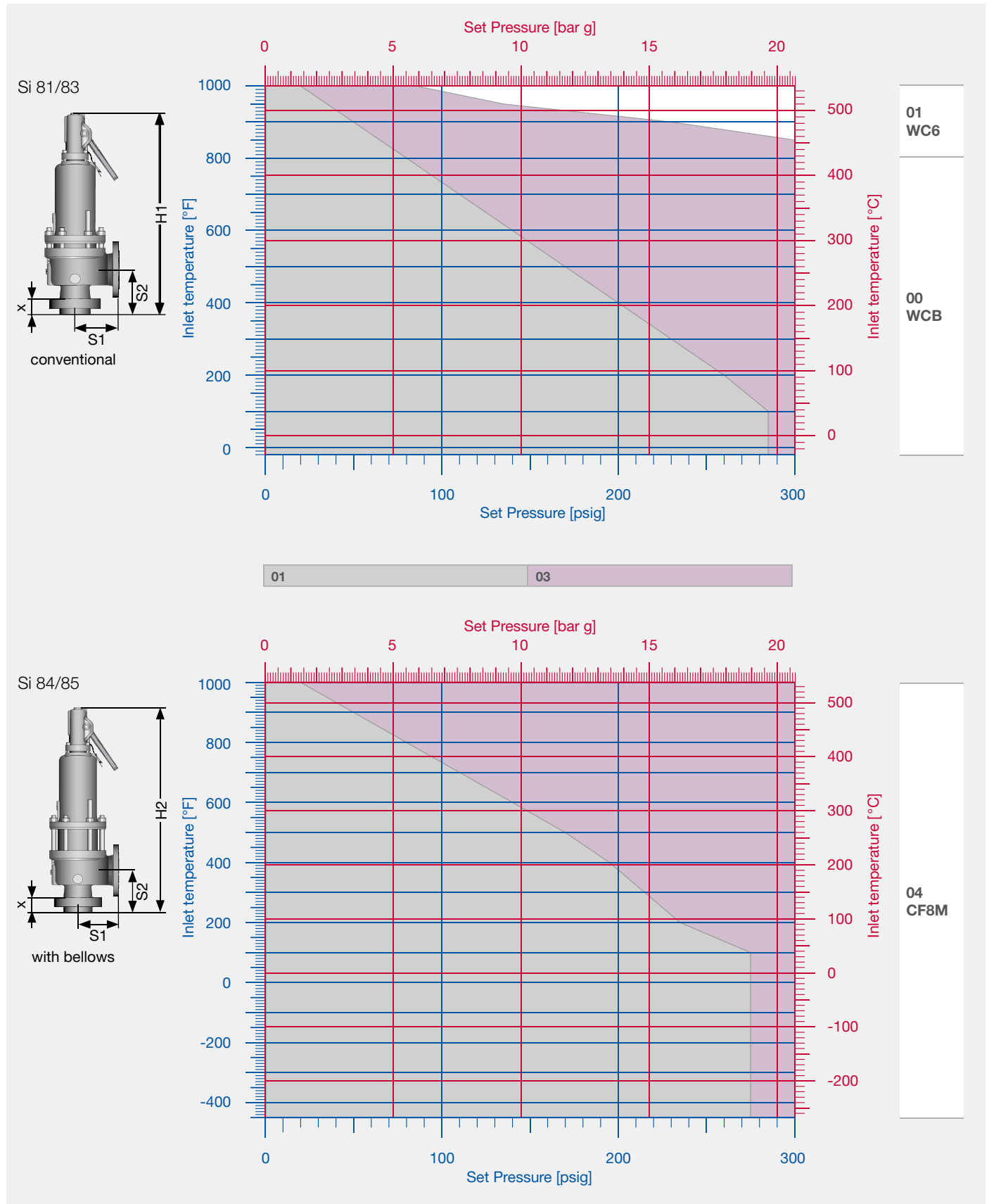
## Effective area 44.91 in<sup>2</sup> / 28954 mm<sup>2</sup>

| Inlet class           | 01                          | 03        |               |
|-----------------------|-----------------------------|-----------|---------------|
| Class                 | 150 x 150                   | 300 x 150 |               |
| NPS Inlet x outlet    | 10" x 14"                   | 10" x 14" |               |
| S1 [in]               | 16.00                       | 16.00     |               |
| S2 [in]               | 12.00                       | 12.00     |               |
| X [in]                | 2.68                        | 2.68      |               |
| H1 Si 81/83 [in]      | 78.94                       | 78.94     |               |
| H2 Si 84/85 [in]      | 80.31                       | 80.31     |               |
| Weight Si 81/83 [lbs] | 2426                        | 2426.00   |               |
| Weight Si 84/85 [lbs] | 2304                        | 2304.00   |               |
| Inlet temperature     | Max. set pressure [psig]    |           | Material code |
| -51 °F to -21 °F      | 286                         | 300       | 22 LCB        |
| -20 °F to 100 °F      | 286                         | 300       |               |
| 101 °F to 450 °F      | 184                         | 300       | 00 WCB        |
| 451 °F to 800 °F      | 80                          | 300       |               |
| 451 °F to 800 °F      |                             | 300       | 01 WC6        |
| 801 °F to 1000 °F     |                             | 215       |               |
| -450 °F to -76 °F     | 276                         | 300       |               |
| -75 °F to -21 °F      | 276                         | 300       |               |
| -20 °F to -100 °F     | 276                         | 300       | 04 CF8M       |
| 101 °F to 450 °F      | 184                         | 300       |               |
| 451 °F to 800 °F      | 80                          | 300       |               |
| 801 °F to 1000 °F     | 20                          | 300       |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |               |
| Si 81/83@100 °F       | 77                          | 77        | 22            |
| Si 81/83@100 °F       | 77                          | 77        | 00/01         |
| Si 81/83@100 °F       | 77                          | 77        | 04            |
| Si 84/85@100 °F       | 77                          | 77        | all           |

| Inlet class          | 01                           | 03        |               |
|----------------------|------------------------------|-----------|---------------|
| Class                | 150 x 150                    | 300 x 150 |               |
| NPS Inlet x outlet   | 10" x 14"                    | 10" x 14" |               |
| S1 [mm]              | 406.4                        | 406.4     |               |
| S2 [mm]              | 304.8                        | 304.8     |               |
| X [mm]               | 68                           | 68        |               |
| H1 Si 81/83 [mm]     | 2005                         | 2005      |               |
| H2 Si 84/85 [mm]     | 2040                         | 2040      |               |
| Weight Si 81/83 [kg] | 1100                         | 1100      |               |
| Weight Si 84/85 [kg] | 1045                         | 1045      |               |
| Inlet temperature    | Max. set pressure [bar g]    |           | Material code |
| -46 °C to -30 °C     | 19.7                         | 20.7      | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 20.7      |               |
| 39 °C to 232 °C      | 12.7                         | 20.7      | 00 WCB        |
| 233 °C to 427 °C     | 5.5                          | 20.7      |               |
| 233 °C to 427 °C     |                              | 20.7      | 01 WC6        |
| 428 °C to 538 °C     |                              | 14.8      |               |
| -268 °C to -60 °C    | 19.0                         | 20.7      |               |
| -59 °C to -30 °C     | 19.0                         | 20.7      |               |
| -29 °C to 38 °C      | 19.0                         | 20.7      | 04 CF8M       |
| 39 °C to 232 °C      | 12.7                         | 20.7      |               |
| 233 °C to 427 °C     | 5.5                          | 20.7      |               |
| 428 °C to 538 °C     | 1.4                          | 20.7      |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |               |
| Si 81/83@38 °C       | 5.3                          | 5.3       | 22            |
| Si 81/83@38 °C       | 5.3                          | 5.3       | 00/01         |
| Si 81/83@38 °C       | 5.3                          | 5.3       | 04            |
| Si 84/85@38 °C       | 5.3                          | 5.3       | all           |

# Orifice V

## Selection chart



# Orifice W

| Minimum set pressures |    |      |      |       |
|-----------------------|----|------|------|-------|
| Si 830x.57            | 3  | psig | 0.19 | bar g |
| Si 830x               | 8  | psig | 0.5  | bar g |
| Si 840x               | 15 | psig | 1    | bar g |

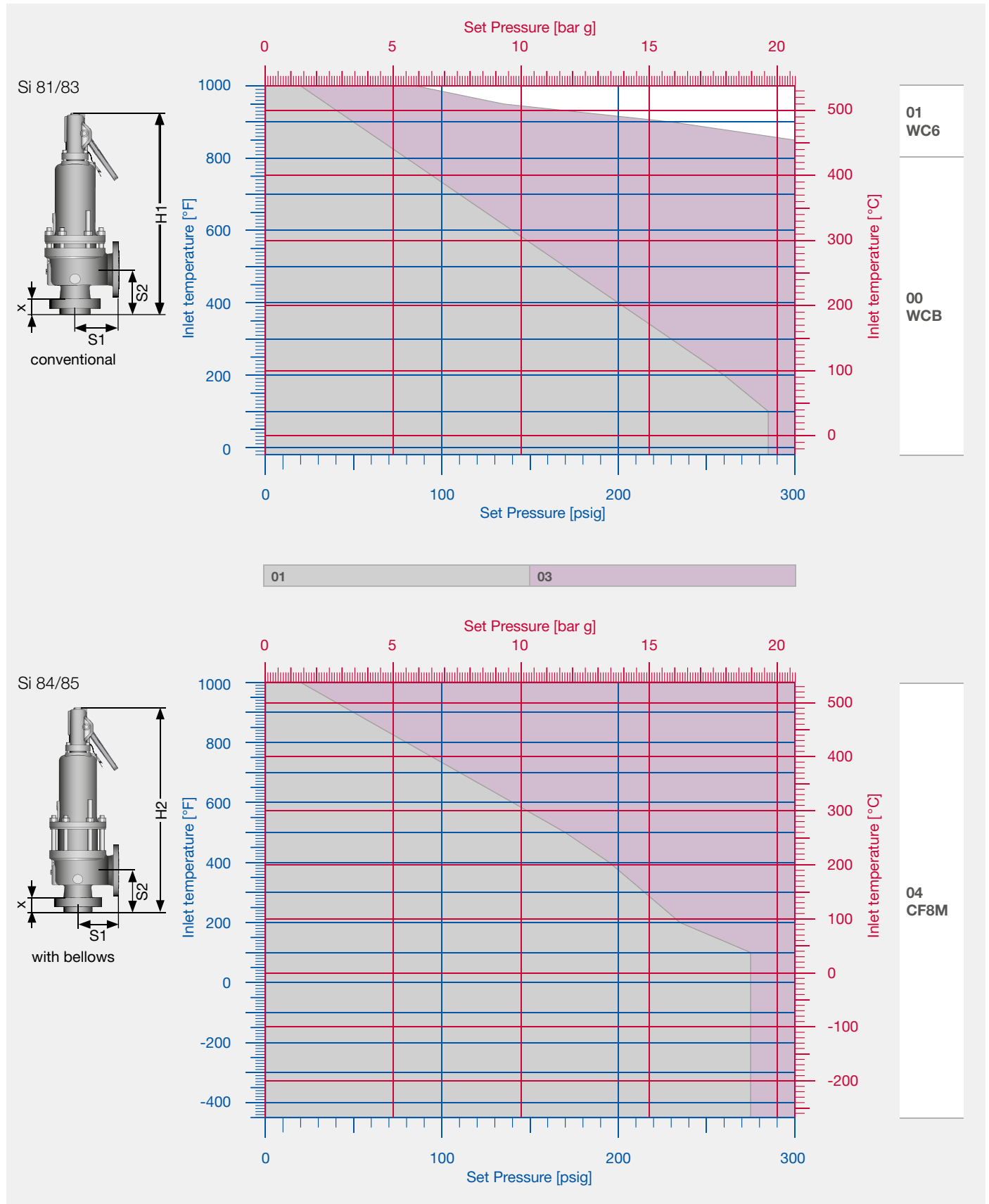
## Effective area 64.45 in<sup>2</sup> / 41583 mm<sup>2</sup>

| Inlet class           | 01                          | 03        |               |
|-----------------------|-----------------------------|-----------|---------------|
| Class                 | 150 x 150                   | 300 x 150 |               |
| NPS Inlet x outlet    | 12" x 16"                   | 12" x 16" |               |
| S1 [in]               | 15.98                       | 15.98     |               |
| S2 [in]               | 14.02                       | 14.02     |               |
| X [in]                | 4.02                        | 4.02      |               |
| H1 Si 81/83 [in]      | 78.15                       | 78.15     |               |
| H2 Si 84/85 [in]      | 83.66                       | 83.66     |               |
| Weight Si 81/83 [lbs] | 2459                        | 2459.00   |               |
| Weight Si 84/85 [lbs] | 2657                        | 2657.00   |               |
| Inlet temperature     | Max. set pressure [psig]    |           | Material code |
| -51 °F to -21 °F      | 286                         | 300       | 22 LCB        |
| -20 °F to 100 °F      | 286                         | 300       |               |
| 101 °F to 450 °F      | 184                         | 300       | 00 WCB        |
| 451 °F to 800 °F      | 80                          | 300       |               |
| 451 °F to 800 °F      |                             | 300       | 01 WC6        |
| 801 °F to 1000 °F     |                             | 215       |               |
| -450 °F to -76 °F     | 276                         | 300       |               |
| -75 °F to -21 °F      | 276                         | 300       |               |
| -20 °F to -100 °F     | 276                         | 300       | 04 CF8M       |
| 101 °F to 450 °F      | 184                         | 300       |               |
| 451 °F to 800 °F      | 80                          | 300       |               |
| 801 °F to 1000 °F     | 20                          | 300       |               |
| Outlet temperature    | Max. outlet pressure [psig] |           |               |
| Si 81/83@100 °F       | 77                          | 77        | 22            |
| Si 81/83@100 °F       | 77                          | 77        | 00/01         |
| Si 81/83@100 °F       | 77                          | 77        | 04            |
| Si 84/85@100 °F       | 77                          | 77        | all           |

| Inlet class          | 01                           | 03        |               |
|----------------------|------------------------------|-----------|---------------|
| Class                | 150 x 150                    | 300 x 150 |               |
| NPS Inlet x outlet   | 12" x 16"                    | 12" x 16" |               |
| S1 [mm]              | 406.0                        | 406.0     |               |
| S2 [mm]              | 356.0                        | 356.0     |               |
| X [mm]               | 102                          | 102       |               |
| H1 Si 81/83 [mm]     | 1985                         | 1985      |               |
| H2 Si 84/85 [mm]     | 2125                         | 2125      |               |
| Weight Si 81/83 [kg] | 1115                         | 1115      |               |
| Weight Si 84/85 [kg] | 1205                         | 1205      |               |
| Inlet temperature    | Max. set pressure [bar g]    |           | Material code |
| -46 °C to -30 °C     | 19.7                         | 20.7      | 22 LCB        |
| -29 °C to 38 °C      | 19.7                         | 20.7      |               |
| 39 °C to 232 °C      | 12.7                         | 20.7      | 00 WCB        |
| 233 °C to 427 °C     | 5.5                          | 20.7      |               |
| 233 °C to 427 °C     |                              | 20.7      | 01 WC6        |
| 428 °C to 538 °C     |                              | 14.8      |               |
| -268 °C to -60 °C    | 19.0                         | 20.7      |               |
| -59 °C to -30 °C     | 19.0                         | 20.7      |               |
| -29 °C to 38 °C      | 19.0                         | 20.7      | 04 CF8M       |
| 39 °C to 232 °C      | 12.7                         | 20.7      |               |
| 233 °C to 427 °C     | 5.5                          | 20.7      |               |
| 428 °C to 538 °C     | 1.4                          | 20.7      |               |
| Outlet temperature   | Max. outlet pressure [bar g] |           |               |
| Si 81/83@38 °C       | 5.3                          | 5.3       | 22            |
| Si 81/83@38 °C       | 5.3                          | 5.3       | 00/01         |
| Si 81/83@38 °C       | 5.3                          | 5.3       | 04            |
| Si 84/85@38 °C       | 5.3                          | 5.3       | all           |

# Orifice W

## Selection chart



# Certified capacities

## Air capacities USCS units

Capacity in standard cubic feet per minute of air at 60°F and 10% overpressure. Capacities below 30 psig set pressure are calculated at 3 psig overpressure. Valve discharging to atmospheric pressure.

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

For gases with other specific gravity than air or other temperatures than 60°F, use either ASME Sec. VIII or API Standard 520 calculation basis.

| Set Pressure [psig] | Orifice Letter |       |       |       |       |       |       |       |       |       |        |        |       |        |        |        |
|---------------------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|-------|--------|--------|--------|
|                     | D              | E     | F     | G     | H     | J     | K     | L     | M     | N     | P      | Q      | R     | T      | V      | W      |
| 15                  | 71             | 116   | 181   | 297   | 463   | 758   | 1083  | 1679  | 2120  | 2556  | 3759   | 6512   | 9423  | 15310  | 26176  | 37570  |
| 20                  | 82             | 133   | 209   | 343   | 534   | 874   | 1249  | 1936  | 2444  | 2947  | 4334   | 7508   | 10864 | 17651  | 30178  | 43315  |
| 30                  | 104            | 169   | 264   | 434   | 675   | 1106  | 1580  | 2450  | 3093  | 3728  | 5484   | 9499   | 13746 | 22333  | 38183  | 54804  |
| 40                  | 128            | 208   | 325   | 534   | 831   | 1361  | 1944  | 3015  | 3806  | 4588  | 6748   | 11690  | 16916 | 27484  | 46988  | 67443  |
| 50                  | 152            | 247   | 386   | 634   | 987   | 1616  | 2309  | 3580  | 4519  | 5448  | 8013   | 13880  | 20086 | 32634  | 55793  | 80081  |
| 60                  | 176            | 286   | 446   | 734   | 1143  | 1871  | 2673  | 4145  | 5232  | 6307  | 9278   | 16071  | 23256 | 37784  | 64599  | 92719  |
| 70                  | 200            | 325   | 507   | 834   | 1299  | 2126  | 3038  | 4710  | 5945  | 7167  | 10542  | 18261  | 26425 | 42934  | 73404  | 105357 |
| 80                  | 224            | 364   | 568   | 934   | 1454  | 2381  | 3402  | 5275  | 6659  | 8027  | 11807  | 20452  | 29595 | 48085  | 82209  | 117996 |
| 90                  | 248            | 403   | 629   | 1034  | 1610  | 2636  | 3766  | 5840  | 7372  | 8886  | 13072  | 22642  | 32765 | 53235  | 91014  | 130634 |
| 100                 | 272            | 441   | 690   | 1134  | 1766  | 2891  | 4131  | 6405  | 8085  | 9746  | 14336  | 24833  | 35935 | 58385  | 99820  | 143272 |
| 120                 | 320            | 519   | 812   | 1334  | 2077  | 3401  | 4859  | 7534  | 9511  | 11466 | 16865  | 29214  | 42275 | 68686  | 117430 | 168549 |
| 140                 | 368            | 597   | 933   | 1535  | 2389  | 3911  | 5588  | 8664  | 10938 | 13185 | 19395  | 33595  | 48615 | 78986  | 135041 | 193825 |
| 160                 | 416            | 675   | 1055  | 1735  | 2701  | 4421  | 6317  | 9794  | 12364 | 14904 | 21924  | 37976  | 54955 | 89287  | 152651 | 219102 |
| 180                 | 464            | 753   | 1177  | 1935  | 3012  | 4930  | 7046  | 10924 | 13790 | 16624 | 24453  | 42358  | 61294 | 99587  | 170262 | 244379 |
| 200                 | 512            | 831   | 1298  | 2135  | 3324  | 5440  | 7774  | 12054 | 15217 | 18343 | 26982  | 46739  | 67634 | 109888 | 187872 | 269655 |
| 220                 | 560            | 909   | 1420  | 2335  | 3635  | 5950  | 8503  | 13184 | 16643 | 20063 | 29512  | 51120  | 73974 | 120188 | 205483 | 294932 |
| 240                 | 608            | 987   | 1542  | 2535  | 3947  | 6460  | 9232  | 14314 | 18070 | 21782 | 32041  | 55501  | 80314 | 130489 | 223094 | 320208 |
| 260                 | 656            | 1065  | 1663  | 2735  | 4258  | 6970  | 9961  | 15444 | 19496 | 23502 | 34570  | 59882  | 86653 | 140790 | 240704 | 345485 |
| 280                 | 704            | 1142  | 1785  | 2935  | 4570  | 7480  | 10689 | 16574 | 20922 | 25221 | 37099  | 64263  | 92993 | 151090 | 258315 | 370761 |
| 300                 | 752            | 1220  | 1907  | 3136  | 4881  | 7990  | 11418 | 17704 | 22349 | 26941 | 39629  | 68644  | 99333 | 161391 | 275925 | 396038 |
| 320                 | 800            | 1298  | 2028  | 3336  | 5193  | 8500  | 12147 | 18834 | 23775 | 28660 | 42158  | 73026  |       |        |        |        |
| 340                 | 848            | 1376  | 2150  | 3536  | 5504  | 9010  | 12876 | 19964 | 25201 | 30379 | 44687  | 77407  |       |        |        |        |
| 360                 | 896            | 1454  | 2272  | 3736  | 5816  | 9520  | 13604 | 21093 | 26628 | 32099 | 47216  | 81788  |       |        |        |        |
| 380                 | 944            | 1532  | 2394  | 3936  | 6128  | 10030 | 14333 | 22223 | 28054 | 33818 | 49745  | 86169  |       |        |        |        |
| 400                 | 992            | 1610  | 2515  | 4136  | 6439  | 10540 | 15062 | 23353 | 29480 | 35538 | 52275  | 90550  |       |        |        |        |
| 450                 | 1112           | 1804  | 2820  | 4637  | 7218  | 11815 | 16884 | 26178 | 33046 | 39836 | 58598  | 101503 |       |        |        |        |
| 500                 | 1232           | 1999  | 3124  | 5137  | 7997  | 13090 | 18705 | 29003 | 36612 | 44135 | 64921  | 112456 |       |        |        |        |
| 550                 | 1352           | 2194  | 3428  | 5637  | 8776  | 14365 | 20527 | 31828 | 40178 | 48434 | 71244  | 123409 |       |        |        |        |
| 600                 | 1472           | 2389  | 3732  | 6137  | 9555  | 15640 | 22349 | 34652 | 43744 | 52732 | 77567  | 134361 |       |        |        |        |
| 650                 | 1592           | 2583  | 4037  | 6638  | 10333 | 16915 | 24171 | 37477 | 47310 | 57031 | 83890  |        |       |        |        |        |
| 700                 | 1712           | 2778  | 4341  | 7138  | 11112 | 18190 | 25993 | 40302 | 50876 | 61329 | 90213  |        |       |        |        |        |
| 800                 | 1952           | 3168  | 4949  | 8139  | 12670 | 20740 | 29637 | 45952 | 58008 | 69927 | 102859 |        |       |        |        |        |
| 900                 | 2192           | 3557  | 5558  | 9139  | 14228 | 23289 | 33280 | 51601 | 65140 | 78524 | 115506 |        |       |        |        |        |
| 1000                | 2432           | 3946  | 6166  | 10140 | 15786 | 25839 | 36924 | 57251 | 72272 | 87121 | 128152 |        |       |        |        |        |
| 1100                | 2672           | 4336  | 6775  | 11141 | 17343 | 28389 | 40568 | 62900 | 79403 |       |        |        |       |        |        |        |
| 1200                | 2912           | 4725  | 7383  | 12141 | 18901 | 30939 | 44211 | 68550 |       |       |        |        |       |        |        |        |
| 1300                | 3152           | 5115  | 7992  | 13142 | 20459 | 33489 | 47855 | 74199 |       |       |        |        |       |        |        |        |
| 1400                | 3392           | 5504  | 8600  | 14142 | 22016 | 36039 | 51499 | 79849 |       |       |        |        |       |        |        |        |
| 1500                | 3632           | 5894  | 9209  | 15143 | 23574 | 38589 | 55142 | 85499 |       |       |        |        |       |        |        |        |
| 1600                | 3872           | 6283  | 9817  | 16144 | 25132 | 41138 | 58786 |       |       |       |        |        |       |        |        |        |
| 1700                | 4112           | 6672  | 10426 | 17144 | 26690 | 43688 | 62430 |       |       |       |        |        |       |        |        |        |
| 1800                | 4352           | 7062  | 11034 | 18145 | 28247 | 46238 | 66074 |       |       |       |        |        |       |        |        |        |
| 1900                | 4592           | 7451  | 11643 | 19145 | 29805 | 48788 | 69717 |       |       |       |        |        |       |        |        |        |
| 2000                | 4832           | 7841  | 12251 | 20146 | 31363 | 51338 | 73361 |       |       |       |        |        |       |        |        |        |
| 2500                | 6032           | 9788  | 15294 | 25149 | 39152 | 64087 |       |       |       |       |        |        |       |        |        |        |
| 3000                | 7232           | 11735 | 18336 | 30152 |       |       |       |       |       |       |        |        |       |        |        |        |
| 3500                | 8432           | 13682 | 21378 | 35155 |       |       |       |       |       |       |        |        |       |        |        |        |
| 4000                | 9632           | 15629 | 24421 | 40159 |       |       |       |       |       |       |        |        |       |        |        |        |
| 4500                | 10832          | 17577 | 27463 | 45162 |       |       |       |       |       |       |        |        |       |        |        |        |
| 5000                | 12032          | 19524 | 30506 | 50165 |       |       |       |       |       |       |        |        |       |        |        |        |
| 5500                | 13232          | 21471 |       |       |       |       |       |       |       |       |        |        |       |        |        |        |
| 6000                | 14432          | 23418 |       |       |       |       |       |       |       |       |        |        |       |        |        |        |

# Certified capacities

## Air capacities SI units

Capacity in standard cubic meters per minute of air at 16°C and 10% over-pressure. Capacities below 2.1 bar-g set pressure are calculated at 0.21 bar-g over-pressure. Valve discharging to atmospheric pressure.

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

For gases with other specific gravity than air or other temperatures than 16°C, use either ASME Sec. VIII or API Standard 520 calculation basis.

| Set Pressure<br>[bar g] | Orifice Letter |     |     |     |      |      |      |      |      |      |      |      |      |      |      |       |
|-------------------------|----------------|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|-------|
|                         | D              | E   | F   | G   | H    | J    | K    | L    | M    | N    | P    | Q    | R    | T    | V    | W     |
| 1                       | 2              | 3   | 5   | 8   | 13   | 21   | 30   | 47   | 59   | 71   | 105  | 182  | 263  | 427  | 730  | 1048  |
| 2                       | 3              | 5   | 7   | 12  | 19   | 31   | 44   | 68   | 86   | 103  | 152  | 263  | 381  | 619  | 1059 | 1520  |
| 3                       | 4              | 6   | 10  | 16  | 25   | 41   | 59   | 91   | 115  | 139  | 204  | 353  | 511  | 830  | 1418 | 2035  |
| 4                       | 5              | 8   | 12  | 20  | 32   | 52   | 74   | 114  | 144  | 174  | 256  | 443  | 641  | 1041 | 1780 | 2555  |
| 5                       | 6              | 10  | 15  | 24  | 38   | 62   | 89   | 137  | 173  | 209  | 308  | 533  | 771  | 1253 | 2141 | 3074  |
| 6                       | 7              | 11  | 17  | 28  | 44   | 73   | 104  | 161  | 203  | 244  | 360  | 623  | 901  | 1464 | 2503 | 3593  |
| 7                       | 8              | 13  | 20  | 33  | 51   | 83   | 119  | 184  | 232  | 280  | 411  | 713  | 1031 | 1676 | 2865 | 4112  |
| 8                       | 9              | 14  | 22  | 37  | 57   | 93   | 134  | 207  | 261  | 315  | 463  | 803  | 1162 | 1887 | 3226 | 4631  |
| 9                       | 10             | 16  | 25  | 41  | 64   | 104  | 149  | 230  | 291  | 350  | 515  | 893  | 1292 | 2099 | 3588 | 5150  |
| 10                      | 11             | 18  | 27  | 45  | 70   | 114  | 163  | 253  | 320  | 386  | 567  | 983  | 1422 | 2310 | 3950 | 5669  |
| 11                      | 12             | 19  | 30  | 49  | 76   | 125  | 178  | 277  | 349  | 421  | 619  | 1073 | 1552 | 2522 | 4311 | 6188  |
| 12                      | 13             | 21  | 32  | 53  | 83   | 135  | 193  | 300  | 379  | 456  | 671  | 1163 | 1682 | 2733 | 4673 | 6707  |
| 13                      | 14             | 22  | 35  | 57  | 89   | 146  | 208  | 323  | 408  | 492  | 723  | 1253 | 1812 | 2945 | 5034 | 7226  |
| 14                      | 15             | 24  | 37  | 61  | 96   | 156  | 223  | 346  | 437  | 527  | 775  | 1342 | 1943 | 3156 | 5396 | 7745  |
| 15                      | 16             | 26  | 40  | 65  | 102  | 167  | 238  | 369  | 466  | 562  | 827  | 1432 | 2073 | 3368 | 5758 | 8264  |
| 16                      | 17             | 27  | 42  | 70  | 108  | 177  | 253  | 393  | 496  | 598  | 879  | 1522 | 2203 | 3579 | 6119 | 8783  |
| 17                      | 18             | 29  | 45  | 74  | 115  | 188  | 268  | 416  | 525  | 633  | 931  | 1612 | 2333 | 3791 | 6481 | 9302  |
| 18                      | 19             | 30  | 47  | 78  | 121  | 198  | 283  | 439  | 554  | 668  | 983  | 1702 | 2463 | 4002 | 6843 | 9821  |
| 19                      | 20             | 32  | 50  | 82  | 127  | 209  | 298  | 462  | 584  | 703  | 1035 | 1792 | 2594 | 4214 | 7204 | 10340 |
| 20                      | 21             | 34  | 52  | 86  | 134  | 219  | 313  | 485  | 613  | 739  | 1087 | 1882 | 2724 | 4425 | 7566 | 10859 |
| 22                      | 23             | 37  | 57  | 94  | 147  | 240  | 343  | 532  | 671  | 809  | 1191 | 2062 |      |      |      |       |
| 24                      | 25             | 40  | 62  | 102 | 159  | 261  | 373  | 578  | 730  | 880  | 1294 | 2242 |      |      |      |       |
| 26                      | 27             | 43  | 67  | 111 | 172  | 282  | 403  | 625  | 789  | 951  | 1398 | 2422 |      |      |      |       |
| 28                      | 29             | 46  | 72  | 119 | 185  | 303  | 433  | 671  | 847  | 1021 | 1502 | 2602 |      |      |      |       |
| 30                      | 31             | 50  | 77  | 127 | 198  | 324  | 463  | 718  | 906  | 1092 | 1606 | 2782 |      |      |      |       |
| 35                      | 35             | 58  | 90  | 148 | 230  | 376  | 538  | 834  | 1052 | 1268 | 1866 | 3232 |      |      |      |       |
| 40                      | 40             | 66  | 102 | 168 | 262  | 429  | 612  | 950  | 1199 | 1445 | 2125 | 3682 |      |      |      |       |
| 45                      | 45             | 73  | 115 | 189 | 294  | 481  | 687  | 1066 | 1345 | 1621 | 2385 |      |      |      |      |       |
| 50                      | 50             | 81  | 127 | 209 | 326  | 533  | 762  | 1182 | 1492 | 1798 | 2645 |      |      |      |      |       |
| 55                      | 55             | 89  | 140 | 230 | 358  | 586  | 837  | 1298 | 1638 | 1975 | 2904 |      |      |      |      |       |
| 60                      | 60             | 97  | 152 | 250 | 390  | 638  | 912  | 1414 | 1784 | 2151 | 3164 |      |      |      |      |       |
| 65                      | 65             | 105 | 165 | 271 | 422  | 690  | 987  | 1530 | 1931 | 2328 | 3424 |      |      |      |      |       |
| 70                      | 70             | 113 | 177 | 292 | 454  | 743  | 1061 | 1646 | 2077 |      |      |      |      |      |      |       |
| 75                      | 75             | 121 | 190 | 312 | 486  | 795  | 1136 | 1762 | 2224 |      |      |      |      |      |      |       |
| 80                      | 80             | 129 | 202 | 333 | 518  | 847  | 1211 | 1878 |      |      |      |      |      |      |      |       |
| 85                      | 85             | 137 | 215 | 353 | 550  | 900  | 1286 | 1994 |      |      |      |      |      |      |      |       |
| 90                      | 90             | 145 | 227 | 374 | 582  | 952  | 1361 | 2110 |      |      |      |      |      |      |      |       |
| 95                      | 95             | 153 | 240 | 394 | 614  | 1005 | 1435 | 2226 |      |      |      |      |      |      |      |       |
| 100                     | 100            | 161 | 252 | 415 | 646  | 1057 | 1510 | 2342 |      |      |      |      |      |      |      |       |
| 120                     | 119            | 193 | 302 | 497 | 774  | 1266 | 1810 |      |      |      |      |      |      |      |      |       |
| 140                     | 139            | 225 | 352 | 579 | 902  | 1476 | 2109 |      |      |      |      |      |      |      |      |       |
| 160                     | 159            | 257 | 402 | 661 | 1030 | 1685 |      |      |      |      |      |      |      |      |      |       |
| 180                     | 178            | 289 | 452 | 744 | 1158 | 1895 |      |      |      |      |      |      |      |      |      |       |
| 200                     | 198            | 321 | 502 | 826 |      |      |      |      |      |      |      |      |      |      |      |       |
| 220                     | 218            | 353 | 552 | 908 |      |      |      |      |      |      |      |      |      |      |      |       |
| 240                     | 238            | 385 | 602 | 990 |      |      |      |      |      |      |      |      |      |      |      |       |
| 260                     | 257            | 417 | 652 |     |      |      |      |      |      |      |      |      |      |      |      |       |
| 280                     | 277            | 449 | 702 |     |      |      |      |      |      |      |      |      |      |      |      |       |
| 300                     | 297            | 481 | 752 |     |      |      |      |      |      |      |      |      |      |      |      |       |
| 350                     | 346            | 561 |     |     |      |      |      |      |      |      |      |      |      |      |      |       |
| 400                     | 395            | 641 |     |     |      |      |      |      |      |      |      |      |      |      |      |       |
| 414                     | 409            | 664 |     |     |      |      |      |      |      |      |      |      |      |      |      |       |

# Certified capacities

## Saturated Steam capacities USCS units

Capacity in pounds per hour of saturated steam at 10% overpressure. Capacities below 30 psig set pressure are calculated at 3 psig overpressure. Valve discharging to atmospheric pressure.

Capacities certified by National Board of Boiler and Pressure Vessel Inspectors and in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII. The maximum permissible set pressure on steam is 2900 psig.

The Napier factor is considered to the capacity of pressures over 1500 psig. For other steam condition, use either ASME Sec. VIII or API Standard 520 calculation basis.

| Set Pressure [psig] | Orifice Letter |       |       |       |        |        |        |        |        |        |        |        |        |        |        |         |
|---------------------|----------------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
|                     | D              | E     | F     | G     | H      | J      | K      | L      | M      | N      | P      | Q      | R      | T      | V      | W       |
| 15                  | 201            | 326   | 510   | 838   | 1304   | 2135   | 3051   | 4731   | 5972   | 7199   | 10590  | 18343  | 26544  | 43127  | 73733  | 105830  |
| 20                  | 232            | 376   | 587   | 966   | 1504   | 2462   | 3518   | 5454   | 6885   | 8300   | 12209  | 21148  | 30603  | 49721  | 85007  | 122012  |
| 30                  | 293            | 476   | 743   | 1222  | 1903   | 3115   | 4451   | 6901   | 8711   | 10501  | 15447  | 26758  | 38720  | 62910  | 107556 | 154376  |
| 40                  | 361            | 585   | 915   | 1504  | 2342   | 3833   | 5477   | 8492   | 10720  | 12923  | 19009  | 32928  | 47649  | 77418  | 132359 | 189976  |
| 50                  | 428            | 695   | 1086  | 1786  | 2780   | 4551   | 6504   | 10084  | 12729  | 15345  | 22572  | 39099  | 56578  | 91925  | 157162 | 225576  |
| 60                  | 496            | 805   | 1257  | 2068  | 3219   | 5269   | 7530   | 11675  | 14738  | 17767  | 26134  | 45269  | 65507  | 106433 | 181965 | 261176  |
| 70                  | 564            | 914   | 1429  | 2350  | 3658   | 5988   | 8556   | 13267  | 16747  | 20188  | 29696  | 51440  | 74437  | 120940 | 206768 | 296777  |
| 80                  | 631            | 1024  | 1600  | 2632  | 4097   | 6706   | 9583   | 14858  | 18756  | 22610  | 33258  | 57610  | 83366  | 135448 | 231572 | 332377  |
| 90                  | 699            | 1134  | 1772  | 2913  | 4536   | 7424   | 10609  | 16449  | 20765  | 25032  | 36821  | 63781  | 92295  | 149955 | 256375 | 367977  |
| 100                 | 766            | 1244  | 1943  | 3195  | 4974   | 8142   | 11635  | 18041  | 22774  | 27453  | 40383  | 69951  | 101224 | 164463 | 281178 | 403577  |
| 120                 | 902            | 1463  | 2286  | 3759  | 5852   | 9579   | 13688  | 21224  | 26792  | 32297  | 47507  | 82292  | 119082 | 193478 | 330784 | 474778  |
| 140                 | 1037           | 1682  | 2629  | 4323  | 6729   | 11015  | 15741  | 24406  | 30810  | 37140  | 54632  | 94633  | 136941 | 222493 | 380391 | 545978  |
| 160                 | 1172           | 1902  | 2972  | 4886  | 7607   | 12452  | 17794  | 27589  | 34828  | 41984  | 61756  | 106974 | 154799 | 251508 | 429997 | 617179  |
| 180                 | 1307           | 2121  | 3314  | 5450  | 8485   | 13888  | 19846  | 30772  | 38846  | 46827  | 68881  | 119315 | 172657 | 280523 | 479603 | 688379  |
| 200                 | 1442           | 2341  | 3657  | 6014  | 9362   | 15325  | 21899  | 33955  | 42863  | 51671  | 76005  | 131656 | 190516 | 309539 | 529210 | 759580  |
| 220                 | 1578           | 2560  | 4000  | 6578  | 10240  | 16761  | 23952  | 37138  | 46881  | 56514  | 83130  | 143997 | 208374 | 338554 | 578816 | 830780  |
| 240                 | 1713           | 2779  | 4343  | 7141  | 11117  | 18198  | 26005  | 40320  | 50899  | 61357  | 90254  | 156338 | 226232 | 367569 | 628422 | 901981  |
| 260                 | 1848           | 2999  | 4686  | 7705  | 11995  | 19635  | 28057  | 43503  | 54917  | 66201  | 97379  | 168679 | 244090 | 396584 | 678029 | 973181  |
| 280                 | 1983           | 3218  | 5028  | 8269  | 12873  | 21071  | 30110  | 46686  | 58935  | 71044  | 104503 | 181020 | 261949 | 425599 | 727635 | 1044382 |
| 300                 | 2118           | 3438  | 5371  | 8832  | 13750  | 22508  | 32163  | 49869  | 62953  | 75888  | 111628 | 193361 | 279807 | 454614 | 777242 | 1115582 |
| 320                 | 2254           | 3657  | 5714  | 9396  | 14628  | 23944  | 34216  | 53052  | 66971  | 80731  | 118752 | 205702 |        |        |        |         |
| 340                 | 2389           | 3876  | 6057  | 9960  | 15505  | 25381  | 36268  | 56234  | 70989  | 85575  | 125877 | 218043 |        |        |        |         |
| 360                 | 2524           | 4096  | 6400  | 10524 | 16383  | 26817  | 38321  | 59417  | 75006  | 90418  | 133001 | 230384 |        |        |        |         |
| 380                 | 2659           | 4315  | 6742  | 11087 | 17260  | 28254  | 40374  | 62600  | 79024  | 95261  | 140126 | 242725 |        |        |        |         |
| 400                 | 2795           | 4535  | 7085  | 11651 | 18138  | 29690  | 42427  | 65783  | 83042  | 100105 | 147250 | 255067 |        |        |        |         |
| 450                 | 3133           | 5083  | 7942  | 13060 | 20332  | 33281  | 47559  | 73740  | 93087  | 112213 | 165062 | 285919 |        |        |        |         |
| 500                 | 3471           | 5631  | 8799  | 14470 | 22526  | 36873  | 52691  | 81697  | 103132 | 124322 | 182873 | 316772 |        |        |        |         |
| 550                 | 3809           | 6180  | 9656  | 15879 | 24720  | 40464  | 57822  | 89654  | 113176 | 136430 | 200684 | 347624 |        |        |        |         |
| 600                 | 4147           | 6728  | 10513 | 17288 | 26914  | 44055  | 62954  | 97611  | 123221 | 148539 | 218495 | 378477 |        |        |        |         |
| 650                 | 4485           | 7277  | 11370 | 18698 | 29108  | 47646  | 68086  | 105568 | 133266 | 160648 | 236307 |        |        |        |        |         |
| 700                 | 4823           | 7825  | 12227 | 20107 | 31302  | 51238  | 73218  | 113525 | 143310 | 172756 | 254118 |        |        |        |        |         |
| 750                 | 5161           | 8374  | 13084 | 21516 | 33496  | 54829  | 78350  | 121482 | 153355 | 184865 | 271929 |        |        |        |        |         |
| 800                 | 5499           | 8922  | 13941 | 22925 | 35690  | 58420  | 83482  | 129439 | 163400 | 196973 | 289740 |        |        |        |        |         |
| 850                 | 5837           | 9471  | 14798 | 24335 | 37884  | 62012  | 88614  | 137396 | 173445 | 209082 | 307552 |        |        |        |        |         |
| 900                 | 6175           | 10019 | 15655 | 25744 | 40078  | 65603  | 93746  | 145353 | 183489 | 221190 | 325363 |        |        |        |        |         |
| 950                 | 6513           | 10568 | 16512 | 27153 | 42272  | 69194  | 98878  | 153310 | 193534 | 233299 | 343174 |        |        |        |        |         |
| 1000                | 6851           | 11116 | 17369 | 28563 | 44466  | 72785  | 104009 | 161267 | 203579 | 245408 | 360985 |        |        |        |        |         |
| 1100                | 7527           | 12213 | 19083 | 31381 | 48853  | 79968  | 114273 | 177181 | 223668 |        |        |        |        |        |        |         |
| 1200                | 8203           | 13310 | 20797 | 34200 | 53241  | 87151  | 124537 | 193095 |        |        |        |        |        |        |        |         |
| 1300                | 8879           | 14407 | 22511 | 37018 | 57629  | 94333  | 134801 | 209009 |        |        |        |        |        |        |        |         |
| 1400                | 9555           | 15504 | 24225 | 39837 | 62017  | 101516 | 145065 | 224923 |        |        |        |        |        |        |        |         |
| 1500                | 10280          | 16681 | 26064 | 42860 | 66724  | 109219 | 156073 | 241992 |        |        |        |        |        |        |        |         |
| 1600                | 11032          | 17901 | 27971 | 45996 | 71605  | 117210 | 167491 |        |        |        |        |        |        |        |        |         |
| 1700                | 11799          | 19146 | 29916 | 49195 | 76585  | 125362 | 179141 |        |        |        |        |        |        |        |        |         |
| 1800                | 12584          | 20419 | 31905 | 52465 | 81677  | 133696 | 191050 |        |        |        |        |        |        |        |        |         |
| 1900                | 13388          | 21723 | 33943 | 55817 | 86894  | 142236 | 203254 |        |        |        |        |        |        |        |        |         |
| 2000                | 14214          | 23064 | 36037 | 59260 | 92254  | 151010 | 215791 |        |        |        |        |        |        |        |        |         |
| 2200                | 15944          | 25872 | 40425 | 66477 | 103489 | 169400 | 242071 |        |        |        |        |        |        |        |        |         |
| 2400                | 17811          | 28900 | 45157 | 74257 | 115601 | 189226 |        |        |        |        |        |        |        |        |        |         |
| 2600                | 19863          | 32230 | 50360 | 82813 | 128920 | 211029 |        |        |        |        |        |        |        |        |        |         |
| 2800                | 22181          | 35992 | 56237 | 92478 |        |        |        |        |        |        |        |        |        |        |        |         |
| 2900                | 23478          | 38097 | 59526 | 97887 |        |        |        |        |        |        |        |        |        |        |        |         |

# Certified capacities

## Saturated Steam capacities SI units

Capacity in kilograms per hour of saturated steam at 10% overpressure. Capacities below 2.1 bar g set pressure are calculated at 0.21 bar g overpressure. Valve discharging to atmospheric pressure.

Capacities certified by National Board of Boiler and Pressure Vessel Inspectors and in accordance with the ASME Boiler and Pressure Vessel Code, Section VIII. The maximum permissible set pressure on steam is 200 bar g.

The Napier factor is considered to the capacity of pressures over 103 bar g. For other steam condition, use either ASME Sec. VIII or API Standard 520 calculation basis.

| Set Pressure<br>[bar g] | Orifice Letter |       |       |       |       |       |        |        |        |        |        |        |        |        |        |        |
|-------------------------|----------------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                         | D              | E     | F     | G     | H     | J     | K      | L      | M      | N      | P      | Q      | R      | T      | V      | W      |
| 1                       | 90             | 146   | 228   | 374   | 583   | 954   | 1363   | 2113   | 2668   | 3216   | 4730   | 8194   | 11857  | 19265  | 32937  | 47275  |
| 2                       | 130            | 211   | 330   | 543   | 845   | 1383  | 1977   | 3065   | 3869   | 4664   | 6861   | 11885  | 17198  | 27942  | 47771  | 68567  |
| 3                       | 174            | 283   | 442   | 727   | 1132  | 1853  | 2648   | 4106   | 5183   | 6248   | 9190   | 15919  | 23035  | 37427  | 63987  | 91842  |
| 4                       | 219            | 355   | 555   | 913   | 1421  | 2325  | 3323   | 5152   | 6504   | 7841   | 11533  | 19978  | 28910  | 46971  | 80305  | 115262 |
| 5                       | 263            | 427   | 668   | 1098  | 1709  | 2798  | 3998   | 6199   | 7826   | 9434   | 13877  | 24038  | 34784  | 56515  | 96622  | 138683 |
| 6                       | 308            | 500   | 780   | 1283  | 1998  | 3271  | 4674   | 7246   | 9148   | 11027  | 16221  | 28097  | 40658  | 66059  | 112940 | 162104 |
| 7                       | 352            | 572   | 893   | 1469  | 2287  | 3743  | 5349   | 8293   | 10469  | 12620  | 18564  | 32157  | 46533  | 75604  | 129257 | 185524 |
| 8                       | 397            | 644   | 1006  | 1654  | 2575  | 4216  | 6024   | 9340   | 11791  | 14214  | 20908  | 36216  | 52407  | 85148  | 145575 | 208945 |
| 9                       | 441            | 716   | 1119  | 1840  | 2864  | 4688  | 6699   | 10387  | 13113  | 15807  | 23251  | 40275  | 58281  | 94692  | 161893 | 232366 |
| 10                      | 486            | 788   | 1232  | 2025  | 3153  | 5161  | 7374   | 11434  | 14434  | 17400  | 25595  | 44335  | 64156  | 104236 | 178210 | 255787 |
| 11                      | 530            | 860   | 1344  | 2211  | 3441  | 5633  | 8050   | 12481  | 15756  | 18993  | 27938  | 48394  | 70030  | 113781 | 194528 | 279207 |
| 12                      | 575            | 933   | 1457  | 2396  | 3730  | 6106  | 8725   | 13528  | 17077  | 20586  | 30282  | 52454  | 75904  | 123325 | 210845 | 302628 |
| 13                      | 619            | 1005  | 1570  | 2581  | 4019  | 6578  | 9400   | 14575  | 18399  | 22180  | 32625  | 56513  | 81779  | 132869 | 227163 | 326049 |
| 14                      | 664            | 1077  | 1683  | 2767  | 4307  | 7051  | 10075  | 15622  | 19721  | 23773  | 34969  | 60573  | 87653  | 142413 | 243480 | 349469 |
| 15                      | 708            | 1149  | 1795  | 2952  | 4596  | 7523  | 10751  | 16669  | 21042  | 25366  | 37312  | 64632  | 93527  | 151957 | 259798 | 372890 |
| 16                      | 753            | 1221  | 1908  | 3138  | 4885  | 7996  | 11426  | 17716  | 22364  | 26959  | 39656  | 68692  | 99401  | 161502 | 276115 | 396311 |
| 17                      | 797            | 1293  | 2021  | 3323  | 5173  | 8468  | 12101  | 18763  | 23686  | 28552  | 41999  | 72751  | 105276 | 171046 | 292433 | 419731 |
| 18                      | 842            | 1366  | 2134  | 3509  | 5462  | 8941  | 12776  | 19810  | 25007  | 30145  | 44343  | 76811  | 111150 | 180590 | 308750 | 443152 |
| 19                      | 886            | 1438  | 2246  | 3694  | 5751  | 9413  | 13452  | 20857  | 26329  | 31739  | 46686  | 80870  | 117024 | 190134 | 325068 | 466573 |
| 20                      | 930            | 1510  | 2359  | 3879  | 6039  | 9886  | 14127  | 21904  | 27651  | 33332  | 49030  | 84929  | 122899 | 199679 | 341385 | 489993 |
| 22                      | 1019           | 1654  | 2585  | 4250  | 6617  | 10831 | 15477  | 23998  | 30294  | 36518  | 53717  | 93048  |        |        |        |        |
| 24                      | 1108           | 1799  | 2810  | 4621  | 7194  | 11776 | 16828  | 26092  | 32937  | 39705  | 58404  | 101167 |        |        |        |        |
| 26                      | 1197           | 1943  | 3036  | 4992  | 7771  | 12721 | 18178  | 28185  | 35580  | 42891  | 63091  | 109286 |        |        |        |        |
| 28                      | 1286           | 2087  | 3261  | 5363  | 8349  | 13666 | 19529  | 30279  | 38224  | 46077  | 67778  | 117405 |        |        |        |        |
| 30                      | 1375           | 2232  | 3487  | 5734  | 8926  | 14611 | 20879  | 32373  | 40867  | 49264  | 72465  | 125524 |        |        |        |        |
| 35                      | 1598           | 2592  | 4051  | 6661  | 10370 | 16974 | 24255  | 37608  | 47475  | 57230  | 84183  | 145821 |        |        |        |        |
| 40                      | 1820           | 2953  | 4614  | 7588  | 11813 | 19336 | 27632  | 42843  | 54083  | 65196  | 95901  | 166119 |        |        |        |        |
| 45                      | 2042           | 3314  | 5178  | 8515  | 13256 | 21699 | 31008  | 48078  | 60692  | 73162  | 107618 |        |        |        |        |        |
| 50                      | 2265           | 3675  | 5742  | 9442  | 14700 | 24062 | 34384  | 53312  | 67300  | 81128  | 119336 |        |        |        |        |        |
| 55                      | 2487           | 4036  | 6306  | 10370 | 16143 | 26424 | 37760  | 58547  | 73908  | 89094  | 131054 |        |        |        |        |        |
| 60                      | 2710           | 4397  | 6870  | 11297 | 17586 | 28787 | 41136  | 63782  | 80516  | 97060  | 142771 |        |        |        |        |        |
| 65                      | 2932           | 4757  | 7433  | 12224 | 19030 | 31150 | 44512  | 69017  | 87124  | 105026 | 154489 |        |        |        |        |        |
| 70                      | 3154           | 5118  | 7997  | 13151 | 20473 | 33512 | 47889  | 74251  | 93733  |        |        |        |        |        |        |        |
| 75                      | 3377           | 5479  | 8561  | 14078 | 21916 | 35875 | 51265  | 79486  | 100341 |        |        |        |        |        |        |        |
| 80                      | 3599           | 5840  | 9125  | 15005 | 23360 | 38237 | 54641  | 84721  |        |        |        |        |        |        |        |        |
| 85                      | 3821           | 6201  | 9689  | 15932 | 24803 | 40600 | 58017  | 89956  |        |        |        |        |        |        |        |        |
| 90                      | 4044           | 6562  | 10253 | 16860 | 26247 | 42963 | 61393  | 95190  |        |        |        |        |        |        |        |        |
| 95                      | 4266           | 6922  | 10816 | 17787 | 27690 | 45325 | 64769  | 100425 |        |        |        |        |        |        |        |        |
| 100                     | 4496           | 7296  | 11399 | 18745 | 29182 | 47768 | 68260  | 105838 |        |        |        |        |        |        |        |        |
| 105                     | 4741           | 7692  | 12019 | 19765 | 30769 | 50366 | 71972  |        |        |        |        |        |        |        |        |        |
| 110                     | 4988           | 8094  | 12647 | 20798 | 32378 | 52999 | 75734  |        |        |        |        |        |        |        |        |        |
| 115                     | 5240           | 8502  | 13285 | 21846 | 34009 | 55670 | 79551  |        |        |        |        |        |        |        |        |        |
| 120                     | 5495           | 8917  | 13932 | 22911 | 35667 | 58383 | 83428  |        |        |        |        |        |        |        |        |        |
| 125                     | 5755           | 9338  | 14591 | 23993 | 37352 | 61141 | 87369  |        |        |        |        |        |        |        |        |        |
| 130                     | 6019           | 9767  | 15261 | 25095 | 39067 | 63949 | 91382  |        |        |        |        |        |        |        |        |        |
| 140                     | 6564           | 10650 | 16641 | 27365 | 42602 | 69734 | 99649  |        |        |        |        |        |        |        |        |        |
| 150                     | 7133           | 11575 | 18085 | 29740 | 46298 | 75786 | 108296 |        |        |        |        |        |        |        |        |        |
| 160                     | 7734           | 12549 | 19608 | 32243 | 50195 | 82164 |        |        |        |        |        |        |        |        |        |        |
| 170                     | 8373           | 13586 | 21228 | 34907 | 54343 | 88953 |        |        |        |        |        |        |        |        |        |        |
| 180                     | 9061           | 14702 | 22972 | 37776 | 58809 | 96264 |        |        |        |        |        |        |        |        |        |        |
| 190                     | 9813           | 15922 | 24879 | 40912 |       |       |        |        |        |        |        |        |        |        |        |        |
| 200                     | 10650          | 17281 | 27002 | 44403 |       |       |        |        |        |        |        |        |        |        |        |        |

# Certified capacities

## Water capacities USCS units

Capacity in gallons per minute of water at 10% overpressure. Capacities below 30 psig set pressure are calculated at 3 psig overpressure. Valve discharging to atmospheric pressure.

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

For liquids with other specific gravity than water, use either ASME Sec. VIII or API Standard 520 calculation basis.

| Set Pressure [psig] | Orifice Letter |     |     |     |      |      |      |      |      |      |      |      |      |       |       |       |
|---------------------|----------------|-----|-----|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|
|                     | D              | E   | F   | G   | H    | J    | K    | L    | M    | N    | P    | Q    | R    | T     | V     | W     |
| 15                  | 15             | 25  | 38  | 63  | 98   | 160  | 229  | 355  | 449  | 541  | 796  | 1378 | 1994 | 3240  | 5540  | 7951  |
| 20                  | 17             | 28  | 43  | 71  | 111  | 181  | 259  | 402  | 507  | 611  | 899  | 1558 | 2254 | 3663  | 6262  | 8988  |
| 30                  | 20             | 33  | 52  | 85  | 133  | 217  | 310  | 481  | 608  | 732  | 1077 | 1866 | 2700 | 4387  | 7501  | 10766 |
| 40                  | 23             | 38  | 60  | 98  | 153  | 251  | 358  | 556  | 702  | 846  | 1244 | 2155 | 3118 | 5066  | 8661  | 12432 |
| 50                  | 26             | 43  | 67  | 110 | 171  | 280  | 401  | 621  | 784  | 945  | 1391 | 2409 | 3486 | 5664  | 9684  | 13899 |
| 60                  | 28             | 47  | 73  | 121 | 188  | 307  | 439  | 681  | 859  | 1036 | 1524 | 2639 | 3819 | 6205  | 10608 | 15226 |
| 70                  | 31             | 51  | 79  | 130 | 203  | 332  | 474  | 735  | 928  | 1119 | 1646 | 2851 | 4125 | 6702  | 11458 | 16446 |
| 80                  | 33             | 54  | 85  | 139 | 217  | 355  | 507  | 786  | 992  | 1196 | 1759 | 3047 | 4410 | 7165  | 12249 | 17581 |
| 90                  | 35             | 57  | 90  | 148 | 230  | 376  | 538  | 834  | 1052 | 1269 | 1866 | 3232 | 4677 | 7599  | 12992 | 18648 |
| 100                 | 37             | 61  | 95  | 156 | 242  | 397  | 567  | 879  | 1109 | 1337 | 1967 | 3407 | 4930 | 8010  | 13695 | 19656 |
| 120                 | 40             | 66  | 104 | 170 | 265  | 434  | 621  | 963  | 1215 | 1465 | 2155 | 3732 | 5401 | 8775  | 15002 | 21533 |
| 140                 | 44             | 72  | 112 | 184 | 287  | 469  | 671  | 1040 | 1312 | 1582 | 2327 | 4031 | 5833 | 9478  | 16204 | 23258 |
| 160                 | 47             | 77  | 120 | 197 | 306  | 502  | 717  | 1111 | 1403 | 1691 | 2488 | 4310 | 6236 | 10132 | 17323 | 24864 |
| 180                 | 49             | 81  | 127 | 209 | 325  | 532  | 760  | 1179 | 1488 | 1794 | 2639 | 4571 | 6615 | 10747 | 18374 | 26372 |
| 200                 | 52             | 86  | 134 | 220 | 343  | 561  | 801  | 1243 | 1569 | 1891 | 2782 | 4818 | 6972 | 11328 | 19368 | 27798 |
| 220                 | 55             | 90  | 140 | 231 | 359  | 588  | 841  | 1303 | 1645 | 1983 | 2917 | 5053 | 7313 | 11881 | 20313 | 29155 |
| 240                 | 57             | 94  | 147 | 241 | 375  | 614  | 878  | 1361 | 1718 | 2071 | 3047 | 5278 | 7638 | 12409 | 21216 | 30452 |
| 260                 | 59             | 98  | 153 | 251 | 391  | 639  | 914  | 1417 | 1789 | 2156 | 3171 | 5494 | 7950 | 12916 | 22082 | 31695 |
| 280                 | 62             | 101 | 158 | 260 | 405  | 664  | 948  | 1470 | 1856 | 2237 | 3291 | 5701 | 8250 | 13404 | 22916 | 32892 |
| 300                 | 64             | 105 | 164 | 270 | 420  | 687  | 982  | 1522 | 1921 | 2316 | 3407 | 5901 | 8539 | 13874 | 23720 | 34046 |
| 320                 | 66             | 108 | 169 | 278 | 433  | 709  | 1014 | 1572 | 1984 | 2392 | 3518 | 6095 |      |       |       |       |
| 340                 | 68             | 112 | 175 | 287 | 447  | 731  | 1045 | 1620 | 2045 | 2466 | 3627 | 6282 |      |       |       |       |
| 360                 | 70             | 115 | 180 | 295 | 460  | 752  | 1075 | 1667 | 2105 | 2537 | 3732 | 6464 |      |       |       |       |
| 380                 | 72             | 118 | 184 | 303 | 472  | 773  | 1105 | 1713 | 2162 | 2607 | 3834 | 6641 |      |       |       |       |
| 400                 | 74             | 121 | 189 | 311 | 485  | 793  | 1133 | 1757 | 2218 | 2674 | 3934 | 6814 |      |       |       |       |
| 450                 | 78             | 128 | 201 | 330 | 514  | 841  | 1202 | 1864 | 2353 | 2836 | 4172 | 7227 |      |       |       |       |
| 500                 | 82             | 135 | 212 | 348 | 542  | 887  | 1267 | 1965 | 2480 | 2990 | 4398 | 7618 |      |       |       |       |
| 550                 | 86             | 142 | 222 | 365 | 568  | 930  | 1329 | 2061 | 2601 | 3136 | 4613 | 7990 |      |       |       |       |
| 600                 | 90             | 148 | 232 | 381 | 593  | 971  | 1388 | 2152 | 2717 | 3275 | 4818 | 8345 |      |       |       |       |
| 650                 | 94             | 154 | 241 | 397 | 618  | 1011 | 1445 | 2240 | 2828 | 3409 | 5015 |      |      |       |       |       |
| 700                 | 97             | 160 | 250 | 412 | 641  | 1049 | 1499 | 2325 | 2935 | 3538 | 5204 |      |      |       |       |       |
| 800                 | 104            | 171 | 268 | 440 | 685  | 1122 | 1603 | 2485 | 3137 | 3782 | 5563 |      |      |       |       |       |
| 900                 | 110            | 182 | 284 | 467 | 727  | 1190 | 1700 | 2636 | 3328 | 4011 | 5901 |      |      |       |       |       |
| 1000                | 116            | 192 | 299 | 492 | 766  | 1254 | 1792 | 2779 | 3508 | 4228 | 6220 |      |      |       |       |       |
| 1100                | 122            | 201 | 314 | 516 | 804  | 1315 | 1880 | 2914 | 3679 |      |      |      |      |       |       |       |
| 1200                | 127            | 210 | 328 | 539 | 839  | 1374 | 1963 | 3044 |      |      |      |      |      |       |       |       |
| 1300                | 133            | 218 | 341 | 561 | 874  | 1430 | 2043 | 3168 |      |      |      |      |      |       |       |       |
| 1400                | 138            | 227 | 354 | 582 | 907  | 1484 | 2120 | 3288 |      |      |      |      |      |       |       |       |
| 1500                | 142            | 235 | 367 | 603 | 938  | 1536 | 2195 | 3403 |      |      |      |      |      |       |       |       |
| 1600                | 147            | 242 | 379 | 623 | 969  | 1586 | 2267 |      |      |      |      |      |      |       |       |       |
| 1700                | 152            | 250 | 390 | 642 | 999  | 1635 | 2337 |      |      |      |      |      |      |       |       |       |
| 1800                | 156            | 257 | 402 | 660 | 1028 | 1683 | 2404 |      |      |      |      |      |      |       |       |       |
| 1900                | 160            | 264 | 413 | 678 | 1056 | 1729 | 2470 |      |      |      |      |      |      |       |       |       |
| 2000                | 165            | 271 | 423 | 696 | 1083 | 1774 | 2534 |      |      |      |      |      |      |       |       |       |
| 2500                | 184            | 303 | 473 | 778 | 1211 | 1983 |      |      |      |      |      |      |      |       |       |       |
| 3000                | 202            | 332 | 518 | 852 |      |      |      |      |      |      |      |      |      |       |       |       |
| 3500                | 218            | 358 | 560 | 921 |      |      |      |      |      |      |      |      |      |       |       |       |
| 4000                | 233            | 383 | 599 |     |      |      |      |      |      |      |      |      |      |       |       |       |
| 4500                | 247            | 406 | 635 |     |      |      |      |      |      |      |      |      |      |       |       |       |
| 5000                | 260            | 428 | 669 |     |      |      |      |      |      |      |      |      |      |       |       |       |
| 5500                | 273            | 449 |     |     |      |      |      |      |      |      |      |      |      |       |       |       |
| 6000                | 285            | 469 |     |     |      |      |      |      |      |      |      |      |      |       |       |       |

# Certified capacities

## Water capacities SI units

Capacity in liters per minute of water at 10% overpressure. Capacities below 2.1 bar g set pressure are calculated at 0.21 bar g overpressure. Valve discharging to atmospheric pressure.

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

For liquids with other specific gravity than water, use either ASME Sec. VIII or API Standard 520 calculation basis.

| Set Pressure<br>[bar g] | Orifice Letter |      |      |      |      |      |      |       |       |       |       |       |       |       |       |        |
|-------------------------|----------------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
|                         | D              | E    | F    | G    | H    | J    | K    | L     | M     | N     | P     | Q     | R     | T     | V     | W      |
| 1                       | 56             | 91   | 143  | 235  | 366  | 599  | 856  | 1327  | 1675  | 2019  | 2970  | 5145  | 7445  | 12096 | 20680 | 29682  |
| 2                       | 75             | 124  | 193  | 318  | 495  | 810  | 1157 | 1794  | 2265  | 2730  | 4016  | 6957  | 10067 | 16356 | 27964 | 40137  |
| 3                       | 92             | 151  | 236  | 389  | 605  | 990  | 1415 | 2194  | 2770  | 3339  | 4911  | 8507  | 12311 | 20001 | 34196 | 49082  |
| 4                       | 106            | 175  | 273  | 449  | 699  | 1143 | 1634 | 2533  | 3198  | 3855  | 5671  | 9823  | 14215 | 23096 | 39486 | 56675  |
| 5                       | 119            | 195  | 305  | 502  | 781  | 1278 | 1827 | 2833  | 3576  | 4310  | 6340  | 10983 | 15893 | 25822 | 44147 | 63364  |
| 6                       | 130            | 214  | 334  | 550  | 856  | 1400 | 2001 | 3103  | 3917  | 4722  | 6946  | 12031 | 17410 | 28286 | 48360 | 69412  |
| 7                       | 140            | 231  | 361  | 594  | 924  | 1513 | 2162 | 3351  | 4231  | 5100  | 7502  | 12995 | 18805 | 30553 | 52235 | 74973  |
| 8                       | 150            | 247  | 386  | 635  | 988  | 1617 | 2311 | 3583  | 4523  | 5452  | 8020  | 13892 | 20103 | 32662 | 55842 | 80150  |
| 9                       | 159            | 262  | 409  | 673  | 1048 | 1715 | 2451 | 3800  | 4797  | 5783  | 8507  | 14735 | 21322 | 34643 | 59229 | 85012  |
| 10                      | 168            | 276  | 431  | 709  | 1104 | 1808 | 2584 | 4006  | 5057  | 6096  | 8967  | 15532 | 22476 | 36517 | 62433 | 89610  |
| 11                      | 176            | 290  | 453  | 744  | 1158 | 1896 | 2710 | 4201  | 5304  | 6393  | 9404  | 16290 | 23573 | 38300 | 65480 | 93984  |
| 12                      | 184            | 302  | 473  | 777  | 1210 | 1981 | 2830 | 4388  | 5539  | 6678  | 9822  | 17014 | 24621 | 40003 | 68392 | 98163  |
| 13                      | 191            | 315  | 492  | 809  | 1259 | 2061 | 2946 | 4567  | 5766  | 6950  | 10224 | 17709 | 25626 | 41636 | 71184 | 102172 |
| 14                      | 198            | 327  | 510  | 839  | 1307 | 2139 | 3057 | 4740  | 5983  | 7213  | 10609 | 18378 | 26594 | 43208 | 73872 | 106028 |
| 15                      | 205            | 338  | 528  | 869  | 1353 | 2214 | 3164 | 4906  | 6193  | 7466  | 10982 | 19023 | 27527 | 44724 | 76464 | 109750 |
| 16                      | 212            | 349  | 546  | 897  | 1397 | 2287 | 3268 | 5067  | 6396  | 7711  | 11342 | 19647 | 28430 | 46191 | 78972 | 113349 |
| 17                      | 219            | 360  | 563  | 925  | 1440 | 2357 | 3369 | 5223  | 6593  | 7948  | 11691 | 20251 | 29305 | 47613 | 81402 | 116838 |
| 18                      | 225            | 370  | 579  | 952  | 1482 | 2426 | 3466 | 5374  | 6784  | 8178  | 12030 | 20838 | 30154 | 48993 | 83762 | 120225 |
| 19                      | 231            | 381  | 595  | 978  | 1522 | 2492 | 3561 | 5522  | 6970  | 8402  | 12360 | 21409 | 30981 | 50336 | 86058 | 123519 |
| 20                      | 237            | 390  | 610  | 1003 | 1562 | 2557 | 3654 | 5665  | 7151  | 8621  | 12681 | 21966 | 31786 | 51643 | 88293 | 126728 |
| 22                      | 249            | 410  | 640  | 1052 | 1638 | 2682 | 3832 | 5942  | 7500  | 9041  | 13300 | 23038 |       |       |       |        |
| 24                      | 260            | 428  | 668  | 1099 | 1711 | 2801 | 4002 | 6206  | 7834  | 9444  | 13891 | 24062 |       |       |       |        |
| 26                      | 270            | 445  | 696  | 1144 | 1781 | 2915 | 4166 | 6459  | 8154  | 9829  | 14458 | 25045 |       |       |       |        |
| 28                      | 281            | 462  | 722  | 1187 | 1848 | 3025 | 4323 | 6703  | 8462  | 10200 | 15004 | 25990 |       |       |       |        |
| 30                      | 290            | 478  | 747  | 1229 | 1913 | 3131 | 4475 | 6938  | 8759  | 10558 | 15531 | 26902 |       |       |       |        |
| 35                      | 314            | 517  | 807  | 1327 | 2066 | 3382 | 4833 | 7494  | 9460  | 11404 | 16775 | 29058 |       |       |       |        |
| 40                      | 335            | 552  | 863  | 1419 | 2209 | 3616 | 5167 | 8012  | 10114 | 12192 | 17933 | 31064 |       |       |       |        |
| 45                      | 356            | 586  | 915  | 1505 | 2343 | 3835 | 5480 | 8498  | 10727 | 12931 | 19021 |       |       |       |       |        |
| 50                      | 375            | 617  | 965  | 1586 | 2470 | 4043 | 5777 | 8957  | 11307 | 13631 | 20050 |       |       |       |       |        |
| 55                      | 393            | 648  | 1012 | 1664 | 2590 | 4240 | 6059 | 9394  | 11859 | 14296 | 21029 |       |       |       |       |        |
| 60                      | 411            | 676  | 1057 | 1738 | 2705 | 4429 | 6328 | 9812  | 12386 | 14932 | 21964 |       |       |       |       |        |
| 65                      | 428            | 704  | 1100 | 1809 | 2816 | 4609 | 6587 | 10213 | 12892 | 15541 | 22861 |       |       |       |       |        |
| 70                      | 444            | 731  | 1141 | 1877 | 2922 | 4783 | 6835 | 10598 | 13379 |       |       |       |       |       |       |        |
| 75                      | 459            | 756  | 1182 | 1943 | 3025 | 4951 | 7075 | 10970 | 13849 |       |       |       |       |       |       |        |
| 80                      | 474            | 781  | 1220 | 2007 | 3124 | 5114 | 7307 | 11330 |       |       |       |       |       |       |       |        |
| 85                      | 489            | 805  | 1258 | 2068 | 3220 | 5271 | 7532 | 11679 |       |       |       |       |       |       |       |        |
| 90                      | 503            | 828  | 1294 | 2128 | 3313 | 5424 | 7751 | 12017 |       |       |       |       |       |       |       |        |
| 95                      | 517            | 851  | 1330 | 2187 | 3404 | 5572 | 7963 | 12347 |       |       |       |       |       |       |       |        |
| 100                     | 530            | 873  | 1364 | 2244 | 3493 | 5717 | 8170 | 12667 |       |       |       |       |       |       |       |        |
| 120                     | 581            | 957  | 1495 | 2458 | 3826 | 6263 | 8950 |       |       |       |       |       |       |       |       |        |
| 140                     | 628            | 1033 | 1614 | 2655 | 4133 | 6765 | 9667 |       |       |       |       |       |       |       |       |        |
| 160                     | 671            | 1104 | 1726 | 2838 | 4418 | 7232 |      |       |       |       |       |       |       |       |       |        |
| 180                     | 712            | 1171 | 1830 | 3010 | 4686 | 7670 |      |       |       |       |       |       |       |       |       |        |
| 200                     | 750            | 1235 | 1929 | 3173 |      |      |      |       |       |       |       |       |       |       |       |        |
| 220                     | 787            | 1295 | 2024 | 3328 |      |      |      |       |       |       |       |       |       |       |       |        |
| 240                     | 822            | 1353 | 2114 | 3476 |      |      |      |       |       |       |       |       |       |       |       |        |
| 260                     | 855            | 1408 | 2200 |      |      |      |      |       |       |       |       |       |       |       |       |        |
| 280                     | 887            | 1461 | 2283 |      |      |      |      |       |       |       |       |       |       |       |       |        |
| 300                     | 919            | 1512 | 2363 |      |      |      |      |       |       |       |       |       |       |       |       |        |
| 350                     | 992            | 1634 |      |      |      |      |      |       |       |       |       |       |       |       |       |        |
| 400                     | 1061           | 1746 |      |      |      |      |      |       |       |       |       |       |       |       |       |        |
| 414                     | 1079           | 1777 |      |      |      |      |      |       |       |       |       |       |       |       |       |        |

# Heating jacket

## Safety valve with heating jacket (Option .18)

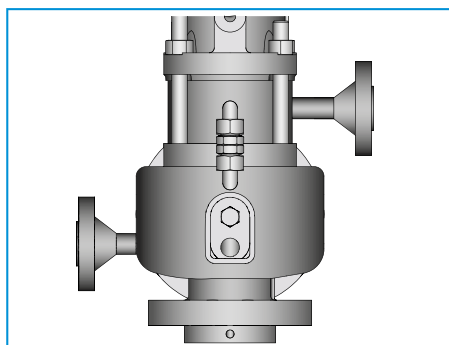
Hardening or solidification of highly viscous media in the safety valve can interfere with the function or closing and hence lead to dangerous operating conditions. Media with a tendency to conglutination or crystallization can block the seat and moving parts. This can usually be remedied by maintaining the temperature of the Fluid before and during the discharge. Monitoring and heating the

pipe will often not provide the required heat to the inlet of the safety valve. Equipping the safety valve with a heating jacket will solve this problem. Typical applications for safety valves with heating jacket (option code .18) include ammonium nitrate, acrylic acid, sulphuric acid, fluoropolymers, polypropylene, olefins, and tar.

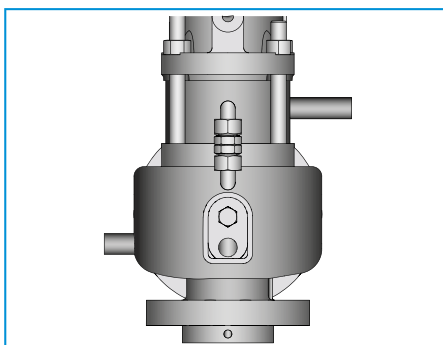
The safety valve should be equipped with bellows to protect the spindle and guides.

Additional heating of the isolating spacer is integrated in the heating circuit by means of piping. The bellows will not be required if the fluid does not tend to solidify in the outlet of the safety valve.

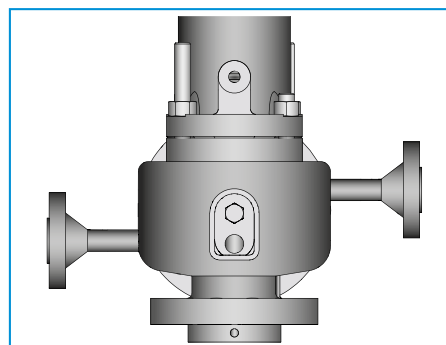
Purging the seat area with steam can serve as a further measure for protecting the safety valve seat from conglutination. The purge connection (option .32) can also be combined with the heating jacket.



**.18** Heating jacket with flange connection for safety valve with bellows



**.18** Heating jacket with threaded connection for safety valve with bellows



**.18** Heating jacket with flange connection for conventional safety valve

| Safety valve Inlet size                                    | NPS Inch | 1                                    | 1½ | 2 | 3  | 4 | 6 | 8               | 10 | 12 | ≥ 250 |
|------------------------------------------------------------|----------|--------------------------------------|----|---|----|---|---|-----------------|----|----|-------|
| Heating jacket connection                                  | Flange   | NPS ½ Class 150                      |    |   |    |   |   | NPS 1 Class 150 |    |    |       |
|                                                            | Thread   | NPT ¾                                |    |   |    |   |   | NPT ¾           |    |    |       |
| Max. heating jacket working pressure [bar g] <sup>1)</sup> | 50 °C    |                                      |    |   | 18 |   |   |                 | 16 | 10 |       |
|                                                            | 150 °C   |                                      |    |   | 18 |   |   |                 | 14 | 9  |       |
|                                                            | 200 °C   |                                      |    |   | 18 |   |   |                 | 13 | 8  |       |
|                                                            | 300 °C   |                                      |    |   | 18 |   |   |                 | 12 | 7  |       |
| Heating jacket material                                    |          | Stainless steel 1.4301 <sup>2)</sup> |    |   |    |   |   |                 |    |    |       |

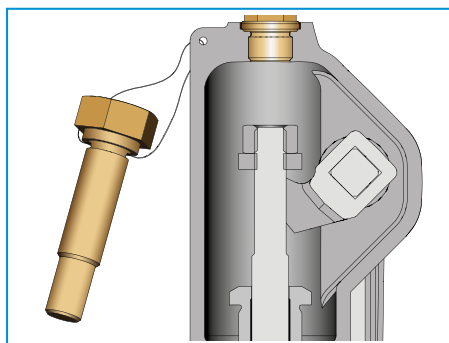
<sup>1)</sup> Nominal pressure rating for the heating jacket at 50 °C. The heating jacket is labelled in compliance with the Pressure Equipment Directive.

<sup>2)</sup> Depending on the heating jacket design or availability of materials, we reserve the right to use higher quality 1.4404 or 1.4571 stainless steel.

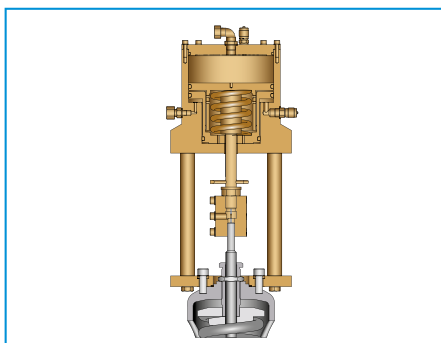
Other connections, pressure ratings or materials available upon request. Safety valves with heating jacket have no support brackets.

# Options

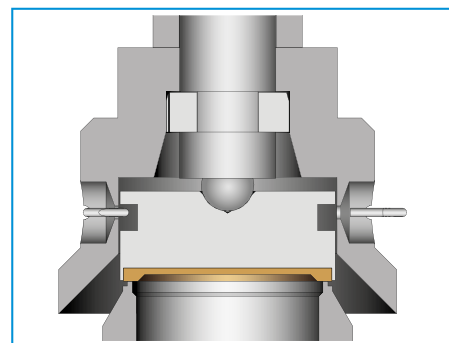
## Technical design options



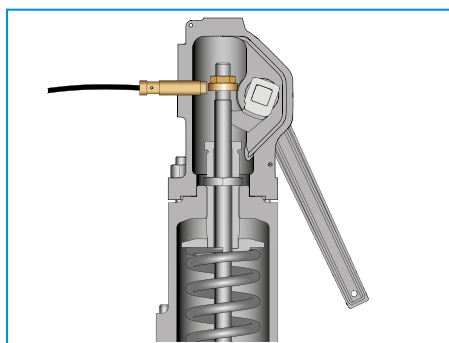
**B** Test gag: Blocking of the safety valve for pressure testing the pressure system



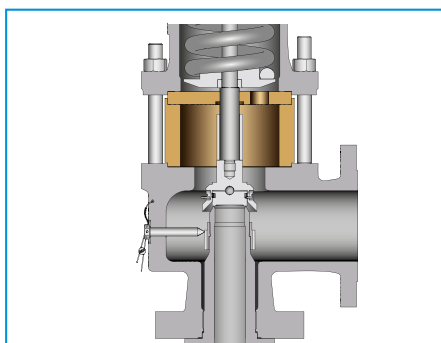
**AK** Pneumatic actuator improves the tightness, reduces the functional pressure differences, controls the open- and close dynamic and can be used as remote control.



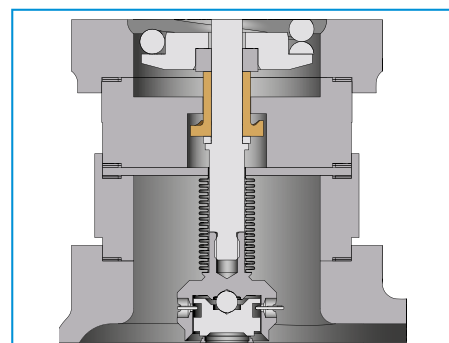
**.11** Disc with soft seal for particularly high tightness



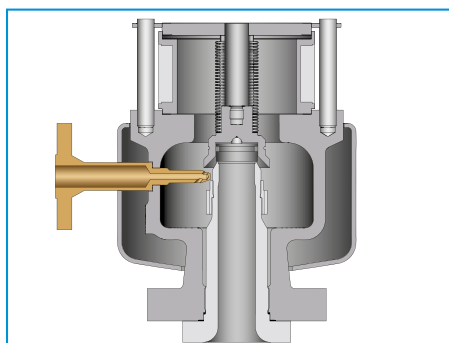
**.14a** Lift indication with inductive proximity switch in the cap. If the safety valve disc lifts by 1 mm minimum, the proximity switch will change its status and switch.



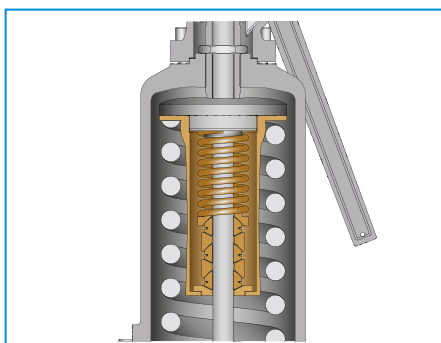
**.15** Bonnet insulation spacer for protecting the spring against high and low temperatures



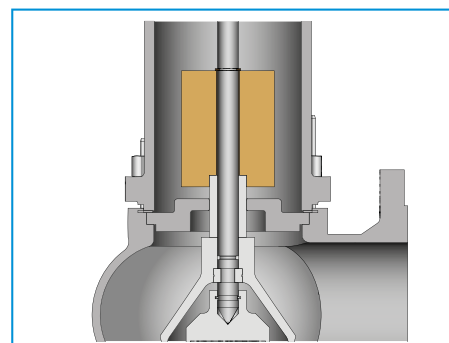
**.17** Balancing piston balances the back pressure when bellows fails



**.32** Purge connection for constant cleaning of the safety valve seat and hence protecting it from conglutination



**.38** Vibration damper for avoiding valve oscillation in case of unfavourable installation conditions



**.57** Weight load for operation with very low set pressure

|                                    |                                   |                                        |                                       |                                 |
|------------------------------------|-----------------------------------|----------------------------------------|---------------------------------------|---------------------------------|
| <b>Алматы</b> (7273)495-231        | <b>Иваново</b> (4932)77-34-06     | <b>Магнитогорск</b> (3519)55-03-13     | <b>Ростов-на-Дону</b> (863)308-18-15  | <b>Тольятти</b> (8482)63-91-07  |
| <b>Ангарск</b> (3955)60-70-56      | <b>Ижевск</b> (3412)26-03-58      | <b>Москва</b> (495)268-04-70           | <b>Рязань</b> (4912)46-61-64          | <b>Томск</b> (3822)98-41-53     |
| <b>Архангельск</b> (8182)63-90-72  | <b>Иркутск</b> (395)279-98-46     | <b>Мурманск</b> (8152)59-64-93         | <b>Самара</b> (846)206-03-16          | <b>Тула</b> (4872)33-79-87      |
| <b>Астрахань</b> (8512)99-46-04    | <b>Казань</b> (843)206-01-48      | <b>Набережные Челны</b> (8552)20-53-41 | <b>Санкт-Петербург</b> (812)309-46-40 | <b>Тюмень</b> (3452)66-21-18    |
| <b>Барнаул</b> (3852)73-04-60      | <b>Калининград</b> (4012)72-03-81 | <b>Нижний Новгород</b> (831)429-08-12  | <b>Саратов</b> (845)249-38-78         | <b>Ульяновск</b> (8422)24-23-59 |
| <b>Белгород</b> (4722)40-23-64     | <b>Калуга</b> (4842)92-23-67      | <b>Новокузнецк</b> (3843)20-46-81      | <b>Севастополь</b> (8692)22-31-93     | <b>Улан-Удэ</b> (3012)59-97-51  |
| <b>Благовещенск</b> (4162)22-76-07 | <b>Кемерово</b> (3842)65-04-62    | <b>Ноябрьск</b> (3496)41-32-12         | <b>Саранск</b> (8342)22-96-24         | <b>Уфа</b> (347)229-48-12       |
| <b>Брянск</b> (4832)59-03-52       | <b>Киров</b> (8332)68-02-04       | <b>Новосибирск</b> (383)227-86-73      | <b>Симферополь</b> (3652)67-13-56     | <b>Хабаровск</b> (4212)92-98-04 |
| <b>Владивосток</b> (423)249-28-31  | <b>Коломна</b> (4966)23-41-49     | <b>Омск</b> (3812)21-46-40             | <b>Смоленск</b> (4812)29-41-54        | <b>Чебоксары</b> (8352)28-53-07 |
| <b>Владикавказ</b> (8672)28-90-48  | <b>Кострома</b> (4942)77-07-48    | <b>Орел</b> (4862)44-53-42             | <b>Сочи</b> (862)225-72-31            | <b>Челябинск</b> (351)202-03-61 |
| <b>Владимир</b> (4922)49-43-18     | <b>Краснодар</b> (861)203-40-90   | <b>Оренбург</b> (3532)37-68-04         | <b>Ставрополь</b> (8652)20-65-13      | <b>Череповец</b> (8202)49-02-64 |
| <b>Волгоград</b> (844)278-03-48    | <b>Красноярск</b> (391)204-63-61  | <b>Пенза</b> (8412)22-31-16            | <b>Сургут</b> (3462)77-98-35          | <b>Чита</b> (3022)38-34-83      |
| <b>Вологда</b> (8172)26-41-59      | <b>Курск</b> (4712)77-13-04       | <b>Петрозаводск</b> (8142)55-98-37     | <b>Сыктывкар</b> (8212)25-95-17       | <b>Якутск</b> (4112)23-90-97    |
| <b>Воронеж</b> (473)204-51-73      | <b>Курган</b> (3522)50-90-47      | <b>Псков</b> (8112)59-10-37            | <b>Тамбов</b> (4752)50-40-97          | <b>Ярославль</b> (4852)69-52-93 |
| <b>Екатеринбург</b> (343)384-55-89 | <b>Липецк</b> (4742)52-20-81      | <b>Пермь</b> (342)205-81-47            | <b>Тверь</b> (4822)63-31-35           |                                 |

**Россия** +7(495)268-04-70

**Казахстан** +7(7172)727-132

**Киргизия** +996(312)96-26-47

https://imibr.nt-rt.ru/ || irb@nt-rt.ru