

Data sheet

# Hand-operated regulating valves in stainless steel

## Types REG-SA SS and REG-SB SS



In certain specific areas such as outdoor applications and corrosive atmospheres, such as coastal installations, there is a need for high surface protection to prevent failure due to corrosion.

Today's food safety standards often call for daily treatment with detergents to protect against bacteria growth, again producing a need for high surface protection.

REG-SA SS and REG-SB SS are angle-way and straight-way hand-operated regulating valves, which act as normal stop valves in closed position.

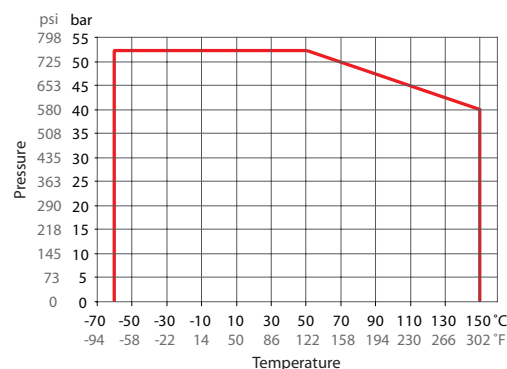
The valves are designed to meet the strict quality requirements on refrigerating installations specified by the international classification societies and are carefully designed to present favourable flow conditions and accurate linear characteristics.

The valves are equipped with vented cap and have internal backseating enabling the spindle seal to be replaced with the valve still under pressure.

### Features

- Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO<sub>2</sub>), Propane, Butane, Iso-Butane and Ethane.  
R717 Heat Pump and Propylene applications with replaced O-ring.
- Designed to give favourable flow conditions.
- Internal backseating enables replacement of the spindle seal whilst the valve is active, i.e. under pressure
- Housing is made of special cold resistant stainless steel approved for low temperature operations.
- Easy to disassemble for inspection and service.
- Butt-weld DIN and ANSI connections.
- Max. operating pressure: 52 bar g (754 psig)
- Temperature range: -60/+150°C (-76 +302°F).
- Compact and light valves for easy handling and installation.
- Classification: DNV, CRN, BV, EAC etc.  
To get an updated list of certification on the products please contact your local Danfoss Sales Company.

### Pressure and temperature range



REG-SA SS/REG-SB SS DN15-DN40

**Design**
**Housing**

Made of stainless steel approved for low temperature operations.

**Connections**

Available with the following connections:

- Butt-weld DIN (EN 10220)  
DN 15 - 40 (½ - 1½ in.)
- Butt-weld ANSI (B 36.19M)  
DN 15 - 40 (½ - 1½ in.)

**The cone**

The valves are available in two different versions – REG-SA SS with an A cone and REG-SB SS with a B cone. The A cone is designed for expansion lines, while the B cone is designed for regulating purposes e.g. liquid lines.

The valve cone is designed to ensure perfect regulation and provide an extensive regulating area. Irrespective of the refrigerant used, it is easy to obtain the correct capacity. A cone seal ring provides perfect sealing at a minimum closing momentum.

The valve cone can be turned on the spindle, thus there will be no friction between the cone and the seat when the valve is opened and closed.

Made of polished stainless steel, ideal for O-ring sealing. Furthermore, parts of the spindle are heat treated to obtain anti-abrasive/adhesive properties.

**Packing gland - REG-SA SS and REG-SB SS**

The stainless steel packing gland comprises a spring loaded seal packing gland which ensures a perfect tightness in the range: -60/+150°C (-76/+302°F).

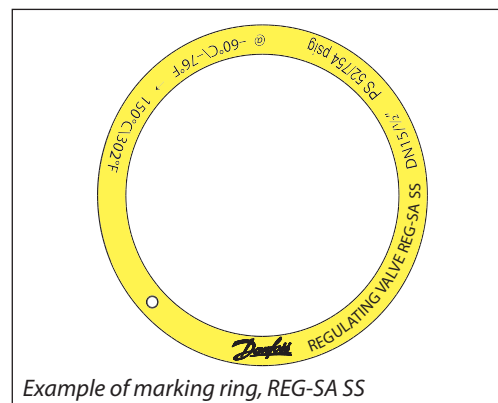
The packing glands are equipped with a scraper ring to prevent penetration of dirt and ice into the packing gland.

**Installation**

Install the valve with the spindle up or in horizontal position. The flow must be directed towards the cone.

The valve is designed to withstand high internal pressure. However, the piping system in general should be designed to avoid liquid traps and reduce the risk of hydraulic pressure caused by thermal expansion.

For further information refer to installation guide for REG-SA SS and REG-SB SS.


**Pressure Equipment Directive (PED)**

REG-SA/SB SS valves are approved according to the European standard specified in the Pressure Equipment Directive and are CE marked.



REG-SA SS and REG-SB SS valves		
Nominal bore	DN = < 25 mm (1 in.)	DN32-40 mm (1¼ - 1½ in.)
Classified for	Fluid group I	
Category	Article 3, paragraph 3	II

**Technical data**
**Refrigerants**

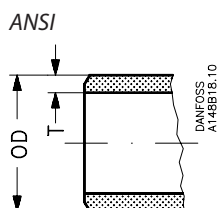
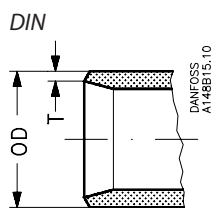
Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO<sub>2</sub>), Propane, Butane, Iso-Butane and Ethane. R717 Heat Pump and Propylene applications with replaced O-ring.

For further information please contact your local Danfoss Sales Company.

- **Temperature range**  
-60/+150°C (-76/+302°F)

- **Max working pressure**  
52 bar g (754 psi g)

- **Flow coefficients**  
Flow coefficients for fully opened valves from  $k_v = 0.15$  to 80 m<sup>3</sup>/h ( $C_v = 0.17$  to 92.5 USgal/min).

**Connections**


Size	OD	T
<b>Butt-weld DIN (EN 10220)</b>		
15	mm	21.3
½	in.	0.839
20	mm	26.9
¾	in.	1.059
25	mm	33.7
1	in.	1.327
32	mm	42.4
1¼	in.	1.669
40	mm	48.3
1½	in.	1.902

Size	OD	T
<b>Butt-weld ANSI (B 36.19M, SCHEDULE 40)</b>		
15	mm	21.3
½	in.	0.839
20	mm	26.9
¾	in.	1.06
25	mm	33.7
1	in.	1.33
32	mm	42.4
1¼	in.	1.67
40	mm	48.3
1½	in.	1.9

**Computation and selection**

*Introduction*

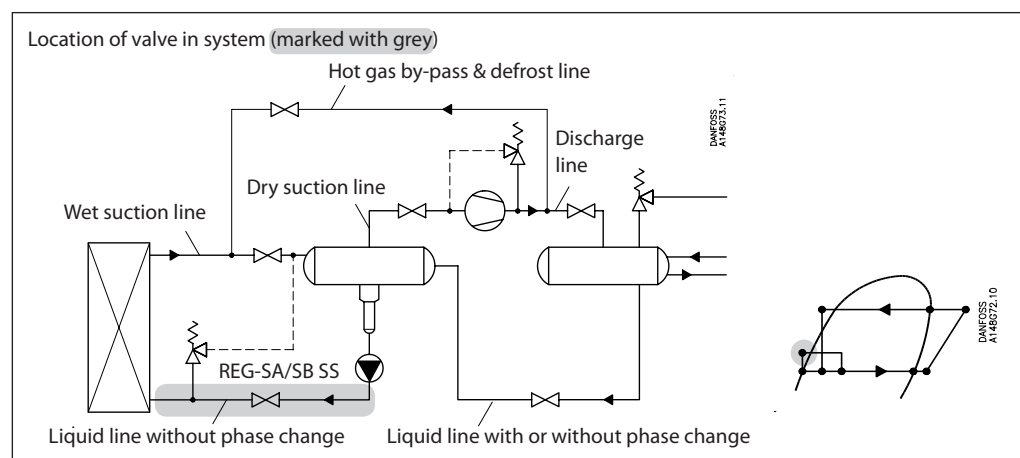
In refrigeration plants, regulating valves are primarily used in liquid lines in order to regulate the flow of refrigerant. The valves can, however, also be used as expansion valves. From a calculation point of view the two fields of application are very different.

Normal flow is the term used to describe the general case where the flow through the valve is proportional to the square root of the pressure drop across it and inversely proportional to the density of the refrigerant (Bernoullis equation).

This relationship between mass flow, pressure drop and density satisfies the majority of all valve applications with refrigerants and brines.

Normal flow is characterised by turbulent flow through the valve without any phase change. The following capacity curves are based on the above mentioned assumption.

Application of the regulating valves outside the normal flow area will reduce the capacity of the valve considerably. In such cases it is recommended to use "DIRcalc™" (Danfoss Industrial Refrigeration calculation programme).



*Sizing regulating valve for liquid flow*  
 Liquid refrigerants: Use the liquid tables, fig. 6 - 10. For other refrigerants and brines, "Normal flow" (Turbulent flow); see below and use the flow coefficient tables (fig. 1 - 2).

**SI-units**

Mass flow:

$$k_v = \frac{G}{\sqrt{\rho \times 1000 \times \Delta p}} = G \times C_A \text{ [m}^3/\text{h]}$$

Volume flow:

$$k_v = \frac{\dot{V}}{\sqrt{\frac{1000 \times \Delta p}{\rho}}} \text{ [m}^3/\text{h]}$$

**Imperial units**

Mass flow:

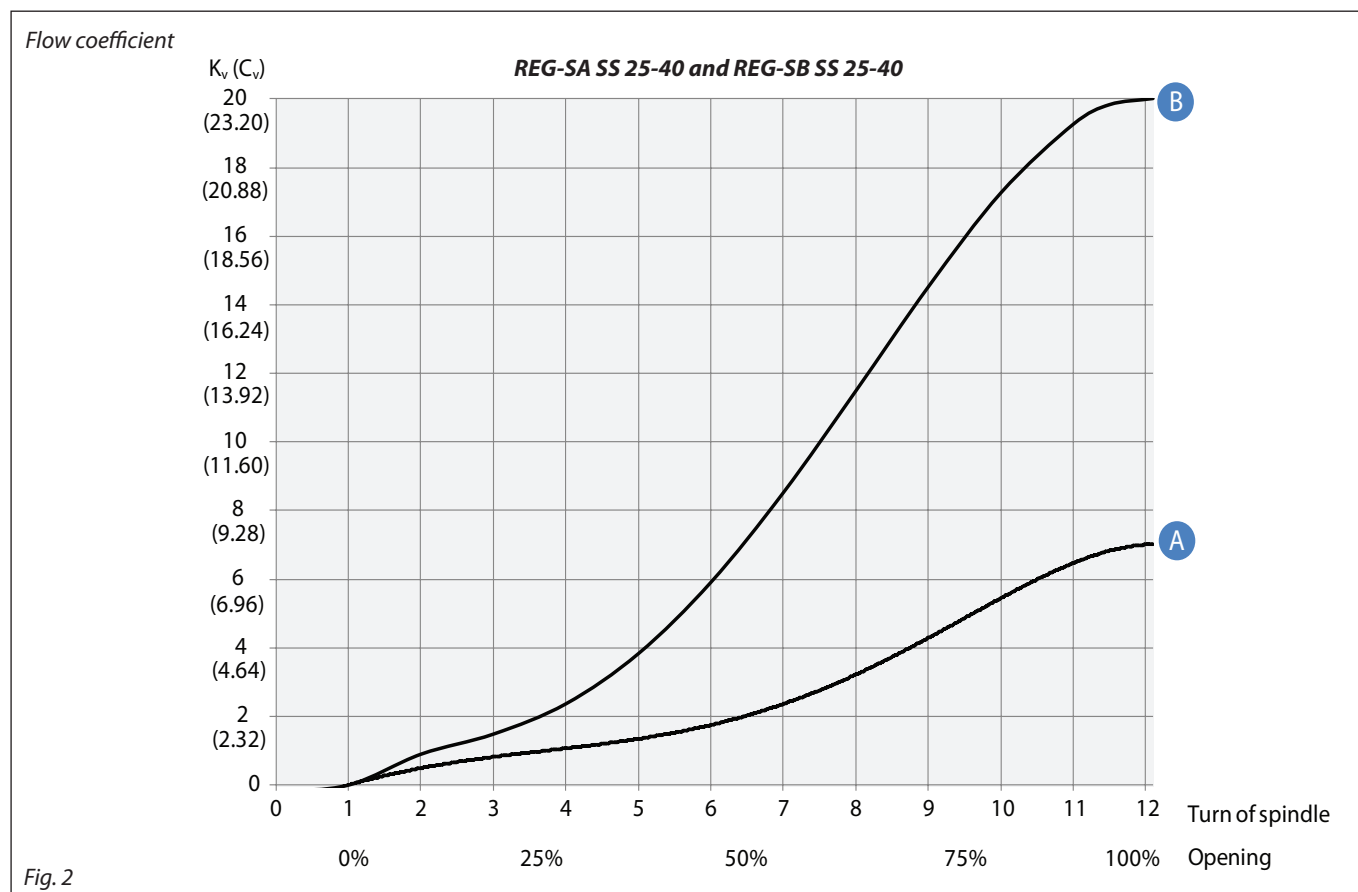
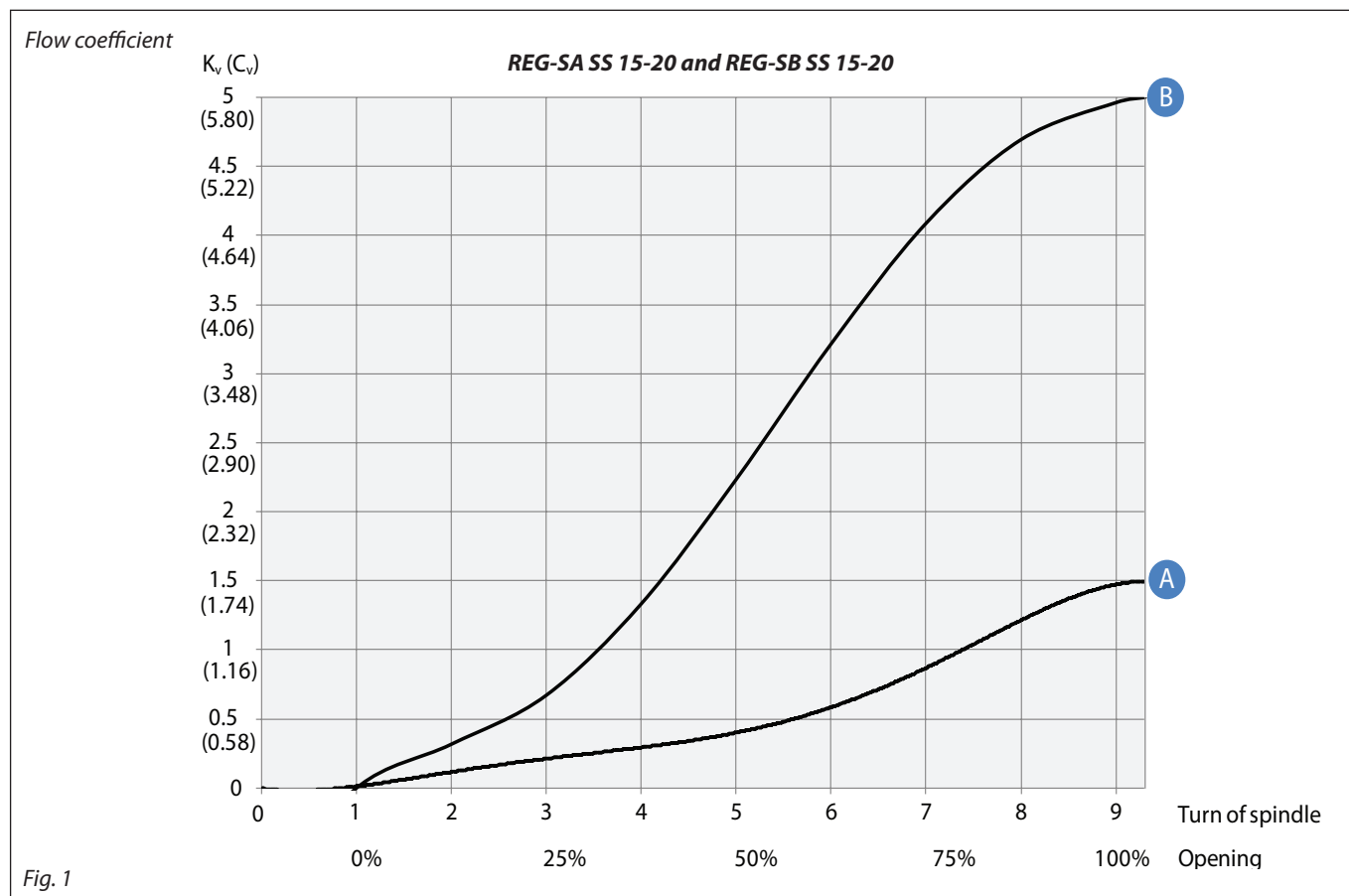
$$C_v = \frac{0.95 \times G}{\sqrt{\rho \times \Delta p}} = 31.6 \times G \times C_A \text{ [USgal/min.]}$$

Volume flow:

$$C_v = \frac{0.127 \times \dot{V}}{\sqrt{\frac{\Delta p}{\rho}}} \text{ [USgal/min.]}$$

$k_v$	[m <sup>3</sup> /h]	Quantity [m <sup>3</sup> /h] of water flowing through a valve at a pressure loss of 1 bar (according to VDE/VDI Norm 2173).	$C_v$	[US gal/min]	Quantity [US gal/min] of water flowing through a valve at a pressure loss of 1 psi.
$P_1$	[bar]	Pressure before the valve (upstream).	$P_1$	[psi]	Pressure before the valve (upstream).
$P_2$	[bar]	Pressure after the valve (downstream).	$P_2$	[psi]	Pressure after the valve (downstream).
$\Delta p$	[bar]	Actual pressure loss across the valve ( $P_1 - P_2$ ).	$\Delta p$	[psi]	Actual pressure loss across the valve ( $P_1 - P_2$ ).
$G$	[kg/h]	Mass flow through the valve.	$G$	[lb/min]	Mass flow through the valve.
$\dot{V}$	[m <sup>3</sup> /h]	Volume flow through the valve.	$\dot{V}$	[US gal/min]	Volume flow through the valve.
$\rho$	[kg/m <sup>3</sup> ]	Density of the refrigerant before the valve.	$\rho$	[lb/ft <sup>3</sup> ]	Density of the refrigerant before the valve.
$C_A$		Calculation factor (fig. 5).	$C_A$		Calculation factor (fig. 5).

Computation and selection



**Computation and selection**  
(Continued)

Liquid R 717, density: 670 kg/m<sup>3</sup> [42 lb/ft<sup>3</sup>]

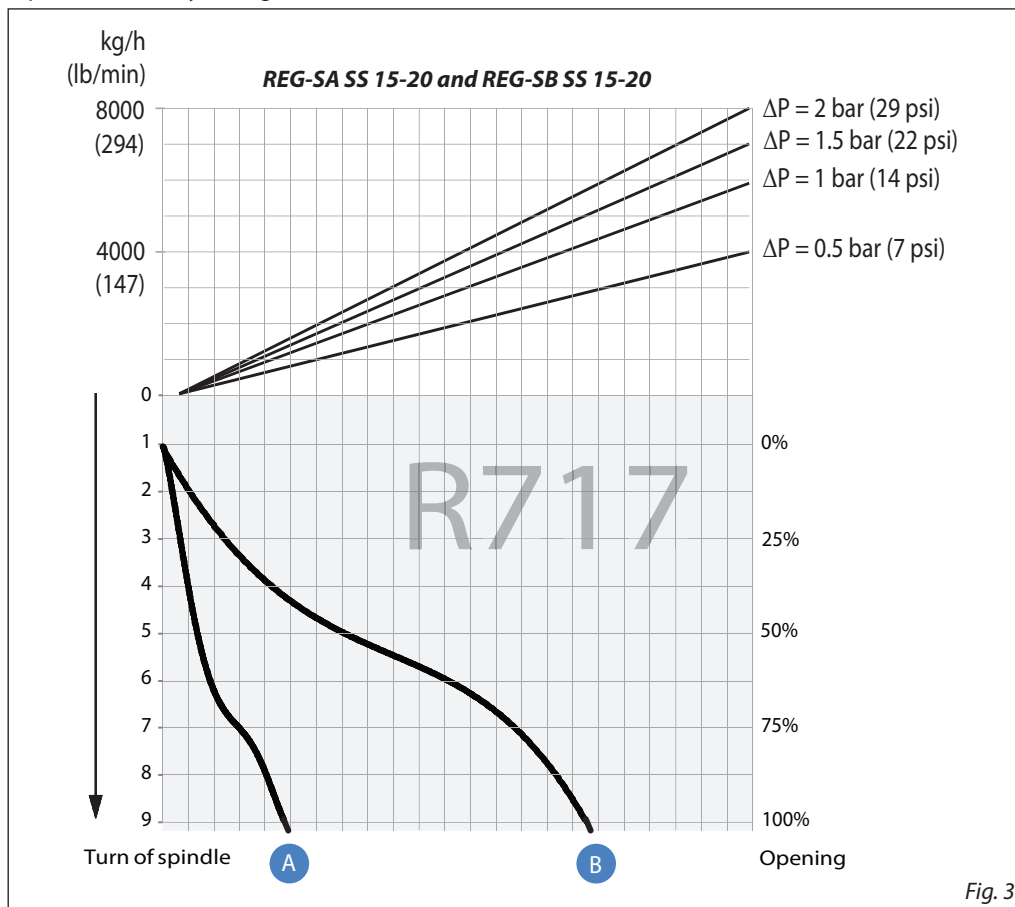


Fig. 3

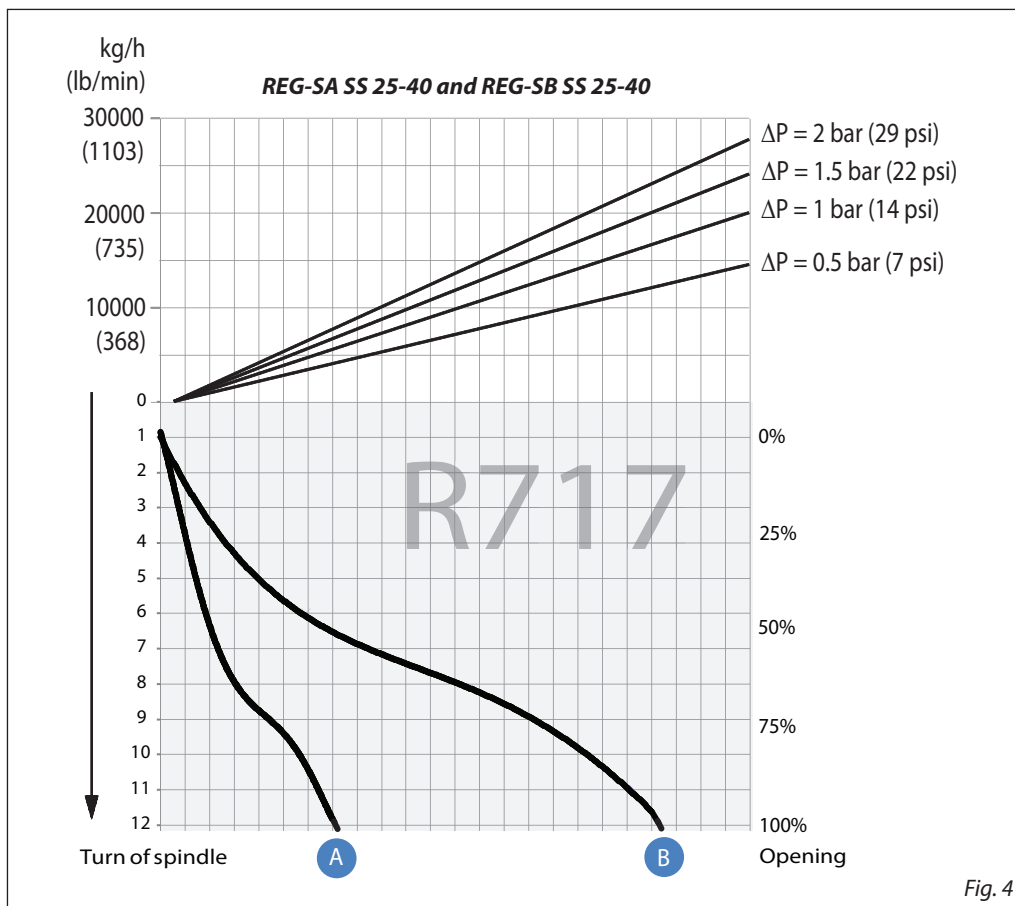
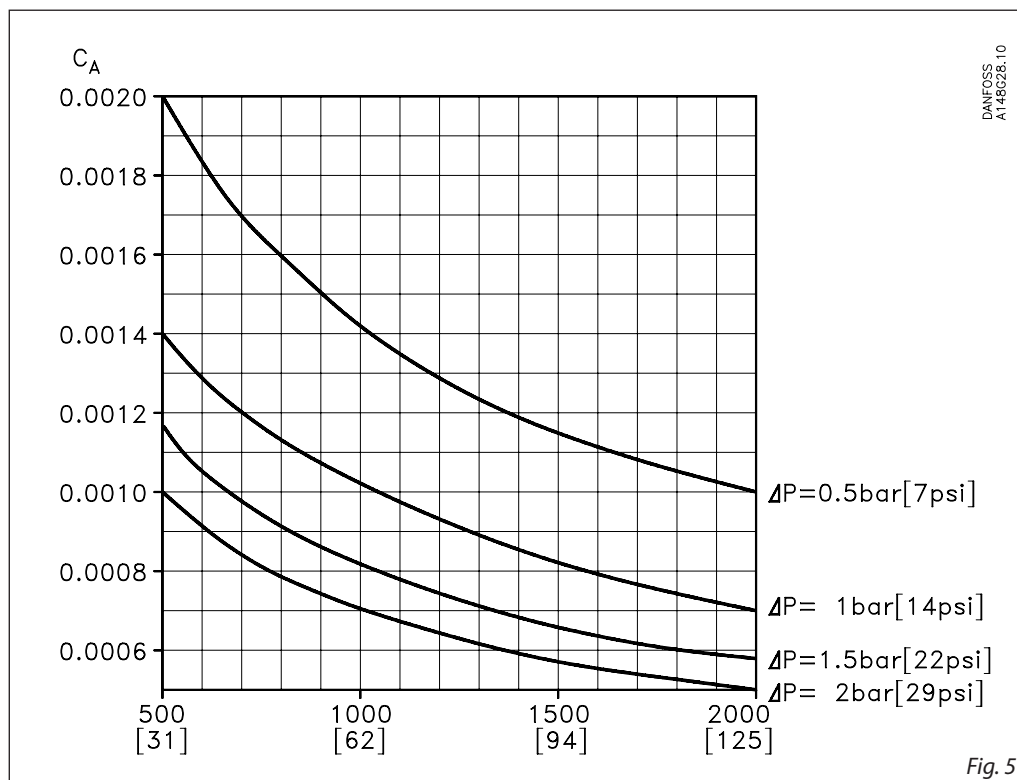


Fig. 4

For choice of valve size and connection see "Connections".

**Computation and selection**  
(Continued)

Calculation factor  $C_A$



For choice of valve size and connection see "Connections".

Fig. 5

**Computation and selection**

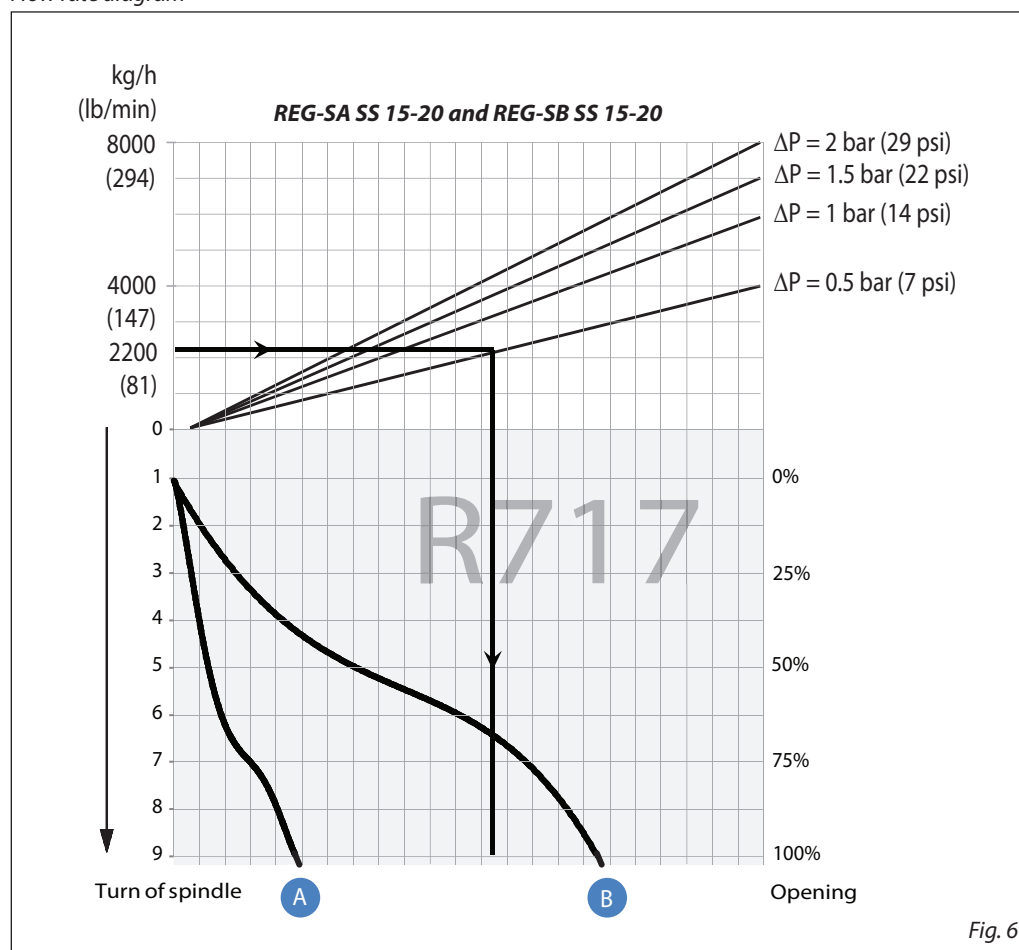
Example 1.

Refrigerant: R 717  
 Refrigerant flow: 2200 kg/h  
 Pressure drop:  $\Delta p = 0.5$  bar

The above mentioned example is illustrated on the following flow rate diagram and shows that REG-SB SS 15 and 20 with cone B can be used. The main rule is that nominal regulation range should be below 85% opening degree. If the arrowline is crossing 2 cone curves, the smaller cone should be selected if opening degree < 85%.

The example is only correct if the density of the refrigerant is approx. 670 (kg/m<sup>3</sup>), and there must be no build-up of flash gas in the valve.

Flow rate diagram



**Computation and selection**

Example 2.

Brine, density  $\rho$ : 1150 [kg/m<sup>3</sup>]  
 Brine flow  $G$ : 2,700 [kg/h]  
 Pressure drop  $\Delta p$ : 0.5 [bar]

In this example it is not possible to use the selection diagrams (fig. 3 and 4) as the refrigerant in question is not included.

Use the curves of the  $k_v$ -values instead (fig. 1 - 2) and calculate the required  $k_v$  by means of the formulas in the "Introduction" passage at the beginning of this chapter. Alternatively calculate the  $k_v$ -values by means of the calculation factor  $C_A$  (fig. 7) and the flow rate diagram (in this example: fig. 8) as per the following calculation example.

*Calculation example:*

Required  $k_v$ -value  
 $C_A = 0.00132$  (from fig. 18)  
 $k_v = C_A \times G$   
 $k_v = 0.00132 \times 2,700$  [kg/h]  
 $= 3.56$  [m<sup>3</sup>/h]

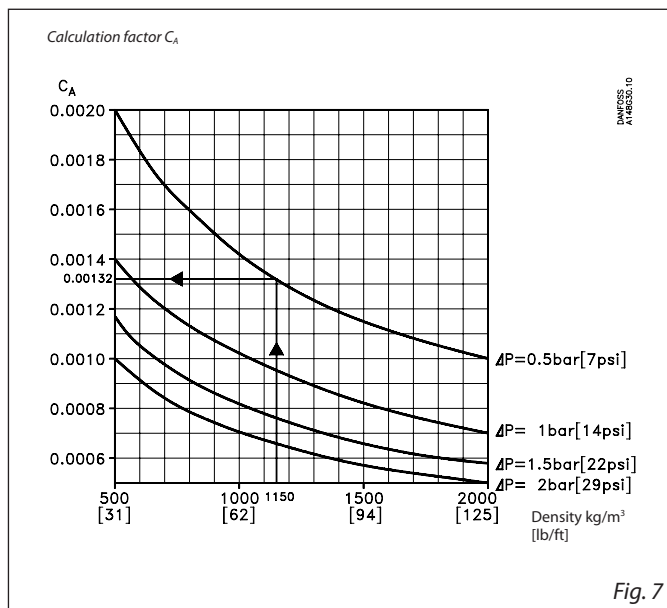


Fig. 7

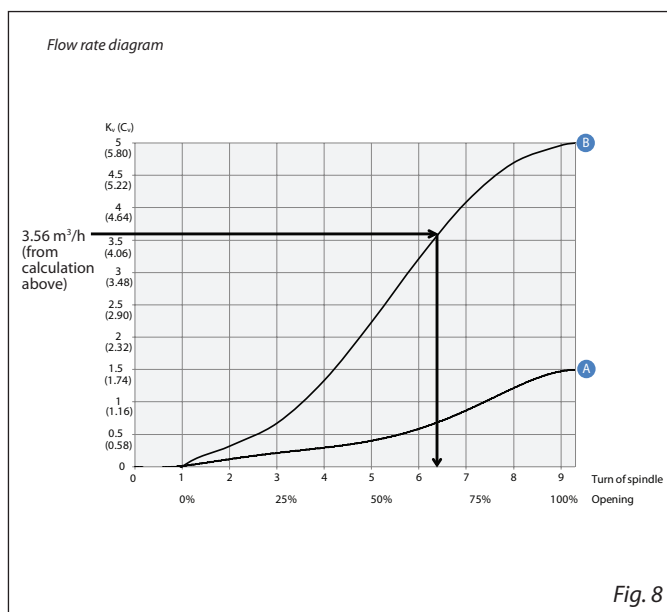


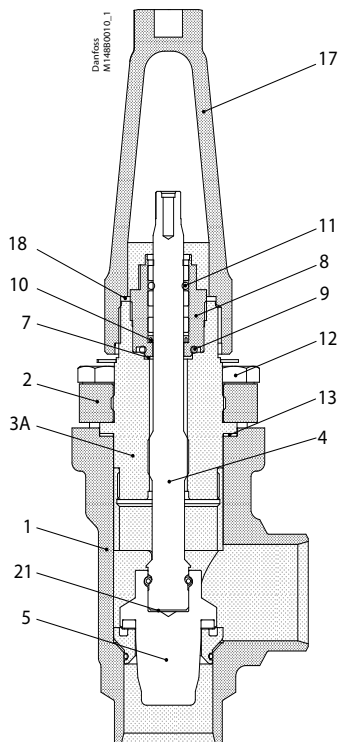
Fig. 8

REG-SB SS 15 and REG-SB SS 20 with cone B can be used.



**Material specification**

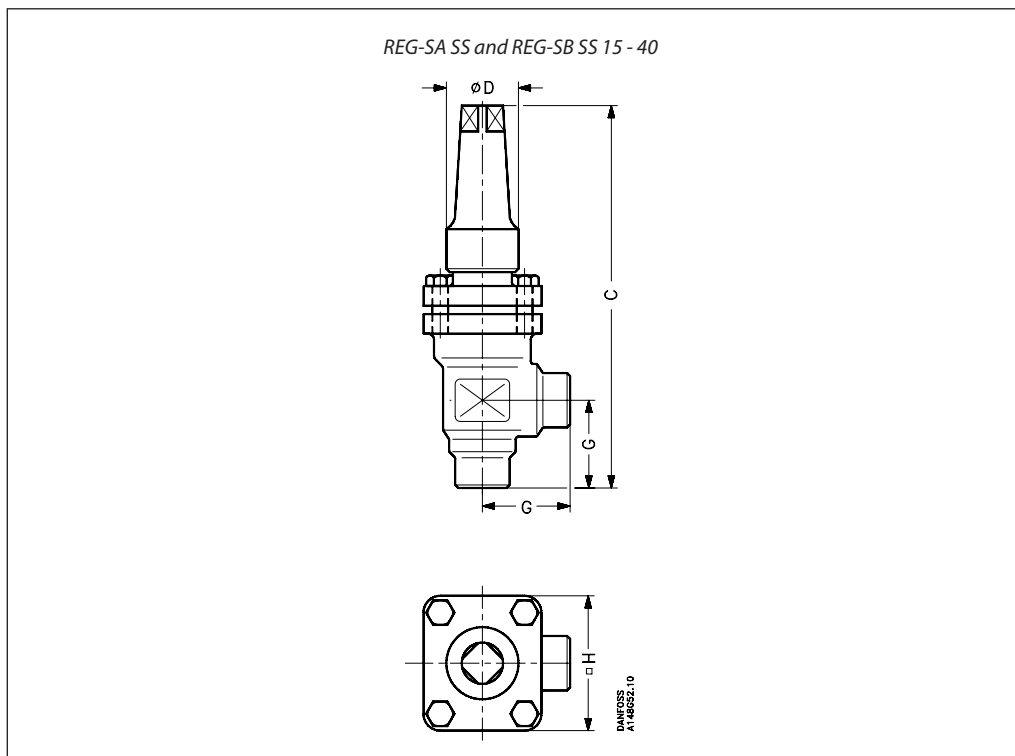
REG-SA SS and REG-SB SS 15 - 40



No.	Part	Material	EN	ISO	ASTM
1	Housing	Stainless steel	GX5CrNi19-10 EN10213-4		AISI 304
2	Bonnet, Flange	Stainless steel	X5CrNi18-10 EN10088		AISI 304
3A	Bonnet, Insert	Stainless steel	X8CrNiS18-9 DIN 17440		AISI 303
4	Spindle	Stainless steel	X8CrNiS 18-9, DIN 17440	Type 17, 683/13	AISI 303
5	Cone	Steel			
7	Packing washer	Aluminium			
8	Packing gland	Stainless Steel	X8CrNiS 18-9, 10088	Type 17, 683/13	AISI 303
9	O-ring	Cloroprene (Neoprene)			
10	Spring loaded Teflon ring	PTFE			
11	O-ring	Cloroprene (Neoprene)			
12	Bolts	Stainless steel	A2-70	A2-70	Type 308
13	Gasket	Fiber, non asbestos			
14	Bottom insert	Steel			
17	Seal cap	Aluminium			
18	Gasket f. seal cap	Nylon			
19	Locking nut	Steel			
20	Screw	Steel			
21	Disk spring	Steel			

Dimensions and weights

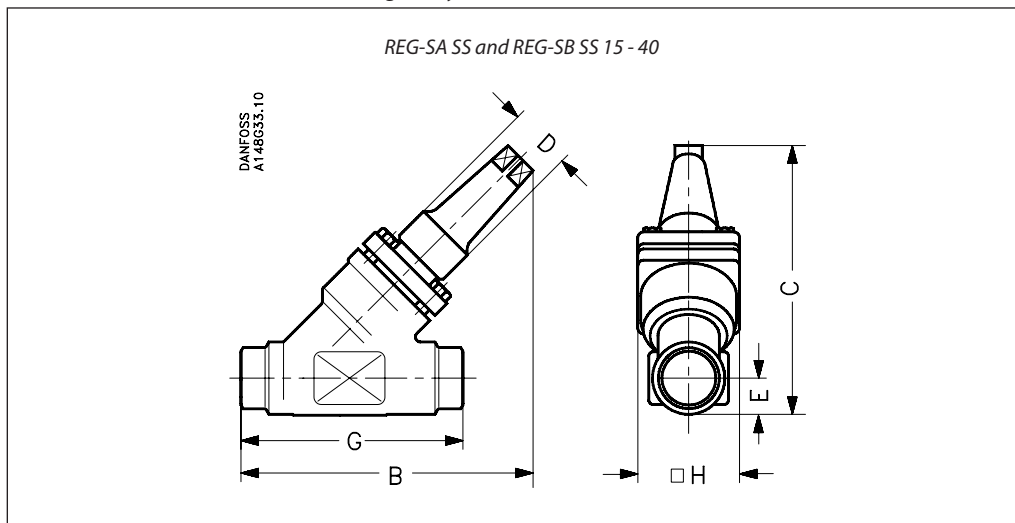
REG-SA SS and REG-SB SS 15 - 40 in angleway version



Valve size		C	G	$\varnothing D$	$\square H$	Weight
REG-SA SS/SB SS 15-20	mm	182	45	38	60	1.4 kg
REG-SA SS/SB SS (1/2-3/4)	in.	7.17	1.77	1.50	2.36	3.1 lb
REG-SA SS/SB SS 25-40	mm	237	55	50	70	2.4 kg
REG-SA SS/SB SS (1-1 1/2)	in.	9.33	2.17	1.97	2.76	5.3 lb

Specified weights are approximate values only.

REG-SA SS and REG-SB SS 10 - 65 in straightway version



Valve size		C	B	E	G	$\varnothing D$	$\square H$	Weight
REG-SA SS/SB SS 15-20	mm	145	155	20	120	38	60	2.0 kg
REG-SA SS/SB SS (1/2-3/4)	in.	5.71	6.10	0.79	4.72	1.50	2.36	4.4 lb
REG-SA SS/SB SS 25-40	mm	200	215	26	155	50	70	3.0 kg
REG-SA SS/SB SS (1-1 1/2)	in.	7.87	8.46	1.02	6.10	1.97	2.76	6.6 lb

Specified weights are approximate values only.

**Ordering**
*How to order*

The table below is used to identify the valve required.

Please note that the type codes only serve to identify the valves, some of which may not form part of the standard product range. For further information please contact your local Danfoss Sales Company.

*Type codes*

Valve type	REG SA SS REG-SB SS	Regulating Valves	
Nominal size in mm <small>(Valve size measured on the connection diameter)</small>	<b>15</b> <b>20</b> <b>25</b> <b>32</b> <b>40</b>	DN 15 DN 20 DN 25 DN 32 DN 40	Available connection types D      A x      x x      x x      x x      x x      x
Connections	<b>D</b> <b>A</b>	Butt-weld connection: DIN EN 10220 Butt-weld connection: ANSI B 36.19M	
Valve housing	<b>ANG</b> <b>STR</b>	Angle flow Straight flow	
Cone A	Size: DN 15 DN 20 DN 25 DN 32 DN 40	Flow area [mm <sup>2</sup> ] 36.5 36.5 178 178 178	
Cone B	Size: DN 15 DN 20 DN 25 DN 32 DN 40	Flow area [mm <sup>2</sup> ] 115 115 531 531 531	

**Complete REG-SA SS (Cone type A)**
*Example:*

REG-SA SS (Cone B) 15 DIN angleway = **148B5387**

**Important!**

Where products need to be certified according to specific certification societies or where higher pressures are required, the relevant information should be included at the time of order.

**Butt-weld DIN (EN 10220)**

Size		Type	Code no.
mm	in.		
15	½	REG-SA SS 15 D ANG	<b>148B5297</b>
20	¾	REG-SA SS 20 D ANG	<b>148B5385</b>
25	1	REG-SA SS 25 D ANG	<b>148B5494</b>
32	1 ¼	REG-SA SS 32 D ANG	<b>148B5589</b>
40	1 ½	REG-SA SS 40 D ANG	<b>148B5674</b>

**Angleway - REG-SA SS with cone type A**

15	½	REG-SA SS 15 D ANG	<b>148B5297</b>
20	¾	REG-SA SS 20 D ANG	<b>148B5385</b>
25	1	REG-SA SS 25 D ANG	<b>148B5494</b>
32	1 ¼	REG-SA SS 32 D ANG	<b>148B5589</b>
40	1 ½	REG-SA SS 40 D ANG	<b>148B5674</b>

**Butt-weld DIN (EN 10220)**

Size		Type	Code no.
mm	in.		
15	½	REG-SA SS 15 D STR	<b>148B5298</b>
20	¾	REG-SA SS 20 D STR	<b>148B5386</b>
25	1	REG-SA SS 25 D STR	<b>148B5495</b>
32	1 ¼	REG-SA SS 32 D STR	<b>148B5590</b>
40	1 ½	REG-SA SS 40 D STR	<b>148B5675</b>

**Straightway - REG-SA SS with cone type A**

15	½	REG-SA SS 15 D STR	<b>148B5298</b>
20	¾	REG-SA SS 20 D STR	<b>148B5386</b>
25	1	REG-SA SS 25 D STR	<b>148B5495</b>
32	1 ¼	REG-SA SS 32 D STR	<b>148B5590</b>
40	1 ½	REG-SA SS 40 D STR	<b>148B5675</b>

**Butt-weld ANSI (B 36.19M SCHEDULE 40)**

Size		Type	Code no.
mm	in.		
15	½	REG-SA SS 15 A40 ANG	<b>148B6482</b>
25	1	REG-SA SS 25 A40 ANG	<b>148B6483</b>
32	1 ¼	REG-SA SS 32 A40 ANG	<b>148B6484</b>

**Angleway - REG-SA SS with cone type A**

15	½	REG-SA SS 15 A40 ANG	<b>148B6482</b>
25	1	REG-SA SS 25 A40 ANG	<b>148B6483</b>
32	1 ¼	REG-SA SS 32 A40 ANG	<b>148B6484</b>

**Butt-weld ANSI (B 36.19M SCHEDULE 40)**

Size		Type	Code no.
mm	in.		
15	½	REG-SA SS 15 A40 STR	<b>148B5299</b>
25	1	REG-SA SS 25 A40 STR	<b>148B6485</b>
32	1 ¼	REG-SA SS 32 A40 STR	<b>148B6486</b>

**Straightway - REG-SA SS with cone type A**

15	½	REG-SA SS 15 A40 STR	<b>148B5299</b>
25	1	REG-SA SS 25 A40 STR	<b>148B6485</b>
32	1 ¼	REG-SA SS 32 A40 STR	<b>148B6486</b>

D = Butt-weld DIN  
A = Butt-weld ANSI  
ANG = Angleway  
STR = Straightway

**Ordering**

**Complete REG-SB SS (Cone type B)**

**Butt-weld DIN (EN 10220)**

Size		Type	Code no.
mm	in.		

**Angleway - REG-SB SS with cone type B**

15	½	REG-SB SS 15 D ANG	<b>148B5387</b>
20	¾	REG-SB SS 20 D ANG	<b>148B5389</b>
25	1	REG-SB SS 25 D ANG	<b>148B5496</b>
32	1 ¼	REG-SB SS 32 D ANG	<b>148B5591</b>
40	1 ½	REG-SB SS 40 D ANG	<b>148B5676</b>

**Butt-weld DIN (EN 10220)**

Size		Type	Code no.
mm	in.		

**Straightway - REG-SB SS with cone type B**

15	½	REG-SB SS 15 D STR	<b>148B5388</b>
20	¾	REG-SB SS 20 D STR	<b>148B5390</b>
25	1	REG-SB SS 25 D STR	<b>148B5497</b>
32	1 ¼	REG-SB SS 32 D STR	<b>148B5592</b>
40	1 ½	REG-SB SS 40 D STR	<b>148B5677</b>

**Butt-weld ANSI (B 36.19M SCHEDULE 40)**

Size		Type	Code no.
mm	in.		

**Angleway - REG-SB SS with cone type B**

20	¾	REG-SB SS 20 A40 ANG	<b>148B6487</b>
40	1 ½	REG-SB SS 40 A40 ANG	<b>148B5686</b>

**Butt-weld ANSI (B 36.19M SCHEDULE 40)**

Size		Type	Code no.
mm	in.		

**Straightway - REG-SB SS with cone type B**

20	¾	REG-SB SS 20 A40 STR	<b>148B6488</b>
25	1	REG-SB SS 25 A40 STR	<b>148B6479</b>
40	1 ½	REG-SB SS 40 A40 STR	<b>148B5685</b>

D = Butt-weld DIN  
A = Butt-weld ANSI  
ANG = Angleway  
STR = Straightway

*Replacement kit (O-ring replacement) for R717 Ammonia Heat Pump\* and Propylene applications (including ID tag)*

Size		O-ring kit for	
mm	in.	R717 Heat pump	R1270 Propylene
10	¾	<b>148B6084</b>	<b>148B6085</b>
15	½	<b>148B6070</b>	<b>148B6077</b>
20	¾		
25	1	<b>148B6071</b>	<b>148B6078</b>
32	1 ¼		
40	1 ½		

\* Replacement kits for R717 Ammonia Heat Pump is applicable for continuous operating temperature between +100°C to 150°C (212°F to 302°F)