

Technical brochure

Check & stop valve, SCA-X & Check valve, CHV-X



SCA-X are check valves with a built-in shutoff valve function. CHV-X are check valves only. SCA-X/CHV-X are available in angleway versions.

The valves are designed to open at very low differential pressures, allow favorable flow conditions and are easy to disassemble for inspection and service.

The SCA-X is equipped with a vented cap and has internal backseating that enables the spindle seal to be replaced while the valve still under pressure.

Laser cut V-ports provide excellent opening characteristics (SCA-X/CHV-X 50-125).

The valve cone has a built-in flexibility to ensure a precise and tight closing toward the valve seat.

A well-balanced dampening effect between the piston and the cylinder provides optimal protection during low loads and against pulsations.

Features

- Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO₂), Propane, Butane, Iso-Butane and Ethane.
- Modular Concept:
 - Each valve housing is available with several different connection types and sizes.
 - Possible to convert SCA-X or CHV-X to any other product in the Flexline™ SVL family (Hand operated regulating valve, shut-off valve or strainer) just by replacing the complete top part.
- Fast and easy valve overhaul service. It is easy to replace the top part and no welding is needed.
- Designed to open at a very low differential pressure of 0.04 bar (0.58 psig).
- Designed with a built-in damping chamber that prevents valve flutter in case of low refrigerant velocity or low density.
- Each valve is clearly marked with its type, size, and performance range.
- Easy to disassemble for inspection and service.
- Internal backseating enables replacement of the spindle seal while the valve is active, that is, under pressure.
- Optimal flow characteristics ensure quick opening to the fully open position.
- Protection against pulsation by a built-in damping facility.
- Housing and bonnet material is low-temperature steel according to requirements of the Pressure Equipment Directive and other international classification authorities.
- Equipped with stainless steel bolts.
- Max. working pressure: 52 bar g (754 psi g)
- Temperature range: -60°C/+150°C (-76°F/+302°F)
- Classification: To get an updated list of certification on the products, please contact your local Danfoss Sales Company.

Design

Connections

Available with the following connections:

- Butt-weld DIN (EN 10220)
- DN 15 - 125 (½–5 in.)
- Butt-weld ANSI (B 36.10 Schedule 80),
- DN 15 - 40 (½– 1½ in.)
- Butt-weld ANSI (B 36.10 Schedule 40),
- DN 50 - 125 (2–5 in.)
- Butt-weld GOST, (8734-75 and 8732-78)
- DN 15 - 125 (½ - 5 in.)
- Socket-weld ANSI (B 16.11),
- DN 50 (2 in.)

Housing

The housing is made from special, cold-resistant steel.

Valve cone

The valve cone with built-in metallic stop prevents damage to the Teflon ring in case of overtightening.

Damping chamber

The chamber is filled with refrigerants (gas or liquid), which provides a damping effect when the valve opens and closes.

Spindle (SCA-X)

Made of polished stainless steel, which is ideal for sealing the O-ring.

Packing Gland (SCA-X)

The “full temperature range” packing gland is the standard for the entire SVL platform.

This ensures perfect tightness throughout the whole temperature range:
–60°C/+150°C (–76°F/+302°F).

Pressure Equipment Directive (PED)

The SCA-X/CHV-X valves are approved according to the European standard specified in the Pressure Equipment Directive and are CE marked.

For further details and restrictions, see the product instructions.

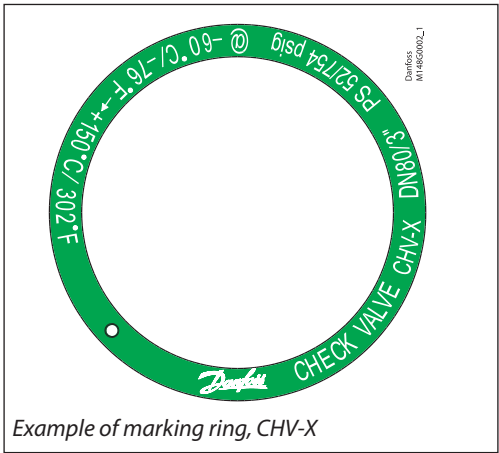
Installation

The valve must be mounted vertically with the cone facing downward.

The valve is designed to resist very 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 the installation instructions for SCA-X/CHV-X.

If cold refrigeration oil having low viscosity enters and settles in the damping chamber, problems with the check valve may arise. Consequently, it may be necessary to modify the valve for more viscous liquids by enlarging the hole to the damping chamber.



SCA-X/CHV-X valves			
Nominal bore	DN = < 25 mm (1 in.)	DN32-80 mm (1¼–3 in.)	DN100 - 125 mm (4–5 in.)
Classified for	Fluid group I		
Category	Article 3, paragraph 3	II	III

Technical data

- Refrigerants
Applicable to HCFC, HFC, R717 (Ammonia), R744 (CO₂), Propane, Butane, Iso-Butane and Ethane.
- Temperature range
–60°C/+150°C (–76°F/+302°F).
- Max. working pressure
52 bar g (754 psig).

Check & stop valve, type SCA-X - Check valve, type CHV-X

Computation and selection

Introduction

When dimensioning the SCA-X/CHV-X, it is important to select a valve that is best suited to all operating conditions. Therefore, it is necessary to consider both the nominal and part-load working conditions.

The SCA-X/CHV-X valve can be calculated in two ways:

- Using the tables below.
- Using Coolselector®2

Example

SI-Units

Assumed working conditions:

Maximum flow $\dot{V} = 1000 \text{ m}^3/\text{h}$

Density $\rho = 3.0 \text{ kg/m}^3$

Minimum part load = 33%

Used expressions:

Recommended velocity - C_{rec} [m/s]

Minimum recommended velocity - $C_{\text{min, rec}}$ [m/s]

Maximum velocity - C_{max} [m/s]

Part load velocity - C_{part} [m/s]

We know the density $\rho \approx 3.0 \text{ kg/m}^3$, consequently C_{rec} as well as $C_{\text{min, rec}}$ can be found in the figure below (standard valve).

$$\begin{aligned} C_{\text{rec}} &\approx 14 \text{ m/s} \\ C_{\text{min, rec}} &\approx 3 \text{ m/s} \end{aligned}$$

US-Units

Assumed working conditions:

Maximum flow $\dot{V} = 1160 \text{ gpm}$

Density $\rho = 0.187 \text{ lb/ft}^3$

Minimum part load = 33%

Used expressions:

Recommended velocity - C_{rec} [ft/min]

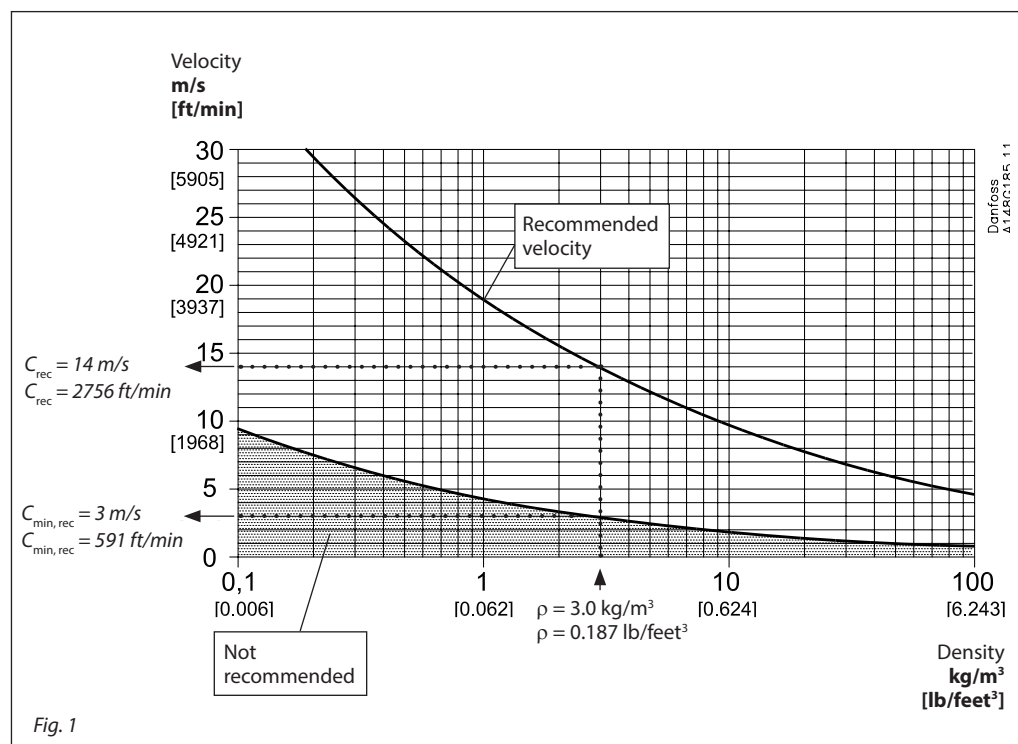
Minimum recommended velocity - $C_{\text{min, rec}}$ [ft/min]

Maximum velocity - C_{max} [ft/min]

Part-load velocity - C_{part} [ft/min]

We know the density $\rho \approx 0.187 \text{ lb/ft}^3$, consequently C_{rec} as well as $C_{\text{min, rec}}$ can be found in the figure (standard valve).

$$\begin{aligned} C_{\text{rec}} &\approx 2756 \text{ ft/min} \\ C_{\text{min, rec}} &\approx 591 \text{ ft/min} \end{aligned}$$



Selection example continued on following page.

Check & stop valve, type SCA-X - Check valve, type CHV-X

Computation and selection
(continued)

Knowing that $V = 1000 \text{ m}^3/\text{h}$ (1160 gpm), Fig. 2 gives the following choices:

For SCA-X/CHV-X in size DN 100, the maximum velocity $C_{\max} \approx 31 \text{ m/s}$ (6100 ft/min)
For SCA-X/CHV-X in size DN 125 the maximum velocity $C_{\max} \approx 20 \text{ m/s}$ (3900 ft/min)

In conclusion, SCA-X in size DN 125 is selected because $C_{\max} \approx 20 \text{ m/s}$ (3900 ft/min) comes nearest to the recommended velocity $C_{\text{rec}} \approx 14 \text{ m/s}$ (2756 ft/min) and while part-load conditions fulfill the requirements as described:

If the valve in question (for instance under part-load conditions) provides a velocity of less than $C_{\min, \text{rec}}$ the valve might start hammering and become noisy. As a result, the valve may wear prematurely.

We know that $C_{\max} \approx 20 \text{ m/s}$ (3900 ft/min) and that the minimum part load is 33%. It follows that $C_{\text{part}} \approx 6.5 \text{ m/s}$ (1290 ft/min). Thus, $C_{\text{part}} (6.5 \text{ m/s}) > C_{\min, \text{rec}} (3.0 \text{ m/s})$ and the selected SCA-X model DN 125 is the perfect choice.

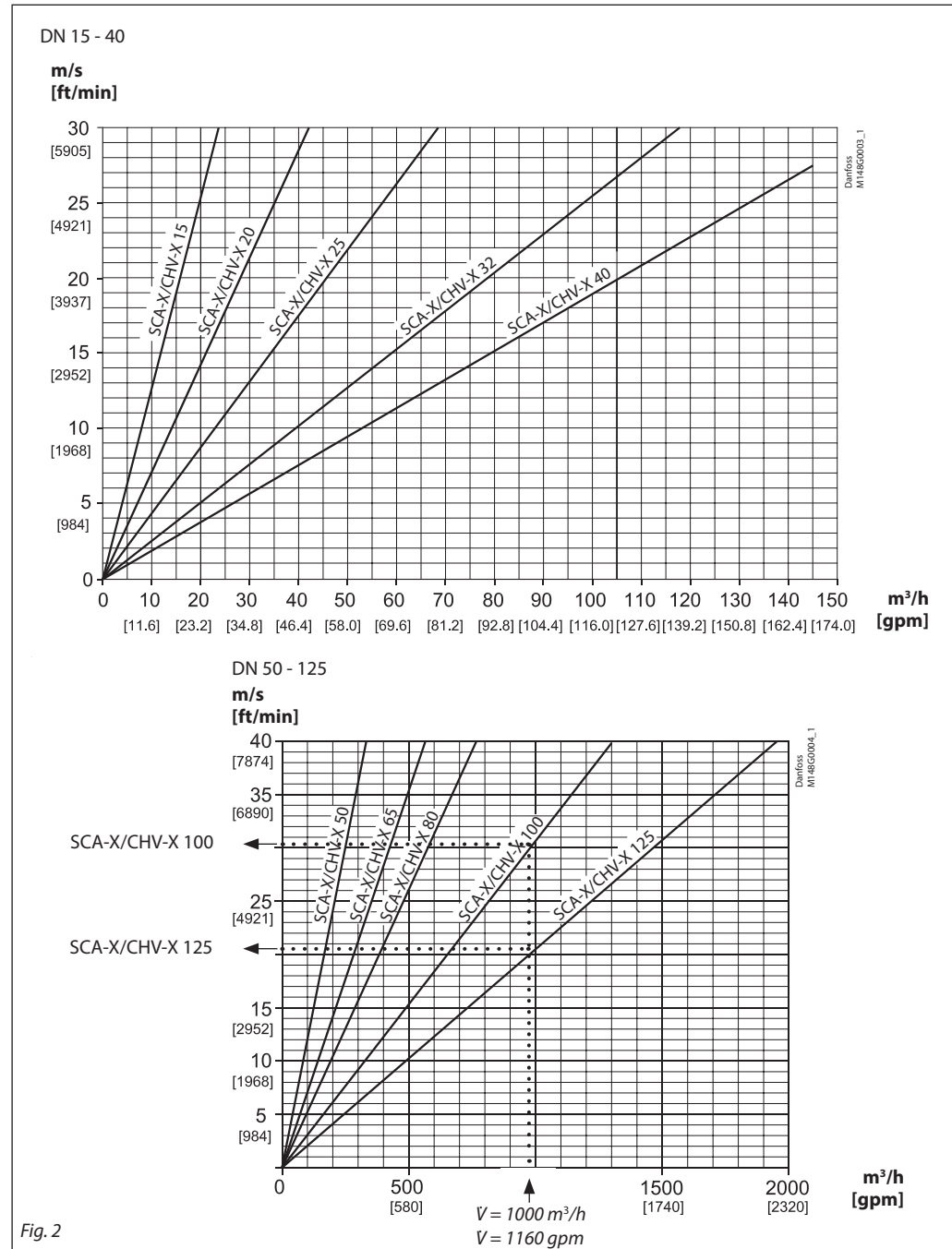
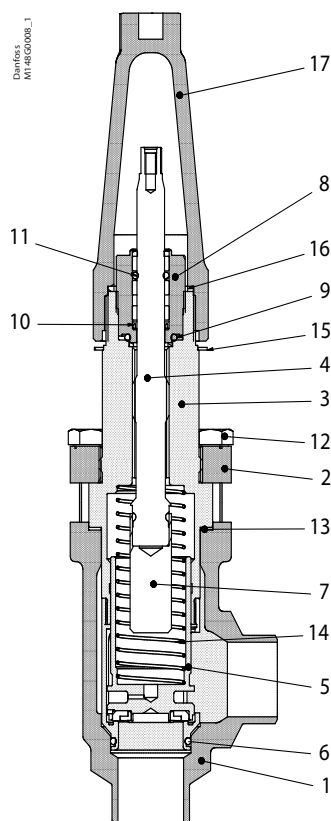
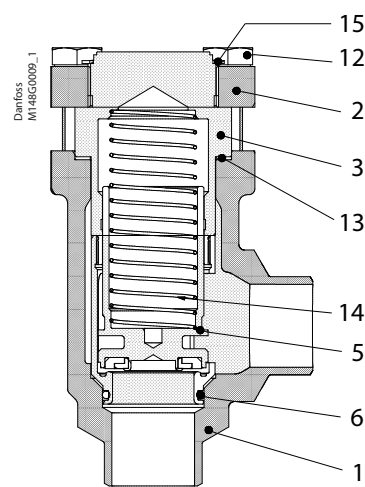


Fig. 2

Material specification



SCA-X 15 - 40

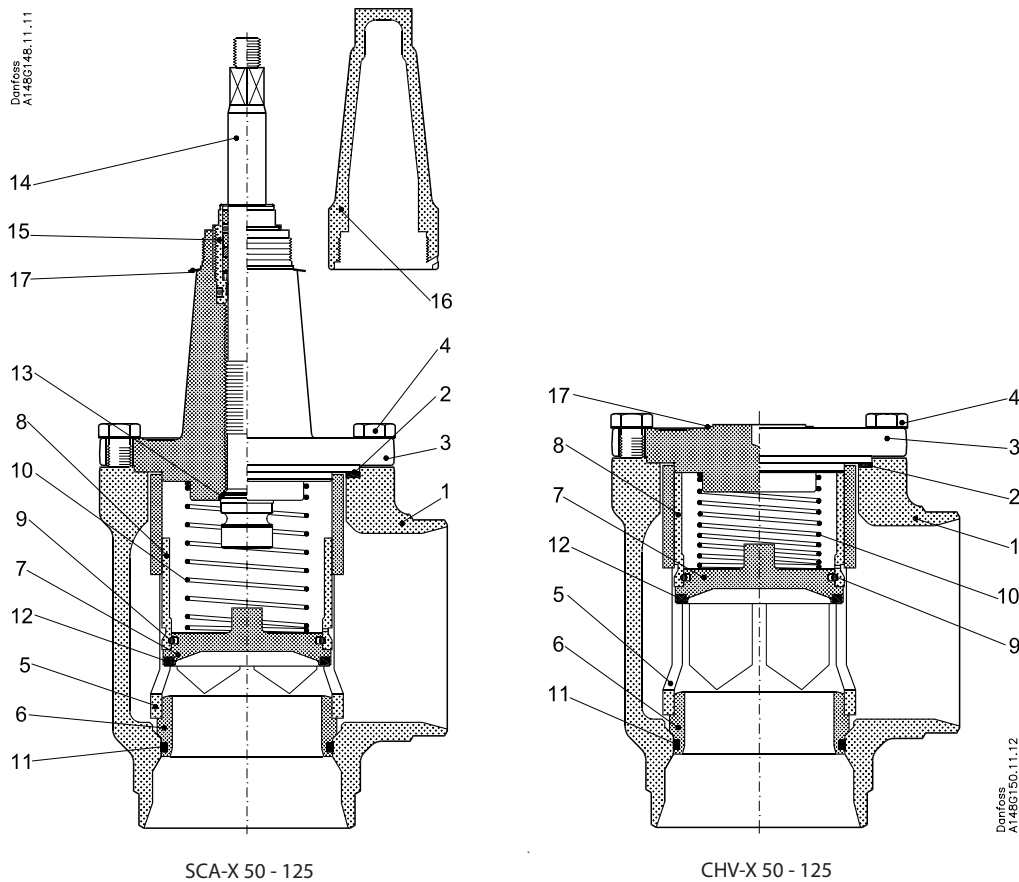


CHV-X 15 - 40

No.	Part	Material	DIN/EN	ISO	ASTM
1	Housing	Steel	P285QH EN10222-4		LF2A350
2	Bonnet, Flange	Steel	P275NL1 EN10028-3		
3	Bonnet, Insert	Steel			
4	Spindle	Stainless steel	X 10CrNiS18-9	Type 17, 17440	AISI 303, 683/13
5	Cone	Steel Teflon (PTFE)			
6	O-ring	Cloroprene (Neoprene)			
7	Spindle extension	Steel			
8	Packing gland O-rings	Steel Cloroprene (Neoprene)			
9	Packing washer	Aluminum			
10	Spring-loaded seal	Teflon (PTFE)			
11	O-ring	Cloroprene (Neoprene)			
12	Bolts	Stainless steel	A2-70	A2-70	Type 308
13	Gasket	Fiber, nonasbestos			
14	Spring	Steel			
15	Identification ring	Stainless steel			
16	Seal cap gasket	Nylon			
17	Spindle seal cap	Aluminum			

Check & stop valve, type SCA-X - Check valve, type CHV-X

Material specification

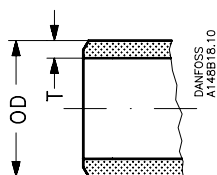


No.	Part	Material	DIN/EN	ISO	ASTM
1	Housing DN 50-65	Steel	P285 QH EN 10222-4		LF2A350
	Housing DN 80-125	Steel	G20Mn5 QT SEW 685		LCC, A352
2	Gasket	Fiber, Nonasbestos			
3	SCA-X: Valve bonnet CHV-X: End cover	Steel	P285 QH EN 10222-4		LF2A350
4	Bolts	Stainless steel	A2-70	A2-70	A-276
5	Tube	Steel			
6	Seat	Steel			
7	Valve plate	Steel			
8	Guide sleeve	Steel			
9	Spring ring	Steel			
10	Spring	Steel			
11	O-ring	Cloroprene (Neoprene)			
12	Teflon ring	Teflon (PTFE)			
13	Soft back seal	Teflon (PTFE)			
14	Spindle DN 50-65	Stainless steel	X8CrNiS18-9 17440	Type 17 R 683/13	AISI 303
	Spindle DN 80-125	Stainless steel	X5CrNi1810 17440	Type 11 683/13	AISI 304 A-276
15	Packing gland	Steel	9Mn28, 1651	Type 2, R 683/9	1213, SAE J403
16	Spindle seal cap and gasket	Aluminum			
17	Marking label	Stainless steel			

Check & stop valve, type SCA-X - Check valve, type CHV-X

Connections

Butt-weld ANSI



Size mm	Size in.	OD mm	T mm	OD in.	T in.			k _v -angle m³/h		C _v -angle USgal/min	
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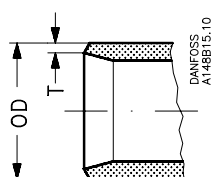
Butt-weld ANSI (B 36.10 Schedule 80)

15	½	21.3	3.7	0.839	0.146			8.0		9.3	
20	¾	26.9	4.0	1.059	0.158			10.0		11.6	
25	1	33.7	4.6	1.327	0.181			24.0		27.8	
32	1¼	42.4	4.9	1.669	0.193			30.0		34.8	
40	1½	48.3	5.1	1.902	0.201			30.0		34.8	

Butt-weld ANSI (B 36.10 Schedule 40)

50	2	60.3	3.9	2.37	0.15			45		53	
65	2½	73.0	5.2	2.87	0.20			72		85	
80	3	88.9	5.5	3.50	0.22			103		129	
100	4	114.3	6.0	4.50	0.24			196		232	
125	5	141.3	6.6	5.56	0.26			301		356	

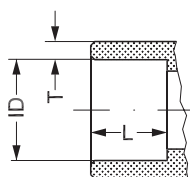
Butt-weld GOST



Butt-weld GOST (8734-75 and 8732-78)

15	½	18	2	0.709	0.079			7		8.1	
20	¾	25	2.5	0.984	0.098			14.6		16.9	
25	1	32	3	1.260	0.118			24.8		28.8	
32	1¼	38	3	1.496	0.118			42.6		49.4	
40	1½	45	3	1.772	0.118			45.2		52.4	
50	2	57	3.5	2.244	0.138			80		93	
65	2½	76.1	2.9	3	0.11			120		140	
80	3	88.9	3.2	3.50	0.13			182		211	
100	4	108	4	4.252	0.157			313		363	
125	5	133	4	5.236	0.157			514		596	

SOC



Size mm	Size in.	ID mm	T mm	ID in.	T in.	L mm	L in.	k _v -angle m³/h		C _v -angle US gal/min	
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Socket welding ANSI (B 16.11)

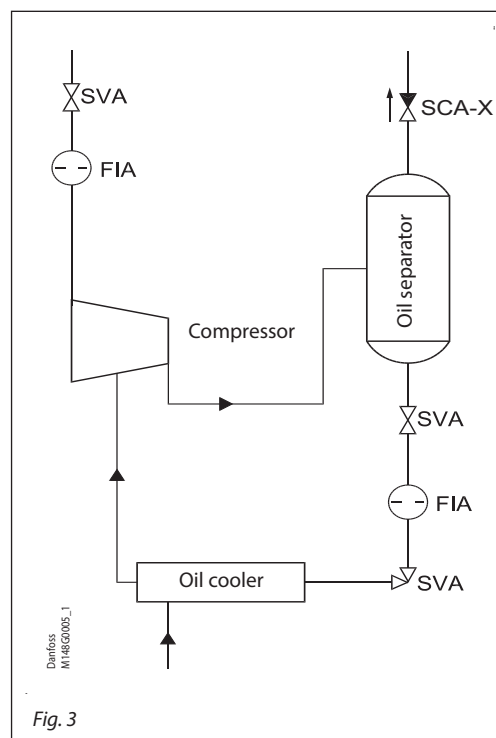
50	2	61.2	6.2	2.41	0.24	16	0.63	45		53	
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Application

Figure 3 shows the check & stop valve SCA-X in the discharge line of a screw compressor unit. The SCA-X valve in the discharge line prevents "back condensation" in the oil separator as well as pressure equalizing through the compressor.

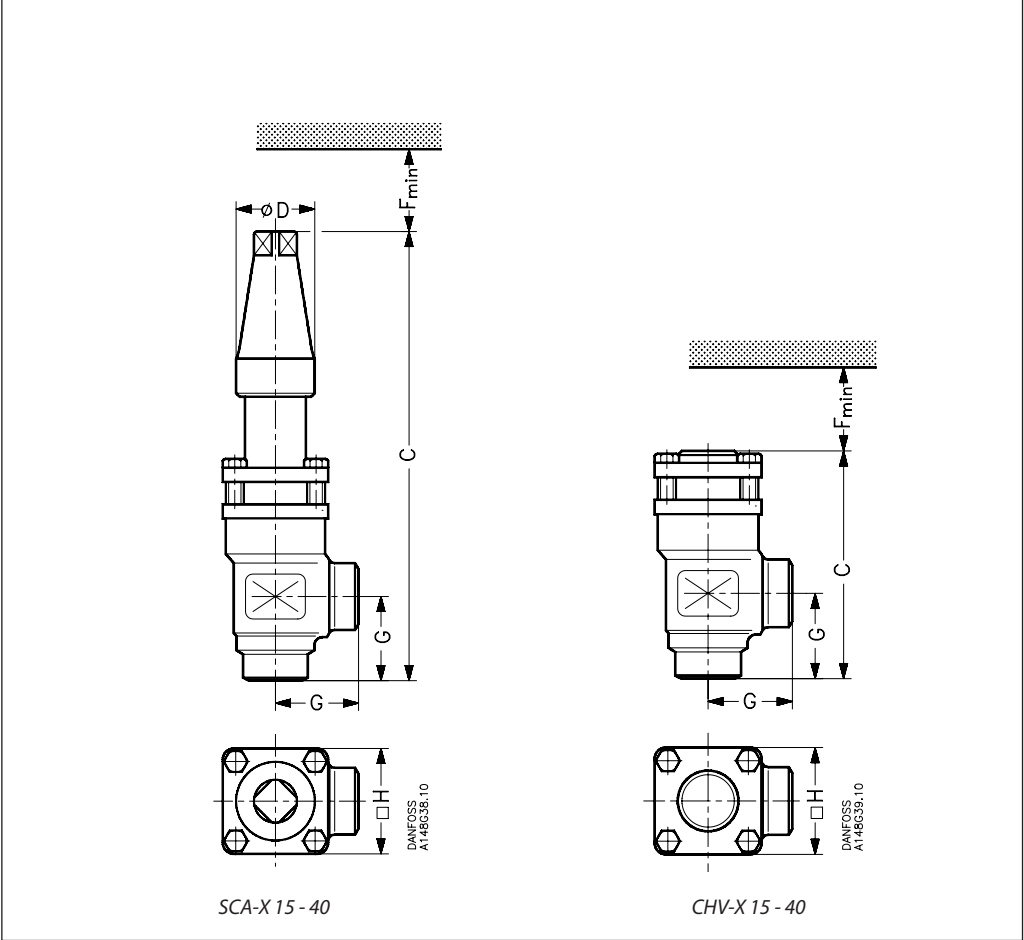
Compared to an ordinary shut-off and check valve arrangement the combined check & stop valve solution, as shown, is easier to install and has lower flow resistance.

Installation of the SCA-X/CHV-X in the economizer line is **not** recommended.



Dimensions and weights

SCA-X/CHV-X 15 - 40 (½–1½ in.)



Valve size		C		G		ØD		F _{min}		□H	Weight
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SCA-X 15 - 40

SCA-X 15 (½ in.)	mm in.	212 8.35		45 1.77		38 1.50		60 2.36		60 2.36	1.6 kg 3.53 lb
SCA-X 20 (¾ in.)	mm in.	212 8.35		45 1.77		38 1.50		60 2.36		60 2.36	1.6 kg 3.53 lb
SCA-X 25 (1 in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb
SCA-X 32 (1¼ in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb
SCA-X 40 (1½ in.)	mm in.	295 11.61		55 2.17		50 1.97		85 3.35		70 2.76	3.2 kg 7.05 lb

Valve size		C		G				F _{min}		□H	Weight
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CHV-X 15 - 40

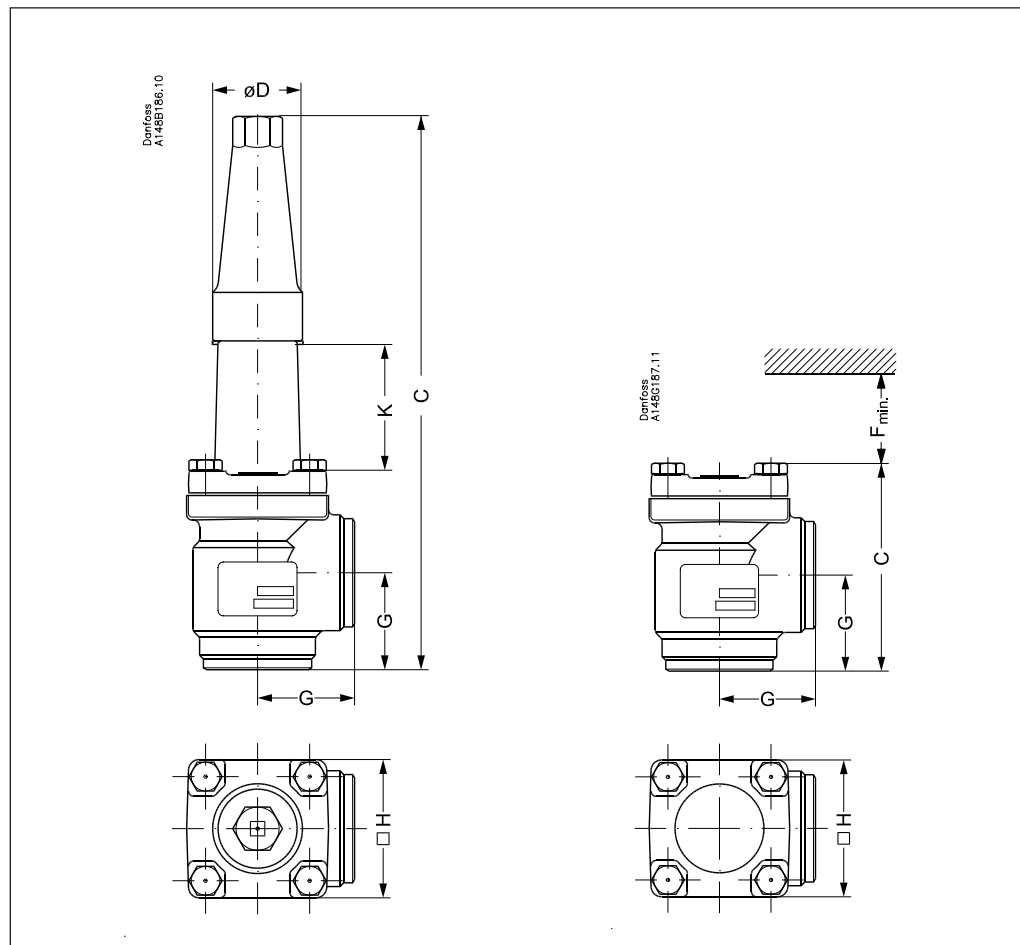
CHV-X 15 (½ in.)	mm in.	103 4.06		45 1.77				60 2.36		60 2.36	1.2 kg 2.65 lb
CHV-X 20 (¾ in.)	mm in.	103 4.06		45 1.77				60 2.36		60 2.36	1.2 kg 2.65 lb
CHV-X 25 (1 in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb
CHV-X 32 (1¼ in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb
CHV-X 40 (1½ in.)	mm in.	143 5.63		55 2.17				85 3.35		70 2.76	2.3 kg 5.07 lb

Specified weights are approximate values only.

Check & stop valve, type SCA-X - Check valve, type CHV-X

Dimensions and weights

SCA-X/CHV-X 50 - 65 (2-2½ in.)



Valve size	K		C		G		ØD	□H		Weight
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SCA-X

SCA-X 50	mm	70			315		60		50	77		3.8 kg
SCA-X (2)	in.	2.76			12.40		2.36		1.97	3.03		8.40 lb
SCA-X 65	mm	70		12.20	335		70	3.94	50	90		5.5 kg
SCA-X (2½)	in.	2.76			13.19		2.76		1.97	3.54		12.16 lb

Valve size			C		G		F min.	□H		Weight
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CHV-X

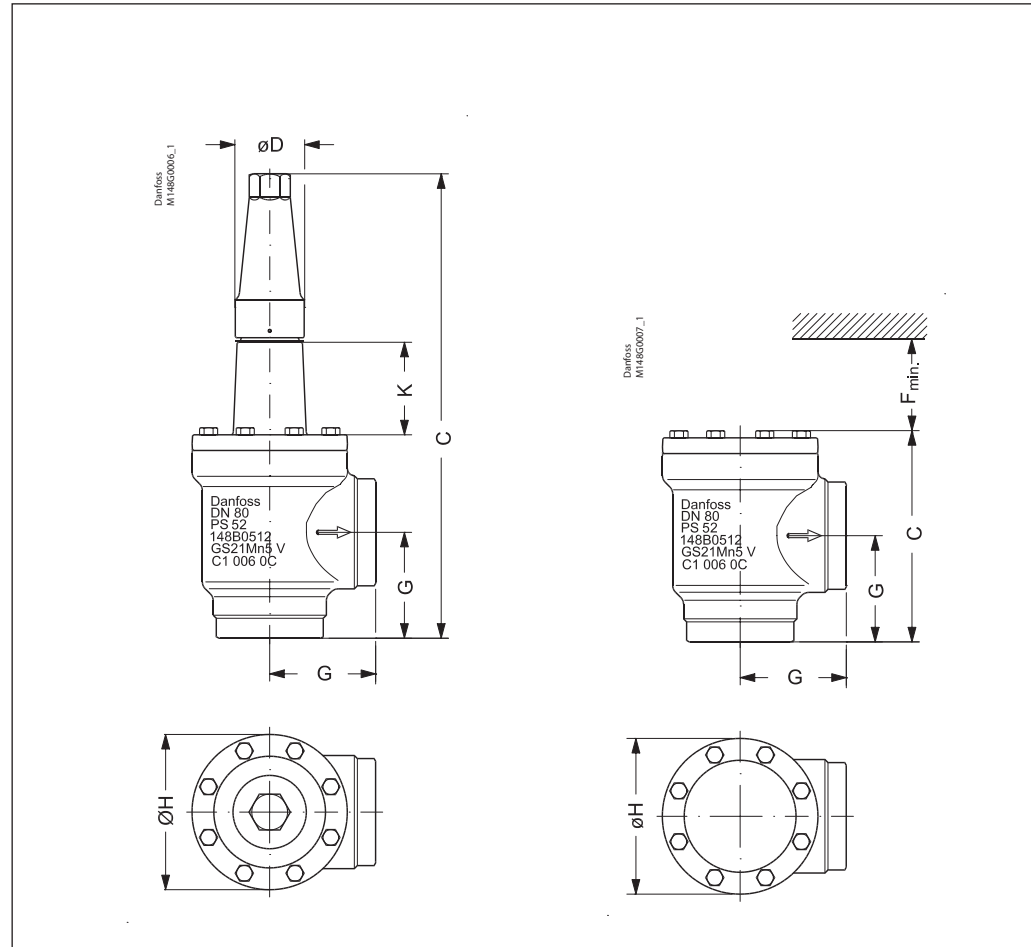
CHV-X 50	mm				132		60		92	77		3.2 kg
CHV-X (2)	in.				5.20		2.36		3.62	3.03		7.10 lb
CHV-X 65	mm				152		70		107	90		4.5 kg
CHV-X (2½)	in.				5.98		2.76		4.21	3.54		9.95 lb

Specified weights are approximate values only.

Check & stop valve, type SCA-X - Check valve, type CHV-X

Dimensions and weights

SCA-X/CHV-X 80 - 125 (3–5 in.)



Valve size	K			C		G		ØD		ØH	Weight
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SCA-X

SCA-X 80	mm	76			388		90		58		129	9.7 kg
SCA-X (3)	in.	3.00			15.28		3.54		2.28		5.08	21.4 lb
SCA-X 100	mm	90			437		106		58		156	15.3 kg
SCA-X (4)	in.	3.54			17.20		4.17		2.28		6.14	33.7 lb
SCA-X 125	mm	90			533		128		74		193	28.1 kg
SCA-X (5)	in.	3.54			20.98		5.04		2.91		7.60	61.9 lb

Valve size				C		G			F _{min.}	ØH	Weight
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CHV-X

CHV-X 80	mm				189		90			133	129	8.7 kg
CHV-X (3)	in.				7.44		3.54			5.24	5.08	19.23 lb
CHV-X 100	mm				223		106			163	156	14.3 kg
CHV-X (4)	in.				8.78		4.17			6.43	6.14	31.60 lb
CHV-X 125	mm				268		128			190	193	25.6 kg
CHV-X (5)	in.				10.55		5.04			7.48	7.60	56.58 lb

Specified weights are approximate values only.

Check & stop valve, type SCA-X - Check valve, type CHV-X

Ordering SCA-X/CHV-X complete valves

How to order

The table below is used to identify the valve that is required.

For further information, please contact your local Danfoss Sales Company.

Please note that the type codes only identify the valves, some of which may not form part of the standard product range.

Valve type	SCA-X CHV-X	Check & stop valve Check Valve
(valve size measured on the connection diameter)	15 20 25 32 40 50 65 80 100 125	A G SOC DN 15 x x DN 20 x x DN 25 x x DN 32 x x x DN 40 x x DN 50 x x x DN 65 x x DN 80 x x DN 100 x x DN 125 x x
Connections	A G SOC	Welding branches: ANSI B 31.5 schedule 80 DN 15 - 40 (½–1½ in.) Welding branches: ANSI B 31.5 schedule 40 DN 50 - 125 (2–5 in.) Butt-weld connection: GOST (8734-75 and 8732-78) Socket weld: ANSI B 16.11
Valve housing	ANG	Angle flow

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.

SCA-X Butt-weld ANSI (B 36.10 Schedule 80)

Size		Type	Code No.
mm	in.		
15	½	SCA-X 15 A ANG	148B5209
20	¾	SCA-X 20 A ANG	148B5309
25	1	SCA-X 25 A ANG	148B5409
32	1¼	SCA-X 32 A ANG	148B5509
40	1½	SCA-X 40 A ANG	148B5609

CHV-X Butt-weld ANSI (B 36.10 Schedule 80)

Size		Type	Code No.
mm	in.		
15	½	CHV-X 15 A ANG	148B5237
20	¾	CHV-X 20 A ANG	148B5337
25	1	CHV-X 25 A ANG	148B5437
32	1¼	CHV-X 32 A ANG	148B5537
40	1½	CHV-X 40 A ANG	148B5637

SCA-X Butt-weld ANSI (B 36.10 Schedule 40)

Size		Type	Code No.
mm	in.		
50	2	SCA-X 50 A ANG	148B5703
65	2½	SCA-X 65 A ANG	148B5802
80	3	SCA-X 80 A ANG	148B5903
100	4	SCA-X 100 A ANG	148B6004
125	5	SCA-X 125 A ANG	148B6103

CHV-X Butt-weld ANSI (B 36.10 Schedule 40)

Size		Type	Code No.
mm	in.		
50	2	CHV-X 50 A ANG	148B5737
65	2½	CHV-X 65 A ANG	148B5837
80	3	CHV-X 80 A ANG	148B5937
100	4	CHV-X 100 A ANG	148B6037
125	5	CHV-X 125 A ANG	148B6137

SCA-X Socket welding ANSI (B 16.11)

Size		Type	Code No.
mm	in.		
50	2	SCA-X 50 SOC ANG	148B5704

CHV-X Socket welding ANSI (B 16.11)

Size		Type	Code No.
mm	in.		
32	1¼	CHV 32 SOC ANG	148B5539
50	2	CHV 50 SOC ANG	148B5740

ANG = Angleway

Check & stop valve, type SCA-X - Check valve, type CHV-X

Ordering SVA-X from the parts programme

Example
(select from
table 1 and 2)

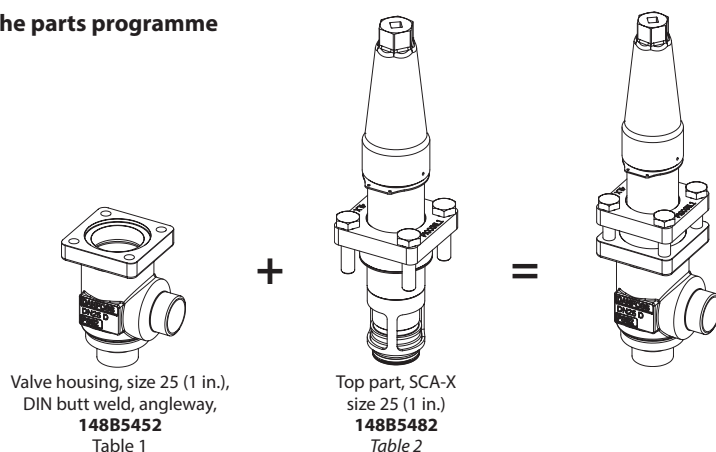
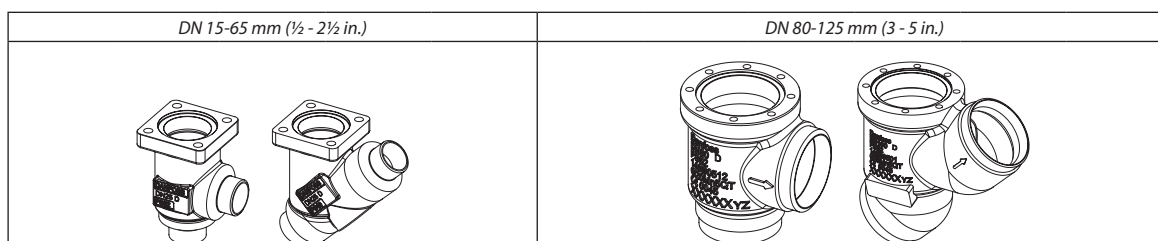
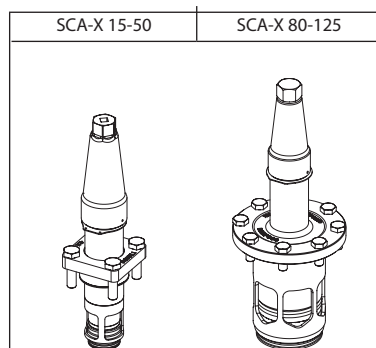


Table 1
SVL valve housings
w/different
connections



Sizes [DN]		Valve Housing SVL										
		DIN-Butt weld		ANSI-Butt weld		GOST-Butt-weld		SOC		FPT		T
mm	in.	ANG	STR	ANG	STR	ANG	STR	ANG	STR	ANG	STR	ANG
15	1/2	148B5252	148B5253	148B5254	148B5255	148B5391	148B5392	148B5256	148B5257	148B5258	148B5259	
20	3/4	148B5352	148B5353	148B5354	148B5355	148B5393	148B5394	148B5356	148B5357	148B5358	148B5359	
25	1	148B5452	148B5453	148B5454	148B5455	148B5498	148B5499	148B5456	148B5457	148B5458	148B5459	
32	1 1/4	148B5576	148B5577	148B5578	148B5579	148B5593	148B5594	148B5580	148B5581	148B5582	148B5583	
40	1 1/2	148B5652	148B5653	148B5654	148B5655	148B5681	148B5682	148B5656	148B5657			
50	2	148B5741	148B5742	148B5743	148B5744	148B5759	148B5760	148B5745	148B5746			
65	2 1/2	148B5816	148B5817	148B5818	148B5819	148B5816	148B5817					
80	3	148B5912	148B5913	148B5914	148B5915	148B5912	148B5913					
100	4	148B6014	148B6015	148B6016	148B6017	148B6033	148B6034					
125	5	148B6112	148B6113	148B6114	148B6115	148B6133	148B6134					

Table 2
SCA-X complete top part
including gaskets and
bolts



Sizes [DN]		Complete top part
mm	in.	SCA-X
15	1/2	148B5282
20	3/4	
25	1	
32	1 1/4	148B5482
40	1 1/2	
50	2	
65	2 1/2	148B5825
80	3	148B5918
100	4	148B6019
125	5	148B6118

Check & stop valve, type SCA-X - Check valve, type CHV-X

Ordering CHV-X from the parts programme

Example
(select from
table 1 and 2)

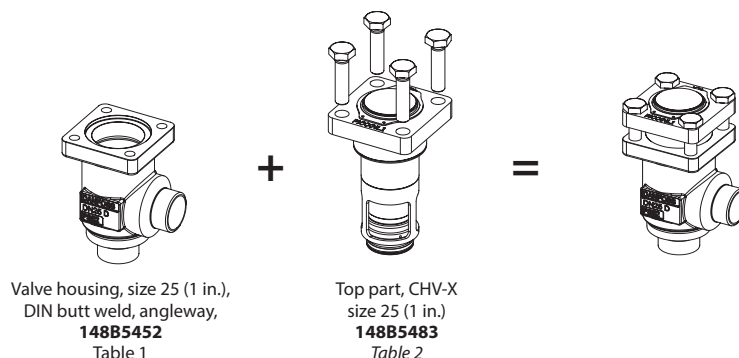


Table 1
SVL valve housings
w/different
connections

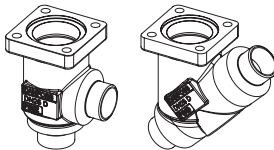
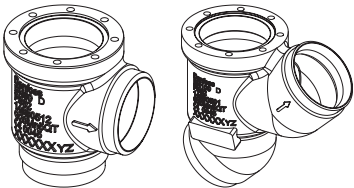
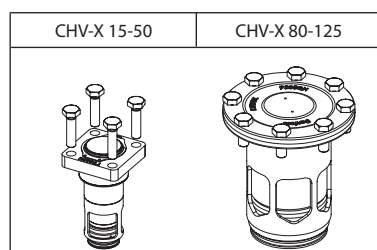
Table 1 SVL valve housings w/different connections		DN 15-65 mm (½ - 2½ in.)						DN 80-125 mm (3 - 5 in.)					
													
Sizes [DN]		Valve Housing SVL											
		DIN-Butt weld		ANSI-Butt weld		GOST-Butt-weld		SOC		FPT		T	
mm	in.	ANG	STR	ANG	STR	ANG	STR	ANG	STR	ANG	STR	ANG	
15	½	148B5252	148B5253	148B5254	148B5255	148B5391	148B5392	148B5256	148B5257	148B5258	148B5259		
20	¾	148B5352	148B5353	148B5354	148B5355	148B5393	148B5394	148B5356	148B5357	148B5358	148B5359		
25	1	148B5452	148B5453	148B5454	148B5455	148B5498	148B5499	148B5456	148B5457	148B5458	148B5459		
32	1¼	148B5576	148B5577	148B5578	148B5579	148B5593	148B5594	148B5580	148B5581	148B5582	148B5583		
40	1½	148B5652	148B5653	148B5654	148B5655	148B5681	148B5682	148B5656	148B5657				
50	2	148B5741	148B5742	148B5743	148B5744	148B5759	148B5760	148B5745	148B5746				
65	2½	148B5816	148B5817	148B5818	148B5819	148B5816	148B5817						
80	3	148B5912	148B5913	148B5914	148B5915	148B5912	148B5913						
100	4	148B6014	148B6015	148B6016	148B6017	148B6033	148B6034						
125	5	148B6112	148B6113	148B6114	148B6115	148B6133	148B6134						

Table 2
CHV-X complete top part
including gaskets and
bolts



Sizes [DN]		Complete top part
mm	in.	CHV-X
15	½	148B5283
20	¾	
25	1	148B5483
32	1¼	
40	1½	
50	2	148B5747
65	2½	148B5827
80	3	148B5919
100	4	148B6022
125	5	148B6119

