

C O N T E N T S

GENERAL DESCRIPTION

SMALL VALVES DN 4 and 8

STOP VALVES FROM 10 to 450mm

HAND REGULATING VALVES

CHECK VALVES

STOP/CHECK VALVES

FILTERS

PURGE VALVES WITH COUNTERWEIGHT

STAINLESS STEEL VALVES DN 4 and 8

STAINLESS STEEL VALVES DN 10 up to DN 25

STAINLESS STEEL HAND REGULATING VALVES

STAINLESS STEEL CHECK VALVES

STAINLESS STEEL STOP/CHECK VALVES

STAINLESS STEEL FILTERS

MAINTENANCE INSTRUCTIONS

SPARE PARTS

WEIGHT AND VOLUME OF RFF VALVES

OTHER AVAILABLE DOCUMENTATION :

- **BALL VALVE DOCUMENTATION**

REFRIGERATING VALVES

By using the most modern production techniques Robinet Frigorifique Français offer the highest quality and competitive range of refrigeration valves.

The RFF products have a world-wide reputation for high quality.

These products are installed in refrigeration plants using Ammonia, CFC, HCFC, HFC or halocarbon refrigerants. Operating in a temperature range from - 50°C to +150°C.

The normal pressure rating is 25 bar with higher pressure available on request : 65 or 40 bar (depending on diameter).

RFF Equipment includes a range of Carbon Steel and Stainless steel valves.

Also available is a range of all Steel, full bore Ball Valves

STEEL VALVE RANGE

- # Small steel valves from 4 to 8 mm
- # Straight or angle valves from 10 to 450 mm, with handwheel or with cap.
- # Hand regulating valves from 10 to 40 mm, with handwheel or with cap.
- # Straight or angle check valves from 10 to 250 mm.
- # Straight or angle Filters from 10 to 350 mm.
- # Straight or angle combined stop/check valves from 10 to 250 mm, with handwheel or with cap.
- # Purge valves with counterweight, 8 and 15 mm.
- # Oil purge valves 8 mm.

Materials and Construction

Valve bodies are made in TStE355 steel-DIN 17102 or GS21Mn5 steel-SEW 685, bonnets are made in TStE355 steel-DIN 17102 with Impact test certificate at -50°C. These materials can be replaced by equivalent quality steel to the following international standards (A350LF2 steel-ASTM, GS20Mn5-EN10213-3...).

Valve connections are available for the following sizes and types :

- # butt welding from 4 to 8 mm.
- # butt welding class "S" ASTM Standard Schedule from 10 to 450 mm.
- # butt welding class "M" DIN 2448 from 10 to 450 mm
- # butt welding class « H » thickness 2mm for stainless steel pipe from DN 10 to DN 450mm
- # brazing from 4 to 100 mm.
- # Socket welding from 10 to 32 mm.(fillet weld instead of full penetration butt weld)

STAINLESS STEEL VALVE RANGE

- # Small stainless steel valves from 4 to 8 mm
- # Stainless steel valves from 10 to 25 mm

Bodies and bonnet are made in X4CrNi 18-10 stainless steel (1.4301) EN10088-3 with strength certificate at -50°C. These materials may be replaced by alternative equivalent stainless steel materials.

Valve connections can be machined for butt welding thickness 2mm for stainless steel pipe.

RFF can supply material certificate type 3.1.B.-EN 10204, if specified at the time of order.

VALVE APPROVAL

RFF products have obtained the approval of the pressure equipment directive 97/23/CE. RFF company has obtained the ISO certification. On request, RFF products can be subject to special inspection by safety organisation. In such cases a price quotation will be given.

OPERATING CONDITIONS OF RFF VALVES

The application of RFF valves is only limited by the "O" ring specifications. The "O" rings are manufactured from chloroprene synthetic rubber elastomer which has a design range from -50°C to +150°C. The "O" rings are compatible with the following refrigerant and lubricating oils :

- Refrigerants :

. C290 . C316 . C318 . R13b1 . R22 . R32 . R744(CO₂) . R407c
. R114b2 . R123 . R124 . R125 . R134 . R134a . R717(NH₃) . R507
. R141b . R142b . R143a . R152a . R404a . R407

- Lubricants :

. Mineral oils, except those with naphthalene base.
. Lubricants with ester silicate base.

It is important that you are aware by using additives or exceeding the operating conditions may cause the "O" rings to fail.

For all applications (refrigerants or lubricants) other than those defined above, a compatibility study is necessary in order to check the resistance of our standard "O" ring, or, if necessary, to offer you "O"-rings more suitable for the specific conditions of your applications.

Our standard "O" ring are not compatible with Aromatic hydrocarbons (benzene), Chlorinated hydrocarbons (trichlorethylene) and Polar solvents (ketone, ester, ether, acetone)

SMALL VALVES DN 4 and 8

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SMALL VALVE, 4 and 8 mm

The small 4 and 8 mm valves are intended for use with instruments and line gauge equipment.

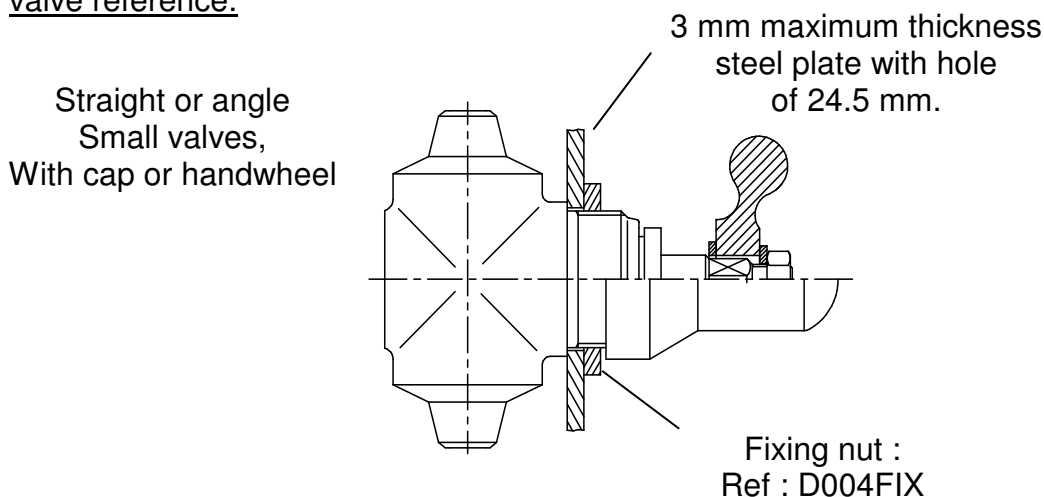
The RFF valves are manufactured from low temperature steel with stainless steel spindles sealed by "O" rings and designed in a special way which gives good gas tightness. Sealing is made by steel spindle on steel face (metal to metal).

The nominal pressure is 25 bar with higher pressure up to 65 bar available on request.

With our old design the cap was screwed on the gland nut whereas with the new design cap is directly screwed on the body. This ensures not to unscrew gland nut when removing the cap.

The gland nut and the spindle have different threads to avoid to unscrew gland nut when opening the valves.

New small valves can be mounted by using a 3mm maximum thickness steel plate fixed with locking nut. The locking nut has to be ordered separately. (order reference No. D004*FIX). Be careful this fixing nut not suit with all RFF small valve reference.



As these valves have a simple design, they are not designed for back seating. The fluid enters under the spindle with the external equipment connected to the outlet. When the valve is closed isolating the external equipment it is possible to change the O-rings in the gland nut.

NEW REFERENCES

Due to the wide increase in different connection now available RFF have changed their code references for the 4mm and 8mm valves.

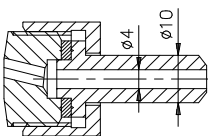
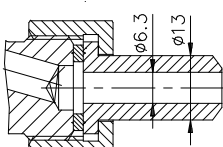
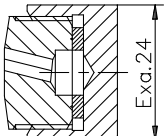
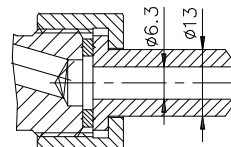
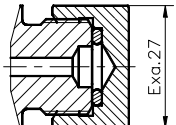
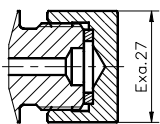
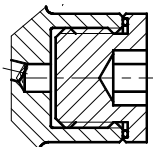
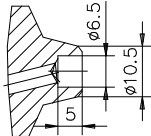
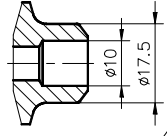
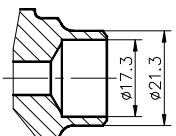
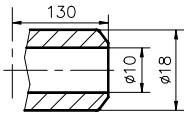
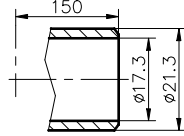
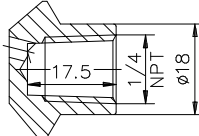
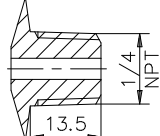
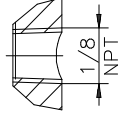
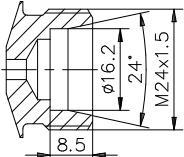
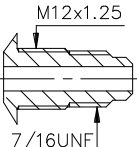
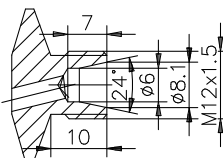
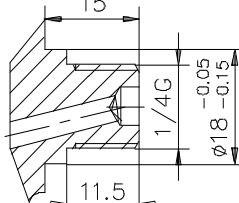
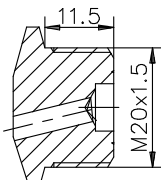
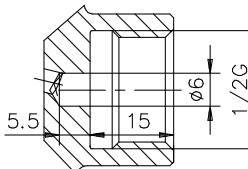
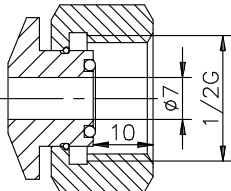
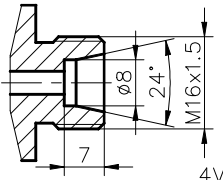
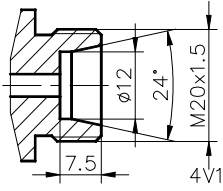
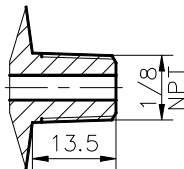
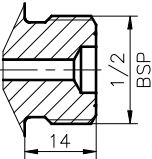
When placing an order please use the following computer codes :

| REFERENCES | | | | | | |
|-------------|--------|-------|------------------------------------|---------------------------|-----------------------|------------------------|
| D | ... | * | X | X | XX | XX |
| Steel range | DN(mm) | Valve | V : with handwheel C : with cap | D : Straight E : Angle | Inlet code connection | Outlet code connection |

STEEL VALVES DN 4 : STANDARDS REFERENCES

| Straight valve | | Angle valve | |
|----------------|----------------|--------------|----------------|
| With cap | With handwheel | With cap | With handwheel |
| D004*CDE1E1 | D004*VDE1E1 | D004*CES1E1 | D004*VES1E1 |
| D004*CDS1E1 | D004*VDS1E1 | D004*CES1S1 | D004*VES1S1 |
| D004*CDS1E3 | D004*VDS1E3 | D004*CES1V1 | D004*VES1V1 |
| D004*CDS1E4 | D004*VDS1S1 | D004*CES1V7 | D004*VES1V16 |
| D004*CDS1S1 | D004*VDS1V1 | D004*CES1V17 | D004*VES3V7 |
| D004*CDS1V1 | D004*VDS2V1 | D004*CES3V1 | D004*VES3V16 |
| D004*CDS1V7 | D004*VDV1V1 | D004*CES3V12 | D004*VES4V1 |
| D004*CDS1V9 | D004*VDV7V7 | D004*CES3V18 | D004*VES4V3 |
| D004*CDS1V17 | | D004*CEV14E5 | D004*VEV1V1 |
| D004*CDS2V1 | | D004*CEV2V1 | D004*VEV1V7 |
| D004*CDV1V1 | | D004*CEV2V4 | D004*VEV2V1 |
| D004*CDV7V7 | | D004*CEV2V6 | D004*VEV2V7 |
| D004*CDV7V11 | | D004*CEV2V11 | D004*VEV2V16 |
| D004*CDV8E1 | | D004*CEV2V12 | D004*VEV2V19 |
| D004*CDV8E3 | | D004*CEV2V13 | D004*VEV8V16 |
| | | D004*CEV2V16 | D004*VEV17V16 |
| | | D004*CEV8V19 | |
| | | | |
| | | | |

CONNECTIONS DN 4

| | | | | |
|--|---|--|---|--|
| <p>E1 Steel nozzle ISO M20x1.5</p>  | <p>E2 Stainless steel nozzle 1/2 BSP</p>  | <p>E3 Steel blank nut ISO M20x1.5</p>  | <p>E4 Steel nozzle 1/2 BSP</p>  | <p>E5 Steel blank nut 1/2 BSP</p>  |
| <p>E7 Stainless steel blank nut 1/2 BSP with alu gasket</p>  | <p>E8 Steel blank nut male 1/2 BSP</p>  | <p>S1 Weld / braze</p>  | <p>S2 weld 10 x 17.5</p>  | <p>S3 weld 17.3 x 21.3</p>  |
| <p>S4 weld 10 x 18 x 130</p>  | <p>S5 weld 17.3 x 21.3 x 150</p>  | <p>V1 1/4 NPT female</p>  | <p>V2 1/4 NPT male</p>  | <p>V3 1/8 NPT female</p>  |
| <p>V4 Olive joint Ø 16</p>  | <p>V5 Flare joint + M12</p>  | <p>V7 Olive joint Ø 6 stainless steel</p>  | <p>V8 1/4 Gaz (BSP) male</p>  | <p>V9 M20 x 1.5 ISO</p>  |
| <p>V10 1/2 Gaz (BSP) female</p>  | <p>V11 1/2 G Rotary female</p>  | <p>V12 Olive joint Ø 8 ser S</p>  | <p>V13 Olive joint Ø 12 sér S</p>  | <p>V14 1/8 NPT male</p>  |
| <p>V15 1/2 BSP male</p>  | | | | |

CONNECTIONS DN 8

| | | | | |
|--|---|---|--|--|
| <p>E1 Steel nozzle ISO M24x1.5</p> | <p>E2 Steel nozzle 1/2 BSP</p> | <p>E3 Stainless steel nozzle 1/2 BSP</p> | <p>E4 Steel blank nut ISO M24x1.5</p> | <p>E5 Steel blank nut 1/2 BSP</p> |
| <p>E6 Stainless steel blank nut 1/2 BSP</p> | <p>E7 Stainless steel blank nut 1/2 BSP – alu gasket</p> | <p>E8 Steel blank nut male 1/2 BSP</p> | <p>S1 Weld / braze</p> | <p>S2 weld 7.5x17.5</p> |
| <p>S3 weld 10 x 17.5</p> | <p>S4 weld 10 x 18 x 60</p> | <p>S5 weld 10 x 18x 130</p> | <p>S6 weld 17.3 x 21.3</p> | <p>S7 weld 12.9 x 17.5</p> |
| <p>S8 weld 16.1 x 21.6</p> | <p>S9 weld 17.3x21.3x150</p> | <p>S10 weld 17.3x21.3x90</p> | <p>S12 weld 10 x 18 x 200</p> | <p>S13 weld 10 x 18 x 90</p> |
| <p>V1 1/2 BSP male</p> | <p>V2 Olive joint Ø 16</p> | <p>V4 M24 x 1.5 ISO</p> | <p>V5 3/8 NPT female</p> | <p>V6 1/2 Gaz (BSP) female</p> |
| <p>V7 1/2 G Rotary female</p> | <p>V8 3/8 NPT male</p> | <p>V9 Olive joint Ø 12</p> | <p>V10 3/8 BSP male</p> | <p>V11 3/8 BSP female</p> |
| <p>V12 1/2 NPT male</p> | <p>V13 1/2 NPT female</p> | <p>V14 1/4 NPT female</p> | <p>V15 3/8 SAE</p> | <p>V16 1/2 BSP CON male</p> |
| <p>V17 1/2 BSP CON female</p> | | | | |

STEEL VALVES DN 8 : STANDARDS REFERENCES

STEEL

| Straight valve | | Angle valves | |
|----------------|----------------|---------------|----------------|
| With cap | With Handwheel | With cap | With Handwheel |
| D008*CDE1E1 | D008*VDE1E1 | D008*CEE2E2 | D008*VEE2E2 |
| D008*CDE2E2 | D008*VDE2E2 | D008*CEE2E5 | D008*VEE2E5 |
| D008*CDE2E5 | D008*VDE2E5 | D008*CES1E2 | D008*VES1E2 |
| D008*CDE4E4 | D008*VDS1E1 | D008*CES1E5 | D008*VES1E5 |
| D008*CDS1E1 | D008*VDS1E2 | D008*CES1E6 | D008*VES1S1 |
| D008*CDS1E2 | D008*VDS1E4 | D008*CES1S1 | D008*VES1V5 |
| D008*CDS1E4 | D008*VDS1E5 | D008*CES1V1 | D008*VES3E5 |
| D008*CDS1E5 | D008*VDS1S1 | D008*CES1V5 | D008*VES5V6 |
| D008*CDS1S1 | D008*VDS1V1 | D008*CES1V6 | D008*VES5V7 |
| D008*CDS1V1 | D008*VDS1V5 | D008*CES1V11 | D008*VES5V14 |
| D008*CDS1V2 | D008*VDS1V6 | D008*CES1V15 | D008*VES7S7 |
| D008*CDS1V5 | D008*VDS6V6 | D008*CES2E2 | D008*VEV1V1 |
| D008*CDS1V6 | D008*VDS7S7 | D008*CES2E5 | D008*VEV1V6 |
| D008*CDS1V11 | D008*VDV1V1 | D008*CES2V1 | D008*VEV5V5 |
| D008*CDS1V15 | D008*VDV16V7 | D008*CES2V5 | D008*VEV10V10 |
| D008*CDS3E5 | | D008*CES3E5 | D008*VEV10V12 |
| D008*CDS3S3 | | D008*CES3V7 | |
| D008*CDS4V6 | | D008*CES4E5 | |
| D008*CDS5V6 | | D008*CES4V1 | |
| D008*CDS6E5 | | D008*CES5E5 | |
| D008*CDS6S6 | | D008*CES5V1 | |
| D008*CDS7E5 | | D008*CES6E2 | |
| D008*CDS7S7 | | D008*CES6E5 | |
| D008*CDS7V1 | | D008*CES6S6 | |
| D008*CDS8S8 | | D008*CES6V1 | |
| D008*CDV1E2 | | D008*CES7S7 | |
| D008*CDV1V1 | | D008*CES8S11 | |
| D008*CDV1V6 | | D008*CES12V1 | |
| D008*CDV5V5 | | D008*CES13V5 | |
| D008*CDV6V6 | | D008*CEV1E5 | |
| D008*CDV8E4 | | D008*CEV1V1 | |
| D008*CDV11V11 | | D008*CEV1V5 | |
| | | D008*CEV1V6 | |
| | | D008*CEV1V7 | |
| | | D008*CEV1V10 | |
| | | D008*CEV1V11 | |
| | | D008*CEV1V13 | |
| | | D008*CEV2V1 | |
| | | D008*CEV5S7 | |
| | | D008*CEV8V3 | |
| | | D008*CEV8V5 | |
| | | D008*CEV8V10 | |
| | | D008*CEV8V15 | |
| | | D008*CEV10V10 | |
| | | D008*CEV12V13 | |
| | | D008*CEV16V17 | |

STANDARDS COMBINATIONS

| | | |
|--|--|---|
| <p>DN...VDS1S1, DN...CDS1S1</p> | <p>DN...CDS1E1, DN...VDS1E1</p> | <p>DN...VES1S1, DN...CES1S1</p> |
| <p>DN 8CDS1V1, DN 8VDS1V1</p> | <p>DN 8CDV1V1, DN 8VDV1V1</p> | <p>DN...CDE1E1, DN...VDE1E1</p> |
| <p>DN4 VDS1V1, DN 4CDS1V1</p> | <p>Blank nut</p> | <p>Fixing nut D004FIX 3mm thick mounting plate</p> |

| Dimensions in millimeters | | | | | | | | | | | | | | | | | | | |
|---------------------------|----------------|----------------|----|----|---|---|---|----|------|------|----|----|--------|------------|------|----|----|-----|------|
| DN (mm) | DN for Brazing | DN for Welding | A | B | C | E | F | G | H1 | H2 | H3 | H4 | J | K | L | CD | HD | ID | OD |
| 4 | 1/4" | 1/8" | 15 | 30 | 5 | - | - | 58 | 90.5 | 96.5 | 76 | 82 | - | 1/4NPTcon. | 10x4 | 28 | 50 | 6.5 | 10.5 |
| 8 | 3/8" | 1/4" | 15 | 34 | 8 | 9 | 3 | 58 | 90.5 | 96.5 | 76 | 82 | 1/2BSP | - | 13x8 | 28 | 50 | 9.7 | 13.8 |

VALVES FROM 10 TO 450mm

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VALVES FROM 10 TO 450 mm

RFF valves can be supplied with a material certificate for body and bonnet which guarantees the impact strength at -50°C .

The material test for the straight branch connections for the valves 300 and 450 mm is certified to -46°C .

The nominal pressure rating is 25 bar. Valves are also available for higher pressure PN 40 or PN 65 (depending on diameter)

RFF valves are constructed of low temperature carbon steel with stainless steel spindles and sealed by two O-rings with a special oil filled groove which provides a complete gas tight seal.

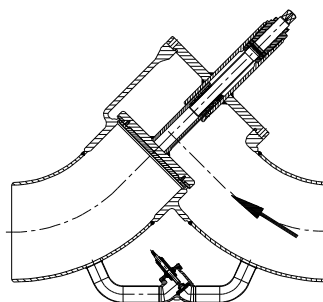
The PTFE seat provides positive shut-off with a minimum amount of force.

All valves should be closed by turning the spindle clockwise. The O-rings can be replaced when the spindle is back-seated fully. Maintenance of the O-rings can be carried out without shutting down the plant.

By using valves fitted with caps on installations using odourless refrigerant extra security is ensured. Gas refrigerant is contained under the cap which is manufactured with small hole drilled under the gasket. When the cap is unscrewed, any build-up of refrigerant gas inside the cap will escape through this hole and can be heard as a whistling noise. This is an indication that the O-rings in the gland nut have been damaged or are in poor condition. All valves can be fitted with handwheels or caps.

To assist opening large diameter valves (150 mm to 450 mm) it may be necessary to fit a small by pass valves at or above the following differential pressures:

| | |
|--------|-------------|
| DN 150 | P > 21 bar |
| DN 200 | P > 14 bar |
| DN 250 | P > 9 bar |
| DN 300 | P > 6 bar |
| DN 350 | P > 4.5 bar |
| DN 400 | P > 3.5 bar |
| DN 450 | P > 3.5 bar |



To size the by-pass valve, the seat diameter must be at least 10 % of the diameter of the large valve being by-passed. For such applications the large isolating valves should be installed upside down.

When designing the position of large shut off valves attention should be paid to the final plant pressure test.

If it is not possible to install the valve upside down. It is possible to use a higher closing torque than normal.

The table below indicates the approximate torque value to be used to seal the seat against a 25 bar test pressure.

| | | | | | | | | | | | | | | |
|-------|----------|----------|----------|-----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| DN | 10 15 | 20 25 | 32 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | 300 | 350 | 400 |
| DaN.m | 0.25 | 0.5 | 1 | 1.5 | 2 | 4 | 7.5 | 10 | 15 | 30 | 55 | 66 | 80 | 200 |

Branch connections for RFF valves can be :

for butt welding, "S" class (standard series)

for butt welding, "M" class (Din 2448)

for brazing, "B" class

socket welding, "K" class (fillet weld instead of full penetration weld)

butt welding class « H » thickness 2mm for stainless steel pipe

VALVES FROM 4 TO 250mm – HIGHER PRESSURE

RFF products are available for higher pressure systems PN 40 or PN 65 (depending on diameter).

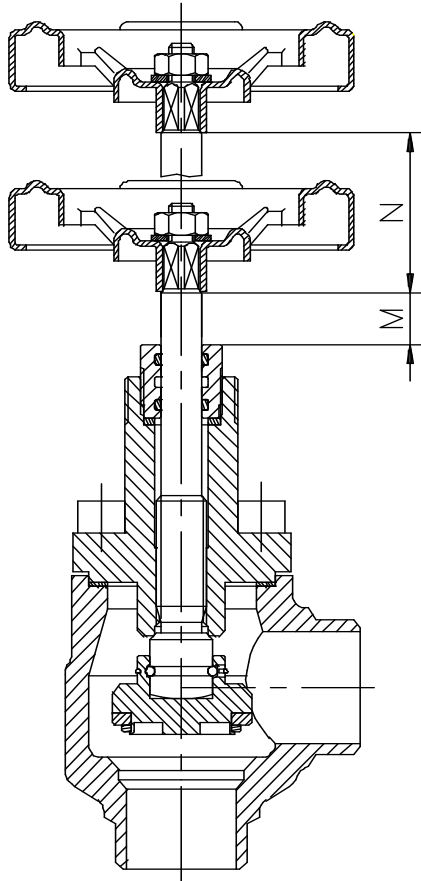
For more information see the special Higher pressure documentation.

VALVES FROM 10 TO 250 mm WITH EXTENDED SPINDLE

Although the standard spindle height is usually enough, RFF can supply handwheel valves with extended spindles for use on special low temperature applications (< -40°C)

Dimensions are the same as standard valve + dimension N.

When placing an order, Please add TL in the end of the RFF standard reference
For example : VDS => VDSTL



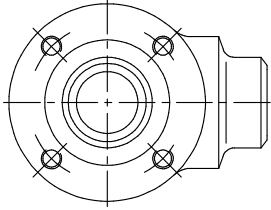
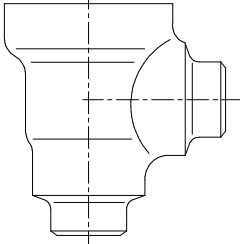
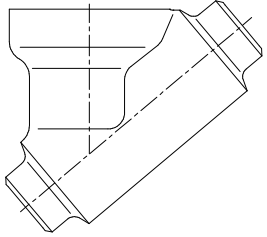
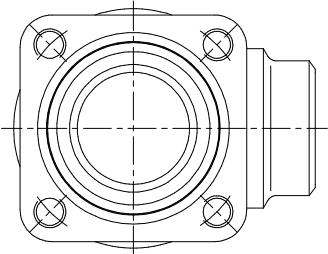
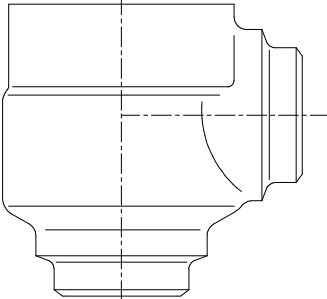
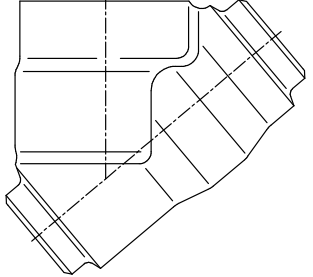
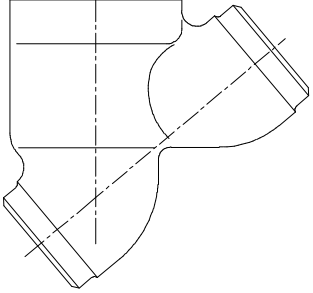
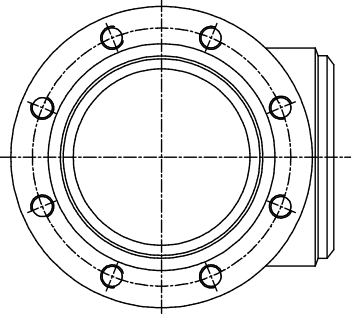
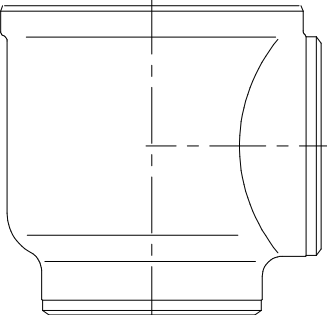
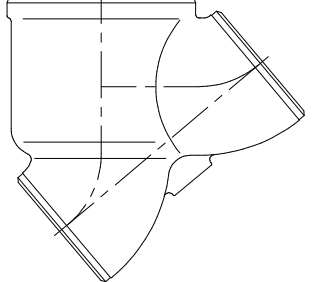
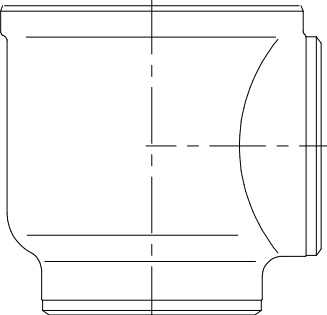
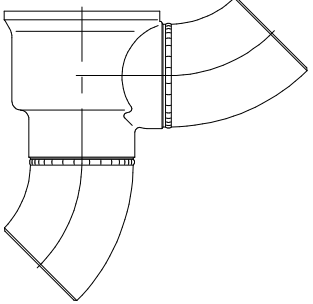
| DN | Dimensions in millimeters with valve open | |
|-------|--|----|
| | M | N |
| 10/15 | 20 | 40 |
| 20/25 | 28 | 40 |
| 32/40 | 24 | 50 |
| 50 | 33 | 60 |
| 65 | 32 | 70 |
| 80 | 43 | 80 |
| 100 | 51 | 80 |
| 125 | 108 | 80 |
| 150 | 108 | 80 |
| 200 | 185 | 70 |
| 250 | 219 | 70 |

M : Open (standard spindle)

N : Extended (special spindle)

The dimensions stated in the table indicate the length of standard spindles when open (M). (N) indicates extension length.
RFF use the term "TL" to indicate the special extended spindle.

RFF VALVE BODY PROFILES

| | | PLAN VIEW | ANGLE BODIES | STRAIGHT BODIES |
|------------------|---------------------|---|---|---|
| DN 10 up to 25 | Round upper flange |  | Drop forged body | Drop forged body |
| | | |  |  |
| DN 32 up to 100 | Square upper flange |  | Drop forged body | Drop forged body |
| | | |  | DN 32 up to 65  Cast steel body DN 80 up to 100  |
| DN 125 up to 450 | Round upper flange |  | Cast steel body | Cast steel body With short cast elbows |
| | | |  | DN 125 up to 250  Cast steel body With welded elbows |
| | | |  | DN 300 up to 450  |

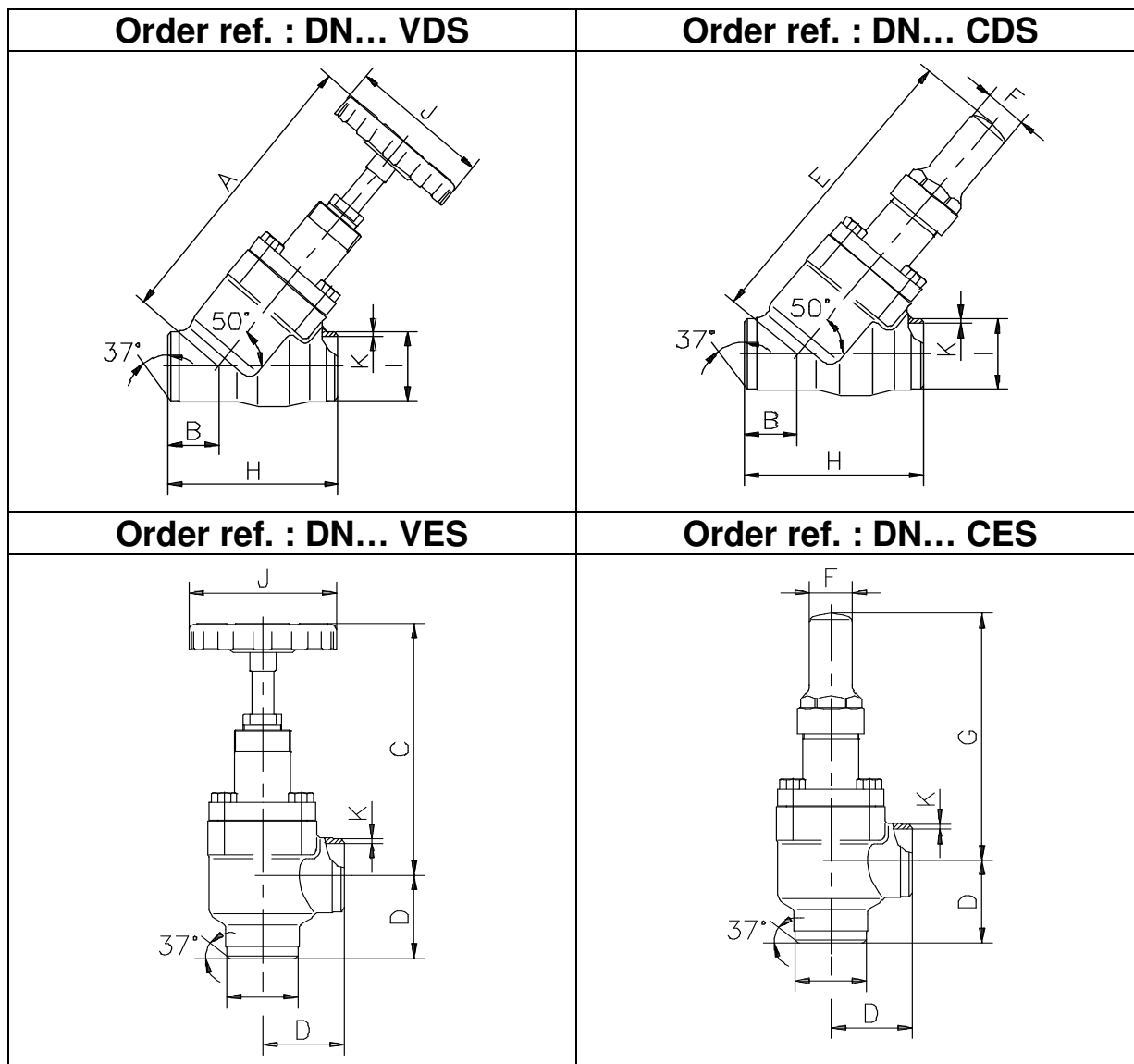
VALVES FROM 10 TO 450 mm

STEEL

| DN | BRANCH | | | | | BODY** | BONNET** | DISC-SEAL | HANDWEEL | CAP | BODY GASKET |
|-----|--------|---|---|---|---|----------|-----------------|---------------|-------------|-----------|-------------|
| | S | M | H | B | K | | | | | | |
| 10 | S | M | H | B | K | TStE355 | TStE355 | PTFE on steel | Bakelite | Steel | O-ring |
| 15 | S | M | H | B | K | TStE355 | TStE355 | PTFE on steel | Bakelite | Steel | O-ring |
| 20 | S | M | H | B | K | TStE355 | TStE355 | PTFE on steel | Bakelite | Steel | O-ring |
| 25 | S | M | H | B | K | TStE355 | TStE355 | PTFE on steel | Bakelite | Steel | O-ring |
| 32 | S | M | H | B | K | TStE355 | TStE355 | PTFE on steel | Sheet steel | Steel | Flat gasket |
| 40 | S | M | H | B | - | TStE355 | TStE355 | PTFE on steel | Sheet steel | Steel | Flat gasket |
| 50 | S | M | H | B | - | TStE355 | TStE355 | PTFE on steel | Sheet steel | Aluminium | Flat gasket |
| 65 | S | M | H | B | - | TStE355 | TStE355 | PTFE on steel | Sheet steel | Aluminium | Flat gasket |
| 80 | S | M | H | B | - | GS21Mn5 | TStE355 | PTFE on steel | Sheet steel | Aluminium | Flat gasket |
| 100 | S | M | H | B | - | GS21Mn5 | TStE355 | PTFE on steel | Sheet steel | Aluminium | Flat gasket |
| 125 | S | M | H | - | - | GS21Mn5 | TStE355 | PTFE on steel | Sheet steel | Aluminium | Flat gasket |
| 150 | S | M | H | - | - | GS21Mn5 | TStE355 | PTFE on steel | Sheet steel | Aluminium | Flat gasket |
| 200 | S | M | H | - | - | GS21Mn5 | P355NL2+S355NLH | PTFE on steel | Sheet steel | Aluminium | O-ring |
| 250 | S | M | H | - | - | GS21Mn5 | P355NL2+S355NLH | PTFE on steel | Sheet steel | Aluminium | O-ring |
| 300 | S | M | H | - | - | GS21Mn5* | P355NL2+S355NLH | PTFE on steel | Sheet steel | Aluminium | O-ring |
| 350 | S | M | H | - | - | GS21Mn5* | P355NL2+S355NLH | PTFE on steel | Sheet steel | Aluminium | O-ring |
| 400 | S | M | H | - | - | GS21Mn5 | P355NL2+S355NLH | PTFE on steel | Sheet steel | Steel | O-ring |
| 450 | S | M | H | | | GS21Mn5 | P355NL2+S355NLH | PTFE on steel | Sheet steel | Steel | O-ring |

- S** Butt welding ends – standard series
- M** Butt welding ends – Din 2448
- H** Butt welding Thickness 2mm pour stainless steel pipe.
- B** Brazing ends
- K** Socket welding ends
- *** For straight bodies, 2 branch connections are welded on the angle body.

STEEL VALVES FROM 10 TO 450 mm FOR BUTT WELDING "S"



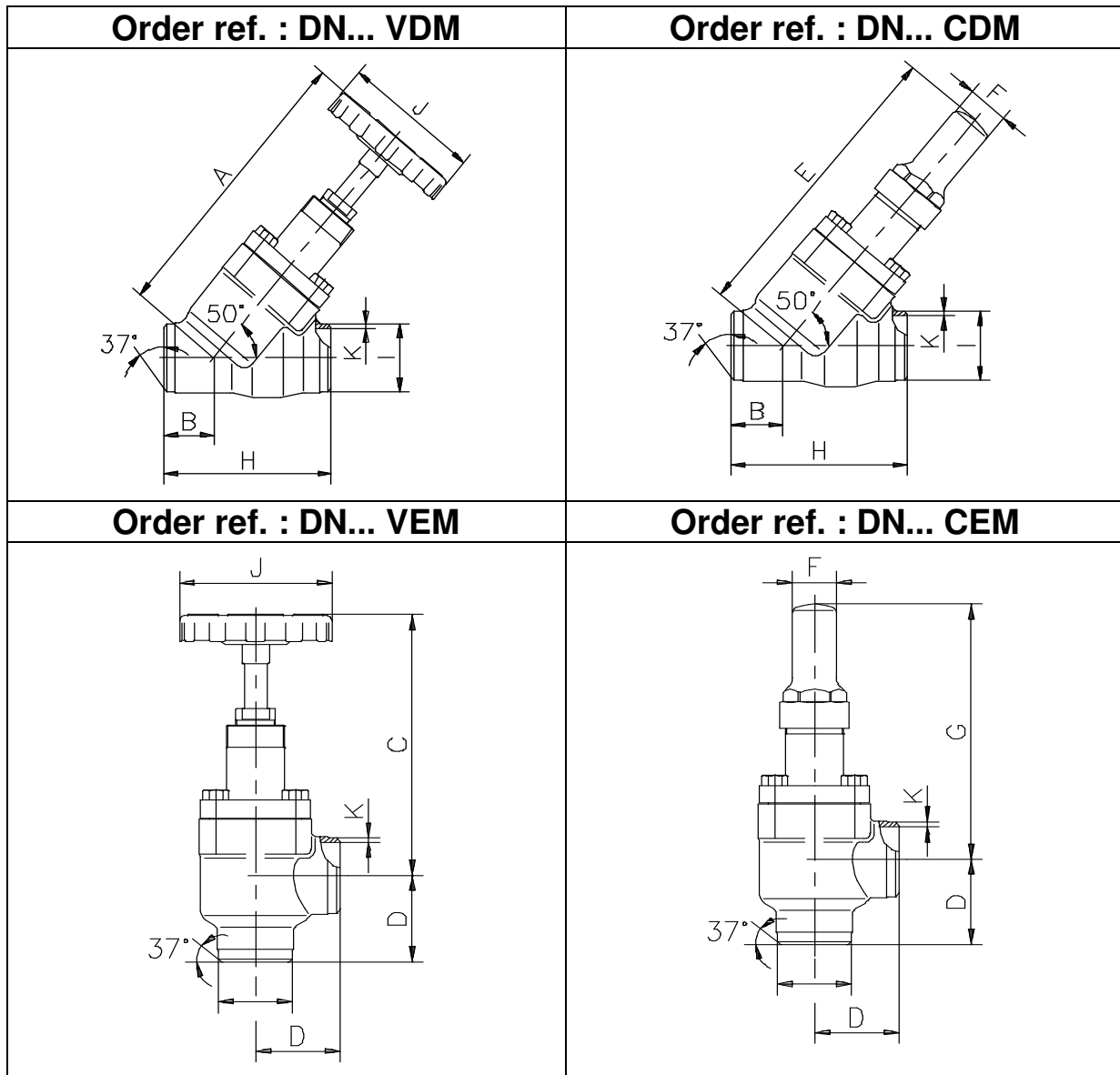
| DIMENSIONS IN MILLIMETERS | | | | | | | | | | | | |
|---------------------------|-----|------|-----|-----|-----|------|----|-----|------|-------|-----|-----|
| DN | A * | B | C* | D | E | F | G | H | I | J | K | |
| 3/8" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 17.2 | 50 | 2.3 |
| 1/2" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 21.3 | 50 | 2.6 |
| 3/4" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 26.9 | 70 | 2.9 |
| 1" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 33.7 | 70 | 3.6 |
| 1 1/4" | 32 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 42.4 | 100 | 3.6 |
| 1 1/2" | 40 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 48.3 | 100 | 3.6 |
| 2" | 50 | 247 | 41 | 209 | 69 | 257 | 36 | 206 | 152 | 60.3 | 125 | 4 |
| 2 1/2" | 65# | 305 | 49 | 235 | 85 | 308 | 41 | 237 | 186 | 76.1 | 175 | 5 |
| 3" | 80 | 360 | 54 | 273 | 85 | 368 | 50 | 281 | 238 | 88.9 | 200 | 5.6 |
| 4" | 100 | 397 | 58 | 299 | 105 | 396 | 50 | 299 | 275 | 114.4 | 200 | 6.3 |
| 5" | 125 | 545 | 66 | 427 | 120 | 558 | 48 | 442 | 308 | 139.7 | 250 | 7.1 |
| 6" | 150 | 569 | 71 | 435 | 135 | 584 | 48 | 450 | 344 | 168.3 | 250 | 7.1 |
| 8" | 200 | 833 | 88 | 655 | 170 | 869 | 56 | 691 | 427 | 219.1 | 400 | 8 |
| 10" | 250 | 946 | 106 | 723 | 215 | 945 | 56 | 722 | 527 | 273 | 400 | 9.3 |
| 12" | 300 | 1020 | 190 | 560 | 270 | 1096 | 50 | 636 | 1030 | 323.9 | 500 | 9.5 |
| 14" | 350 | 1110 | 221 | 620 | 270 | 1183 | 50 | 693 | 1140 | 355.6 | 500 | 9.5 |
| 16" | 400 | 1385 | 253 | 801 | 328 | 1409 | 79 | 825 | 1330 | 406.4 | 700 | 9.7 |
| 18" | 450 | 1515 | 285 | 864 | 363 | 1526 | 79 | 877 | 1486 | 457 | 700 | 9.7 |

* Dimensions open valve

ND 65 : Ref S065*VDUSA, S065*CDUSA, S065*VEUSA or S065*CEUSA ⇒ I = 73 , K = 5.2

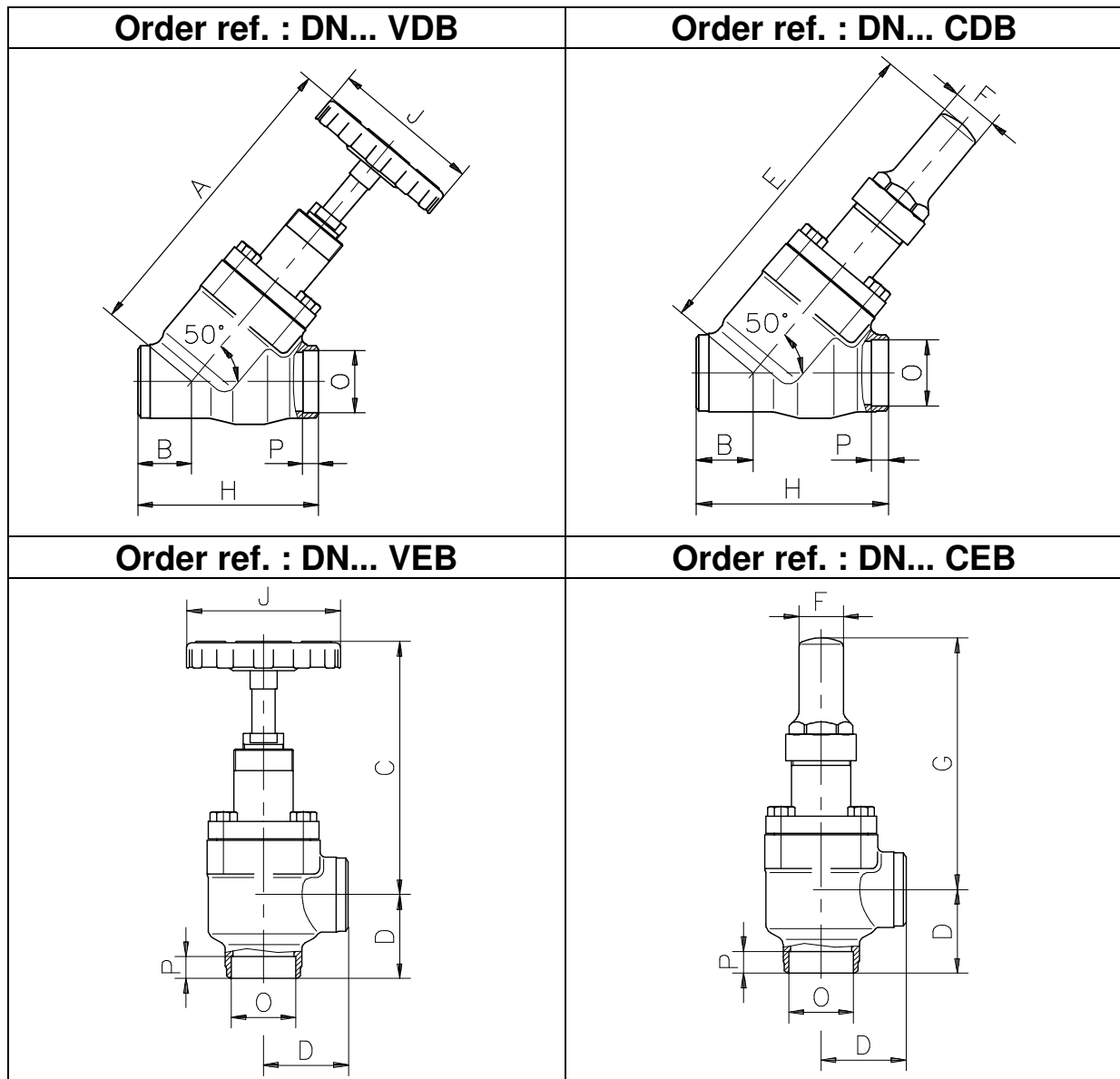
VALVES FROM 10 TO 450 mm FOR BUTT WELDING "M"

STEEL



| DIMENSIONS IN MILLIMETRES | | | | | | | | | | | | | |
|---------------------------|--------|-----|------|-----|-----|-----|------|----|-----|------|-------|-----|-----|
| | DN | A * | B | C* | D | E | F | G | H | I | J | K | |
| | 3/8" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 17.2 | 50 | 1.8 |
| | 1/2" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 21.3 | 50 | 2 |
| | 3/4" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 26.9 | 70 | 2.3 |
| | 1" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 33.7 | 70 | 2.6 |
| | 1 1/4" | 32 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 42.4 | 100 | 2.6 |
| | 1 1/2" | 40 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 48.3 | 100 | 2.6 |
| | 2" | 50 | 247 | 41 | 209 | 69 | 257 | 36 | 206 | 152 | 60.3 | 125 | 2.9 |
| | 2 1/2" | 65 | 305 | 49 | 235 | 85 | 308 | 41 | 237 | 186 | 76.1 | 175 | 2.9 |
| | 3" | 80 | 360 | 54 | 273 | 85 | 368 | 50 | 281 | 238 | 88.9 | 200 | 3.2 |
| | 4" | 100 | 397 | 58 | 299 | 105 | 396 | 50 | 299 | 275 | 114.4 | 200 | 3.6 |
| | 5" | 125 | 545 | 66 | 427 | 120 | 558 | 48 | 442 | 308 | 139.7 | 250 | 4.5 |
| | 6" | 150 | 569 | 71 | 435 | 135 | 584 | 48 | 450 | 344 | 168.3 | 250 | 4.5 |
| | 8" | 200 | 833 | 88 | 655 | 170 | 869 | 56 | 691 | 427 | 219.1 | 400 | 6.3 |
| | 10" | 250 | 946 | 106 | 723 | 215 | 945 | 56 | 722 | 527 | 273 | 400 | 6.3 |
| | 12" | 300 | 1020 | 190 | 560 | 270 | 1096 | 50 | 636 | 1030 | 323.9 | 500 | 7.1 |
| | 14" | 350 | 1110 | 221 | 620 | 270 | 1183 | 50 | 693 | 1140 | 355.6 | 500 | 8 |
| | 16" | 400 | 1385 | 253 | 801 | 328 | 1409 | 79 | 825 | 1330 | 406.4 | 700 | 9.7 |
| | 18" | 450 | 1515 | 285 | 864 | 363 | 1526 | 79 | 877 | 1486 | 457 | 700 | 9.7 |

* Dimensions open valve

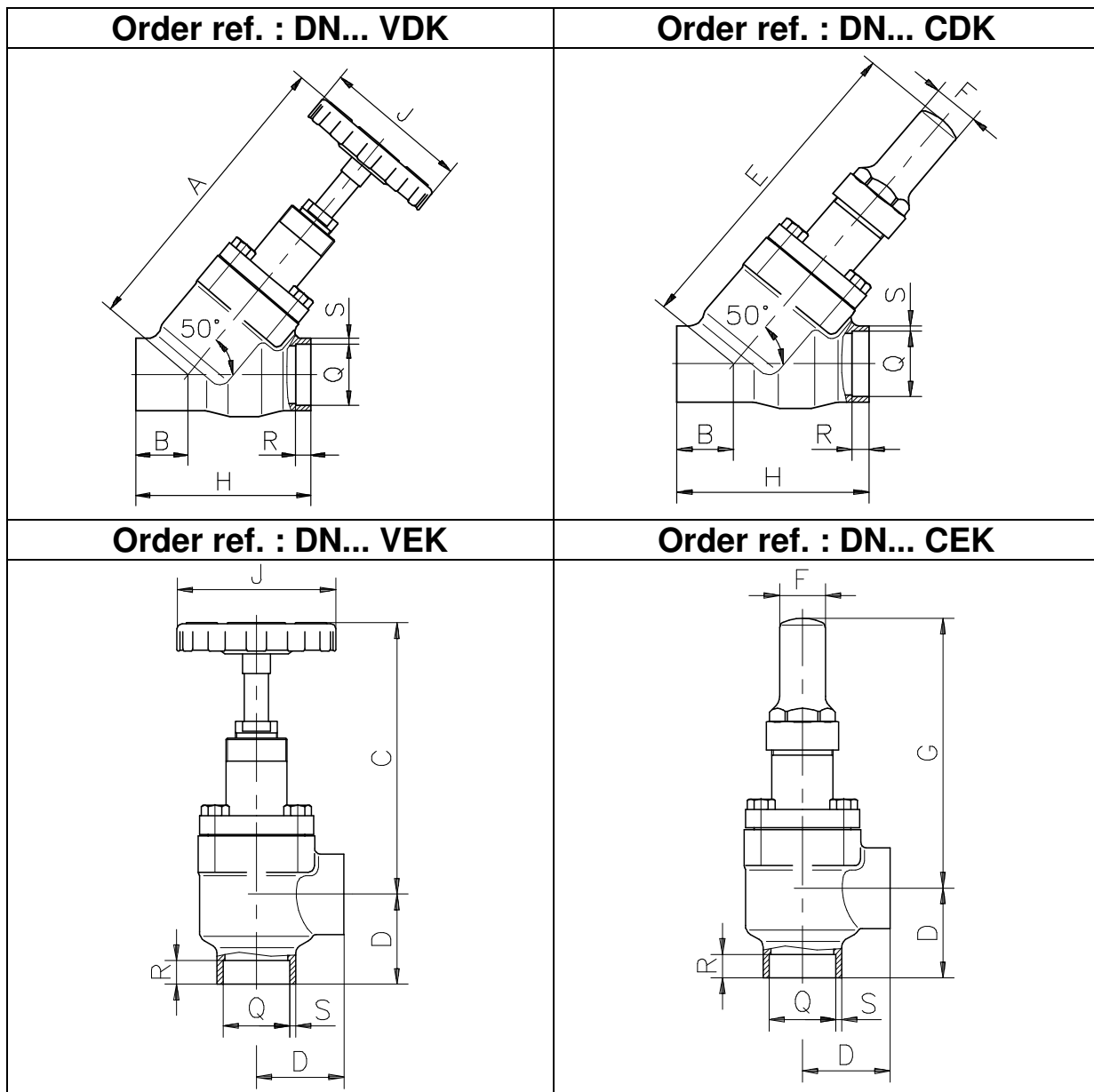


| DIMENSIONS IN MILLIMETERS | | | | | | | | | | | | | |
|---------------------------|--------|-----|-----|----|-----|-----|-----|----|-----|-----|-----|------|------|
| | DN | A* | B | C* | D | E | F | G | H | J | O | P | |
| | 1/2" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 50 | 12.9 | 12 |
| | 5/8" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 50 | 16.1 | 15.5 |
| | 7/8" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 70 | 22.4 | 20 |
| | 1 1/8" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 70 | 28.8 | 20 |
| | 1 3/8" | 32 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 100 | 35.2 | 22 |
| | 1 5/8" | 40 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 100 | 41.5 | 22 |
| | 2 1/8" | 50 | 247 | 41 | 209 | 69 | 257 | 36 | 206 | 152 | 125 | 54.3 | 25 |
| | 2 5/8" | 65 | 305 | 49 | 235 | 85 | 308 | 41 | 237 | 186 | 175 | 66.9 | 25 |
| | 3 1/8" | 80 | 360 | 54 | 273 | 85 | 368 | 50 | 281 | 238 | 200 | 79.6 | 30 |
| | 4 1/8" | 100 | 397 | 58 | 299 | 105 | 396 | 50 | 299 | 275 | 200 | 105 | 30 |

* Dimensions open valve

VALVES FROM 10 TO 32 mm SOCKET WELDING "K"

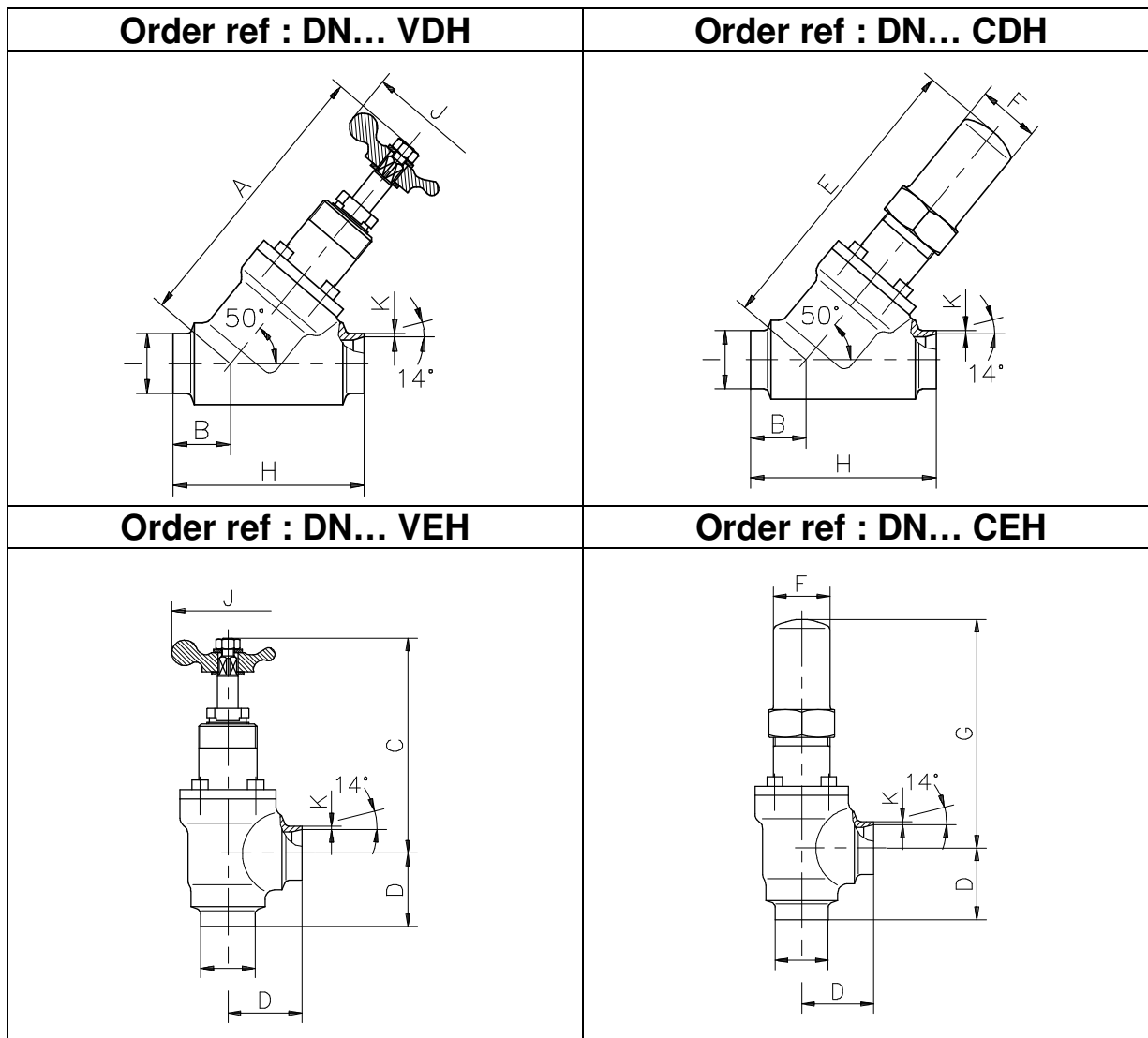
STEEL



| DIMENSIONS IN MILLIMETERS | | | | | | | | | | | | | |
|---------------------------|-----|-----|----|-----|----|-----|----|-----|-----|-----|------|----|-----|
| DN | A * | B | C* | D | E | F | G | H | J | Q | R | S | |
| 3/8" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 50 | 17.5 | 10 | 7.2 |
| 1/2" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 50 | 21.9 | 10 | 5.1 |
| 3/4" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 70 | 27.4 | 13 | 9.3 |
| 1" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 70 | 34.1 | 13 | 5.9 |
| 1 1/4" | 32 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 100 | 42.9 | 13 | 5.3 |

* Dimensions open valve

STEEL VALVES FROM 10 TO 450 mm FOR BUTT WELDING "H"



| DIMENSIONS IN MILLIMETERS | | | | | | | | | | | | |
|---------------------------|-----|------|-----|-----|-----|------|----|-----|------|-------|-----|---|
| | DN | A * | B | C* | D | E | F | G | H | I | J | K |
| 3/8" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 17.2 | 50 | 2 |
| 1/2" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 21.3 | 50 | 2 |
| 3/4" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 26.9 | 70 | 2 |
| 1" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 33.7 | 70 | 2 |
| 1 1/4" | 32 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 42.4 | 100 | 2 |
| 1 1/2" | 40 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 48.3 | 100 | 2 |
| 2" | 50 | 247 | 41 | 209 | 69 | 257 | 36 | 206 | 152 | 60.3 | 125 | 2 |
| 2 1/2" | 65 | 305 | 49 | 235 | 85 | 308 | 41 | 237 | 186 | 76.1 | 175 | 2 |
| 3" | 80 | 360 | 54 | 273 | 85 | 368 | 50 | 281 | 238 | 88.9 | 200 | 2 |
| 4" | 100 | 397 | 58 | 299 | 105 | 396 | 50 | 299 | 275 | 114.4 | 200 | 2 |
| 5" | 125 | 545 | 66 | 427 | 120 | 558 | 48 | 442 | 308 | 139.7 | 250 | 2 |
| 6" | 150 | 569 | 71 | 435 | 135 | 584 | 48 | 450 | 344 | 168.3 | 250 | 2 |
| 8" | 200 | 833 | 88 | 655 | 170 | 869 | 56 | 691 | 427 | 219.1 | 400 | 2 |
| 10" | 250 | 946 | 106 | 723 | 215 | 945 | 56 | 722 | 527 | 273 | 400 | 2 |
| 12" | 300 | 1020 | 190 | 560 | 270 | 1096 | 50 | 636 | 1030 | 323.9 | 500 | 2 |
| 14" | 350 | 1110 | 221 | 620 | 270 | 1183 | 50 | 693 | 1140 | 355.6 | 500 | 2 |
| 16" | 400 | 1385 | 253 | 801 | 328 | 1409 | 79 | 825 | 1330 | 406.4 | 700 | 2 |
| 18" | 450 | 1515 | 285 | 864 | 363 | 1526 | 79 | 877 | 1486 | 457 | 700 | 2 |

* Dimensions open valve

COEFFICIENT OF DISCHARGE OF VALVES FROM 10 TO 450 mm

Valve Coefficient k_v : This expresses the water volumetric flow-rate (cubic metre per hour : m³/h) flowing through the valve, which creates a pressure loss of one bar.

1) With density (liquid) :

$$K_v = Q \sqrt{\frac{d}{\Delta P}} \quad \Rightarrow : \quad Q = K_v \sqrt{\frac{\Delta P}{d}} \quad \text{and} \quad \Delta P = \frac{Q^2 \cdot d}{K_v^2}$$

where :
 Q : volumetric flow - m³/h
 ΔP : Pressure loss - bar
 d : refrigerant density - kg/dm³

2) With specific volume (gas if $P_o > \frac{P_i}{2}$, $\Delta P < \frac{P_i}{2}$)

$$K_v = \frac{Q}{31.62 \sqrt{v \cdot \Delta P}} \quad \Rightarrow : \quad Q = 31.62 K_v \sqrt{v \cdot \Delta P} \quad \text{and} \quad \Delta P = \frac{Q^2}{1000 \cdot K_v^2 \cdot v}$$

with :
 Q : volumetric flow - m³/h
 P : pressure loss - bar
 v : specific volume at T_i and P_i - m³/Kg
 P_i and T_i : inlet temperature (°C) and pressure (b.a.)
 P_o : outlet pressure (b.a.)

| ANGLES VALVES | | STRAIGHT VALVES | |
|---------------|--------|-----------------|--------|
| DN | Kv | DN | Kv |
| 10 | 5.17 | 10 | 4.4 |
| 15 | 6.46 | 15 | 8.88 |
| 20 | 17.24 | 20 | 15.86 |
| 25 | 20.25 | 25 | 16.46 |
| 32 | 36.2 | 32 | 29.91 |
| 40 | 43.1 | 40 | 46.72 |
| 50 | 71.55 | 50 | 76 |
| 65 | 120.7 | 65 | 112 |
| 80 | 176.7 | 80 | 168.1 |
| 100 | 267.2 | 100 | 258.6 |
| 125 | 517.2 | 125 | 480.2 |
| 150 | 706.9 | 150 | 662.1 |
| 200 | 1237 | 200 | 1157.8 |
| 250 | 2112 | 250 | 1952.6 |
| 300 | 3017 | 300 | 2794 |
| 350 | 3846.5 | 350 | 3538.8 |
| 400 | 4878 | 400 | 4487 |
| 450 | 6235 | 450 | 5736.2 |

HAND REGULATING VALVES

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| | |
|--|-----------|
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HAND-REGULATING VALVES

RFF hand-regulating valves can be supplied with a material certificate for body and bonnet which guarantees the impact strength at -50°C.

The nominal pressure rating is 25 bar, with the possible higher pressure PN 65 on request.

RFF hand-regulating valves are constructed of low temperature carbon steel with stainless steel spindles and sealed by two O-rings with a special oil filled groove which provides a complete gas tight seal.

The O-rings can be replaced when the spindle is back-seated fully. Maintenance of the O-rings can be carried out without shutting down the plant.

RFF have redesigned the hand regulating valve Seat. The regulation of liquid flow is carried out by restricting the orifice size by the conical (cone) underneath the Seat. The new model has a new PTFE Seat which can be used to close the Regulating valve completely.

Hand regulating valves can be identified by a series of two grooves machined into the vertical bonnet surface. They are painted mauve in colour.

Hand-regulating valves have a normal maximum flow-rate which depends on their nominal diameters, but they can be fitted with special cones to give a higher-than-standard flow-rate.

The new Hand Regulating Valves can be described as straight through. Angle versions are possible for sizes DN 15, 25 and 40mm only. The angle valve dimensions are identical to the angle shut off valve sizes.

By using valves fitted with caps on installations using odourless refrigerant extra security is ensured. Gas refrigerant is contained under the cap which is manufactured with small hole drilled under the gasket. When the cap is unscrewed, any build-up of refrigerant gas inside the cap will escape through this hole and can be heard as a whistling noise. This is an indication that the O-rings in the gland nut have been damaged or are in poor condition.

All hand-regulating valves can be fitted with handwheels or caps.

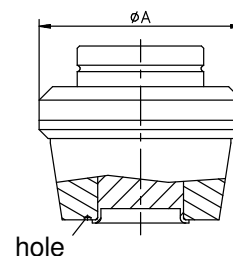
Branch connections on RFF hand-regulating valves can be :

- # for butt welding, "S" class (standard series)
- # for butt welding, "M" class (Din 2448)
- # for butt welding, "H" class Thickness 2 mm for stainless steel pipe
- # for brazing, "B" class
- # for socket welding, "K" class (fillet weld instead of full penetration weld)

Cones can be identified by holes on the under side of the seat.

| | | A | No. of holes |
|-----------------------|---------------------|----|--------------|
| DN 10/15 Cone size | 24 mm ² | 18 | 1 |
| | 36 mm ² | 18 | 2 |
| | 60 mm ² | 18 | 3 |
| DN 20/25 Cone size | 40 mm ² | 29 | 0 |
| | 56 mm ² | 29 | 1 |
| | 110 mm ² | 29 | 2 |
| DN 32/40 Cone size | 90 mm ² | 45 | 0 |
| | 140 mm ² | 45 | 1 |
| | 300 mm ² | 45 | 2 |
| | 500 mm ² | 45 | 3 |

EX : DN 10/15 - 24mm²



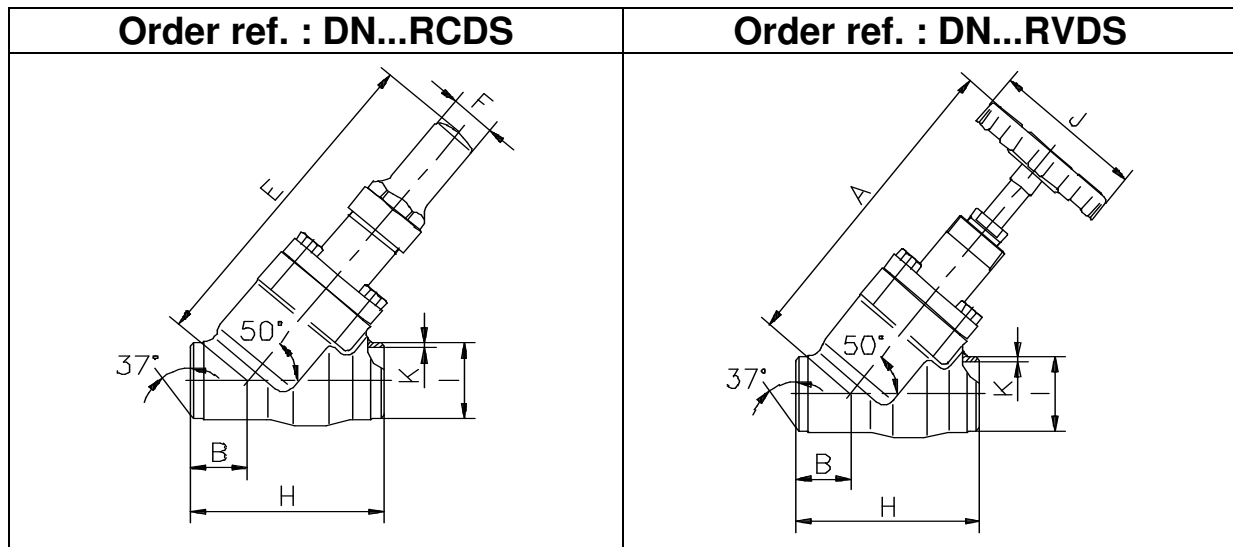
REFERENCES

| D | ... | R | x | x | x | Xxx |
|-------------|-----|------------------|------------------------------------|---------------------------|---|--|
| Steel range | DN | Regulating valve | V : with handwheel C : with cap | D : Straight E : Angle | Connections S : Butt welding ends - standard series M : Butt weldings end – Din 2448 B : Brazing ends K : Socket welding ends H : Butt welding Thickness 2 mm for stainless steel pipe | Cone : <u>DN 10/15</u> 024 : 24 mm ² usual cone DN 10 036 : 36 mm ² usual cone DN 15 060 : 60 mm ² <u>DN 20/25</u> 040 : 40 mm ² usual cone DN 20 056 : 56 mm ² usual cone DN 25 110 : 110 mm ² <u>DN 32/40</u> 090 : 90 mm ² usual cone DN 32 140 : 140 mm ² usual cone DN40 300 : 300 mm ² 500 : 500 mm ² |

| DN | BRANCH | | | | BODY* | BONNET | DISC-SEAL | SETTING | HANDWHEEL | CAP | BODY GASKET |
|----|--------|---|---|---|---------|---------|---------------|--------------|-------------|-------|---------------------|
| 10 | S | M | B | K | TStE355 | TStE355 | PTFE on steel | Conical seal | Bakelite | Steel | O-ring |
| 15 | S | M | B | K | TStE355 | TStE355 | PTFE on steel | Conical seal | Bakelite | Steel | O-ring |
| 20 | S | M | B | K | TStE355 | TStE355 | PTFE on steel | Conical seal | Bakelite | Steel | O-ring |
| 25 | S | M | B | K | TStE355 | TStE355 | PTFE on steel | Conical seal | Bakelite | Steel | O-ring |
| 32 | S | M | B | K | TStE355 | TStE355 | PTFE on steel | Conical seal | Sheet steel | Alu | O-ring + alu gasket |
| 40 | S | M | B | - | TStE355 | TStE355 | PTFE on steel | Conical seal | Sheet steel | Alu | O-ring + alu gasket |

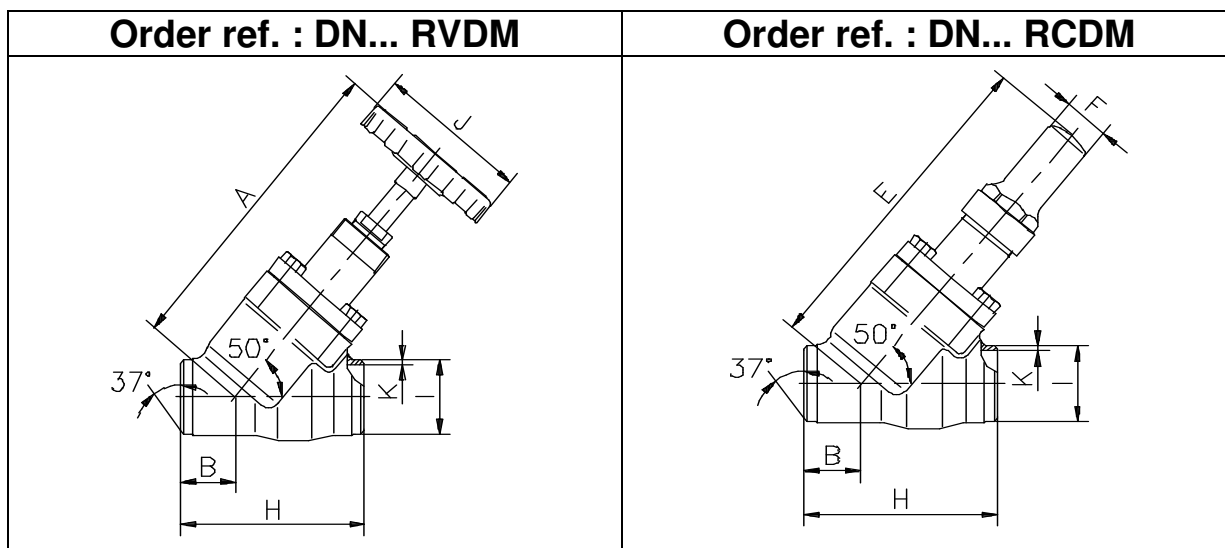
HAND REGULATING VALVES - 10 to 40mm "S" CLASS

STEEL



| DIMENSIONS IN MILLIMETERS | | | | | | | | | |
|---------------------------|----|-----|----|-----|----|-----|------|-----|-----|
| | DN | A * | B | E | F | H | I | J | K |
| 3/8" | 10 | 128 | 25 | 136 | 28 | 85 | 17.2 | 50 | 2.3 |
| 1/2" | 15 | 128 | 25 | 136 | 28 | 85 | 21.3 | 50 | 2.6 |
| 3/4" | 20 | 161 | 33 | 171 | 36 | 110 | 26.9 | 70 | 2.9 |
| 1" | 25 | 161 | 33 | 171 | 36 | 110 | 33.7 | 70 | 3.6 |
| 1 1/4" | 32 | 200 | 40 | 214 | 36 | 130 | 42.4 | 100 | 3.6 |
| 1 1/2" | 40 | 200 | 40 | 214 | 36 | 130 | 48.3 | 100 | 3.6 |

* Dimensions open valve

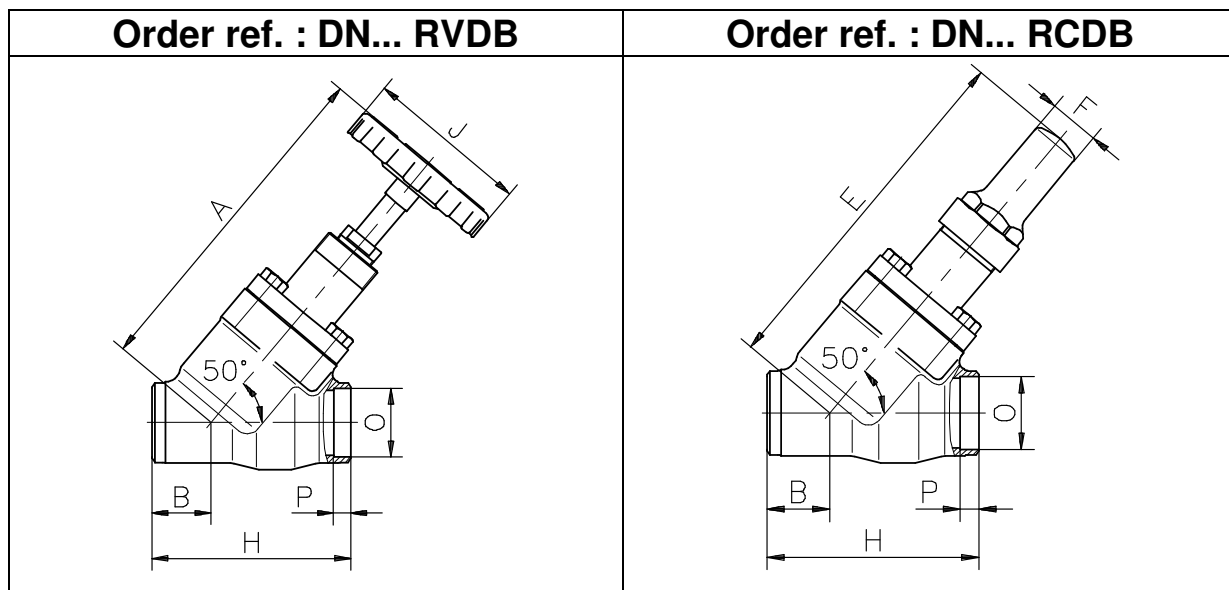


| DIMENSION IN MILLIMETERS | | | | | | | | | |
|--------------------------|----|-----|----|-----|----|-----|------|-----|-----|
| | DN | A * | B | E | F | H | I | J | K |
| 3/8" | 10 | 128 | 25 | 136 | 28 | 85 | 17.2 | 50 | 1.8 |
| 1/2" | 15 | 128 | 25 | 136 | 28 | 85 | 21.3 | 50 | 2 |
| 3/4" | 20 | 161 | 33 | 171 | 36 | 110 | 26.9 | 70 | 2.3 |
| 1" | 25 | 161 | 33 | 171 | 36 | 110 | 33.7 | 70 | 2.6 |
| 1 1/4" | 32 | 200 | 40 | 214 | 36 | 130 | 42.4 | 100 | 2.6 |
| 1 1/2" | 40 | 200 | 40 | 214 | 36 | 130 | 48.3 | 100 | 2.6 |

* Dimensions open valve

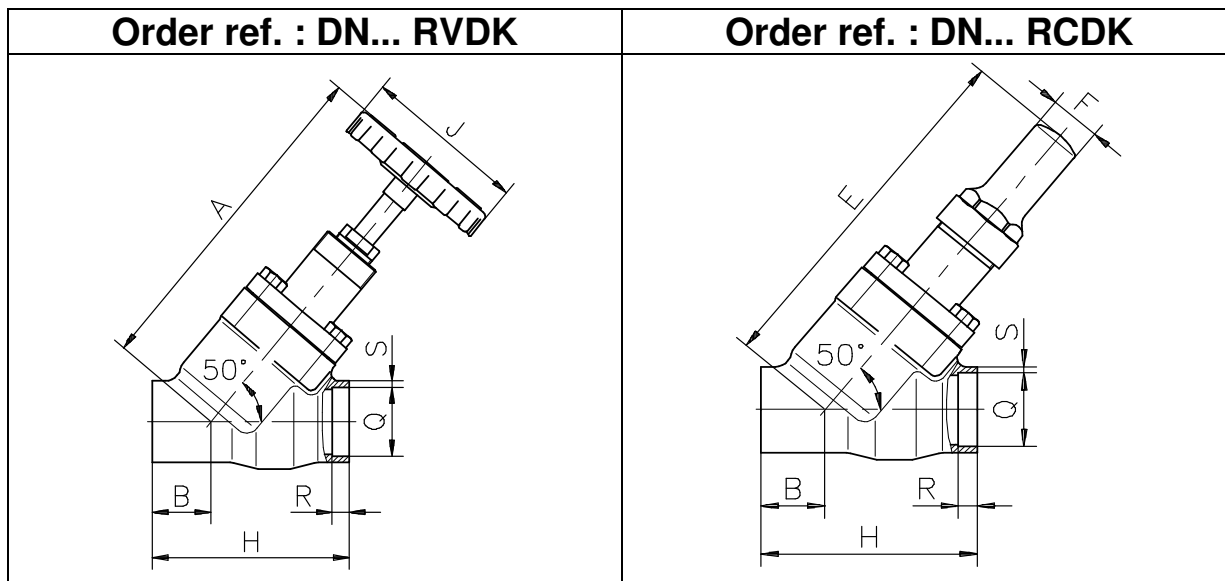
HAND REGULATING VALVES - 10 to 40 mm "B" CLASS

STEEL



| DIMENSIONS IN MILIMETRES | | | | | | | | | |
|--------------------------|----|-----|----|-----|----|-----|-----|------|------|
| | DN | A * | B | E | F | H | J | O | P |
| 1/2" | 10 | 128 | 25 | 136 | 28 | 85 | 50 | 12.9 | 12 |
| 5/8" | 15 | 128 | 25 | 136 | 28 | 85 | 50 | 16.1 | 15.5 |
| 7/8" | 20 | 161 | 33 | 171 | 36 | 110 | 70 | 22.4 | 20 |
| 1 1/8" | 25 | 161 | 33 | 171 | 36 | 110 | 70 | 28.8 | 20 |
| 1 3/8" | 32 | 200 | 40 | 214 | 36 | 130 | 100 | 35.2 | 22 |
| 1 5/8" | 40 | 200 | 40 | 214 | 36 | 130 | 100 | 41.5 | 22 |

* Dimensions open valve

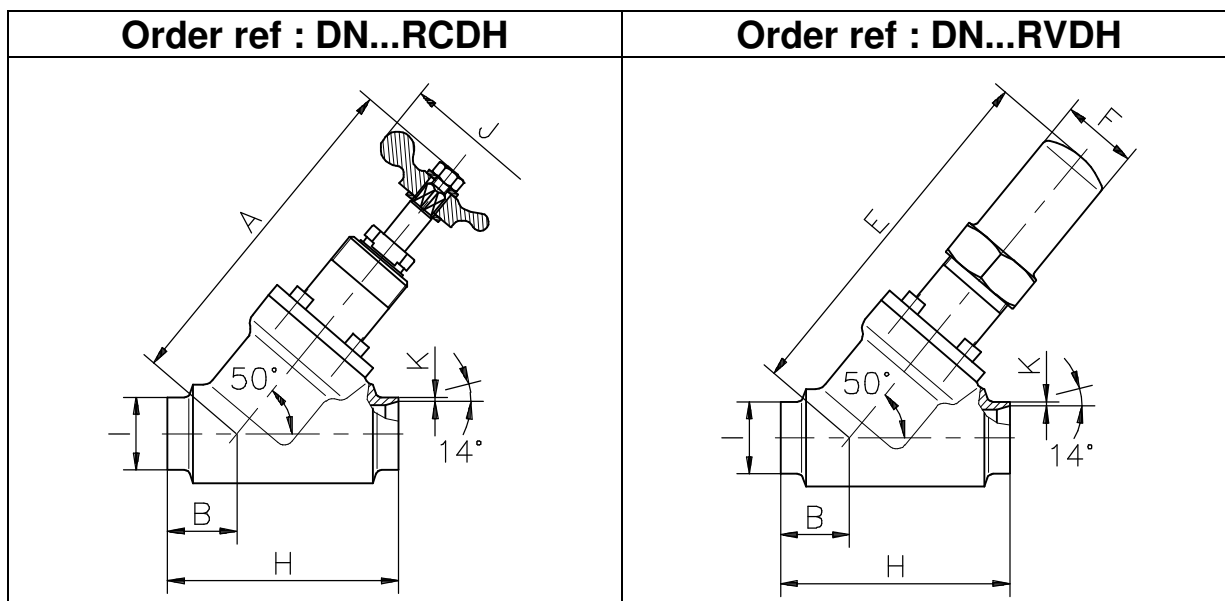


| DIMENSIONS IN MILIMETRES | | | | | | | | | | |
|--------------------------|----|-----|----|-----|----|-----|-----|------|----|-----|
| | DN | A * | B | E | F | H | J | Q | R | S |
| 3/8" | 10 | 128 | 25 | 136 | 28 | 85 | 50 | 17.5 | 10 | 7.2 |
| 1/2" | 15 | 128 | 25 | 136 | 28 | 85 | 50 | 21.9 | 10 | 5.1 |
| 3/4" | 20 | 161 | 33 | 171 | 36 | 110 | 70 | 27.4 | 13 | 9.3 |
| 1" | 25 | 161 | 33 | 171 | 36 | 110 | 70 | 34.1 | 13 | 5.9 |
| 1 1/4" | 32 | 200 | 40 | 214 | 36 | 130 | 100 | 42.9 | 13 | 5.3 |

* Dimensions valve open

HAND REGULATING VALVES - 10 to 40mm "H" CLASS

STEEL

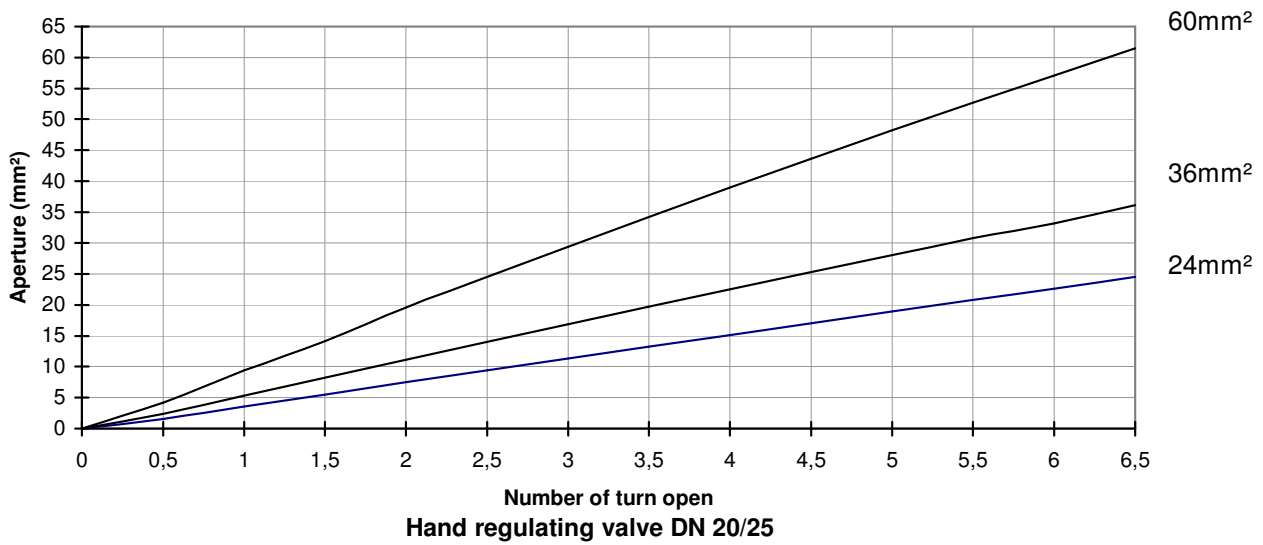


| DIMENSIONS IN MILIMETERS | | | | | | | | | |
|--------------------------|----|-----|----|-----|----|-----|------|-----|---|
| | DN | A * | B | E | F | H | I | J | K |
| 3/8" | 10 | 128 | 25 | 136 | 28 | 85 | 17.2 | 50 | 2 |
| 1/2" | 15 | 128 | 25 | 136 | 28 | 85 | 21.3 | 50 | 2 |
| 3/4" | 20 | 161 | 33 | 171 | 36 | 110 | 26.9 | 70 | 2 |
| 1" | 25 | 161 | 33 | 171 | 36 | 110 | 33.7 | 70 | 2 |
| 1 1/4" | 32 | 200 | 40 | 214 | 36 | 130 | 42.4 | 100 | 2 |
| 1 1/2" | 40 | 200 | 40 | 214 | 36 | 130 | 48.3 | 100 | 2 |

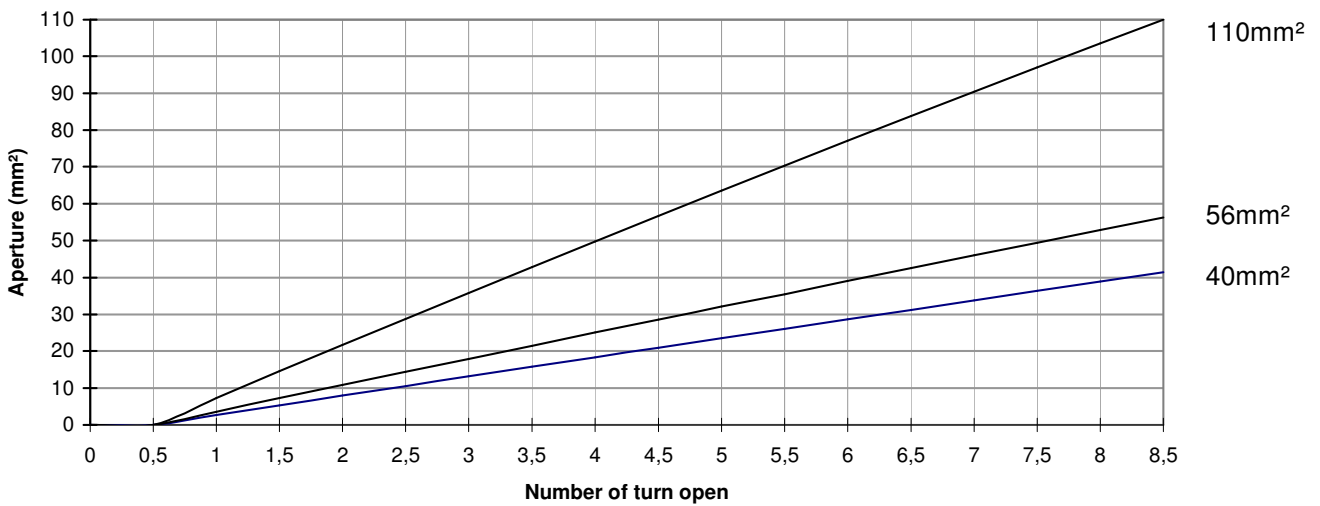
* Dimensions open valve

APERTURE OF HAND REGULATING VALVES from 10 to 40 mm

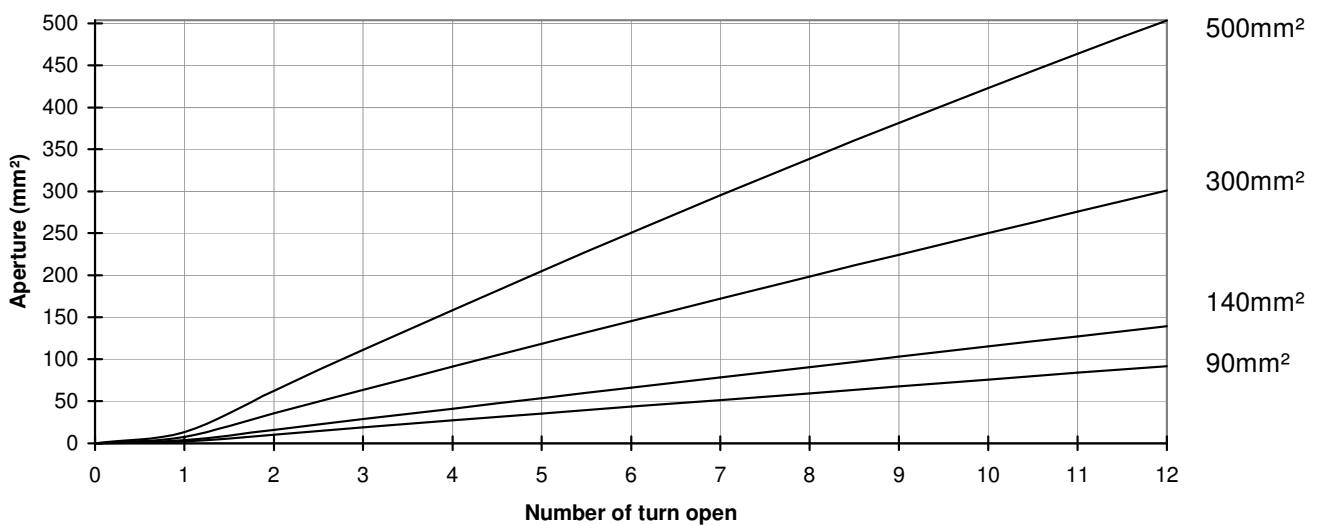
Hand regulating valve DN 10/15



Hand regulating valve DN 20/25



Hand regulating valve DN 32/40



COEFFICIENT DISCHARGE OF HAND REGULATING VALVES

OPERATION FOR LIQUID INLET / LIQUID OUTLET :

Valve coefficient k_v : This expresses the water volumetric flow-rate (cubic meter per hour : m^3/h) flowing through the valve, which creates a pressure loss of one bar.

That is :

$$K_v = Q \sqrt{\frac{d}{\Delta P}} \quad \Rightarrow : \quad Q = K_v \sqrt{\frac{\Delta P}{d}} \quad \text{and} \quad \Delta P = \frac{Q^2 \cdot d}{K_v^2}$$

where : Q : volumetric flow - m^3/h
 ΔP : pressure loss - bar
d : refrigerant density - Kg/dm^3

| FULL OPENING | | | | | | | | | | |
|-----------------------|------------------|--------------|-----------------------|------------------|--------------|-----------------------|------------------|---------------|---------------|---------------|
| DN 10/15 cone size | | | DN 20/25 cone size | | | DN 32/40 cone size | | | | |
| | 24 mm^2 (1) | 36 mm^2 | 60 mm^2 | 40 mm^2 (2) | 56 mm^2 | 110 mm^2 | 90 mm^2 (3) | 140 mm^2 | 300 mm^2 | 500 mm^2 |
| Kv | 1.35 | 1.86 | 2.52 | 2.09 | 2.79 | 4.61 | 4.78 | 7.03 | 12.94 | 19.03 |

(1) with DN 10 only
(2) with DN 20 only
(3) with DN 32 only

COEFFICIENT DISCHARGE OF HAND-REGULATING VALVES

OPERATION FOR LIQUID INLET / LIQUID-GAS MIXTURE OUTLET (FLASHING)

Values of the flow-rate coefficient F_L , which make it possible to calculate the "critical" flow-rate when "flashing" occurs :

$$K_v = \frac{Q}{F_L} \sqrt{\frac{d}{p_e - F_F \cdot p_s}} \Rightarrow Q = F_L \cdot K_v \sqrt{\frac{P_e - F_F \cdot P_s}{d}} \quad F_F = 0.96 - 0.28 \sqrt{\frac{p_s}{p_c}}$$

with :

avec

Q : liquid flow in m³/h (inlet)

d : liquid refrigerant density in Kg/dm³ (inlet)

p_i : inlet absolute pressure in bar

p_o : vapour absolute pressure in bar at the fluid temperature concerned (outlet)

p_c : critical absolute pressure in bar

F_L, K_v : see table

| | | F _L | K _v |
|-----------------------|------------------------|--------------------------|----------------|
| DN 10/15 Cone size | 24 mm ² (1) | 0.85 | 1.35 |
| | 36 mm ² | 0.89 | 1.86 |
| | 60 mm ² | 0.9 < F _L < 1 | 2.52 |
| DN 20/25 Cone size | 40 mm ² (2) | 0.85 | 2.09 |
| | 56 mm ² | 0.89 | 2.79 |
| | 110 mm ² | 0.9 < F _L < 1 | 4.61 |
| DN 32/40 Cone size | 90 mm ² (3) | 0.85 | 4.78 |
| | 140 mm ² | 0.89 | 7.03 |
| | 300 mm ² | 0.9 < F _L < 1 | 12.94 |
| | 500 mm ² | 0.9 < F _L < 1 | 19.03 |

(1) with DN 10 only

(2) with DN 20 only

(3) with DN 32 only

Following tables give you an estimate of refrigerating capacity (KW) for fully opened hand-regulating valves with principal refrigerants (calculated values without undercooling). P(KW) x 3600 = P(Kj/h).

When selecting a hand-regulating valve, a 30 % minimum margin is recommended, not include in the tables.

REFRIGERATING CAPACITY (Kw) FOR HAND-REGULATING VALVES

R717(NH3)

| OUTLET °C and bar a. | | INLET : °C and bar absolute | | | | | | | | OUTLET °C and bar a. | | INLET : °C and bar absolute | | | | | | | |
|----------------------------|-----|-----------------------------|-------------|-----------|------------|------------|-------------|-------------|-------------|----------------------------|------|-----------------------------|-------------|-----------|------------|------------|-------------|-------------|-------------|
| | | Pas. mm ² | -10 2.91 | 0 4.29 | 10 6.15 | 20 8.57 | 30 11.67 | 40 15.55 | 50 20.33 | | | Pas. mm ² | -10 2.91 | 0 4.29 | 10 6.15 | 20 8.57 | 30 11.67 | 40 15.55 | 50 20.33 |
| -50 | 24 | 505 | 599 | 692 | 783 | 869 | 949 | 1021 | -45 | 24 | 492 | 591 | 688 | 781 | 870 | 952 | 1026 | | |
| | 36 | 728 | 865 | 999 | 1129 | 1254 | 1369 | 1473 | | 36 | 710 | 853 | 992 | 1127 | 1255 | 1374 | 1480 | | |
| | 60 | 998 | 1185 | 1368 | 1548 | 1718 | 1876 | 2018 | | 60 | 973 | 1169 | 1359 | 1544 | 1720 | 1882 | 2028 | | |
| | 40 | 782 | 928 | 1072 | 1212 | 1346 | 1469 | 1580 | | 40 | 762 | 915 | 1065 | 1210 | 1347 | 1474 | 1588 | | |
| | 56 | 1093 | 1297 | 1498 | 1694 | 1881 | 2054 | 2209 | | 56 | 1065 | 1280 | 1488 | 1691 | 1883 | 2061 | 2220 | | |
| | 110 | 1826 | 2168 | 2504 | 2832 | 3143 | 3432 | 3692 | | 110 | 1780 | 2139 | 2487 | 2826 | 3146 | 3444 | 3710 | | |
| | 90 | 1789 | 2123 | 2452 | 2773 | 3078 | 3361 | 3615 | | 90 | 1743 | 2094 | 2436 | 2767 | 3081 | 3372 | 3633 | | |
| 0.41 | 140 | 2755 | 3270 | 3776 | 4270 | 4740 | 5176 | 5567 | 140 | 2684 | 3225 | 3751 | 4261 | 4745 | 5193 | 5595 | | | |
| | 300 | 5128 | 6087 | 7029 | 7949 | 8824 | 9636 | 10363 | 300 | 4997 | 6004 | 6983 | 7932 | 8833 | 9667 | 10415 | | | |
| | 500 | 7541 | 8951 | 10338 | 11690 | 12977 | 14171 | 15241 | 500 | 7348 | 8829 | 10270 | 11666 | 12990 | 14217 | 15316 | | | |
| | -40 | 24 | 481 | 585 | 684 | 780 | 871 | 955 | 1031 | -35 | 24 | 462 | 572 | 676 | 776 | 869 | 956 | 1033 | |
| | | 36 | 695 | 844 | 987 | 1126 | 1257 | 1378 | 1487 | | 36 | 667 | 825 | 976 | 1119 | 1254 | 1379 | 1491 | |
| | | 60 | 952 | 1156 | 1353 | 1543 | 1722 | 1888 | 2037 | | 60 | 914 | 1131 | 1337 | 1534 | 1719 | 1890 | 2043 | |
| | | 40 | 745 | 905 | 1060 | 1208 | 1349 | 1479 | 1596 | | 40 | 716 | 886 | 1047 | 1201 | 1346 | 1480 | 1600 | |
| 56 | | 1042 | 1266 | 1481 | 1689 | 1885 | 2067 | 2230 | 56 | | 1001 | 1238 | 1464 | 1679 | 1882 | 2069 | 2237 | | |
| 110 | | 1742 | 2115 | 2475 | 2822 | 3151 | 3455 | 3727 | 110 | | 1673 | 2070 | 2446 | 2806 | 3145 | 3457 | 3738 | | |
| 90 | | 1706 | 2071 | 2424 | 2764 | 3085 | 3383 | 3650 | 90 | | 1638 | 2027 | 2395 | 2748 | 3080 | 3386 | 3660 | | |
| 0.71 | 140 | 2627 | 3190 | 3733 | 4256 | 4752 | 5210 | 5621 | 140 | 2523 | 3121 | 3689 | 4232 | 4743 | 5214 | 5637 | | | |
| | 300 | 4890 | 5938 | 6948 | 7923 | 8845 | 9698 | 10462 | 300 | 4697 | 5810 | 6867 | 7877 | 8828 | 9706 | 10492 | | | |
| | 500 | 7191 | 8733 | 10219 | 11652 | 13008 | 14262 | 15387 | 500 | 6908 | 8545 | 10099 | 11585 | 12983 | 14274 | 15430 | | | |
| | -30 | 24 | 436 | 555 | 665 | 768 | 865 | 955 | 1035 | -25 | 24 | 402 | 532 | 649 | 758 | 859 | 952 | 1034 | |
| | | 36 | 630 | 801 | 959 | 1109 | 1249 | 1378 | 1493 | | 36 | 580 | 767 | 937 | 1094 | 1239 | 1373 | 1492 | |
| | | 60 | 863 | 1097 | 1314 | 1519 | 1711 | 1888 | 2046 | | 60 | 794 | 1051 | 1284 | 1499 | 1698 | 1881 | 2045 | |
| | | 40 | 676 | 859 | 1029 | 1190 | 1340 | 1478 | 1602 | | 40 | 622 | 823 | 1005 | 1174 | 1330 | 1473 | 1601 | |
| 56 | | 945 | 1201 | 1439 | 1663 | 1873 | 2067 | 2240 | 56 | | 870 | 1151 | 1405 | 1641 | 1859 | 2060 | 2239 | | |
| 110 | | 1580 | 2007 | 2404 | 2780 | 3131 | 3453 | 3742 | 110 | | 1453 | 1924 | 2349 | 2742 | 3107 | 3442 | 3741 | | |
| 90 | | 1547 | 1966 | 2355 | 2722 | 3066 | 3382 | 3665 | 90 | | 1423 | 1884 | 2300 | 2685 | 3043 | 3371 | 3663 | | |
| 1.2 | 140 | 2382 | 3027 | 3626 | 4192 | 4721 | 5208 | 5644 | 140 | 2192 | 2901 | 3542 | 4135 | 4686 | 5191 | 5641 | | | |
| | 300 | 4435 | 5635 | 6750 | 7804 | 8789 | 9695 | 10506 | 300 | 4080 | 5401 | 6594 | 7697 | 8723 | 9662 | 10501 | | | |
| | 500 | 6522 | 8287 | 9927 | 11476 | 12925 | 14257 | 15450 | 500 | 6000 | 7943 | 9697 | 11320 | 12829 | 14210 | 15443 | | | |
| | -20 | 24 | 353 | 501 | 628 | 744 | 850 | 946 | 1032 | -15 | 24 | 284 | 461 | 601 | 725 | 836 | 937 | 1027 | |
| | | 36 | 510 | 723 | 907 | 1073 | 1226 | 1365 | 1488 | | 36 | 410 | 665 | 867 | 1046 | 1207 | 1352 | 1481 | |
| | | 60 | 699 | 991 | 1242 | 1470 | 1680 | 1870 | 2039 | | 60 | 561 | 911 | 1188 | 1433 | 1654 | 1853 | 2030 | |
| | | 40 | 547 | 776 | 973 | 1152 | 1315 | 1465 | 1597 | | 40 | 440 | 713 | 931 | 1122 | 1295 | 1451 | 1590 | |
| 56 | | 765 | 1085 | 1360 | 1610 | 1839 | 2047 | 2233 | 56 | | 615 | 997 | 1301 | 1569 | 1811 | 2029 | 2222 | | |
| 110 | | 1279 | 1813 | 2273 | 2690 | 3073 | 3421 | 3731 | 110 | | 1027 | 1667 | 2174 | 2622 | 3026 | 3390 | 3713 | | |
| 90 | | 1253 | 1776 | 2226 | 2634 | 3009 | 3350 | 3654 | 90 | | 1006 | 1632 | 2129 | 2567 | 2963 | 3320 | 3636 | | |
| 1.9 | 140 | 1929 | 2735 | 3429 | 4057 | 4634 | 5159 | 5627 | 140 | 1550 | 2514 | 3279 | 3954 | 4563 | 5113 | 5600 | | | |
| | 300 | 3591 | 5091 | 6382 | 7552 | 8627 | 9604 | 10474 | 300 | 2885 | 4679 | 6103 | 7360 | 8494 | 9517 | 10424 | | | |
| | 500 | 5282 | 7487 | 9386 | 11106 | 12687 | 14124 | 15404 | 500 | 4243 | 6882 | 8975 | 10823 | 12491 | 13996 | 15330 | | | |
| | -10 | 24 | - | 406 | 566 | 700 | 819 | 925 | 1019 | -5 | 24 | - | 329 | 520 | 669 | 797 | 910 | 1008 | |
| | | 36 | - | 586 | 816 | 1010 | 1182 | 1335 | 1470 | | 36 | - | 475 | 750 | 965 | 1150 | 1312 | 1455 | |
| | | 60 | - | 803 | 1118 | 1384 | 1620 | 1829 | 2014 | | 60 | - | 651 | 1028 | 1323 | 1576 | 1798 | 1993 | |
| | | 40 | - | 629 | 876 | 1084 | 1268 | 1433 | 1578 | | 40 | - | 510 | 805 | 1036 | 1234 | 1409 | 1561 | |
| 56 | | - | 879 | 1224 | 1516 | 1773 | 2003 | 2205 | 56 | | - | 713 | 1126 | 1448 | 1725 | 1969 | 2182 | | |
| 110 | | - | 1469 | 2046 | 2533 | 2963 | 3347 | 3685 | 110 | | - | 1191 | 2003 | 2420 | 2883 | 3290 | 3646 | | |
| 90 | | - | 1439 | 2004 | 2480 | 2902 | 3278 | 3609 | 90 | | - | 1167 | 1842 | 2370 | 2823 | 3222 | 3571 | | |
| 2.91 | 140 | - | 2301 | 3086 | 3820 | 4469 | 5048 | 5558 | 140 | - | 1797 | 2837 | 3650 | 4348 | 4962 | 5499 | | | |
| | 300 | - | 4125 | 5745 | 7111 | 8318 | 9396 | 10346 | 300 | - | 3345 | 5281 | 6794 | 8094 | 9237 | 10236 | | | |
| | 500 | - | 6066 | 8449 | 10458 | 12234 | 13818 | 15215 | 500 | - | 4919 | 7766 | 9992 | 11903 | 13584 | 15054 | | | |
| | 0 | 24 | - | - | 460 | 629 | 769 | 890 | 994 | 5 | 24 | - | - | 377 | 579 | 734 | 864 | 976 | |
| | | 36 | - | - | 663 | 908 | 1110 | 1283 | 1434 | | 36 | - | - | 543 | 835 | 1059 | 1247 | 1408 | |
| | | 60 | - | - | 909 | 1244 | 1521 | 1759 | 1965 | | 60 | - | - | 745 | 1145 | 1451 | 1709 | 1929 | |
| | | 40 | - | - | 712 | 975 | 1191 | 1377 | 1539 | | 40 | - | - | 583 | 896 | 1137 | 1338 | 1511 | |
| 56 | | - | - | 995 | 1362 | 1665 | 1925 | 2151 | 56 | | - | - | 815 | 1253 | 1589 | 1871 | 2112 | | |
| 110 | | - | - | 1663 | 2277 | 2782 | 3218 | 3595 | 110 | | - | - | 1363 | 2094 | 2656 | 3126 | 3529 | | |
| 90 | | - | - | 1629 | 2230 | 2724 | 3151 | 3520 | 90 | | - | - | 1334 | 2051 | 2600 | 3062 | 3455 | | |
| 4.29 | 140 | - | - | 2508 | 3434 | 4196 | 4852 | 5421 | 140 | - | - | 2055 | 3158 | 4005 | 4715 | 5321 | | | |
| | 300 | - | - | 4669 | 6392 | 7810 | 9033 | 10091 | 300 | - | - | 3826 | 5879 | 7455 | 8776 | 9905 | | | |
| | 500 | - | - | 6866 | 9400 | 11486 | 13284 | 14841 | 500 | - | - | 5627 | 8647 | 10963 | 12907 | 14567 | | | |
| | 10 | 24 | - | - | - | 514 | 691 | 833 | 953 | 15 | 24 | - | - | - | 426 | 636 | 795 | 925 | |
| | | 36 | - | - | - | 741 | 996 | 1202 | 1375 | | 36 | - | - | - | 615 | 918 | 1147 | 1334 | |
| | | 60 | - | - | - | 1016 | 1365 | 1647 | 1884 | | 60 | - | - | - | 842 | 1258 | 1572 | 1828 | |
| | | 40 | - | - | - | 796 | 1069 | 1290 | 1475 | | 40 | - | - | - | 660 | 985 | 1231 | 1432 | |
| 56 | | - | - | - | 1112 | 1495 | 1803 | 2062 | 56 | | - | - | - | 922 | 1377 | 1721 | 2002 | | |
| 110 | | - | - | - | 1859 | 2498 | 3014 | 3446 | 110 | | - | - | - | 1541 | 2301 | 2875 | 3345 | | |
| 90 | | - | - | - | 1820 | 2446 | 2951 | 3375 | 90 | | - | - | - | 1509 | 2253 | 2816 | 3275 | | |
| 6.15 | 140 | - | - | - | 2803 | 3767 | 4545 | 5197 | 140 | - | - | - | 2325 | 3470 | 4336 | 5044 | | | |
| | 300 | - | - | - | 5218 | 7013 | 8460 | 9674 | 300 | - | - | - | 4328 | 6460 | 8072 | 9390 | | | |
| | 500 | - | - | - | 7674 | 10314 | 12442 | 14227 | 500 | - | - | - | 6364 | 9501 | 11871 | 13809 | | | |

REFRIGERATING CAPACITY (Kw) FOR HAND-REGULATING VALVES

R134a

| OUTLET °C and bar a. | Pas. mm ² | INLET : °C and bar absolute | | | | | | | | OUTLET °C and bar a. | Pas. mm ² | INLET : °C and bar absolute | | | | | | | |
|----------------------------|-------------------------|-----------------------------|-----------|------------|------------|-----------|-------------|-------------|-------------|----------------------------|-------------------------|-----------------------------|------------|------------|-----------|-------------|-------------|-----|--|
| | | -10 2.01 | 0 2.93 | 10 4.15 | 20 5.72 | 30 7.7 | 40 10.16 | 50 13.18 | -10 2.01 | | | 0 2.93 | 10 4.15 | 20 5.72 | 30 7.7 | 40 10.16 | 50 13.18 | | |
| -50 | 24 | 86 | 98 | 107 | 114 | 118 | 118 | 114 | -45 | 24 | 85 | 98 | 108 | 116 | 120 | 121 | 117 | | |
| | 36 | 125 | 141 | 155 | 165 | 170 | 171 | 165 | | 36 | 123 | 142 | 156 | 167 | 174 | 175 | 170 | | |
| | 60 | 171 | 194 | 212 | 226 | 234 | 234 | 226 | | 60 | 169 | 194 | 214 | 229 | 238 | 239 | 233 | | |
| | 40 | 134 | 152 | 166 | 177 | 183 | 183 | 177 | | 40 | 132 | 152 | 168 | 188 | 186 | 187 | 182 | | |
| | 56 | 187 | 212 | 233 | 248 | 256 | 256 | 247 | | 56 | 185 | 213 | 235 | 251 | 261 | 262 | 255 | | |
| | 110 | 313 | 355 | 389 | 414 | 428 | 428 | 414 | | 110 | 310 | 356 | 393 | 420 | 436 | 438 | 426 | | |
| | 90 | 306 | 348 | 381 | 405 | 419 | 419 | 405 | | 90 | 304 | 348 | 384 | 411 | 427 | 429 | 417 | | |
| | 140 | 472 | 536 | 587 | 625 | 645 | 646 | 624 | | 140 | 468 | 536 | 592 | 634 | 658 | 661 | 642 | | |
| 0.3 | 300 | 879 | 997 | 1093 | 1163 | 1201 | 1203 | 1162 | 300 | 871 | 999 | 1103 | 1180 | 1224 | 1231 | 1196 | | | |
| | 500 | 1293 | 1467 | 1608 | 1711 | 1767 | 1769 | 1709 | 500 | 1282 | 1469 | 1622 | 1735 | 1801 | 1811 | 1759 | | | |
| | -40 | 24 | 84 | 98 | 109 | 117 | 122 | 124 | 121 | -35 | 24 | 81 | 97 | 109 | 118 | 124 | 126 | 124 | |
| | | 36 | 121 | 141 | 157 | 169 | 177 | 178 | 174 | | 36 | 118 | 140 | 157 | 171 | 179 | 182 | 179 | |
| | | 60 | 166 | 193 | 215 | 232 | 242 | 245 | 239 | | 60 | 161 | 191 | 216 | 234 | 246 | 250 | 245 | |
| | | 40 | 130 | 151 | 169 | 182 | 189 | 192 | 187 | | 40 | 126 | 150 | 169 | 183 | 192 | 195 | 192 | |
| | | 56 | 182 | 212 | 236 | 254 | 265 | 268 | 262 | | 56 | 177 | 210 | 236 | 256 | 269 | 273 | 268 | |
| | | 110 | 305 | 354 | 395 | 425 | 443 | 448 | 438 | | 110 | 296 | 351 | 395 | 428 | 450 | 457 | 449 | |
| 90 | | 298 | 347 | 386 | 416 | 434 | 439 | 428 | 90 | | 290 | 343 | 387 | 419 | 440 | 447 | 439 | | |
| 140 | | 460 | 535 | 595 | 641 | 669 | 676 | 660 | 140 | | 446 | 529 | 596 | 646 | 678 | 689 | 677 | | |
| 0.52 | 300 | 856 | 995 | 1109 | 1193 | 1245 | 1259 | 1229 | 300 | 831 | 985 | 1109 | 1203 | 1263 | 1283 | 1260 | | | |
| | 500 | 1259 | 1464 | 1631 | 1755 | 1831 | 1851 | 1808 | 500 | 1222 | 1449 | 1632 | 1770 | 1857 | 1888 | 1854 | | | |
| | -30 | 24 | 78 | 95 | 108 | 119 | 125 | 128 | 127 | -25 | 24 | 72 | 92 | 107 | 119 | 126 | 130 | 129 | |
| | | 36 | 112 | 137 | 156 | 171 | 181 | 185 | 183 | | 36 | 105 | 133 | 155 | 171 | 182 | 188 | 187 | |
| | | 60 | 154 | 188 | 215 | 235 | 248 | 254 | 251 | | 60 | 143 | 182 | 212 | 235 | 250 | 257 | 256 | |
| | | 40 | 121 | 147 | 168 | 184 | 194 | 199 | 196 | | 40 | 112 | 142 | 166 | 184 | 196 | 202 | 200 | |
| | | 56 | 169 | 206 | 235 | 257 | 272 | 278 | 275 | | 56 | 157 | 199 | 232 | 257 | 274 | 282 | 280 | |
| | | 110 | 282 | 344 | 393 | 430 | 455 | 465 | 459 | | 110 | 263 | 333 | 388 | 430 | 458 | 471 | 468 | |
| 90 | | 276 | 337 | 385 | 421 | 445 | 455 | 450 | 90 | | 257 | 327 | 380 | 421 | 449 | 462 | 459 | | |
| 140 | | 426 | 519 | 593 | 649 | 686 | 701 | 692 | 140 | | 397 | 503 | 586 | 649 | 691 | 711 | 707 | | |
| 0.85 | 300 | 793 | 966 | 1104 | 1209 | 1277 | 1305 | 1289 | 300 | 739 | 937 | 1091 | 1208 | 1287 | 1324 | 1316 | | | |
| | 500 | 1167 | 1421 | 1624 | 1778 | 1878 | 1920 | 1896 | 500 | 1086 | 1378 | 1605 | 1777 | 1893 | 1947 | 1935 | | | |
| | -20 | 24 | 65 | 88 | 105 | 118 | 127 | 131 | 132 | -15 | 24 | 53 | 82 | 102 | 116 | 127 | 132 | 133 | |
| | | 36 | 93 | 127 | 152 | 170 | 183 | 190 | 190 | | 36 | 77 | 118 | 147 | 168 | 183 | 191 | 193 | |
| | | 60 | 128 | 174 | 208 | 234 | 251 | 260 | 260 | | 60 | 105 | 162 | 201 | 231 | 251 | 262 | 264 | |
| | | 40 | 100 | 136 | 163 | 183 | 197 | 204 | 204 | | 40 | 82 | 127 | 158 | 181 | 197 | 205 | 207 | |
| | | 56 | 140 | 190 | 228 | 256 | 275 | 285 | 285 | | 56 | 115 | 177 | 221 | 253 | 275 | 287 | 289 | |
| | | 110 | 235 | 318 | 381 | 428 | 460 | 477 | 477 | | 110 | 193 | 296 | 369 | 423 | 460 | 480 | 484 | |
| 90 | | 230 | 312 | 373 | 419 | 450 | 467 | 467 | 90 | | 189 | 290 | 361 | 414 | 450 | 470 | 474 | | |
| 140 | | 354 | 480 | 574 | 645 | 694 | 719 | 719 | 140 | | 291 | 447 | 556 | 637 | 693 | 725 | 730 | | |
| 1.33 | 300 | 660 | 894 | 1069 | 1202 | 1292 | 1339 | 1339 | 300 | 543 | 833 | 1036 | 1187 | 1291 | 1349 | 1359 | | | |
| | 500 | 970 | 1315 | 1573 | 1767 | 1900 | 1969 | 1970 | 500 | 799 | 1225 | 1524 | 1746 | 1899 | 1985 | 1999 | | | |
| | -10 | 24 | - | 73 | 97 | 114 | 126 | 133 | 135 | -5 | 24 | - | 61 | 91 | 111 | 124 | 133 | 136 | |
| | | 36 | - | 106 | 140 | 165 | 182 | 192 | 195 | | 36 | - | 88 | 131 | 160 | 180 | 192 | 197 | |
| | | 60 | - | 145 | 192 | 226 | 250 | 263 | 267 | | 60 | - | 121 | 179 | 219 | 246 | 263 | 270 | |
| | | 40 | - | 114 | 150 | 177 | 195 | 206 | 209 | | 40 | - | 95 | 140 | 171 | 193 | 206 | 211 | |
| | | 56 | - | 159 | 210 | 247 | 273 | 288 | 293 | | 56 | - | 132 | 196 | 240 | 270 | 288 | 295 | |
| | | 110 | - | 266 | 352 | 414 | 457 | 482 | 490 | | 110 | - | 221 | 329 | 401 | 451 | 482 | 494 | |
| 90 | | - | 260 | 345 | 405 | 447 | 472 | 479 | 90 | | - | 217 | 322 | 393 | 442 | 472 | 483 | | |
| 140 | | - | 401 | 531 | 624 | 689 | 727 | 738 | 140 | | - | 334 | 496 | 605 | 681 | 727 | 745 | | |
| 2.01 | 300 | - | 747 | 989 | 1163 | 1283 | 1354 | 1375 | 300 | - | 622 | 923 | 1127 | 1267 | 1354 | 1386 | | | |
| | 500 | - | 1099 | 1455 | 1710 | 1888 | 1992 | 2022 | 500 | - | 916 | 1358 | 1657 | 1864 | 1991 | 2039 | | | |
| | 0 | 24 | - | - | 82 | 106 | 122 | 132 | 137 | 5 | 24 | - | - | 69 | 99 | 118 | 130 | 137 | |
| | | 36 | - | - | 118 | 153 | 176 | 191 | 197 | | 36 | - | - | 99 | 143 | 171 | 188 | 197 | |
| | | 60 | - | - | 162 | 209 | 241 | 262 | 271 | | 60 | - | - | 136 | 196 | 234 | 258 | 270 | |
| | | 40 | - | - | 126 | 164 | 189 | 205 | 212 | | 40 | - | - | 107 | 153 | 183 | 202 | 212 | |
| | | 56 | - | - | 177 | 229 | 264 | 286 | 296 | | 56 | - | - | 149 | 214 | 256 | 283 | 296 | |
| | | 110 | - | - | 296 | 383 | 442 | 479 | 495 | | 110 | - | - | 250 | 358 | 428 | 473 | 495 | |
| 90 | | - | - | 290 | 375 | 433 | 469 | 485 | 90 | | - | - | 245 | 351 | 419 | 463 | 485 | | |
| 140 | | - | - | 447 | 578 | 667 | 722 | 747 | 140 | | - | - | 377 | 541 | 646 | 713 | 747 | | |
| 2.93 | 300 | - | - | 832 | 1076 | 1241 | 1345 | 1391 | 300 | - | - | 703 | 1007 | 1203 | 1328 | 1390 | | | |
| | 500 | - | - | 1224 | 1583 | 1826 | 1978 | 2046 | 500 | - | - | 1034 | 1481 | 1770 | 1953 | 2045 | | | |
| | 10 | 24 | - | - | - | 90 | 113 | 128 | 136 | 15 | 24 | - | - | - | 77 | 106 | 124 | 134 | |
| | | 36 | - | - | - | 129 | 163 | 185 | 196 | | 36 | - | - | - | 111 | 153 | 179 | 194 | |
| | | 60 | - | - | - | 177 | 224 | 253 | 269 | | 60 | - | - | - | 152 | 210 | 246 | 266 | |
| | | 40 | - | - | - | 139 | 175 | 198 | 210 | | 40 | - | - | - | 119 | 164 | 192 | 208 | |
| | | 56 | - | - | - | 194 | 245 | 277 | 294 | | 56 | - | - | - | 167 | 230 | 269 | 291 | |
| | | 110 | - | - | - | 325 | 410 | 463 | 492 | | 110 | - | - | - | 279 | 385 | 450 | 486 | |
| 90 | | - | - | - | 318 | 401 | 454 | 482 | 90 | | - | - | - | 273 | 377 | 440 | 476 | | |
| 140 | | - | - | - | 490 | 618 | 699 | 743 | 140 | | - | - | - | 420 | 580 | 679 | 734 | | |
| 4.15 | 300 | - | - | - | 913 | 1151 | 1302 | 1383 | 300 | - | - | - | 783 | 1081 | 1264 | 1366 | | | |
| | 500 | - | - | - | 1343 | 1694 | 1915 | 2034 | 500 | - | - | - | 1152 | 1590 | 1858 | 2009 | | | |

REFRIGERATING CAPACITY (Kw) FOR HAND REGULATING VALVES

R22

| OUTLET °C and bar a. | Pas. mm ² | INLET : °C and bar absolute | | | | | | | OUTLET °C and bar a. | Pas. mm ² | INLET : °C and bar absolute | | | | | | | | |
|----------------------------|-------------------------|-----------------------------|-----------|------------|-----------|-------------|-------------|-------------|----------------------------|-------------------------|-----------------------------|-----------|------------|-----------|-------------|-------------|-------------|-----|-----|
| | | -10 3.54 | 0 4.98 | 10 6.81 | 20 9.1 | 30 11.92 | 40 15.34 | 50 19.42 | | | -10 3.54 | 0 4.98 | 10 6.81 | 20 9.1 | 30 11.92 | 40 15.34 | 50 19.42 | | |
| -50 | 24 | 122 | 138 | 152 | 163 | 170 | 174 | 173 | -45 | 24 | 120 | 138 | 152 | 164 | 172 | 176 | 175 | | |
| | 36 | 177 | 200 | 220 | 235 | 246 | 251 | 250 | | 36 | 173 | 199 | 220 | 236 | 248 | 254 | 253 | | |
| | 60 | 242 | 274 | 301 | 323 | 337 | 344 | 342 | | 60 | 238 | 272 | 301 | 324 | 340 | 348 | 347 | | |
| | 40 | 189 | 215 | 236 | 253 | 264 | 270 | 268 | | 40 | 186 | 213 | 236 | 254 | 266 | 273 | 272 | | |
| | 56 | 265 | 300 | 330 | 353 | 369 | 377 | 375 | | 56 | 260 | 298 | 330 | 355 | 372 | 381 | 380 | | |
| | 110 | 443 | 502 | 552 | 591 | 617 | 630 | 626 | | 110 | 436 | 499 | 552 | 593 | 623 | 638 | 636 | | |
| | 0.64 | 90 | 434 | 491 | 540 | 578 | 604 | 617 | | 613 | 0.83 | 90 | 427 | 488 | 540 | 581 | 610 | 624 | 623 |
| | 140 | 669 | 757 | 832 | 891 | 931 | 951 | 945 | | 140 | 657 | 752 | 832 | 895 | 939 | 962 | 959 | | |
| 300 | 1245 | 1410 | 1549 | 1658 | 1733 | 1770 | 1759 | 300 | 1224 | 1400 | 1549 | 1666 | 1748 | 1791 | 1785 | | | | |
| 500 | 1831 | 2073 | 2278 | 2439 | 2550 | 2603 | 2587 | 500 | 1800 | 2060 | 2278 | 2451 | 2571 | 2634 | 2626 | | | | |
| -40 | 24 | 117 | 136 | 152 | 164 | 173 | 178 | 178 | -35 | 24 | 113 | 133 | 150 | 164 | 174 | 179 | 180 | | |
| | 36 | 169 | 196 | 219 | 237 | 250 | 257 | 257 | | 36 | 163 | 193 | 217 | 237 | 251 | 259 | 260 | | |
| | 60 | 232 | 269 | 300 | 325 | 342 | 352 | 352 | | 60 | 223 | 264 | 298 | 324 | 344 | 355 | 356 | | |
| | 40 | 182 | 211 | 235 | 254 | 268 | 276 | 276 | | 40 | 175 | 207 | 233 | 254 | 269 | 278 | 279 | | |
| | 56 | 254 | 295 | 329 | 356 | 375 | 385 | 385 | | 56 | 245 | 289 | 326 | 355 | 376 | 388 | 390 | | |
| | 110 | 425 | 493 | 550 | 595 | 627 | 644 | 644 | | 110 | 409 | 484 | 545 | 594 | 629 | 649 | 652 | | |
| | 0.64 | 90 | 416 | 482 | 538 | 582 | 614 | 631 | | 631 | 1.32 | 90 | 400 | 473 | 534 | 582 | 616 | 636 | 638 |
| | 140 | 640 | 743 | 829 | 897 | 945 | 972 | 972 | | 140 | 617 | 729 | 822 | 896 | 949 | 979 | 983 | | |
| 300 | 1193 | 1384 | 1544 | 1670 | 1760 | 1809 | 1810 | 300 | 1149 | 1358 | 1531 | 1668 | 1767 | 1824 | 1831 | | | | |
| 500 | 1754 | 2035 | 2270 | 2456 | 2588 | 2661 | 2662 | 500 | 1690 | 1997 | 2252 | 2454 | 2598 | 2682 | 2693 | | | | |
| -30 | 24 | 107 | 130 | 148 | 163 | 174 | 180 | 182 | -25 | 24 | 99 | 125 | 145 | 162 | 173 | 181 | 183 | | |
| | 36 | 154 | 187 | 214 | 236 | 251 | 260 | 262 | | 36 | 143 | 180 | 210 | 233 | 250 | 261 | 264 | | |
| | 60 | 212 | 257 | 294 | 323 | 344 | 357 | 360 | | 60 | 196 | 247 | 288 | 320 | 343 | 358 | 362 | | |
| | 40 | 166 | 201 | 230 | 253 | 269 | 279 | 282 | | 40 | 153 | 194 | 226 | 251 | 269 | 280 | 284 | | |
| | 56 | 232 | 281 | 322 | 354 | 377 | 391 | 394 | | 56 | 215 | 271 | 315 | 350 | 376 | 392 | 397 | | |
| | 110 | 388 | 471 | 538 | 591 | 630 | 653 | 658 | | 110 | 359 | 453 | 527 | 586 | 628 | 655 | 663 | | |
| | 0.64 | 90 | 380 | 461 | 527 | 579 | 617 | 640 | | 645 | 2.01 | 90 | 352 | 443 | 516 | 574 | 615 | 642 | 650 |
| | 140 | 585 | 710 | 812 | 892 | 950 | 985 | 993 | | 140 | 542 | 683 | 796 | 884 | 948 | 988 | 1001 | | |
| 300 | 1089 | 1322 | 1511 | 1660 | 1769 | 1834 | 1849 | 300 | 1009 | 1272 | 1481 | 1645 | 1765 | 1840 | 1863 | | | | |
| 500 | 1602 | 1944 | 2222 | 2442 | 2601 | 2698 | 2719 | 500 | 1484 | 1871 | 2179 | 2419 | 2596 | 2706 | 2740 | | | | |
| -20 | 24 | 88 | 118 | 141 | 159 | 172 | 181 | 184 | -15 | 24 | 73 | 111 | 136 | 156 | 171 | 180 | 185 | | |
| | 36 | 127 | 171 | 204 | 230 | 249 | 261 | 266 | | 36 | 106 | 159 | 196 | 225 | 246 | 260 | 266 | | |
| | 60 | 175 | 234 | 280 | 315 | 341 | 358 | 364 | | 60 | 145 | 217 | 269 | 309 | 338 | 357 | 365 | | |
| | 40 | 137 | 184 | 219 | 247 | 267 | 280 | 285 | | 40 | 113 | 170 | 211 | 242 | 265 | 280 | 286 | | |
| | 56 | 191 | 257 | 307 | 345 | 374 | 392 | 399 | | 56 | 159 | 238 | 295 | 338 | 370 | 391 | 400 | | |
| | 110 | 320 | 429 | 513 | 577 | 625 | 655 | 667 | | 110 | 265 | 398 | 493 | 565 | 619 | 654 | 668 | | |
| | 0.64 | 90 | 313 | 420 | 502 | 565 | 612 | 642 | | 653 | 2.96 | 90 | 260 | 390 | 483 | 554 | 606 | 640 | 655 |
| | 140 | 483 | 648 | 773 | 871 | 943 | 989 | 1006 | | 140 | 400 | 600 | 744 | 853 | 933 | 986 | 1008 | | |
| 300 | 899 | 1206 | 1440 | 1621 | 1755 | 1841 | 1872 | 300 | 746 | 1118 | 1385 | 1588 | 1737 | 1835 | 1877 | | | | |
| 500 | 1323 | 1773 | 2118 | 2385 | 2581 | 2707 | 2754 | 500 | 1097 | 1645 | 2037 | 2336 | 2555 | 2699 | 2761 | | | | |
| -10 | 24 | - | 98 | 129 | 152 | 168 | 179 | 184 | -5 | 24 | - | 82 | 120 | 146 | 165 | 177 | 184 | | |
| | 36 | - | 142 | 186 | 219 | 243 | 259 | 266 | | 36 | - | 119 | 173 | 211 | 238 | 256 | 265 | | |
| | 60 | - | 195 | 255 | 300 | 333 | 355 | 365 | | 60 | - | 164 | 237 | 289 | 326 | 351 | 364 | | |
| | 40 | - | 152 | 200 | 235 | 261 | 278 | 286 | | 40 | - | 128 | 186 | 226 | 255 | 275 | 285 | | |
| | 56 | - | 213 | 280 | 329 | 364 | 388 | 400 | | 56 | - | 179 | 260 | 316 | 357 | 384 | 398 | | |
| | 110 | - | 356 | 468 | 549 | 609 | 649 | 668 | | 110 | - | 300 | 435 | 528 | 596 | 642 | 666 | | |
| | 0.64 | 90 | - | 349 | 458 | 538 | 596 | 636 | | 654 | 4.21 | 90 | - | 293 | 426 | 517 | 584 | 629 | 652 |
| | 140 | - | 538 | 705 | 829 | 919 | 979 | 1008 | | 140 | - | 452 | 656 | 797 | 899 | 969 | 1004 | | |
| 300 | - | 1002 | 1314 | 1543 | 1711 | 1823 | 1877 | 300 | - | 842 | 1221 | 1484 | 1674 | 1803 | 1870 | | | | |
| 500 | - | 1473 | 1932 | 2269 | 2516 | 2681 | 2760 | 500 | - | 1238 | 1795 | 2183 | 2463 | 2652 | 2750 | | | | |
| 0 | 24 | - | - | 108 | 138 | 160 | 174 | 182 | 5 | 24 | - | - | 92 | 129 | 154 | 171 | 180 | | |
| | 36 | - | - | 156 | 200 | 231 | 252 | 263 | | 36 | - | - | 133 | 186 | 222 | 246 | 260 | | |
| | 60 | - | - | 214 | 274 | 316 | 345 | 361 | | 60 | - | - | 182 | 255 | 304 | 338 | 357 | | |
| | 40 | - | - | 167 | 214 | 248 | 270 | 283 | | 40 | - | - | 143 | 200 | 238 | 264 | 279 | | |
| | 56 | - | - | 234 | 300 | 346 | 378 | 395 | | 56 | - | - | 199 | 279 | 333 | 370 | 391 | | |
| | 110 | - | - | 391 | 502 | 579 | 632 | 661 | | 110 | - | - | 334 | 467 | 557 | 618 | 653 | | |
| | 0.64 | 90 | - | 383 | 491 | 567 | 619 | 647 | | 5.84 | 90 | - | - | 327 | 458 | 546 | 605 | 640 | |
| | 140 | - | - | 590 | 757 | 874 | 953 | 997 | | 140 | - | - | 503 | 705 | 841 | 933 | 986 | | |
| 300 | - | - | 1099 | 1409 | 1626 | 1775 | 1856 | 300 | - | - | 937 | 1313 | 1565 | 1737 | 1835 | | | | |
| 500 | - | - | 1617 | 2072 | 2392 | 2610 | 2730 | 500 | - | - | 1378 | 1930 | 2302 | 2554 | 2699 | | | | |
| 10 | 24 | - | - | - | 117 | 146 | 166 | 177 | 15 | 24 | - | - | - | 101 | 137 | 160 | 174 | | |
| | 36 | - | - | - | 169 | 211 | 239 | 256 | | 36 | - | - | - | 146 | 197 | 231 | 251 | | |
| | 60 | - | - | - | 231 | 289 | 328 | 351 | | 60 | - | - | - | 200 | 270 | 316 | 344 | | |
| | 40 | - | - | - | 181 | 227 | 257 | 275 | | 40 | - | - | - | 157 | 212 | 247 | 269 | | |
| | 56 | - | - | - | 253 | 317 | 359 | 385 | | 56 | - | - | - | 219 | 296 | 346 | 376 | | |
| | 110 | - | - | - | 423 | 530 | 601 | 643 | | 110 | - | - | - | 366 | 495 | 579 | 629 | | |
| | 0.64 | 90 | - | - | 415 | 519 | 588 | 630 | | 7.89 | 90 | - | - | - | 359 | 485 | 567 | 616 | |
| | 140 | - | - | - | 639 | 799 | 906 | 970 | | 140 | - | - | - | 552 | 747 | 873 | 949 | | |
| 300 | - | - | - | 1190 | 1488 | 1687 | 1805 | 300 | - | - | - | 1029 | 1391 | 1625 | 1766 | | | | |
| 500 | - | - | - | 1750 | 2188 | 2481 | 2655 | 500 | - | - | - | 1513 | 2046 | 2390 | 2598 | | | | |

REFRIGERATING CAPACITY (Kw) FOR HAND-REGULATING VALVES

R404a

| OUTLET | | INLET : °C and bar absolute | | | | | | | OUTLET | | INLET : °C and bar absolute | | | | | | |
|---------------|----------------------|-----------------------------|-----------|------------|-------------|-------------|-------------|-------------|---------------|----------------------|-----------------------------|-----------|------------|-------------|-------------|-------------|-------------|
| °C and bar a. | Pas. mm ² | 4.4 -10 | 6.11 0 | 8.28 10 | 10.98 20 | 14.29 30 | 18.29 40 | 23.08 50 | °C and bar a. | Pas. mm ² | -10 4.4 | 0 6.11 | 10 8.28 | 20 10.98 | 30 14.29 | 40 18.29 | 50 23.08 |
| -50 | 24 | 99 | 108 | 113 | 113 | 107 | 96 | 76 | -45 | 24 | 99 | 108 | 114 | 115 | 110 | 100 | 81 |
| | 36 | 144 | 156 | 163 | 163 | 155 | 138 | 110 | | 36 | 142 | 157 | 165 | 166 | 160 | 144 | 117 |
| | 60 | 197 | 214 | 223 | 223 | 213 | 190 | 151 | | 60 | 195 | 215 | 226 | 228 | 219 | 197 | 160 |
| | 40 | 154 | 167 | 175 | 175 | 167 | 149 | 119 | | 40 | 153 | 168 | 177 | 178 | 171 | 154 | 125 |
| | 56 | 216 | 234 | 244 | 244 | 233 | 208 | 166 | | 56 | 214 | 235 | 247 | 249 | 240 | 216 | 175 |
| | 110 | 361 | 391 | 408 | 409 | 390 | 348 | 278 | | 110 | 358 | 393 | 414 | 417 | 401 | 361 | 293 |
| | 90 | 353 | 383 | 400 | 400 | 382 | 340 | 272 | | 90 | 350 | 385 | 405 | 408 | 392 | 354 | 287 |
| | 140 | 544 | 590 | 616 | 617 | 588 | 525 | 419 | | 140 | 540 | 593 | 624 | 629 | 605 | 545 | 442 |
| 300 | 1014 | 1099 | 1147 | 1148 | 1095 | 977 | 780 | 300 | 1005 | 1104 | 1162 | 1171 | 1126 | 1015 | 824 | | |
| 500 | 1491 | 1617 | 1688 | 1689 | 1611 | 1437 | 1147 | 500 | 1479 | 1624 | 1709 | 1723 | 1656 | 1492 | 1211 | | |
| -40 | 24 | 97 | 108 | 115 | 117 | 113 | 103 | 85 | -35 | 24 | 94 | 107 | 115 | 118 | 116 | 106 | 89 |
| | 36 | 140 | 156 | 166 | 169 | 163 | 149 | 122 | | 36 | 136 | 155 | 167 | 171 | 167 | 153 | 128 |
| | 60 | 192 | 214 | 228 | 231 | 224 | 204 | 168 | | 60 | 187 | 212 | 228 | 234 | 229 | 210 | 176 |
| | 40 | 150 | 168 | 178 | 181 | 175 | 160 | 131 | | 40 | 146 | 166 | 179 | 183 | 179 | 165 | 138 |
| | 56 | 210 | 234 | 249 | 228 | 245 | 223 | 184 | | 56 | 204 | 232 | 250 | 257 | 251 | 230 | 192 |
| | 110 | 352 | 392 | 417 | 424 | 411 | 373 | 308 | | 110 | 342 | 389 | 418 | 429 | 419 | 385 | 322 |
| | 90 | 344 | 384 | 408 | 415 | 402 | 366 | 301 | | 90 | 335 | 381 | 409 | 420 | 411 | 377 | 315 |
| | 140 | 531 | 591 | 629 | 639 | 619 | 563 | 464 | | 140 | 516 | 586 | 631 | 647 | 632 | 581 | 486 |
| 300 | 988 | 1101 | 1171 | 1190 | 1153 | 1049 | 865 | 300 | 961 | 1092 | 1175 | 1205 | 1178 | 1082 | 904 | | |
| 500 | 1453 | 1620 | 1722 | 1750 | 1696 | 1543 | 1272 | 500 | 1413 | 1606 | 1728 | 1772 | 1732 | 1591 | 1330 | | |
| -30 | 24 | 90 | 105 | 115 | 119 | 118 | 109 | 93 | -25 | 24 | 84 | 102 | 114 | 120 | 119 | 112 | 96 |
| | 36 | 130 | 152 | 166 | 172 | 170 | 158 | 134 | | 36 | 122 | 148 | 165 | 173 | 172 | 162 | 139 |
| | 60 | 179 | 209 | 228 | 236 | 233 | 216 | 183 | | 60 | 167 | 203 | 226 | 237 | 236 | 221 | 190 |
| | 40 | 140 | 163 | 179 | 185 | 183 | 169 | 143 | | 40 | 131 | 159 | 177 | 186 | 185 | 173 | 149 |
| | 56 | 196 | 229 | 250 | 259 | 255 | 237 | 201 | | 56 | 183 | 222 | 247 | 260 | 259 | 243 | 208 |
| | 110 | 328 | 382 | 418 | 433 | 427 | 396 | 336 | | 110 | 307 | 372 | 414 | 434 | 433 | 406 | 348 |
| | 90 | 321 | 374 | 409 | 424 | 418 | 388 | 329 | | 90 | 300 | 364 | 405 | 425 | 424 | 397 | 341 |
| | 140 | 494 | 577 | 630 | 653 | 644 | 598 | 507 | | 140 | 463 | 561 | 624 | 655 | 653 | 612 | 525 |
| 300 | 920 | 1074 | 1173 | 1216 | 1200 | 1113 | 943 | 300 | 862 | 1044 | 1162 | 1220 | 1216 | 1139 | 978 | | |
| 500 | 1353 | 1579 | 1725 | 1789 | 1765 | 1637 | 1388 | 500 | 1268 | 1535 | 1710 | 1795 | 1788 | 1676 | 1438 | | |
| -20 | 24 | 76 | 98 | 112 | 120 | 120 | 114 | 99 | -15 | 24 | 65 | 92 | 109 | 119 | 121 | 116 | 102 |
| | 36 | 110 | 142 | 162 | 173 | 174 | 165 | 143 | | 36 | 94 | 133 | 158 | 171 | 175 | 167 | 147 |
| | 60 | 151 | 194 | 222 | 237 | 239 | 226 | 196 | | 60 | 129 | 183 | 216 | 235 | 240 | 230 | 202 |
| | 40 | 119 | 152 | 174 | 185 | 187 | 177 | 154 | | 40 | 101 | 143 | 169 | 184 | 188 | 180 | 158 |
| | 56 | 166 | 213 | 243 | 259 | 261 | 247 | 215 | | 56 | 141 | 200 | 237 | 257 | 263 | 251 | 221 |
| | 110 | 278 | 356 | 407 | 434 | 437 | 414 | 360 | | 110 | 236 | 335 | 396 | 430 | 439 | 420 | 370 |
| | 90 | 272 | 349 | 398 | 425 | 428 | 405 | 352 | | 90 | 231 | 328 | 388 | 421 | 430 | 412 | 362 |
| | 140 | 419 | 537 | 614 | 654 | 659 | 624 | 542 | | 140 | 356 | 505 | 598 | 649 | 663 | 634 | 558 |
| 300 | 780 | 1001 | 1143 | 1218 | 1227 | 1162 | 1010 | 300 | 663 | 941 | 1113 | 1209 | 1234 | 1181 | 1039 | | |
| 500 | 1147 | 1472 | 1681 | 1792 | 1805 | 1709 | 1486 | 500 | 975 | 1383 | 1637 | 1778 | 1814 | 1737 | 1529 | | |
| -10 | 24 | - | 84 | 105 | 117 | 121 | 117 | 104 | -5 | 24 | - | 72 | 99 | 114 | 120 | 118 | 106 |
| | 36 | - | 121 | 152 | 169 | 175 | 169 | 151 | | 36 | - | 105 | 143 | 164 | 174 | 170 | 154 |
| | 60 | - | 166 | 208 | 231 | 240 | 232 | 207 | | 60 | - | 144 | 196 | 225 | 238 | 234 | 211 |
| | 40 | - | 130 | 163 | 181 | 188 | 182 | 162 | | 40 | - | 112 | 153 | 176 | 186 | 183 | 165 |
| | 56 | - | 182 | 228 | 253 | 262 | 254 | 227 | | 56 | - | 157 | 214 | 247 | 261 | 256 | 231 |
| | 110 | - | 305 | 381 | 424 | 439 | 425 | 379 | | 110 | - | 263 | 359 | 413 | 436 | 428 | 386 |
| | 90 | - | 299 | 373 | 415 | 430 | 416 | 371 | | 90 | - | 258 | 351 | 404 | 427 | 419 | 378 |
| | 140 | - | 460 | 574 | 639 | 662 | 641 | 572 | | 140 | - | 397 | 541 | 623 | 657 | 645 | 582 |
| 300 | - | 857 | 1069 | 1190 | 1233 | 1194 | 1064 | 300 | - | 739 | 1008 | 1160 | 1224 | 1202 | 1085 | | |
| 500 | - | 1260 | 1572 | 1750 | 1813 | 1757 | 1566 | 500 | - | 1088 | 1482 | 1706 | 1800 | 1768 | 1595 | | |
| 0 | 24 | - | - | 91 | 110 | 118 | 118 | 108 | 5 | 24 | - | - | 80 | 104 | 116 | 118 | 109 |
| | 36 | - | - | 131 | 158 | 171 | 170 | 156 | | 36 | - | - | 115 | 150 | 167 | 170 | 158 |
| | 60 | - | - | 180 | 217 | 234 | 234 | 214 | | 60 | - | - | 158 | 206 | 229 | 233 | 216 |
| | 40 | - | - | 141 | 170 | 183 | 183 | 167 | | 40 | - | - | 123 | 161 | 180 | 182 | 169 |
| | 56 | - | - | 197 | 238 | 257 | 256 | 234 | | 56 | - | - | 173 | 225 | 251 | 255 | 237 |
| | 110 | - | - | 329 | 397 | 429 | 428 | 391 | | 110 | - | - | 289 | 377 | 420 | 427 | 396 |
| | 90 | - | - | 322 | 389 | 420 | 419 | 383 | | 90 | - | - | 283 | 369 | 411 | 418 | 388 |
| | 140 | - | - | 497 | 599 | 648 | 646 | 591 | | 140 | - | - | 436 | 569 | 634 | 644 | 598 |
| 300 | - | - | 925 | 1116 | 1206 | 1202 | 1100 | 300 | - | - | 812 | 1059 | 1180 | 1198 | 1113 | | |
| 500 | - | - | 1360 | 1642 | 1773 | 1768 | 1617 | 500 | - | - | 1194 | 1557 | 1735 | 1763 | 1636 | | |
| 10 | 24 | - | - | - | 96 | 111 | 116 | 109 | 15 | 24 | - | - | - | 85 | 106 | 113 | 109 |
| | 36 | - | - | - | 138 | 161 | 167 | 158 | | 36 | - | - | - | 123 | 153 | 164 | 157 |
| | 60 | - | - | - | 190 | 221 | 229 | 216 | | 60 | - | - | - | 169 | 210 | 224 | 215 |
| | 40 | - | - | - | 149 | 173 | 179 | 169 | | 40 | - | - | - | 132 | 164 | 175 | 168 |
| | 56 | - | - | - | 208 | 242 | 251 | 237 | | 56 | - | - | - | 185 | 230 | 246 | 236 |
| | 110 | - | - | - | 348 | 404 | 420 | 396 | | 110 | - | - | - | 309 | 384 | 411 | 394 |
| | 90 | - | - | - | 340 | 396 | 411 | 388 | | 90 | - | - | - | 303 | 376 | 402 | 386 |
| | 140 | - | - | - | 524 | 610 | 633 | 597 | | 140 | - | - | - | 467 | 580 | 619 | 594 |
| 300 | - | - | - | 977 | 1136 | 1179 | 1112 | 300 | - | - | - | 869 | 1080 | 1153 | 1107 | | |
| 500 | - | - | - | 1436 | 1671 | 1735 | 1635 | 500 | - | - | - | 1278 | 1588 | 1696 | 1628 | | |

CHECK VALVE

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CHECK VALVES

RFF Check valves may be supplied with a material certificate for the body and the bonnet which guarantees impact strength at -50°C .

The nominal pressure rating is 25 bar, with possible higher pressure on request PN 40 or PN 65 (depending on diameter)

Check valves sizes 10 to 40mm and 125 to 250mm are sealed by PTFE, and check valves sizes 50 to 100mm are sealed by an O-ring.

To avoid damage during disassembly, check valves with PTFE seats (DN 10 to 40) have a captive seat assembly.

The size of a check valve on an installation should be carefully selected especially if ammoniac is used : The check valve should not be oversized or it may start to "chatter" when operating.

Branch connections on RFF check valves can be :

- # for butt welding, "S" class (standard series)
- # for butt welding, "M" class (Din 2448)
- # for brazing, "B" class
- # for socket welding, "K" class. (angle weld instead of full penetration weld).
- # for butt welding, "H" class Thickness 2mm for stainless steel pipe.

Check valves are supplied painted in blue to indicate the no-return function. Contrary to filters, they don't have a groove on the top surface of the flange.

Check valves can be installed in any position but it is recommended to use angle check valves vertically allowing the seats weight to aid closing.

Spring strength for check valves :

| <u>DN</u> | <u>START OPENING PRESSURE</u> (bar) | <u>END OPENING FORCE</u> (DaN) | <u>SEAT AREA</u> (cm ²) |
|-----------|--|-----------------------------------|--|
| 10/15 | 0.097 | 0.33 | 2.54 |
| 20/25 | 0.06 | 0.53 | 6.16 |
| 32/40 | 0.02 | 0.44 | 15.9 |
| 50 | 0.035 | 1.47 | 23.76 |
| 65 | 0.024 | 1.4 | 38.48 |
| 80 | 0.018 | 2 | 55.42 |
| 100 | 0.018 | 3.2 | 84.95 |
| 125 | 0.037 | 6.5 | 134.78 |
| 150 | 0.037 | 11 | 188.69 |
| 200 | 0.035 | 16.35 | 277.59 |
| 250 | 0.035 | 25 | 422.73 |

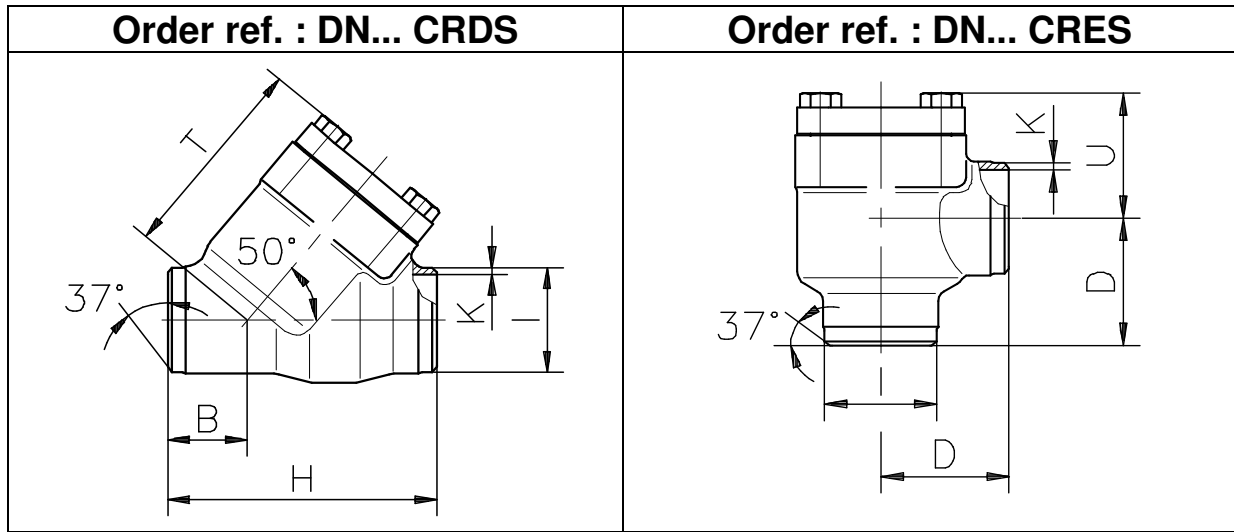
CHECK VALVES

| REFERENCES | | | | |
|-------------|-----|-------------|---------------------------|--|
| D | ... | CR | x | x |
| Steel range | DN | Check valve | D : Straight E : Angle | <u>Connections</u> S : Butt welding ends – standard series M : Butt weldings end – Din 2448 B : Brazing ends K : Socket welding ends H : Butt welding Thickness 2 mm for stainless steel pipe |

| DN | BRANCH | | | | | BODY* | BONNET* | DISC-SEAL | BODY GASKET |
|-----|--------|---|---|---|---|---------|---------|-----------------|-------------|
| 10 | S | M | H | B | K | TStE355 | TStE355 | PTFE on steel | O-ring |
| 15 | S | M | H | B | K | TStE355 | TStE355 | PTFE on steel | O-ring |
| 20 | S | M | H | B | K | TStE355 | TStE355 | PTFE on steel | O-ring |
| 25 | S | M | H | B | K | TStE355 | TStE355 | PTFE on steel | O-ring |
| 32 | S | M | H | B | K | TStE355 | TStE355 | PTFE on steel | O-ring |
| 40 | S | M | H | B | - | TStE355 | TStE355 | PTFE on steel | O-ring |
| 50 | S | M | H | B | - | TStE355 | TStE355 | O-ring on steel | Flat gasket |
| 65 | S | M | H | B | - | TStE355 | TStE355 | O-ring on steel | Flat gasket |
| 80 | S | M | H | B | - | GS21Mn5 | TStE355 | O-ring on steel | Flat gasket |
| 100 | S | M | H | B | - | GS21Mn5 | TStE355 | O-ring on steel | Flat gasket |
| 125 | S | M | H | - | - | GS21Mn5 | P275NL2 | PTFE on steel | O-ring |
| 150 | S | M | H | - | - | GS21Mn5 | P275NL2 | PTFE on steel | O-ring |
| 200 | S | M | H | - | - | GS21Mn5 | P275NL2 | PTFE on steel | O-ring |
| 250 | s | M | H | - | - | GS21Mn5 | P275NL2 | PTFE on steel | O-ring |

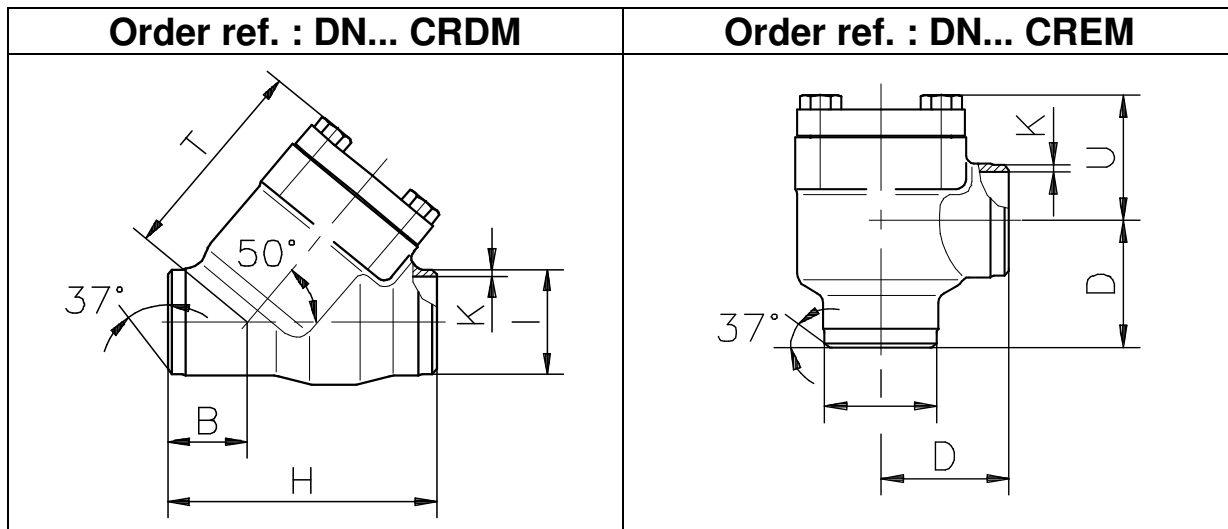
CHECK VALVES FROM 10 TO 250mm FOR WELDING "S"

STEEL



| DIMENSIONS IN MILLIMETERS | | | | | | | | |
|---------------------------|------|-----|-----|-----|-------|-----|------|-----|
| | DN | B | D | H | I | K | T | U |
| 3/8" | 10 | 25 | 39 | 85 | 17.2 | 2.3 | 55.6 | 39 |
| 1/2" | 15 | 25 | 39 | 85 | 21.3 | 2.6 | 55.6 | 39 |
| 3/4" | 20 | 33 | 46 | 110 | 26.9 | 2.9 | 71.5 | 46 |
| 1" | 25 | 33 | 46 | 110 | 33.7 | 3.6 | 71.5 | 46 |
| 1 1/4" | 32 | 40 | 57 | 130 | 42.4 | 3.6 | 93.5 | 55 |
| 1 1/2" | 40 | 40 | 57 | 130 | 48.3 | 3.6 | 93.5 | 55 |
| 2" | 50 | 41 | 69 | 152 | 60.3 | 4 | 118 | 68 |
| 2 1/2" | 65 # | 49 | 85 | 186 | 76.1 | 5 | 144 | 81 |
| 3" | 80 | 54 | 85 | 238 | 88.9 | 5.6 | 177 | 89 |
| 4" | 100 | 58 | 105 | 275 | 114.4 | 6.3 | 210 | 108 |
| 5" | 125 | 66 | 120 | 308 | 141.3 | 7.1 | 258 | 135 |
| 6" | 150 | 71 | 135 | 344 | 168.3 | 7.1 | 294 | 152 |
| 8" | 200 | 88 | 170 | 427 | 219.1 | 8 | 370 | 188 |
| 10" | 250 | 106 | 215 | 527 | 273 | 9.3 | 498 | 215 |

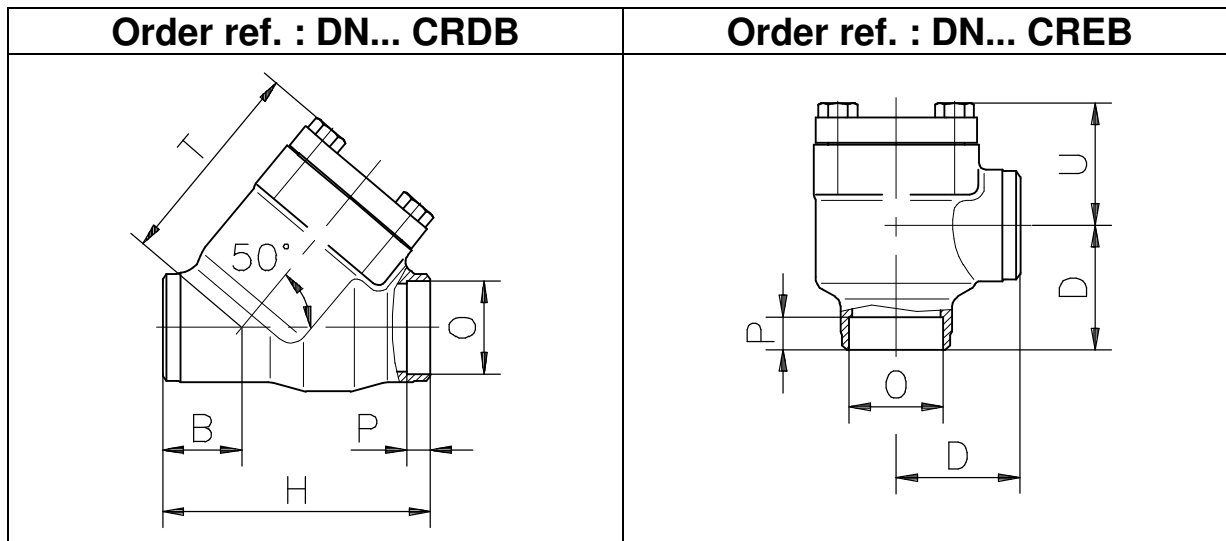
DN 65 : Ref S065CRDUSA or S065CREUSA
I = 73 , K = 5.2



| DIMENSIONS IN MILLIMETERS | | | | | | | | |
|---------------------------|-----|-----|-----|-----|-------|-----|------|-----|
| | DN | B | D | H | I | K | T | U |
| 3/8" | 10 | 25 | 39 | 85 | 17.2 | 1.8 | 55.6 | 39 |
| 1/2" | 15 | 25 | 39 | 85 | 21.3 | 2 | 55.6 | 39 |
| 3/4" | 20 | 33 | 46 | 110 | 26.9 | 2.3 | 71.5 | 46 |
| 1" | 25 | 33 | 46 | 110 | 33.7 | 2.6 | 71.5 | 46 |
| 1 1/4" | 32 | 40 | 57 | 130 | 42.4 | 2.6 | 93.5 | 55 |
| 1 1/2" | 40 | 40 | 57 | 130 | 48.3 | 2.6 | 93.5 | 55 |
| 2" | 50 | 41 | 69 | 152 | 60.3 | 2.9 | 118 | 68 |
| 2 1/2" | 65 | 49 | 85 | 186 | 76.1 | 2.9 | 144 | 81 |
| 3" | 80 | 54 | 85 | 238 | 88.9 | 3.2 | 177 | 89 |
| 4" | 100 | 58 | 105 | 275 | 114.4 | 3.6 | 210 | 108 |
| 5" | 125 | 66 | 120 | 308 | 141.3 | 4.5 | 258 | 135 |
| 6" | 150 | 71 | 135 | 344 | 168.3 | 4.5 | 294 | 152 |
| 8" | 200 | 88 | 170 | 427 | 219.1 | 6.3 | 370 | 188 |
| 10" | 250 | 106 | 215 | 527 | 273 | 6.3 | 498 | 215 |

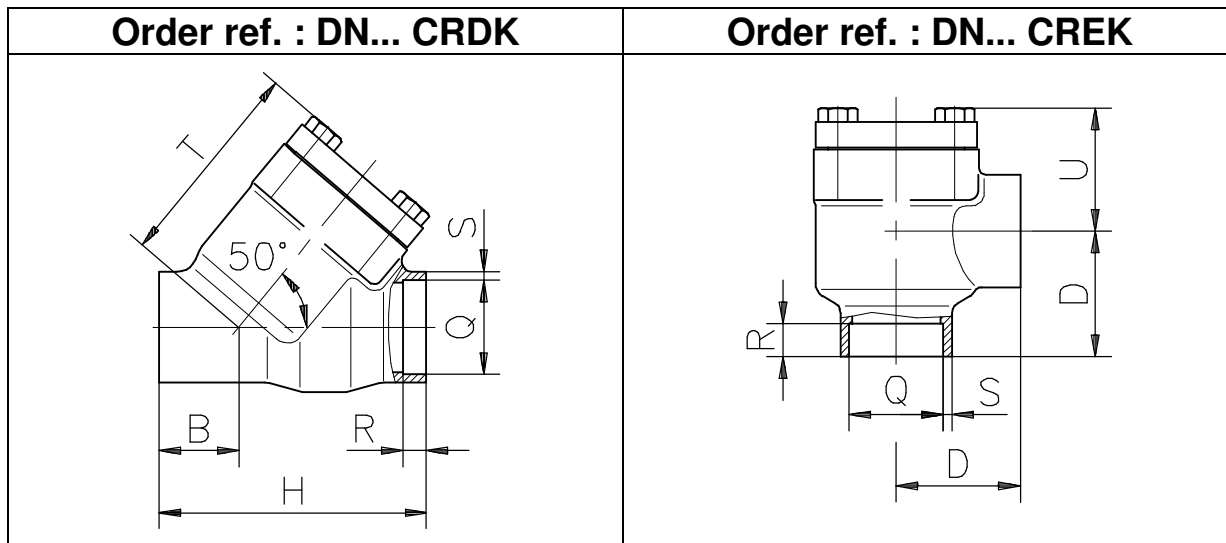
CHECK VALVES FROM 10 TO 100mm FOR BRAZING "B"

STEEL



| DIMENSIONS IN MILLIMETERS | | | | | | | | |
|---------------------------|-----|----|-----|-----|------|------|------|-----|
| | DN | B | D | H | O | P | T | U |
| 1/2" | 10 | 25 | 39 | 85 | 12.9 | 12 | 55.6 | 39 |
| 5/8" | 15 | 25 | 39 | 85 | 16.1 | 15.5 | 55.6 | 39 |
| 7/8" | 20 | 33 | 46 | 110 | 22.4 | 20 | 71.5 | 46 |
| 1 1/8" | 25 | 33 | 46 | 110 | 28.8 | 20 | 71.5 | 46 |
| 1 3/8" | 32 | 40 | 57 | 130 | 35.2 | 22 | 93.5 | 55 |
| 1 5/8" | 40 | 40 | 57 | 130 | 41.5 | 22 | 93.5 | 55 |
| 2 1/8" | 50 | 41 | 69 | 152 | 54.2 | 25 | 118 | 68 |
| 2 5/8" | 65 | 49 | 85 | 186 | 66.9 | 25 | 144 | 81 |
| 3 1/8" | 80 | 54 | 85 | 238 | 79.6 | 30 | 177 | 89 |
| 4 1/8" | 100 | 58 | 105 | 275 | 105 | 30 | 210 | 108 |

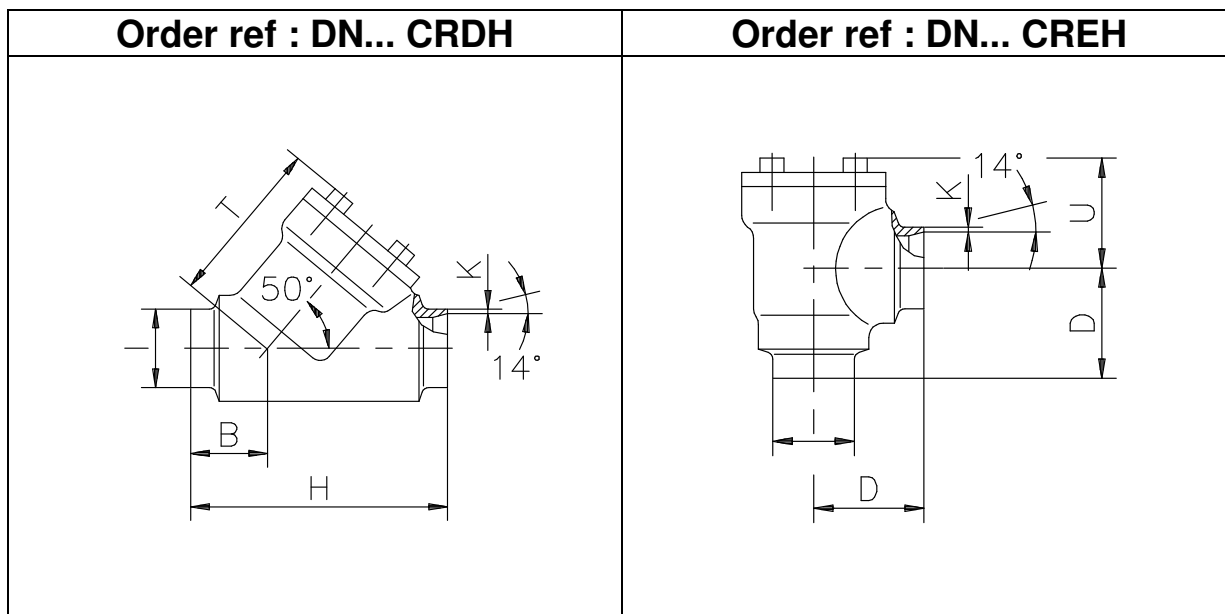
CHECK VALVES FROM 10 TO 32 mm SOCKET "K"



| DIMENSIONS IN MILLIMETERS | | | | | | | | | |
|---------------------------|----|----|----|-----|------|----|-----|------|----|
| | DN | B | D | H | Q | R | S | T | U |
| 3/8" | 10 | 25 | 39 | 85 | 17.6 | 10 | 7.2 | 55.6 | 39 |
| 1/2" | 15 | 25 | 39 | 85 | 21.9 | 10 | 5.1 | 55.6 | 39 |
| 3/4" | 20 | 33 | 46 | 110 | 27.4 | 13 | 9.3 | 71.5 | 46 |
| 1" | 25 | 33 | 46 | 110 | 34.1 | 13 | 5.9 | 71.5 | 46 |
| 1 1/4" | 32 | 40 | 57 | 130 | 42.9 | 13 | 5.3 | 93.5 | 55 |

CHECK VALVES FROM 10 TO 250mm FOR WELDING "H"

STEEL



| DIMENSIONS IN MILLIMETERS | | | | | | | | |
|---------------------------|-----|-----|-----|-----|-------|---|------|-----|
| | DN | B | D | H | I | K | T | U |
| 3/8" | 10 | 25 | 39 | 85 | 17.2 | 2 | 55.6 | 39 |
| 1/2" | 15 | 25 | 39 | 85 | 21.3 | 2 | 55.6 | 39 |
| 3/4" | 20 | 33 | 46 | 110 | 26.9 | 2 | 71.5 | 46 |
| 1" | 25 | 33 | 46 | 110 | 33.7 | 2 | 71.5 | 46 |
| 1 1/4" | 32 | 40 | 57 | 130 | 42.4 | 2 | 93.5 | 55 |
| 1 1/2" | 40 | 40 | 57 | 130 | 48.3 | 2 | 93.5 | 55 |
| 2" | 50 | 41 | 69 | 152 | 60.3 | 2 | 118 | 68 |
| 2 1/2" | 65 | 49 | 85 | 186 | 76.1 | 2 | 144 | 81 |
| 3" | 80 | 54 | 85 | 238 | 88.9 | 2 | 177 | 89 |
| 4" | 100 | 58 | 105 | 275 | 114.4 | 2 | 210 | 108 |
| 5" | 125 | 66 | 120 | 308 | 141.3 | 2 | 258 | 135 |
| 6" | 150 | 71 | 135 | 344 | 168.3 | 2 | 294 | 152 |
| 8" | 200 | 88 | 170 | 427 | 219.1 | 2 | 370 | 188 |
| 10" | 250 | 106 | 215 | 527 | 273 | 2 | 498 | 215 |

STOP/CHECK VALVES

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STOP/CHECK VALVES FROM 10 TO 250 mm

RFF stop/check valves can operate at the same time as both stop valves and check valves. When they are open, they act as check valves, but it is possible to lock them in the closed position, and they act as stop valves.

They are identical in design to standard versions of RFF valves. Maintenance and installation procedures are identical to the corresponding RFF standard valve.

The nominal pressure is 25 bar with temperature range from -50°C up to +150°C. Also available in PN 65 or PN 40 on request (depending on diameter).

The size of a stop/check valve on an installation should be carefully selected especially if ammoniac is used : The stop/check valve should not be oversized or it may start to "chatter" when operating.

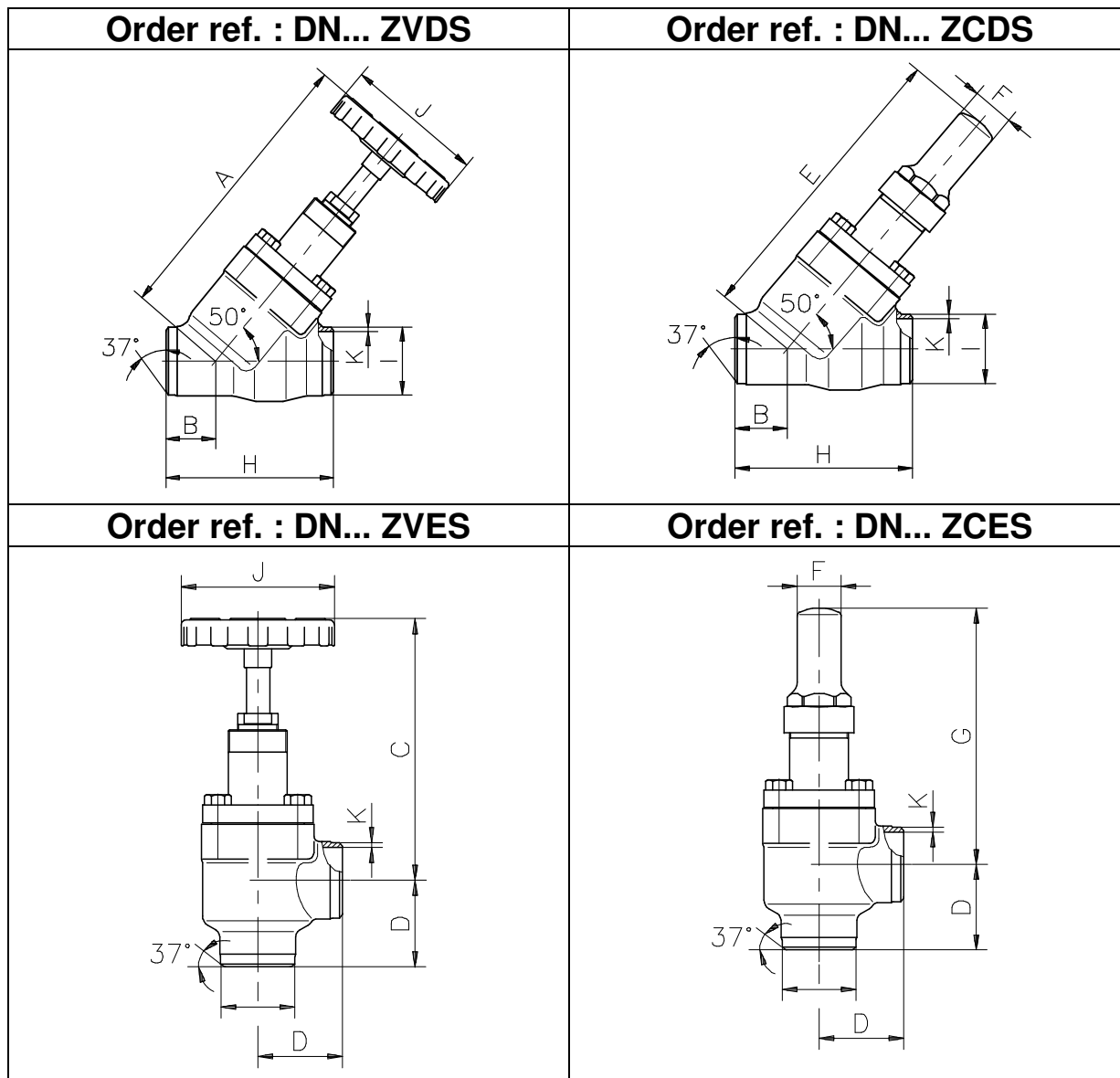
Stop/check valves can be identified by a groove machined above the bonnet. They are also supplied painted in blue to indicate the no-return function.

Spring strength for stop/check valves :

| DN | START OPENING PRESSURE (bar) | END OPENING FORCE (DaN) | SEAT AREA (cm ²) |
|-------|---------------------------------|----------------------------|---------------------------------|
| 10/15 | 0.093 | 0.3 | 2.54 |
| 20/25 | 0.053 | 0.49 | 6.157 |
| 32/40 | 0.04 | 0.86 | 15.9 |
| 50 | 0.039 | 1.6 | 23.76 |
| 65 | 0.032 | 2.2 | 38.48 |
| 80 | 0.032 | 2.9 | 55.42 |
| 100 | 0.042 | 6.2 | 88.24 |
| 125 | 0.037 | 6.5 | 134.78 |
| 150 | 0.037 | 11 | 188.69 |
| 200 | 0.035 | 16.35 | 277.59 |
| 250 | 0.035 | 25 | 422.73 |

REFERENCES

| D | ... | Z | X | x | x |
|----------------|-----|---------------------|------------------------------------|---------------------------|---|
| Steel range | DN | Stop/check valve | V : with handwheel C : with cap | D : straight E : angle | <u>Connections</u> S : Butt welding ends – standard series M : Butt weldings end – Din 2448 B : Brazing ends K : Socket welding ends H : Butt welding Thickness 2 mm for stainless steel pipe |



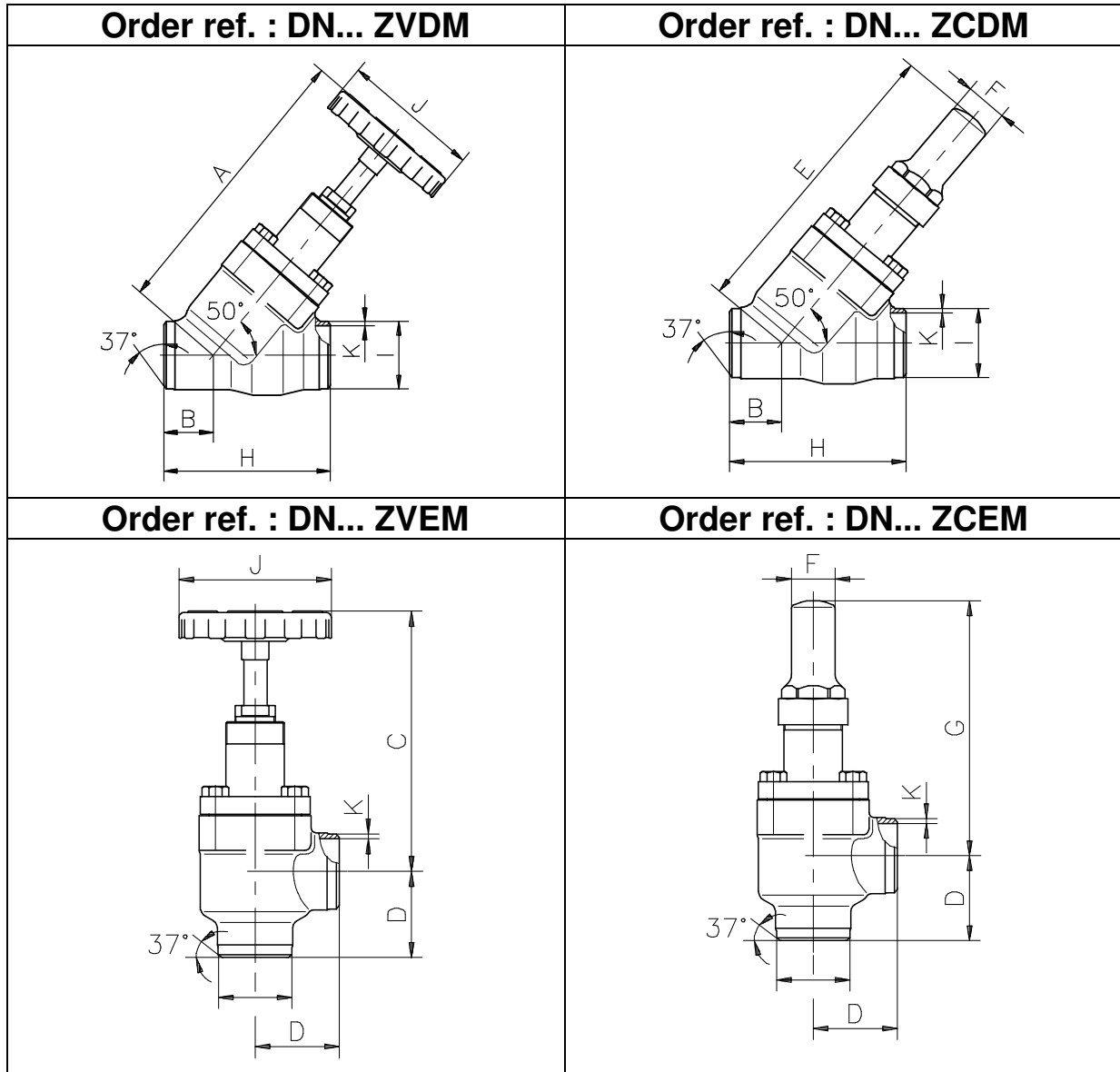
| DIMENSIONS IN MILLIMETRES | | | | | | | | | | | | |
|---------------------------|------|-----|-----|-----|-----|-----|----|-----|-----|-------|-----|-----|
| | DN | A * | B | C * | D | E | F | G | H | I | J | K |
| 3/8" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 17.2 | 50 | 2.3 |
| 1/2" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 21.3 | 50 | 2.6 |
| 3/4" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 26.9 | 70 | 2.9 |
| 1" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 33.7 | 70 | 3.6 |
| 1 1/4" | 32 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 42.4 | 100 | 3.6 |
| 1 1/2" | 40 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 48.3 | 100 | 3.6 |
| 2" | 50 | 247 | 41 | 209 | 69 | 257 | 36 | 206 | 152 | 60.3 | 125 | 4 |
| 2 1/2" | 65 # | 305 | 49 | 235 | 85 | 308 | 41 | 237 | 186 | 76.1 | 175 | 5 |
| 3" | 80 | 360 | 54 | 273 | 85 | 368 | 50 | 281 | 238 | 88.9 | 200 | 5.6 |
| 4" | 100 | 397 | 58 | 299 | 105 | 396 | 50 | 299 | 275 | 114.4 | 200 | 6.3 |
| 5" | 125 | 545 | 66 | 427 | 120 | 558 | 48 | 442 | 308 | 139.7 | 250 | 7.1 |
| 6" | 150 | 569 | 71 | 435 | 135 | 584 | 48 | 450 | 344 | 168.3 | 250 | 7.1 |
| 8" | 200 | 833 | 88 | 655 | 170 | 869 | 56 | 691 | 427 | 219.1 | 400 | 8 |
| 10" | 250 | 946 | 106 | 723 | 215 | 945 | 56 | 722 | 527 | 273 | 400 | 9.3 |

* Dimensions stop/check valve open

DN 65 : Ref S065ZVDUSA, S065ZVEUSA, S065ZCDUSA or S065ZCEUSA

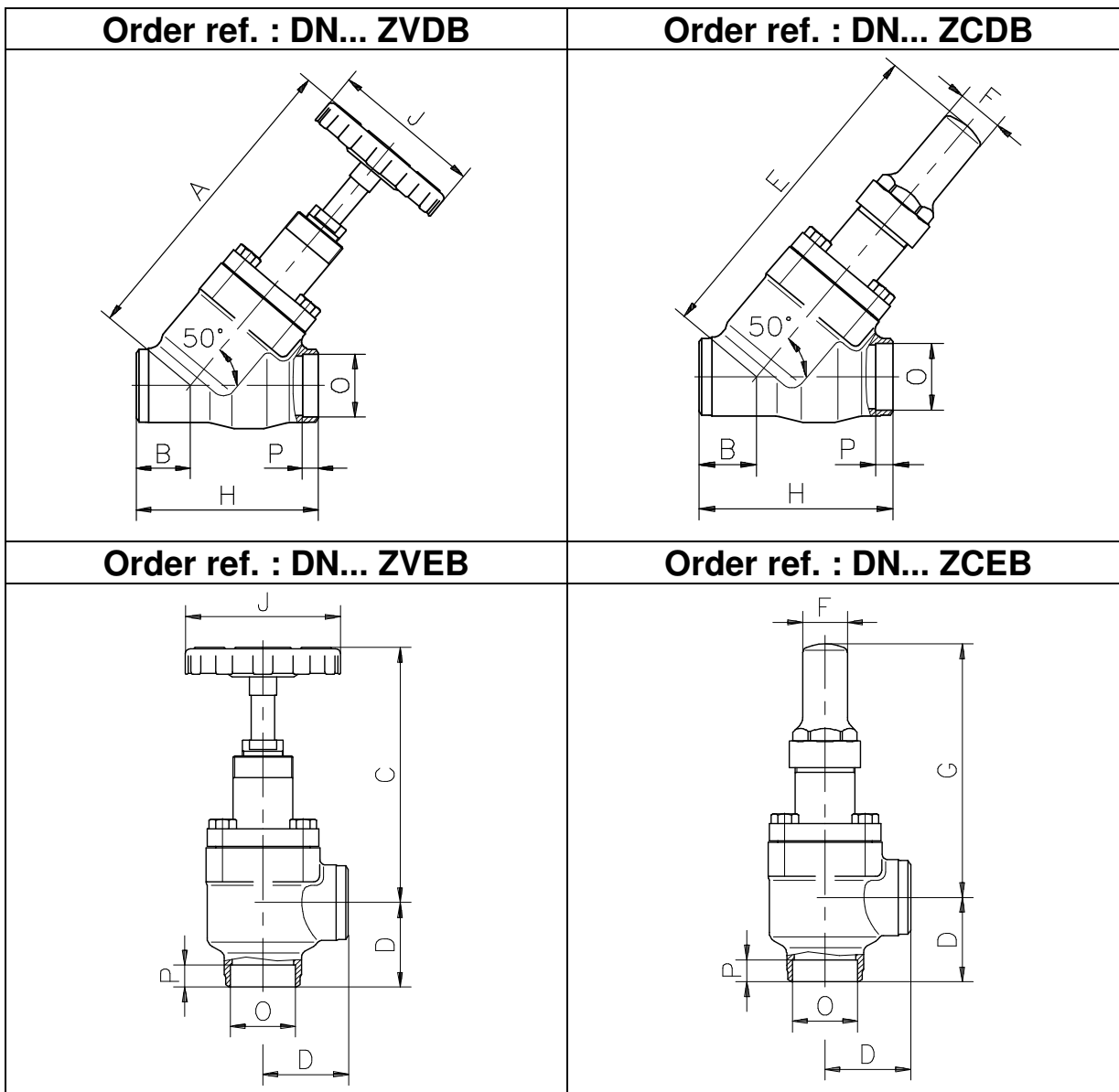
I = 73 , K = 5.2

STOP/CHECK VALVES FROM 10 TO 250 mm for WELDING "M"



| DIMENSIONS IN MILLIMETRES | | | | | | | | | | | | |
|---------------------------|-----|-----|-----|-----|-----|-----|----|-----|-----|-------|-----|-----|
| | DN | A * | B | C * | D | E | F | G | H | I | J | K |
| 3/8" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 17.2 | 50 | 1.8 |
| 1/2" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 21.3 | 50 | 2 |
| 3/4" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 26.9 | 70 | 2.3 |
| 1" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 33.7 | 70 | 2.6 |
| 1 1/4" | 32 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 42.4 | 100 | 2.6 |
| 1 1/2" | 40 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 48.3 | 100 | 2.6 |
| 2" | 50 | 247 | 41 | 209 | 69 | 257 | 36 | 206 | 152 | 60.3 | 125 | 2.9 |
| 2 1/2" | 65 | 305 | 49 | 235 | 85 | 308 | 41 | 237 | 186 | 76.1 | 175 | 2.9 |
| 3" | 80 | 360 | 54 | 273 | 85 | 368 | 50 | 281 | 238 | 88.9 | 200 | 3.2 |
| 4" | 100 | 397 | 58 | 299 | 105 | 396 | 50 | 299 | 275 | 114.4 | 200 | 3.6 |
| 5" | 125 | 545 | 66 | 427 | 120 | 558 | 48 | 442 | 308 | 139.7 | 250 | 4.5 |
| 6" | 150 | 569 | 71 | 435 | 135 | 584 | 48 | 450 | 344 | 168.3 | 250 | 4.5 |
| 8" | 200 | 833 | 88 | 655 | 170 | 869 | 56 | 691 | 427 | 219.1 | 400 | 6.3 |
| 10" | 250 | 946 | 106 | 723 | 215 | 945 | 56 | 722 | 527 | 273 | 400 | 6.3 |

* Dimensions stop/check valve open

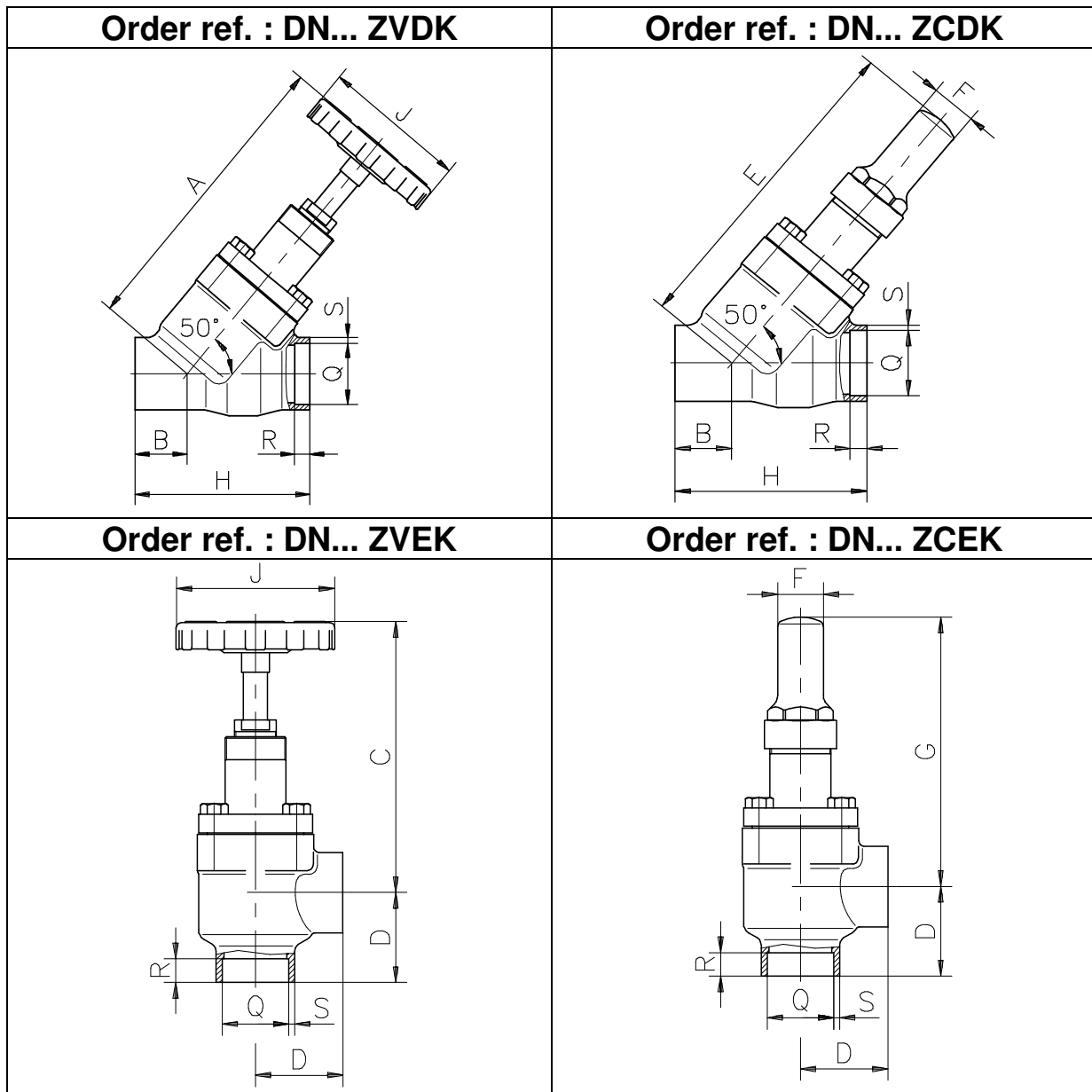


| DIMENSIONS IN MILLIMETRES | | | | | | | | | | | | | |
|---------------------------|--------|-----|-----|----|-----|-----|-----|----|-----|-----|-----|------|------|
| | DN | A* | B | C* | D | E | F | G | H | J | O | P | |
| | 1/2" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 50 | 12.9 | 12 |
| | 5/8" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 50 | 16.1 | 15.5 |
| | 7/8" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 70 | 22.4 | 20 |
| | 1 1/8" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 70 | 28.8 | 20 |
| | 1 3/8" | 32 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 100 | 35.2 | 22 |
| | 1 5/8" | 40 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 100 | 41.5 | 22 |
| | 2 1/8" | 50 | 247 | 41 | 209 | 69 | 257 | 36 | 206 | 152 | 125 | 54.3 | 25 |
| | 2 5/8" | 65 | 305 | 49 | 235 | 85 | 308 | 41 | 237 | 186 | 175 | 66.9 | 25 |
| | 3 1/8" | 80 | 360 | 54 | 273 | 85 | 368 | 50 | 281 | 238 | 200 | 79.6 | 30 |
| | 4 1/8" | 100 | 397 | 58 | 299 | 105 | 396 | 50 | 299 | 275 | 200 | 105 | 30 |

* Dimensions open stop/check valve

STOP/CHECK VALVES FROM 10 TO 32 mm SOCKET "K"

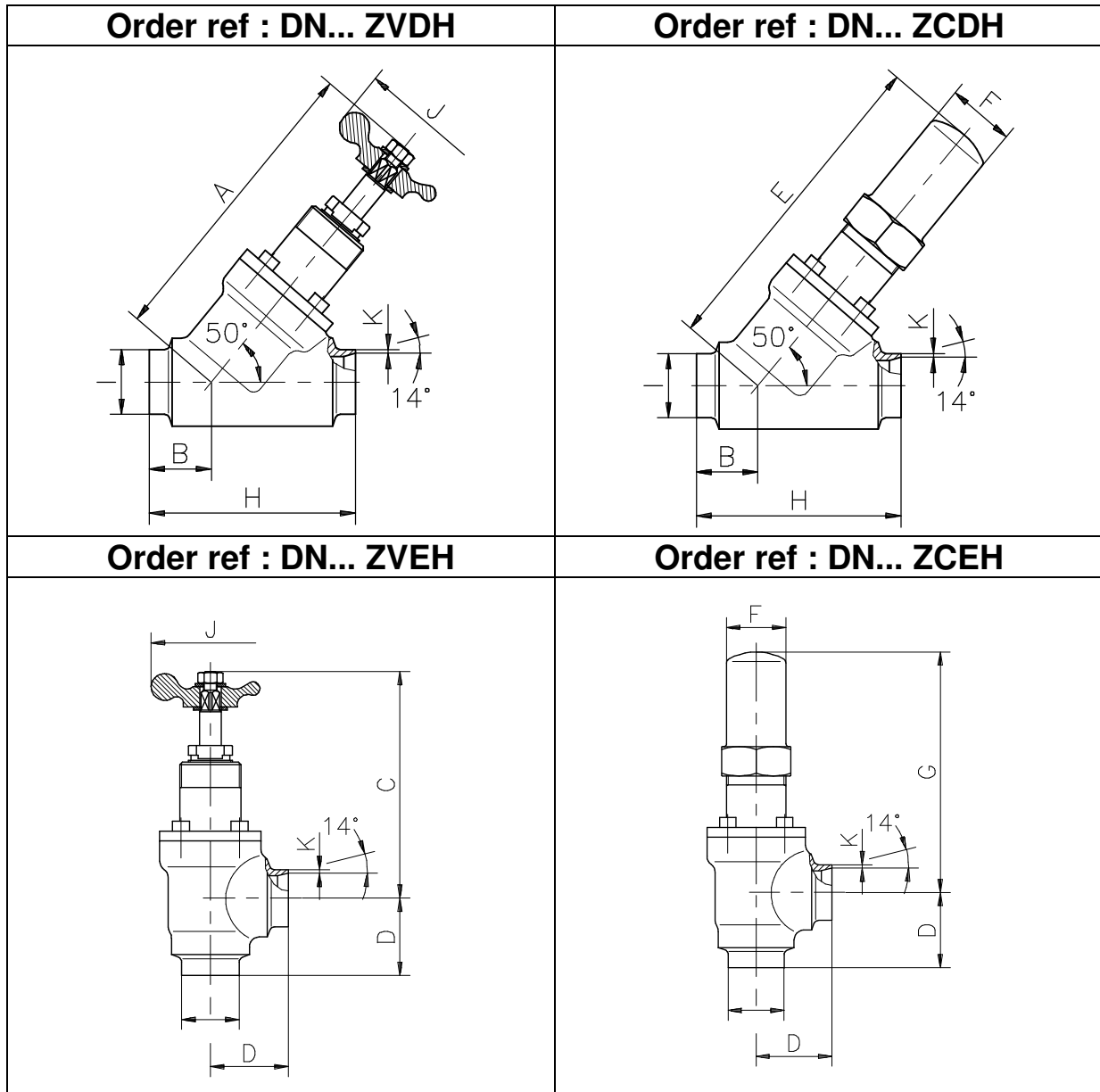
STEEL



| DIMENSIONS IN MILLIMETRES | | | | | | | | | | | | | |
|---------------------------|-----|-----|-----|-----|----|-----|----|-----|-----|-----|------|----|-----|
| DN | A * | B | C * | D | E | F | G | H | J | Q | R | S | |
| 3/8" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 50 | 17.5 | 10 | 7.2 |
| 1/2" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 50 | 21.9 | 10 | 5.1 |
| 3/4" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 70 | 27.4 | 13 | 9.3 |
| 1" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 70 | 34.1 | 13 | 5.9 |
| 1 1/4" | 32 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 100 | 42.9 | 13 | 5.3 |

* Dimensions open stop/check valve

STOP/CHECK VALVES FROM 10 TO 250 mm for WELDING "H"



| DIMENSIONS IN MILLIMETERS | | | | | | | | | | | | |
|---------------------------|-----|-----|-----|-----|-----|-----|----|-----|-----|-------|-----|---|
| | DN | A * | B | C * | D | E | F | G | H | I | J | K |
| 3/8" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 17.2 | 50 | 2 |
| 1/2" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 21.3 | 50 | 2 |
| 3/4" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 26.9 | 70 | 2 |
| 1" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 33.7 | 70 | 2 |
| 1 1/4" | 32 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 42.4 | 100 | 2 |
| 1 1/2" | 40 | 200 | 40 | 159 | 57 | 214 | 36 | 161 | 130 | 48.3 | 100 | 2 |
| 2" | 50 | 247 | 41 | 209 | 69 | 257 | 36 | 206 | 152 | 60.3 | 125 | 2 |
| 2 1/2" | 65 | 305 | 49 | 235 | 85 | 308 | 41 | 237 | 186 | 76.1 | 175 | 2 |
| 3" | 80 | 360 | 54 | 273 | 85 | 368 | 50 | 281 | 238 | 88.9 | 200 | 2 |
| 4" | 100 | 397 | 58 | 299 | 105 | 396 | 50 | 299 | 275 | 114.4 | 200 | 2 |
| 5" | 125 | 545 | 66 | 427 | 120 | 558 | 48 | 442 | 308 | 139.7 | 250 | 2 |
| 6" | 150 | 569 | 71 | 435 | 135 | 584 | 48 | 450 | 344 | 168.3 | 250 | 2 |
| 8" | 200 | 833 | 88 | 655 | 170 | 869 | 56 | 691 | 427 | 219.1 | 400 | 2 |
| 10" | 250 | 946 | 106 | 723 | 215 | 945 | 56 | 722 | 527 | 273 | 400 | 2 |

* Dimensions open stop/check valve

FILTERS

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FILTERS FROM 10 TO 350 mm

RFF filters, straight or angle types, have stainless steel mesh cartridges which can be removed for cleaning. Sizes of screen aperture (distance between wires): 0.15 mm (FY type), 0.25 mm (FR type), 0.5 mm (FA type) or 0.1 mm (FW type).

The normal pressure rating is 25 bar with a temperature range from -50 °C up to +150 °C. Filters are also available on request with higher pressure PN40 or PN65 (depending diameter).

Maintenance and installation procedures are identical to the corresponding RFF valves. It is necessary to take care of the flow direction so that the filtration wire cloth is strengthened by the external wire cloth.

Filters can be identified by a groove machined above the bonnet. They are also supplied painted grey whereas check valves are painted blue to indicate a no-return function.

| REFERENCES | | | | | |
|-------------|-----|--------|---|---------------------------|--|
| D | ... | F | x | x | x |
| Steel range | DN | Filter | Sizes of screen aperture : A : 0.5mm R : 0.25mm Y : 0.15 mm W : 0.10 mm | D : Straight E : Angle | <u>Connections</u> S : Butt welding ends – standard series M : Butt weldings end – Din 2448 B : Brazing ends K : Socket welding ends H : Butt welding Thickness 2 mm for stainless steel pipe |

SOCKS FOR FILTERS

Disposable filter socks are available for fitting inside the cartridge during the commissioning period to obtain fine filtration.

They are available for filters DN 32 to DN 350.
 Maximum operating temperature is 80 °C.

FILTERS CHARACTERISTICS

Filter and Steel Mesh:

| Type | Size of screen aperture | Wire diameter | % free air space |
|------|-------------------------|---------------|------------------|
| FA | 0.5 mm | 0.28 mm | 41% |
| FR | 0.25 mm | 0.16 mm | 37% |
| FY | 0.15 mm | 0.1 mm | 33% |
| FW | 0.1 mm | 0.071 mm | 34 % |

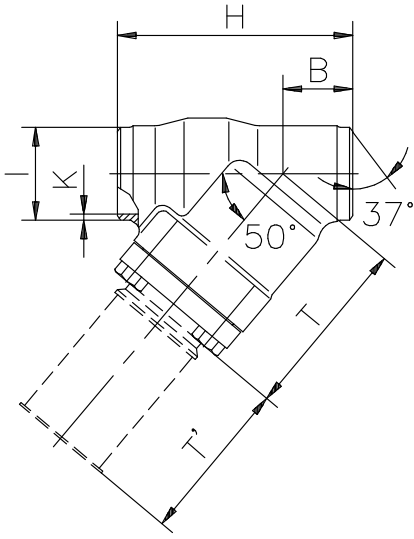
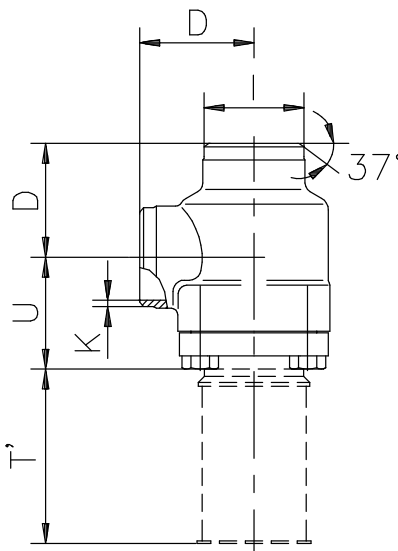
Reinforcement model outer casing :

| DN | Perforated sheet | % free air space |
|-----------|---|------------------|
| 10 à 100 | Square hole of 10, Thread 12, Thickness 1 | 70 % |
| 125 à 150 | Round hole of 5, Thread 6, Thickness 1 | 63 % |
| 200 à 350 | Square hole of 10, Thread 12, Thickness 1 | 70 % |

| DN | Outer casing free area (mm ²) | Filter metal mesh total free area (mm ²) | | | |
|-------|--|--|--------|--------|--------|
| | | FA | FR | FY | FW |
| 10/15 | 932 | 546 | 492 | 439 | 453 |
| 20/25 | 2344 | 1373 | 1239 | 1105 | 1138 |
| 32/40 | 4837.70 | 2833 | 2557 | 2280 | 2350 |
| 50 | 7476.70 | 4379 | 3952 | 3524 | 3631 |
| 65 | 12666.50 | 7419 | 6695 | 5971 | 6152 |
| 80 | 17582 | 10298 | 9293 | 8288 | 8540 |
| 100 | 27154 | 15905 | 14353 | 12801 | 13189 |
| 125 | 35055.72 | 40098 | 36186 | 32274 | 33252 |
| 150 | 50354.64 | 67847 | 61227 | 54608 | 56263 |
| 200 | 87598 | 144648 | 130536 | 116424 | 119952 |
| 250 | 145766 | 242654 | 218980 | 195307 | 201225 |
| 300 | 177587 | 295200 | 266400 | 237600 | - |
| 350 | 221539 | - | 341880 | 304920 | - |

FILTERS FROM 10 TO 350 mm FOR WELDING "S"

STEEL

| | |
|--|--|
|  |  |
| <p>Order ref. : Sizes of screen aperture : 0,5 mm DN... FADS 0,25 mm DN... FRDS 0,15 mm DN... FYDS 0.10 mm DN... FWDS</p> | <p>Order ref. : Sizes of screen aperture : 0,5 mm DN... FAES 0,25 mm DN... FRES 0,15 mm DN... FYES 0.10 mm DN... FWES</p> |

| | DIMENSIONS IN MILLIMETERS | | | | | | | | |
|--------|---------------------------|-----|-----|------|-------|-----|------|-------|-----|
| | DN | B | D | H | I | K | T | T' | U |
| 3/8" | 10 | 25 | 39 | 85 | 17.2 | 2.3 | 55.6 | 41 | 39 |
| 1/2" | 15 | 25 | 39 | 85 | 21.3 | 2.6 | 55.6 | 41 | 39 |
| 3/4" | 20 | 33 | 46 | 110 | 26.9 | 2.9 | 71.5 | 54.5 | 46 |
| 1" | 25 | 33 | 46 | 110 | 33.7 | 3.6 | 71.5 | 54.5 | 46 |
| 1 1/4" | 32 | 40 | 57 | 130 | 42.4 | 3.6 | 93.5 | 70.5 | 55 |
| 1 1/2" | 40 | 40 | 57 | 130 | 48.3 | 3.6 | 93.5 | 70.5 | 55 |
| 2" | 50 | 41 | 69 | 152 | 60.3 | 4 | 118 | 92.5 | 68 |
| 2 1/2" | 65 # | 49 | 85 | 186 | 76.1 | 5 | 144 | 108.5 | 81 |
| 3" | 80 | 54 | 85 | 238 | 88.9 | 5.6 | 177 | 122.5 | 89 |
| 4" | 100 | 58 | 105 | 275 | 114.4 | 6.3 | 210 | 147.5 | 108 |
| 5" | 125 | 66 | 120 | 308 | 141.3 | 7.1 | 258 | 186 | 135 |
| 6" | 150 | 71 | 135 | 344 | 168.3 | 7.1 | 294 | 219 | 152 |
| 8" | 200 | 126 | 170 | 672 | 219.1 | 8 | 513 | 259 | 213 |
| 10" | 250 | 158 | 215 | 846 | 273 | 9.3 | 627 | 317 | 250 |
| 12" § | 300 | 190 | 270 | 1030 | 323.9 | 9.5 | 714 | 293 | 248 |
| 14" * | 350 | 221 | 270 | 1140 | 355.6 | 9.5 | 758 | 329 | 264 |

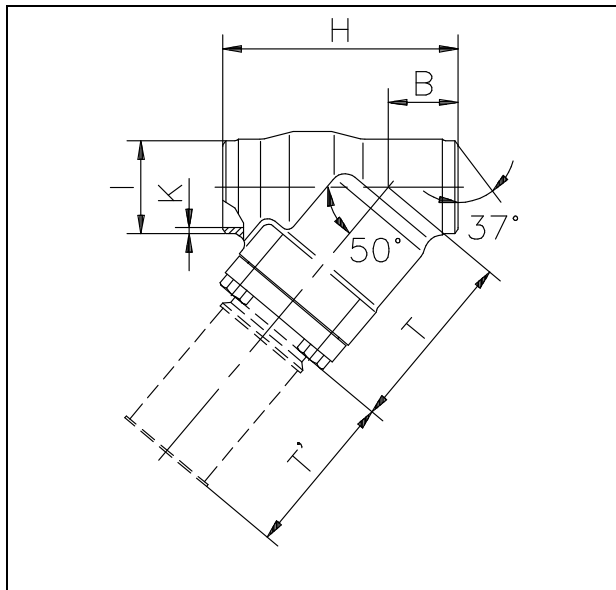
§ cartridge only available in 0.15mm, 0.25mm and 0.50mm

* cartridge only available in 0.25mm and 0.15mm

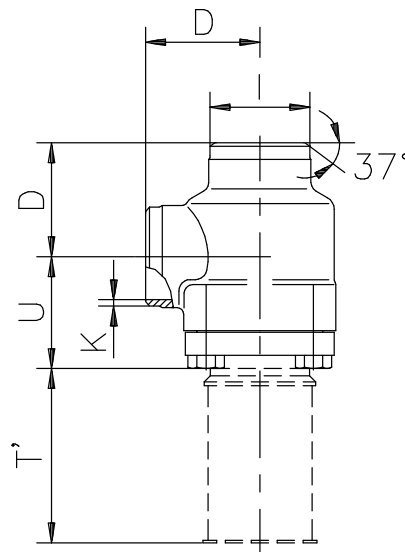
DN 65 : Ref. : S065FRDUSA, S065FADUSA, S065FYDUSA, S065FREUSA, S065FAEUSA or S065FYEUSA ⇒ I = 73 , K = 5.2

Please note :

- It is good practise to install the filter body so the filter cartridge can be withdrawn from below. This prevents contaminants re-entering the pipework as the filter cartridge is withdrawn.
- Allow a space of the dimension T' to remove the cartridge.



Order ref. :
Sizes of screen aperture :
 0,5 mm DN... FADM
 0,25 mm DN... FRDM
 0,15 mm DN... FYDM
 0.10 mm DN... FWDM



Order ref. :
Sizes of screen aperture
 0,5 mm DN... FAEM
 0,25 mm DN... FREM
 0,15 mm DN... FYEM
 0.10 mm DN... FWEM

| | DIMENSIONS IN MILLIMETERS | | | | | | | | |
|--------|---------------------------|-----|-----|------|-------|-----|------|-------|-----|
| | DN | B | D | H | I | K | T | T' | U |
| 3/8" | 10 | 25 | 39 | 85 | 17.2 | 1.8 | 55.6 | 41 | 39 |
| 1/2" | 15 | 25 | 39 | 85 | 21.3 | 2 | 55.6 | 41 | 39 |
| 3/4" | 20 | 33 | 46 | 110 | 26.9 | 2.3 | 71.5 | 54.5 | 46 |
| 1" | 25 | 33 | 46 | 110 | 33.7 | 2.6 | 71.5 | 54.5 | 46 |
| 1 1/4" | 32 | 40 | 57 | 130 | 42.4 | 2.6 | 93.5 | 70.5 | 55 |
| 1 1/2" | 40 | 40 | 57 | 130 | 48.3 | 2.6 | 93.5 | 70.5 | 55 |
| 2" | 50 | 41 | 69 | 152 | 60.3 | 2.9 | 118 | 92.5 | 68 |
| 2 1/2" | 65 | 49 | 85 | 186 | 76.1 | 2.9 | 144 | 108.5 | 81 |
| 3" | 80 | 54 | 85 | 238 | 88.9 | 3.2 | 177 | 122.5 | 89 |
| 4" | 100 | 58 | 105 | 275 | 114.4 | 3.6 | 210 | 147.5 | 108 |
| 5" | 125 | 66 | 120 | 308 | 141.3 | 4.5 | 258 | 186 | 135 |
| 6" | 150 | 71 | 135 | 344 | 168.3 | 4.5 | 294 | 219 | 152 |
| 8" | 200 | 126 | 170 | 672 | 219.1 | 6.3 | 513 | 259 | 213 |
| 10" | 250 | 158 | 215 | 846 | 273 | 6.3 | 627 | 317 | 250 |
| 12" § | 300 | 190 | 270 | 1030 | 323.9 | 7.1 | 714 | 293 | 248 |
| 14" * | 350 | 221 | 270 | 1140 | 355.6 | 8 | 758 | 329 | 264 |

§ cartridge only available in 0.15mm, 0.25mm and 0.50mm

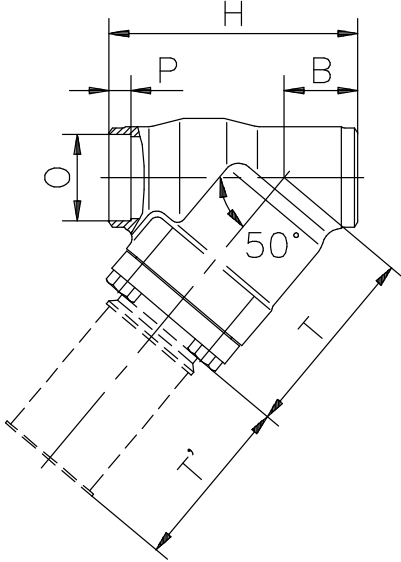
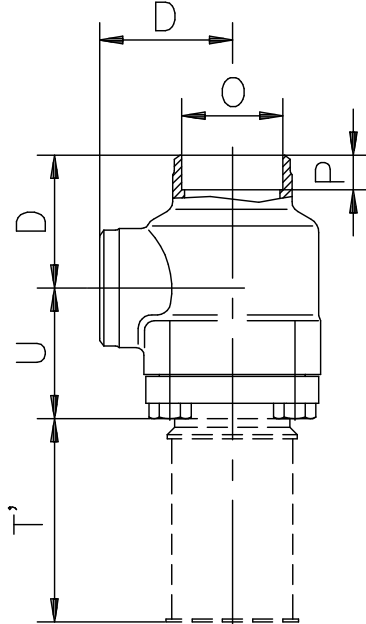
* cartridge only available in 0.25mm and 0.15mm

Please note :

- It is good practise to install the filter body so the filter cartridge can be withdrawn from below. This prevents contaminants re-entering the pipework as the filter cartridge is withdrawn.
- Allow a space of the dimension T' to remove the cartridge.

FILTERS FROM 10 TO 100mm FOR BRAZING "B"

STEEL

| | |
|--|--|
|  |  |
| <p>Order ref. : Sizes of screen aperture : 0,5 mm DN... FADB 0,25 mm DN... FRDB 0,15 mm DN... FYDB 0.10 mm DN... FWDB</p> | <p>Order ref. : Sizes of screen aperture : 0,5 mm DN... FAEB 0,25 mm DN... FREB 0,15 mm DN... FYEB 0.10 mm DN... FWEB</p> |

| DIMENSIONS IN MILLIMETERS | | | | | | | | | |
|---------------------------|-----|----|-----|-----|------|------|------|-------|-----|
| | DN | B | D | H | O | P | T | T' | U |
| 1/2" | 10 | 25 | 39 | 85 | 12.9 | 12 | 55.6 | 41 | 39 |
| 5/8" | 15 | 25 | 39 | 85 | 16.1 | 15.5 | 55.6 | 41 | 39 |
| 7/8" | 20 | 33 | 46 | 110 | 22.4 | 20 | 71.5 | 54.5 | 46 |
| 1 1/8" | 25 | 33 | 46 | 110 | 28.8 | 20 | 71.5 | 54.5 | 46 |
| 1 3/8" | 32 | 40 | 57 | 130 | 35.2 | 22 | 93.5 | 70.5 | 55 |
| 1 5/8" | 40 | 40 | 57 | 130 | 41.5 | 22 | 93.5 | 70.5 | 55 |
| 2 1/8" | 50 | 41 | 69 | 152 | 54.2 | 25 | 118 | 92.5 | 68 |
| 2 5/8" | 65 | 49 | 85 | 186 | 66.9 | 25 | 144 | 108.5 | 81 |
| 3 1/8" | 80 | 54 | 85 | 238 | 79.6 | 30 | 177 | 122.5 | 89 |
| 4 1/8" | 100 | 58 | 105 | 275 | 105 | 30 | 210 | 147.5 | 108 |

Please note :

- It is good practise to install the filter body so the filter cartridge can be withdrawn from below. This prevents contaminants re-entering the pipework as the filter cartridge is withdrawn.
- Allow a space of the dimension T' to remove the cartridge.

FILTERS FROM 10 TO 32 mm SOCKET "K"

| | |
|--|--|
| | |
| <p>Order ref. : Sizes of screen aperture : 0,5 mm DN... FADK 0,25 mm DN... FRDK 0,15 mm DN... FYDK 0.10 mm DN... FWDK</p> | <p>Order ref. : Sizes of screen aperture 0,5 mm DN... FAEK 0,25 mm DN... FREK 0,15 mm DN... FYEK 0.10 mm DN... FWEK</p> |

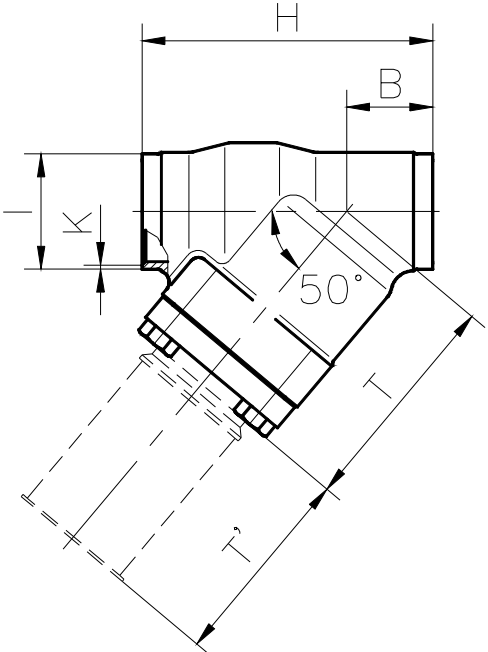
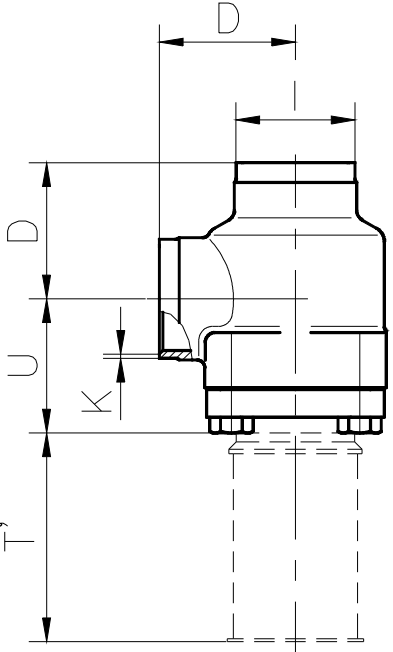
| DIMENSIONS IN MILLIMETERS | | | | | | | | | | |
|---------------------------|----|----|----|-----|------|----|-----|------|------|----|
| | DN | B | D | H | Q | R | S | T | T' | U |
| 3/8" | 10 | 25 | 39 | 85 | 17.6 | 10 | 7.2 | 55.6 | 41 | 39 |
| 1/2" | 15 | 25 | 39 | 85 | 21.9 | 10 | 5.1 | 55.6 | 41 | 39 |
| 3/4" | 20 | 33 | 46 | 110 | 27.4 | 13 | 9.3 | 71.5 | 54.5 | 46 |
| 1" | 25 | 33 | 46 | 110 | 34.1 | 13 | 5.9 | 71.5 | 54.5 | 46 |
| 1 1/4" | 32 | 40 | 57 | 130 | 42.9 | 13 | 5.3 | 93.5 | 70.5 | 55 |

Please note :

- It is good practise to install the filter body so the filter cartridge can be withdrawn from below. This prevents contaminants re-entering the pipework as the filter cartridge is withdrawn.
- Allow a space of the dimension T' to remove the cartridge.

FILTERS FROM 10 TO 350 mm FOR WELDING "H"

STEEL

| | |
|---|---|
|  |  |
| <p>Order ref : Sizes of screen aperture 0.5 mm DN ... FADH 0.25 mm DN ... FRDH 0.15 mm DN ... FYDH 0.10 mm DN ... FWDH</p> | <p>Order ref : Sizes of screen aperture 0.5 mm DN ... FAEH 0.25 mm DN ... FREH 0.15 mm DN ... FYEH 0.10 mm DN ... FWEH</p> |

| DIMENSIONS IN MILLIMETERS | | | | | | | | | |
|---------------------------|-----|-----|-----|------|-------|---|------|-------|-----|
| | DN | B | D | H | I | K | T | T' | U |
| 3/8" | 10 | 25 | 39 | 85 | 17.2 | 2 | 55.6 | 41 | 39 |
| 1/2" | 15 | 25 | 39 | 85 | 21.3 | 2 | 55.6 | 41 | 39 |
| 3/4" | 20 | 33 | 46 | 110 | 26.9 | 2 | 71.5 | 54.5 | 46 |
| 1" | 25 | 33 | 46 | 110 | 33.7 | 2 | 71.5 | 54.5 | 46 |
| 1 1/4" | 32 | 40 | 57 | 130 | 42.4 | 2 | 93.5 | 70.5 | 55 |
| 1 1/2" | 40 | 40 | 57 | 130 | 48.3 | 2 | 93.5 | 70.5 | 55 |
| 2" | 50 | 41 | 69 | 152 | 60.3 | 2 | 118 | 92.5 | 68 |
| 2 1/2" | 65 | 49 | 85 | 186 | 76.1 | 2 | 144 | 108.5 | 81 |
| 3" | 80 | 54 | 85 | 238 | 88.9 | 2 | 177 | 122.5 | 89 |
| 4" | 100 | 58 | 105 | 275 | 114.4 | 2 | 210 | 147.5 | 108 |
| 5" | 125 | 66 | 120 | 308 | 141.3 | 2 | 258 | 186 | 135 |
| 6" | 150 | 71 | 135 | 344 | 168.3 | 2 | 294 | 219 | 152 |
| 8" | 200 | 126 | 170 | 672 | 219.1 | 2 | 513 | 259 | 213 |
| 10" | 250 | 158 | 215 | 846 | 273 | 2 | 627 | 317 | 250 |
| 12" | 300 | 190 | 270 | 1030 | 323.9 | 2 | 714 | 293 | 248 |
| 14" * | 350 | 221 | 270 | 1140 | 355.6 | 2 | 758 | 329 | 264 |

* cartridge only available in 0.25mm and 0.15mm

Please note :

- It is good practise to install the filter body so the filter cartridge can be withdrawn from below. This prevents contaminants re-entering the pipework as the filter cartridge is withdrawn.
- Allow a space of the dimension T' to remove the cartridge.

PURGE VALVE WITH COUNTERWEIGHT

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| PURGE VALVES | 75 |

PURGE VALVES WITH COUNTERWEIGHT

Design characteristics

Purge valves with counterweights are valves with a normal primary closing system and a secondary closing system operated by the counterweight falling. The normal closing system is designed to provide a seal for a long period. The secondary closing system is a quick but temporary closing, see below the design working pressures. To the DN 15 a higher limit is possible, by making the standard counterweight heavier. A counterweight heavier than standard can be ordered. This counterweight allows a closing against 25 bar.

| | SECONDARY CLOSING | |
|-------|---|--|
| | Pressure to obtain a seal By counterweight falling | Increase in pressure Resistance after closing |
| DN 8 | 25 bar | 25 bar |
| DN 15 | maxi 7,5 bar | 25 bar |

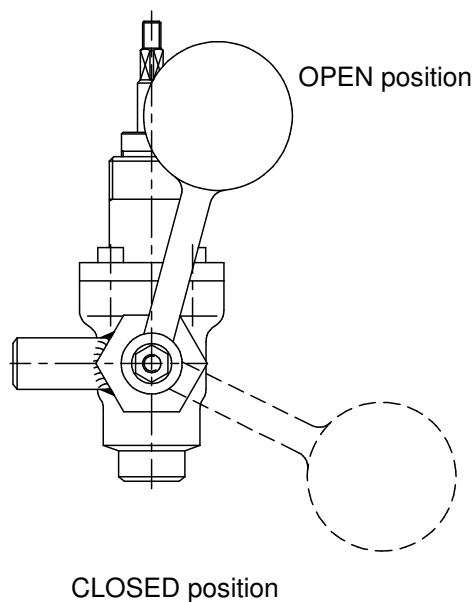
Adjusting the counterweight

Full opening of the secondary closing system should occur when the counterweight is positioned at "1 o'clock" when facing the counterweight side of the valve.

The counterweight position (conical fixing) must be oriented depending on the purge valve fitting position.

The counterweight is fastened to the stem by a nut and taper. If the valve is installed in a position different to the one indicated on this page, then reposition the counterweight by removing and refitting it.

The counterweight should fall closed under its own weight.



Operation

If the primary valve is open, the counterweight is in the high position, the purge valve is open. To close the purge valve, let the counterweight fall. The primary closing system can then be operated manually. The cap should be replaced after closing the primary valve.

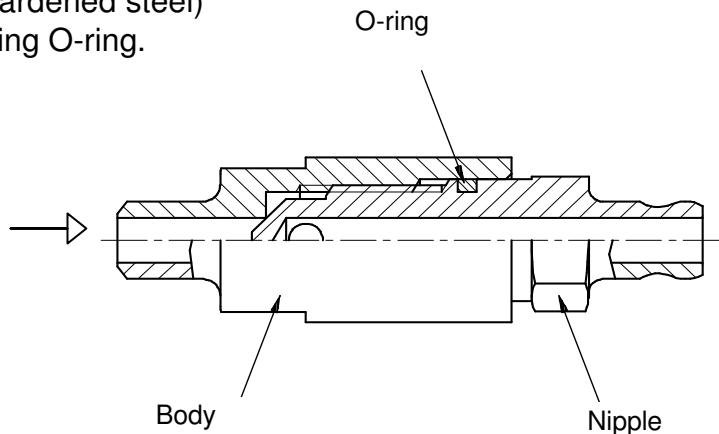
8mm OIL PURGE VALVE

Oil purge valves are of a simplified design. They are principally used for the occasional purging of evaporators.

Design characteristics :

The 8mm oil purge consists of :

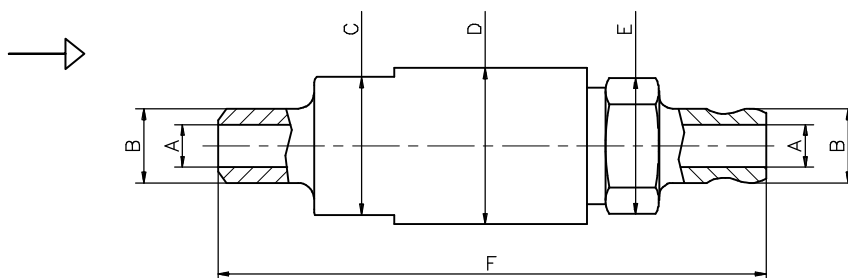
- A purge valve body (weldable steel : TStE 2355-DIN 17102 or A350LF2-ASTM or equivalent) with impact strength certificate to -50°C,
- A nipple (hardened steel)
- And a sealing O-ring.



Operation :

To open that oil purge, unscrew the nipple by two turns. The oil will then flow through the valve and needle.

To close, screw in the nipple.

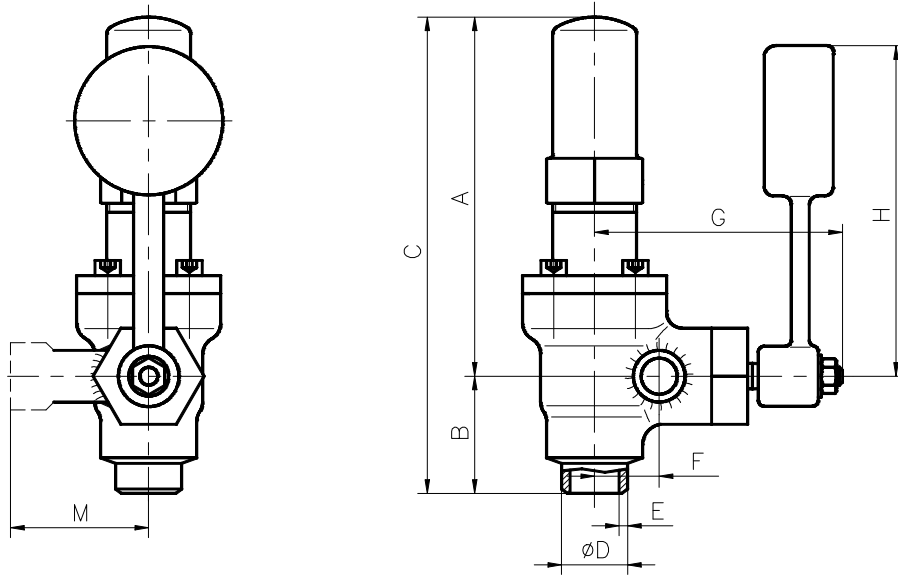


Dimensions in millimeters

| | DN | A | B | C | D | E | F | Order Ref. |
|------|----|---|----|----|------|---------|-------|------------|
| 1/4" | 8 | 8 | 14 | 26 | 29.5 | Hexa 23 | 102.5 | D008PURG |

PURGE VALVE WITH COUNTERWEIGHT - 8 and 15 mm

STEEL



Dimensions in millimeters

| | DN | A | B | C | D | E | F | G | H | K | L | M | Ref. |
|------|----|------|------|-----|------|-----|------|------|-----|------|------|------|----------|
| 1/4" | 8 | 60.5 | 29.5 | 90 | 21.3 | 2.6 | 13.5 | 73.5 | 110 | 13.5 | 2.35 | 38.5 | D008PACP |
| 1/2" | 15 | 119 | 39 | 158 | 21.3 | 2.6 | 21.5 | 85.5 | 110 | 17.2 | 2.6 | 46 | D015PACP |

| OUTLET | DN | Reference | DN | Référence |
|--------|----|------------------|----|------------------|
| | 8 | D008PACP | 15 | D015PACP |
| | 8 | D008PACP1/2BSP | 15 | D015PACP1/2BSP |
| | 8 | D008PACPBO1/2BSP | 15 | D015PACPBO1/2BSP |

STAINLESS STEEL VALVES 4 AND 8 mm

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SMALL STAINLESS STEEL VALVE FROM 4 TO 8mm

STAINLESS

The small 4 and 8 mm valves are intended for use with instruments and line gauge equipment.

The RFF valves are made in stainless steel bodies X4CrNi18-10 (1.4301) EN10088-3. The two spindle 'O'-rings ensure a high quality seal.

The nominal design pressure is 25 bar with higher pressure 65 bar on request. The temperature range is from -50 °C to +150 °C.

Sealing is made by steel spindle on steel face (metal to metal).

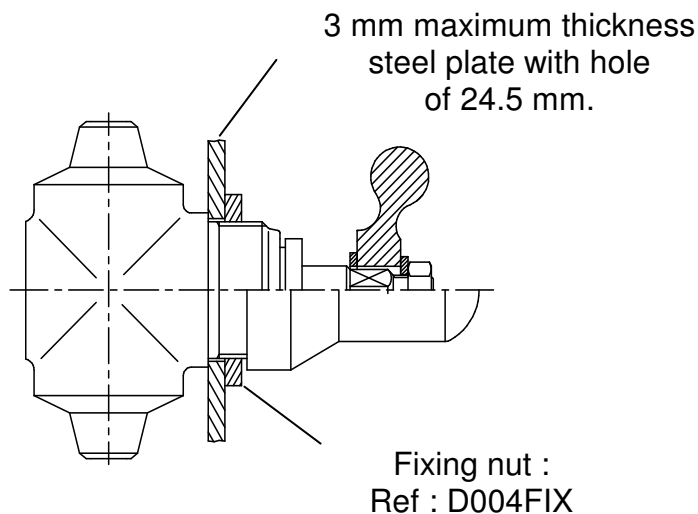
The design incorporates screwed components. The valve cap and gland nut are screwed in to the body using different threads which ensures it is impossible to unscrew the gland nut when the cap is removed.

RFF stainless steel valves have aluminium cap or bakelite handwheel.

They have a back-seat in PTFE which allows the O-rings to be replaced while the plant is operating.

New small valves can be mounted by using a 3mm maximum thickness steel plate fixed with locking nut. The locking nut has to be ordered separately. (order reference Number : D004*FIX). This locking nut is only available made in steel. Be careful this fixing nut not suit with all RFF small valve reference.

Straight or angle
Small valves,
With cap or handwheel



NEW REFERENCES

Following the different possibilities, RFF have changed their computer reference for 4 and 8mm valve.

To place an order, please use the following classification.

| REFERENCES | | | | | | |
|-----------------------|--------|-------|------------------------------------|---------------------------|-----------------------|------------------------|
| I | ... | * | x | x | xx | xx |
| Stainless Steel range | DN(mm) | Valve | V : with handwheel C : with cap | D : Straight E : Angle | Inlet code connection | Outlet code connection |

Available connections : See page 9 and 10

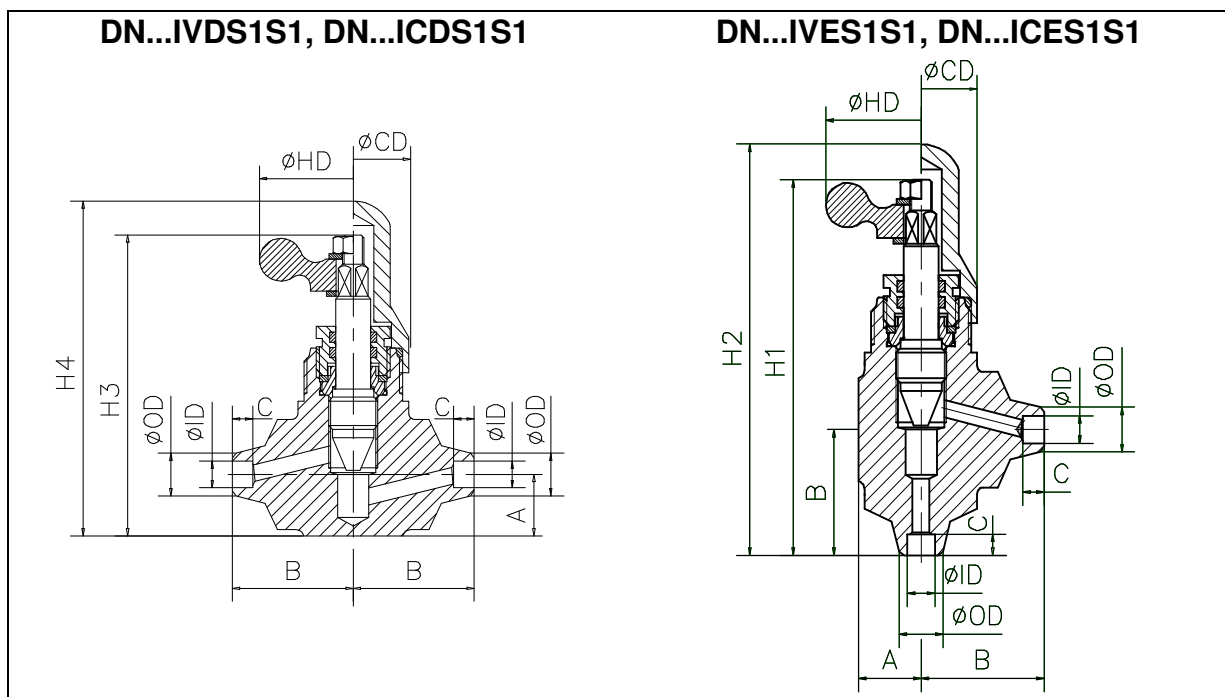
STANDARDS REFERENCES - VALVES DN 4 AND 8

STAINLESS

| STAINLESS STEEL VALVE DN 4 | | | |
|----------------------------|----------------|--------------|----------------|
| Straight valve | | Angle valve | |
| With cap | With handwheel | With cap | With handwheel |
| I004*CDS1E2 | I004*VDS3V10 | I004*CEV2V1 | I004*VEV2V11 |
| I004*CDS1S1 | I004*VDV8S1 | I004*CEV2V13 | I004*VES1V16 |
| I004*CDS3V1 | I004*VDS3V11 | I004*CES1S1 | I004*VEV2V5 |
| I004*CDS5V1 | I004*VDS1S1 | I004*CES1E2 | I004*VEV2V16 |
| I004*CDE2E2 | I004*VDS1E2 | I004*CEE2E2 | I004*VES3V11 |
| I004*CDV1V1 | I004*VDE2E2 | | I004*VES1S1 |
| | I004*VDV1V1 | | I004*VES1E2 |
| | | | I004*VEE2E2 |

| STAINLESS STEEL VALVE 8 | | | |
|-------------------------|----------------|---------------|----------------|
| Straight valve | | Angle valve | |
| With cap | With handwheel | With cap | With handwheel |
| I008*CDE3E3 | I008*VDE3E3 | I008*CEE3E3 | I008*VEE3E3 |
| I008*CDE3E6 | I008*VDS1E3 | I008*CEE3E6 | I008*VEE3E6 |
| I008*CDE3E7 | I008*VDS1S1 | I008*CEE3E7 | I008*VES1S1 |
| I008*CDS1S1 | I008*VDS9E6 | I008*CES1E3 | I008*VES1E3 |
| I008*CDS1E3 | I008*VDS9V11 | I008*CES1E6 | I008*VES1E6 |
| I008*CDS1E6 | I008*VDS10E3 | I008*CES1S1 | I008*VES6V7 |
| I008*CDS1V2 | I008*VDS10E6 | I008*CES3V1 | I008*VES9V7 |
| I008*CDS3S3 | I008*VDS10V11 | I008*CES6E6 | I008*VES10V1 |
| I008*CDS6E3 | | I008/CES6V11 | I008*VES10V7 |
| I008*CDS6E6 | | I008*CES9E6 | I008*VEV1V6 |
| I008*CDS6V1 | | I008*CES9V1 | |
| I008*CDV1E6 | | I008*CES9V14 | |
| I008*CDV5V5 | | I008*CES10E6 | |
| | | I008*CEV1V6 | |
| | | I008*CEV8V5 | |
| | | I008*CEV8V9 | |
| | | I008*CEV12V13 | |

SMALL STAINLESS STEEL VALVES FROM 4 TO 8mm



| | | | DIMENSIONS IN MILLIMETERS | | | | | | | | | | |
|---------|----------------|----------------|---------------------------|------|---|------|------|----|----|----|----|-----|------|
| DN (mm) | DN for brazing | DN for welding | A | B | C | H1 | H2 | H3 | H4 | CD | HD | ID | OD |
| 4 | 1/4" | 1/8" | 15 | 29.5 | 5 | 90.5 | 96.5 | 76 | 82 | 28 | 50 | 6.5 | 10.5 |
| 8 | 3/8" | 1/4" | 15 | 29.5 | 8 | 90.5 | 96.5 | 76 | 82 | 28 | 50 | 9.7 | 13.8 |

STAINLESS STEEL VALVES FROM 10 TO 25 mm

STAINLESS

RFF valves can be supplied with a material certificate for body and bonnet which guarantees the impact strength at -50°C.

RFF valves are constructed of Stainless steel shell X4CrNi 18-10 (1.4301) EN10088-3. Internal parts are similar to standard steel valves. They are sealed by two O-rings with a special oil filled groove which provides a complete gas tight seal.

The nominal pressure rating is 25 bar with temperature range from -50°C up to +150°C. Valves with higher pressure PN 65 is available on request with temperature range from -50°C up to +110°C.

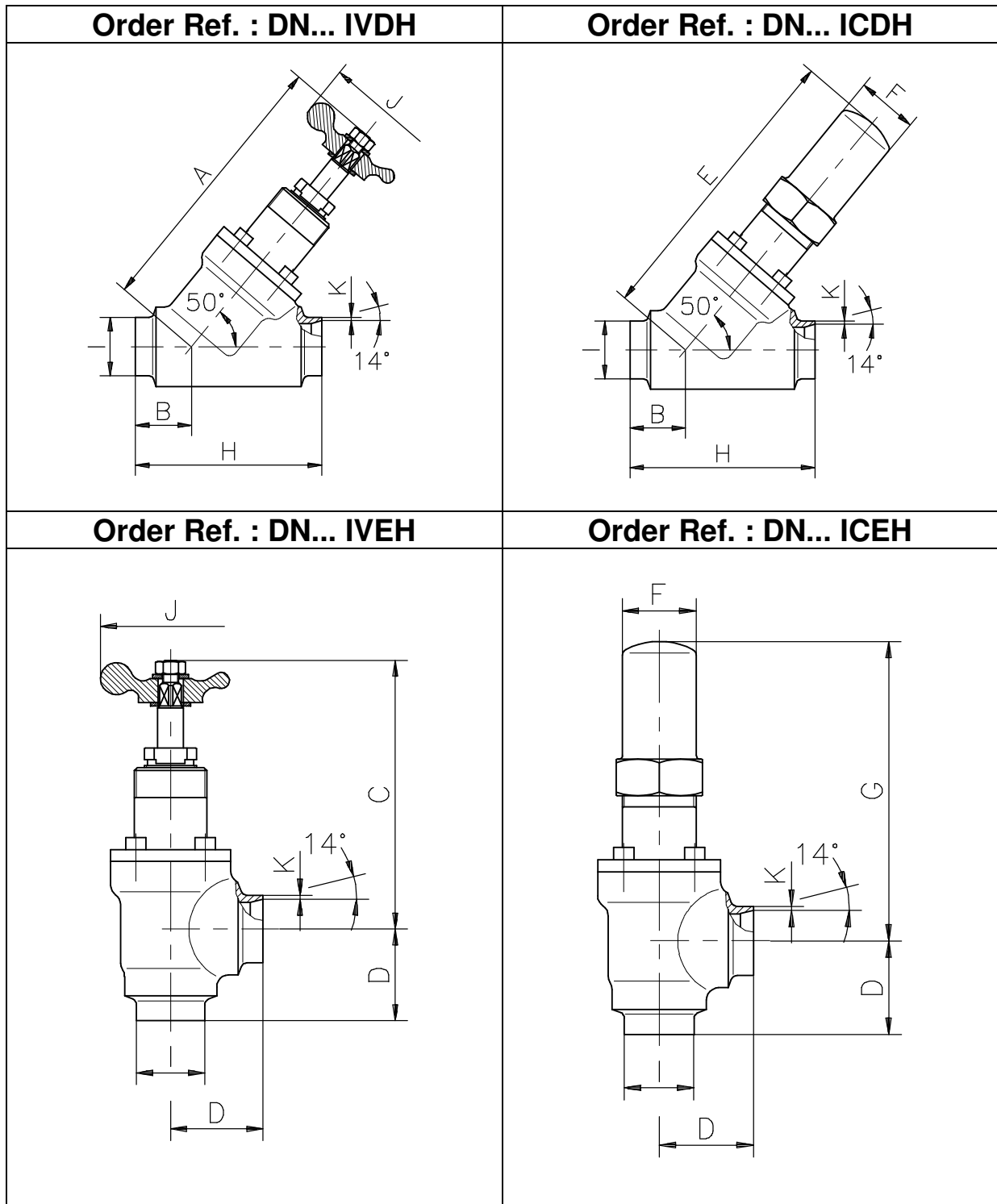
The PTFE seat provides positive shut-off with a minimum amount of force.

All valves should be closed by turning the spindle clockwise. The O-rings can be replaced when the spindle is back-seated fully. Maintenance of the O-rings can be carried out without shutting down the plant.

By using valves fitted with caps on installations using odourless refrigerant extra security is ensured. Gas refrigerant is contained under the cap which is manufactured with small hole drilled under the gasket. When the cap is unscrewed, any build-up of refrigerant gas inside the cap will escape through this hole and can be heard as a whistling noise. This is an indication that the O-rings in the gland nut have been damaged or are in poor condition. All valves can be fitted with bakelite handwheels or aluminium caps.

Branch connections for RFF valves can be :
 # for butt welding, "H" class
 (thickness 2mm for stainless steel pipe)

| REFERENCES | | | | | |
|-----------------------|-----|------------|------------------------------------|---------------------------|--|
| I | ... | * | x | x | x |
| Stainless steel range | DN | Stop valve | V : with handwheel C : with cap | D : Straight E : Angle | <u>Connections</u> H : Butt welding Thickness 2 mm for stainless steel pipe |



| DIMENSIONS IN MILLIMETRES | | | | | | | | | | | | |
|---------------------------|-----|-----|----|-----|----|-----|----|-----|-----|------|----|---|
| DN | A * | B | C* | D | E | F | G | H | I | J | K | |
| 3/8" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 17.2 | 50 | 2 |
| 1/2" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 21.3 | 50 | 2 |
| 3/4" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 26.9 | 70 | 2 |
| 1" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 33.7 | 70 | 2 |

* Dimensions valve open

STAINLESS STEEL REGULATING VALVES FROM 10 TO 25

STAINLESS

RFF hand-regulating valves can be supplied with a material certificate for body and bonnet which guarantees the impact strength at -50°C.

RFF hand-regulating valves are constructed of Stainless steel shell CrNi18-10 (1.4301) EN 10088-3. Internal parts are similar to standard steel valves. They are sealed by two O-rings with a special oil filled groove which provides a complete gas tight seal.

The nominal pressure rating is 25 bar with temperature range from -50°C up to +150°C. Valves with higher pressure PN 65 is available on request with temperature range from -50°C up to +110°C.

The O-rings can be replaced when the spindle is back-seated fully. Maintenance of the O-rings can be carried out without shutting down the plant.

RFF have redesigned the hand regulating valve Seat. The regulation of liquid flow is carried out by restricting the orifice size by the conical (cone) underneath the Seat. The new model has a new PTFE Seat which can be used to close the Regulating valve completely.

Hand regulating valves can be identified by a series of two grooves machined into the vertical bonnet surface.

Hand-regulating valves have a normal maximum flow-rate which depends on their nominal diameters, but they can be fitted with special cones to give a higher-than-standard flow-rate.

The new Hand Regulating Valves can be described as straight through. Angle versions are possible for sizes DN 15 and 25mm only. The angle valve dimensions are identical to the angle shut off valve sizes.

By using valves fitted with caps on installations using odourless refrigerant extra security is ensured. Gas refrigerant is contained under the cap which is manufactured with small hole drilled under the gasket. When the cap is unscrewed, any build-up of refrigerant gas inside the cap will escape through this hole and can be heard as a whistling noise. This is an indication that the O-rings in the gland nut have been damaged or are in poor condition.

All hand-regulating valves can be fitted with bakelite handwheel or aluminium caps.

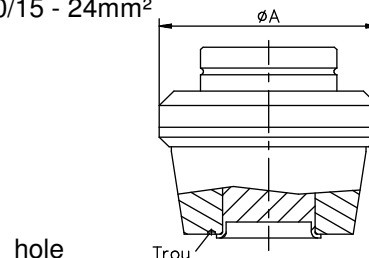
Branch connections on RFF hand-regulating valves can be :

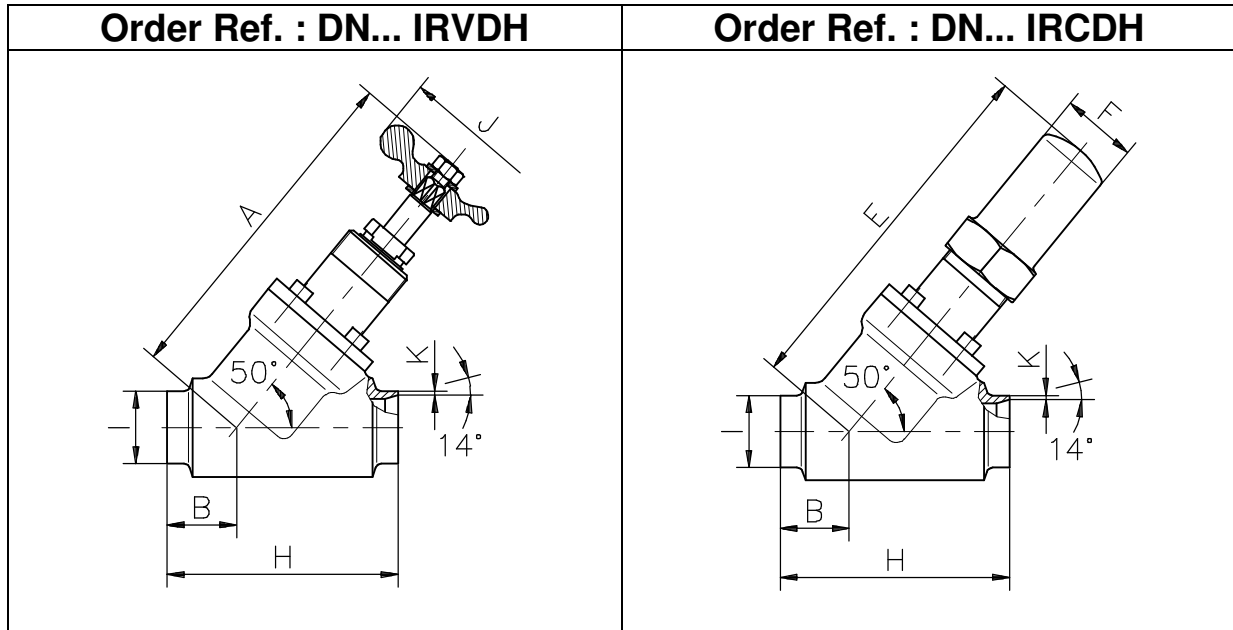
for butt welding, "H" class (Thickness 2mm for stainless steel pipe)

Cones can be identified by holes on the under side of the seat.

EX : DN 10/15 - 24mm²

| | | A | No. of holes |
|-----------------------|---------------------|----|--------------|
| DN 10/15 Cone size | 24 mm ² | 18 | 1 |
| | 36 mm ² | 18 | 2 |
| | 60 mm ² | 18 | 3 |
| DN 20/25 Cone size | 40 mm ² | 29 | 0 |
| | 56 mm ² | 29 | 1 |
| | 110 mm ² | 29 | 2 |





| DIMENSIONS IN MILIMETRES | | | | | | | | | |
|--------------------------|----|-----|----|-----|----|-----|------|----|---|
| | DN | A * | B | E | F | H | I | J | K |
| 3/8" | 10 | 128 | 25 | 136 | 28 | 85 | 17.2 | 50 | 2 |
| 1/2" | 15 | 128 | 25 | 136 | 28 | 85 | 21.3 | 50 | 2 |
| 3/4" | 20 | 161 | 33 | 171 | 36 | 110 | 26.9 | 70 | 2 |
| 1" | 25 | 161 | 33 | 171 | 36 | 110 | 33.7 | 70 | 2 |

* Dimensions valve open

| REFERENCES | | | | | | |
|-----------------------|-----|------------------|------------------------------------|---------------------------|---|--|
| I | ... | R | x | x | x | xxx |
| Stainless steel range | DN | Regulating valve | V : with handwheel C : with cap | D : Straight E : Angle | <u>Connections</u> H : Butt welding Thickness 2 mm for stainless steel pipe | <u>Cone :</u> <u>DN 10/15</u> 024 : 24 mm ² usual cone DN 10 036 : 36 mm ² usual cone DN 15 060 : 60 mm ² <u>DN 20/25</u> 040 : 40 mm ² usual cone DN 20 056 : 56 mm ² usual cone DN 25 110 : 110 mm ² |

STAINLESS STEEL CHECK VALVE FROM 10 TO 25 mm

STAINLESS

RFF check valves are constructed of Stainless steel shell CrNi 18-10 (1.4301) EN 10088-3. Internal parts are similar than standard steel valves.

RFF Check valves may be supplied with a material certificate for the body and the bonnet which guarantees impact strength at -50°C

Check valves sizes 10 to 25mm are sealed by PTFE.

The nominal pressure rating is 25 bar with temperature range from -50°C up to $+150^{\circ}\text{C}$. Valves with higher pressure PN 65 is available on request with temperature range from -50°C up to $+110^{\circ}\text{C}$.

To avoid damage during dismantling, check valves with PTFE seats (DN 10 to 25) have a captive seat assembly.

The size of a check valve on an installation should be carefully selected especially if ammoniac is used : The check valve should not be oversized or it may start to "chatter" when operating.

Branch connections on RFF check valves can be :

for butt welding, "H" class
(Thickness 2mm for stainless steel pipe)

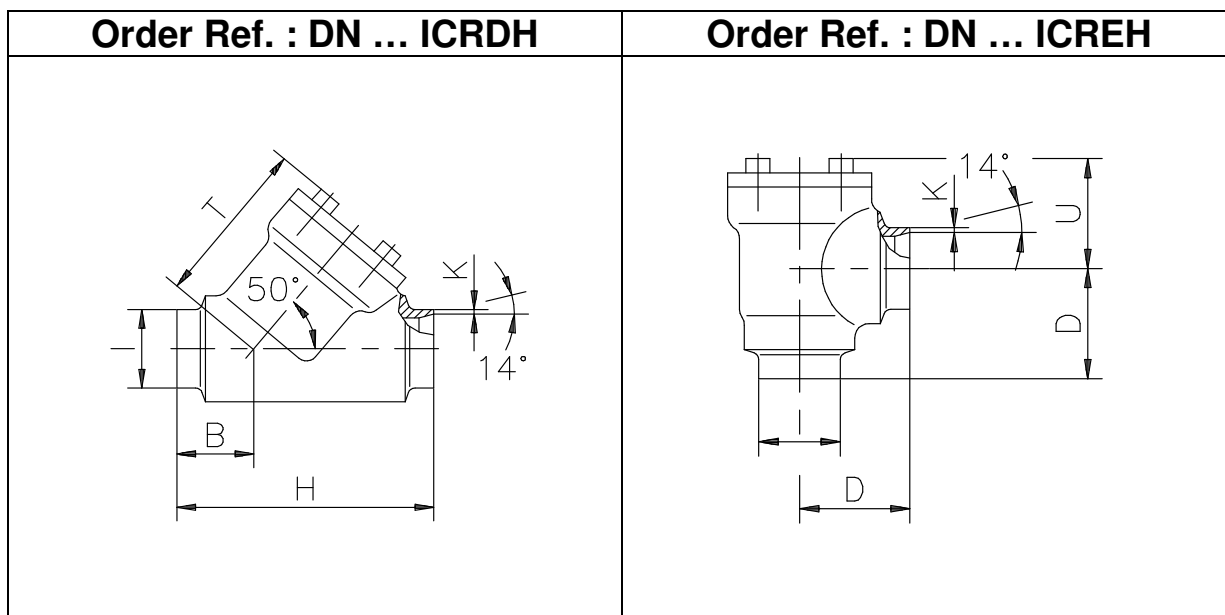
Contrary to filters, Check valves do not have a groove on the top surface of the flange.

Check valves can be installed in any position but it is recommended to use angle check valves vertically allowing the seats weight to aid closing.

Spring strength for check valves :

| <u>DN</u> | <u>START OPENING PRESSURE</u> (bar) | <u>END OPENING FORCE</u> (DaN) | <u>SEAT AREA</u> (cm^2) |
|-----------|--|-----------------------------------|---------------------------------------|
| 10/15 | 0.097 | 0.33 | 2.54 |
| 20/25 | 0.06 | 0.53 | 6.16 |

| REFERENCES | | | | |
|-----------------------|-----|-------------|---------------------------|--|
| I | ... | CR | x | x |
| Stainless steel range | DN | Check valve | D : Straight E : Angle | <u>Connections</u> H : Butt welding Thickness 2 mm for stainless steel pipe |



| DIMENSIONS IN MILLIMETERS | | | | | | | | |
|---------------------------|----|----|----|-----|------|---|------|----|
| | DN | B | D | H | I | K | T | U |
| 3/8" | 10 | 25 | 39 | 85 | 17.2 | 2 | 55.6 | 39 |
| 1/2" | 15 | 25 | 39 | 85 | 21.3 | 2 | 55.6 | 39 |
| 3/4" | 20 | 33 | 46 | 110 | 26.9 | 2 | 71.5 | 46 |
| 1" | 25 | 33 | 46 | 110 | 33.7 | 2 | 71.5 | 46 |

STAINLESS STEEL STOP/CHECK VALVE FROM 10 TO 25mm

STAINLESS

RFF stop/check valves are constructed of Stainless steel shell X4CrNi 18-10 (1.4301) EN10088-3 with aluminium cap or bakelite handwheel. Internal parts are similar than standard steel valves.

The nominal pressure rating is 25 bar with temperature range from -50°C up to +150°C. Stop/check valves with higher pressure PN 65 are also available on request with temperature range from -50°C to +110°C.

RFF stop/check valves can operate at the same time as both stop valves and check valves. When they are open, they act as check valves, but it is possible to lock them in the closed position, and they act as stop valves.

The size of a stop/check valve on an installation should be carefully selected especially if ammoniac is used : The stop/check valve should not be oversized or it may start to "chatter" when operating.

They are identical in design to standard versions of RFF valves. Maintenance and installation procedures are identical to the corresponding RFF standard valve.

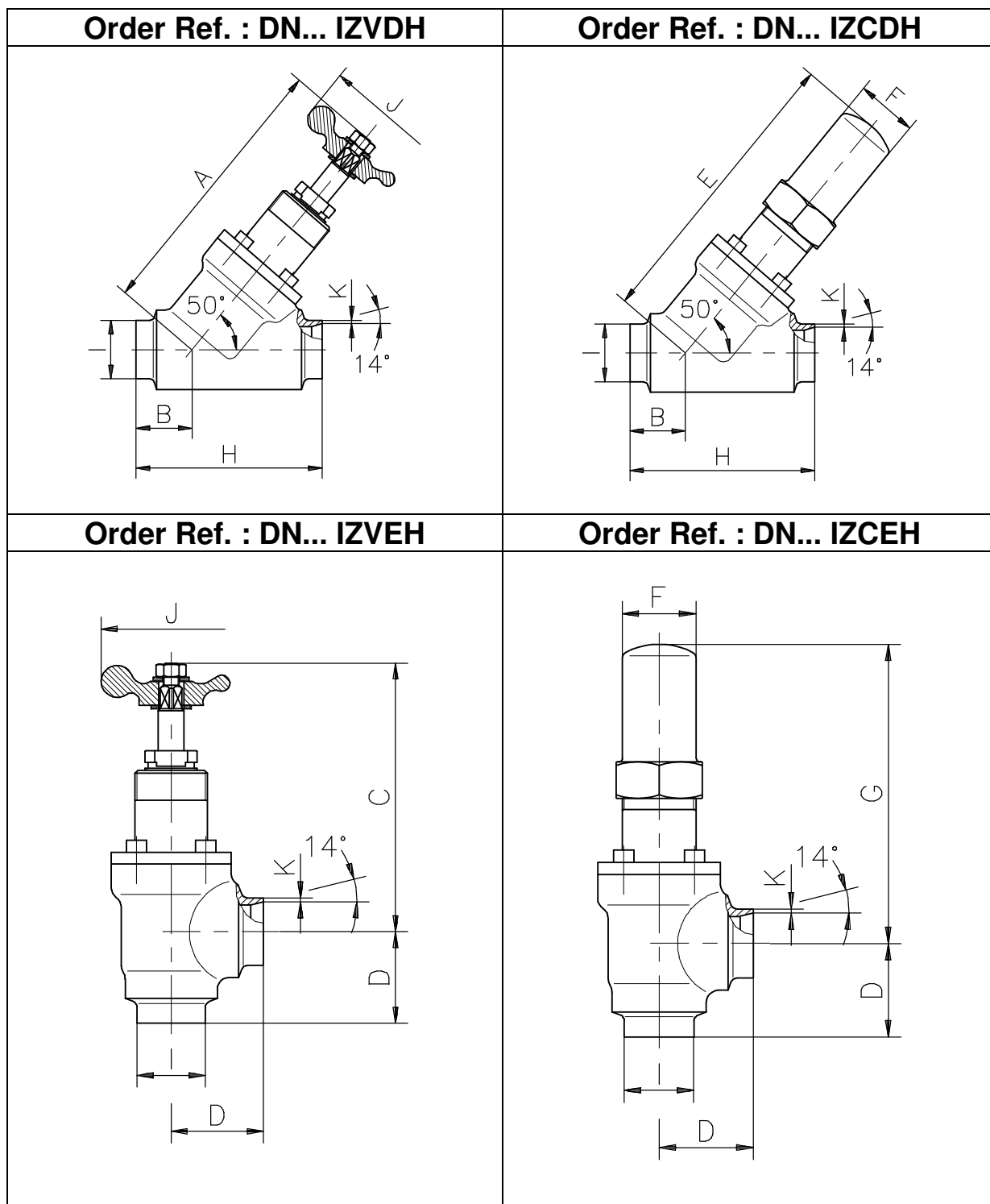
Stop/check valves can be identified by a groove machined above the bonnet.

Branch connections on RFF check valves can be :
for butt welding, "H" class
(Thickness 2mm for stainless steel pipe)

Spring strength for stop/check valves :

| <u>DN</u> | <u>START OPENING PRESSURE</u> (bar) | <u>END OPENING FORCE</u> (DaN) | <u>SEAT AREA</u> (cm ²) |
|-----------|-------------------------------------|--------------------------------|-------------------------------------|
| 10/15 | 0.093 | 0.3 | 2.54 |
| 20/25 | 0.053 | 0.49 | 6.157 |

| REFERENCES | | | | | |
|-----------------------|-----|------------------|------------------------------------|---------------------------|--|
| I | ... | Z | x | x | x |
| Stainless steel range | DN | Stop check valve | V : with handwheel C : with cap | D : Straight E : Angle | <u>Connections</u> H : Butt welding Thickness 2 mm for stainless steel pipe |



| DIMENSIONS IN MILIMETRES | | | | | | | | | | | | | |
|--------------------------|------|-----|-----|----|-----|----|-----|----|-----|-----|------|----|---|
| | DN | A * | B | C* | D | E | F | G | H | I | J | K | |
| | 3/8" | 10 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 17.2 | 50 | 2 |
| | 1/2" | 15 | 128 | 25 | 112 | 39 | 136 | 28 | 112 | 85 | 21.3 | 50 | 2 |
| | 3/4" | 20 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 26.9 | 70 | 2 |
| | 1" | 25 | 161 | 33 | 136 | 46 | 171 | 36 | 146 | 110 | 33.7 | 70 | 2 |

* Dimensions valve open

STAINLESS STEEL FILTERS FROM 10 TO 25 mm

STAINLESS

RFF filters are constructed of Stainless steel shell X4CrNi 18-10 (1.4301) EN10088-3.

RFF filters, straight or angle types, have stainless steel mesh cartridges which can be removed for cleaning. Sizes of screen aperture (distance between wires): 0.15 mm (FY type), 0.25 mm (FR type) or 0.5 mm (FA type).

The nominal pressure rating is 25 bar with temperature range from -50°C up to +150°C. Filters with higher pressure PN 65 are also available on request.

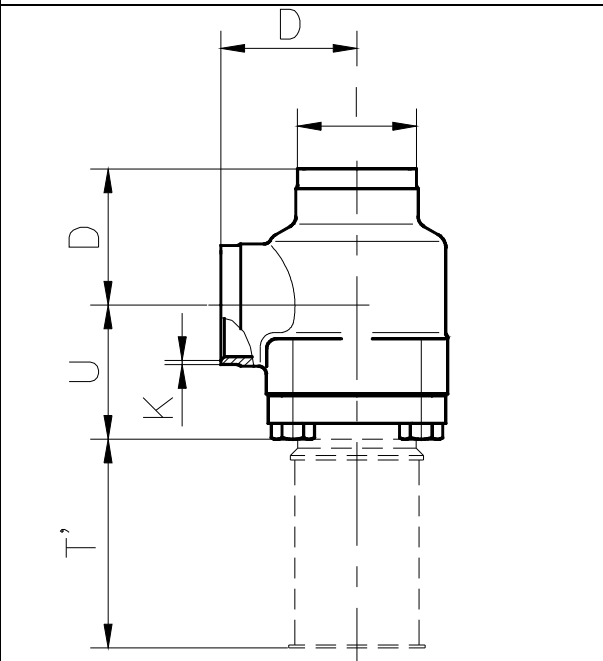
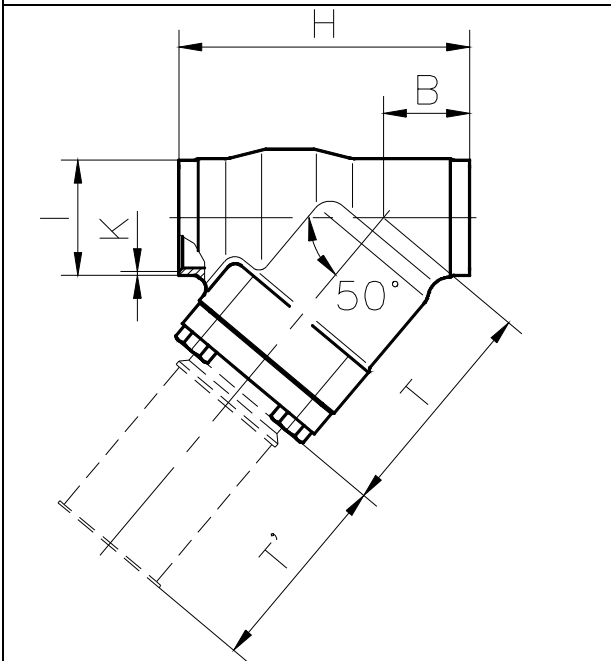
Maintenance and installation procedures are identical to the corresponding RFF valves. It is necessary to take care of the flow direction so that the filtration wire cloth is strengthened by the external wire cloth.

Filters can be identified by a groove machined above the bonnet.

| REFERENCES | | | | | |
|-----------------------|-----|--------|---|---------------------------|--|
| I | ... | F | x | x | x |
| Stainless steel range | DN | Filter | Sizes of screen aperture : A : 0.5mm R : 0.25mm Y : 0.15 mm W : 0.10 mm | D : Straight E : Angle | <u>Connections</u> H : Butt welding Thickness 2 mm for stainless steel pipe |

Order Ref. :
Sizes of screen aperture :
 0,5 mm DN ... IFADH
 0,25 mm DN ... IFRDH
 0,15 mm DN ... IFYDH
 0.10 mm DN ... IFWDH

Order Ref. :
Sizes of screen aperture :
 0,5 mm DN ... IFAEH
 0,25 mm DN ... IFREH
 0,15 mm DN ... IFYEH
 0.10 mm DN ... IFWEH



| DIMENSIONS IN MILLIMETERS | | | | | | | | | |
|---------------------------|----|----|----|-----|------|---|------|------|----|
| | DN | B | D | H | I | K | T | T' | U |
| 3/8" | 10 | 25 | 39 | 85 | 17.2 | 2 | 55.6 | 41 | 39 |
| 1/2" | 15 | 25 | 39 | 85 | 21.3 | 2 | 55.6 | 41 | 39 |
| 3/4" | 20 | 33 | 46 | 110 | 26.9 | 2 | 71.5 | 54.5 | 46 |
| 1" | 25 | 33 | 46 | 110 | 33.7 | 2 | 71.5 | 54.5 | 46 |

Please note :

- It is good practise to install the filter body so the filter cartridge can be withdrawn from below. This prevents contaminants re-entering the pipework as the filter cartridge is withdrawn.
- Allow a space of the dimension T' to remove the cartridge.

MAINTENANCE

CONTENTS

| | |
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| MAINTENANCE INSTRUCTIONS..... | 95 |
| TIGHTENING TORQUE FOR ASBESTOS FREE GASKETS | 97 |
| LAY OUT INSTRUCTIONS | 98 |

MAINTENANCE OFF RFF VALVES AND FITTINGS

GENERAL INSTRUCTIONS :

To ensure the safe operation and effectiveness of RFF valves and fittings during their operational life the valves should be regularly checked and serviced.

Particular attention should be paid to the valves :

- when constructing new installations,
- re-commissioning plant after modifications or new plant extensions,
- when restarting plant after extended periods of shut-down.

The following maintenance instructions are the minimum manufacturers recommendations.

SAFETY WARNING "Valve under pressure"

During demolition or part dismantling care must be taken as parts of the valves may still contain high pressure refrigerant gas.

MAINTENANCE PLAN :

1/ Annual maintenance :

a/ Test opening and closing operation :

Prior to opening any valve particular care should be taken to pump down the gas line and to isolate the valve undergoing inspection.

Check that the valves operate freely by opening and closing the valves by hand. Should it be difficult to turn the spindle, the valve bonnet should be removed for servicing. The bonnet should be dismantled, cleaned, and the spindle lubricated with grease. It may be necessary to change the O-rings and replace the body gasket, or to replace complete bonnet. When reassembling the valves, the body fixing screws should be lubricated with grease.

b/ Gas leakage check :

From the top of the gland nut :

Check that there is no leakage from the O-rings when the valve is not back seated or for small bore valves 4 and 8 mm. When the spindle is in open position with cap valves, leaks may be detected when unscrewing the cap : there will be a noise when the gas is relieved if there is any pressure inside the cap. Should there be any trace of leakage the O-rings must be replaced (see instructions page 94 and 95)

From body gaskets :

The flat body gasket should be replaced if necessary. When reassembling, the body fixing screws should be lubricated with grease.

c/ Sound Emittance from Valves :

The increased sound may be caused by wear on the bonnet or by damage to the sealing system (O-ring or Teflon seat) for check-valves or stop/check-valves, and for stop valves, by excessive looseness on the ball race connecting the seat to the spindle (e.g. lack of ball-bearings). Depending on the diagnosis, the defective parts concerned should be replaced. When re-assembling, the sliding parts should be lubricated with low temperature oil, and the fixing screws with grease.

2/ Planned Four Year Maintenance :

Every four years, it is recommended to carry out the following additional procedures :

a/ Valve seat check :

If the Teflon seal face is damaged, the PTFE of the whole seat should be replaced.

b/ Seat ball bearing race check :

Make check the seal must turn freely.

In the event of excessive play or sticking the defective seat or part should be replaced.

c/ Fixing screw check :

Any screws which are corroded or damaged should be replaced (screw material is class 8/8 – ISO 898)

d/ External surface check :

When necessary, all external surfaces, which are corroded, should be cleaned and repainted.

General re-assembly instructions :

When re-assembling valves and appliances, the body fixing screws should be lubricated with grease, and all moving parts in the bonnet (spindle, gland nut, seat or check valve seat) should be cleaned and lubricated with low-temperature oil.

As a preventative measure, all O-rings and body gaskets should be also replaced.

TIGHTENING TORQUES FOR ASBESTOS FREE GASKETS

- **Valves and filters from 32 to 150 mm**

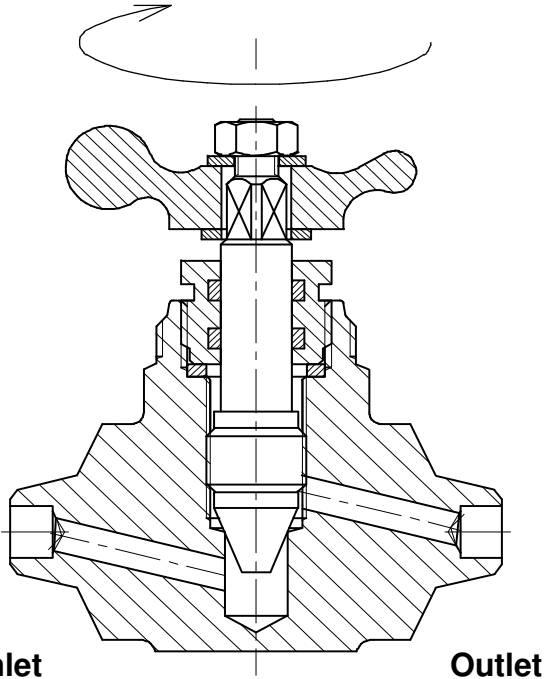
For several years RFF products are supplied with asbestos-free gaskets.

As asbestos free gaskets have less yield and are less tolerant to over tightening extra care has to be taken when tightening down.

The table below gives an approximate torque settings for the tightening of the body screws.

| Tightening torque required to seal Bonnet front on body | | |
|---|-----------|-----------|
| DN | Min (N.m) | Max (N.m) |
| 32/40 | 13.6 | 31.6 |
| 50 | 24.6 | 56.2 |
| 65 | 42 | 94.1 |
| 80 | 51.2 | 108 |
| 100 | 82.6 | 170 |
| 125 | 47.8 | 96 |
| 150 | 65 | 128 |

INSTRUCTIONS TO CHANGE PACKING GLAND "O" RINGS INSTRUMENTATION VALVES DN 4 and DN 8

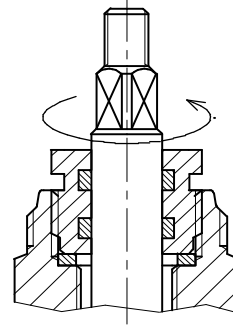


Inlet

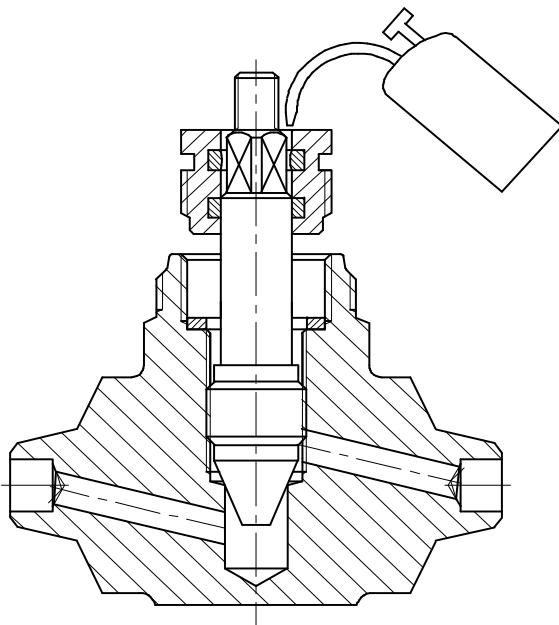
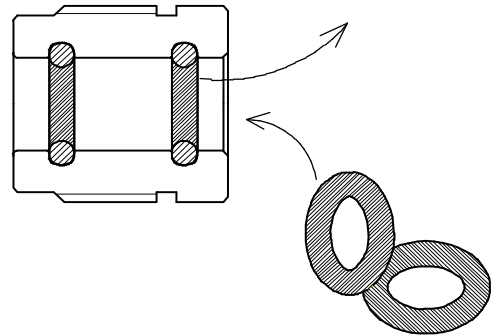
Outlet

1

2



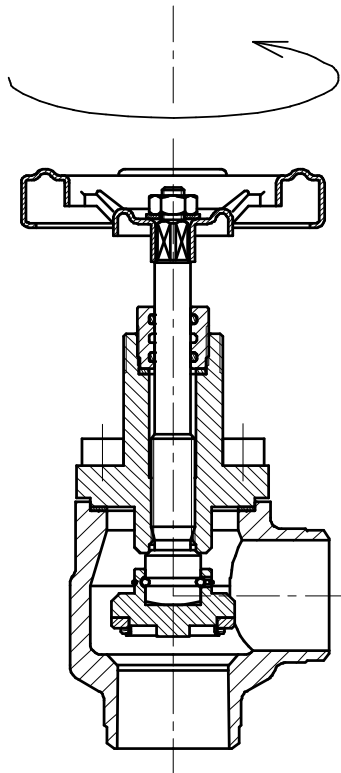
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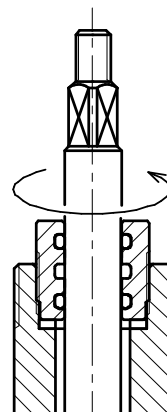
4

1. SHUT OFF THE VALVE AND BLOCK.
2. UNSCREW THE GLAND NUT.
3. CHANGE THE SPINDLE "O" RING. ALSO REPLACE THE GLAND ALUMINIUM GASKET IF NECESSARY.
4. PUT A LITTLE OF NON-FREEZING LOW-TEMPERATURE OIL BETWEEN THE TWO "O" RINGS AND REFIT THE GLAND NUT.

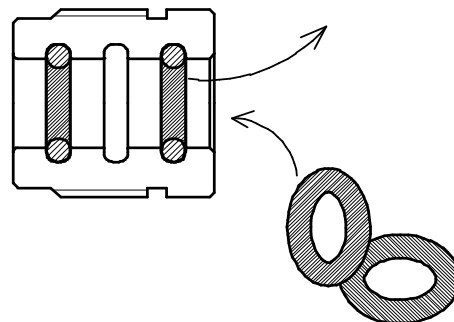
INSTRUCTIONS TO CHANGE PACKING GLAND "O"RINGS DN 10 to 450 mm



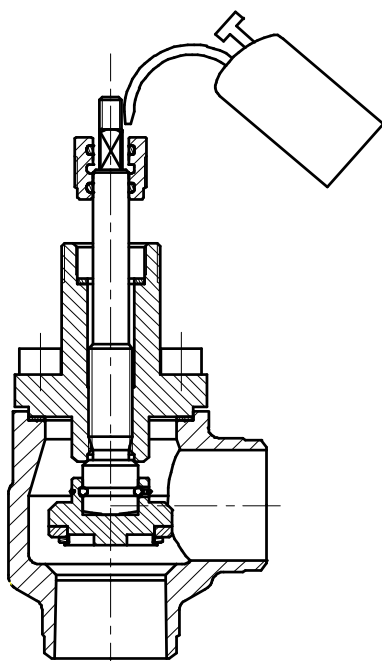
1



2



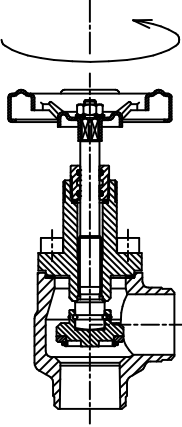
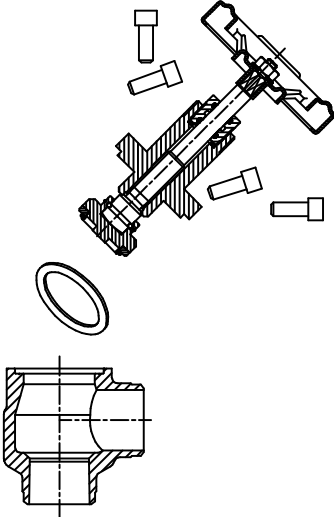
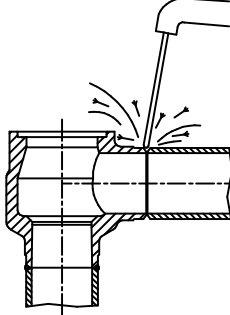
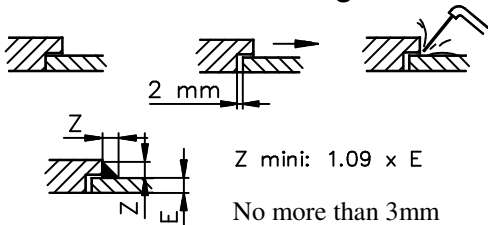
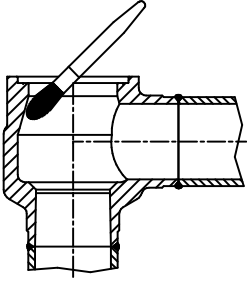
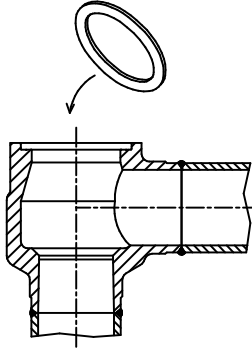
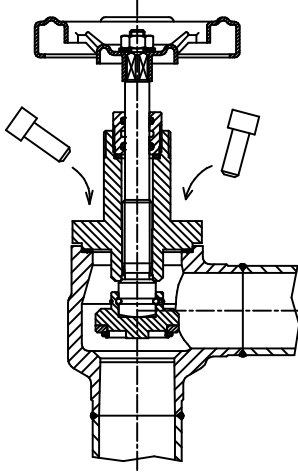
3



4

1. BACK SEAT THE VALVE BY OPENING IT TO ITS FULL EXTEND.
2. UNSCREW THE GLAND NUT.
3. CHANGE THE SPINDLE "O"RINGS (1ST AND 3RD NOTCH). ALSO REPLACE THE GLAND ALUMINIUM GASKET IF NECESSARY.
4. REFIT THE GLAND NUT. FILL THE GLAND OIL RESERVOIR WITH NON-FREEZING LOW-TEMPERATURE COMPRESSOR OIL.

LAY-OUT INSTRUCTIONS FOR R.F.F. VALVES

| | | |
|---|--|--|
|  <p>1</p> |  <p>2</p> | <p>Butt welding</p>  <p>Socket welding</p>  <p>3</p> |
|  <p>4</p> |  <p>5</p> |  <p>6</p> |
| <ol style="list-style-type: none"> 1. Wind open the valve to its full extend to back seat the valve. 2. Remove the complete bonnet taking care not to damage the seat material. 3. Weld the empty valve body to the pipework. In the case of filters or check valves take special note that the flow direction is indicated on the arrow on the body. (The flow should enter under the seat or into the filter). 4. Check that the inside of the valve body is clean and there is a film of oil on the internal surfaces. 5. Replace the body gasket 6. Re-assemble the bonnet on the valve body. | | |

FILTER INSTALLATION INSTRUCTION

The filter must be installed with the liquid entering in the direction of the arrow.

The filter body should be installed so that the filter cartridge can be withdrawn from below.

It is important to allow sufficient distance (dimensions T') to remove the filter cartridge.

Hot Gas lines :

Hot gas lines should have fitted in front of control valves and in hot gas defrost lines to Air Coolers.

Suction Gas lines. - Fabric Socks

In addition to the metal strainer cartridge, it is possible to install disposable fabric filter socks.

The filter socks should only be used during the initial commissioning period or after new suction pipework has been installed.

During the commissioning period, it may be necessary to replace contaminated dirty socks with clean socks until the system is clean.

The filter sock should not be left permanently inside the filter cartridge.

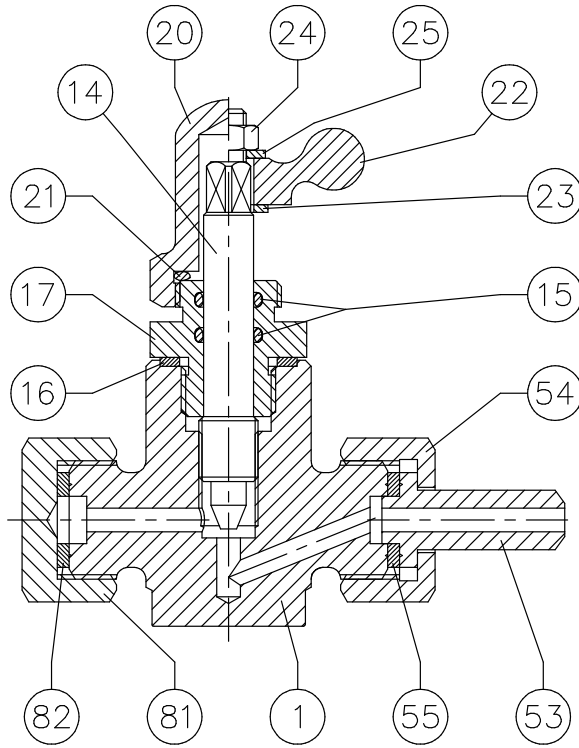
SPARE PARTS

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SPARE PARTS for

ORIGINAL SMALL VALVES, 4 and 8 mm

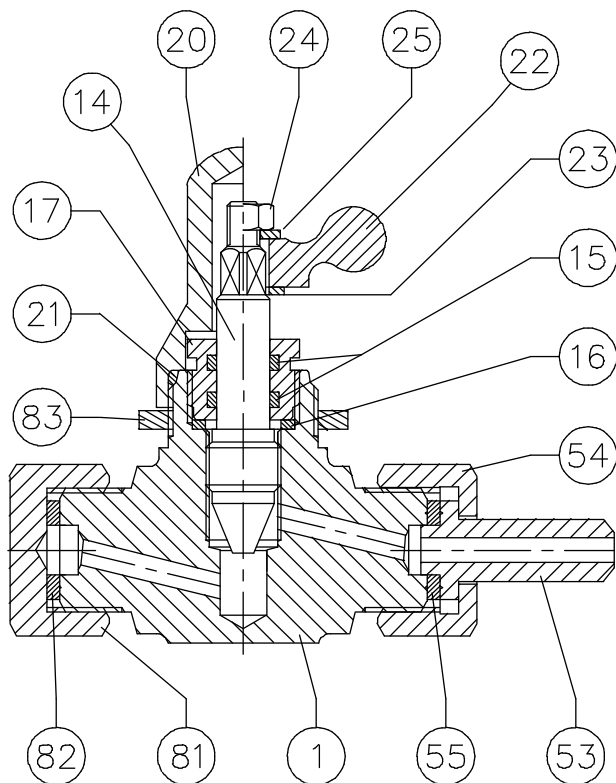


| Ref. | Description |
|------|-------------------------|
| 1 | Body |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 20 | Cap |
| 21 | Cap gasket |
| 22 | Handwheel |
| 23 | Handwheel bottom washer |
| 24 | Handwheel nut |
| 25 | Handwheel top washer |
| 53 | Tail |
| 54 | Tail nut |
| 55 | Tail gasket |
| 81 | Blind nut |
| 82 | Blind nut O-ring |

| DESCRIPTION | WITH PARTS NUMBER |
|------------------------------|-------------------------|
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Handwheel top washer and nut | 23+24+25 |
| Complete handwheel | 22+23+24+25 |
| Packing gland O-ring | 15 |
| Pacing gland gasket | 16 |
| Gland nut | 17 |
| Tail gasket | 55 |
| Tail | 53 |
| Tail nut | 54 |
| Blind nut and O-ring | 81+82 |
| Handwheel valve spindle | 14 |
| Gaskets for handwheel valve | 15+16 |
| Gaskets for cap valve | 15+16+21 |
| Bonnet with cap | 14+15+16+17+20+21 |
| Bonnet with handwheel | 14+15+16+17+22+23+24+25 |

SPARE PARTS FOR M93

SMALL VALVES, 4 and 8 mm

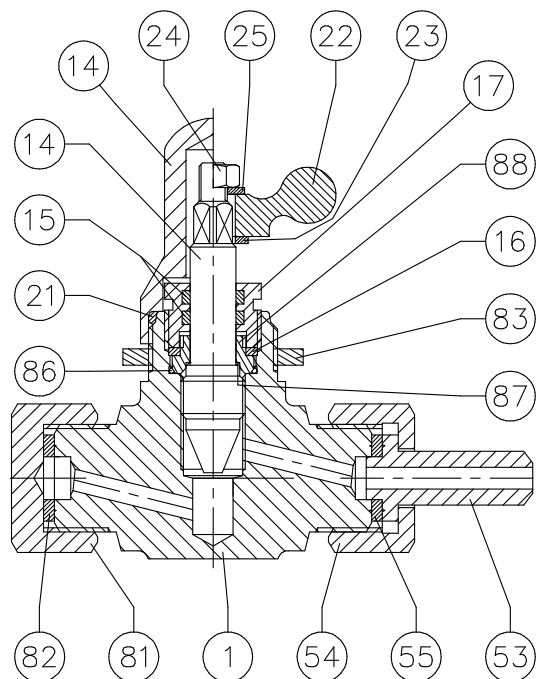


| Ref. | Description |
|------|-------------------------|
| 1 | Body |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 20 | Cap |
| 21 | Cap gasket |
| 22 | Handwheel |
| 23 | Handwheel bottom washer |
| 24 | Handwheel nut |
| 25 | Handwheel top washer |
| 53 | Tail |
| 54 | Tail nut |
| 55 | Tail Gasket |
| 81 | Blind nut |
| 82 | Blind nut O-ring |
| 83 | Fixing nut |

| DESCRIPTION | With parts number |
|------------------------------|-------------------------|
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Handwheel top washer and nut | 23+24+25 |
| Complete Handwheel | 22+23+24+25 |
| Packing gland O-ring | 15 |
| Packing gland gasket | 16 |
| Gland nut | 17 |
| Tail gasket | 55 |
| Tail | 53 |
| Tail nut | 54 |
| Blind nut and O-ring | 81+82 |
| Handwheel valve spindle | 14 |
| Gaskets for handwheel valve | 15+16 |
| Gaskets for cap valve | 15+16+21 |
| Bonnet with cap | 14+15+16+17+20+21 |
| Bonnet with handwheel | 14+15+16+17+22+23+24+25 |
| Fixing nut | 83 |

SPARE PARTS for

SMALL STAINLESS STEEL VALVE, 4 and 8 mm

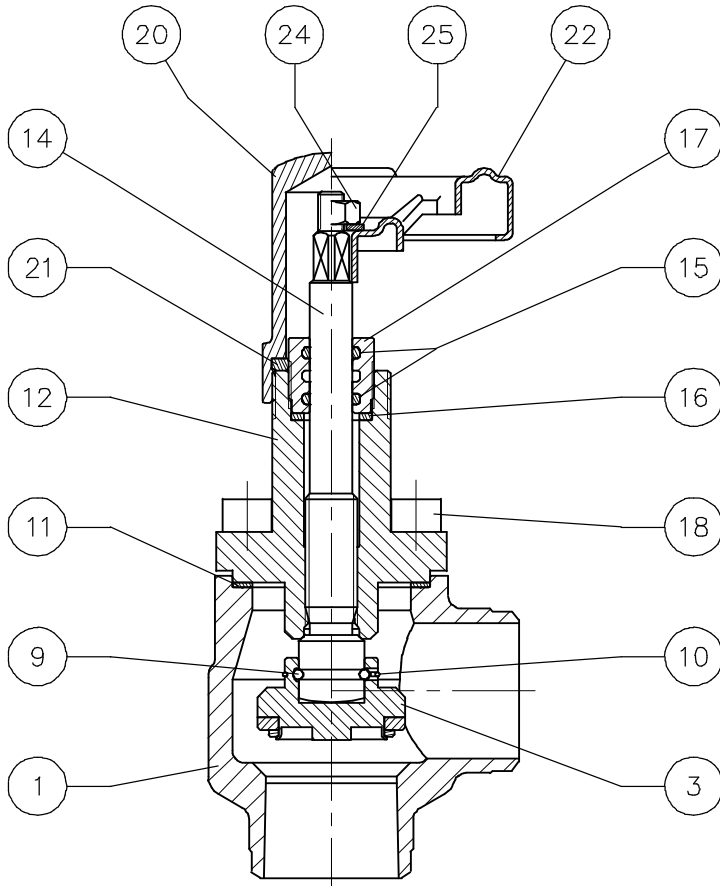


| Ref. | Description |
|------|-------------------------|
| 1 | Body |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 20 | Cap |
| 21 | Cap O-ring |
| 22 | Handwheel |
| 23 | Handwheel bottom washer |
| 24 | Handwheel nut |
| 25 | Handwheel top washer |
| 53 | Tail |
| 54 | Tail nut |
| 55 | Tail gasket |
| 81 | Blind nut |
| 82 | Blind nut O-ring |
| 83 | Fixing nut |
| 86 | O-ring for back seat |
| 87 | Back seat PTFE ring |
| 88 | Back seat nut |

| DESCRIPTION | With parts number |
|------------------------------|----------------------------------|
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Handwheel top washer and nut | 23+24+25 |
| Complete handwheel | 22+23+24+25 |
| Packing gland O-ring | 15 |
| Packing gland gasket | 16 |
| Gland nut | 17 |
| Back seat nut | 88 |
| Gaskets for back seat | 86+87 |
| Tail gasket | 55 |
| Tail | 53 |
| Tail nut | 54 |
| Blind nut and O-ring | 81+82 |
| Handwheel valve spindle | 14 |
| Gaskets for handwheel valve | 15+16+86+87 |
| Gaskets for cap valve | 15+16+21+86+87 |
| Bonnet with cap valve | 14+15+16+17+20+21+86+87+88 |
| Bonnet with handwheel | 14+15+16+17+22+23+24+25+86+87+88 |
| Fixing nut | 83 |

SPARE PARTS for

VALVES DN 10 A 250 mm



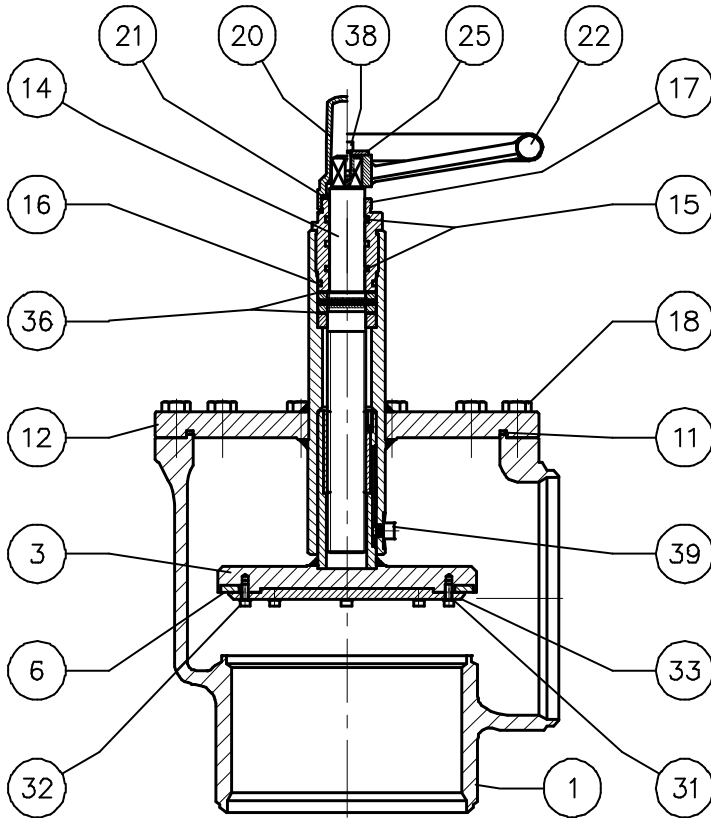
| Ref. | Description |
|------|---------------------------|
| 1 | Body |
| 3 | Seat |
| 9 | Ball bearing |
| 10 | Circlip |
| 11 | Body gasket |
| 12 | Bonnet |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 18 | Screw |
| 20 | Cap |
| 21 | Cap O-ring |
| 22 | handwheel |
| 23 | (Handwheel bottom washer) |
| 24 | Handwheel nut |
| 25 | Handwheel top washer |

() depending on diameter

| DESCRIPTION | WITH PARTS NUMBER |
|------------------------------|---|
| Ball bearings | 9 |
| Complete seat | 3+9+10 |
| Body gasket | 11 |
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Handwheel top washer and nut | (23)+24+25 |
| Complete handwheel | 22+(23)+24+25 |
| Packing gland O-ring | 15 |
| Packing gland gasket | 16 |
| Gland nut | 17 |
| Spindle | 14 |
| Gaskets for handwheel valve | 11+15+16 |
| Gaskets for cap valve | 11+15+16+21 |
| Bonnet with cap | 3+9+10+11+12+14+15+16+17+20+21 |
| Bonnet with handwheel | 3+9+10+11+12+14+15+16+17+18+22+(23)+24+25 |
| Screw | 18 |

SPARE PARTS for

VALVES DN 300 A 350 mm



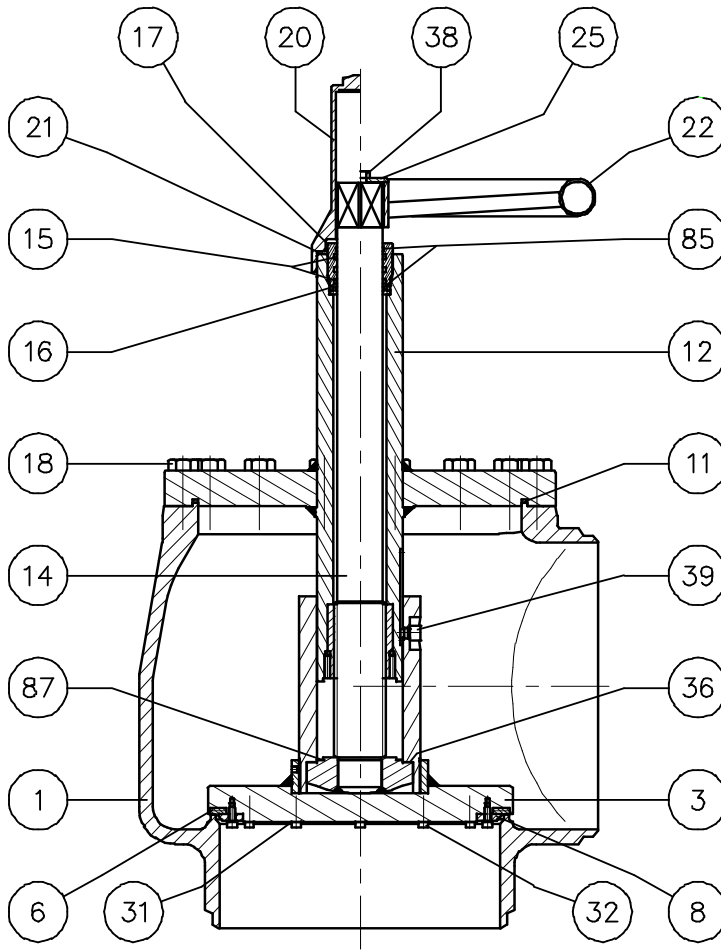
| Ref. | Description |
|------|----------------------|
| 1 | Body |
| 3 | Seat |
| 6 | Seat PTFE |
| 11 | Body gasket |
| 12 | Bonnet |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 18 | Screw |
| 20 | Cap |
| 21 | Cap O-ring |
| 22 | Handwheel |
| 25 | Washer |
| 31 | Spring washer |
| 32 | Screw |
| 33 | Locking plate |
| 36 | Sliding ring |
| 38 | Screw |
| 39 | Retaining screw |

() : depending on diameter

| DESCRIPTION | WITH PARTS NUMBER |
|-----------------------------|---|
| Seat PTFE | 6 |
| Complete seat | 3+6+31+32+33+39 |
| Body gasket | 11 |
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Handwheel screw and washer | 25+38 |
| Complete handwheel | 22+25+38 |
| Packing gland O-ring | 15 |
| Packing gland gasket | 16 |
| Gland nut | 17 |
| Spindle | 14 |
| Gaskets for handwheel valve | 11+15+16 |
| Gaskets for cap valve | 11+15+16+21 |
| Bonnet with cap | 3+6+11+12+14+15+16+17 +20+21+31+32+33+36+39 |
| Bonnet with handwheel | 3+6+11+12+14+15+16+17 +22+25+31+32+33+36+38+39 |
| Screw | 18 |

SPARE PARTS for

VALVES DN 400 and 450 mm

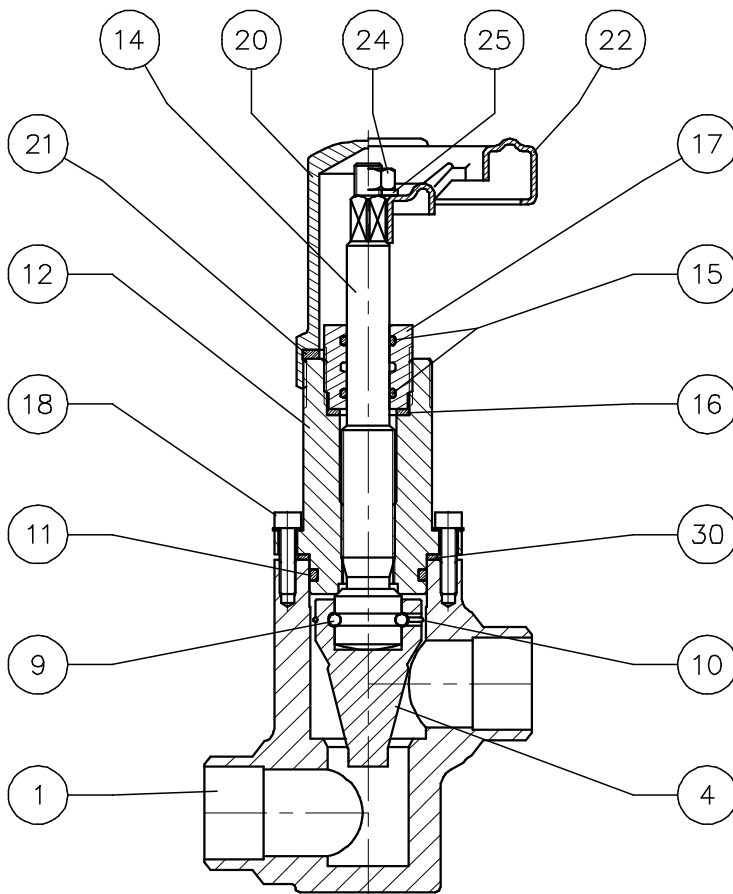


| Ref. | Description |
|------|----------------------|
| 1 | Body |
| 3 | Seat |
| 6 | Seat PTFE |
| 8 | Fixing PTFE washer |
| 11 | Body gasket |
| 12 | Bonnet |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 18 | Screw |
| 20 | Cap |
| 21 | Cap O-ring |
| 22 | Handwheel |
| 25 | Washer |
| 31 | Spring washer |
| 32 | Screw |
| 36 | Sliding ring |
| 38 | Screw |
| 39 | Retaining screw |
| 85 | Guidance tape |
| 87 | Back seat PTFE ring |

| DESCRIPTION | WITH PARTS NUMBER |
|-----------------------------|---|
| Seat PTFE | 6 |
| Complete seat | 3+6+8+31+32 |
| Body gasket | 11 |
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Handwheel screw and washer | 25+38 |
| Complete handwheel | 22+25+38 |
| Packing gland O-ring | 15 |
| Packing gland gasket | 16 |
| Gland nut | 17 |
| Complete Gland | 15+16+17+85 |
| Complete spindle | 14+36+87 |
| Gaskets for handwheel valve | 11+15+16 |
| Gaskets for cap valve | 11+15+16+21 |
| Bonnet with cap | 3+6+8+11+12+14+15+16+17 +20+21+31+32+36+39+85+87 |
| Bonnet with handwheel | 3+6+8+11+12+14+15+16+17+22 +25+31+32+36+36+38+39+85+87 |
| Screw | 18 |

SPARE PARTS for

HAND REGULATING VALVE 10 to 40 mm previous model

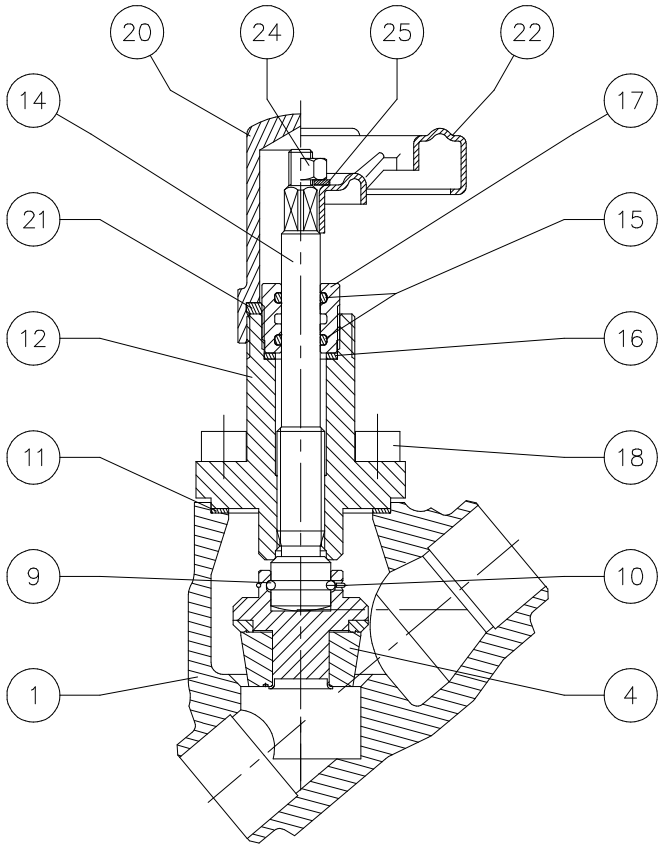


| Ref | Description |
|-----|---------------------------|
| 1 | Body |
| 4 | Cone |
| 9 | Ball bearing |
| 10 | Circlip |
| 11 | Body gasket |
| 12 | Bonnet |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 18 | Screw |
| 20 | Cap |
| 21 | Cap O-ring |
| 22 | Handwheel |
| 23 | (handwheel bottom washer) |
| 24 | Handwheel nut |
| 25 | Handwheel top washer |
| 30 | (Aluminium body gasket) |

| DESCRIPTION | WITH PART NUMBER |
|--------------------------------------|---|
| Ball bearings | 9 |
| Complete cone (DN+flow-rate) | 4+9+10 |
| Body gasket | 11+(30) |
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Handwheel top washer and nut | (23)+24+25 |
| complete handwheel | 22+(23)+24+25 |
| Packing gland O-ring | 15 |
| Packing gland gasket | 16 |
| Gland nut | 17 |
| Spindle | 14 |
| Gaskets for handwheel valve | 11+15+16+(30) |
| Gaskets for cap valve | 11+15+16+21+(30) |
| Bonnet with cap (DN+flow-rate) | 3+9+10+11+12+14+15+16+17+20+21+(30) |
| Bonnet with handwheel (DN+flow-rate) | 3+9+10+11+12+14+15+16+17+22+(23)+24+25+(30) |
| Screw | 18 |

SPARE PARTS for

HAND REGULATING VALVE 10 to 40 New Model



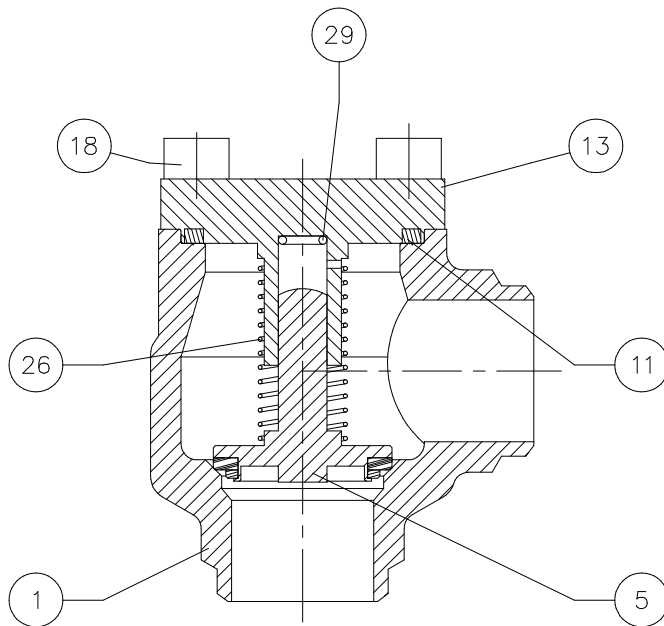
| Ref. | Description |
|------|---------------------------|
| 1 | Body |
| 4 | Cone |
| 9 | Ball bearing |
| 10 | Circlips |
| 11 | Body gasket |
| 12 | Bonnet |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 18 | Screw |
| 20 | Cap |
| 21 | Cap O-ring |
| 22 | handwheel |
| 23 | (handwheel bottom washer) |
| 24 | Handwheel nut |
| 25 | Handwheel top washer |

() : depending on diameter

| DESCRIPTION | WITH PARTS NUMBER |
|--------------------------------------|--|
| Ball bearings | 9 |
| Complete cone (DN+flow-rate) | 4+9+10 |
| Body gasket | 11 |
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Handwheel top washer and nut | (23)+24+25 |
| Complete handwheel | 22+(23)+24+25 |
| Packing gland O-ring | 15 |
| Packing gland gasket | 16 |
| Gland nut | 17 |
| Spindle | 14 |
| Gaskets for handwheel valve | 11+15+16 |
| Gaskets for cap valve | 11+15+16+21 |
| Bonnet with cap (DN+flow-rate) | 3+9+10+11+12+14+15+16+17+20+21 |
| Bonnet with handwheel (DN+flow-rate) | 3+9+10+11+12+14+15+16+17+22+(23)+24+25 |
| Screw | 18 |

SPARE PARTS for

CHECK VALVES from 10 to 40 mm

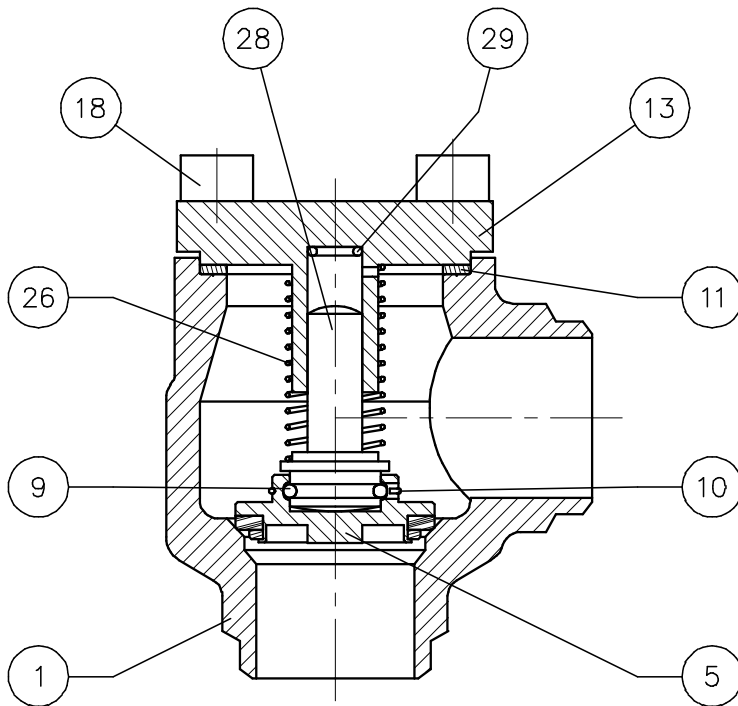


| Ref | Description |
|-----|------------------|
| 1 | Body |
| 5 | Check valve seat |
| 11 | Body gasket |
| 13 | Bonnet |
| 18 | Screw |
| 26 | Spring |
| 29 | Buffer O-ring |

| DESIGNATION | WITH PARTS NUMBER |
|------------------------------|-------------------|
| Bonnet | 13 |
| Spring | 26 |
| Buffer O-ring | 29 |
| Body gasket | 11 |
| Complete check valve clapper | 5 |
| Gaskets for check valve | 11+29 |
| Complete bonnet | 5+11+13+26+29 |
| Screw | 18 |

SPARE PARTS for

CHECK VALVES DN 32 and 40 mm previous model

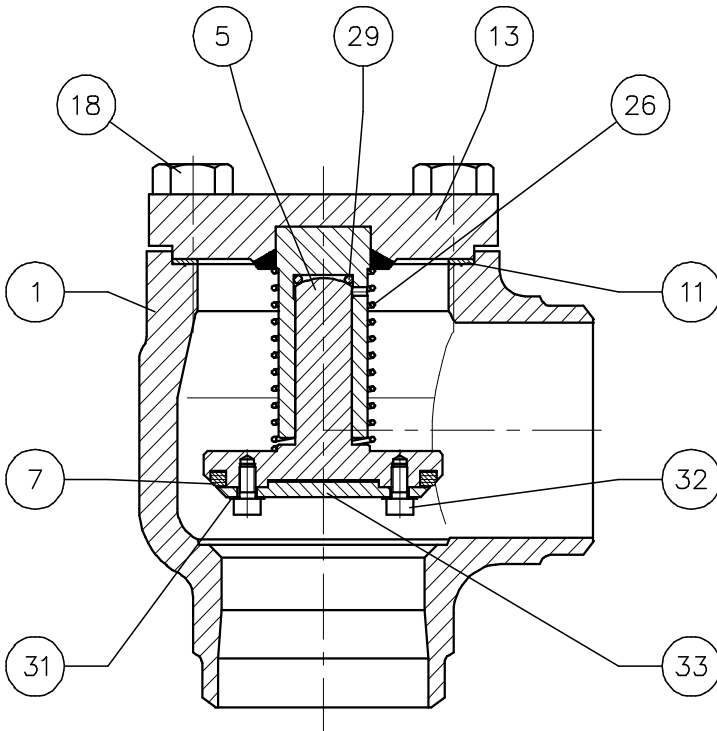


| Ref | Description |
|-----|---------------------|
| 1 | Body |
| 5 | Check valve seat |
| 9 | Ball bearing |
| 10 | Circlips |
| 11 | Body gasket |
| 13 | Bonnet |
| 18 | Screw |
| 26 | Spring |
| 28 | Check valve spindle |
| 29 | Buffer O-ring |

| DESCRIPTION | WITH PARTS NUMBER |
|------------------------------|-----------------------------|
| Ball bearing | 9 |
| Bonnet | 13 |
| Check valve stem | 28 |
| Complete seat | 5+9+10 |
| Spring | 26 |
| Buffer O-ring | 29 |
| Body gasket | 11 |
| Complete check valve clapper | 5+(9)+(10)+(28) |
| Gaskets for check valve | 11+29 |
| Complete bonnet | 5+(9)+(10)+11+13+26+(28)+29 |
| Screw | 18 |

SPARE PARTS for

CHECK VALVES from 50 to 100 mm

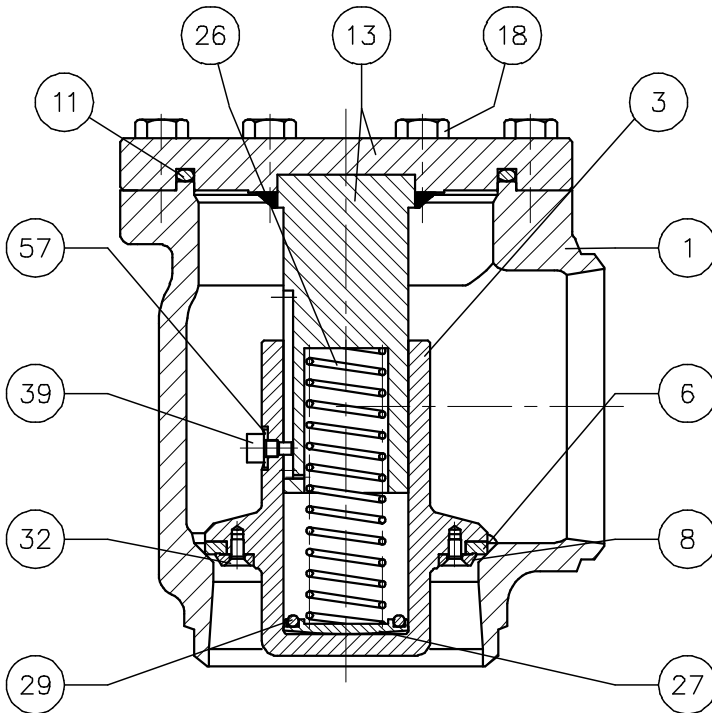


| Ref | Description |
|-----|-------------------------|
| 1 | Body |
| 5 | Check valve seat |
| 7 | Check valve seat O-ring |
| 11 | Body gasket |
| 13 | Bonnet |
| 18 | Screw |
| 26 | Spring |
| 29 | Buffer O-ring |
| 31 | Spring washer |
| 32 | Locking plate screw |
| 33 | Locking plate |

| DESCRIPTION | WITH PARTS NUMBER |
|---------------------------|--------------------------|
| Bonnet | 13 |
| Spring | 26 |
| Buffer O-ring | 29 |
| Check valve seat O-ring | 7 |
| Body gasket | 11 |
| Complete check valve seat | 5+7+31+32+33 |
| Gaskets for check valve | 7+11+29 |
| Complete bonnet | 5+7+11+13+26+29+31+32+33 |
| Screw | 18 |

SPARE PARTS for

CHECK VALVE from 125 to 250 mm

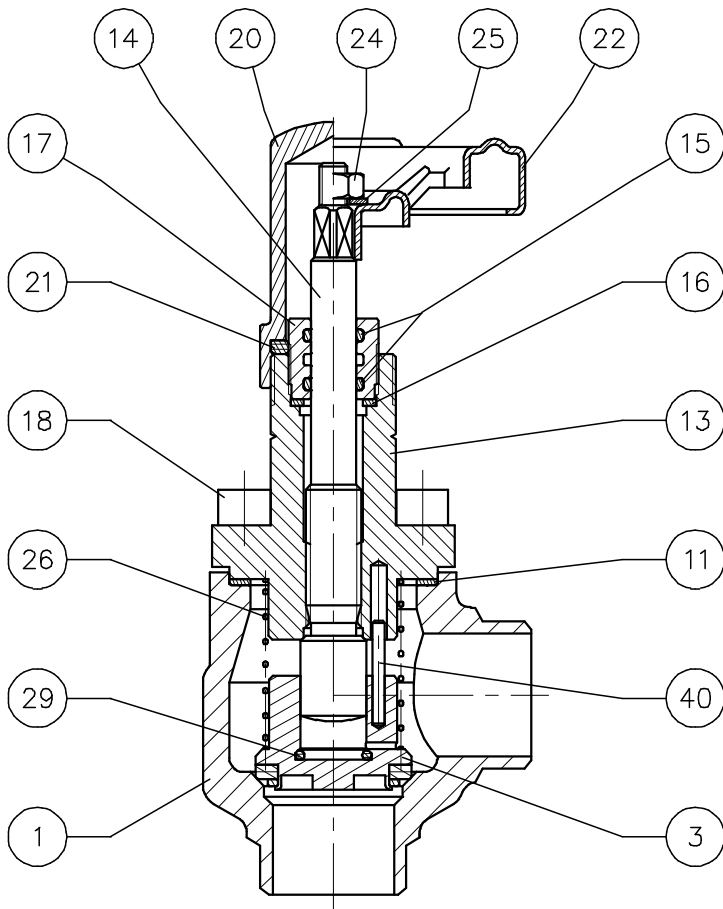


| Ref | Description |
|-----|-------------------|
| 1 | Body |
| 3 | Check valve seat |
| 6 | Seat PTFE |
| 8 | PTFE fixing disc |
| 11 | Body gasket |
| 13 | Bonnet |
| 18 | Screw |
| 26 | Spring |
| 27 | Thrust bearing |
| 29 | Buffer O-ring |
| 32 | PTFE Fixing screw |
| 39 | Stoppage screw |
| 57 | Washer |

| DESCRIPTION | WITH PARTS NUMBER |
|---------------------------|-------------------------------|
| Bonnet | 13 |
| Spring | 26 |
| Complete buffer | 27+29 |
| Check valve seat PTFE | 7 |
| Body gasket | 11 |
| Complete check valve seat | 3+7+8+32+39+57 |
| Gaskets for check valve | 11+27+29 |
| Complete bonnet | 3+7+8+11+13+26+27+29+32+39+52 |
| Screw | 18 |

SPARE PARTS for

STOP/CHECK VALVES from 10 to 100 mm

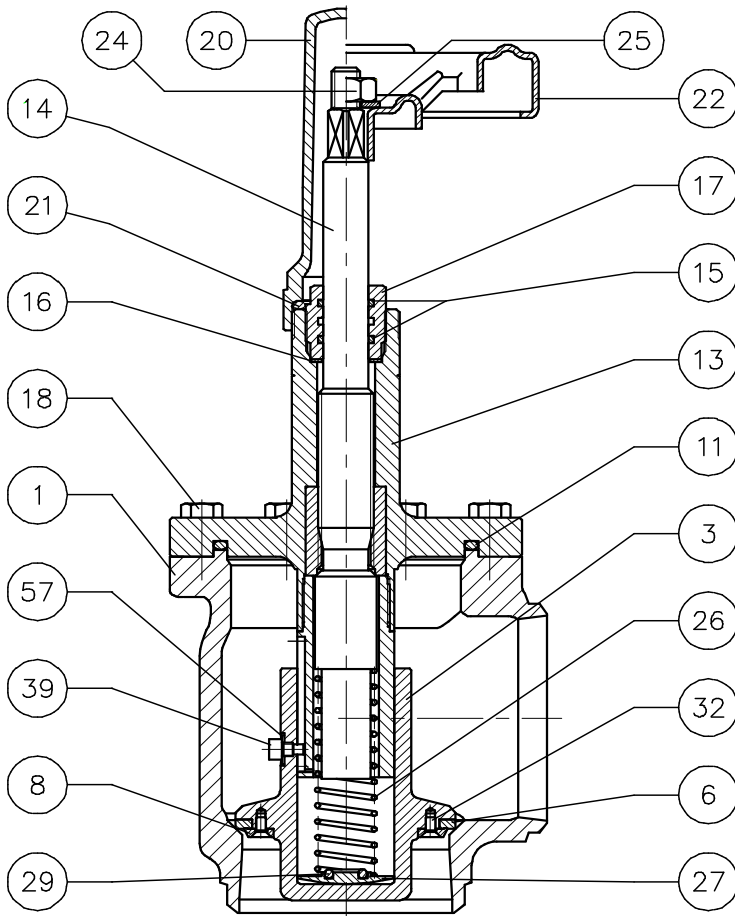


| Ref. | Description |
|------|----------------------|
| 1 | Body |
| 3 | Seat |
| 11 | Body gasket |
| 13 | Bonnet |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 18 | Screw |
| 20 | Cap |
| 21 | Cap O-ring |
| 22 | Handwheel |
| 24 | Handwheel nut |
| 25 | Handwheel top washer |
| 26 | Spring |
| 29 | Buffer O-ring |
| 40 | Pin |

| DESCRIPTION | WITH PARTS NUMBER |
|------------------------------|---------------------------------------|
| Buffer O-ring | 29 |
| Seat pin | 40 |
| Complete seat | 3+29+40 |
| Body gasket | 11 |
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Handwheel top washer and nut | 24+25 |
| Complete handwheel | 22+24+25 |
| Packing gland O-ring | 15 |
| Packing gland gasket | 16 |
| Gland nut | 17 |
| Stop/check valve spindle | 14 |
| Spring | 26 |
| Gaskets for handwheel valve | 11+15+16+29 |
| Gaskets for cap valve | 11+15+16+21+29 |
| Bonnet with cap | 3+11+13+14+15+16+17+20+21+26+29+40 |
| Bonnet with handwheel | 3+11+13+14+15+16+17+22+24+25+26+29+40 |
| Screw | 18 |

SPARE PARTS for

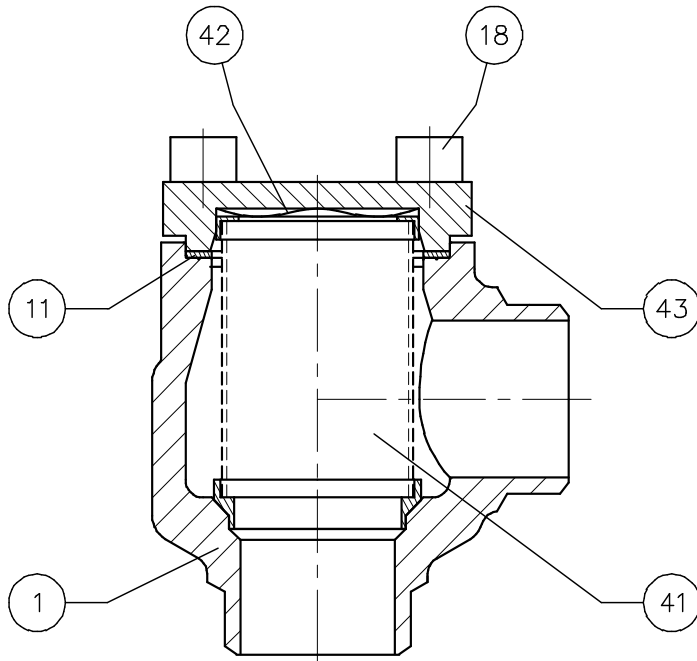
STOP/CHECK VALVE from 125 to 250 mm



| Ref. | Description |
|------|----------------------|
| 1 | Body |
| 3 | Seat |
| 6 | Seat PTFE |
| 8 | PTFE fixing disc |
| 11 | Body gasket |
| 13 | Bonnet |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 18 | Screw |
| 20 | Cap |
| 21 | Cap O-ring |
| 22 | Handwheel |
| 24 | Handwheel nut |
| 25 | Handwheel top washer |
| 26 | Spring |
| 27 | Thrust bearing |
| 29 | Buffer O-ring |
| 32 | PTFE fixing screw |
| 39 | Stoppage screw |
| 57 | Washer |

| DESCRIPTION | WITH PARTS NUMBER |
|------------------------------|--|
| Complete buffer | 27+29 |
| Stop/check valve seat PTFE | 7 |
| Complete seat | 3+7+8+32+39+57 |
| Body gasket | 11 |
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Handwheel top washer and nut | 24+25 |
| Complete Handwheel | 22+24+25 |
| Packing gland O-ring | 15 |
| Packing gland gasket | 16 |
| Gland nut | 17 |
| Spindle | 14 |
| Spring | 26 |
| Gaskets for handwheel valve | 11+15+16+27+29 |
| Gaskets for cap valve | 11+15+16+21+27+29 |
| Bonnet with cap | 3+7+8+11+13+14+15+16+17+20+21+26+27+29+32+39+57 |
| Bonnet with handwheel | 3+7+8+11+13+14+15+16+17+22+24+25+26+27+29+32+39+57 |
| Screw | 18 |

SPARE PARTS for FILTERS from 10 to 350 mm



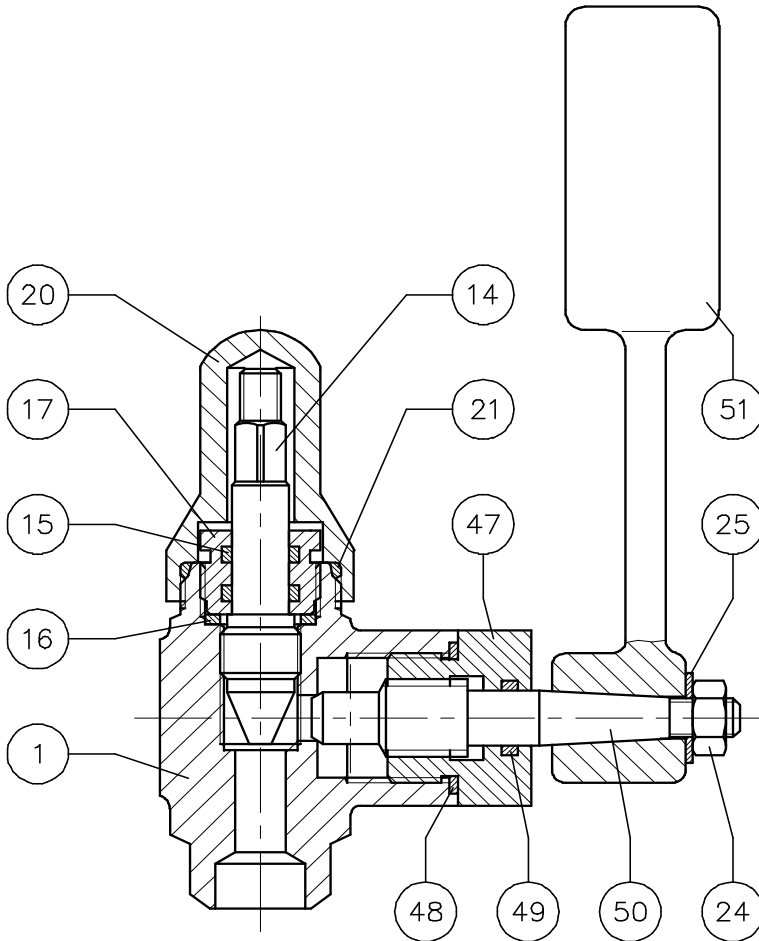
| Ref | Description |
|-----|-------------------|
| 1 | Body |
| 11 | Body gasket |
| 18 | Screw |
| 41 | Cartridge |
| 42 | (Flexible washer) |
| 43 | Bonnet |

() : Depending on diameter

| DESCRIPTION | WITH PARTS NUMBER |
|-----------------|-------------------|
| Cartridge | 41+(43) |
| Flexible washer | 42 |
| Body gasket | 11 |
| Complete Bonnet | 11+41+(42)+43 |
| Screw | 18 |

SPARE PARTS for

PURGE VALVES WITH COUNTERWEIGHT DN 8 mm

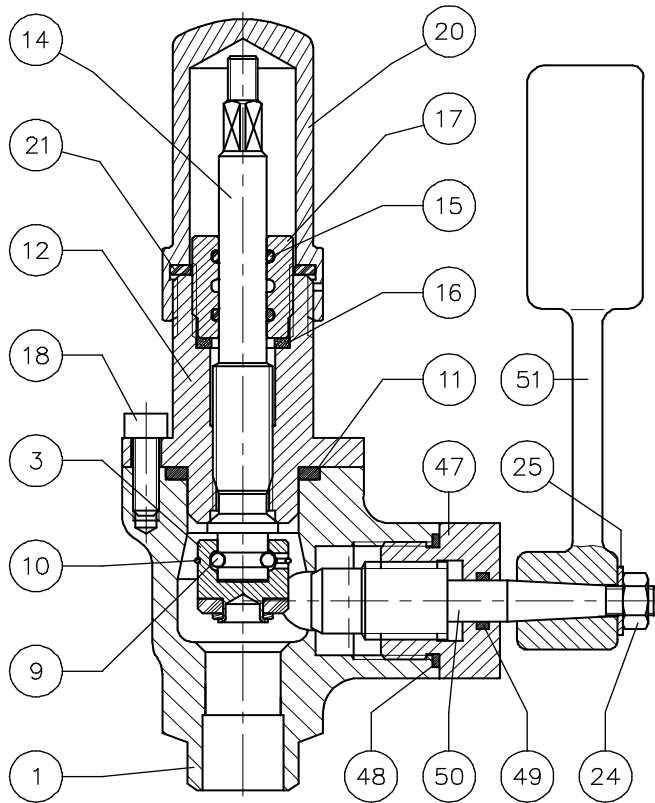


| Ref. | Description |
|------|-----------------------------|
| 1 | Body |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 20 | Cap |
| 21 | Cap O-ring |
| 24 | Nut |
| 25 | Washer |
| 47 | Counterweight shaft support |
| 48 | O-ring |
| 49 | O-ring |
| 50 | Counterweight shaft |
| 51 | Counterweight |

| DESCRIPTION | WITH PARTS NUMBER |
|------------------------------------|----------------------|
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Packing gland O-ring | 15 |
| Packing gland gasket | 16 |
| Gland nut | 17 |
| Manual valve Spindle | 14 |
| Manual valve complete bonnet | 14+15+16+17+20+21 |
| Counterweight shaft support O-ring | 48 |
| Counterweight axle O-ring | 49 |
| Counterweight shaft support | 50 |
| Complete closure system | 24+25+47+48+49+50+51 |
| Gaskets for purge valve | 15+16+21+48+49 |

SPARE PARTS for

PURGE VALVES WITH COUNTERWEIGHT DN 15 mm



| Ref. | Description |
|------|-----------------------------|
| 1 | Body |
| 3 | Seat |
| 9 | Ball bearing |
| 10 | Circlip |
| 11 | Body gasket |
| 12 | Bonnet |
| 14 | Spindle |
| 15 | Packing gland O-ring |
| 16 | Packing gland gasket |
| 17 | Gland nut |
| 18 | Screw |
| 20 | Cap |
| 21 | Cap O-ring |
| 24 | Nut |
| 25 | Washer |
| 47 | Counterweight Shaft support |
| 48 | O-ring |
| 49 | O-ring |
| 50 | Counterweight shaft |
| 51 | Counterweight |

| DESCRIPTION | WITH PARTS NUMBER |
|------------------------------|--------------------------------|
| Ball bearings | 9 |
| Complete cap | 3+9+10 |
| Body gasket | 11 |
| Cap O-ring | 21 |
| Complete cap | 20+21 |
| Packing gland O-ring | 15 |
| Packing gland gasket | 16 |
| Gland nut | 17 |
| Manual valve spindle | 14 |
| Manual valve complete bonnet | 3+9+10+11+12+14+15+16+17+20+21 |
| Screw | 18 |
| Counterweight shaft O-ring | 48 |
| Counterweight axle O-ring | 49 |
| Complete closure system | 24+25+47+48+49+50+51 |
| Gaskets for purge valve | 11+15+16+21+48+49 |

WEIGHT AND VOLUME OF RFF VALVES

| STOP VALVES | | | | | | |
|-------------|-------------|---------|-------------|-------|-------|-------|
| DN | VOL. (Lit.) | | WEIGHT (kg) | | | |
| | D* | E* | VD* | CD* | VE* | CE* |
| 4 1E | 0.004 | - | 0.36 | 0.39 | - | - |
| 4 2E | 0.004 | - | 0.42 | 0.44 | - | - |
| 4 | 0.004 | 0.004 | 0.30 | 0.32 | 0.28 | 0.30 |
| 8 1E | 0.005 | - | 0.48 | 0.50 | - | - |
| 8 2E | 0.005 | - | 0.54 | 0.57 | - | - |
| 8 | 0.005 | 0.005 | 0.40 | 0.41 | 0.38 | 0.39 |
| 10 | 0.021 | 0.016 | 0.93 | 1.05 | 0.79 | 0.91 |
| 15 | 0.025 | 0.021 | 0.90 | 1.02 | 0.79 | 0.90 |
| 20 | 0.060 | 0.050 | 1.97 | 2.22 | 1.57 | 1.84 |
| 25 | 0.070 | 0.055 | 1.92 | 2.16 | 1.55 | 1.80 |
| 32 | 0.210 | 0.150 | 3.44 | 3.60 | 2.94 | 3.04 |
| 40 | 0.240 | 0.160 | 3.26 | 3.44 | 2.82 | 3.07 |
| 50 | 0.500 | 0.350 | 5.50 | 5.45 | 5.04 | 4.96 |
| 65 | 0.910 | 0.710 | 11.37 | 10.95 | 9.21 | 8.90 |
| 80 | 1.500 | 1.080 | 15.90 | 15.44 | 12.42 | 12.23 |
| 100 | 3.060 | 2.020 | 24.08 | 23.80 | 19.30 | 18.80 |
| 125 | 6.990 | 3.570 | 39.30 | 38.50 | 30 | 29.40 |
| 150 | 12.270 | 5.810 | 50.5 | 49.7 | 38.5 | 37.8 |
| 200 | 19.00 | 14.40 | 103 | 102 | 81 | 80 |
| 250 | 37.00 | 27.00 | 158 | 157 | 125 | 124 |
| 300 | 99.020 | 51.130 | 264 | 259 | 208 | 203 |
| 350 | 129.000 | 62.570 | 319 | 314 | 229 | 224 |
| 400 | 234.000 | 121.000 | 526 | 521 | 430 | 425 |
| 450 | 313.000 | 150.000 | 645 | 643 | 515 | 513 |

V = with handwheel

C = with cap

D = straight

E = angle

| STOP/CHECK VALVES | | | | | | | | | | | | |
|-------------------|---------|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| VOL. (lit.) | | WEIGHT (kg) | | | | | | | | | | |
| D* | E* | VD* | VE* | CD* | CE* | | | | | | | |
| 8 | 0.005 | 0.005 | 0.40 | 0.41 | 0.38 | 0.39 | | | | | | |
| 10 | 0.021 | 0.016 | 0.93 | 1.05 | 0.79 | 0.91 | 0.021 | 0.016 | 0.93 | 0.79 | 1.05 | 0.91 |
| 15 | 0.025 | 0.021 | 0.90 | 1.02 | 0.79 | 0.90 | 0.025 | 0.021 | 0.90 | 0.79 | 1.02 | 0.90 |
| 20 | 0.060 | 0.050 | 1.97 | 2.22 | 1.57 | 1.84 | 0.06 | 0.04 | 1.96 | 1.6 | 2.2 | 1.84 |
| 25 | 0.070 | 0.055 | 1.92 | 2.16 | 1.55 | 1.80 | 0.06 | 0.04 | 1.9 | 1.58 | 2.14 | 1.82 |
| 32 | 0.210 | 0.150 | 3.44 | 3.60 | 2.94 | 3.04 | 0.200 | 0.140 | 3.56 | 3.74 | 2.97 | 3.15 |
| 40 | 0.240 | 0.160 | 3.26 | 3.44 | 2.82 | 3.07 | 0.230 | 0.160 | 3.38 | 3.56 | 2.94 | 3.11 |
| 50 | 0.500 | 0.350 | 5.50 | 5.45 | 5.04 | 4.96 | 0.480 | 0.340 | 5.52 | 5.46 | 5.12 | 5.06 |
| 65 | 0.910 | 0.710 | 11.37 | 10.95 | 9.21 | 8.90 | 0.860 | 0.660 | 11.36 | 11.05 | 9.42 | 9.10 |
| 80 | 1.500 | 1.080 | 15.90 | 15.44 | 12.42 | 12.23 | 1.440 | 1.020 | 16.10 | 16.55 | 12.34 | 12.72 |
| 100 | 3.060 | 2.020 | 24.08 | 23.80 | 19.30 | 18.80 | 3.220 | 2.180 | 24.27 | 23.90 | 19.82 | 19.44 |
| 125 | 6.990 | 3.570 | 39.30 | 38.50 | 30 | 29.40 | 6.59 | 3.17 | 40.28 | 31.42 | 39.58 | 30.72 |
| 150 | 12.270 | 5.810 | 50.5 | 49.7 | 38.5 | 37.8 | 11.82 | 5.36 | 51.52 | 40.8 | 50.82 | 40.1 |
| 200 | 19.00 | 14.40 | 103 | 102 | 81 | 80 | 18.60 | 14.00 | 104 | 82 | 103 | 81 |
| 250 | 37.00 | 27.00 | 158 | 157 | 125 | 124 | 36.30 | 26.30 | 157 | 124 | 157 | 124 |
| 300 | 99.020 | 51.130 | 264 | 259 | 208 | 203 | | | | | | |
| 350 | 129.000 | 62.570 | 319 | 314 | 229 | 224 | | | | | | |
| 400 | 234.000 | 121.000 | 526 | 521 | 430 | 425 | | | | | | |
| 450 | 313.000 | 150.000 | 645 | 643 | 515 | 513 | | | | | | |

| CHECK VALVES | | | | FILTERS | | | | HAND REGUL. VALVE | | | | |
|--------------|------------|-------|-------------|---------|-------------|-------|-------------|-------------------|-----------|------|-------------|--|
| ND | VOL.(lit.) | | WEIGHT (kg) | | VOL. (lit.) | | WEIGHT (kg) | | VOL.(lit) | | WEIGHT (kg) | |
| | D* | E* | D* | E* | D* | E* | D* | E* | D* | VD* | CD* | |
| 10 | 0.030 | 0.020 | 0.73 | 0.60 | 0.02 | 0.04 | 0.66 | 0.56 | 0.020 | 0.98 | 1.10 | |
| 15 | 0.040 | 0.036 | 0.71 | 0.57 | 0.12 | 0.04 | 0.7 | 0.54 | 0.025 | 1 | 1.12 | |
| 20 | 0.080 | 0.070 | 1.50 | 1.06 | 0.070 | 0.064 | 1.39 | 1.018 | 0.050 | 2.13 | 2.38 | |
| 25 | 0.090 | 0.075 | 1.43 | 1.08 | 0.085 | 0.068 | 1.36 | 0.992 | 0.070 | 2.10 | 2.28 | |
| 32 | 0.240 | 0.180 | 2.75 | 2.19 | 0.260 | 0.200 | 2.50 | 1.89 | 0.130 | 3.50 | 3.66 | |
| 40 | 0.280 | 0.200 | 2.50 | 2.10 | 0.300 | 0.220 | 2.32 | 1.80 | 0.175 | 3.32 | 3.50 | |
| 50 | 0.550 | 0.400 | 4.18 | 3.71 | 0.580 | 0.440 | 3.64 | 3.13 | | | | |
| 65 | 0.970 | 0.770 | 9.12 | 7.20 | 1.060 | 0.860 | 8.30 | 6.02 | | | | |
| 80 | 1.580 | 1.160 | 12.30 | 8.79 | 1.720 | 1.300 | 10.98 | 7.32 | | | | |
| 100 | 3.170 | 2.130 | 20.60 | 15.60 | 3.500 | 2.460 | 18.38 | 12.85 | | | | |
| 125 | 6.59 | 3.17 | 35.56 | 26.7 | 7.12 | 3.7 | 30.28 | 21.42 | | | | |
| 150 | 11.82 | 5.36 | 46.44 | 35.72 | 12.51 | 6.05 | 40.1 | 29.38 | | | | |
| 200 | 18.60 | 14.00 | 93 | 71 | 21.60 | 16.00 | 82 | 60 | | | | |
| 250 | 36.30 | 26.30 | 156 | 113 | 40.00 | 30.00 | 130 | 97 | | | | |
| 300 | - | - | - | - | 105 | 56 | 256 | 254 | | | | |
| 350 | - | - | - | - | 134 | 68 | 310 | 315 | | | | |