Garlock

# Garlock Butterfly Valves

Trusted throughout chemical, petrochemical and many other industries.

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# Garlock Butterfly Valves

## Reliable handle of corrosive and abrasive media

The economic advantages of reduced maintenance, smooth operation and exceptional service life are proven repeatedly. Garlock valves set the standards in TA-Luft compliance. The reliability of Garlock butterfly valves is not only appreciated and well known at our customers but also certified with SIL 3 according to EN 61508.

**GAR-SEAL**
GAR-SEAL valves are used extensively where corrosive, abrasive and toxic media needs to be reliably controlled. They are typically used for accurate control, throttling and shut-off duties in the chemical, petrochemical, chlorine, paper, electro-plating, and many other industries. GAR-SEAL butterfly valves offer reduced maintenance requirements and increased operational reliability.

**MOBILE-SEAL**
MOBILE-SEAL valves are used on road tanker vehicles, railway wagons, silos and other transportation and storage containers where high chemical resistance, reliability and special safety requirements are essential. MOBILE-SEAL is EN 14432 approved.

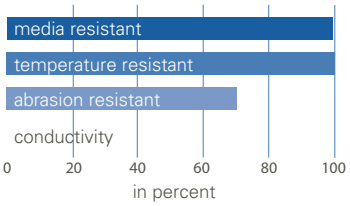
**SAFETY-SEAL**
SAFETY-SEAL valves are used in applications where corrosive, abrasive and toxic media needs to be handled and electrostatic charges must be avoided at the same time.

# The correct type of lining

**Temperature range**
-40 °C up to +200 °C
-40 °F up to +392 °F

## PTFE

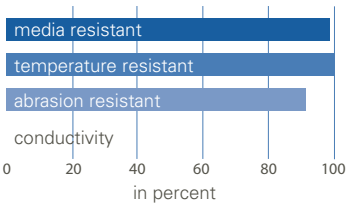
Void-free body liner and disc isostatic molded from virgin PTFE. High material density >2.16 g/cm³. Guaranteed lining thickness of at least 3 mm plus high crystallinity. FDA and 1935/2004/EG compliant.




**Temperature range**
-40 °C up to +200 °C
-40 °F up to +392 °F

## Abrasive PTFE

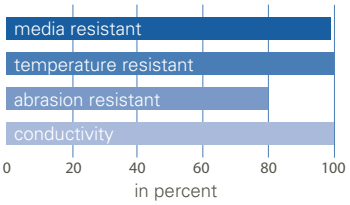
For applications requiring high chemical and abrasive resistance, the use of abrasive PTFE is recommended.
The special PTFE compound is considerably more resistant to mechanical wear while offering almost the same chemical and thermal resistance.




**Temperature range**
-40 °C up to +200 °C
-40 °F up to +392 °F

## Antistatic PTFE

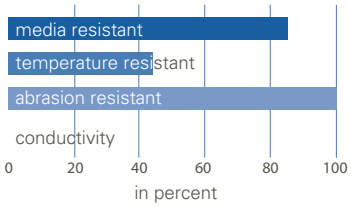
For explosive environments and medias this electrostatically conductive lining is available. The service life is comparable to the values for valves lined with PTFE. The material is FDA conform. TÜV approval (TÜV 941 F 416 601).
Surface resistance ≤ 106 Ω.
Volume resistance ≤ 106 Ω cm.




**Temperature range**
-40 °C up to +85 °C
-40 °F up to +185 °F

## UHMWPE

For use in extremely abrasive media, Garlock offers a complete ultra-high molecular weight polyethylene (UHMWPE) lining. This material is extremely resistant to abrasion from suspensions and other media due to its extremely high molecular weight, while also offering excellent chemical resistance and FDA and 1935/2004/EC compliance.



# Reliable and safe to operate

**Section through the head flange**
The shaft is sealed against atmospheric pollution and corrosion by two O-rings. TA-Luft compliant sealing is standard. If control connection is needed, it can be integrated to observe the shaft tightness.

**Body**
According to Pressure Equipment Directive the bodies of Garlock valves are approved by TÜV Rheinland according to DIN 3840 and EN 12516.

**Flange types**
The valves are available in Wafer, Lug and wafer tank truck type.

**Design**
The two-piece design of shaft and disc allows an easy change of disc and liner. To your convenience disc and liner can be delivered as a pre-assembled set.

**Shaft sealing**
The fully reliable shaft sealing system with the Garlock seal rings guarantees tightness over a long period. The shaft sealing system consists of two barriers. The first is an area where disc and liner are pressed together. The second barrier is the Garlock seal ring which includes a PTFE-ring energized by two O-rings. The long extensively approved system is completely maintenance free. The structure allows easy maintenance and replacement of disc and liner on site without special tools. The shaft sealing is certified according to TA-Luft and ISO 15848-1 and exceeds the requirements.

**Quality assurance**
Garlock valves set the standard in high quality. To ensure this and guarantee a long reliable lifetime the Garlock quality management system is certified according to ISO 9001 and DGRL 2014/68/EU Module H1. Each valve is extensively tested according to EN 12266 or EN 14432 before leaving our factory. To ensure absolute traceability of the materials each valve is tagged with a serial number on a stainless-steel tag. Based on the serial number, material certificates for body parts, PTFE/UHMWPE resins, shaft and steel disc can be provided. This high standard guarantees absolute quality, control, and transparency.

**Certificates and approvals**
» DIN EN ISO 9001:2008
» 2014/68/EU
» 2006/42/EG
» Material certificate EN 10204 - 3.1
» Testing according to EN 12266
» Testing according to EN 14432
» 100% spark test of all PTFE and UHMWPE parts

# Materials

### Housing materials

As standard, the bodies of Garlock fittings are made of high-quality ductile cast iron (EN-JS 1049) as standard. Depending on the application, stainless steel (1.4581) is also available. All housings are manufactured and tested in accordance with the Pressure Equipment Directive.

### Liner

Depending on the intended use, a large selection of lining materials is available. To provide reliable seals, PTFE is available in several versions as well as UHMWPE. All lining materials are manufactured by specialists and inspected comprehensively. Your contact for Garlock products will be happy to assist you in selecting the suitable material.

### Elastomers

The Elastomers generate the necessary force to achieve a tight seal between the lining and the valve disc. Even if these elements do not come into direct contact with the medium, care should be taken to ensure good resistance. Garlock offers various materials for this and can be used individually.

» Silicon (standard)
» FKM
» EPDM
» CR

### Disc

The Disc is also available in different materials depending on the application. Plastics such as PTFE and UHMWPE are available. All Discs are manufactured by specialists and inspected comprehensively.

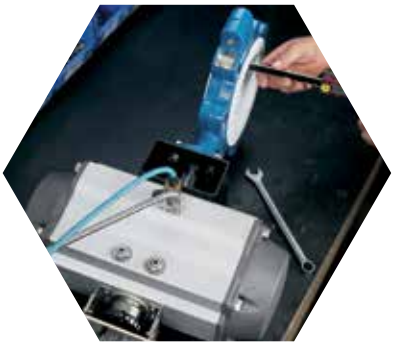

### Marking

Each valve is provided with a stainless steel plate. All information such as dimensions, serial number, design, material, operating pressure, temperature, flange connection and certification are engraved on the plate in accordance with the DIN EN 19 standard.

# Production

All processes have been defined through our ISO 9001 quality assurance system. The system is regularly reviewed and constantly developed. Quality, service and flexibility of the highest order are standard requirements we impose on ourselves and all our suppliers.

Due to our production facility in Germany and stock all over the world, we are in a position to react to your requirements in a very short time, worldwide.



In our assembly department we manufacture each valve and automation according to the customer requirements. Customer's specific configurations of liner, elastomer and actuators can be carry out by us.

**Custom-tailored service**

We are happy to help you to find the most suitable product for your particular application. In this respect, we have a high number of standard products available to you. In addition, project planning and design of custom-made solutions for our customers is one of our strengths, where we draw on decades of experience as a global manufacturer of seals and valves.

We offer professional consulting and project planning that is geared towards your requirements. Your benefit from our individual on-site support services which are specifically tailored to meet your company's needs. We conduct training seminars, help optimize inventory, reduce emissions, ensure functionality and prevent costly downtime. Our experienced employees will be happy to assist you at any time.

# Test engineering

**Testing**

All of our individual valves are tested according to EN 12266-1 or EN 14432 before they are shipped to you. Standard tests include body strength (P10), body tightness (P11) and seat tightness (P12). A functional test is also carried out.

**Testing of liner thickness**

On all PTFE and UHMWPE parts, the liner thickness is also checked in accordance with specific measuring methods. The test ensures that the required thicknesses are adhered reliably for all parts. This measure is indicative of the special attention paid to quality requirements of Garlock valves. This guarantees a long and reliable lifetime of PTFE and UHMWPE parts during operation.

**Conductivity**

The PTFE body liner and disc of the SAFETY-SEAL (conductive version) are all checked for the required conductivity. These measurements are carried out with the resistivity measurement device in accordance with the specific guidelines. This ensures that electrostatic loads are safely discharged during operations.

# Standards

## Garlock Butterfly Valves

**Face-to-face dimensions**
» DIN EN 558-1 GR 20, (DN 350 GR25)
» ISO 5752 Table 5 short
» ASME B16.10
(2“ bis 12“ Table Narrow
14“ bis 24“ Table Wide)
» MSS-SP 67
(2“ bis 12“ Table Narrow
14“ bis 24“ Table Wide)
» API 609
(2“ bis 12“ Category A Table 2
14“ bis 24“ Category B Table 3)

**Head flange**
» EN ISO 5211
» NF E 29-402

**Body types**
» Wafer
» Lug
» Tank truck
» With long neck for insulation in accordance with HeizAnl.V (German Heating Installations Ordinance)

**Body strength**
» DIN EN 12516 T2 (DIN 3840), tested within the scope certification according to 2014/68/EU Module H1.

**Body Materials**
» Cast steel (GS-C 25, 1.0619)
» Stainless steel casting (G-X5CrNiMoNb 18 10, 1.4581)

**Flange connection**
» EN 1092 PN 10/16 (Design A/B)
» ASME B16.5 Class 150 lbsn (Design RF, FF)
» DIN 28459

**Testing**
» EN 12266 P10
» EN 12266 P11
» EN 12266 P12 leak rate A
» EN 14432 8.2-8.4

**Certificates and approvals**
» DIN EN ISO 9001:2008
» 2014/68/EU
» Material certificates according to EN 10204 - 3.1
» Testing according to EN 12266
» Testing in accordance with EN 14432
» 100% spark testing of all PTFE and UHMWPE parts

**PTFE lining**
» Void-free
» Isostatic pressed
» High density (min. 2.16 g/cm³)
» Lining thickness min. 3 mm
» Vacuum lining up to 10 mm available

**Vacuum tightness**
» $q\ ^{He}max < 10^{-6}$ mbar $1 \cdot s^{-1}$

**Identification**
» DIN EN 19
» AD 2000 Data Sheet A4

**Valve disc alignment**
» Centrally, i.e. energy-saving

**Characteristic**
» Linear

**Approvals**
» 2014/68/EU
» TA-Luft / VDI 2440
» EN 61508 - SIL
» EN 14432 (MOBILE-SEAL)
» FDA
» EG 1935/2004
» ISO 15848-1 AH

# The correct material choice for your application

| Fittings Material | | | | | | Design Type | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Housing | | 2 Housing lining | | 3 Flap disk | | 4 Special design Housing lining | | 5 Fitting Typ | | 6 Valve design | |
| Code | Material | Code | Material | Code | Material | Code | Material | Code | Material | Code | Material |
| 1 | EN-JS 1049 (0.7043) | 1 | PTFE** | 1 | PTFE** | A | antistaic (SAFETY-SEAL) | V | Vacuum | W | WAFER Ring housing |
| 3 | Stainless steel (1.4581) | 2 | UHMWPE*** | 2 | UHMWPE*** | C | abrasive | SV | Special vacuum | L | LUG Flange housing |
| | | | | | | | | | | MOBILE-SEAL | |
| | | | | | | | | | | Code | For existing pipe flanges |
| | | | | | | | | | | W-T | MOBILE-SEAL Wafer |
| | | | | | | | | | | L-T | MOBILE-SEAL Lug |
| | | | | | | | | | | W-TW | MOBILE-SEAL Ring housing according to DIN 28459 drilled |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| Examples | 1 | 2 | 3 | 4 | 5 | 6 | |
|---|---|---|---|---|---|---|---|
| GAR-SEAL Wafer version | 1 | 1 | 1 | - | - | W | MT |
| SAFETY-SEAL Lug version, antistatic | 3 | 1 | 1 | A | - | L | MT |
| MOBILE-SEAL Wafer design according to TW standard | 1 | 1 | 1 | - | - | W-TW | MT |
| SAFETY-SEAL Wafer version, antistatic | 1 | 1 | 1 | A | - | W | MT |
| GAR-SEAL Wafer version, vacuum-lined | 1 | 1 | 1 | - | V | W | MT |

Performance data:
DN 50 - 600, 2“ - 24“

Nominal pressure:
Maximum 16 bar (<DN 300)
Vacuum up to 1 mbar absolute, temperature-dependent

Operating temperature:
-40 °C up to +200 °C (for PTFE**)
-40 °C up to +85 °C (for UHMWPE***)
MT = GAR-SEAL fittings

** Polytetrafluoroethylene
*** ultra-high moleculare weight polyethylene

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# GAR-SEAL

## Applications

GAR-SEAL butterfly valves are used where corrosive, abrasive and toxic media need to be controlled. GAR-SEAL valves are used for controlling, throttling and shutting off purposes in the chemical, petrochemical and chlorine industry as well as in electroplating, the paper industry and many other industries.

**GAR-SEAL**

**Dimensions**
» DN 50 / 2“ up to DN 600 / 24“

**Flange connection**
» EN 1092 PN 10/16 (Design A/B)
» ASME B16.5 class 150 lbs (Design RF/FF)

**Face-to-face dimensions**
» DIN EN 558-1 GR 20 (DN 350 GR25)
» ISO 5752 Table 5 short
» ASME B16.10 (2“ up to 12“ Table Narrow 14“ up to 24“ Table Wide)
» MSS-SP 67 (2“ up to 12“ Table Narrow 14“ up to 24“ Table Wide)
» API 609 (2“ up to 12“ Category A Table 2 14“up to 24“ Category B Table 3)

**Body strength**
» DIN/ EN 12516 T2 (DIN 3840)
» tested within the scope of the inspection body designate by Module H1

**Operating pressure**
» DN 50/2“ up to 300/12“: 16 bar
» above DN 300/12“: 10 bar (depending on operating temperature)

**Testing**
» EN 12266 P10
» EN 12266 P11
» EN 12266 P12 Leak rate A

**Bodies**
» Wafer and Lug design with long neck for insulation

**Vacuum**
» up to 1 mbar absolute (depending on size and temperature)

**Temperature range**
» -40 °C up to +200 °C (depending on material)

**Head flange**
» EN ISO 5211
» NF E 29-402

**Liner**
» PTFE
» Abrasive PTFE
» UHMWPE

# SAFETY-SEAL

## Applications

SAFETY-SEAL butterfly valves are used in applications where corrosive, abrasive and toxic media need to be insulated against electrostatic charges. SAFETY-SEAL valves offer long life and reduced maintenance effort and extra safety.

**SAFETY-SEAL**

**Dimensions**
» DN 50 / 2“up to DN 600 / 24“

**Flange connection**
» EN 1092 PN 10/16 (Design A/B)
» ASME B16.5 class 150 lbs (Design RF/FF)

**Face-to-face dimensions**
» DIN EN 558-1 GR 20 (DN 350 GR25)
» ISO 5752 Table 5 short
» ASME B16.10 (2“ up to 12“ Table Narrow 14“ up to 24“ Table Wide)
» MSS-SP 67 (2“ up to “ Table Narrow 14“ up to 24“ Table Wide)
» API 609 (2“ up to 12“ Category A Table 2 14“ up to “ Category B Table 3)

**Body strength**
» DIN/ EN 12516 T2 (DIN 3840)
» tested within the scope of the inspection body designate by Module H1

**Operating pressure**
» DN 50/2“ up to 300/12“: 16 bar
» above DN 300/12“: 10 bar (depending on operating temperature)

**Testing**
» EN 12266 P10
» EN 12266 P11
» EN 12266 P12 Leak rate A
» EN 12266 F22

**Bodies**
» Wafer and Lug design with long neck for insulation

**Vacuum**
» up to 1 mbar absolute (depending on size and temperature)

**Temperature range**
» -40 °C up to +200 °C (depending on material)

**Head flange**
» EN ISO 5211
» NF E 29-402

**Liner**
» Antistatic PTFE

# MOBILE-SEAL

## Applications

MOBILE-SEAL butterfly valves are used on road tanker vehicles, railway wagons, silos and other transportation and storage containers where high chemical resistance, reliability and special safety requirements are essential.

Garlock is a certified testing service in accordance with EN 14432 and the ADR regulations, which means that our fittings are tested and labeled directly in-house.

Garlock test mark

### MOBILE-SEAL

**Dimensions**
» DN 50/ 2“ up to DN 100 / 4“ DIN 28459
» DN 50/ 2“ up to DN 150 / 6“ EN 1092

**Flange connection**
» EN 1092 PN 10/16 (Design A/B)
» ASME B16.5 class 150 lbs (design RF/FF)
» DIN 28459 PN10

**Face-to-face dimensions**
» DIN EN 558-1 GR 20
» ISO 5752 Table 5 short
» ASME B16.10 (2“ up to 4“ Table Narrow)
» MSS-SP 67 (2“ up to 4“ Table Narrow)
» API 609 (2“ up to 4“ Category A Table 2)

**Body strength**
» DIN/ EN 12516 T2 (DIN 3840)
» tested within the scope of the inspection body designate by Module H1

**Operating pressure**
» DN 50/2“ - 100/4“: 10 bar (depending on operating temperature)

**Testing**
» EN 14432 8.2
» EN 14432 8.3
» EN 14432 8.4

**Bodies**
» Wafer and Lug design with long neck for insulation

**Vacuum**
» up to 1 mbar absolute

**Temperature range**
» -40 °C up to +200 °C (depending on material)

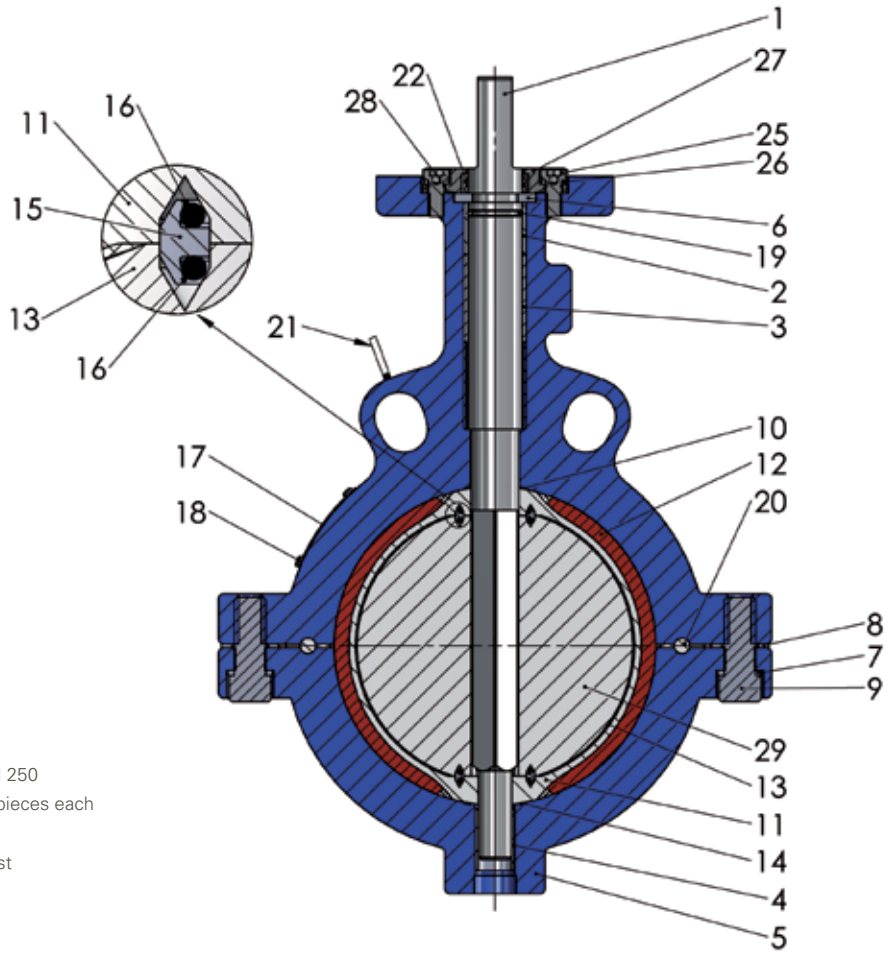
**Head flange**
» EN ISO 5211
» NF E 29-402

**Liner**
» PTFE
» Antistatic PTFE
» Abrasive PTFE
» UHMWPE

**Zertifikate**
» EN 14432
» TÜ-AGG 044-84

# GAR-SEAL, SAFETY-SEAL, MOBILE-SEAL

## Materials




[1] does not apply above DN 250
[2] Dimensions DN 350 – 4 pieces each
[3] Special design
[4] other materials on request

| Pos. | Qty. | Material | Designation | Pos. | Qty. | Material | Designation |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 1.4313 up to DN 300 1.4021 fromDN 350 | Shaft | 14* | 1 | GYLON® | Bottom gasket |
| | | | | 15* | 2 | PTFE | Sealring |
| 2 | 1 | Steel/PTFE | Slide bushing (top) | 16* | 4[4] | Viton | O-Ring (Sealring) |
| 3 | 2 | Steel/PTFE | Slide bushing (center) | 17 | 1 | Stainless steel | Nameplate |
| 4 | 1 | Steel/PTFE | Slide bushing (bottom) | 18 | 4 | Stainless steel | Rivet |
| 5 | 1 | see material table | Body | 19 | 1[4] | Viton | O-Ring |
| 6 | 1[1] | PTFE, carbon reinf. | Retaining ring (split) | 20* | 2 | PTFE | Securitiy element |
| 7 | 2[2] | Stainless steel | Spring washer | 21 | 1[3] | Steel, electroplated | Ground connection |
| 8* | 2[2] | GYLON® | Washer | 22 | 2[4] | Viton | O-Ring (Head flange) |
| 9 | 2[2] | Stainless steel | Body screw | 25 | 4 | Stainless steel | Screw |
| 10* | 1 | GYLON® | Top gasket | 26 | 4 | Stainless steel | Spring washer |
| 11* | 1 | see material table | Lining | 27 | 1 | Stainless steel | Head flange |
| 12* | 2[4] | Silicone | Elastomer backup-element | 28 | 1 | GYLON® | Seal (Head flange) |
| 13* | 1 | see material table | Disc | 29 | 1 | 1.4404 0.7040 (GGG 40) | Disc insert (only PTFE and UHMWPE lined disc) |

* Spare-parts kit

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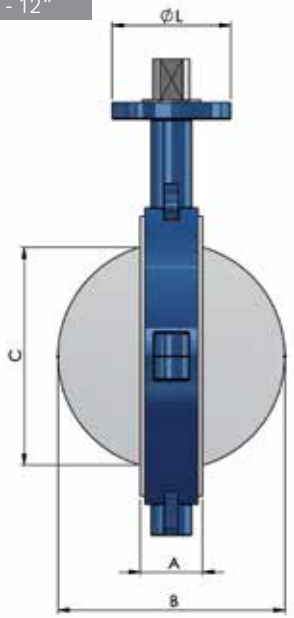
# GAR-SEAL, SAFETY-SEAL, MOBILE-SEAL

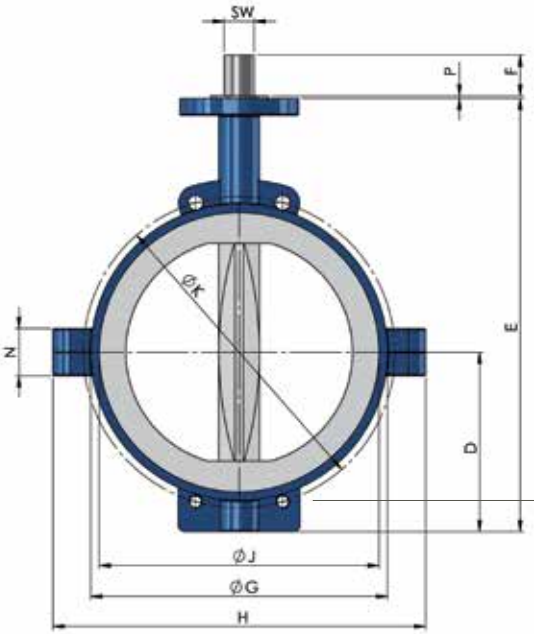
## Dimensions, wafer intermediate flange design

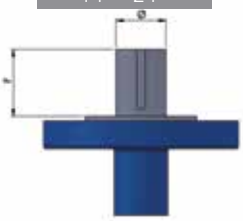
**Flange connection:** EN 1092 (DIN 2501), PN 10 • PN 16 • ANSI B 16.5,150 LBS
**Overall length:** EN 558-1 GR20 (DIN 3202 T3 K1) and ASME B16.10
**Head flange:** EN ISO 5211

DN 50 - 300
2" - 12"




DN 350 - 600
14" - 24"



Note:
Lower centering drillings only from DN350/14"

GAR-SEAL + SAFETY-SEAL / MOBILE-SEAL

| DN Inch | DN mm | Head flange ** | A | B | C | D | E | F | Ø G | H | Ø J | Ø K EN PN10 | Ø K ASME 150lbs | Ø L | SW Ø | P | N | Z EN PN 10 | Z ASME 150 lbs | Weight kg *** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 50 | F05 | 43 | 60 | 43 | 62 | 202 | 35 | 102 | 152 | 98 | 125 | 121 | 65 | 10,0 | 3 | 40 | 4xM16 | 4x5/8"-11 | 2,6 |
| 2 ½ | 65 | F05 | 46 | 70 | 53 | 70 | 220 | 35 | 121 | 171 | 120 | 145 | 140 | 65 | 10,0 | 3 | 40 | 4xM16 | 4x5/8"-11 | 3,5 |
| 3 | 80 | F05 | 46 | 82 | 67 | 79 | 244 | 35 | 133 | 183 | 127 | 160 | 152 | 65 | 10,0 | 3 | 40 | 8xM16 | 4x5/8"-11 | 3,8 |
| 4 | 100 | F07 | 52 | 106 | 93 | 95 | 275 | 35 | 162 | 214 | 159 | 180 | 190 | 90 | 13,0 | 3 | 50 | 8xM16 | 8x5/8"-11 | 6,2 |
| 5 | 125 | F07 | 56 | 128 | 115 | 108 | 303 | 35 | 192 | 248 | 187 | 210 | 216 | 90 | 13,0 | 3 | 50 | 8xM16 | 8x3/4"-10 | 8,6 |
| 6 | 150 | F10 | 56 | 157 | 147 | 121 | 336 | 40 | 218 | 290 | 216 | 240 | 241 | 125 | 17,0 | 3 | 56 | 8xM20 | 8x3/4"-10 | 11,6 |
| 8 | 200 | F10 | 60 | 197 | 188 | 150 | 395 | 40 | 273 | 350 | 270 | 295 | 298 | 125 | 17,0 | 3 | 56 | 8xM20 | 8x3/4"-10 | 17,4 |
| 10 | 250 | F12 | 68 | 246 | 236 | 179 | 459 | 50 | 328 | 405 | 324 | 350 | 362 | 150 | 22,0 | 3 | 60 | 12xM20 | 12x7/8" - 9 | 30,6 |
| 12 | 300 | F12 | 78 | 295 | 284 | 216 | 536 | 50 | 378 | 455 | 375 | 400 | 432 | 150 | 22,0 | 3 | 70 | 12xM20 | 12x7/8" - 9 | 38,3 |
| 14 | 350 | F14 | 92* | 335 | 322 | 265 | 640 | 60 | 438 | 550 | 413 | 460 | 476 | 175 | 44,4 | 4 | 70 | 16xM20 | 12x 1" - 8 | 71,5 |
| 16 | 400 | F14 | 102 | 387 | 374 | 305 | 725 | 60 | 489 | 570 | 470 | 515 | 540 | 175 | 44,4 | 4 | 70 | 16xM24 | 16x 1" - 8 | 90,6 |
| 18 | 450 | F16 | 114 | 430 | 415 | 320 | 780 | 80 | 539 | 670 | 533 | 565 | 578 | 210 | 44,4 | 4 | 70 | 20xM24 | 16x1 1/8" - 7 | 113,0 |
| 20 | 500 | F16 | 127 | 484 | 467 | 355 | 865 | 80 | 594 | 690 | 584 | 620 | 635 | 210 | 44,4 | 4 | 70 | 20xM24 | 20x1 1/8" - 7 | 163,5 |
| 24 | 600 | F25 | 154 | 578 | 558 | 415 | 990 | 90 | 695 | 820 | 692 | 725 | 749 | 300 | 63,5 | 5 | 76 | 20xM27 | 20x1 1/4" - 7 | 254,0 |

| | | | EN PN16 | | | |
|---|---|---|---|---|---|---|
| 8 | 200 | for PN 16 > DN 150 | 295 | | 12xM20 | |
| 10 | 250 | | 355 | | 12xM24 | |
| 12 | 300 | | 410 | | 12xM24 | |

*GR 25 ** EN ISO 5211; all dimensions in millimeters (mm), if not indicated differently

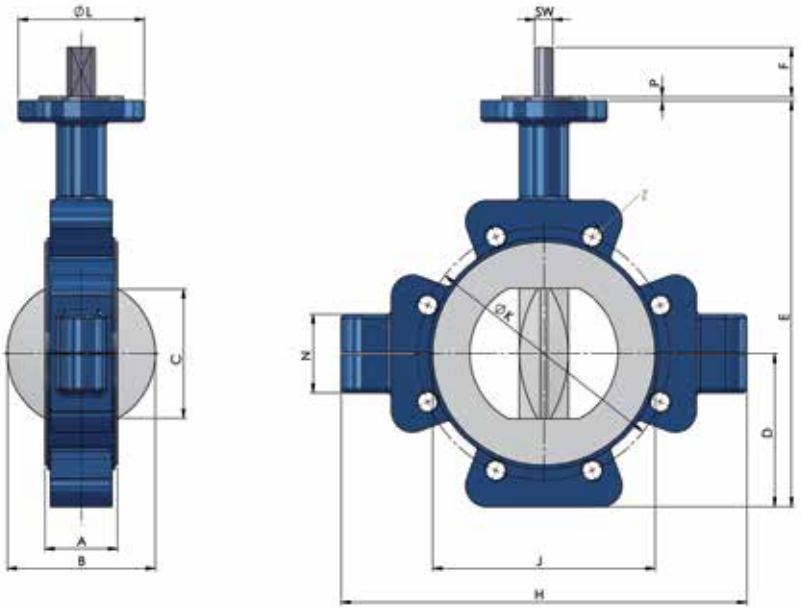
*** Weight for version 111-W

# GAR-SEAL, SAFETY-SEAL, MOBILE-SEAL

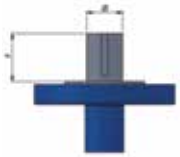
## Dimensions, flange version lug

| | |
|---|---|
| **Flange connection:** | EN 1092 (DIN 2501), PN 10 • PN 16 • ANSI B 16.5,150 LBS |
| **Overall length:** | EN 558-1 GR20 (DIN 3202 T3 K1) and ASME B16.10 |
| **Head flange:** | EN ISO 5211 |

DN 50 - 300
2“ - 12“




DN 350 - 600
14“ - 24“



GAR-SEAL + SAFETY-SEAL

MOBILE-SEAL

| DN Inch | DN mm | Head flange ** | A | B | C | D | E | F | H | Ø J | Ø K EN PN10 | Ø K ASME 150lbs | Ø L | SW Ø | P | N | Z EN PN 10 | Z ASME 150 lbs | Weight kg *** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 50 | F05 | 43 | 60 | 43 | 62 | 202 | 35 | 170 | 98 | 125 | 121 | 65 | 10,0 | 3 | 45 | 4xM16 | 4x5/8“-11 | 3,6 |
| 2 ½ | 65 | F05 | 46 | 70 | 53 | 70 | 220 | 35 | 193 | 120 | 145 | 140 | 65 | 10,0 | 3 | 45 | 4xM16 | 4x5/8“-11 | 4,5 |
| 3 | 80 | F05 | 46 | 82 | 67 | 91 | 256 | 35 | 252 | 127 | 160 | 152 | 65 | 10,0 | 3 | 56 | 8xM16 | 4x5/8“-11 | 7,1 |
| 4 | 100 | F07 | 52 | 106 | 93 | 109 | 289 | 35 | 290 | 159 | 180 | 190 | 90 | 13,0 | 3 | 56 | 8xM16 | 8x5/8“-11 | 10,2 |
| 5 | 125 | F07 | 56 | 128 | 115 | 120 | 315 | 35 | 312 | 187 | 210 | 216 | 90 | 13,0 | 3 | 60 | 8xM16 | 8x3/4“-10 | 12,7 |
| 6 | 150 | F10 | 56 | 157 | 147 | 136 | 351 | 40 | 312 | 216 | 240 | 241 | 125 | 17,0 | 3 | 66 | 8xM20 | 8x3/4“-10 | 17,3 |
| 8 | 200 | F10 | 60 | 197 | 188 | 163 | 408 | 40 | 416 | 270 | 295 | 298 | 125 | 17,0 | 3 | 76 | 8xM20 | 8x3/4“-10 | 27,0 |
| 10 | 250 | F12 | 68 | 246 | 236 | 200 | 480 | 50 | 508 | 324 | 350 | 362 | 150 | 22,0 | 3 | 90 | 12xM20 | 12x7/8“- 9 | 41,5 |
| 12 | 300 | F12 | 78 | 295 | 284 | 233 | 553 | 50 | 575 | 375 | 400 | 432 | 150 | 22,0 | 3 | 110 | 12xM20 | 12x7/8“- 9 | 60,5 |
| 14 | 350 | F14 | 92* | 335 | 322 | 265 | 640 | 60 | 640 | 413 | 460 | 476 | 175 | 44,4 | 4 | 70 | 16xM20 | 12x 1“- 8 | 108,0 |
| 16 | 400 | F14 | 102 | 387 | 374 | 305 | 725 | 60 | 720 | 470 | 515 | 540 | 175 | 44,4 | 4 | 70 | 16xM24 | 16x 1“- 8 | 137,5 |
| 18 | 450 | F16 | 114 | 430 | 415 | 320 | 780 | 80 | 750 | 533 | 565 | 578 | 210 | 44,4 | 4 | 70 | 20xM24 | 16x1 1/8“- 7 | 153,9 |
| 20 | 500 | F16 | 127 | 484 | 467 | 366 | 876 | 80 | 830 | 584 | 620 | 635 | 210 | 44,4 | 4 | 70 | 20xM24 | 20x1 1/8“- 7 | 256,0 |
| 24 | 600 | F25 | 154 | 578 | 558 | 415 | 990 | 90 | 960 | 692 | 725 | 749 | 300 | 63,5 | 5 | 76 | 20xM27 | 20x1 1/4“- 7 | 395,0 |

| | | | EN PN16 | | | |
|---|---|---|---|---|---|---|
| 8 | 200 | **for PN 16 > DN 150** | 295 | | 12xM20 | |
| 10 | 250 | | 355 | | 12xM24 | |
| 12 | 300 | | 410 | | 12xM24 | |

*GR 25 ** EN ISO 5211; all dimensions in millimeters (mm), if not indicated differently

*** Weight for version 111-L

Garlock

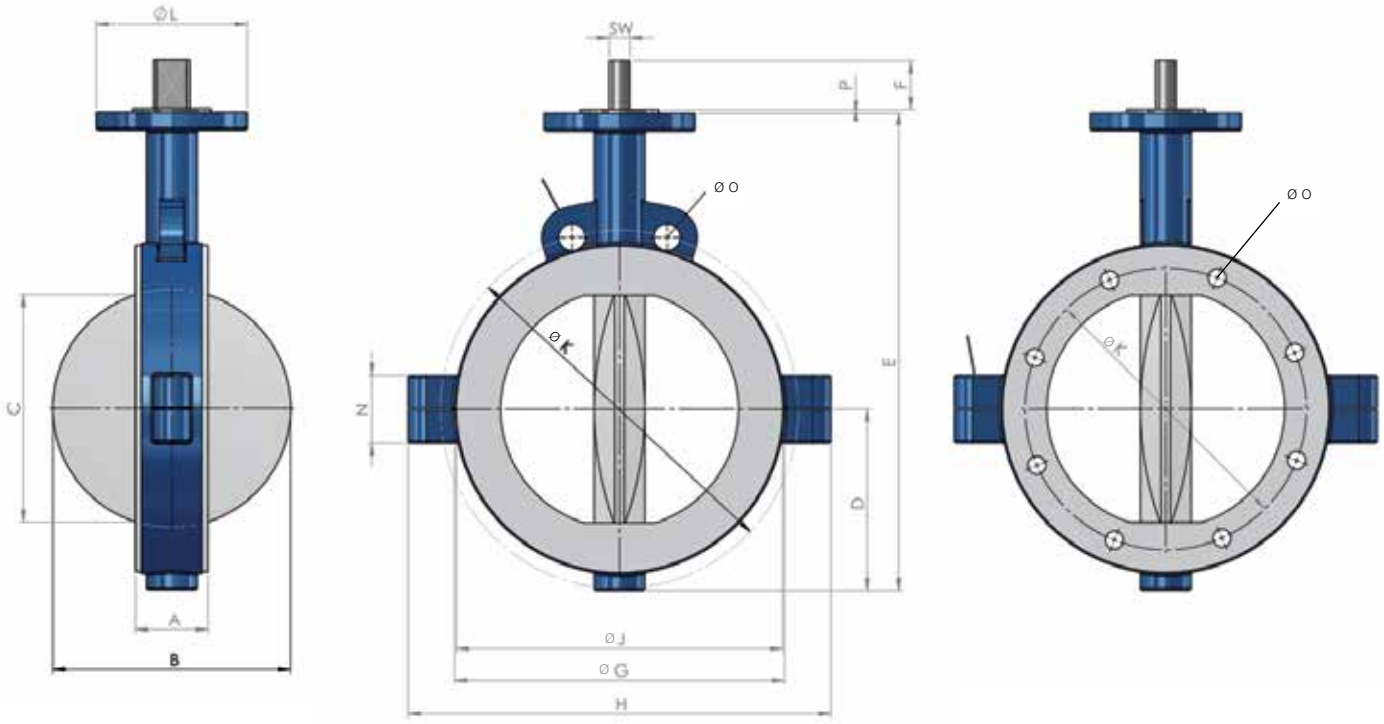
# MOBILE-SEAL

## Dimensions, wafer tank truck

| | |
|---|---|
| **Flange connection:** | DIN 28459 PN 10 |
| **Overall length:** | EN 558-1 GR20 (DIN 3202 T3 K1) |
| **Head flange:** | EN ISO 5211 |

DN 50 - 65
2“ - 2½“

DN 80 - 100
3“ - 4“




| | DN Inch | DN mm | Head flange ** | A | B | C | D | E | F | Ø G | H | Ø J | Ø K | Ø L | SW | P | N | Ø O | Z | Weight kg *** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOBILE-SEAL | 2 | 50 | F05 | 43 | 60 | 43 | 62 | 202 | 35 | 102 | 152 | 98 | 130 | 65 | 10 | 3 | 40 | 11 | 8xM10 | 2,6 |
| | 2½ | 65 | F05 | 46 | 70 | 53 | 70 | 220 | 35 | 121 | 171 | 120 | 130 | 65 | 10 | 3 | 40 | 11 | 8xM10 | 3,5 |
| | 3 | 80 | F05 | 46 | 82 | 67 | 82 | 244 | 35 | 154 | 183 | 127 | 130 | 65 | 10 | 3 | 40 | 11 | 8xM10 | 3,7 |

** EN ISO 5211; all dimensions in millimeters (mm), if not indicated differently

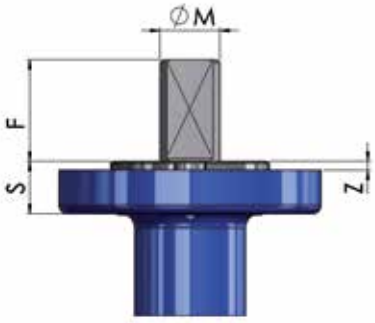
*** Weight for version 111-W-TW

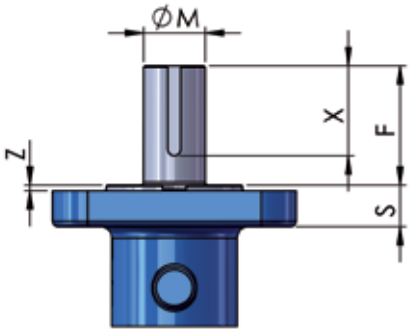
# Head flange

## Dimensions standard version

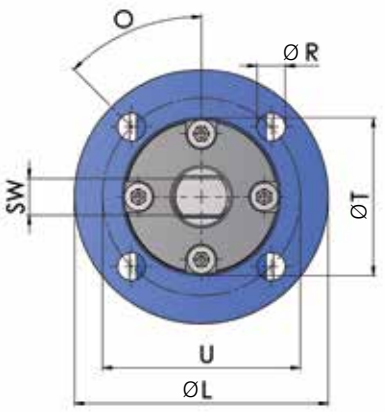
According to EN ISO 5211

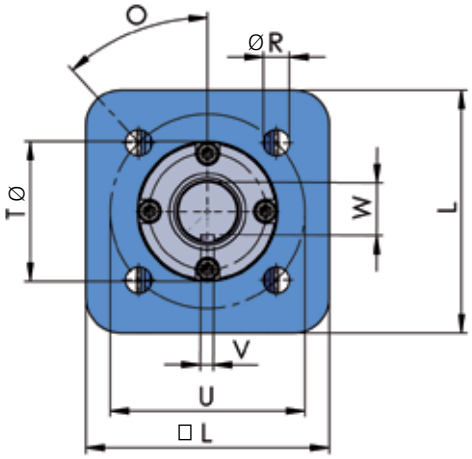
DN 50 - 300
2“ - 12“




DN 350 - 600
12“ - 24“




| DN | | Head flange | F | SW | Ø L | Ø M | O | n x Ø R | S | U | ØT | Z | V | W | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inch | mm | | | | □ L | | | | | | | | | | |
| 2, 2 ½, 3 | 50, 65, 80 | F05 | 35 | 10 | 65 | 14,2 | 45° | 4 x 7 | 15 | 50 | 35 | 3 | - | - | - |
| 4, 5 | 100, 125 | F07 | 35 | 13 | 90 | 20,5 | 45° | 4 x 9 | 18 | 70 | 55 | 3 | - | - | - |
| 6, 8 | 150, 200 | F10 | 40 | 17 | 125 | 25,3 | 45° | 4 x 11 | 18 | 102 | 70 | 3 | - | - | - |
| 10, 12 | 250, 300 | F12 | 50 | 22 | 150 | 32,4 | 45° | 4 x 13 | 21 | 125 | 85 | 3 | - | - | - |
| 14, 16 | 350, 400 | F14 | 60 | - | 175 | 44,4 | 45° | 4 x 17 | 34 | 140 | 100 | 4 | 9,5 | 39 | 55 |
| 18, 20 | 450, 500 | F16 | 80 | - | 210 | 44,4 | 45° | 4 x 22 | 44 | 165 | 130 | 4 | 9,5 | 39 | 55 |
| 24 | 600 | F25 | 90 | - | 300 | 63,5 | 22,5° | 8 x 17 | 60 | 254 | 200 | 5 | 16,0 | 54 | 70 |

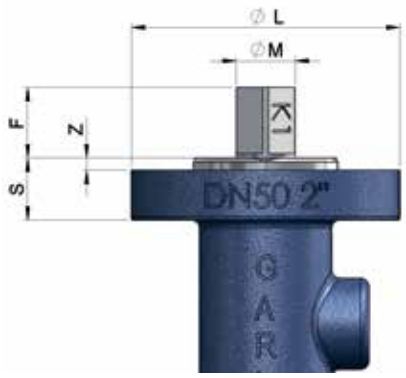
all dimensions in millimeters (mm), if not indicated differently

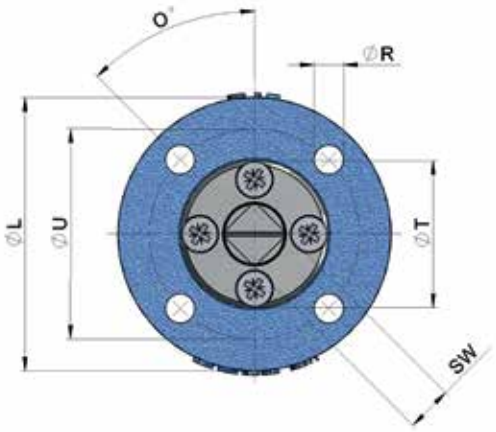
# Head flange

## Dimensions for direct mounting of drives

In accordance with EN ISO 5211, including the requirement of the chemical industry to decouple the actuator from the valve.

DN 50 - 300
2" - 12"




| DN Inch | DN mm | Head flange * | F | SW | Ø L | Ø M | O | n x Ø R | S** | U | Ø T | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2, 2 ½, 3 | 50, 65, 80 | F05 | 17 | 11 | 65 | 14,2 | 45° | 4 x 7 | 15 | 50 | 35 | 3 |
| 4, 5 | 100, 125 | F07 | 17 | 14 | 90 | 18,2 | 45° | 4 x 9 | 18 | 70 | 55 | 3 |
| 6, 8 | 150, 200 | F10 | 23 | 17 | 125 | 22,4 | 45° | 4 x 11 | 18 | 102 | 70 | 3 |
| 10, 12 | 250, 300 | F12 | 28 | 22 | 150 | 28,4 | 45° | 4 x 13 | 21 | 125 | 85 | 3 |

## Panels for direct mounting

at the head flange

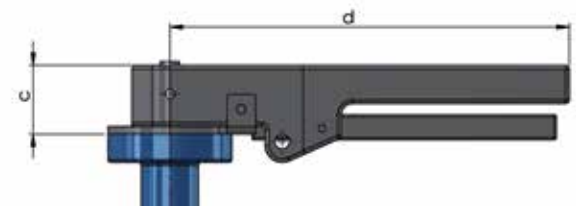

| DN Inch | DN mm | Head flange * | Item Number |
|---|---|---|---|
| 2, 2 ½, 3 | 50, 65, 80 | F05 | VAL07-10202 |
| 4, 5 | 100, 125 | F07 | VAL07-10203 |
| 6, 8 | 150, 200 | F10 | VAL07-10204 |
| 10, 12 | 250, 300 | F12 | VAL07-10205 |

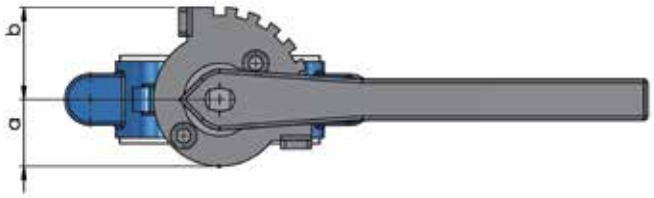
## Reducing sleeves for direct mounting

| From in mm | To in mm * | Item Number |
|---|---|---|
| 11 | 14 | VAL08-10191 |
| 14 | 17 | VAL08-10192 |
| 17 | 22 | VAL08-10193 |
| 22 | 27 | VAL08-10194 |
| 27 | 22 | VAL08-10195 |

# Manual Operators

## Hand-Lever



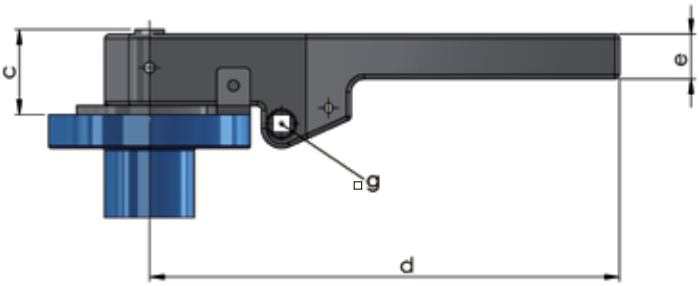



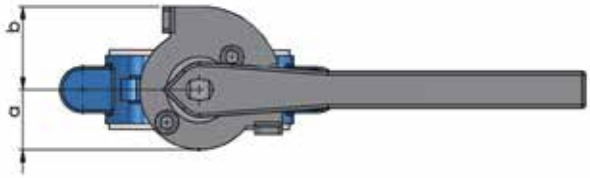

| DN Inch | DN mm | a | b | c | d | Weight kg |
|---|---|---|---|---|---|---|
| 2, 2 ½, 3 | 50, 65, 80 | 32,5 | 45 | 38 | 210 | 1,0 |
| 4, 5 | 100, 125 | 45 | 57 | 38 | 300 | 1,5 |
| 6, 8 | 150, 200 | 80 | 80 | 43 | 500 | 3,5 |

all dimensions in millimeters (mm), if not indicated differently

## ADR-Hand-Lever

ADR-Hand-Lever for hazardous goods transportation



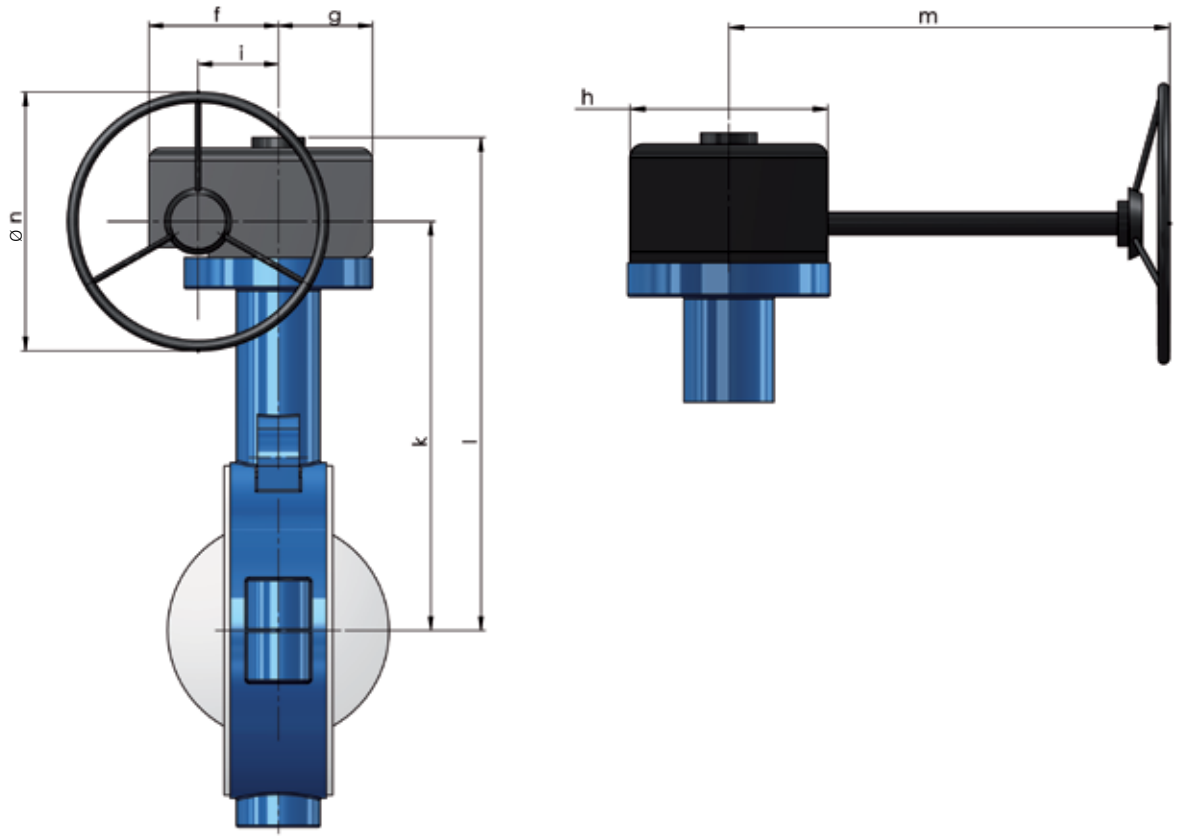




| DN Inch | DN mm | a | b | c | d | e | □ g | Weight kg |
|---|---|---|---|---|---|---|---|---|
| 2, 2½, 3 | 50, 65, 80 | 32,5 | 45 | 38 | 210 | 20 | 8 | 0,9 |
| 4, 5 | 100, 125 | 45 | 57 | 38 | 300 | 20 | 8 | 1,2 |
| 6, 8 | 150, 200 | 80 | 80 | 43 | 500 | 26 | 8 | 3,1 |

all dimensions in millimeters (mm), if not indicated differently

# Manual Operators

## Gear Operator




| DN | | f | g | h | i | k* | l* | m | Ø n | Total weight kg** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Inch | mm | | | | | | | | | Type W Wafer | Type L Lug |
| 2 | 50 | 62 | 45 | 88 | 38,5 | 166,5 | 198 | 152 | 125 | 6,6 | 7,4 |
| 2 ½ | 65 | 62 | 45 | 88 | 38,5 | 167,5 | 208 | 152 | 125 | 7,6 | 8,3 |
| 3 | 80 | 62 | 45 | 88 | 38,5 | 191,5 | 223 | 152 | 125 | 8,0 | 10,5 |
| 4 | 100 | 62 | 45 | 88 | 38,5 | 206,5 | 238 | 152 | 125 | 10,1 | 14,2 |
| 5 | 125 | 62 | 45 | 88 | 38,5 | 221,5 | 253 | 152 | 125 | 12,6 | 16,6 |
| 6 | 150 | 83,5 | 58 | 116 | 52 | 250 | 282 | 182 | 250 | 18,0 | 22,9 |
| 8 | 200 | 83,5 | 58 | 116 | 52 | 280 | 312 | 182 | 250 | 23,2 | 29,2 |
| 10 | 250 | 105 | 75 | 150 | 66,7 | 322 | 361 | 216 | 300 | 38,2 | 47,9 |
| 12 | 300 | 105 | 75 | 150 | 66,7 | 362 | 401 | 216 | 300 | 47,1 | 63,5 |
| 14 | 350 | 131 | 86 | 198 | 89,5 | 425 | 468 | 283 | 450 | 89,0 | 120,0 |
| 16 | 400 | 131 | 86 | 198 | 89,5 | 470 | 513 | 283 | 450 | 106,7 | 149,2 |
| 18 | 450 | 178 | 114 | 252 | 123 | 510 | 566 | 335 | 450 | 152,4 | 180,9 |
| 20 | 500 | 178 | 114 | 252 | 123 | 560 | 611 | 335 | 450 | 184,3 | 274,8 |
| 24 | 600 | 209 | 117 | 315 | 154 | 625 | 702 | 360 | 450 | 289,2 | 427,7 |

* GAR-SEAL, SAFETY-SEAL, MOBILE-SEAL

all dimensions in millimeters (mm), if not indicated differently

** for version 111-

Garlock

# Technical Details

## Standard Design

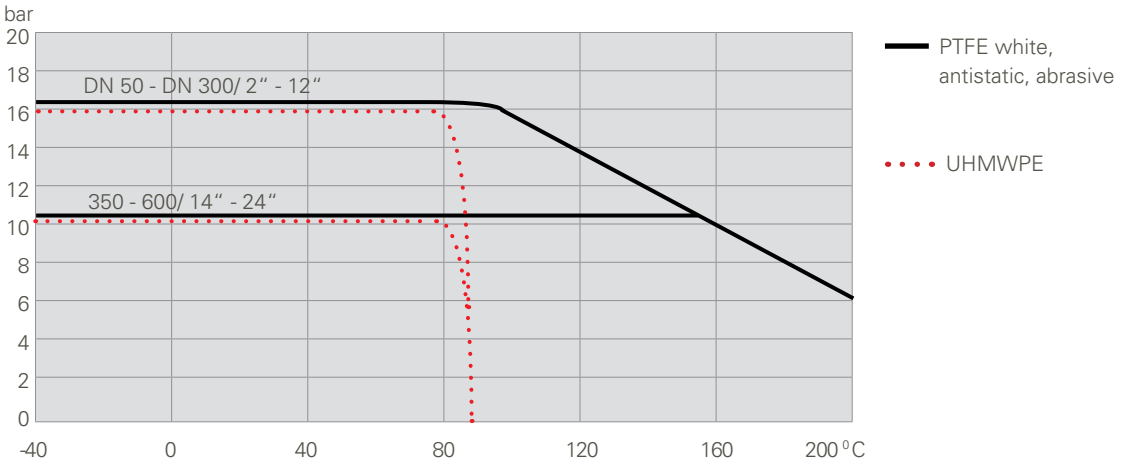
For selecting the correct valve actuation, the values below represent the maximum torques for the opening and closing action. The torques shown in the table are valid for disc and liner made of the same material: PTFE, antistatic or abrasive. For torque tables for other materials or other material combinations please consult our valves specialists. The stated torques are including a 10 % safety factor at dry condition measured at 21 °C (70 °F).

**Torques in Nm**

| Größen / Material | | Liner* | PTFE/antistatic/abrasive |
|---|---|---|---|
| | | Disc | PTFE/antistatic/abrasive |
| **Inch** | **mm** | **Nm** | |
| 2 | 50 | 25 | |
| 2½ | 65 | 28 | |
| 3 | 80 | 29 | |
| 4 | 100 | 53 | |
| 5 | 125 | 87 | |
| 6 | 150 | 121 | |
| 8 | 200 | 168 | |
| 10 | 250 | 215 | |
| 12 | 300 | 274 | |
| 14 | 350 | 544 | |
| 16 | 400 | 770 | |
| 18 | 450 | 996 | |
| 20 | 500 | 1089 | |
| 24 | 600 | 2056 | |

*3 mm liner up to DN 300 / 12“
4 mm liner up from DN 350 / 14“

**P x T - Diagramm GAR-SEAL Butterfly Valve**



# Technical Details

## Standard Design

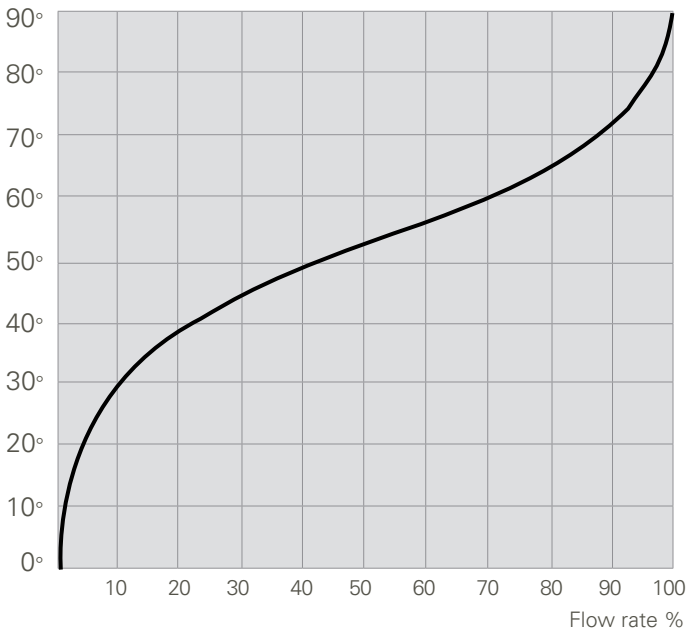
**Open/Close control – characteristic curve**

This curve applies to butterfly valves of all nominal sizes with small deviations depending on the thickness and shape of the valve disc. Butterfly valves with a disc opening of more than 60° should only be used for on/off control only.

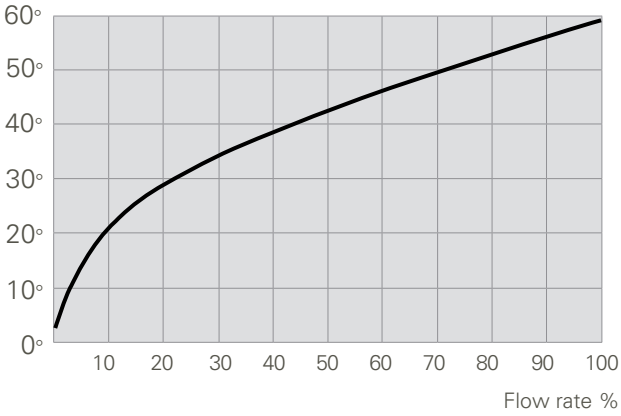
**Continuous control / characteristic curve**

For throttle valves for continuous control, the volumetric flow rate is set to 100% at an opening angle of 60°. This ensures a flow reserve. The curve has an equal-percentage characteristic in the opening range from approx. 20° to 60°.

**Angle of aperture**




**Angle of aperture**




**Flow Rate**

For liquids the following references apply:
Constant control: 4,5 m/s Open/Close control: 7,5 m/s
for GAR-SEAL Butterfly Valves with UHMWPE-Lining the maximum flow rate is limited to 3,5 m/s.

| Nominal bore | | kv-factor against the angle of aperture | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Inch | mm | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° |
| 2 | 50 | 1 | 13 | 25 | 37 | 54 | 69 | 81 | 84 |
| 2 ½ | 65 | 2 | 16 | 34 | 52 | 82 | 112 | 130 | 132 |
| 3 | 80 | 2 | 16 | 38 | 80 | 133 | 191 | 243 | 244 |
| 4 | 100 | 9 | 43 | 87 | 144 | 228 | 316 | 399 | 420 |
| 5 | 125 | 16 | 61 | 122 | 210 | 262 | 497 | 670 | 710 |
| 6 | 150 | 22 | 113 | 215 | 364 | 547 | 822 | 972 | 997 |
| 8 | 200 | 35 | 165 | 332 | 555 | 874 | 1215 | 1534 | 1613 |
| 10 | 250 | 65 | 301 | 608 | 1015 | 1599 | 2221 | 2805 | 2950 |
| 12 | 300 | 96 | 446 | 900 | 1504 | 2369 | 3291 | 4157 | 4371 |
| 14 | 350 | 136 | 632 | 1277 | 2133 | 3360 | 4669 | 5896 | 6200 |
| 16 | 400 | 194 | 898 | 1813 | 3027 | 4770 | 6626 | 8369 | 8800 |
| 18 | 450 | 237 | 1097 | 2215 | 3698 | 5824 | 8095 | 10223 | 10750 |
| 20 | 500 | 297 | 1377 | 2781 | 4644 | 7317 | 10166 | 12839 | 13500 |
| 24 | 600 | 420 | 1948 | 3935 | 6570 | 10352 | 14382 | 18164 | 19100 |

**kv-factor against the angle of aperture**

The kv-factor reflects the flow of water (density 1=1000 kg/m3) in m3/h for a pressure gradient of Δ p= 1 bar.
The resistance characteristic of the butterfly valve is subject to the kv-factor. It replaces all earlier definitions, see cross-section, flow and friction coefficient. A detailed butterfly valve dimensioning for maximum flow and/or for throttle use is performed by CONVAL-Software programming.

We will be pleased to calculate the flow characteristics. According to your operating conditions. Please contact us directly us directly.

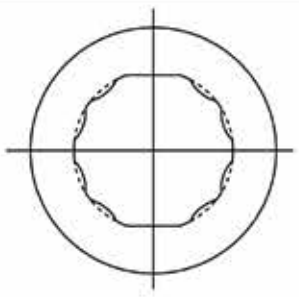
# Technical Details

## Special Vacuum Design

**Garlock valves have for decades operated under extreme vacuum conditions.**
Past statements on vacuum stress have been made and documented, but only at ambient temperature and the valve closed. This is very ambiguous to a plant engineer. His requirements are the actual vacuum data at all temperatures. Plant vacuum can go down to 1 mbar together with higher temperatures. This often leads to leakages and malfunctions as the liner can deformed. Garlock has developed special vacuum versions of its GAR-SEAL valves to meet these particular demands.

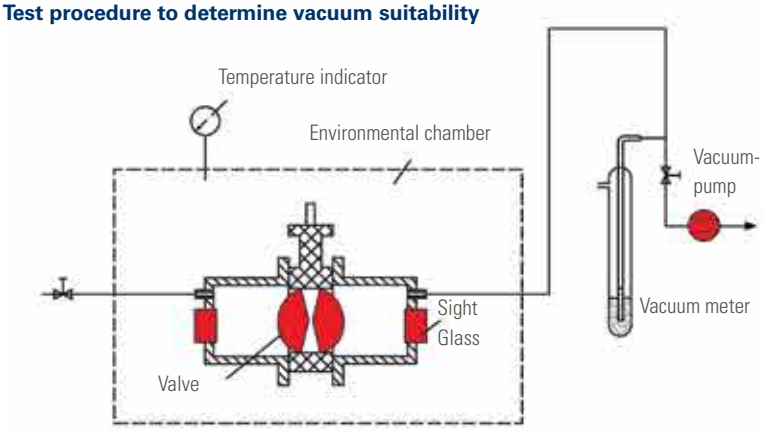
Vacuum applications of fluorocarbon lined valves with separate liners are subject to special parameters. Therefore not only the actual vacuum is important, but also the service temperature, the thickness of the liner and its geometry.

Garlock with its successful development program and substantial testing of various sizes, including DN 500, at temperatures up to 200 °C concluded that such extreme service conditions can be handled.



**Typical appearance of high vacuum-loades Body Liner**

**Test procedure to determine vacuum suitability**




**Temperature range:** - 35 °C to + 200 °C
**Temperature increments:** Δt: 15 °C

GAR-SEAL Valves can be supplied with varying liner thicknesses for vacuum duties.

The DN 100 size liners show the difference between the standard 3 mm thick and the vacuum 5 mm thick liners. The liner thickness substantially improves the performance against high vacuum stress.

In the DN 100 valve the 3 mm thick liner will operate to 1 mbar, while the 5 mm liner operates below 1 mbar vacuum. Depending on the operating vacuum and temperature and size of valve, the liner thickness can be calculated and selected between 3 mm and 10 mm for GAR-SEAL valves.

Please contact Garlock directly for your specific requirements on Vacuum Application.

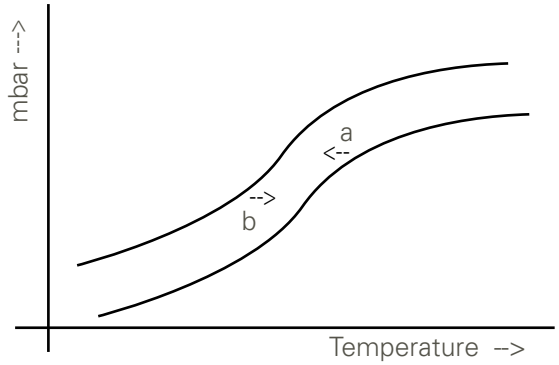
**3 mm standard liner**

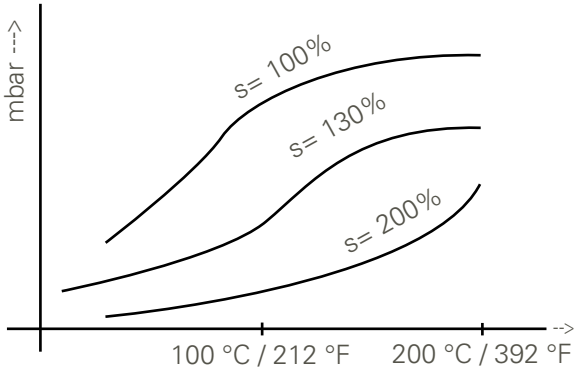
**5 mm vacuum liner**

# Technical Details

## Data for vacuum application

**Facts and figures for the use with vacuum**




**Typical characteristics of body liners under vacuum stress depending on temperature**

a) Increase size and/or decrease liner thickness
DN 1 > DN 2; s1 < s2

b) Increasing liner thickness and/or higher moment of resistance by altering geometry
s2 > s1.

**Stress example of Garlock DN 300 body liner with same geometry but different liner thickness "s"**

A 30% increase of the liner thickness at a service temperature of 160 °C improves the vacuum resistance by 35 %. A doubling of the lining thickness will lead to a 85 % increase in the vacuum resistance.

**Recommended application limits for GAR-SEAL valves with standard body liners**

For applications in vacuum and/or temperatures above these values special body liners are necessary. Please contact Garlock directly.

| Nominal width | Temperature range | Standard liner * | Maximum vacuum liner * |
|---|---|---|---|
| ≤ DN 100 | ≤ 100 °C/ 212 °F | 1 | < 1 |
| | > 100 °C/ 212 °F ≤ 150 °C/ 302 °F | 1 | < 1 |
| | > 150 °C/ 302 °F ≤ 200 °C/ 392 °F | 1 | < 1 |
| DN 150 | ≤ 100 °C/ 212 °F | 5 | < 1 |
| | > 100 °C/ 212 °F ≤ 150 °C/ 302 °F | 173 | 1 |
| | > 150 °C/ 302 °F ≤ 200 °C/ 392 °F | 293 | 1 |
| DN 200 | ≤ 100 °C/ 212 °F | 209 | < 1 |
| | > 100 °C/ 212 °F ≤ 150 °C/ 302 °F | 343 | < 1 |
| | > 150 °C/ 302 °F ≤ 200 °C/ 392 °F | 438 | 1 |
| DN 300 | ≤ 100 °C/ 212 °F | 471 | 1 |
| | > 100 °C/ 212 °F ≤ 150 °C/ 302 °F | 561 | 39 |
| | > 150 °C/ 302 °F ≤ 200 °C/ 392 °F | 624 | 178 |
| DN 400 | ≤ 100 °C/ 212 °F | 498 | 1 |
| | > 100 °C/ 212 °F ≤ 150 °C/ 302 °F | 583 | 1 |
| | > 150 °C/ 302 °F ≤ 200 °C/ 392 °F | 643 | 108 |
| DN 500 | ≤ 100 °C/ 212 °F | 599 | 162 |
| | > 100 °C/ 212 °F ≤ 150 °C/ 302 °F | 667 | 304 |
| | > 150 °C/ 302 °F ≤ 200 °C/ 392 °F | 715 | 405 |
| DN 600 | ≤ 100 °C/ 212 °F | 737 | 343 |
| | > 100 °C/ 212 °F ≤ 150 °C/ 302 °F | 782 | 454 |
| | > 150 °C/ 302 °F ≤ 200 °C/ 392 °F | 813 | 533 |

* all data in mbar (absolute)

# Garlock Butterfly Valves: Trusted throughout chemical, petrochemical and many other industries



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