

ARMYLOR®

PTFE / PFA LINED PIPES AND FITTINGS ANSI B16.5

TECHNICAL GUIDE



PTFE / PFA lined pipes and fittings are recognized as the ideal solution for conveying or treating highly corrosive fluids using severe service conditions.

PTFE / PFA lining is chemically inert facing the majority of corrosive fluids up to 230°C.

MERSEN masters 3 lining manufacturing technologies :

- Extrusion of PTFE fine powders
- PFA injection
- PTFE isomoulding

Thus MERSEN offers a large product range with high performances.

Our PTFE & PFA lined products show several advantages :

- High resistance to thermal shocks
- PTFE / PFA linings are seamless
- Possibility for custom made pieces (complex geometry)
- Easy installation, no gasket required
- Low natural permeability rate

MERSEN also manufactures PTFE bellows and PTFE lined columns.

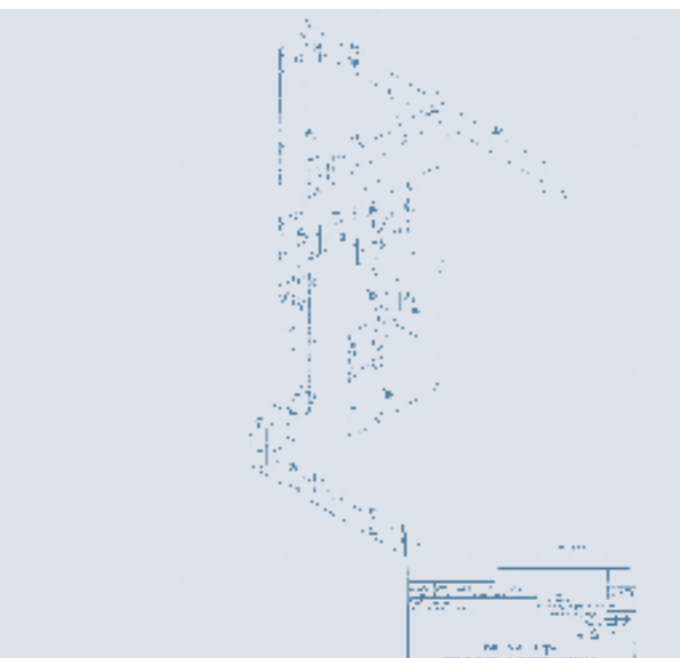
MERSEN

SUMMARY

| | | |
|--|------------------------------------|-------|
| | EXPERTISE | 2 |
| | ARMYLOR PRODUCT RANGE PRESENTATION | 3 |
| | PTFE / PFA POLYMER | 4 |
| | PTFE / PFA LININGS | 5-7 |
| | STEEL SHELLS | 8-9 |
| | LINED COMPONENTS | 10 |
| | QUALITY | 11 |
| | INSTALLATION PROCEDURE | 12-13 |
| | REFERENCE | 14 |
| | MANUFACTURE PROCESS | 15 |
| | PRODUCT INDEX | 17-35 |

EXPERTISE

Mersen has an engineering team dedicated for customer assistance.
Our experts help to study the best technical & economical solutions for your projects.
This team can also help customers to establish take-off from isometric drawings.



Mersen is a global expert in materials and equipment used in extreme environments, and safety / reliability of electrical equipment.

One of the 4 Mersen activity consists in process equipment designed and compliant for hot and corrosive applications.

We design and manufacture in Europe, USA, China & India equipment such as heat exchangers, anti-corrosion systems, pressure vessels, agitators in a wide range of materials (Graphite, silicon carbide, reactive metals, fluoropolymers...)

Since 1964, Mersen offers an exhaustive range of PTFE / PFA lined pipe and fittings especially designed for conveying corrosive fluids in both chemical and pharmaceutical industries.

Armylor® is the trademark for Mersen PTFE / PFA lined pipes and fittings.

The product range shows as follows :

- PTFE / PFA lined pipe and fittings
- PTFE bellows (expansion joints) and compensators
- Manifolds
- Dip pipes
- Jacketed pipes
- Custom made parts

Thanks to its international network, Mersen keeps a safety stock of half-finished products in all subsidiaries allowing a very short delivery time. Pagny-Sur-Moselle plant is ISO 9001, ISO 140001, ISO 18000 OHAS certified.

| | Reactors Pressure vessels | Mixers | Heat exchangers | | Columns | Piping Fittings |
|--|------------------------------|--------|-----------------|---------------|---------|--------------------|
| | | | Block / Plate | Shell & Tubes | | |
| Graphite | | | | | | |
| SiC | | | | | | |
| Tantalum | | | | | | |
| Zirconium | | | | | | |
| Titanium | | | | | | |
| Carbon Steel Stainless Steel Nickel Alloys | | | | | | |
| Fluoropolymer | | | | | | |



PTFE / PFA POLYMER

DEFINITION

Available lining materials for our product range are as follows :

Virgin or anti-static* PTFE (polytetrafluorethylene), in accordance with the ASTM D4894 & 4895.

Virgin or anti-static* PFA (perfluoroalkoxy), according to ASTM D 3307** standards.

*Conductive black PTFE or PFA

** Also on request according to DIN 53455 standard

GENERAL CHARACTERISTICS

Values indicated in the following table are given for virgin PTFE.

These characteristics can vary depending on raw material received, the transformation processes and their components.

| PROPERTIES | UNITS | PTFE | PFA |
|--|-----------------------|-----------------------|------------------|
| Physical | | | |
| Density | g/cm ³ | 2.13 - 2.19 | 2.12 - 2.17 |
| Water absorption : 24h thickness 3,2 mm | % | <0.01 | 0.03 |
| Mechanical | | | |
| Tensile strenght | Mpa | 20 - 40 | 27 - 32 |
| Elongation at break | % | 250 - 500 | 300 - 500 |
| Modulus of elasticity under elongation | Mpa | 350 - 750 | 650 - 700 |
| Modulus of elasticity under flexural stress | Mpa | 440 - 670 | 590 - 700 |
| Hardness shore D method | | 50 - 72 | 60 - 65 |
| Thermal | | | |
| Flame propagation | | hard | hard |
| Melting point | °C | 327 and 342 | 300 to 310 |
| Other transitions | °C | -90*, +123,* +27** | -80*, 90* |
| Maximum service temperature | °C | -200/+260 | -150/+260 |
| Temperature of deflection under load (1.82Mpa) | °C | 50 - 60 | 50 |
| Linear elongation coefficient | 10 ⁻⁵ / °C | 10 - 25 | 12 |
| Thermal conductivity | Ω / m.K | 0.24 | 0.25 |
| Electrical | | | |
| Dielectric constant from 60 Hz to 10 ⁷ Hz | | 2.2 | 2.1 |
| Volume resistivity | Ω.cm | 10 ¹⁸ | 10 ¹⁸ |
| Surface resistivity | Ω | 10 ¹⁷ | 10 ¹⁷ |
| Dielectric strenght (ep. mm) | KV / mm | 36(1) | 80(2.3) |

* amorphous phase, ** crystal phase

CONTROLLED CHARACTERISTICS AT RECEIPT

Material certificates of PTFE powders manufacturers are checked at receipt and identified as batches. On request, FDA certificates (Food and Drug Administration) can be supplied.

NOMINAL THICKNESSES

Mersen offers 3 PTFE thickness grades :

- ARMYLOR® G to operate under pressure
- ARMYLOR® V to operate under pressure and vacuum
- ARMYLOR® S for special applications.

} Thicknesses G and V are indicated in the chart below

Ask us

PTFE / PFA NOMINAL THICKNESS

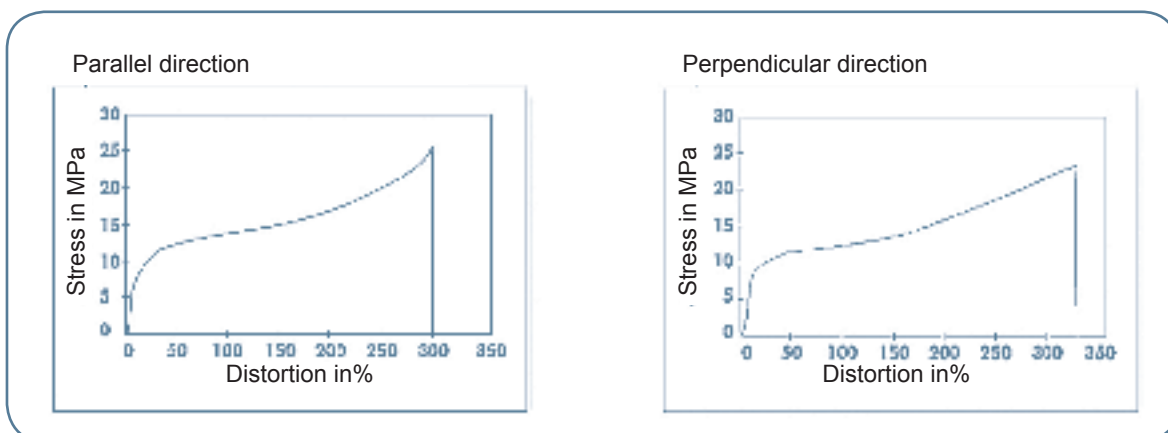
| DN | STRAIGHT LENGTHS | | ELBOWS | | TEES | | CONC. / EXC. REDUCERS | | INSTRUMENT TEES | | MANIFOLDS | |
|--------|------------------|-----|--------|------|------|------|-----------------------|-----|-----------------|------|-----------|------|
| | G | V | G | V | G | V | G | V | G | V | G | V |
| 1/2" | 1.8 | 3.0 | | 3.0 | | 3.0 | | 3.0 | | 3.0 | | 3.0 |
| 3/4" | 2.0 | 3.0 | | 3.0 | | 3.0 | | 3.0 | | 3.0 | | 4.0 |
| 1" | 2.0 | 3.0 | | 3.3 | | 3.0 | | 3.5 | | 3.5 | | 4.0 |
| 1 1/2" | 2.5 | 3.0 | | 4.0 | | 3.5 | | 3.5 | | 3.5 | | 6.0 |
| 2" | 2.5 | 3.0 | | 4.0 | | 3.5 | | 3.5 | | 3.5 | | 7.0 |
| 3" | 3.0 | 3.5 | 3.5 | 4.5 | | 4.5 | | 4.0 | | 4.0 | | 9.0 |
| 4" | 3.0 | 4.2 | 4.0 | 7.5 | | 5.0 | | 5.0 | | 5.0 | 5.0 | 10.0 |
| 6" | 4.0 | 5.3 | 5.0 | 9.5 | 6.0 | 10.0 | 5.0 | 5.3 | | 6.0 | 6.0 | 11.0 |
| 8" | 4.0 | 6.2 | 7.0 | 10.0 | 6.0 | 12.0 | 6.0 | 6.2 | | 8.0 | 7.0 | 12.0 |
| 10" | 4.0 | 7.0 | 7.0 | 11.0 | 7.0 | 12.0 | 6.5 | 7.0 | 7.0 | 12.0 | 7.0 | 12.0 |
| 12" | 4.0 | 8.0 | 7.0 | 12.0 | 7.0 | 12.0 | 6.5 | 8.0 | 7.0 | 12.0 | 7.0 | 12.0 |
| 14" | 4.5 | | 8.0 | | 8.0 | | 8.0 | | 8.0 | | | |
| 16" | 4.5 | | 8.0 | | 8.0 | | 8.0 | | 8.0 | | | |
| 18" | 4.5 | | 8.0 | | 8.0 | | 8.0 | | 8.0 | | | |
| 20" | 4.5 | | 8.0 | | 8.0 | | 8.0 | | 8.0 | | | |
| 24" | 4.5 | | 4.5 | | 4.5 | | 4.5 | | 4.5 | | | |

The minimum thickness tolerance of the PTFE tube is equal to the nominal thickness minus 10%.
The thickness of the PTFE flaring shall not be lower than 20% of the nominal thickness

TESTS ON PTFE / PFA

On each manufacturing batch, Mersen checks mechanical & physical properties.

Values for elongation at break and tensile strength, together with regularity of the graph confirms that the liner sintering has re-established the isotropy of PTFE, which guarantees a low level of permeability.



Optimal density ensures a balance between a low permeability level and a good distortion during temperature cycles.

| | MECHANICAL PROPERTIES | | PHYSICAL PROPERTIES | |
|---|---|---|---------------------------------|---------------------------------|
| | Tensile strenght | Elongation at break | Density | |
| PTFE Extruded Virgin <i>Test according standard</i> | $\pm 21 \text{ N/mm}^2 \leq$ (// wise) $\pm 17 \text{ N/mm}^2 \leq$ (\perp wise) <i>ASTM D4895</i> | $\pm 250\%$ (// wise) $\pm 200\%$ (\perp wise) <i>ASTM D4895</i> | 2.14 - 2.19 <i>ASTM D792</i> | 2.13 - 2.19 <i>DIN 53749</i> |
| Anti static <i>Test according standard</i> | $\pm 21 \text{ N/mm}^2 \leq$ (// wise) $\pm 17 \text{ N/mm}^2 \leq$ (\perp wise) <i>ASTM D4895</i> | $\pm 250\%$ (// wise) $\pm 200\%$ (\perp wise) <i>ASTM D4895</i> | 2.13 - 2.19 <i>ASTM D792</i> | 2.12 - 2.18 <i>DIN 53749</i> |
| PTFE Molding Virgin <i>Test according standard</i> | $\pm 21 \text{ N/mm}^2$ <i>ASTM D4894</i> | $\pm 250\%$ <i>ASTM D4894</i> | 2.14 - 2.19 <i>ASTM D792</i> | 2.13 - 2.19 <i>DIN 53749</i> |
| Anti static <i>Test according standard</i> | $\pm 21 \text{ N/mm}^2$ <i>ASTM D4894</i> | $\pm 250\%$ <i>ASTM D4894</i> | 2.14 - 2.19 <i>ASTM D792</i> | 2.12 - 2.18 <i>DIN 53749</i> |
| PFA Virgin <i>Test according standard</i> | $\pm 26 \text{ N/mm}^2$ <i>ASTM D3307</i> | $\pm 300\%$ <i>ASTM D3307</i> | 2.12 - 2.17 <i>ASTM D792</i> | 2.12 - 2.17 <i>DIN 53749</i> |
| Anti static <i>Test according standard</i> | $\pm 26 \text{ N/mm}^2$ <i>ASTM D3307</i> | $\pm 300\%$ <i>ASTM D3307</i> | 2.11 - 2.17 <i>ASTM D792</i> | 2.11 - 2.16 <i>DIN 53749</i> |

The results comply with ASTM F1545 standard.

• ANTISTATIC PTFE / PFA ELECTRICAL PROPERTIES

Transverse resistivity : $< 10^7$ ohm based on the BS 2050 standard

Surface resistivity : $< 10^8$ ohm based on the BS 2782-230A standard

Volume resistivity : $< 10^8$ ohm.cm based on the BS 2782-231A standard



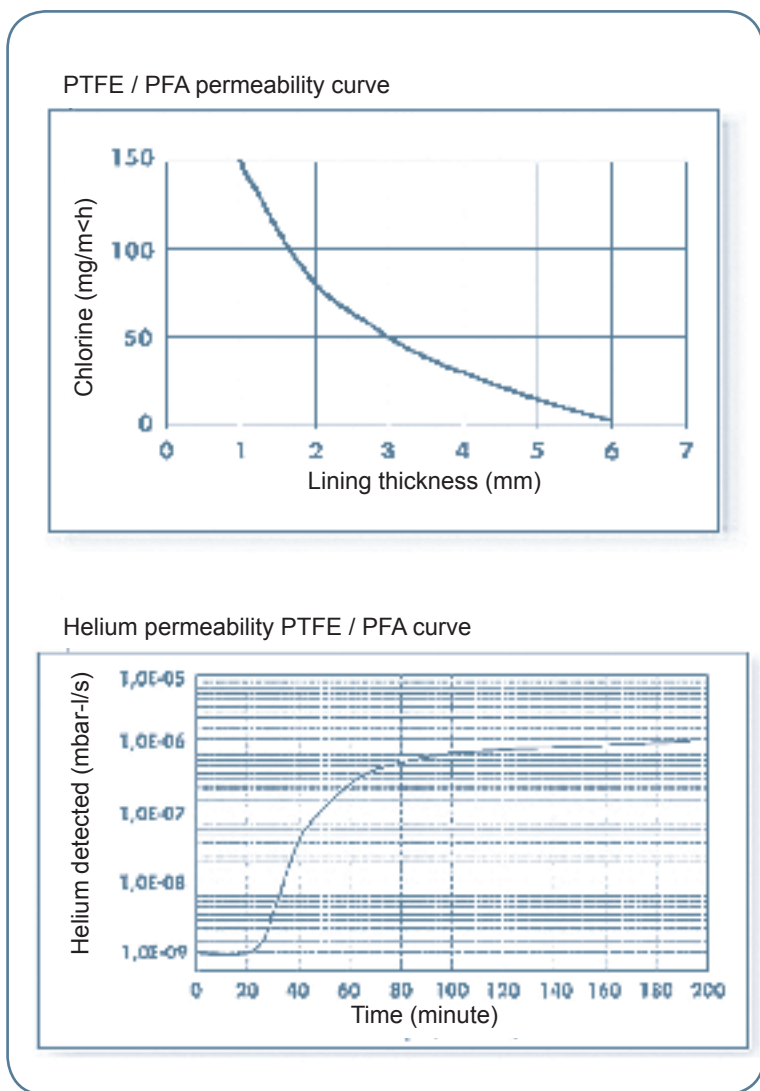
Thanks to mastered manufacturing technologies (PFA injection, extrusion of fine PTFE powders, Isomoulding) Mersen optimised PTFE lining thickness and manufacturing procedures to limit permeability rate.

PERMEABILITY

Several factors have an influence on permeability :

- ▶ **Thickness of the lining is the most significant factor.** The curve below shows the sharp decrease in permeability level according to thickness.
- ▶ **Size of the ions or molecules.** This Helium permeability curve shows the ability of a very small molecule such as helium to pass through the PTFE / PFA.
- ▶ **Chemical nature of the product :** any chemical similarity between the material passing through and the material passed through increases permeability.
- ▶ **Temperature and pressure :** permeability increases with growth of temperature and pressure.

Examples of permeability curves:



STEEL SHELLS

COMPONENTS

The table below shows the various steel components used for manufacturing of our standard pieces. 3.1 mill certificates in accordance with EN 10204 are available on request.

ASTM or JIS standards compliant steel grades, low temperature or stainless steel grades can be supplied on request. Please contact us for more information.

| DESCRIPTION | TUBES / BODIES | | FLANGES | |
|---------------------------------------|----------------------------|-----------------------------------|----------------------|---|
| | STANDARD DIMENSIONAL | GRADE | STANDARD DIMENSIONAL | GRADE |
| Spools | ANSI B36.10 | ASTM 106 Gr B | ANSI B16.5 | ASTM A 105 |
| Elbows Welded construction | ANSI B16.9 /ANSI B16.28 | ASTM A 234 WPB | ANSI B16.5 | ASTM A 105 |
| Elbows Cast steel | ANSI B16.5 | ASTM A 216 WCB | ANSI B16.5 (*) | ASTM A 216 WCB |
| Tee Welded construction | ANSI B16.10 /ANSI B16.9 | ASTM A 106 Gr B ASTM A 234 WPB | ANSI B16.5 | ASTM A 105 |
| Tee Cast steel | ANSI B16.5 | ASTM A 216 WCB | ANSI B16.5 (*) | ASTM A 216 WCB |
| Concentric & Eccentric Reducers | ANSI B16.9 | ASTM A 234 WPB | ANSI B16.5 | ASTM A 105 |
| Reducing flange | | | ANSI B16.5 (*) | ASTM A 516 Gr 60 / P 235 GH / En 10028 |
| Spacers | ANSI B36.10 | ASTM A 106 Gr B | ANSI B16.5 (*) | ASTM A 516 Gr 60 / P 235 GH / En 10028 |
| Instrument tee Welded construction | | ASTM A 106 Gr B | ANSI B16.5 | ASTM A 105 ASTM A 516 Gr 60 / P 235 GH / En 10028 |
| Instrument tee Cast steel | | ASTM A 216 WCB | ANSI B16.5 (*) | ASTM A 216 WCB |

CONTROLS DURING MANUFACTURING

The dimensional inspection is always completed by the following additional checks :

- ▶ Straightness and positioning of flanges.
- ▶ Thickness of painting.
- ▶ Absence of any protruding element inside the parts that might damage the lining.

Mersen offers other optional non-destructive tests :

- ▶ X-rays on butt-welds (as per code)
- ▶ Die penetrant tests (by COFREND II qualified personnel)

WELDING

Mersen is qualified in accordance with the European standards EN 288.3 (for operational modes) and EN 287.1 (for welders) regarding the A.A.G., M.I.G. & T.I.G., A.D.M. HP 5.3 and ASME IX processes.

These qualifications are regularly renewed, either internally by using an external independent organism.

External audits are carried out in order to ensure that our suppliers meet the same requirements.

Mersen is also HPO, SQLO, and ASME Stamp 'U' certified.

FLARED STUB END

Regarding spools, Mersen builds them with 2 loose flanges on collars obtained by cold forming of the steel tube, from DN 15 to DN 350. This process is in conformity with PED and has been validated by T.Ü.V.

A loose flange stop can be supplied on request.

VENT HOLES

Vent holes are drilled PTFE and PFA lined piping steel shells to :

- ▶ Prevent any back pressure between the metallic housing and the lining.
- ▶ Detect any possible leaks during pressure tests.
- ▶ Quickly detect any sign of corrosion.

Spools with length below 500 mm have one 3 mm diameter vent hole in the middle of the piece. Those above 500 mm are fitted with two vent holes located about 150 mm from each end.

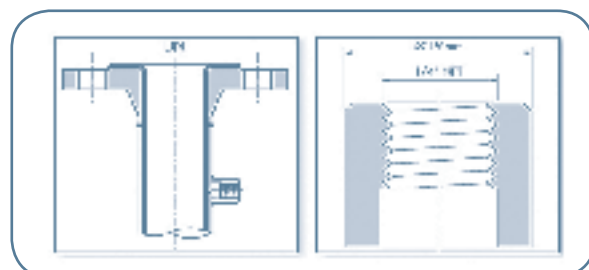
The fittings have at least one 3 mm diameter vent hole. Reducing flanges, blind flanges and spacers do not have any vent holes.

In the case of particular specifications or pipe lagging, 1/4" NPT vent bosses can be welded to the vent holes.

VENT BOSSES

If vent holes must be identified quickly or when the line is lagged, a coupling can be welded at the vent holes levels.

In the case of different lagging thicknesses, an extension to achieve the size required can be screwed on to the coupling.

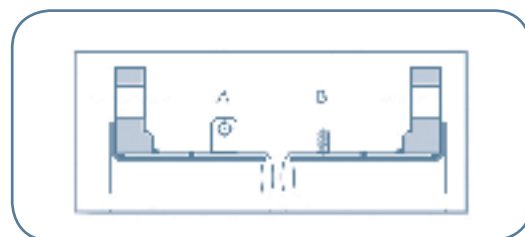


ELECTRICAL CONTINUITY

The electrical continuity of lined piping can be ensured by connecting each individual component together by using conductors linked to earth.

Regarding fitting and spools below 500 mm, these are welded in the middle of the steel piece and at about 150 mm from the back side of each flange. In case of above 500 mm long spools, Mersen supplies two types of earthing lugs. The standard earthing lugs are in AISI 304 or 316 stainless steel.

Other materials can be supplied on request.



PAINTING

The standard coating is a 40 micron thick zinc epoxy primer coating on sand blasted steel, in accordance with the S.A 2.5 cleanliness level. Other surface preparations, undercoats or topcoats can be applied on request.

LINED COMPONENTS

DIMENSIONAL TOLERANCES

The lined pieces and their dimensions are indicated in pages 17 to 35.
All the lined pieces are built using following tolerances :

| | TOLERANCE | DIMENSIONAL TOLERANCE | ANGULAR TOLERANCE |
|-----------|--------------|-----------------------|-------------------|
| LENGTHS | 0-315 mm | +0; -3 mm | -0.5 ₁ |
| | 315-1000 mm | +0; -4 mm | -0.5 ₁ |
| | 1000-6000 mm | +0; -5 mm | -0.5 ₁ |
| DIAMETERS | DN 25-100 | +0; -3 mm | -0.5 ₁ |
| | DN 125-200 | +0; -4 mm | -0.5 ₁ |
| | DN 250-600 | +0; -5 mm | -0.5 ₁ |

Tolerance for PTFE / PFA : 5%

TEMPERATURE CYCLE TESTS

The pieces tested undergo 100 alternate steam / cold water cycles, according to the ASTM F1545 standard. Steam is absorbed by the lining under the influence of both temperature and pressure. Lining vacuum resistance is then proved thanks to significant mechanical stresses due to the sudden pressure drop combined with fast cooling.

VACUUM RESISTANCE

| DN | 1/2" | 3/4" | 1" | 1"1/2 | 2" | 3" | 4" | 6" | 8" | 10" | 12" | 14" | 16" |
|------------|----------------------|------|----|-------|----|----|----|----|---|-----|-----|-----|-----|
| ARMYLOR® G | Vacuum 2 Torr 150° C | | | | | | | | | | | | |
| ARMYLOR® V | Vacuum 2 Torr 230° C | | | | | | | | Vacuum 2 Torr 150° C | | | | |
| ARMYLOR® S | | | | | | | | | Vacuum according to particular specifications | | | | |

Unity conversion : 760 Torrs = 760 mmHg = 1 bar = 1kg/cm² = 10 Pa = 14.5 Psi



CHARACTERISTICS CONTROLLED DURING MANUFACTURE

Mersen manufactures PTFE lined pipe and fittings in accordance with PED 97/23 CE.

In addition to internal audits carried out throughout the entire manufacturing process (acceptance of powders, physical properties of the lining, etc.) all piping is subject to the following inspections ;

- **Dimensional and visual check :**

the overall dimensions of the spools, the size of the collars, the lining thickness of moulded pieces and the absence of surface defects are checked once the pieces have been produced.

- **Spark test :**

each piping element undergoes the electrostatic check in the following condition : PTFE/PFA : potentials test in V : $5000 * E$ V (E = thickness of liner en mm) with a maximum of 25000 V.

- **Hydraulic test :**

this check is only carried out on pieces equipped with vent holes, injected or produced from tubes. The standard test pressure is 1.5 times the operational pressure. This test can also be carried out in other conditions (pressure, time, number of cycles) on request.

- **Pneumatic check :**

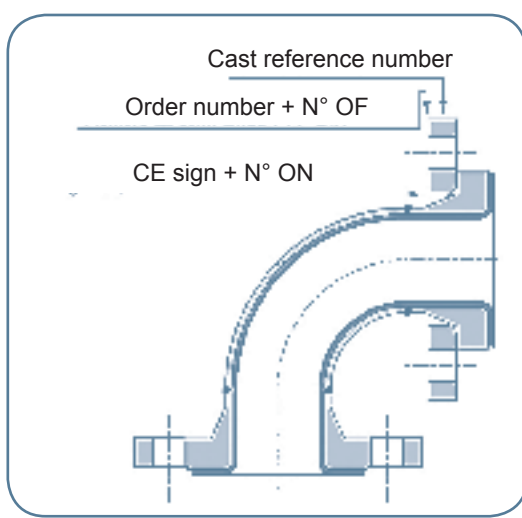
a hot pneumatic test is carried out on isomolding pieces and on some pieces produced from extruded liners.

TRACEABILITY AND MARKING

- **Traceability**

In addition to hydrostatic and electrostatic tests records, traceability, is a key issue for our Quality insurance system : it is achieved as follows:

- ▶ **Steel :** the heat number is cold stamped on each steel piece. Mersen is approved by the TÜV to stamp heat numbers on steel pipes cuts.
- ▶ **Finished product :** the following information is stamped on the finished piece :
 - The initials of Mersen, the order number and the piece number (O.F. number)
 - The C€ + O.N. (third party organism)
- ▶ **Traceability of documents :** total traceability is ensured with the same method for both metallic components and lining materials.



- **Marking**

Additional marking can be done.

On request, each part can be identified thanks to a heat transfer printed sticky label that shows piece reference and isometrics number.

PACKAGING

Spools can be packed on floor-mounted loads or in wooden crates.

Fittings are packed in wooden crates or in cardboards on pallets.

INSTALLATIONS PROCEDURE

PRECAUTIONS

The lined steel components are delivered with wooden or plastic plugs installed to protect the PTFE collars. Remove these protective plugs when the components are about to be connected only : they shall be refitted after each inspection and when the piece is withdrawn from the installation. Once the plugs have been removed, the greatest care is required : no contact with the floor, absence of any sharp object that could damage the lining.

CLEANING

Flared surface must be carefully cleaned prior to connection.

BOLT TIGHTENING

For assembling of PTFE / PFA lined piping components together, no gaskets are needed except when materials of different natures are being coupled or during successive assembling and dismantling operations.

Tightening blots :

- ▶ **Insert** the washers
- ▶ **Clean** and grease the blots
- ▶ **Tighten** nuts by hands
- ▶ **Tighten** each bolt using a torque wrench, keeping to the torque values specified in the right table
- ▶ Tightening "opposites" as with any flange connection

Tightening torque values are given for PTFE / PFA and may vary depending on greasing, condition of the threaded holes, and so on.

Values are given for PN 10 flanges. They are indicated for ambient conditions and must always be checked in cold condition, after 24 hours of installation; they should also be checked periodically.

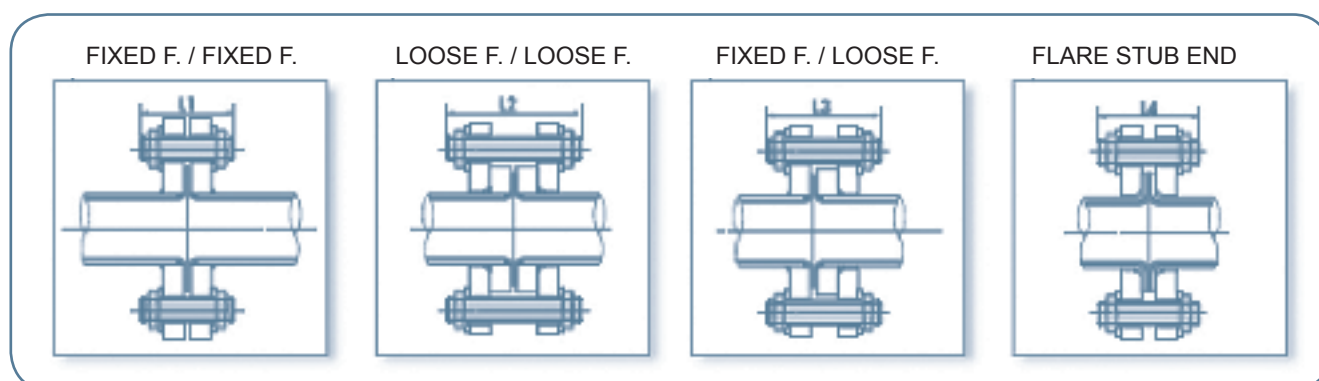
The tightening torque values indicated apply to :

- **Class 8.8 steel nuts** (resistant to 800 N/mm rupture, elasticity limit of 640 N/mm)
- 0.12. nut friction **coefficient**

| DN Inch | BOLTS UNC | TORQUE N.m |
|------------|--------------|---------------|
| 1/2" | 4x1/2" | 20 |
| 3/4" | 4x1/2" | 20 |
| 1" | 4x1/2" | 30 |
| 1"1/2 | 4x1/2" | 30 |
| 2" | 4x5/8" | 60 |
| 3" | 4x5/8" | 60 |
| 4" | 8x5/8" | 60 |
| 6" | 8x3/4" | 110 |
| 8" | 8x3/4" | 110 |
| 10" | 12x7/8" | 160 |
| 12" | 12x7/8" | 180 |
| 14" | 12x1" | 200 |
| 16" | 16x1" | 190 |
| 18" | 16x1" 1/2 | 370 |
| 20" | 20x1" 1/8 | 370 |
| 24" | 20x1" 1/4 | 530 |

BOLT LENGTHS

The table below sets out the recommended threaded rod lengths for the various assemblies.



The dimensions indicated refer to :

- ▶ **A coupling** equal to 1/3 the diameter of the screwed rod.
- ▶ **A nut height** equal to the diameter of the screwed rod.

ASA 150

| NB | L1 mm | L2 mm | L3 mm | L4 mm |
|-----------|-------|-------|-------|-------|
| NB 1/2" | 75 | 95 | 85 | |
| NB 3/4" | 80 | 100 | 90 | |
| NB 1" | 80 | 105 | 90 | 85 |
| NB 1 1/2" | 90 | 115 | 100 | 85 |
| NB 2" | 100 | 125 | 110 | 95 |
| NB 3" | 110 | 140 | 125 | 105 |
| NB 4" | 110 | 140 | 125 | 105 |
| NB 6" | 125 | 165 | 145 | 125 |
| NB 8" | 135 | 175 | 155 | 130 |
| NB 10" | 150 | 195 | 175 | |
| NB 12" | 155 | 205 | 175 | |
| NB 14" | 170 | 220 | 195 | |
| NB 16" | 175 | 225 | 195 | |
| NB 18" | 185 | 235 | 215 | |
| NB 20" | 195 | 245 | 220 | |
| NB 24" | 205 | 260 | 230 | |

ASA 300

| NB | L1 mm | L2 mm | L3 mm | L4 mm |
|-----------|-------|-------|-------|-------|
| NB 1/2" | 80 | 100 | 90 | |
| NB 3/4" | 90 | 115 | 100 | |
| NB 1" | 95 | 120 | 105 | 95 |
| NB 1 1/2" | 110 | 140 | 125 | 105 |
| NB 2" | 110 | 140 | 125 | 105 |
| NB 3" | 130 | 165 | 145 | 120 |
| NB 4" | 135 | 180 | 155 | 120 |
| NB 6" | 150 | 195 | 170 | 135 |
| NB 8" | 170 | 225 | 195 | 155 |
| NB 10" | 195 | 255 | 225 | |
| NB 12" | 210 | 275 | 240 | |
| NB 14" | 215 | 290 | 250 | |
| NB 16" | 235 | 315 | 275 | |
| NB 18" | 240 | 330 | 285 | |
| NB 20" | 245 | 345 | 290 | |
| NB 24" | 270 | 380 | 325 | |

VENT HOLES

Vent holes must not be obstructed by lagging or painting. Where lagging is fitted, vent extensions should be provided. When pipes are in service for the first time, air or water trapped inside at the moment of assembling may escape through the vent holes. It is recommended, when undertaking periodic inspections of installation, to check that no leak has occurred out of the vent holes. The latter also act as corrosion indicators.

WEIGHT

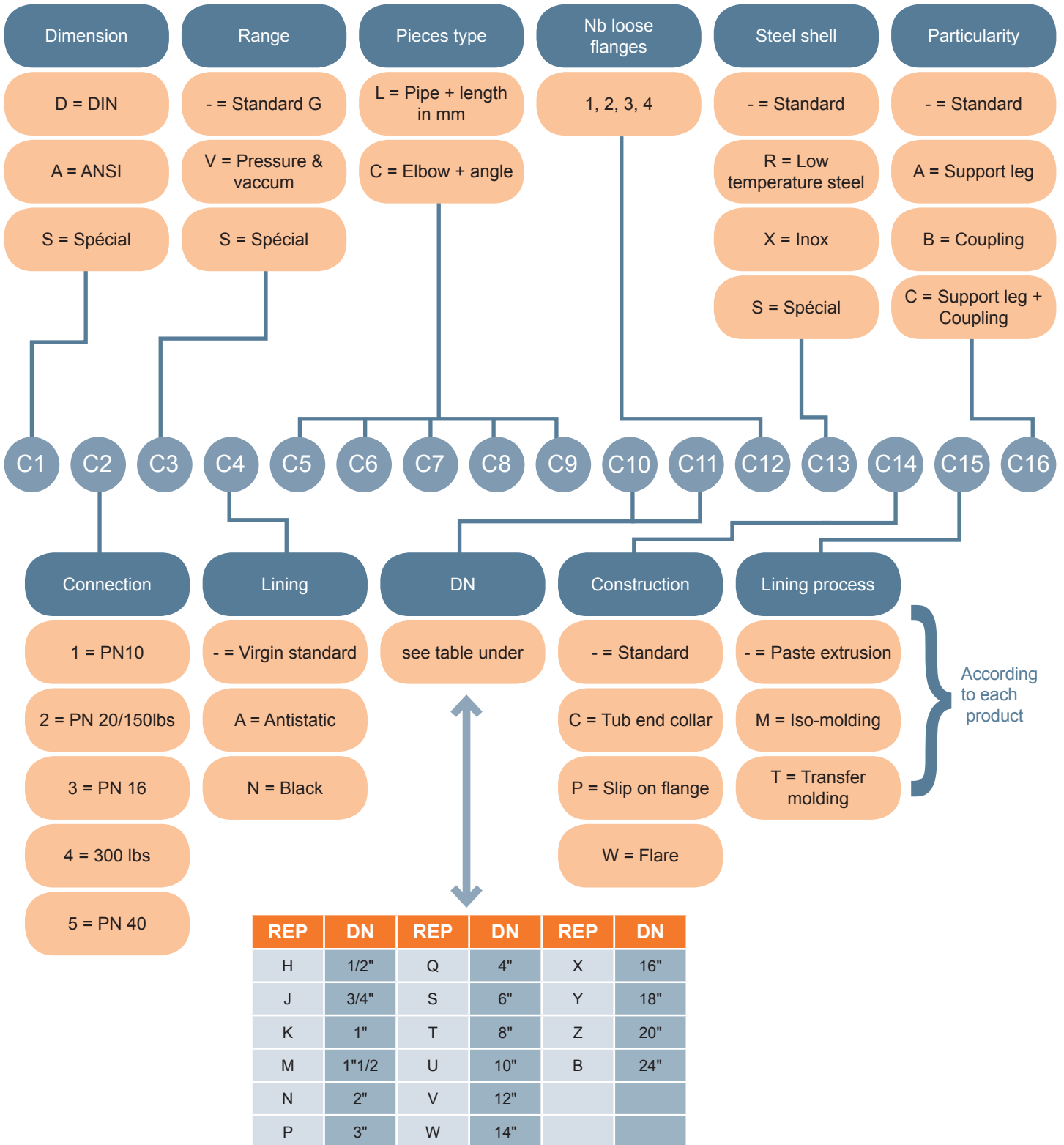
The weight (kilograms) of each piece is indicated on the corresponding tables. Due to the various construction methods, the weights are theoretic values only. The tolerance is +/- 10%.

SUPPORTS

Components shall be supported using rings that are independent of the lined pipe. **No welding should be performed on lined elements.** However, supporting elements may be welded prior to lining.

REFERENCES

Each part has a 16 digits reference.

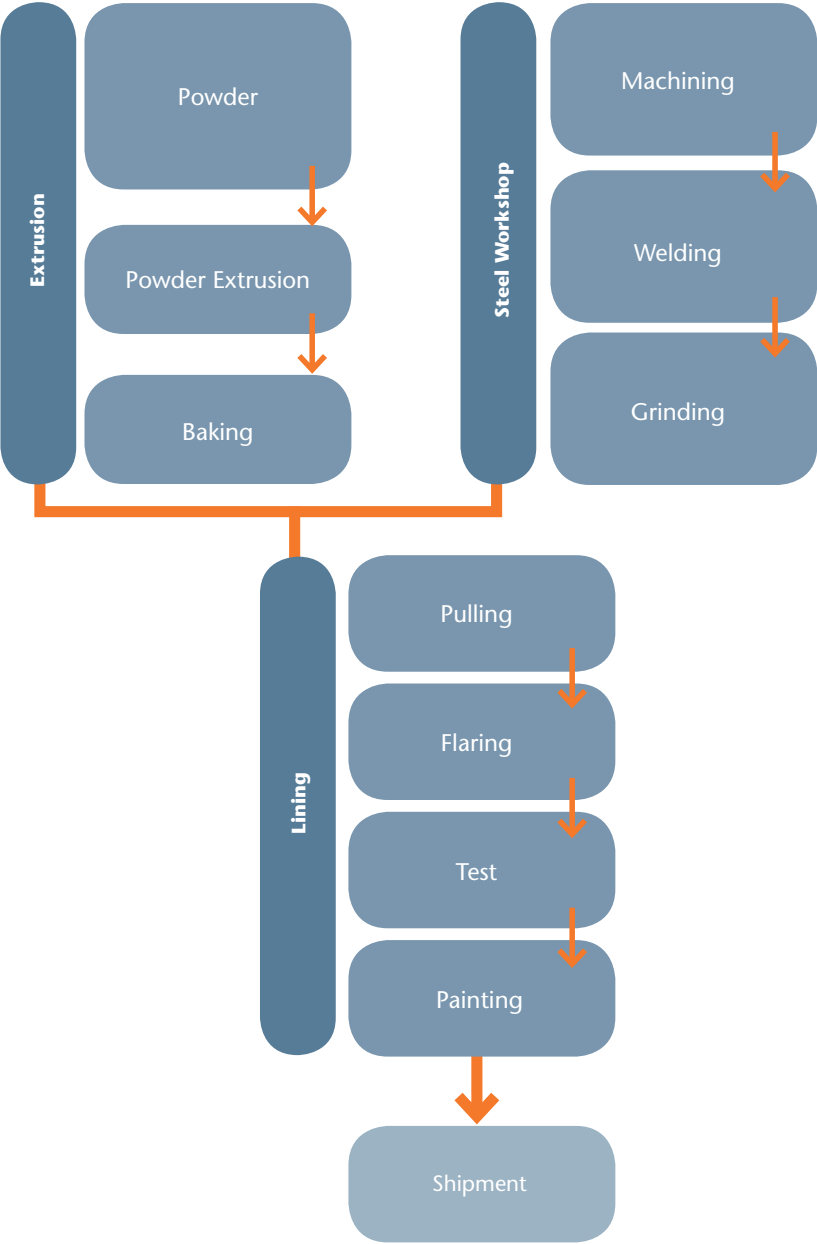


Examples :

D3V-L1234T--XW-A : DIN, PN16, vaccum range, 1234 mm straight length, DN200, inox steel, welding neck, earthing lug.

D1--C45--P-1 : DIN, PN10, 45° elbow, DN80, 1 BT.

MANUFACTURE PROCESS

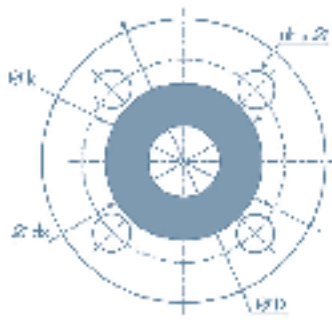


PRODUCTS DATA SHEETS

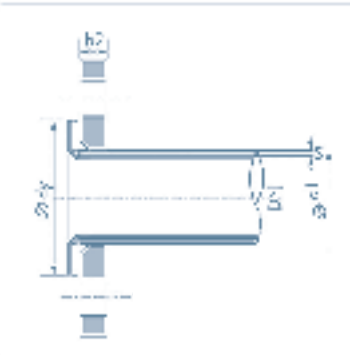
| | | |
|--|---------------------------------|-------|
| | DIN FLANGES AND TUBES | 17 |
| | FLANGED SPOOLS | 18 |
| | ELBOWS | 19 |
| | EQUAL TEES | 20 |
| | REDUCING TEES | 21-22 |
| | CONCENTRIC & ECCENTRIC REDUCERS | 23 |
| | REDUCING FLANGES | 24-26 |
| | INSTRUMENT TEES | 27 |
| | CROSSES | 28 |
| | SPACERS | 30 |
| | SPECTACLE BLIND | 31 |
| | BLIND FLANGES & LATERAL TEES | 32 |
| | MANIFOLDS | 33 |
| | LINED JACKETED PIPING | 34 |
| | DIP PIES & ENTRY PIPES | 35 |



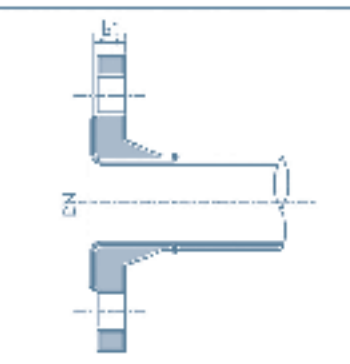
ANSI 150 LBS FLANGES AND TUBES



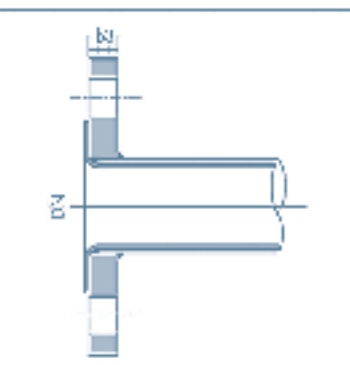
Flange (front view)



Flared stub end type C (loose)



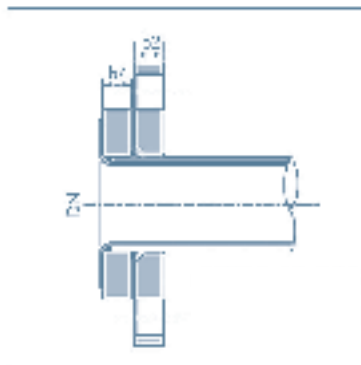
Welding neck type W (Fix)



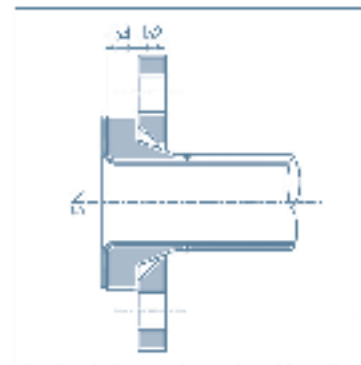
Slip-on Type P (Fix)

Entire flanged products range can be equipped with loose or fix flanges on request.

| NB | | | | | | | | | | | STEEL TUBES | | |
|--------|-----|-------------|-----|-----|-------|------|------|----|-------|----|-------------|-------|-----|
| | D | dx* mini | dy | k | b1 | b2 | b3 | b4 | holes | | bolting | d1 | s |
| | mm | mm | mm | mm | mm | mm | mm | mm | nb | ø | UNC | mm | mm |
| 1/2" | 89 | 31 | | 42 | 60.3 | 11.1 | 9.5 | 10 | 4 | 16 | 1/2 | 26.7 | 2.9 |
| 3/4" | 99 | 39 | | 52 | 69.0 | 12.7 | 11.1 | 12 | 4 | 16 | 1/2 | 26.7 | 2.9 |
| 1" | 108 | 47 | 51 | 60 | 79.4 | 14.3 | 12.7 | 12 | 4 | 16 | 1/2 | 33.4 | 3.4 |
| 1 1/2" | 127 | 68 | 72 | 73 | 98.4 | 17.5 | 15.9 | 12 | 4 | 16 | 1/2 | 48.3 | 3.7 |
| 2" | 152 | 87 | 90 | 92 | 120.6 | 19.0 | 17.4 | 14 | 4 | 20 | 5/8 | 60.3 | 3.9 |
| 3" | 191 | 117 | 125 | 127 | 152.4 | 23.8 | 22.2 | 16 | 4 | 20 | 5/8 | 88.9 | 5.5 |
| 4" | 229 | 150 | 155 | 157 | 190.5 | 23.8 | 22.2 | 16 | 8 | 20 | 5/8 | 114.3 | 6.0 |
| 6" | 279 | 203 | 210 | 216 | 241.3 | 25.4 | 23.8 | 18 | 8 | 23 | 3/4 | 168.3 | 7.1 |
| 8" | 343 | 255 | 262 | 270 | 298.4 | 28.6 | 27.0 | 20 | 8 | 23 | 3/4 | 219.1 | 8.2 |
| 10" | 406 | 311 | | 324 | 361.9 | 30.2 | 28.6 | 22 | 12 | 26 | 7/8 | 273.0 | 7.8 |
| 12" | 493 | 365 | | 381 | 431.8 | 32.7 | 31.1 | 24 | 12 | 26 | 7/8 | 323.8 | 8.4 |
| 14" | 535 | 393 | | 413 | 476.2 | 34.9 | 33.3 | 25 | 12 | 29 | 1 | 355.6 | 7.9 |
| 16" | 597 | 450 | | 470 | 539.7 | 36.5 | 34.9 | 25 | 16 | 29 | 1 | 406.4 | 7.9 |
| 18" | 635 | 514 | | 533 | 577.8 | 39.7 | 38.1 | 25 | 16 | 32 | 1 1/8 | 457.2 | 7.9 |
| 20" | 699 | 565 | | 584 | 635.0 | 42.9 | 41.3 | 25 | 20 | 32 | 1 1/8 | 508.0 | 9.5 |
| 24" | 813 | 666 | | 692 | 749.3 | 47.6 | 46.0 | 25 | 20 | 35 | 1 1/4 | 609.8 | 9.5 |



Collar + slip-on type P (loose)

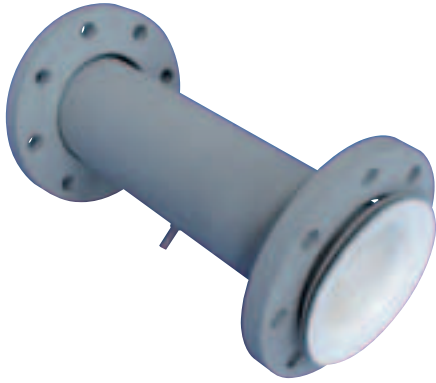


Collar + slip-on type W

ANSI 300 on request

Please see page 34

FLANGED SPOOLS



LINING

VIRGIN PTFE : :
NB 1/2" – NB 24"

ANTI STATIC PTFE (Black), C4 = A
NB 1/2" – NB 16"

Standard construction : 2 loose flanges

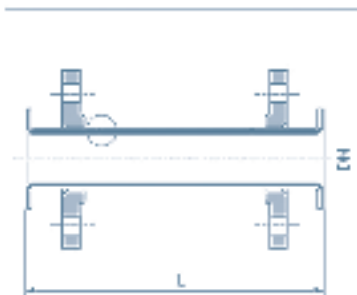
- Type C : NB 1/2" to NB 12", C14 = C

On request : 1 fixed flange, 1 loose flange

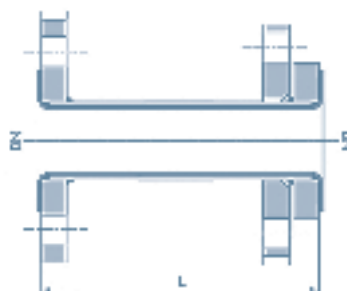
- Type P : NB 1/2" to NB 14"
- Type W : C14 = W

| NB | L mini | L maxi | Weight kg/m | Pair flanges weight | REFERENCE | | | | | | | | | | | | | | | |
|-------|--------|--------|----------------|---------------------------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| | mm | mm | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 1/2" | 85 | 6000 | 2 | 0.9 | A | 2 | - | - | L | x | x | x | x | H | | | | | | |
| 3/4" | 85 | 6000 | 2 | 1.3 | A | 2 | - | - | L | x | x | x | x | J | | | | | | |
| 1" | 85 | 6000 | 2 | 2.1 | A | 2 | - | - | L | x | x | x | x | K | | | | | | |
| 1"1/2 | 90 | 6000 | 5 | 3.2 | A | 2 | - | - | L | x | x | x | x | M | | | | | | |
| 2" | 100 | 6000 | 7 | 5.1 | A | 2 | - | - | L | x | x | x | x | N | | | | | | |
| 3" | 110 | 6000 | 14 | 9.3 | A | 2 | - | - | L | x | x | x | x | P | | | | | | |
| 4" | 120 | 6000 | 19 | 12.9 | A | 2 | - | - | L | x | x | x | x | Q | | | | | | |
| 6" | 120 | 6000 | 34 | 17.8 | A | 2 | - | - | L | x | x | x | x | S | | | | | | |
| 8" | 130 | 6000 | 53 | 28.2 | A | 2 | - | - | L | x | x | x | x | T | | | | | | |
| 10" | 150 | 6000 | 64 | 38.5 | A | 2 | - | - | L | x | x | x | x | U | | | | | | |
| 12" | 150 | 6000* | 65 | 60.9 | A | 2 | - | - | L | x | x | x | x | V | | | | | | |
| 14" | 150 | 3000 | 85 | 76.1 | A | 2 | - | - | L | x | x | x | x | W | | | | | | |
| 16" | 150 | 3000 | 98 | 95.2 | A | 2 | - | - | L | x | x | x | x | X | | | | | | |
| 18" | 150 | 3000 | 110 | 108 | A | 2 | - | - | L | x | x | x | x | Y | | | | | | |
| 20" | 160 | 3000 | 132 | 136 | A | 2 | - | - | L | x | x | x | x | Z | | | | | | |
| 24" | 180 | 3000 | 161 | 172 | A | 2 | - | - | L | x | x | x | x | B | | | | | | |

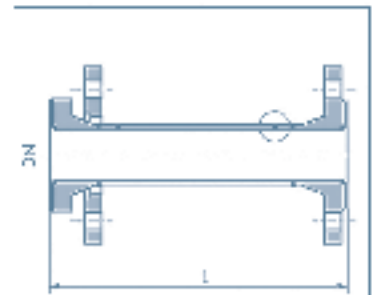
* For vacuum thickness, L max = 4500 xxxx : length in mm



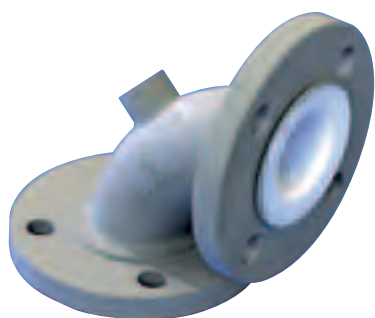
Type C construction



Type P construction



Type W construction



LINING

VIRGIN PTFE :
NB 1/2" – NB 24"

ANTI STATIC PTFE, C4 = A
NB 1/2" – NB 16"

Standard construction : 2 fix flanges

- Type K : NB 1" to NB 4", C13 = K
- Type W : superior NB 4"

On request : 1 fix flange + 1 loose flange

C12 = 1

| DN | L (mm) | | | | WEIGHT (kg) | | | | REFERENCE | | | | | | | | | | | | | | | | |
|--------|---------|--------|-------|-------|-------------|------|------|------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|
| | α=90° | α=45° | α=60° | α=30° | 90° | 45° | 60° | 30° | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 15 | 16 |
| 1/2" | 65 | 44 | 52 | 40 | 1.0 | 0.9 | 0.9 | 0.9 | A | 2 | - | - | C | ? | ? | x | x | H | | | | | | | |
| 3/4" | 75 | 44 | 72 | 59 | 1.4 | 1.3 | 1.3 | 1.3 | A | 2 | - | - | C | ? | ? | x | x | K | | | | | | | |
| 1" | 89 | 44(1) | 98 | 77 | 2.2 | 2.1 | 2.1 | 2.0 | A | 2 | - | - | C | ? | ? | x | x | L | | | | | | | |
| 1 1/2" | 102 | 57 | 92 | 78 | 3.8 | 3.4 | 3.5 | 3.3 | A | 2 | - | - | C | ? | ? | x | x | M | | | | | | | |
| 2" | 114 | 64 | 110 | 86 | 5.9 | 5.3 | 5.5 | 5.1 | A | 2 | - | - | C | ? | ? | x | x | N | | | | | | | |
| 3" | 140 | 76 | 110 | 75 | 11.5 | 10.0 | 10.5 | 9.5 | A | 2 | - | - | C | ? | ? | x | x | P | | | | | | | |
| 4" | 165 | 102 | 135 | 90 | 16.7 | 14.2 | 15.1 | 13.4 | A | 2 | - | - | C | ? | ? | x | x | Q | | | | | | | |
| 6" | 203 | 127 | 180 | 110 | 26.6 | 21.2 | 22.9 | 19.4 | A | 2 | - | - | C | ? | ? | x | x | S | | | | | | | |
| 8" | 229 | 140 | 235 | 140 | 44.3 | 34.7 | 37.9 | 31.6 | A | 2 | - | - | C | ? | ? | x | x | T | | | | | | | |
| 10" | 279 | 165 | | | 62.4 | 48.4 | | | A | 2 | - | - | C | ? | ? | x | x | U | | | | | | | |
| 12" | 305 | 190 | | | 86.3 | 70.7 | | | A | 2 | - | - | C | ? | ? | x | x | V | | | | | | | |
| 14" | 356 | 190 | | | 117 | 93.1 | | | A | 2 | - | - | C | ? | ? | x | x | W | | | | | | | |
| 16" | 450 | 203 | | | 156 | 121 | | | A | 2 | - | - | C | ? | ? | x | x | X | | | | | | | |
| 18" | • 475 | 216 | | | 179 | 138 | | | A | 2 | - | - | C | ? | ? | x | x | Y | | | | | | | |
| 20" | • 810** | • 343* | | | 538 | 341 | | | A | 2 | - | - | C | ? | ? | x | x | Z | | | | | | | |
| 24" | • 974** | • 412* | | | 693 | 439 | | | A | 2 | - | - | C | ? | ? | x | x | B | | | | | | | |

• : Does not conform to ANSI NB 16.5 standard

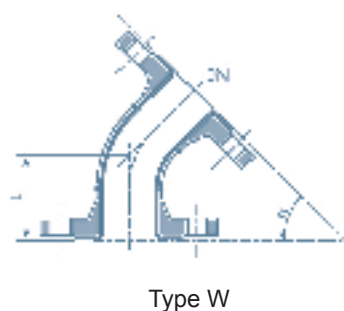
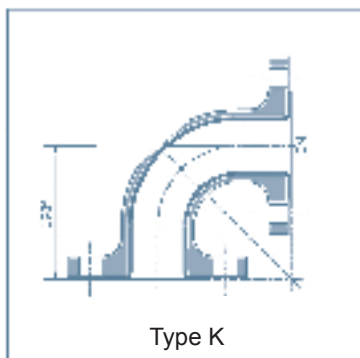
* : 2 parts construction

** : 3 parts construction

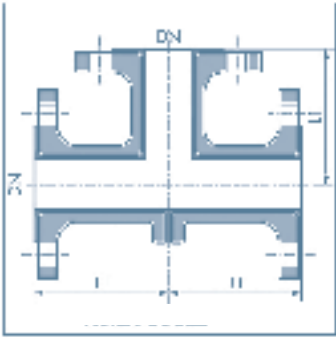
?? Angle in degree : 90, 45, 60 or 30 or standard

The 30° and 60° elbows are not included in the ANSI B 16.5 standard

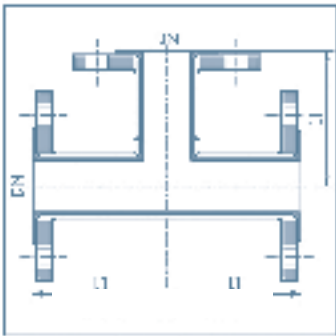
Standard fix flanges elbow
= 90°/60°/30°



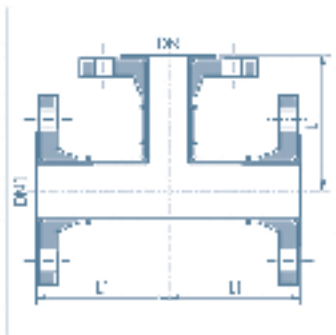
EQUAL TEES



Type K



Fix flanges type P



Fix flanges type W

LINING

VIRGIN PFA : NB 1/2" – NB 3"

ANTI STATIC PFA : NB 1/2" – NB 3", C4 = A

VIRGIN PTFE : NB 4" – NB 24"

ANTI STATIC PTFE : NB 4" – NB 16", C4 = A

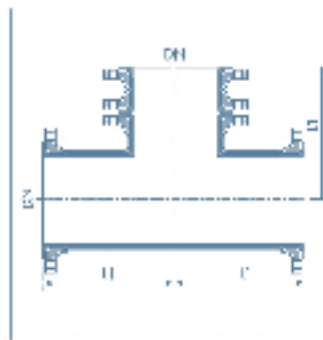
| NB | L1 mm | Weight kg | REFERENCE | | | | | | | | | | | | | | | |
|-------|-------|-----------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 1/2" | 65 | 1.6 | A | 2 | - | - | T | E | - | - | - | H | | | | | | |
| 3/4" | 75 | 2.2 | A | 2 | - | - | T | E | - | - | - | J | | | | | | |
| 1" | 89 | 3.5 | A | 2 | - | - | T | E | - | - | - | K | | | | | | |
| 1"1/2 | 102 | 5.9 | A | 2 | - | - | T | E | - | - | - | M | | | | | | |
| 2" | 114 | 9.2 | A | 2 | - | - | T | E | - | - | - | N | | | | | | |
| 3" | 140 | 17.9 | A | 2 | - | - | T | E | - | - | - | P | | | | | | |
| 4" | 165 | 26.1 | A | 2 | - | - | T | E | - | - | - | Q | | | | | | |
| 6" | 203 | 41.7 | A | 2 | - | - | T | E | - | - | - | S | | | | | | |
| 8" | 229 | 68.8 | A | 2 | - | - | T | E | - | - | - | T | | | | | | |
| 10" | 279 | 96.8 | A | 2 | - | - | T | E | - | - | - | U | | | | | | |
| 12" | 305 | 132 | A | 2 | - | - | T | E | - | - | - | V | | | | | | |
| 14" | 356* | 215 | A | 2 | - | - | T | E | - | - | - | W | | | | | | |
| 16" | 381** | 266 | A | 2 | - | - | T | E | - | - | - | X | | | | | | |
| 18" | 419** | 308 | A | 2 | - | - | T | E | - | - | - | Y | | | | | | |
| 20" | 457** | 396 | A | 2 | - | - | T | E | - | - | - | Z | | | | | | |
| 24" | 559** | 520 | A | 2 | - | - | T | E | - | - | - | B | | | | | | |

Standard construction

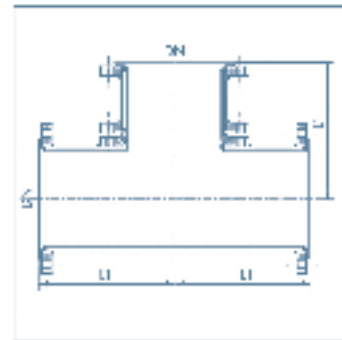
- Type P : NB 1/2" to NB 3" and NB 14" to NB 24"
- NB 1" to NB 4", C13 = K
- Type W : NB 4" to NB 12"

On request :

- 3 loose flanges : C12 = 3

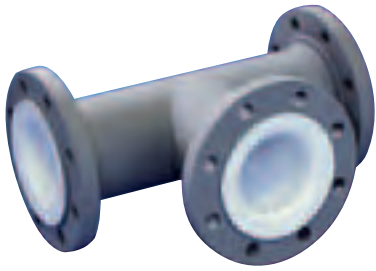


* Fix flanges type W



** Fix flanges type P

REDUCING TEES



LINING

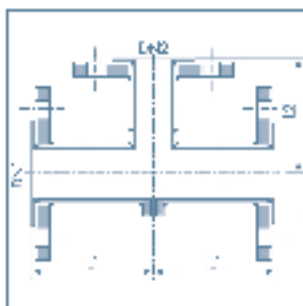
VIRGIN PFA : NB 3/4" – NB 3"

ANTI STATIC PFA : NB 3/4" – NB 3", C4 = A

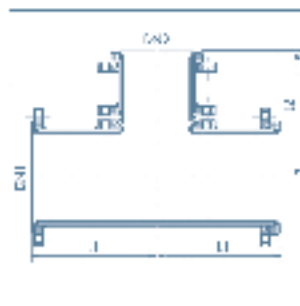
VIRGIN PTFE : NB 4" – NB 8"

ANTI STATIC PFA : NB 4" – NB 8", C4 = A

| NB1 | NB2 | L mm | Weight kg | REFERENCE | | | | | | | | | | | | | | | | |
|--------|--------|---------|--------------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|--|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| 3/4" | 1/2" | 75 | 2.0 | A | 2 | - | - | T | R | - | - | - | J | H | | | | | | |
| 1" | 1/2" | 89 | 2.9 | A | 2 | - | - | T | R | - | - | - | K | H | | | | | | |
| | 3/4" | 89 | 3.1 | A | 2 | - | - | T | R | - | - | - | K | J | | | | | | |
| 1 1/2" | 1/2" | 102 | 4.6 | A | 2 | - | - | T | R | - | - | - | M | H | | | | | | |
| | 3/4" | 102 | 4.8 | A | 2 | - | - | T | R | - | - | - | M | J | | | | | | |
| | 1" | 102 | 5.2 | A | 2 | - | - | T | R | - | - | - | M | K | | | | | | |
| 2" | 1/2" | 114 | 6.8 | A | 2 | - | - | T | R | - | - | - | N | H | | | | | | |
| | 3/4" | 114 | 7.0 | A | 2 | - | - | T | R | - | - | - | N | J | | | | | | |
| | 1" | 114 | 7.4 | A | 2 | - | - | T | R | - | - | - | N | K | | | | | | |
| | 1 1/2" | 114 | 8.2 | A | 2 | - | - | T | R | - | - | - | N | M | | | | | | |
| 3" | 1" | 140 | 13.5 | A | 2 | - | - | T | R | - | - | - | P | K | | | | | | |
| | 1 1/2" | 140 | 14.3 | A | 2 | - | - | T | R | - | - | - | P | M | | | | | | |
| | 2" | 140 | 15.4 | A | 2 | - | - | T | R | - | - | - | P | N | | | | | | |
| 4" | 1" | 165 | 19.3 | A | 2 | - | - | T | R | - | - | - | Q | K | | | | | | |
| | 1 1/2" | 165 | 20.2 | A | 2 | - | - | T | R | - | - | - | Q | M | | | | | | |
| | 2" | 165 | 21.2 | A | 2 | - | - | T | R | - | - | - | Q | N | | | | | | |
| | 3" | 165 | 23.9 | A | 2 | - | - | T | R | - | - | - | Q | P | | | | | | |
| 6" | 1" | 203 | 30.8 | A | 2 | - | - | T | R | - | - | - | S | K | | | | | | |
| | 1 1/2" | 203 | 31.7 | A | 2 | - | - | T | R | - | - | - | S | M | | | | | | |
| | 2" | 203 | 32.8 | A | 2 | - | - | T | R | - | - | - | S | N | | | | | | |
| | 3" | 203 | 35.6 | A | 2 | - | - | T | R | - | - | - | S | P | | | | | | |
| | 4" | 203 | 37.9 | A | 2 | - | - | T | R | - | - | - | S | Q | | | | | | |
| 8" | 1" | 229 | 50.7 | A | 2 | - | - | T | R | - | - | - | T | K | | | | | | |
| | 1 1/2" | 229 | 51.6 | A | 2 | - | - | T | R | - | - | - | T | M | | | | | | |
| | 2" | 229 | 52.7 | A | 2 | - | - | T | R | - | - | - | T | N | | | | | | |
| | 3" | 229 | 55.5 | A | 2 | - | - | T | R | - | - | - | T | P | | | | | | |
| | 4" | 229 | 57.8 | A | 2 | - | - | T | R | - | - | - | T | Q | | | | | | |
| | 6" | 229 | 61.7 | A | 2 | - | - | T | R | - | - | - | T | S | | | | | | |



Construction type K



Construction type P

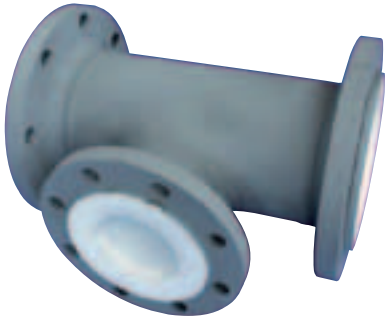
Standard construction :

- Type K : fix flanges, NB 1" to NB 3", C13 = K
- Type P : fix flanges

On request :

- 3 loose flanges C12=3

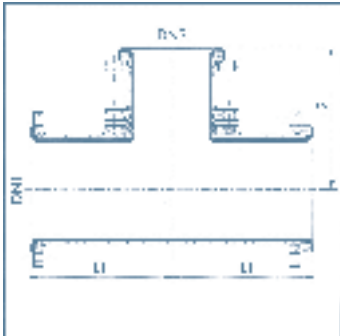
REDUCING TEES



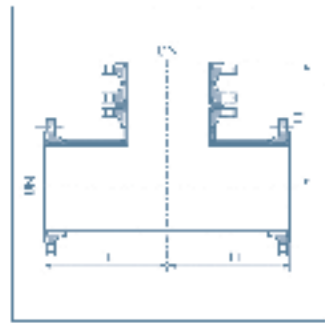
LININGS

VIRGIN PTFE (White) :
NB 10" – NB 24"

ANTI STATIC PTFE (Black), C4 = A
NB 10" – NB 16"



Type P



Type W

| NB1 | NB2 | L mm | Weight kg | REFERENCE | | | | | | | | | | | | | | | |
|-----|-----|---------|--------------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 10" | 4" | 279 | 78.8 | A | 2 | - | - | T | R | - | - | - | U | Q | | | | | |
| | 6" | 279 | 83.0 | A | 2 | - | - | T | R | - | - | - | U | S | | | | | |
| | 8" | 279 | 90.6 | A | 2 | - | - | T | R | - | - | - | U | T | | | | | |
| 12" | 4" | 305 | 104 | A | 2 | - | - | T | R | - | - | - | V | Q | | | | | |
| | 6" | 305 | 108 | A | 2 | - | - | T | R | - | - | - | V | S | | | | | |
| | 8" | 305 | 115 | A | 2 | - | - | T | R | - | - | - | V | T | | | | | |
| 14" | 10" | 305 | 122 | A | 2 | - | - | T | R | - | - | - | V | U | | | | | |
| | 4" | 356 | 145 | A | 2 | - | - | T | R | - | - | - | W | Q | | | | | |
| | 6" | 356* | 152 | A | 2 | - | - | T | R | - | - | - | W | S | | | | | |
| | 8" | 356* | 165 | A | 2 | - | - | T | R | - | - | - | W | T | | | | | |
| 16" | 10" | 356* | 176 | A | 2 | - | - | T | R | - | - | - | W | U | | | | | |
| | 4" | 381* | 177 | A | 2 | - | - | T | R | - | - | - | X | Q | | | | | |
| | 6" | 381* | 183 | A | 2 | - | - | T | R | - | - | - | X | S | | | | | |
| | 8" | 381* | 196 | A | 2 | - | - | T | R | | | | X | T | | | | | |
| | 10" | 381* | 207 | A | 2 | - | - | T | R | | | | X | U | | | | | |
| 18" | 12" | 381* | 228 | A | 2 | - | - | T | R | - | - | - | X | V | | | | | |
| | 14" | 381** | 246 | A | 2 | - | - | T | R | - | - | - | X | W | | | | | |
| | 8" | 419* | 225 | A | 2 | - | - | T | R | - | - | - | Y | T | | | | | |
| | 10" | 419 | 236 | A | 2 | - | - | T | R | | | | Y | U | | | | | |
| 20" | 12" | 419 | 257 | A | 2 | - | - | T | R | | | | Y | V | | | | | |
| | 14" | 419 | 276 | A | 2 | - | - | T | R | - | - | - | Y | W | | | | | |
| | 8" | 457 | 281 | A | 2 | - | - | T | R | - | - | - | Z | T | | | | | |
| | 10" | 457 | 292 | A | 2 | - | - | T | R | - | - | - | Z | U | | | | | |
| | 12" | 457 | 313 | A | 2 | - | - | T | R | - | - | - | Z | V | | | | | |
| | 14" | 457 | 332 | A | 2 | - | - | T | R | - | - | - | Z | W | | | | | |
| 24" | 16" | 457 | 352 | A | 2 | - | - | T | R | - | - | - | Z | X | | | | | |
| | 18" | 457 | 364 | A | 2 | - | - | T | R | - | - | - | Z | Y | | | | | |
| | 10" | 559 | 380 | A | 2 | - | - | T | R | - | - | - | B | U | | | | | |
| | 12" | 559 | 401 | A | 2 | - | - | T | R | - | - | - | B | V | | | | | |
| | 14" | 559 | 421 | A | 2 | - | - | T | R | - | - | - | B | W | | | | | |
| 16" | 559 | 441 | A | 2 | - | - | T | R | - | - | - | B | X | | | | | | |
| 18" | 559 | 455 | A | 2 | - | - | T | R | - | - | - | B | Y | | | | | | |

* 2 parts construction

Standard construction :

- Type P: fix flanges
- Type W: fix flanges

On request :

- loose flange : C12 = 3

CONCENTRIC & EXCENTRIC REDUCERS



LININGS

VIRGIN PTFE :
NB 1" – NB 24"

ANTI STATIC PTFE, C4 = A :
NB 1" – NB 16"

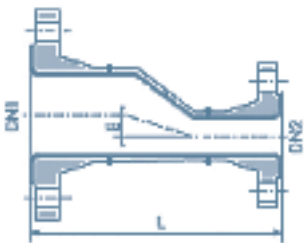
Standard construction :
• Type W : fix flanges

On request :
• 1 fix flange / 1 loose flange, C12 =1

| NB1 | NB2 | L mm | Weight kg | REFERENCE | | | | | | | | | | | | | | | |
|-------|--------|---------|--------------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 1 | 1/2" | 114 | 3.4 | 1.6 | A | 2 | - | - | R | ? | - | - | - | K | H | | | | |
| | 3/4" | 114 | 3.4 | 1.8 | A | 2 | - | - | R | ? | - | - | - | K | J | | | | |
| 1 1/2 | 1/2" | 114 | 10 | 2.3 | A | 2 | - | - | R | ? | - | - | - | M | H | | | | |
| | 3/4" | 114 | 10 | 2.5 | A | 2 | - | - | R | ? | - | - | - | M | J | | | | |
| 2" | 1" | 114 | 7.0 | 2.9 | A | 2 | - | - | R | ? | - | - | - | M | K | | | | |
| | 3/4" | 127 | 4.6 | 3.5 | A | 2 | - | - | R | ? | - | - | - | N | J | | | | |
| 3" | 1" | 127 | 13 | 3.9 | A | 2 | - | - | R | ? | - | - | - | N | K | | | | |
| | 1 1/2" | 127 | 5.7 | 4.6 | A | 2 | - | - | R | ? | - | - | - | N | M | | | | |
| 4" | 1 1/2" | 152 | 20 | 7.2 | A | 2 | - | - | R | ? | - | - | - | P | M | | | | |
| | 2" | 152 | 14 | 8.2 | A | 2 | - | - | R | ? | - | - | - | P | M | | | | |
| 6" | 1 1/2" | 178 | 32 | 9.5 | A | 2 | - | - | R | ? | - | - | - | Q | M | | | | |
| | 2" | 178 | 26 | 10.5 | A | 2 | - | - | R | ? | - | - | - | Q | N | | | | |
| 8" | 3" | 178 | 13 | 13.1 | A | 2 | - | - | R | ? | - | - | - | Q | P | | | | |
| | 3" | 229 | 40 | 17.6 | A | 2 | - | - | R | ? | - | - | - | S | P | | | | |
| 10" | 4" | 229 | 26 | 19.9 | A | 2 | - | - | R | ? | - | - | - | S | Q | | | | |
| | 4" | 279 | 52 | 28.5 | A | 2 | - | - | R | ? | - | - | - | T | Q | | | | |
| 12" | 6" | 279 | 25 | 32.6 | A | 2 | - | - | R | ? | - | - | - | T | S | | | | |
| | 4" | 305 | 76 | 35.7 | A | 2 | - | - | R | ? | - | - | - | U | Q | | | | |
| 14" | 6" | 305 | 52 | 40.0 | A | 2 | - | - | R | ? | - | - | - | U | S | | | | |
| | 8" | 305 | 27 | 47.6 | A | 2 | - | - | R | ? | - | - | - | U | T | | | | |
| 16" | 6" | 356 | 75 | 53.1 | A | 2 | - | - | R | ? | - | - | - | V | S | | | | |
| | 8" | 356 | 51 | 61.2 | A | 2 | - | - | R | ? | - | - | - | V | T | | | | |
| 18" | 10" | 356 | 26 | 67.7 | A | 2 | - | - | R | ? | - | - | - | V | U | | | | |
| | 6" | 406 | 91 | 66.7 | A | 2 | - | - | R | ? | - | - | - | W | S | | | | |
| 20" | 8" | 406 | 67 | 75.3 | A | 2 | - | - | R | ? | - | - | - | W | T | | | | |
| | 10" | 406 | 41 | 82.1 | A | 2 | - | - | R | ? | - | - | - | W | U | | | | |
| 22" | 12" | 406 | 16 | 92.7 | A | 2 | - | - | R | ? | - | - | - | W | V | | | | |
| | 8" | 457 | 92 | 90.4 | A | 2 | - | - | R | ? | - | - | - | X | T | | | | |
| 24" | 10" | 457 | 66 | 97.5 | A | 2 | - | - | R | ? | - | - | - | X | U | | | | |
| | 12" | 457 | 41 | 108 | A | 2 | - | - | R | ? | - | - | - | X | V | | | | |
| 26" | 14" | 457 | 25 | 120 | A | 2 | - | - | R | ? | - | - | - | X | W | | | | |
| | 10" | 483 | 92 | 108 | A | 2 | - | - | R | ? | - | - | - | Y | U | | | | |
| 28" | 12" | 483 | 66 | 118 | A | 2 | - | - | R | ? | - | - | - | Y | V | | | | |
| | 14" | 483 | 51 | 130 | A | 2 | - | - | R | ? | - | - | - | Y | W | | | | |
| 30" | 16" | 483 | 25 | 142 | A | 2 | - | - | R | ? | - | - | - | Y | X | | | | |
| | 12" | 508 | 91 | 139 | A | 2 | - | - | R | ? | - | - | - | Z | V | | | | |
| 32" | 14" | 508 | 76 | 152 | A | 2 | - | - | R | ? | - | - | - | Z | W | | | | |
| | 16" | 508 | 51 | 163 | A | 2 | - | - | R | ? | - | - | - | Z | X | | | | |
| 34" | 18" | 508 | 25 | 172 | A | 2 | - | - | R | ? | - | - | - | Z | Y | | | | |
| | 24" | 610 | 51 | 226 | A | 2 | - | - | R | ? | - | - | - | B | Z | | | | |

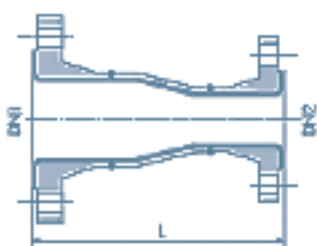
? = C : Concentric Reducer
? = E : Eccentric Reducer

Concentric reducer



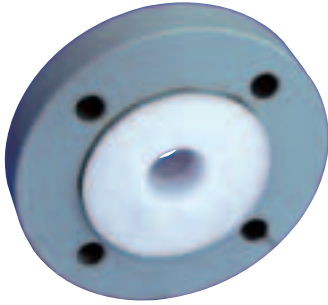
Type W

Eccentric reducer



Type W

REDUCING FLANGES



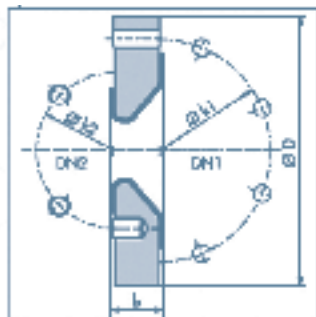
LININGS

VIRGIN PTFE :
NB 3/4" – NB 4"

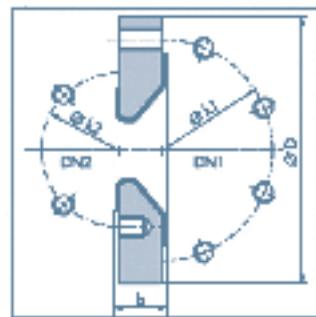
ANTI STATIC PTFE, C4 = A :
NB 3/4" – NB 4"

| NB1 | NB2 | ØD mm | b mm | NB1 | | | NB2 | | | Type | Weight kg | REFERENCE | | | | | | | | | | | | | | | | | |
|--------|--------|-------|------|---------|------------|----|---------|------------|-----|------|-----------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|-----|--|
| | | | | Ø k1 mm | Holes Bolt | | Ø k2 mm | Holes Bolt | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | |
| | | | | | nb | Ø | | UNC | nb | | | | | | | | | | | | | | | | | | | UNC | |
| 3/4" | 1/2"* | 98 | 35 | 69.8 | 4 x | | 1/2" | 60.3 | 4 x | 1/2" | C | 1.9 | A | 2 | - | - | B | R | - | - | - | J | H | | | | | | |
| | 1 | 108 | 35 | 79.4 | 4 x | | 1/2" | 60.3 | 4 x | 1/2" | C | 2.1 | A | 2 | - | - | B | R | - | - | - | K | H | | | | | | |
| 1" | 3/4"* | 108 | 35 | 79.4 | 4 x | | 1/2" | 69.8 | 4 x | 1/2" | C | 2.0 | A | 2 | - | - | B | R | - | - | - | K | J | | | | | | |
| | 1/2" | 127 | 35 | 98.4 | 4 x | | 1/2" | 60.3 | 4 x | 1/2" | B | 4.1 | A | 2 | - | - | B | R | - | - | - | M | H | | | | | | |
| 1 1/2" | 3/4"* | 127 | 35 | 98.4 | 4 x | | 1/2" | 69.8 | 4 x | 1/2" | B | 4.0 | A | 2 | - | - | B | R | - | - | - | M | J | | | | | | |
| | 1" | 127 | 35 | 98.4 | 4 x | | 1/2" | 79.4 | 4 x | 1/2" | B | 3.9 | A | 2 | - | - | B | R | - | - | - | M | K | | | | | | |
| | 1/2" | 152 | 35 | 120.6 | 4 x | | 5/8" | 60.3 | 4 x | 1/2" | B | 4.8 | A | 2 | - | - | B | R | - | - | - | N | H | | | | | | |
| 2" | 3/4" | 152 | 35 | 120.6 | 4 x | | 5/8" | 69.8 | 4 x | 1/2" | B | 4.8 | A | 2 | - | - | B | R | - | - | - | N | J | | | | | | |
| | 1" | 152 | 35 | 120.6 | 4 x | | 5/8" | 79.4 | 4 x | 1/2" | B | 4.7 | A | 2 | - | - | B | R | - | - | - | N | K | | | | | | |
| | 1 1/2" | 152 | 35 | 120.6 | 4 x | | 5/8" | 98.4 | 4 x | 1/2" | C | 4.5 | A | 2 | - | - | B | R | - | - | - | N | M | | | | | | |
| 3" | 1/2" | 190 | 35 | 152.4 | 4 x | 19 | M16 | 60.3 | 4 x | 1/2" | A | 6.7 | A | 2 | - | - | B | R | - | - | - | P | H | | | | | | |
| | 3/4" | 190 | 35 | 152.4 | 4 x | 19 | M16 | 69.8 | 4 x | 1/2" | A | 6.6 | A | 2 | - | - | B | R | - | - | - | P | J | | | | | | |
| | 1" | 190 | 35 | 152.4 | 4 x | | 5/8" | 79.4 | 4 x | 1/2" | B | 6.5 | A | 2 | - | - | B | R | - | - | - | P | K | | | | | | |
| | 1 1/2" | 190 | 35 | 152.4 | 4 x | | 5/8" | 98.4 | 4 x | 1/2" | B | 6.2 | A | 2 | - | - | B | R | - | - | - | P | M | | | | | | |
| | 2" | 190 | 35 | 152.4 | 4 x | | 5/8" | 120.6 | 4 x | 5/8" | C | 6.0 | A | 2 | - | - | B | R | - | - | - | P | N | | | | | | |
| 4" | 1/2" | 229 | 45 | 190.5 | 8 x | 19 | M16 | 60.3 | 4 x | 1/2" | A | 11 | A | 2 | - | - | B | R | - | - | - | Q | H | | | | | | |
| | 3/4" | 229 | 45 | 190.5 | 8 x | 19 | M16 | 69.8 | 4 x | 1/2" | A | 20 | A | 2 | - | - | B | R | - | - | - | Q | J | | | | | | |
| | 1" | 229 | 45 | 190.5 | 8 x | 19 | M16 | 79.4 | 4 x | 1/2" | A | 11 | A | 2 | - | - | B | R | - | - | - | Q | K | | | | | | |
| | 1 1/2" | 229 | 45 | 190.5 | 8 x | 19 | M16 | 98.4 | 4 x | 1/2" | A | 11 | A | 2 | - | - | B | R | - | - | - | Q | M | | | | | | |
| | 2" | 229 | 45 | 190.5 | 8 x | | 5/8" | 120.6 | 4 x | 5/8" | B | 10 | A | 2 | - | - | B | R | - | - | - | Q | N | | | | | | |
| | 3" | 229 | 45 | 190.5 | 8 x | | 5/8" | 152.4 | 4 x | 5/8" | B | 10 | A | 2 | - | - | B | R | - | - | - | Q | P | | | | | | |

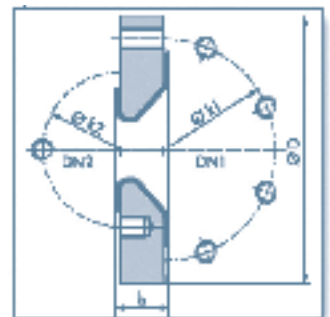
* Cylindrical bore



Tapped hole / through hole Type A



Tapped hole Type B



Tapped holes on center-line/ off center-line Type C

CROSSES



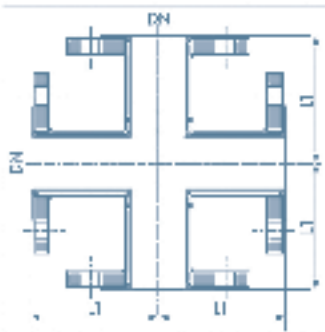
LININGS

VIRGIN PFA :
NB 1/2" – NB 3"

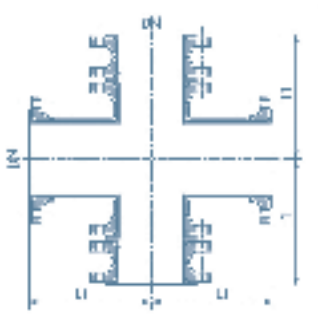
ANTI STATIC PFA :
NB 1/2" – NB 3"

VIRGIN PTFE :
NB 4" – NB 24"

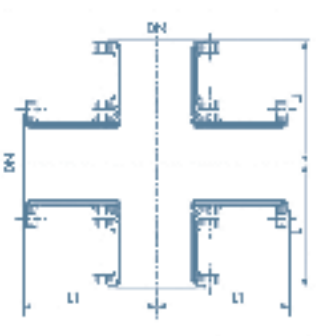
ANTI STATIC PTFE :
NB 4" – NB 16"



Fix flanges
Type P



* Fix flanges
Type W



** Fix flanges
Type P

| NB | L mm | Weight kg | REFERENCE | | | | | | | | | | | | | | | | |
|--------|---------|--------------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|--|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| 1/2" | 65 | 2.1 | A | 2 | - | - | x | E | - | - | - | H | | | | | | | |
| 3/4" | 75 | 2.9 | A | 2 | - | - | x | E | - | - | - | J | | | | | | | |
| 1" | 89 | 4.6 | A | 2 | - | - | x | E | - | - | - | K | | | | | | | |
| 1 1/2" | 102 | 7.8 | A | 2 | - | - | x | E | - | - | - | M | | | | | | | |
| 2" | 114 | 12.1 | A | 2 | - | - | x | E | - | - | - | N | | | | | | | |
| 3" | 140 | 23.6 | A | 2 | - | - | x | E | - | - | - | P | | | | | | | |
| 4" | 165 | 34.2 | A | 2 | - | - | x | E | - | - | - | Q | | | | | | | |
| 6" | 203 | 53.9 | A | 2 | - | - | x | E | - | - | - | S | | | | | | | |
| 8" | 229 | 88.2 | A | 2 | - | - | x | E | - | - | - | T | | | | | | | |
| 10" | 279* | 124 | A | 2 | - | - | x | E | - | - | - | U | | | | | | | |
| 12" | 305* | 169 | A | 2 | - | - | x | E | - | - | - | V | | | | | | | |
| 14" | 356** | 300 | A | 2 | - | - | x | E | - | - | - | W | | | | | | | |
| 16" | 381** | 371 | A | 2 | - | - | x | E | - | - | - | X | | | | | | | |
| 18" | 419** | 427 | A | 2 | - | - | x | E | - | - | - | Y | | | | | | | |
| 20" | 457** | 547 | A | 2 | - | - | x | E | - | - | - | Z | | | | | | | |
| 24" | 559** | 712 | A | 2 | - | - | x | E | - | - | - | B | | | | | | | |

* Assembly only possible using 4 bolts

** In 2 parts

Standard construction :

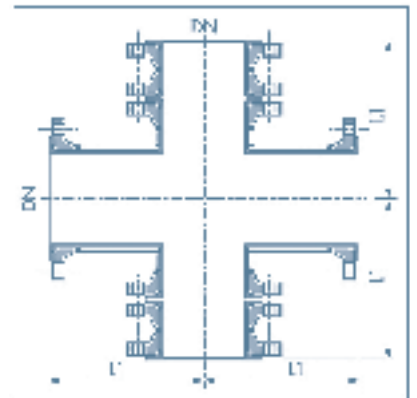
- Type P: NB 1/2" to NB 3" and NB 18" to NB 24"
- Type W : NB 4" to NB 16"

On request :

- 4 loose flanges : C12 = 4

| NB1 | NB2 | L mm | Weight kg | REFERENCE | | | | | | | | | | | | | | | | |
|--------|--------|---------|--------------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|--|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| 3/4" | 1/2" | 75 | 2.0 | A | 2 | - | - | x | R | - | - | - | J | H | | | | | | |
| 1" | 1/2" | 89 | 2.9 | A | 2 | - | - | x | R | - | - | - | K | H | | | | | | |
| | 3/4" | 89 | 3.1 | A | 2 | - | - | x | R | - | - | - | K | J | | | | | | |
| 1 1/2" | 1/2" | 102 | 4.6 | A | 2 | - | - | x | R | - | - | - | M | H | | | | | | |
| | 3/4" | 102 | 4.8 | A | 2 | - | - | x | R | - | - | - | M | J | | | | | | |
| 2" | 1" | 102 | 5.2 | A | 2 | - | - | x | R | - | - | - | M | K | | | | | | |
| | 1/2" | 114 | 6.8 | A | 2 | - | - | x | R | - | - | - | N | H | | | | | | |
| | 3/4" | 114 | 7.0 | A | 2 | - | - | x | R | - | - | - | N | J | | | | | | |
| 3" | 1" | 114 | 7.4 | A | 2 | - | - | x | R | - | - | - | N | K | | | | | | |
| | 1 1/2" | 114 | 8.2 | A | 2 | - | - | x | R | - | - | - | N | M | | | | | | |
| | 1" | 140 | 13.5 | A | 2 | - | - | X | R | - | - | - | P | K | | | | | | |
| 3" | 1 1/2" | 140 | 14.3 | A | 2 | - | - | X | R | - | - | - | P | M | | | | | | |
| | 2" | 140 | 15.4 | A | 2 | - | - | X | R | - | - | - | P | N | | | | | | |
| 4" | 1" | 165 | 19.3 | A | 2 | - | - | X | R | - | - | - | Q | K | | | | | | |
| | 1 1/2" | 165 | 20.2 | A | 2 | - | - | X | R | - | - | - | Q | M | | | | | | |
| | 2" | 165 | 21.2 | A | 2 | - | - | X | R | - | - | - | Q | N | | | | | | |
| 4" | 3" | 165 | 23.9 | A | 2 | - | - | X | R | - | - | - | Q | P | | | | | | |
| | 1" | 203 | 30.8 | A | 2 | - | - | X | R | - | - | - | S | K | | | | | | |
| | 1 1/2" | 203 | 31.7 | A | 2 | - | - | X | R | - | - | - | S | M | | | | | | |
| 6" | 2" | 203 | 32.8 | A | 2 | - | - | X | R | - | - | - | S | N | | | | | | |
| | 3" | 203 | 35.6 | A | 2 | - | - | X | R | - | - | - | S | P | | | | | | |
| | 4" | 203 | 37.9 | A | 2 | - | - | X | R | - | - | - | S | Q | | | | | | |
| 8" | 1" | 229 | 50.7 | A | 2 | - | - | X | R | - | - | - | T | K | | | | | | |
| | 1 1/2" | 229 | 51.6 | A | 2 | - | - | X | R | - | - | - | T | M | | | | | | |
| | 2" | 229 | 52.7 | A | 2 | - | - | X | R | - | - | - | T | N | | | | | | |
| | 3" | 229 | 55.5 | A | 2 | - | - | X | R | - | - | - | T | P | | | | | | |
| | 4" | 229 | 57.8 | A | 2 | - | - | X | R | - | - | - | T | Q | | | | | | |
| 10" | 6" | 229 | 61.7 | A | 2 | - | - | X | R | - | - | - | T | S | | | | | | |
| | 4" | 279 | 78.8 | A | 2 | - | - | X | R | - | - | - | U | Q | | | | | | |
| | 6" | 279* | 83.0 | A | 2 | - | - | X | R | - | - | - | U | S | | | | | | |
| | 8" | 279* | 90.6 | A | 2 | - | - | X | R | - | - | - | U | T | | | | | | |
| | 4" | 305* | 104 | A | 2 | - | - | X | R | - | - | - | V | Q | | | | | | |
| 12" | 6" | 305* | 108 | A | 2 | - | - | X | R | - | - | - | V | S | | | | | | |
| | 8" | 305* | 115 | A | 2 | - | - | X | R | - | - | - | V | T | | | | | | |
| | 10" | 305* | 122 | A | 2 | - | - | X | R | - | - | - | V | U | | | | | | |
| 14" | 4" | 356* | 145 | A | 2 | - | - | X | R | - | - | - | W | Q | | | | | | |
| | 6" | 356* | 152 | A | 2 | - | - | X | R | - | - | - | W | S | | | | | | |
| | 8" | 356* | 165 | A | 2 | - | - | X | R | - | - | - | W | T | | | | | | |
| | 10" | 356* | 176 | A | 2 | - | - | X | R | - | - | - | W | U | | | | | | |
| | 12" | 356* | 197 | A | 2 | - | - | X | R | - | - | - | W | V | | | | | | |
| 16" | 4" | 381 | 177 | A | 2 | - | - | X | R | - | - | - | X | Q | | | | | | |
| | 6" | 381 | 183 | A | 2 | - | - | X | R | - | - | - | X | S | | | | | | |
| | 8" | 381 | 196 | A | 2 | - | - | X | R | - | - | - | X | T | | | | | | |
| | 10" | 381 | 207 | A | 2 | - | - | X | R | - | - | - | X | U | | | | | | |
| | 12" | 381 | 228 | A | 2 | - | - | X | R | - | - | - | X | V | | | | | | |
| 18" | 14" | 381 | 246 | A | 2 | - | - | X | R | - | - | - | X | W | | | | | | |
| | 8" | 419 | 225 | A | 2 | - | - | X | R | - | - | - | Y | T | | | | | | |
| | 10" | 419 | 236 | A | 2 | - | - | X | R | - | - | - | Y | U | | | | | | |
| | 12" | 419 | 257 | A | 2 | - | - | X | R | - | - | - | Y | V | | | | | | |
| | 14" | 419 | 276 | A | 2 | - | - | X | R | - | - | - | Y | W | | | | | | |
| 20" | 8" | 457 | 281 | A | 2 | - | - | X | R | - | - | - | Z | T | | | | | | |
| | 10" | 457 | 292 | A | 2 | - | - | X | R | - | - | - | Z | U | | | | | | |
| | 12" | 457 | 313 | A | 2 | - | - | X | R | - | - | - | Z | V | | | | | | |
| | 14" | 457 | 332 | A | 2 | - | - | X | R | - | - | - | Z | W | | | | | | |
| | 16" | 457 | 352 | A | 2 | - | - | X | R | - | - | - | Z | X | | | | | | |
| 24" | 18" | 457 | 364 | A | 2 | - | - | X | R | - | - | - | Z | Y | | | | | | |
| | 10" | 559 | 380 | A | 2 | - | - | X | R | - | - | - | B | U | | | | | | |
| | 12" | 559 | 401 | A | 2 | - | - | X | R | - | - | - | B | V | | | | | | |
| | 14" | 559 | 421 | A | 2 | - | - | X | R | - | - | - | B | W | | | | | | |
| | 16" | 559 | 441 | A | 2 | - | - | X | R | - | - | - | B | X | | | | | | |
| 24" | 18" | 559 | 455 | A | 2 | - | - | X | R | - | - | - | B | Y | | | | | | |
| | 20" | 559 | 487 | A | 2 | - | - | X | R | - | - | - | B | Z | | | | | | |

REDUCING CROSSES



Fix flanges Type P

LININGS

VIRGIN PFA :
NB 3/4"– NB 3"

ANTI STATIC PFA, C4 = A :
NB 3/4"– NB 3"

VIRGIN PTFE :
NB 4"– NB 24"

ANTI STATIC PTFE, C4 = A :
NB 4"– NB 16"

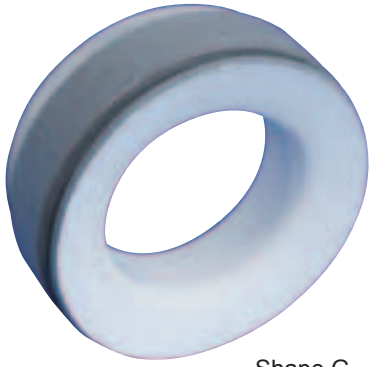
Standard construction :

- Type P : fix flanges

On request :

- 4 loose flanges :
C12 = 4

SPACERS



Shape G

LININGS

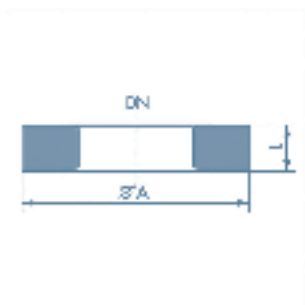
VIRGIN PTFE :
NB 1/2" – NB 24"

ANTI STATIC PTFE, C4 =A :
NB 1/2" – NB 16"

| NB | ØA | F | | G(mm) | | H(mm) | | REFERENCE | | | | | | | | | | | | | | | | |
|--------|------|------|------|-------|------|-------|------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|--|
| | mm | Lmax | Lmax | Lmax | Lmax | Lmax | Lmax | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| 1/2" | 42.0 | 20 | 15 | 50 | 50 | 90 | 90 | A | 2 | - | - | ? | - | x | x | x | H | | | | | | | |
| 3/4" | 52.0 | 20 | 15 | 50 | 50 | 90 | 90 | A | 2 | - | - | ? | - | x | x | x | J | | | | | | | |
| 1" | 66.5 | 20 | 15 | 50 | 50 | 90 | 90 | A | 2 | - | - | ? | - | x | x | x | K | | | | | | | |
| 1 1/2" | 85.5 | 20 | 15 | 60 | 60 | 110 | 110 | A | 2 | - | - | ? | - | x | x | x | M | | | | | | | |
| 2" | 105 | 20 | 15 | 60 | 60 | 120 | 120 | A | 2 | - | - | ? | - | x | x | x | N | | | | | | | |
| 3" | 136 | 20 | 15 | 60 | 60 | 140 | 140 | A | 2 | - | - | ? | - | x | x | x | P | | | | | | | |
| 4" | 174 | 20 | 15 | 60 | 60 | 150 | 150 | A | 2 | - | - | ? | - | x | x | x | Q | | | | | | | |
| 6" | 222 | 20 | 15 | 60 | 60 | 160 | 160 | A | 2 | - | - | ? | - | x | x | x | S | | | | | | | |
| 8" | 279 | 20 | 20 | 70 | 60 | 180 | 180 | A | 2 | - | - | ? | - | x | x | x | T | | | | | | | |
| 10" | 339 | 20 | 20 | 70 | 60 | 210 | 210 | A | 2 | - | - | ? | - | x | x | x | U | | | | | | | |
| 12" | 409 | 20 | 20 | 70 | 60 | 230 | 230 | A | 2 | - | - | ? | - | x | x | x | V | | | | | | | |
| 14" | 451 | 20 | 20 | 70 | 70 | 230 | 230 | A | 2 | - | - | ? | - | x | x | x | W | | | | | | | |
| 16" | 510 | 20 | 20 | 80 | 70 | 260 | 260 | A | 2 | - | - | ? | - | x | x | x | X | | | | | | | |
| 18" | 549 | 20 | 20 | 80 | 70 | 270 | 270 | A | 2 | - | - | ? | - | x | x | x | Y | | | | | | | |
| 20" | 590 | 20 | 20 | 80 | 70 | 280 | 280 | A | 2 | - | - | ? | - | x | x | x | Z | | | | | | | |
| 24" | 717 | 20 | 20 | 80 | 80 | 300 | 300 | A | 2 | - | - | ? | - | x | x | x | B | | | | | | | |

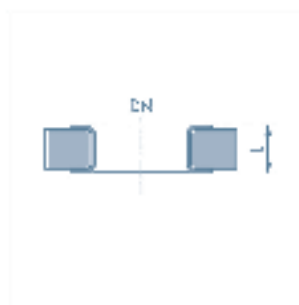
? = F : Spacers share F (PTFE massif)
 ? = G : Spacers share G (rondelle revêtue)
 ? = E : Spacers share H (tube revêtue)
 xxxx : Length in mm

Massive PTFE spacer



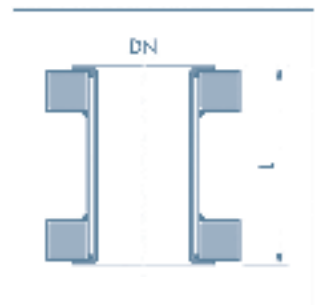
Shape F

Steel lined spacer



Shape G

Tube lined spacer



Shape H

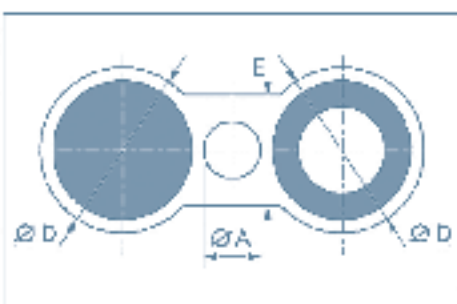
LININGS

VIRGIN PTFE :
NB 1/2" – NB 24"

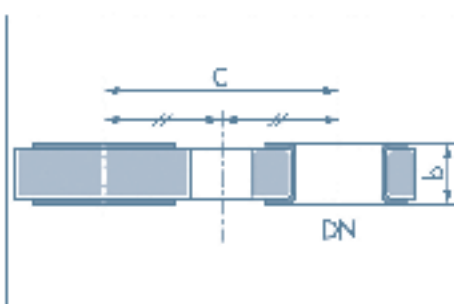
ANTI STATIC PTFE, C4 = A :
NB 1/2" – NB 16"

| NB | ØD | C | E | ØA | b | Weight kg | REFERENCE | | | | | | | | | | | | | | | | |
|--------|-----|-----|----|----|----|--------------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|--|
| | mm | mm | mm | mm | mm | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| 1/2" | 44 | 60 | 35 | 16 | 14 | 0.2 | A | 2 | - | - | O | B | - | - | - | H | | | | | | | |
| 3/4" | 53 | 70 | 35 | 16 | 14 | 0.2 | A | 2 | - | - | O | B | - | - | - | J | | | | | | | |
| 1" | 63 | 78 | 35 | 16 | 14 | 0.3 | A | 2 | - | - | O | B | - | - | - | K | | | | | | | |
| 1 1/2" | 82 | 98 | 50 | 19 | 14 | 0.4 | A | 2 | - | - | O | B | - | - | - | M | | | | | | | |
| 2" | 101 | 121 | 50 | 19 | 14 | 0.6 | A | 2 | - | - | O | B | - | - | - | N | | | | | | | |
| 3" | 133 | 152 | 60 | 19 | 14 | 0.9 | A | 2 | - | - | O | B | - | - | - | P | | | | | | | |
| 4" | 171 | 191 | 50 | 22 | 18 | 1.6 | A | 2 | - | - | O | B | - | - | - | Q | | | | | | | |
| 6" | 219 | 241 | 60 | 22 | 18 | 3.7 | A | 2 | - | - | O | B | - | - | - | S | | | | | | | |
| 8" | 276 | 298 | 70 | 26 | 21 | 5.6 | A | 2 | - | - | O | B | - | - | - | T | | | | | | | |
| 10" | 336 | 362 | 65 | 26 | 21 | 10.7 | A | 2 | - | - | O | B | - | - | - | U | | | | | | | |
| 12" | 406 | 432 | 70 | 29 | 23 | 15.5 | A | 2 | - | - | O | B | - | - | - | V | | | | | | | |
| 14" | 441 | 476 | 70 | 29 | 26 | 27.2 | A | 2 | - | - | O | B | - | - | - | W | | | | | | | |
| 16" | 505 | 540 | 70 | 29 | 28 | 34.8 | A | 2 | - | - | O | B | - | - | - | X | | | | | | | |
| 18" | 540 | 578 | 70 | 32 | 28 | 49.9 | A | 2 | - | - | O | B | - | - | - | Y | | | | | | | |
| 20" | 597 | 635 | 65 | 32 | 33 | 55.1 | A | 2 | - | - | O | B | - | - | - | Z | | | | | | | |
| 24" | 708 | 750 | 70 | 35 | 39 | 73.7 | A | 2 | - | - | O | B | - | - | - | B | | | | | | | |

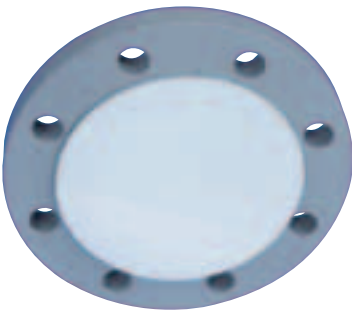
Spectacle blind (front view)



Spectacle blind (sectional view)



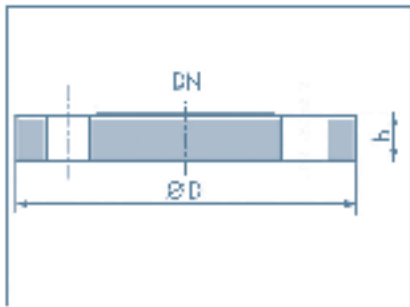
BLIND FLANGES



LININGS

VIRGIN PTFE :
NB 1/2" – NB 24"

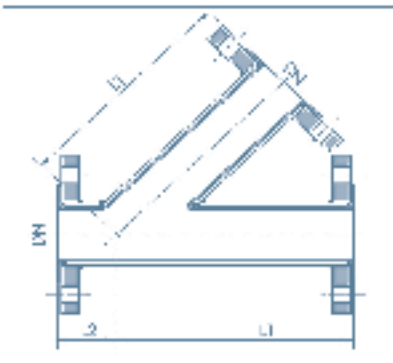
ANTI STATIC, C4 = A :
NB 1/2" – NB 16"



| NB | ØD mm | b mm | Weight kg | REFERENCE | | | | | | | | | | | | | | | |
|--------|----------|---------|--------------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 1/2" | 89 | 14 | 0.3 | A | 2 | - | - | B | P | - | - | - | H | | | | | | |
| 3/4" | 98 | 16 | 0.5 | A | 2 | - | - | B | P | - | - | - | J | | | | | | |
| 1" | 108 | 17 | 0.9 | A | 2 | - | - | B | P | - | - | - | K | | | | | | |
| 1 1/2" | 127 | 18 | 1.3 | A | 2 | - | - | B | P | - | - | - | M | | | | | | |
| 2" | 152 | 22 | 2.4 | A | 2 | - | - | B | P | - | - | - | N | | | | | | |
| 3" | 190 | 27 | 4.9 | A | 2 | - | - | B | P | - | - | - | P | | | | | | |
| 4" | 229 | 27 | 6.9 | A | 2 | - | - | B | P | - | - | - | Q | | | | | | |
| 6" | 279 | 28 | 11 | A | 2 | - | - | B | P | - | - | - | S | | | | | | |
| 8" | 343 | 32 | 19 | A | 2 | - | - | B | P | - | - | - | T | | | | | | |
| 10" | 406 | 34 | 28 | A | 2 | - | - | B | P | - | - | - | U | | | | | | |
| 12" | 482 | 36 | 45 | A | 2 | - | - | B | P | - | - | - | V | | | | | | |
| 14" | 533 | 39 | 58 | A | 2 | - | - | B | P | - | - | - | W | | | | | | |
| 16" | 597 | 40 | 76 | A | 2 | - | - | B | P | - | - | - | X | | | | | | |
| 18" | 635 | 44 | 92 | A | 2 | - | - | B | P | - | - | - | Y | | | | | | |
| 20" | 698 | 47 | 119 | A | 2 | - | - | B | P | - | - | - | Z | | | | | | |
| 24" | 813 | 52 | 181 | A | 2 | - | - | B | P | - | - | - | B | | | | | | |

LATERAL TEES

Lateral tees Type P



LININGS

VIRGIN PFA :
NB 1" – NB 4"

ANTI STATIC PFA, C4 = A :
NB 1" – NB 4"

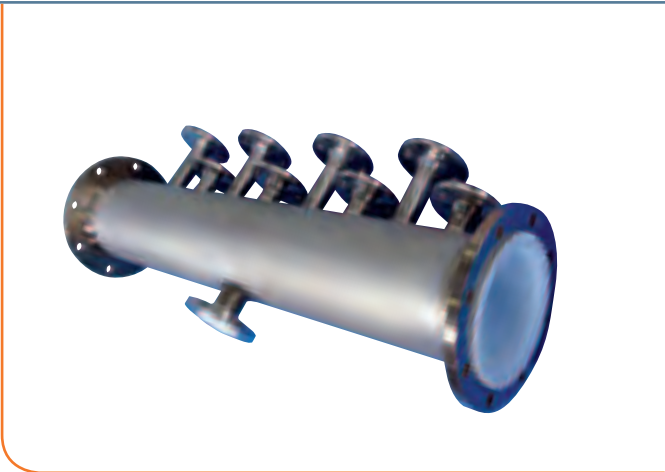
VIRGIN PTFE :
NB 6" to NB 8"

ANTI STATIC PTFE, C4 = A :
NB 6" to NB 8"

Standard construction :
• Type P : fix flanges

| NB | L1 mm | L2 mm | Weight kg | REFERENCE | | | | | | | | | | | | | | | |
|--------|----------|----------|--------------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 1" | 146 | 44 | 3.7 | A | 2 | - | - | T | L | - | - | - | K | | | | | | |
| 1 1/2" | 178 | 51 | 6.5 | A | 2 | - | - | T | L | - | - | - | M | | | | | | |
| 2" | 203 | 64 | 10 | A | 2 | - | - | T | L | - | - | - | N | | | | | | |
| 3" | 254 | 76 | 21 | A | 2 | - | - | T | L | - | - | - | P | | | | | | |
| 4" | 305 | 76 | 31 | A | 2 | - | - | T | L | - | - | - | Q | | | | | | |
| 6" | 368 | 89 | 52 | A | 2 | - | - | T | L | - | - | - | S | | | | | | |
| 8" | 445 | 114 | 91 | A | 2 | - | - | T | L | - | - | - | T | | | | | | |

| NB1 | NB2 | H mm | L 1 mm |
|--------|--------|------|--------|
| 1 | 1" | 89 | 89 |
| 1" 1/2 | 1" | 102 | 102 |
| | 1 1/2" | 102 | 102 |
| 2" | 1" | 114 | 114 |
| | 2" | 114 | 114 |
| | 3" | 114 | 114 |
| 3" | 1" | 140 | 140 |
| | 1 1/2" | 140 | 140 |
| | 2" | 140 | 140 |
| | 3" | 140 | 140 |
| 4" | 1" | 165 | 165 |
| | 1 1/2" | 165 | 165 |
| | 2" | 165 | 165 |
| | 3" | 165 | 165 |
| | 4" | 165 | 165 |
| 6" | 1" | 203 | 203 |
| | 1 1/2" | 203 | 203 |
| | 2" | 203 | 203 |
| | 3" | 203 | 203 |
| | 4" | 203 | 203 |
| | 6" | 203 | 203 |
| 8" | 1 1/2" | 229 | 229 |
| | 2" | 229 | 229 |
| | 3" | 229 | 229 |
| | 4" | 229 | 229 |
| | 6" | 229 | 229 |
| | 8" | 229 | 229 |
| 10" | 1 1/2" | 279 | 279 |
| | 2" | 279 | 279 |
| | 3" | 279 | 279 |
| | 4" | 279 | 279 |
| | 6" | 279 | 279 |
| | 8" | 279 | 279 |
| 12" | 3" | 305 | 305 |
| | 4" | 305 | 305 |
| | 6" | 305 | 305 |
| | 8" | 305 | 305 |
| | 10" | 305 | 305 |
| | 12" | 305 | 305 |

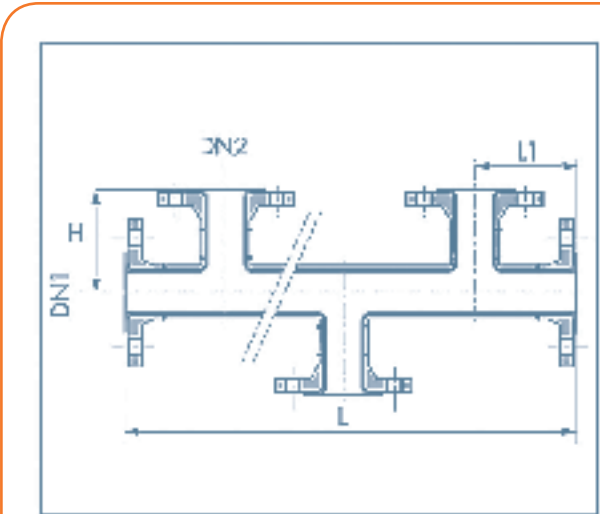


LININGS

- VIRGIN PTFE :**
NB 1" – NB 12"
- ANTI STATIC PTFE :**
NB 1" – NB 12"

DRAWING ABOVE IS SHOWN AS AN EXEMPLE

Other manifolds configurations on request
number, DN and nozzles inclination
L max : 1.5 meter



Fix flanges manifolds Type W

ANSI 300 LBS FLANGES & SPOOLS

LININGS

VIRGIN PTFE : NB 1" – NB 4"

ANTI STATIC PTFE / PFA, C4 = A :
NB 1/2" – NB 4"

| NB | FLANGES | | | | | | | | | | | SPOOLS | | |
|--------|---------|-------|-----|-----|-------|------|------|----|-------|---------|------|--------|----------|-----------------|
| | D | dx | dy | dz | k | b1 | b2 | b3 | holes | bolting | L | Weight | Weight | |
| | mm | mm | mm | mm | mm | mm | mm | mm | nb | ø | UNC | min | kg/metre | kg/pair flanges |
| 1/2" | 95 | 31,8 | 36 | 42 | 66,7 | 14,3 | 12,7 | 12 | 4 | 16 | 1/2 | 100 | 2,1 | 1,7 |
| 3/4" | 117 | 39,7 | 42 | 52 | 82,5 | 15,9 | 14,3 | 14 | 4 | 19 | 5/8 | 110 | 2,1 | 2,7 |
| 1" | 124 | 47,6 | 51 | 60 | 88,9 | 17,5 | 15,9 | 14 | 4 | 19 | 5/8 | 115 | 2,5 | 3,3 |
| 1 1/2" | 156 | 68,3 | 72 | 73 | 114,3 | 20,6 | 19,6 | 14 | 4 | 23 | 3/4 | 120 | 5,0 | 5,9 |
| 2" | 165 | 87,3 | 90 | 92 | 127,0 | 22,2 | 20,6 | 16 | 8 | 19 | 5/8 | 140 | 6,7 | 7,0 |
| 3" | 210 | 117,5 | 125 | 127 | 168,3 | 28,6 | 27,0 | 18 | 8 | 23 | 3/4 | 170 | 13,7 | 13,8 |
| 4" | 254 | 150,8 | 155 | 157 | 200,0 | 31,7 | 30,1 | 20 | 8 | 23 | 3/4 | 200 | 19,2 | 21,5 |
| 6" | 318 | 203,2 | 210 | 216 | 269,9 | 36,5 | 34,9 | 22 | 12 | 23 | 3/4 | 210 | 34,1 | 35,3 |
| 8" | 381 | 255,6 | 262 | 270 | 330,2 | 41,3 | 39,7 | 26 | 12 | 26 | 7/8 | 230 | 52,9 | 52,9 |
| 10" | 445 | 311,2 | 320 | 324 | 387,3 | 47,6 | 46,0 | 30 | 16 | 29 | 1 | 250 | 63,9 | 77,4 |
| 12" | 520 | 365,1 | 370 | 381 | 450,8 | 50,8 | 49,2 | 34 | 16 | 32 | 11/8 | 280 | 65,5 | 110,0 |
| 14" | 585 | 393,7 | 416 | 413 | 514,3 | 54,0 | 52,4 | 36 | 20 | 32 | 11/8 | 280 | 85,3 | 150,0 |
| 16" | 650 | 450,9 | | 470 | 571,5 | 57,1 | 55,5 | 42 | 20 | 35 | 11/4 | 300 | 97,9 | 191,0 |
| 18" | 710 | 514,4 | | 533 | 628,6 | 60,3 | 58,7 | 46 | 24 | 35 | 11/4 | 330 | 110,0 | 232,0 |
| 20" | 775 | 565,2 | | 584 | 685,8 | 63,5 | 61,9 | 50 | 24 | 35 | 11/4 | 350 | 132,0 | 280,0 |
| 24" | 915 | 666,8 | | 692 | 812,8 | 69,8 | 68,2 | 54 | 24 | 42 | 11/2 | 400 | 161,0 | 406,0 |

ANSI 300 LBS FITTINGS

For fittings, ANSI 300 lbs linings are not identical to 150 lbs parts and standard construction. Please pay attention for instrument tees, L is given for a 1" nozzle.

| NB | 90° Elbow | | 45° Elbow | | Tee | | Reducer | | Inst. Tee | |
|------|-----------|--------|-----------|--------|--------|--------|---------|--------|-----------|--------|
| | L (mm) | W (kg) | L (mm) | W (kg) | L (mm) | W (kg) | L (mm) | W (kg) | L (mm) | H (mm) |
| 1/2" | 102 | 3,5 | 57 | 3,3 | 102 | 5,3 | 114 | 3 | 50 | 102 |
| 1" | 114 | 6,6 | 70 | 6,1 | 114 | 10,2 | 114 | 4,8 | 50 | 114 |
| 2" | 127 | 7,9 | 76 | 7,2 | 127 | 12,2 | 127 | 6,9 | 50 | 127 |
| 3" | 151 | 16,2 | 89 | 14 | 152 | 25,2 | 152 | 11,3 | 50 | 152 |
| 4" | 178 | 25,7 | 114 | 23 | 178 | 39,8 | 178 | 19,6 | 50 | 178 |
| 6" | 216 | 44,8 | 140 | 39,1 | 216 | 69,4 | 229 | 32,9 | 50 | 216 |
| 8" | 254 | 71 | 151 | 60,4 | 254 | 110 | 279 | 53,7 | 50 | 254 |
| 10" | 292 | 103 | 178 | 87,9 | 292 | 158 | 305 | 79,4 | 50 | 292 |
| 12" | 330 | 138 | 203 | 121 | 330 | 211 | 356 | 112 | 50 | 330 |
| 14" | 381 | 195 | 216 | 169 | 381 | 370 | 107 | 155 | 50 | 381 |
| 16" | 419 | 247 | 241 | 215 | 419 | 469 | 457 | 205 | 50 | 419 |
| 18" | **700 | 342 | 298 | 281 | 457 | 568 | 482 | 252 | 50 | 457 |
| 20" | **810 | 971 | *343 | 615 | 495 | 700 | 508 | 306 | 50 | 495 |
| 24" | **974 | 1384 | *412 | 877 | 571 | 987 | 610 | 413 | *100 | 571 |

* 2 parts construction
** 3 parts construction

ENTRY PIPES

LININGS

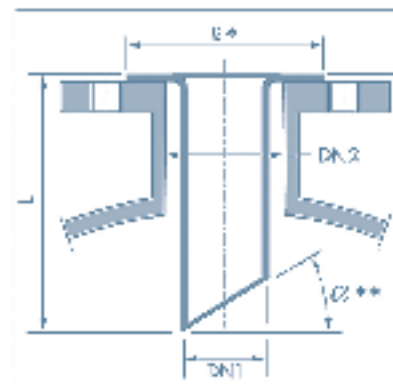
VIRGIN PTFE :
NB 3/4" – NB 20"

ANTI STATIC PTFE, C4 = A :
NB 3/4" – NB 16"

| NB1 | NB2 | Lmax mm | REFERENCE | | | | | | | | | | | | | | | |
|--------|--------|------------|-----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 3/4" | 1" | 3000 | A | 2 | - | - | N | x | x | x | x | J | | | | | | |
| 1" | 1 1/4" | 3000 | A | 2 | - | - | N | x | x | x | x | K | | | | | | |
| 1 1/2" | 2" | 3000 | A | 2 | - | - | N | x | x | x | x | M | | | | | | |
| 2" | 3" | 3000 | A | 2 | - | - | N | x | x | x | x | N | | | | | | |
| 3" | 4" | 3000 | A | 2 | - | - | N | x | x | x | x | P | | | | | | |
| 4" | 5" | 3000 | A | 2 | - | - | N | x | x | x | x | Q | | | | | | |
| 6" | 8" | 3000 | A | 2 | - | - | N | x | x | x | x | S | | | | | | |
| 8" | 10" | 3000 | A | 2 | - | - | N | x | x | x | x | T | | | | | | |
| 10" | 12" | 3000 | A | 2 | - | - | N | x | x | x | x | U | | | | | | |
| 12" | 14" | 3000 | A | 2 | - | - | N | x | x | x | x | V | | | | | | |
| 14" | 16" | 3000 | A | 2 | - | - | N | x | x | x | x | W | | | | | | |
| 16" | 18" | 2000 | A | 2 | - | - | N | x | x | x | x | X | | | | | | |
| 18" | 20" | 2000 | A | 2 | - | - | N | x | x | x | x | Y | | | | | | |
| 20" | 24" | 1500 | A | 2 | - | - | N | x | x | x | x | Z | | | | | | |

xxxx : length in mmm

Type A



* Collar G diameter in accordance with NB2
**α : different angles possible on requested

DIP PIPES

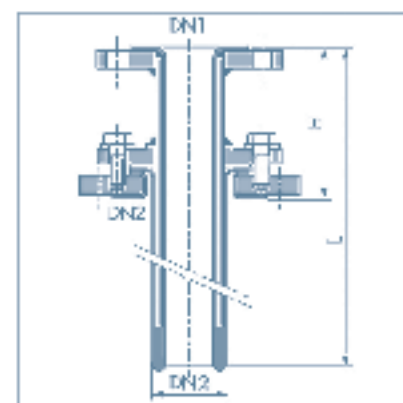
| NB1 | NB2 mini | H mm | L max mm |
|--------|----------|------|----------|
| 1/2" | 1 1/2" | 140 | 3000 |
| 3/4" | 1 1/2" | 140 | 3000 |
| 1" | 2" | 160 | 3000 |
| 1 1/2" | 3" | 170 | 3000 |
| 2" | 3" | 180 | 3000 |
| 3" | 4" | 190 | 3000 |
| 4" | 6" | 200 | 3000 |
| 6" | 8" | 200 | 3000 |

Other special dip pipes are available on request.

LININGS

VIRGIN PTFE :
NB 1/2" – NB 6"



ANTI STATIC PTFE, C4 = A :
NB 1/2" – NB 6"



Type B

WORLDWIDE INDUSTRIAL WORKSHOP



-  Main production sites
-  Quick service shops

| | |
|--|---|
| <p>A worldwide specialist in anticorrosion and process equipment</p> | <p>Mersen France Pagny-sur-Moselle > 36,000 m² > All equipment. All materials Research and development center</p> |
| <p>Mersen France Brignais > 8,000 m² > Specialist in welded plate heat exchangers and mixers</p> | <p>Mersen France Grésy > 8,000 m² > Specialist in equipment for the nuclear industry</p> |
| <p>Mersen UK Teesside > 5,600 m² > The graphite cubic heat exchangers specialist</p> | <p>Mersen Deutschland Linsengericht > 3,000 m² > Tantalum equipment Center</p> |
| <p>Mersen India Chennai > 2,600 m² > Graphite heat exchangers, systems</p> | <p>Mersen Maroc El Jadida > 2,500 m² > Asseblly and repair shop</p> |
| <p>Mersen USA Salem > 6,690 m² > All equipment All materials</p> | <p>Mersen USA Oxnard > 6,600 m² > Specialist in reactive metals equipment</p> |
| <p>Nippon Carbon Mersen > Distribution and repair shop</p> | <p>Mersen Xianda Shanghai-Fengxian > 150,000 m² > All equipment All materials Pressure vessels expertise center</p> |



A worldwide specialist in anticorrosion and process equipment

A GLOBAL PLAYER

Global expert in materials and equipment for extreme environments and in the safety and reliability of electrical equipment.

Mersen designs innovative solutions to address its client's specific needs to enable them to optimize their manufacturing process in sectors such as Energy, Transportation, Electronics, Chemicals, Pharmaceuticals and Process Industries.

The information contained in this catalogue are given purely indicative and cannot engage liability of Mersen.

Any copy, reproduction or translation, fully or in part, is prohibited without the written consent of Mersen

Mersen France Pagny
 1, rue Jules Ferry – 54530 Pagny-sur-Moselle
 Tel. +33 ((0)3 83 81 60 81

www.mersen.com