



Automated PFA Moulding



Paste Extrusion PTFE Facility



Van Stone Pipe Spool Manufacture



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## Quality System

Corrosion Resistant Products is an ISO 9001:2015 approved company. Originally accredited to BS5750 Part 1 in 1992, CRP maintains this accreditation through a process of continuous third party surveillance with, six monthly, annual and triennial audits taking place. All of the company's manufacturing and test procedures fall within this regime.

## Design and Test Standards

Products are all manufactured and tested to national and international standards where applicable, with fundamental design qualification having been undertaken via the approval process required to comply with the Pressure Equipment Directive 2014/68/EU.

|                        |   |
|------------------------|---|
| Qualification Testing: | To EDSPIP 53.01C and ASTM F423/ASTM F1545.  |
| Rating:                | Full vacuum up to PN 10/16 pressure rating at 200°C for sizes up to and including 200NB.                                  |
| Terminations:          | Fixed flanges fitted off centres.   |
| Dimensions:            | Fitting centreline to face and face to face dimensions are in accordance with those laid down in DIN 2848 where relevant. |

## Product Traceability

All CRP manufactured Lined Pipe & Fittings are backwards traceable from the finished component to the manufacturing tests, processes and lining materials. Each spool has one flange stamped with the reference of the liner batch used in its construction. This provides traceability back to the liner manufacture, the tests undertaken and the materials certification of the polymer. PFA moulded items likewise are stamped with a mould reference which again provide traceability back to the manufacturing and test activities and the material certification of the polymers used.



## Product Origin

All Corrosion Resistant Products (CRP) manufactured products are produced in Rochdale near Manchester, England or produced locally by authorised international distributors using CRP liner in accordance with CRP manufacturing and quality assurance procedures. This both clearly establishes the origin and gives a commonality of manufacturing methods and materials – providing consistency of product standards through materials supplied.



## Common Product Standards

All PTFE pipe spools are manufactured using in-house produced PTFE paste extruded liner, whilst PFA lined fittings use virgin material.

All products are painted with a corrosion resistant two component low VOC, high solids fast curing epoxy primer/finish containing zinc phosphate anti-corrosive pigmentation. Colour RAL 5015 Blue Semi-Gloss. Typical thickness 60 microns.

All products (except type 1 spacers) include suitable venting within the metal structure of the item. Typically one or more 5mm diameter holes in spools and PTFE lined fittings, and the injection boss of PFA moulded fittings.

When Vent Extensions are required, a 10mm high G 1/4 internally threaded boss is welded to pipe spools. For moulded fittings the injection boss is drilled and tapped with an appropriate female taper thread. A 65mm long vent extension is then supplied to fit to this, to provide a standard 75mm vent extension.

## Special requirements

As part of the supply CRP can provide alternative special paint finishes, stainless steel spools & fittings, BS or ASME flanges, the use of static dissipating polymers, special low temperature service requirements, non-standard face to face dimensions, rotating flanges and the creation of special components for the reduction of flanges or to assist in tight access areas.

## Product Identification and Packaging

All CE marked product is identified with a UV resistant, high temperature, nylon cable tie, providing manufacturers details, location and notified body CE registration number.

Additionally, product is marked in indelible marker with details of the sales order and line item for easy cross-reference to the delivery documentation and for project activity; tape colour coding is used for identifying specific isometric drawing content.



Pipe spools are finished with protective water resistant MDF end boards using BZP Roofing Bolts. PFA lined products are protected with a polyethylene end cap.



## Product Certification

Standard product certification comprises a certificate of compliance and test to EN10204 type 2.2, confirming that the products supplied meet the relevant specifications, that fluoropolymers meet the requirements of the FDA regulation reference 21 CFR 177.1550 and details of the product tests undergone.

Project documentation – to customer specification. The following documentation can be supplied as evidence of quality control: Quality Plan, Product Drawings, Weld Procedures, Welder Qualifications, NDT Procedures, NDT Operator Qualification, Material Certification (2.2 or 3.1) and CRP Certificate of Conformance.

## Testing

- All virgin PTFE/PFA lined products are subject to an electrostatic spark test at 25kV. All pipe spools and certain fittings are also subject to Hydrotest at 24 bar(g) for three minutes, followed by a relaxation dwell to atmospheric pressure and a repeat.
- All spools and fittings lined in static dissipating PTFE/PFA are subject to Hydrotest at 24 bar(g) for three minutes, followed by a relaxation dwell to atmospheric pressure and a repeat.
- All spools and fittings are visually examined, particularly the flare faces, to ensure that there are no defects that would prevent the item sealing against adjacent items.
- The mechanical properties and the specific gravity of representative samples of PTFE liner, selected from each sinter batch, are tested

## PTFE and PFA Specifications

### Liner Type

| Liner Type                             | Specification | Properties   |
|--|---------------|--|
| Virgin PTFE Paste Extruded             | ASTM D4895    | Minimum Tensile Strength: 26 MPa<br>Minimum Elongation at Break: 275%<br>Specific Gravity: 2.14 – 2.20 (when tested to ASTM D792 or D1505)   |
| Static Dissipating PTFE Paste Extruded | ASTM D4895    | Minimum Tensile Strength: 26 MPa<br>Minimum Elongation at Break: 275%<br>Specific Gravity: 2.14 – 2.17 (when tested to ASTM D792 or D1505)<br>Volume Resistivity: $<10^7 \Omega \cdot \text{cm}$   |
| Virgin PFA                             | ASTM D3307    | Minimum Tensile Strength: 21 MPa<br>Minimum Elongation at Break: 300%<br>Specific Gravity: 2.12 – 2.16 (when tested to ASTM D792 or D1505)<br>Melt Flow Rate: 1-2.5g/10mins (when tested to ASTM D3307 at 372°C)   |
| Static Dissipating PFA                 | ASTM D3307    | Minimum Tensile Strength: 21 MPa<br>Minimum Elongation at Break: 300%<br>Specific Gravity: 2.11 – 2.16 (when tested to ASTM D792 or D1505)<br>Melt Flow Rate: 1-2.5g/10mins (when tested to ASTM D3307 at 372°C)<br>Volume Resistivity: $<10^7 \Omega \cdot \text{cm}$ |

## General Materials of Construction - Lined Piping

| Pipe Spools |  |
|-------------|--|
| Materials   | Specification                              |
| Liner:      | Virgin PTFE in accordance with ASTM D4895. |
| Pipe:       | EN10216-2 / EN10217-2 Gr. P235GH           |
| Stub End:   | EN10222-2 Gr. P250GH / ASTM A516 GR.60     |
| Flange:     | EN10222-2 Gr. P250GH                       |

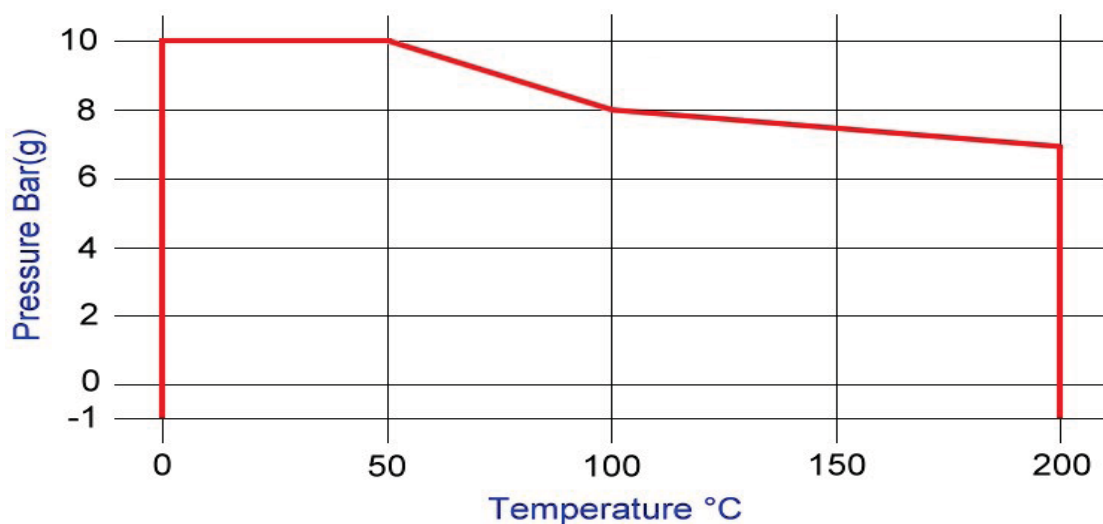
| Fabricated Fittings |   |
|---------------------|---|
| Materials           | Specification   |
| Liner:              | Virgin PTFE in accordance with ASTM D4895.<br>Virgin PTFE in accordance with ASTM D4894.<br>Virgin PFA in accordance with ASTM D3307. |
| Pipe:               | EN10216-2 / EN10217-2 Gr. P235GH  |
| Wrought Fittings:   | EN10253-2 Gr. P235GH  |
| Stub Ends:          | EN10222-2 Gr. P265GH / ASTM A516 GR.60  |
| Flanges:            | EN10222-2 Gr. P250GH  |
| Carbon Steel Plate: | EN10222-2 Gr. P265GH / ASTM A516 GR.60  |

| Spacers           |  |
|-------------------|--|
| Feature           | Specification                              |
| Type 1:           | Virgin PTFE in accordance with ASTM D4894. |
| Type 2 & 3 Liner: | Virgin PTFE in accordance with ASTM D4895. |
| Type 2 Body:      | EN10222-2 Gr. P265GH / ASTM A516 GR.60     |
| Type 3 Pipe:      | EN10216-2 / EN10217-2 Gr. P235GH           |
| Type 3 Stub End:  | EN10222-2 Gr. P265GH / ASTM A516 GR.60     |

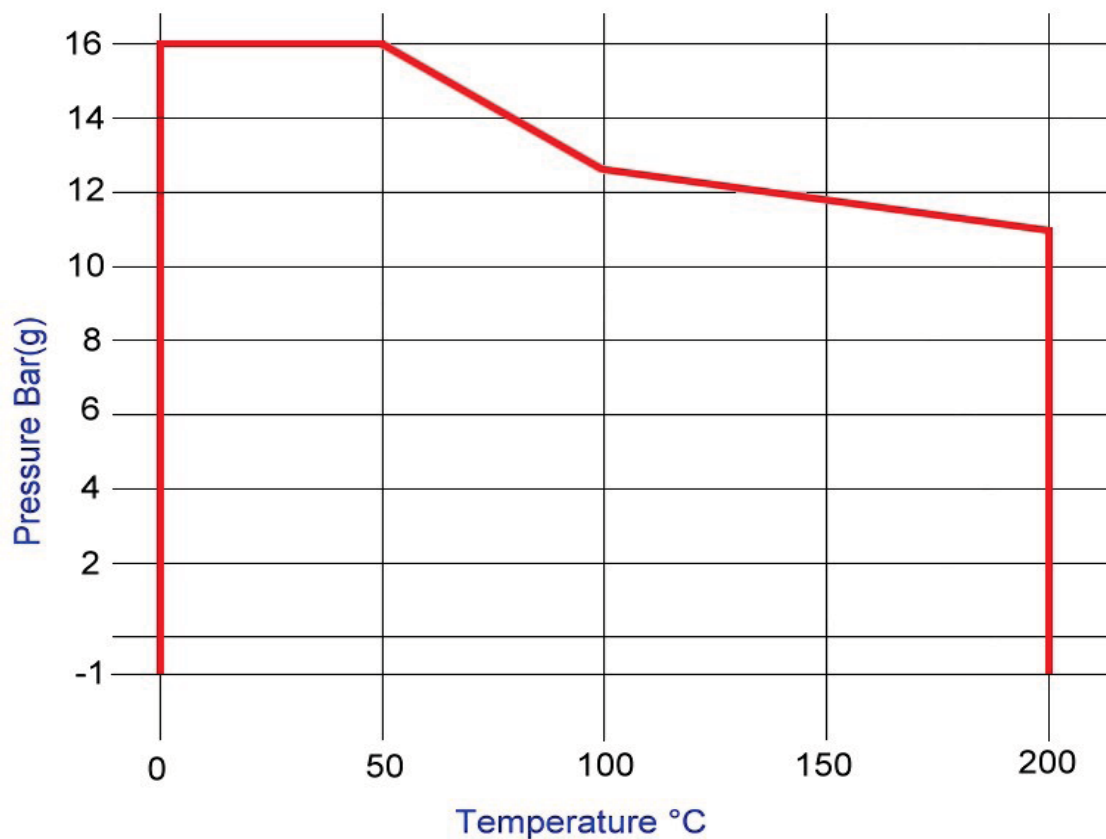
## Service Application Ratings

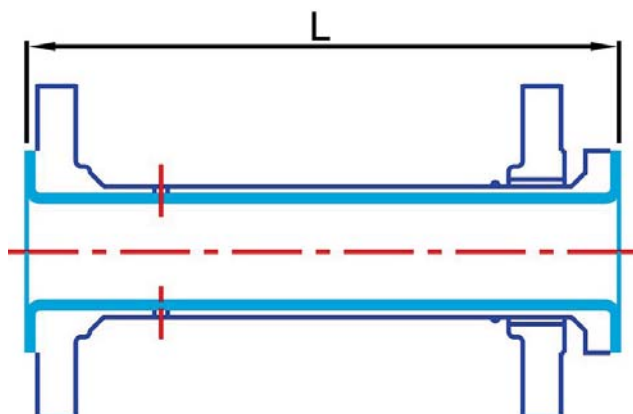
The Graph below shows the pressure / temperature performance curve for CRP's lined pipe and fittings. For products up to and including DN 200, they are rated for full vacuum up to 200 degrees C. Above DN 200 please consult CRP for vacuum performance.

### DIN 2848 PN 10 Lined Piping Systems



### DIN 2848 PN 16 Lined Piping Systems





| Nominal Bore | Length (L) |         | Flange Diameter |       | Raised Face | Pipe Wall | PTFE Liner Thickness |
|--------------|------------|---------|-----------------|-------|-------------|-----------|----------------------|
|              | Minimum    | Maximum | PN 10           | PN 16 |             |           |                      |
| DN           | mm         | mm      | mm              | mm    | mm          | mm        | mm                   |
| 15           | 90         | 6000    | 95              | 95    | 45          | 2.3       | 2                    |
| 20           | 90         | 6000    | 105             | 105   | 58          | 2.3       | 2                    |
| 25           | 90         | 6000    | 115             | 115   | 68          | 2.6       | 3.3                  |
| 40           | 95         | 6000    | 150             | 150   | 88          | 2.6       | 3.3                  |
| 50           | 110        | 6000    | 165             | 165   | 102         | 2.9       | 3.3                  |
| 80           | 120        | 6000    | 200             | 200   | 138         | 3.2       | 3.3                  |
| 100          | 140        | 6000    | 220             | 220   | 158         | 3.6       | 4.5                  |
| 150          | 150        | 6000    | 285             | 285   | 212         | 4.0       | 5.5                  |
| 200          | 170        | 3000    | 340             | 340   | 268         | 4.5       | 4.5 or 8             |
| 250          | 190        | 3000    | 395             | 405   | 320         | 5.0       | 5 or 9               |
| 300          | 210        | 3000    | 445             | 460   | 370         | 5.6       | 5 or 9               |

This pipe spool has a welded slip on flange one end and rotating flange with welded stub end the other for bolt hole alignment. Each pipe spool is manufactured to the customers length requirement in 1mm increments. Spools up to and including DN 200 are full vacuum rated. For halogen services we offer spools with super weight liners, further information can be found on page 32. For shorter lengths we supply spacers.

| Materials |  |
|-----------|--|
| Pipe      | EN10216-2 / EN10217-2 Gr. P235GH       |
| Flanges   | EN10222-2 Gr. P250GH                   |
| Liner     | PTFE to ASTM D4895                     |
| Stub Ends | EN10222-2 Gr. P265GH / ASTM A516 GR.60 |

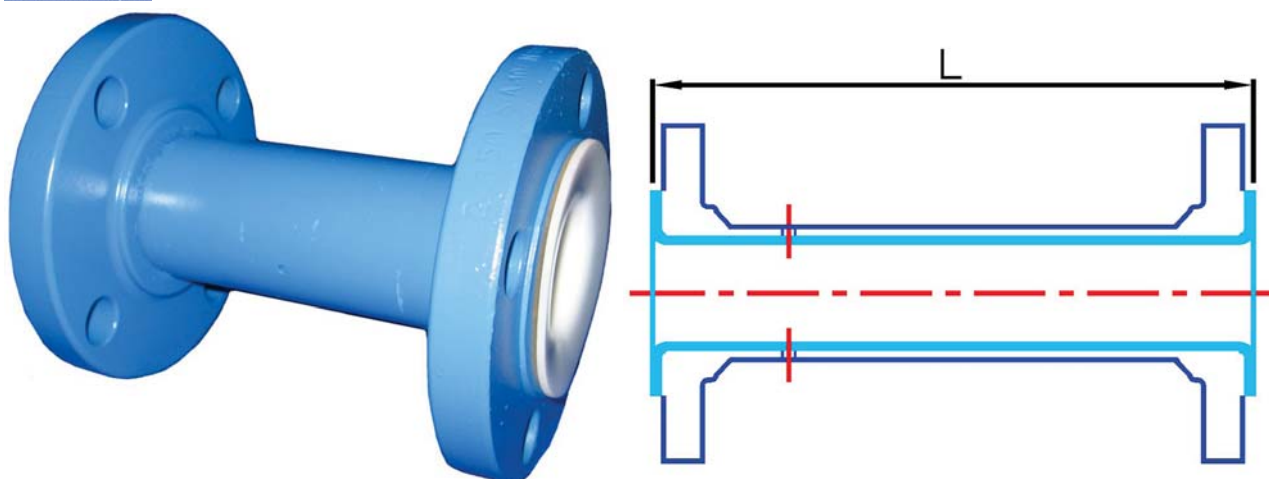
| Options   |  |
|-----------|--|
| Flanges   | DIN PN6, PN25, PN40  |
| Materials | Stainless steel  |
| Linings   | Static Dissipating / Super Weight.                         |
| Extras    | Spikie earthing washers, earth studs, vent extensions etc. |



## Vent Extensions

When the lined piping system will be lagged, please specify that the spools and fittings should be supplied with vent extensions, these 75mm long extension protrude through the lagging allowing the correct venting of the lined equipment.





| Nominal Bore | Length (L) |         | Flange Diameter |       | Raised Face | Pipe Schedule | PTFE Liner Thickness |
|--------------|------------|---------|-----------------|-------|-------------|---------------|----------------------|
|              | Minimum    | Maximum | PN 10           | PN 16 |             |               |                      |
| DN           | mm         | mm      | mm              | mm    | mm          | mm            | mm                   |
| 15           | 90         | 6000    | 95              | 95    | 45          | 2.3           | 2                    |
| 20           | 90         | 6000    | 105             | 105   | 58          | 2.3           | 2                    |
| 25           | 90         | 6000    | 115             | 115   | 68          | 2.6           | 3.3                  |
| 40           | 95         | 6000    | 150             | 150   | 88          | 2.6           | 3.3                  |
| 50           | 110        | 6000    | 165             | 165   | 102         | 2.9           | 3.3                  |
| 80           | 120        | 6000    | 200             | 200   | 138         | 3.2           | 3.3                  |
| 100          | 140        | 6000    | 220             | 220   | 158         | 3.6           | 4.5                  |
| 150          | 150        | 6000    | 285             | 285   | 212         | 4.0           | 5.5                  |
| 200          | 170        | 6000    | 340             | 340   | 268         | 4.5           | 4.5 or 8             |
| 250          | 190        | 3000    | 395             | 405   | 320         | 5.0           | 5 or 9               |
| 300          | 210        | 3000    | 445             | 460   | 370         | 5.6           | 5 or 9               |

Each pipe spool is manufactured to the customers length requirement in 1mm increments. Spools up to and including DN 200 are full vacuum rated, with larger diameters we offer standard weight liners and heavy duty thicker wall liners suitable for vacuum duties. For halogen services we offer spools with super weight liners, further information can be found on page 32. For shorter lengths we supply spacers.

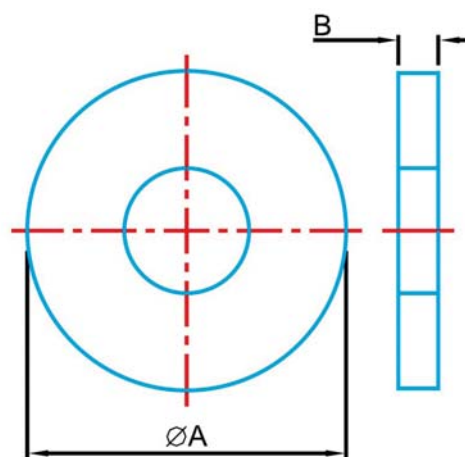
| Materials |                                  |
|-----------|----------------------------------|
| Pipe      | EN10216-2 / EN10217-2 Gr. P235GH |
| Flanges   | EN10222-2 Gr. P250GH             |
| Liner     | PTFE to ASTM D4895               |

| Options   |  |
|-----------|--|
| Flanges   | DIN PN 6 , PN 25, DN 40                                    |
| Materials | Stainless steel  |
| Linings   | Static Dissipating / Super Weight.                         |
| Extras    | Spikie earthing washers, earth studs, vent extensions etc. |



## Venting

All lined piping systems must have vent holes drilled through the steel body. This is for 2 reasons, firstly to vent any gasses that may permeate through the liner over time to the atmosphere rather than allow them to build up behind the liner trapped within the steel pipe and secondly to act as an early warning if the liner should fail. Pipe spools less than 500mm have 2 off vent holes located centrally, longer spools have 4 vent holes 1 pair at located at each end.



| Nominal Bore | Length (B) |         | Diameter (A)<br>PN 10 | Diameter (A)<br>PN 16 |
|--------------|------------|---------|-----------------------|-----------------------|
|              | Minimum    | Maximum |                       |                       |
| DN           | mm         | mm      | mm                    | mm                    |
| 15           | 1          | 25      | 50                    | 50                    |
| 20           | 1          | 25      | 60                    | 60                    |
| 25           | 1          | 25      | 70                    | 70                    |
| 40           | 1          | 25      | 91                    | 91                    |
| 50           | 1          | 25      | 106                   | 106                   |
| 80           | 1          | 25      | 141                   | 141                   |
| 100          | 1          | 25      | 161                   | 161                   |
| 150          | 1          | 25      | 217                   | 217                   |
| 200          | 1          | 25      | 272                   | 272                   |
| 250          | 1          | 25      | 327                   | 327                   |
| 300          | 1          | 25      | 377                   | 383                   |

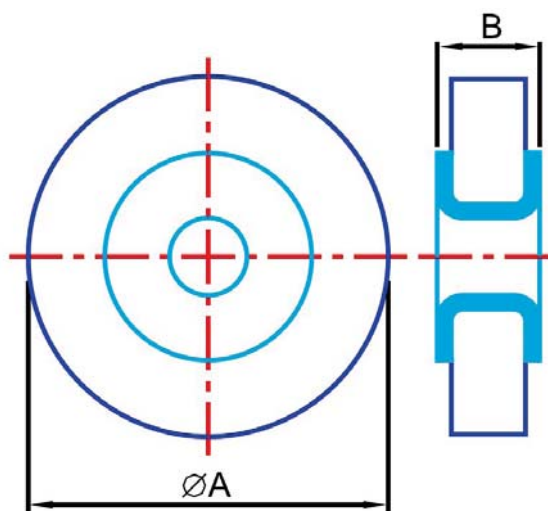
Type 1 spacers are manufactured from solid PTFE and used to fill short gaps up to 25mm maximum.

| Materials |            |
|-----------|------------|
| PTFE      | ASTM D4894 |



## Tapered Spacers

CRP supply tapered type 1 spacers to offer falls on pipelines to aid draining or to overcome misalignment issues with a flanged connection



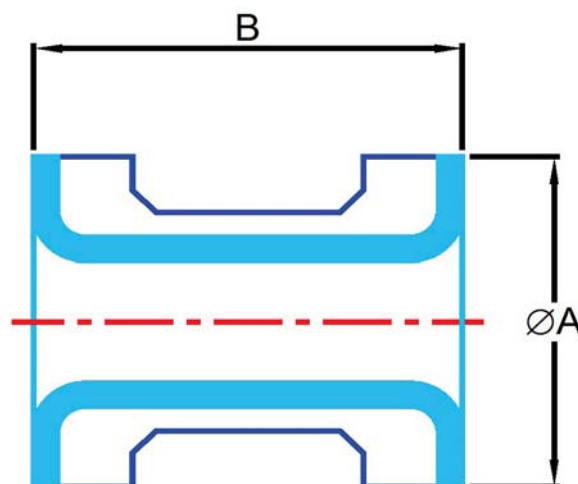
| Nominal Bore | Length (B) |         | Diameter (A)<br>PN 10 | Diameter (A)<br>PN 16 | PTFE Liner<br>Thickness |
|--------------|------------|---------|-----------------------|-----------------------|-------------------------|
|              | Minimum    | Maximum |                       |                       |                         |
| DN           | mm         | mm      | mm                    | mm                    | mm                      |
| 15           | 26         | 60      | 51                    | 51                    | 2                       |
| 20           | 26         | 60      | 61                    | 61                    | 2                       |
| 25           | 26         | 60      | 71                    | 71                    | 3.3                     |
| 40           | 26         | 60      | 92                    | 92                    | 3.3                     |
| 50           | 26         | 60      | 107                   | 107                   | 3.3                     |
| 80           | 26         | 70      | 142                   | 142                   | 3.3                     |
| 100          | 26         | 70      | 162                   | 162                   | 4.5                     |
| 150          | 26         | 70      | 218                   | 218                   | 5.5                     |
| 200          | 26         | 80      | 273                   | 273                   | 4.5 or 8                |
| 250          | 26         | 80      | 328                   | 329                   | 5 or 9                  |
| 300          | 26         | 80      | 378                   | 384                   | 5 or 9                  |

Type 2 spacers are manufactured from heavy wall steel tube with a PTFE lining flared each end.

| Materials |  |
|-----------|--|
| Body      | EN10222-2 Gr. P265GH / ASTM A516 GR.60 |
| Liner     | PTFE to ASTM D4895                     |

## High Permeation Resistant Liners

Bromine, along with other members of the halogen family, is highly reactive. This can lead, over time, to particles permeating through fluoropolymer linings used to carry this highly corrosive chemical. Working closely with a global agricultural chemical manufacturer CRP has developed a special lined piping range utilising super-weight paste extruded PTFE liners and PFA moulded fittings. All of our piping systems can be supplied lined in these super weight liners reducing the effects of permeation. See page 34 for details.



| Nominal Bore | Length (B) |         | Diameter (A)<br>PN 10 | Diameter (A)<br>PN 16 | PTFE Liner<br>Thickness |
|--------------|------------|---------|-----------------------|-----------------------|-------------------------|
|              | Minimum    | Maximum |                       |                       |                         |
| DN           | mm         | mm      | mm                    | mm                    | mm                      |
| 15           | 61         | 100     | 51                    | 51                    | 2                       |
| 20           | 61         | 100     | 61                    | 61                    | 2                       |
| 25           | 61         | 100     | 71                    | 71                    | 3.3                     |
| 40           | 61         | 100     | 92                    | 92                    | 3.3                     |
| 50           | 61         | 100     | 107                   | 107                   | 3.3                     |
| 80           | 71         | 150     | 142                   | 142                   | 3.3                     |
| 100          | 71         | 150     | 162                   | 162                   | 4.5                     |
| 150          | 71         | 150     | 218                   | 218                   | 5.5                     |
| 200          | 81         | 200     | 273                   | 273                   | 4.5 or 8                |
| 250          | 81         | 200     | 328                   | 329                   | 5 or 9                  |
| 300          | 81         | 210     | 378                   | 384                   | 5 or 9                  |

Type 3 spacers are manufactured from 2 stub ends and a steel pipe welded to form the housing with a PTFE liner flared each end to provide sealing faces.

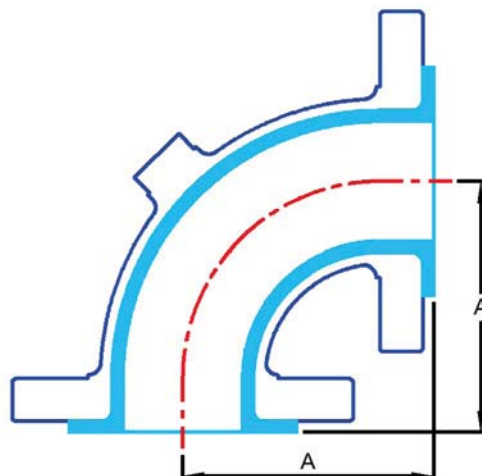
| Materials |  |
|-----------|--|
| Pipe      | EN10216-2 / EN10217-2 Gr. P235GH       |
| Stub Ends | EN10222-2 Gr. P265GH / ASTM A516 GR.60 |
| Liner     | PTFE to ASTM D4895                     |

| Options   |                                    |
|-----------|------------------------------------|
| Flanges   | To suit DIN PN6 / PN25 , PN40      |
| Materials | Stainless steel                    |
| Linings   | Static Dissipating / Super Weight. |
| Extras    | Earth studs, vent extensions etc.  |



## Earthing Studs / Lugs

We offer all our piping with the option to have earth continuity studs or lugs welded to the pipe, flange or both depending upon site specifications.



| Nominal Bore | Centre Line to Face (A) | Flange Diameter |       | Raised Face | Steel Thickness | Liner Thickness |
|--------------|-------------------------|-----------------|-------|-------------|-----------------|-----------------|
| DN           | mm                      | PN 10           | PN 16 | mm          | mm              | mm              |
| 15           | 80                      | 45              | 95    | 45          | 2.3             | 2               |
| 20           | 95                      | 105             | 105   | 58          | 2.3             | 2               |
| 25           | 110                     | 115             | 115   | 68          | 2.6             | 3.3             |
| 40           | 150                     | 150             | 150   | 88          | 2.6             | 3.3             |
| 50           | 120                     | 165             | 165   | 102         | 2.9             | 3.3             |
| 80           | 165                     | 200             | 200   | 138         | 3.2             | 3.3             |
| 100          | 205                     | 220             | 220   | 158         | 3.6             | 4.5             |
| 150          | 285                     | 285             | 285   | 212         | 4.0             | 5.5             |
| 200          | 365                     | 340             | 340   | 268         | 4.5             | 4.5 or 8        |
| 250          | 450                     | 395             | 405   | 320         | 5.0             | 5 or 9          |
| 300          | 525                     | 445             | 460   | 370         | 5.6             | 5 or 9          |

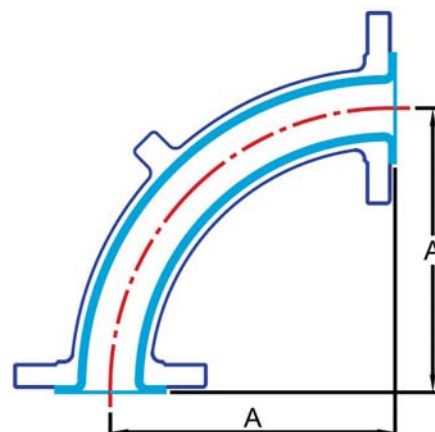
| Materials - PTFE lined Fabrications |                                  |
|-------------------------------------|----------------------------------|
| Pipe                                | EN10216-2 / EN10217-2 Gr. P235GH |
| Flanges                             | EN10222-2 Gr. P250GH             |
| Lining                              | PTFE to ASTM D4895               |

| Specials   |
|--|
| As well as standard 45 and 90 degree elbows, CRP can supply special elbows with any angle from 1 degree up to 180 degrees which are commonly found on heat exchangers. Whilst we would encourage using standard dimensioned elbows to DIN 2848 dimensions, we can supply special elbows with swept bends for slurry duty or to overcome installation problems etc. For elbows with angles less than 45 degrees the centre-line to face dimension adopted would be the same as 45 degree elbows, For elbows with angles above 45 degrees we adopt the 90 degree centre-line to face dimensions. |



180 Degree Elbow





| Nominal Bore | Centre Line to Face (A) | Flange Diameter |       | Raised Face | Steel Thickness | PTFE Liner Thickness |
|--------------|-------------------------|-----------------|-------|-------------|-----------------|----------------------|
| DN           | mm                      | PN 10           | PN 16 | mm          | mm              | mm                   |
| 25           | 127                     | 115             | 115   | 68          | 3.4             | 3.3                  |
| 40           | 191                     | 150             | 150   | 88          | 3.7             | 3.3                  |
| 50           | 254                     | 165             | 165   | 102         | 3.9             | 3.3                  |
| 80           | 381                     | 200             | 200   | 138         | 5.5             | 3.3                  |
| 100          | 508                     | 220             | 220   | 158         | 6.0             | 4.5                  |
| 150          | 762                     | 285             | 285   | 212         | 7.1             | 5.5                  |
| 200          | 1016                    | 340             | 340   | 268         | 7.0             | 4.5 or 8             |
| 250          | 1270                    | 395             | 405   | 320         | 7.8             | 5 or 9               |
| 300          | 1524                    | 445             | 460   | 370         | 8.4             | 5 or 9               |

Please note DN15 and DN20 5D long radius bends are not available

These swept bends are ideal for use with slurries. The centreline to faces are based on 5 times the nominal bore.

| Materials - PTFE lined Fabrications |                                  |
|-------------------------------------|----------------------------------|
| Pipe                                | EN10216-2 / EN10217-2 Gr. P235GH |
| Flanges                             | EN10222-2 Gr. P250GH             |
| Lining                              | PTFE to ASTM D4895               |

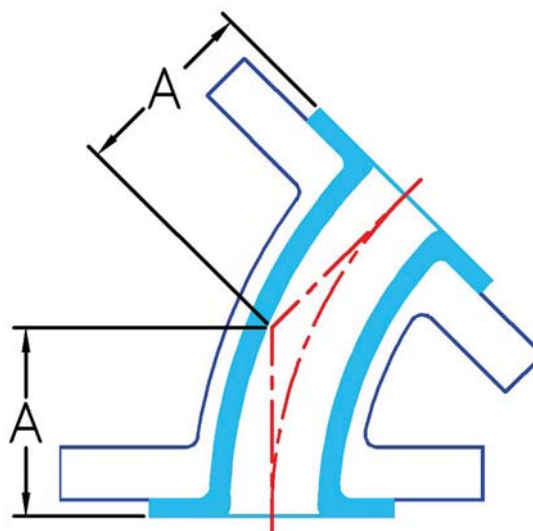
| Specials   |
|--|
| As well as standard 45 and 90 degree elbows, we can supply special elbows with any angle from 1 degree up to 180 degree which are commonly found on heat exchangers. Whilst we would encourage using standard dimensioned elbows to DIN 2848 dimensions, we can supply special elbows with swept bends for slurry duty or to overcome installation problems etc. For elbows with angles less than 45 degrees the centre-line to face dimension adopted would be the same as 45 degree elbows, For elbows with angles above 45 degrees we adopt the 90 degree centre-line to face dimensions. |



## Hose Adaptors

CRP manufacture PFA lined camlock, triclamp and threaded flanged hose adaptors.





| Nominal Bore | Centre Line to Face (A) | Flange Diameter PN 10 | Flange Diameter PN 16 | Raised Face | Steel Thickness | PTFE Liner Thickness |
|--------------|-------------------------|-----------------------|-----------------------|-------------|-----------------|----------------------|
| DN           | mm                      | mm                    | mm                    | mm          | mm              | mm                   |
| 15           | 60                      | 95                    | 95                    | 45          | 2.3             | 2                    |
| 20           | 65                      | 105                   | 105                   | 58          | 2.3             | 2                    |
| 25           | 70                      | 115                   | 115                   | 68          | 2.6             | 3.3                  |
| 40           | 90                      | 150                   | 150                   | 88          | 2.6             | 3.3                  |
| 50           | 80                      | 165                   | 165                   | 102         | 2.9             | 3.3                  |
| 80           | 100                     | 200                   | 200                   | 138         | 3.2             | 3.3                  |
| 100          | 115                     | 220                   | 220                   | 158         | 3.6             | 4.5                  |
| 150          | 150                     | 285                   | 285                   | 212         | 4.0             | 5.5                  |
| 200          | 190                     | 340                   | 340                   | 268         | 4.5             | 4.5 or 8             |
| 250          | 225                     | 395                   | 405                   | 320         | 5.0             | 5 or 9               |
| 300          | 260                     | 445                   | 460                   | 370         | 5.6             | 5 or 9               |

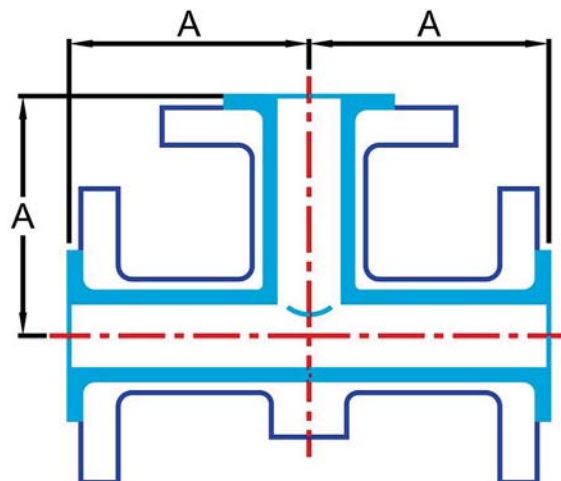
| Materials - PTFE lined Fabrications |                                  |
|-------------------------------------|----------------------------------|
| Pipe                                | EN10216-2 / EN10217-2 Gr. P235GH |
| Flanges                             | EN10222-2 Gr. P250GH             |
| Lining                              | PTFE to ASTM D4895               |

| Specials   |
|--|
| As well as standard 45 and 90 degree elbows, we can supply special elbows with any angle from 1 degree up to 180 degree which are commonly found on heat exchangers. Whilst we would encourage using standard dimensioned elbows to DIN 2848 dimensions, we can supply special elbows with swept bends for slurry duty or to overcome installation problems etc. For elbows with angles less than 45 degrees the centre-line to face dimension adopted would be the same as 45 degree elbows, For elbows with angles above 45 degrees we adopt the 90 degree centre-line to face dimensions. |



## Blanking Spades

CRP supply a full range of PTFE lined blanking spades for positive line shutoff in shutdown and maintenance instructions.



| Nominal Bore | Centre Line to Face (A) | Flange Diameter |       | Raised Face | Steel Thickness | Liner Thickness |
|--------------|-------------------------|-----------------|-------|-------------|-----------------|-----------------|
| DN           | mm                      | PN 10           | PN 16 | mm          | mm              | mm              |
| 15           | 85                      | 95              | 95    | 45          | 2.3             | 3.5             |
| 20           | 95                      | 105             | 105   | 58          | 2.3             | 3.5             |
| 25           | 110                     | 115             | 115   | 68          | 2.6             | 4.6             |
| 40           | 150                     | 150             | 150   | 88          | 2.6             | 4.6             |
| 50           | 120                     | 165             | 165   | 102         | 2.9             | 4.7             |
| 80           | 165                     | 200             | 200   | 138         | 3.2             | 5.0             |
| 100          | 205                     | 220             | 220   | 158         | 3.6             | 6.0             |
| 150          | 285                     | 285             | 285   | 212         | 4.0             | 8.6             |
| 200          | 365                     | 340             | 340   | 268         | 4.5             | 9.5             |
| 250          | 450                     | 395             | 405   | 320         | 5.0             | 11.0            |
| 300          | 525                     | 445             | 460   | 370         | 5.6             | 11.0            |

| Materials - PFA lined Fabrications |                                  |
|------------------------------------|----------------------------------|
| Pipe                               | EN10216-2 / EN10217-2 Gr. P235GH |
| Flanges                            | EN10222-2 Gr. P250GH             |
| Lining                             | PFA to ASTM D3307                |

## Tee Range

CRP offer the widest range of PFA lined tees:

Equal Tees  
Reducing Tees  
Short Branch Tees  
Lateral Tees  
Instrument Tees

Any of these can be supplied with fixed or rotating flanges to aid installation.

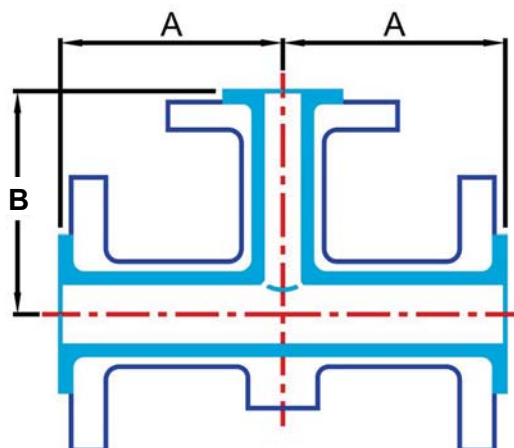
The PFA linings offer the best permeation resistance and smoothest bores, it's non-wettable properties are excellent and allow easy cleaning.



## Stainless Steel Lined Pipe and Fittings

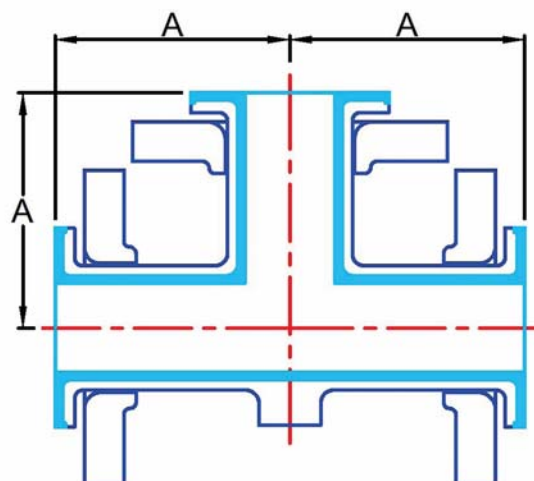
CRP can supply our complete range in stainless steel. We have developed the range to provide a very cost effective alternative to lined carbon steel.





| Nominal Bore | Centre Line to Face |     | Large NB Flange Ø |       | Large NB    | Small NB Flange Ø |       | Small NB    |
|--------------|---------------------|-----|-------------------|-------|-------------|-------------------|-------|-------------|
|              | (A)                 | (B) | PN 10             | PN 16 | Raised Face | PN 10             | PN 16 | Raised Face |
| DN           | mm                  | mm  | mm                | mm    | mm          | mm                | mm    | mm          |
| 20 x 15      | 95                  | 80  | 105               | 105   | 58          | 95                | 95    | 45          |
| 25 x 20      | 110                 | 95  | 115               | 115   | 68          | 105               | 105   | 58          |
| 40 x 25      | 150                 | 110 | 115               | 150   | 88          | 115               | 115   | 68          |
| 50 x 25      | 120                 | 110 | 165               | 165   | 102         | 115               | 115   | 68          |
| 50 x 40      | 120                 | 150 | 165               | 165   | 102         | 150               | 150   | 88          |
| 80 x 25      | 165                 | 110 | 200               | 200   | 138         | 115               | 115   | 68          |
| 80 x 40      | 165                 | 150 | 200               | 200   | 138         | 150               | 150   | 88          |
| 80 x 50      | 165                 | 120 | 200               | 200   | 138         | 165               | 165   | 102         |
| 100 x 25     | 205                 | 110 | 220               | 220   | 158         | 115               | 115   | 68          |
| 100 x 40     | 205                 | 150 | 220               | 220   | 158         | 150               | 150   | 88          |
| 100 x 50     | 205                 | 120 | 220               | 220   | 158         | 165               | 165   | 102         |
| 100 x 80     | 205                 | 165 | 220               | 220   | 158         | 200               | 200   | 138         |
| 150 x 80     | 285                 | 165 | 285               | 285   | 212         | 200               | 200   | 138         |
| 150 x 100    | 285                 | 205 | 285               | 285   | 212         | 220               | 220   | 158         |
| 200 x 100    | 365                 | 205 | 340               | 340   | 268         | 220               | 220   | 158         |
| 200 x 150    | 365                 | 285 | 340               | 340   | 268         | 285               | 285   | 212         |
| 250 x 150    | 450                 | 285 | 395               | 405   | 320         | 285               | 285   | 212         |
| 250 x 200    | 450                 | 365 | 395               | 405   | 320         | 340               | 340   | 268         |
| 300 x 150    | 525                 | 285 | 445               | 460   | 370         | 285               | 285   | 212         |
| 300 x 200    | 525                 | 365 | 445               | 460   | 370         | 340               | 340   | 268         |
| 300 x 250    | 525                 | 450 | 445               | 460   | 370         | 395               | 405   | 320         |

| Materials - PFA lined Fabrications |                                  |
|------------------------------------|----------------------------------|
| Pipe                               | EN10216-2 / EN10217-2 Gr. P235GH |
| Flanges                            | EN10222-2 Gr. P250GH             |
| Lining                             | PFA to ASTM D3307                |

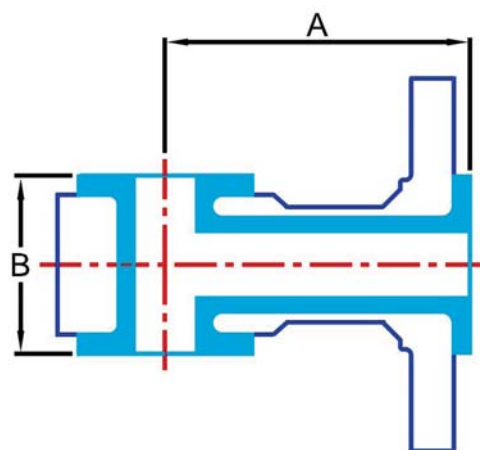


| Nominal Bore | Centre Line to Face (A) | Flange Diameter |       | Raised Face | Steel Thickness | Liner Thickness |
|--------------|-------------------------|-----------------|-------|-------------|-----------------|-----------------|
| DN           | mm                      | PN 10           | PN 16 | mm          | mm              | mm              |
| 15           | 85                      | 95              | 95    | 45          | 2.3             | 3.5             |
| 20           | 95                      | 105             | 105   | 58          | 2.3             | 3.5             |
| 25           | 110                     | 115             | 115   | 68          | 2.6             | 4.6             |
| 40           | 150                     | 150             | 150   | 88          | 2.6             | 4.6             |
| 50           | 120                     | 165             | 165   | 102         | 2.9             | 4.7             |
| 80           | 165                     | 200             | 200   | 138         | 3.2             | 5.0             |
| 100          | 205                     | 220             | 220   | 158         | 3.6             | 6.0             |
| 150          | 285                     | 285             | 285   | 212         | 4.0             | 8.6             |
| 200          | 365                     | 340             | 340   | 268         | 4.5             | 9.5             |
| 250          | 450                     | 395             | 405   | 320         | 5.0             | 11.0            |
| 300          | 525                     | 445             | 460   | 370         | 5.6             | 11.0            |

| Materials - PFA / PTFE lined Fabrications |   |
|---|---|
| Pipe                                      | EN10216-2 / EN10217-2 Gr. P235GH        |
| Flanges                                   | EN10222-2 Gr. P250GH                    |
| Lining                                    | PTFE to ASTM D4894 / PFA to ASTM D3307. |

| Reducing Tees with Rotating Flanges                     |
|---|
| CRP can supply reducing tees with rotating flanges too. |



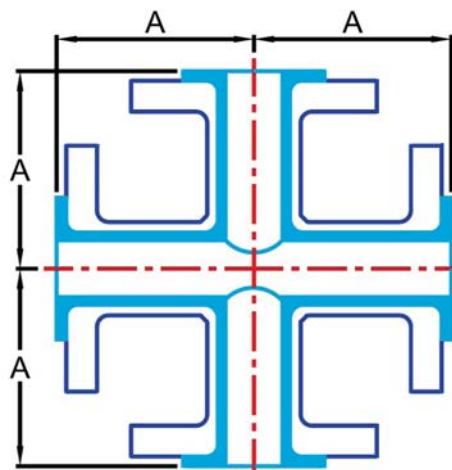


| Nominal Bore | Centre Line to Face (A) | Face to Face (B) |
|--------------|-------------------------|------------------|
| DN           | mm                      | mm               |
| 15 x 15      | 90                      | 50               |
| 20 x 15      | 90                      | 50               |
| 20 x 20      | 90                      | 50               |
| 25 x 15      | 90                      | 50               |
| 25 x 20      | 90                      | 50               |
| 25 x 25      | 90                      | 50               |
| 40 x 25      | 110                     | 50               |
| 40 x 40      | 110                     | 75               |
| 50 x 25      | 115                     | 50               |
| 50 x 40      | 115                     | 75               |
| 50 x 50      | 115                     | 90               |
| 80 x 25      | 135                     | 50               |
| 100 x 25     | 150                     | 50               |

| Nominal Bore | Centre Line to Face (A) | Face to Face (B) |
|--------------|-------------------------|------------------|
| DN           | mm                      | mm               |
| 100 x 40     | 150                     | 75               |
| 150 x 25     | 180                     | 50               |
| 150 x 40     | 180                     | 75               |
| 150 x 50     | 180                     | 90               |
| 200 x 25     | 210                     | 50               |
| 200 x 40     | 210                     | 75               |
| 200 x 50     | 210                     | 90               |
| 250 x 25     | 240                     | 50               |
| 250 x 50     | 240                     | 90               |
| 300 x 25     | 340                     | 50               |
| 300 x 40     | 340                     | 75               |
| 300 x 50     | 340                     | 90               |

| Materials - PFA lined Fabrications |  |
|------------------------------------|--|
| Pipe                               | EN10216-2 / EN10217-2 Gr. P235GH       |
| Flanges                            | EN10222-2 Gr. P250GH                   |
| Body                               | EN10222-2 Gr. P265GH / ASTM A516 GR.60 |
| Lining                             | PFA to ASTM D3307                      |

| Tee Range   |
|---|
| <p>CRP offer the widest range of PFA lined tees:</p> <ul style="list-style-type: none"> <li>Equal Tees</li> <li>Reducing Tees</li> <li>Short Branch Tees</li> <li>Lateral Tees</li> <li>Instrument Tees</li> </ul> <p>Some of these can be supplied with rotating flanges to aid installation.</p> <p>The PFA linings offer the best permeation resistance and smoothest bores, it's nonwetable properties are excellent and allow easy cleaning.</p> |

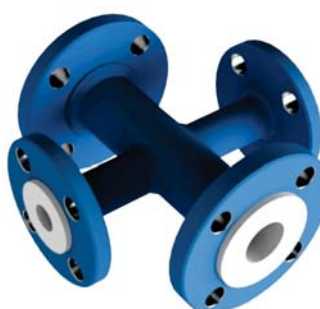


| Nominal Bore | Centre Line to Face (A) | Flange Diameter |       | Raised Face | Steel Thickness | Liner Thickness |
|--------------|-------------------------|-----------------|-------|-------------|-----------------|-----------------|
| DN           | mm                      | PN 10           | PN 16 | mm          | mm              | mm              |
| 15           | 85                      | 95              | 95    | 45          | 2.3             | 3.5             |
| 20           | 95                      | 105             | 105   | 58          | 2.3             | 3.5             |
| 25           | 110                     | 115             | 115   | 68          | 2.6             | 4.6             |
| 40           | 150                     | 150             | 150   | 88          | 2.6             | 4.6             |
| 50           | 120                     | 165             | 165   | 102         | 2.9             | 4.7             |
| 80           | 165                     | 200             | 200   | 138         | 3.2             | 5.0             |
| 100          | 205                     | 220             | 220   | 158         | 3.6             | 6.0             |
| 150          | 285                     | 285             | 285   | 212         | 4.0             | 8.6             |
| 200          | 365                     | 340             | 340   | 268         | 4.5             | 9.5             |
| 250          | 450                     | 395             | 405   | 320         | 5.0             | 11.0            |
| 300          | 525                     | 445             | 460   | 370         | 5.6             | 11.0            |

## Materials - PFA lined Fabrications

|         |                                  |
|---------|----------------------------------|
| Pipe    | EN10216-2 / EN10217-2 Gr. P235GH |
| Flanges | EN10222-2 Gr. P250GH             |
| Lining  | PFA to ASTM D3307                |

## Reducing Crosses



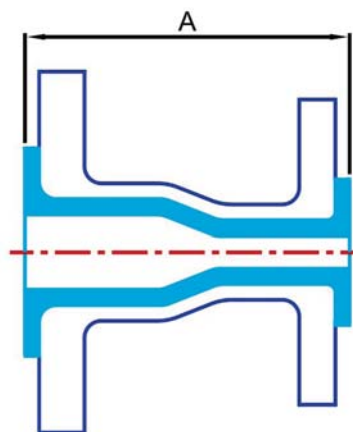
CRP can also supply reducing crosses upon request, body and branch centre line to face dimensions are the same as a reducing tee.



## Stainless Steel Lined Pipe and Fittings

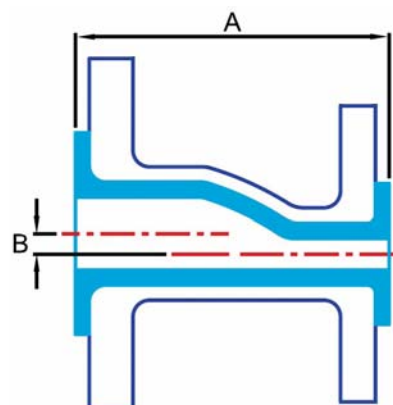
CRP can supply our complete range in stainless steel, we have developed the range to provide a very cost effective alternative to lined carbon steel.





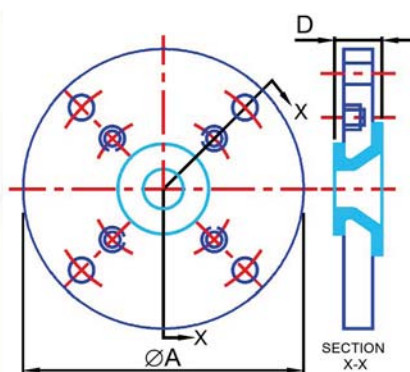
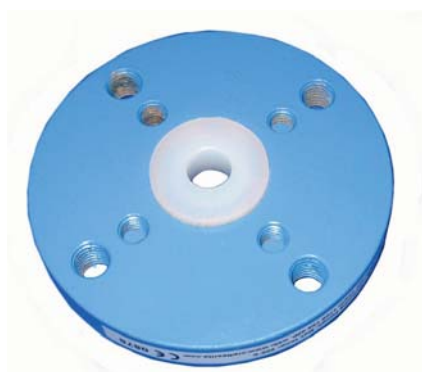
| Nominal Bore | Face to Face (A) | Large NB Flange Ø |       | Large NB Raised Face | Small NB Flange Ø |       | Small NB Raised Face |
|--------------|------------------|-------------------|-------|----------------------|-------------------|-------|----------------------|
| DN           | mm               | PN 10             | PN 16 | mm                   | PN10              | PN 16 | mm                   |
| 20 x 15      | 125              | 105               | 105   | 58                   | 95                | 95    | 45                   |
| 25 x 20      | 125              | 115               | 115   | 68                   | 105               | 105   | 58                   |
| 40 x 25      | 145              | 150               | 150   | 88                   | 115               | 115   | 68                   |
| 50 x 25      | 160              | 165               | 165   | 102                  | 115               | 115   | 68                   |
| 50 x 40      | 165              | 165               | 165   | 102                  | 150               | 150   | 88                   |
| 80 x 25      | 185              | 200               | 200   | 138                  | 115               | 115   | 68                   |
| 80 x 40      | 185              | 200               | 200   | 138                  | 150               | 150   | 88                   |
| 80 x 50      | 190              | 200               | 200   | 138                  | 165               | 165   | 102                  |
| 100 x 50     | 200              | 220               | 220   | 158                  | 165               | 165   | 102                  |
| 100 x 80     | 205              | 220               | 220   | 158                  | 200               | 200   | 138                  |
| 150 x 80     | 250              | 285               | 285   | 212                  | 200               | 200   | 138                  |
| 150 x 100    | 250              | 285               | 285   | 212                  | 220               | 220   | 158                  |
| 200 x 100    | 270              | 340               | 340   | 268                  | 220               | 220   | 158                  |
| 200 x 150    | 270              | 340               | 340   | 268                  | 285               | 285   | 212                  |
| 250 x 150    | 305              | 395               | 405   | 320                  | 285               | 285   | 212                  |
| 250 x 200    | 310              | 395               | 405   | 320                  | 340               | 340   | 268                  |
| 300 x 200    | 335              | 445               | 460   | 370                  | 340               | 340   | 268                  |
| 300 x 250    | 340              | 445               | 460   | 370                  | 395               | 405   | 320                  |

| Materials - PFA / PTFE lined Fabrications |  |
|---|--|
| Pipe                                      | EN10216-2 / EN10217-2 Gr. P235GH       |
| Reducer                                   | EN10253-2 Gr. P235GH                   |
| Flanges                                   | EN10222-2 Gr. P250GH                   |
| Lining                                    | PTFE to ASTM D4895 / PFA to ASTM D3307 |

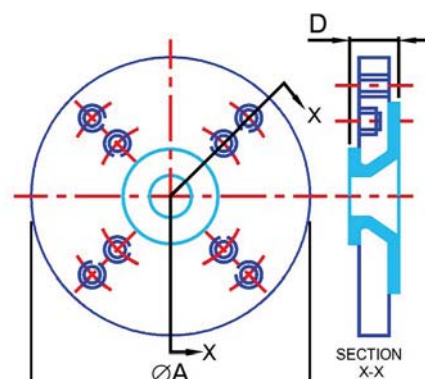


| Nominal Bore | Face to Face (A) | Offset (B) | Large NB Flange Ø |     | Large NB Raised Face | Small NB Flange Ø |     | Small NB Raised Face |
|--------------|------------------|------------|-------------------|-----|----------------------|-------------------|-----|----------------------|
| DN           | mm               | mm         | mm                | mm  | mm                   | mm                | mm  | mm                   |
| 20 x 15      | 125              | 2.8        | 105               | 105 | 58                   | 95                | 95  | 45                   |
| 25 x 20      | 125              | 3.4        | 115               | 115 | 68                   | 105               | 105 | 58                   |
| 40 x 25      | 145              | 7.3        | 150               | 150 | 88                   | 115               | 115 | 68                   |
| 50 x 25      | 160              | 13.3       | 165               | 165 | 102                  | 115               | 115 | 68                   |
| 50 x 40      | 165              | 6          | 165               | 165 | 102                  | 150               | 150 | 88                   |
| 80 x 25      | 185              | 27.6       | 200               | 200 | 138                  | 115               | 115 | 68                   |
| 80 x 40      | 185              | 20.3       | 200               | 200 | 138                  | 150               | 150 | 88                   |
| 80 x 50      | 190              | 14.3       | 200               | 200 | 138                  | 165               | 165 | 102                  |
| 100 x 50     | 200              | 27         | 220               | 220 | 158                  | 165               | 165 | 102                  |
| 100 x 80     | 205              | 12.7       | 220               | 220 | 158                  | 200               | 200 | 138                  |
| 150 x 80     | 250              | 39.7       | 285               | 285 | 212                  | 200               | 200 | 138                  |
| 150 x 100    | 250              | 27         | 285               | 285 | 212                  | 220               | 220 | 158                  |
| 200 x 100    | 270              | 52.4       | 340               | 340 | 268                  | 220               | 220 | 158                  |
| 200 x 150    | 270              | 25.4       | 340               | 340 | 268                  | 285               | 285 | 212                  |
| 250 x 150    | 305              | 52.4       | 395               | 405 | 320                  | 285               | 285 | 212                  |
| 250 x 200    | 310              | 27         | 395               | 405 | 320                  | 340               | 340 | 268                  |
| 300 x 200    | 335              | 52.4       | 445               | 460 | 370                  | 340               | 340 | 268                  |
| 300 x 250    | 340              | 25.5       | 445               | 460 | 370                  | 395               | 405 | 320                  |

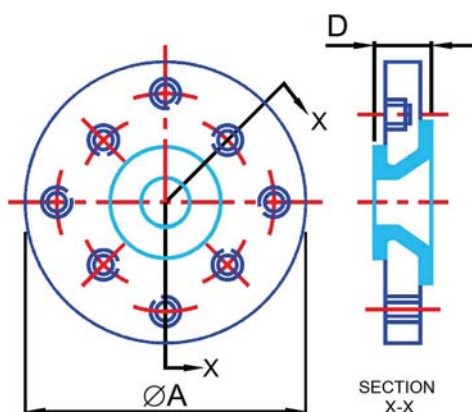
| Materials—PFA / PTFE lined Fabrications |  |
|---|--|
| Pipe                                    | EN10216-2 / EN10217-2 Gr. P235GH       |
| Reducer                                 | EN10253-2 Gr. P235GH                   |
| Flanges                                 | EN10222-2 Gr. P250GH                   |
| Liner                                   | PTFE to ASTM D4895 / PFA to ASTM D3307 |



Type 3



Type 2



Type 1

## Bolt hole configuration

Reducing flanges are supplied in 3 configurations – Type 1, 2 & 3. The configuration is dictated by the proximity of the small bore bolt holes to the large bore bolt holes. Each type is designed so that they do not clash and that the nuts can be fitted successfully. Type 3 flanges have through holes for the large bore bolts and are used where there is a significant reduction in bores. Where the reduction is not so great and the periphery of the smaller bore mating flange would impinge on the nuts then a type 2 flange is employed with threaded bolt holes negating the use of nuts. Finally where the reduction in bores is quite small the bolt holes have to be staggered on / off centres so that they don't clash – a type 1 reducing flange.

| Nominal Bore<br>DN | Flange Type | Face to Face (D)<br>mm | Diameter    |             | Liner Thickness<br>mm |
|--------------------|-------------|------------------------|-------------|-------------|-----------------------|
|                    |             |                        | PN 10<br>mm | PN 16<br>mm |                       |
| 20 x 15            | 1           | 30                     | 105         | 105         | 5                     |
| 25 x 15            | 1           | 30                     | 115         | 115         | 5                     |
| 25 x 20            | 1           | 30                     | 115         | 115         | 5                     |
| 40 x 15            | 2           | 30                     | 150         | 150         | 5                     |
| 40 x 20            | 2           | 30                     | 150         | 150         | 5                     |
| 40 x 25            | 1           | 30                     | 150         | 150         | 5                     |
| 50 x 15            | 3           | 30                     | 165         | 165         | 5                     |
| 50 x 20            | 2           | 30                     | 165         | 165         | 5                     |
| 50 x 25            | 2           | 30                     | 165         | 165         | 5                     |
| 50 x 40            | 1           | 35                     | 165         | 165         | 5                     |
| 80 x 20            | 3           | 35                     | 200         | 200         | 5                     |
| 80 x 25            | 3           | 35                     | 200         | 200         | 5                     |
| 80 x 40            | 2           | 35                     | 200         | 200         | 5                     |

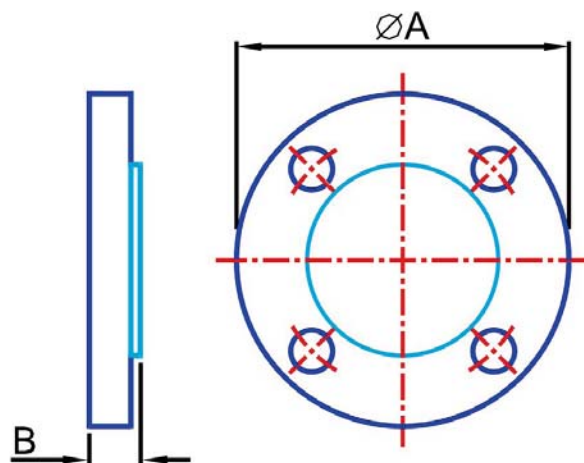


| Nominal Bore | Flange Type | Face to Face (D) | Diameter |       | Liner Thickness |
|--------------|-------------|------------------|----------|-------|-----------------|
|              |             |                  | PN 10    | PN 16 |                 |
| DN           |             | mm               | mm       | mm    | mm              |
| 80 x 50      | 1           | 35               | 200      | 200   | 5               |
| 100 x 20     | 3           | 35               | 220      | 220   | 5               |
| 100 x 25     | 3           | 35               | 220      | 220   | 5               |
| 100 x 40     | 3           | 35               | 220      | 220   | 5               |
| 100 x 50     | 2           | 35               | 220      | 220   | 5               |
| 100 x 80     | 1           | 35               | 220      | 220   | 5               |
| 150 x 25     | 3           | 40               | 285      | 285   | 5               |
| 150 x 40     | 3           | 40               | 285      | 285   | 5               |
| 150 x 50     | 3           | 40               | 285      | 285   | 5               |
| 150 x 80     | 3           | 40               | 285      | 285   | 5               |
| 150 x 100    | 2           | 40               | 285      | 285   | 5               |
| 200 x 25     | 3           | 35               | 340      | 340   | 5               |
| 200 x 40     | 3           | 35               | 340      | 340   | 5               |
| 200 x 50     | 3           | 40               | 340      | 340   | 5               |
| 200 x 80     | 3           | 40               | 340      | 340   | 5               |
| 200 x 100    | 3           | 40               | 340      | 340   | 5               |
| 200 x 150    | 2           | 40               | 340      | 340   | 5               |
| 250 x 50     | 3           | 35               | 395      | 405   | 4               |
| 250 x 80     | 3           | 35               | 395      | 405   | 4               |
| 250 x 100    | 3           | 35               | 395      | 405   | 4               |
| 250 x 150    | 3           | 35               | 395      | 405   | 4               |
| 250 x 200    | 2           | 35               | 395      | 405   | 4               |
| 300 x 50     | 3           | 35               | 445      | 460   | 4               |
| 300 x 80     | 3           | 35               | 445      | 460   | 4               |
| 300 x 100    | 3           | 35               | 445      | 460   | 4               |
| 300 x 150    | 3           | 35               | 445      | 460   | 4               |
| 300 x 200    | 3           | 35               | 445      | 460   | 4               |
| 300 x 250    | 2           | 35               | 445      | 460   | 4               |

| Materials |   |
|-----------|---|
| Steelwork | EN10222-2 Gr. P265GH / ASTM A516 GR.60  |
| Lining    | PFA to ASTM D3307 or PTFE to ASTM D4895 |

## Special Reducing Flanges

CRP can manufacture much larger flanges than listed. We can manufacture special adaptor flanges eg DIN to ASME or BS10 to ASME and can also supply other sizes not listed such as DN 300 x DN 20, DN 65 x DN 25 etc.



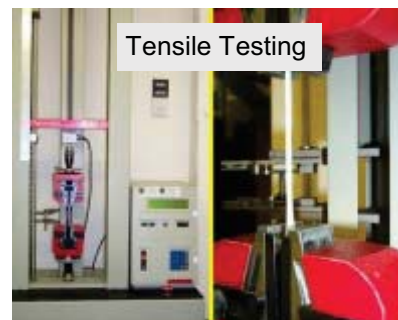
| Nominal Bore | Flange Diameter (A) |       | Raised Face | Flange Thickness (B)<br>PN10 | PTFE Liner Thickness |
|--------------|---------------------|-------|-------------|------------------------------|----------------------|
|              | PN 10               | PN 16 |             |                              |                      |
| DN           | mm                  | mm    | mm          | mm                           | mm                   |
| 15           | 95                  | 95    | 45          | 19                           | 3                    |
| 20           | 105                 | 105   | 58          | 21                           | 3                    |
| 25           | 115                 | 115   | 68          | 21                           | 3                    |
| 40           | 150                 | 150   | 88          | 21                           | 3                    |
| 50           | 165                 | 165   | 102         | 21                           | 3                    |
| 80           | 200                 | 200   | 138         | 23                           | 3                    |
| 100          | 220                 | 220   | 158         | 23                           | 3                    |
| 150          | 285                 | 285   | 212         | 25                           | 3                    |
| 200          | 340                 | 340   | 268         | 27                           | 3                    |
| 250          | 395                 | 405   | 320         | 29                           | 3                    |
| 300          | 445                 | 460   | 370         | 29                           | 3                    |

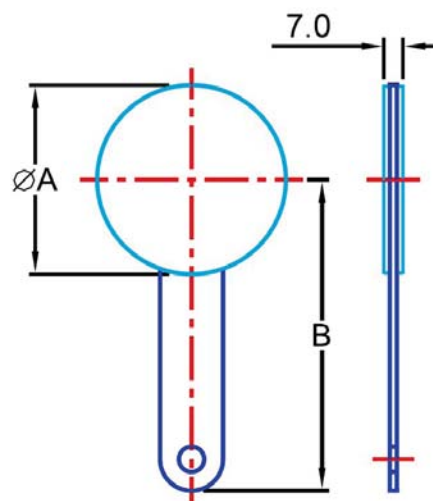
| Materials |                      |
|-----------|----------------------|
| Flange    | EN10222-2 Gr. P250GH |
| PTFE      | ASTM D4894           |



## Traceability and Testing

All lined equipment is traceable back through hard stamped references on the flanges to the original PFA or PTFE batch numbers. Liners are subjected to tensile testing and finished components subjected to electrostatic and hydrostatic testing.





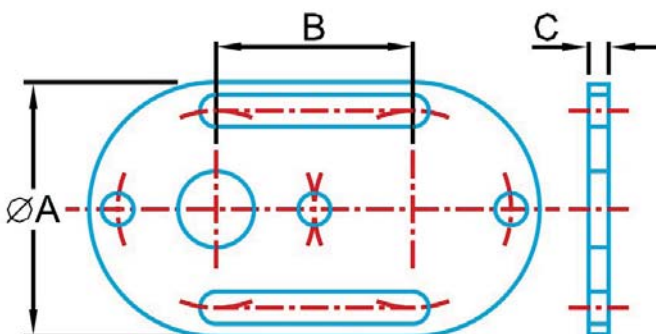
| Nominal Bore | Spade Diameter (A)<br>PN10 | Handle Length (B) | PTFE Liner<br>Thickness |
|--------------|----------------------------|-------------------|-------------------------|
| DN           | mm                         | mm                | mm                      |
| 15           | 51                         | 102               | 2                       |
| 20           | 61                         | 110               | 2                       |
| 25           | 71                         | 148               | 2                       |
| 40           | 92                         | 156               | 2                       |
| 50           | 107                        | 162               | 2                       |
| 80           | 142                        | 178               | 2                       |
| 100          | 162                        | 194               | 2                       |
| 150          | 218                        | 220               | 2                       |
| 200          | 273                        | 250               | 2                       |
| 250          | 328                        | 300               | 2                       |
| 300          | 378                        | 340               | 2                       |

| Materials |                        |
|-----------|------------------------|
| Flange    | 1.4301 (304 St. Steel) |
| PTFE      | ASTM D4894             |




## Orifice Plates

CRP can supply solid PTFE orifice plates with holes drilled to suit your application. Orifice plates can be used to control flow or help in flow measurement. We can supply them to suit a wide range of pipe nominal bores, they are generally supplied in virgin PTFE but other materials can be provided.



| Nominal Bore | Flange Diameter (A) |       | Dimension (B) |       | Face to Face (C) |
|--------------|---------------------|-------|---------------|-------|------------------|
|              | PN 10               | PN 16 | PN 10         | PN 16 |                  |
| DN           | mm                  | mm    | mm            | mm    | mm               |
| 15           | 95                  | 95    | 65            | 65    | 10               |
| 20           | 105                 | 105   | 75            | 75    | 10               |
| 25           | 115                 | 115   | 85            | 85    | 10               |
| 40           | 150                 | 150   | 110           | 110   | 10               |
| 50           | 165                 | 165   | 125           | 125   | 16               |
| 80           | 200                 | 200   | 160           | 160   | 16               |
| 100          | 220                 | 220   | 180           | 180   | 27               |
| 150          | 285                 | 285   | 240           | 240   | 27               |
| 200          | 340                 | 340   | 295           | 295   | 27               |
| 250          | 395                 | 405   | 350           | 355   | 27               |
| 300          | 445                 | 460   | 400           | 410   | 27               |


| Materials |            |
|-----------|------------|
| PTFE      | ASTM D4894 |

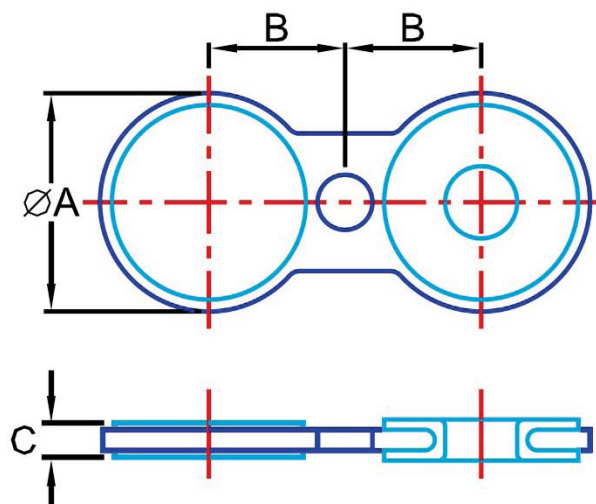


**User Manual**

**Installation and Operating Guidance**

Detailed storage, installation and operation guidance can be found for all CRP products in our handy "User Manual" This is supplied with all deliveries and can also be downloaded from our website from the Technical Info section.





| Nominal Bore | Diameter (A) |       | Dimension (B) |       | Face to Face (C) |
|--------------|--------------|-------|---------------|-------|------------------|
|              | PN 10        | PN 16 | PN 10         | PN 16 |                  |
| DN           | mm           | mm    | mm            | mm    | mm               |
| 15           | 51           | 51    | 32.5          | 32.5  | 11               |
| 20           | 61           | 61    | 37.5          | 37.5  | 11               |
| 25           | 71           | 71    | 42.5          | 42.5  | 11               |
| 40           | 92           | 92    | 55.0          | 55.0  | 11               |
| 50           | 107          | 107   | 62.5          | 62.5  | 11               |
| 80           | 142          | 142   | 80.0          | 80.0  | 11               |
| 100          | 162          | 162   | 90.0          | 90.0  | 11               |
| 150          | 218          | 218   | 120.0         | 120.0 | 19               |
| 200          | 273          | 273   | 147.5         | 147.5 | 19               |
| 250          | 328          | 329   | 175.0         | 177.5 | 28               |
| 300          | 378          | 384   | 200.0         | 205.0 | 28               |

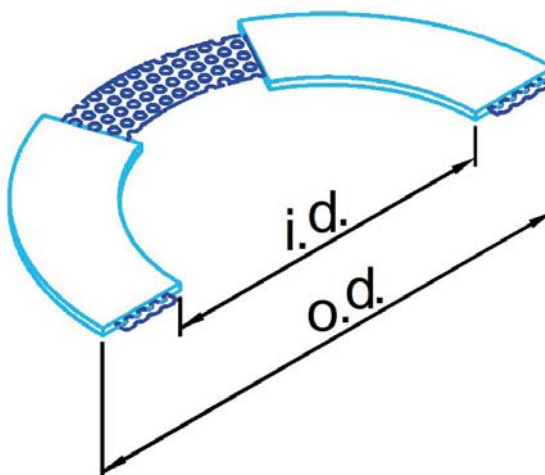
| Materials |                   |
|-----------|-------------------|
| Steelwork | ASTM A516 GR.60   |
| PTFE      | ASTM D4894 / 4895 |



## ISO 9001:2015 Accreditation

CRP is an ISO 9001:2015 approved company. Originally accredited to BS5750 Part 1 in 1992, CRP maintains this accreditation through a process of continuous third party surveillance with, six monthly, annual and triennial audits taking place. The company was one of the first in the UK to obtain approval to the upgraded version ISO 9001:2015. All of the company's manufacture and test procedures fall within this regime.





| Nominal Bore | Gasket o.d.<br>PN 10 | Gasket o.d.<br>PN 16 | Gasket i/d<br>PN 10 | Gasket i/d<br>PN 16 | Thickness |
|--------------|----------------------|----------------------|---------------------|---------------------|-----------|
| DN           | mm                   | mm                   | mm                  | mm                  | mm        |
| 15           | 50                   | 50                   | 22                  | 22                  | 3.0       |
| 20           | 60                   | 60                   | 28                  | 28                  | 3.0       |
| 25           | 70                   | 70                   | 35                  | 35                  | 3.0       |
| 40           | 92                   | 92                   | 49                  | 49                  | 3.0       |
| 50           | 107                  | 107                  | 61                  | 61                  | 3.0       |
| 80           | 142                  | 142                  | 90                  | 90                  | 3.0       |
| 100          | 162                  | 162                  | 115                 | 115                 | 3.0       |
| 150          | 218                  | 218                  | 169                 | 169                 | 3.0       |
| 200          | 273                  | 273                  | 220                 | 220                 | 3.0       |
| 250          | 328                  | 330                  | 274                 | 274                 | 3.0       |
| 300          | 378                  | -                    | 325                 | -                   | 3.0       |
| 350          | 438                  | -                    | 368                 | -                   | 3.0       |
| 400          | 490                  | -                    | 420                 | -                   | 3.0       |
| 450          | 540                  | -                    | 470                 | -                   | 3.0       |
| 500          | 595                  | -                    | 520                 | -                   | 3.0       |
| 600          | 695                  | -                    | 620                 | -                   | 3.0       |

Toughgask reusable gaskets can be used in nearly all applications to seal metallic flange joints. They are far superior and cost effective compared with other designs such as envelope gaskets as they are reusable many times. Their design is extremely robust and they are very easy to install.

The Toughgask gasket offers superior performance than a standard virgin PTFE gasket as its stainless steel core prevents cold flow of the PTFE which can lead to joint failure.



Flange sprayguards are used to protect personnel from uncontrolled spray out from a failing flange joint. They should always be considered when installing any piping system carrying toxic or corrosive chemicals. By controlling the leak and protecting personnel and surrounding plant equipment from chemical contact considerable cost savings can be made. They help to minimise accidents on plant preventing costly plant down time, unplanned absenteeism, HSE investigations etc.

The CRP Flange Spray Guards Roll has been designed to be very cost effective, manufactured from hardwearing polypropylene they have very good chemical resistance, are UV resistant and can be reused.

Very easy to install, they are supplied as a roll, the correct length is cut from the roll and then wrapped around the flange joint, they are secured with a stainless steel self tapping screw.

If a spray out were to occur the spray is safely deflected diminishing the force of the spray.

The spray out is deflected not contained so the guard is never pressurised.

Three widths of Spray Guard will cover most piping installations

The Spray Guards are suitable for use on piping ranging from -40°C to +110°C.

Available by the metre, CRP Spray Guard is available in 5 roll widths, 50mm, 70mm, 100mm, 140mm and 180 mm to cover flange joint sizes from 15mm up to 600mm nominal bore. Typically only 2 or 3 widths can cover most installations on site.

The table below shows the correct width required for typical flange joints and the cut length of sprayguard required for each flange nominal bore.



| Nominal Bore | Length Required |       | Width of roll required for each type of mating flange connection to be shielded |                  |                     |
|--------------|-----------------|-------|---|------------------|---------------------|
|              | PN 10           | PN 16 | Fixed / Fixed   | Fixed / Rotating | Rotating / Rotating |
| mm           | mm              | mm    |   |                  |                     |
| 15           | 360             | 360   | 50  | 70               | 70                  |
| 20           | 390             | 390   | 50  | 70               | 100                 |
| 25           | 420             | 420   | 50  | 70               | 100                 |
| 40           | 530             | 530   | 50  | 70               | 100                 |
| 50           | 580             | 580   | 50  | 70               | 100                 |
| 80           | 690             | 690   | 50  | 70               | 100                 |
| 100          | 750             | 750   | 70  | 100              | 100                 |
| 150          | 960             | 960   | 70  | 100              | 140                 |
| 200          | 1130            | 1130  | 100   | 100              | 140                 |
| 250          | 1300            | 1330  | 100   | 140              | 140                 |
| 300          | 1460            | 1510  | 100   | 140              | 140                 |
| 350          | 1650            | 1700  | 100   | 140              | 180                 |
| 400          | 1840            | 1880  | 140   | 140              | 180                 |
| 450          | 1990            | 2070  | 140   | 180              | 180                 |
| 500          | 2170            | 2310  | 140   | 180              | N/A                 |
| 600          | 2510            | 2700  | 140   | 180              | N/A                 |



Flange Safety Spray Shields provide protection to personnel and plant equipment in the surrounding area if a flange joint should start to leak. CRP would strongly recommend that they should be installed as part of any flanged piping system conveying hot, corrosive or toxic chemicals. Our flange guards can be used on all our piping systems up to 200°C and are easy to install with 2 tie cords. Our standard design has PTFE coated extra strong 3 ply glass fibre fabric with a clear FEP window to allow easy inspection of the joint. CRP's PTFE lined products are mainly used to convey very corrosive products. Safety regulations stipulate that consideration must be made for reducing the effects of leaks to the environment and personnel. CRP safety shields are a recommended addition to any piping system and would be looked on favourably by the regulating authorities.

- Recommend by Insurance companies.
- Helps to contain leaks until the pipe line can be isolated.
- Reduces risk of operator and plant damage.
- Clear window allows easy inspection of flange joint.
- Heavy duty 3-ply PTFE coated glass fibre construction.
- FEP and PTFE glass fibre construction for use at temperatures up to 200° C.
- One size covers all joint thicknesses from fixed / fixed flanges to rotating / rotating
- Manufactured from UV and weather resistant materials for long life.
- Available to suit both DIN and ASME150 flange sizes.
- Available from stock at CRP up to size DN150
- Please contact CRP for a quotation for spray guards.

We also supply matching bellows spray guards, which not only protect against spray out from failing flange joints but also covers the whole PTFE bellows.



# Static Dissipating Lined Piping & Spikie Earthing Washers

CRP can supply lined pipe and fittings with static dissipating PTFE / PFA liners, commonly referred to as having 'Antistatic' properties. By combining the PTFE or PFA fluoropolymers with a small amount of carbon filler the liners are able to conduct any build up of static from the bore of the pipe to the steelwork.

There are many ways that electrostatic charge can be generated and accumulate. Static electricity develops when two different materials are brought together and then separated, one of the materials acquires electrons from the other material and becomes positively charged.

In pipe lines carrying low conductivity fluids, the fluid can lose some of its electrons and these can accumulate or 'charge' the pipework. This process is known as flow electrification, the charge build up increases as flow velocity and pipe nominal bore increase.

CRPs standard virgin fluoropolymers have excellent insulating properties, so in certain situations electrical charge can accumulate on the liner surface through flow electrification. CRPs static dissipating liners allow any build up of charge to safely dissipate through the liner to the steel pipe. For the electrical charge to dissipate to earth the steel pipe must be sufficiently earthed, typically using earth bonding clamps, spikie washers, star washers on bolts, earthing studs or lugs etc. CRP are able to supply the pipe spool with earth studs/lugs or Spikie® earthing washers already welded or fitted in position.



The fillers used to provide the electrical continuity do not impair in any way the mechanical and chemical resistance of the liners. They exhibit the same performance as virgin liners, the conducting agent used within the liners are stable and are not subjected to chemical attack and will not leach into the process fluids.

All of our lined pipe and fittings range can be supplied with static dissipating liner.

## Spikies

To aid with earth bonding of the steel pipe CRP has specially developed our own Spikey™ washer which is a very cost effective alternative to earth bonding straps.

Spikies™ are simply slipped into place between the loose flange and stub end on a pipe spool or fitting, and the joint made using star washers and studs as on a fixed flange joint. Once in place the centring lugs ensure that the raised points on the Spikies® are positioned to bite into the front of the flange face and the back of the stub end, thus providing earth continuity from rotating flange to fitting / spool. Star washers on at least one connecting bolt must be used in conjunction with the Spikie to allow continuity across the joint.

## Development

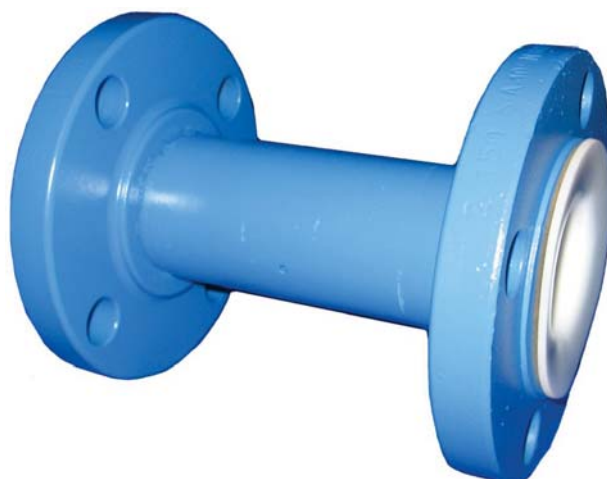
The extensive design, development and testing programme for Spikies® has ensured that the optimum spring steel substrate and nickel corrosion protection coating materials have been used, along with a design that makes Spikies® a truly durable fit and forget solution to process plant pipework earth continuity issues.

Nb. CRP recommends the replacement of Spikies™ whenever a joint is split.

## Cost and Reliability

The Spikey provides a robust and cost effective solution to achieving earth continuity between the pipe body and a rotating flange. It can be supplied factory fitted or can easily be retro-fitted in the field.



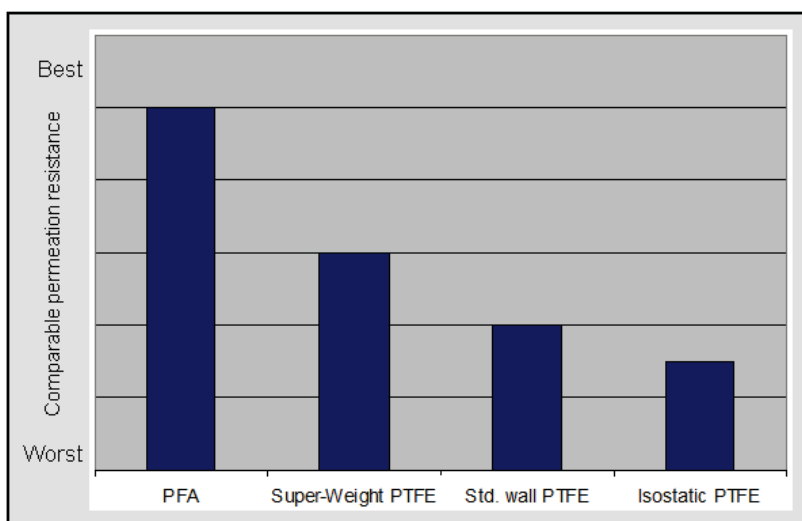


Bromine along with other members of the halogen family is highly reactive, over time this can lead over time to molecules permeating through fluoropolymer linings used to carry this highly corrosive chemical. Working closely with a global agricultural chemical manufacturer CRP has developed a special lined piping range utilising super-weight paste extruded PTFE liners and PFA moulded fittings.

PFA is well known for its excellent permeation resistance properties often double that of PTFE and a natural choice for Bromine applications. Life spans of piping are extended by supplying extra heavy wall PTFE liners up to 50% thicker than our standard heavy wall liners

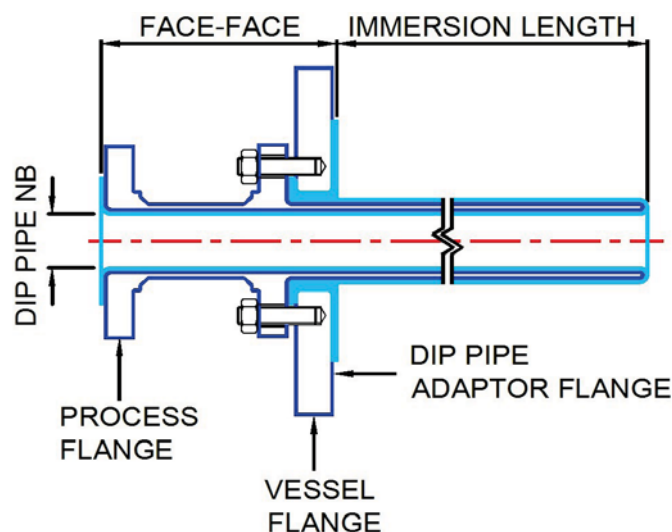
## Super Weight Piping Specification

- PFA lined fittings – Heavy wall typically 5mm or more thick.
- PTFE paste extruded liners. Offer superior permeation resistance than isostatically formed liners.
- ¼" vent bosses supplied at each end of pipe spools, fitted with PTFE vent plugs, help minimise local corrosion.
- All usual CRP quality, testing & inspection standards adhered to.



Typical permeation failure of isostatically formed liner





CRP dip pipes have a wide array of uses. Typically they are used to charge a reactor below the liquid level, to extract samples from the reactor as part of one of our sampling systems, or to drain liquid from a vessel without the need of side or bottom outlet.

CRP dip pipes are manufactured from a carbon steel fabricated construction with a continuously lined paste extruded PTFE liner. One piece of PTFE liner lines and protects both the inner and outer diameters of the dip pipe. Our advanced manufacturing techniques enable us to produce dip pipes without any pinched or welded ends eliminating a potential weak point completely.

Having all wetted parts in PTFE gives excellent corrosion resistance.  
Dip pipes can be supplied straight or curved to angle liquor to the side of the reactor etc.

Powerful agitator blades can create a lot of stress on components installed in a reactor vessel. Before we supply any dip pipes we thoroughly check that the mechanical strength of the dip pipe will be sound against the specific process conditions. This is extremely important to save on very costly breakages.

| Nominal Bore | Face to Face | Maximum Immersion | PTFE liner Thickness | Vessel flange range | Minimum id of vessel flange |
|--------------|--------------|-------------------|----------------------|---------------------|-----------------------------|
| DN           | mm           | mm                | mm                   | DN                  | mm                          |
| 25           | 150          | 2850              | 2.5                  | 40 - 600            | 45                          |
| 40           | 150          | 2850              | 2.8                  | 50 - 600            | 60                          |
| 50           | 150          | 2850              | 3.0                  | 80 - 600            | 73                          |
| 80           | 150          | 2850              | 3.0                  | 100 - 600           | 101                         |
| 100          | 150          | 2650              | 4.5                  | 150 - 600           | 130                         |



## Entry Pipes / Nozzle liners

Where there is little need for mechanical strength offered by CRPs lined steel dip pipes, CRPs Entry pipes can be an ideal low cost solution to introduce liquor into a storage vessel etc.. They are manufactured from paste extruded PTFE flared one end to raised face dimensions to connect between suitable mating flanges.

They can be supplied in any length up to 6000mm long and generally available in sizes from DN 20 to DN 150. Entry pipes are often used to protect the bores of glass lined vessels from mechanical damage, being a sacrificial sleeve.