

# PIPE FITTINGS & FLANGES



# Galvanised Malleable Fittings

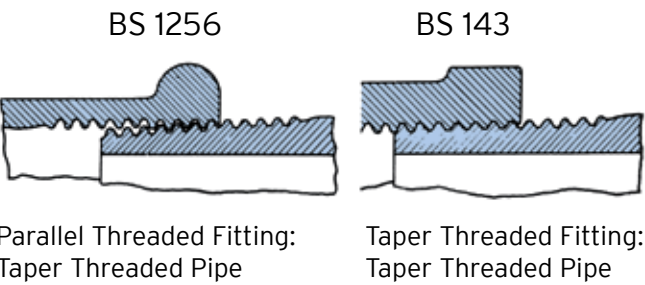
**MATERIALS** Blackheart Malleable Iron castings.

**DIMENSIONS** generally to ASME B16.3 or JIS B2301, depending on manufacturing source. JIS B2301 dimensions are generally considered to be corresponding values to BS143 and BS1256, although some sizes are not exact equivalents.

**THREADING** is BSP pipe thread, to BS.21 (AS 1722, Part 1).

The specification for BS 143 fittings is:  
Taper External (Series R) Taper Internal (Series RC)

The specification for BS 1256 fittings is:  
Taper External (Series R) Parallel Internal (Series RP)



**ALTERNATIVE THREADING** to special order.

**NPT** (API linepipe threads) Taper Internal/Taper External can be supplied for fittings to American specification ANSI B16.3.

**NOTE:** Locknuts and Plain Sockets without ribs, are supplied with parallel threads.

## FINISH

Hot Dip Galvanised is the standard finish for stock.

## TESTING

Fittings shall be subject to an internal hydraulic pressure of 2068 kPa without showing any sign of leakage or abnormality.

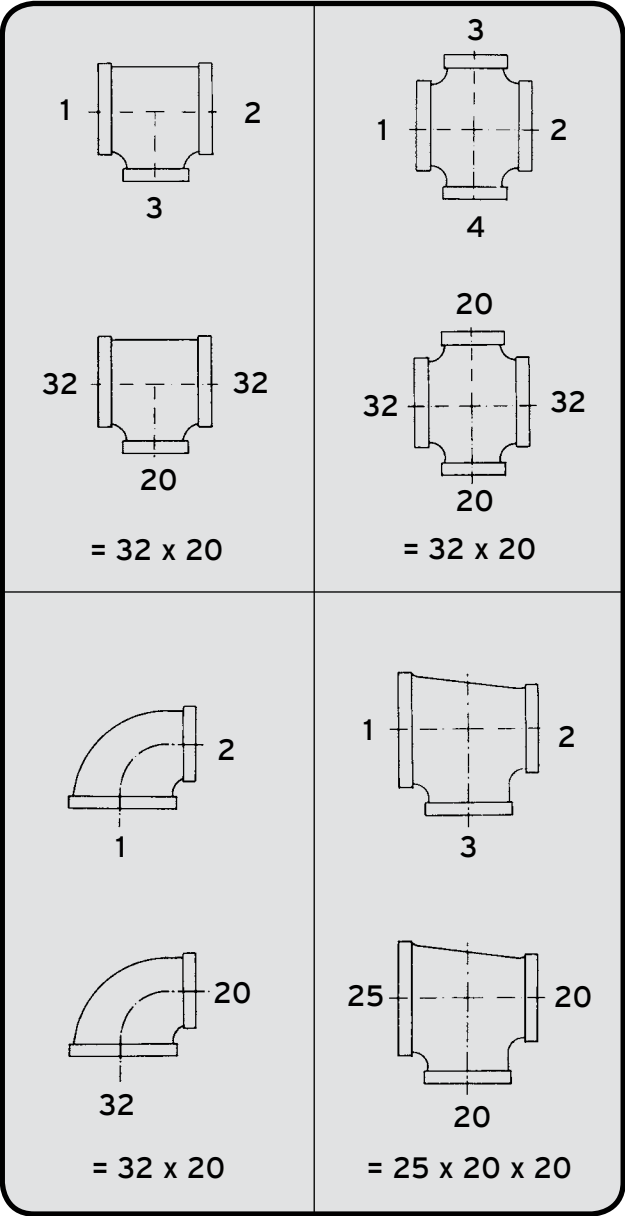
**WORKING PRESSURES** (except flanges)  
Recommended maximum working pressures are 1379 kPa for water and 1034 kPa for steam, air, gas and oil.

**NOTE:** Working pressures may also be limited by relevant Pressure Piping Codes or Industry regulations.

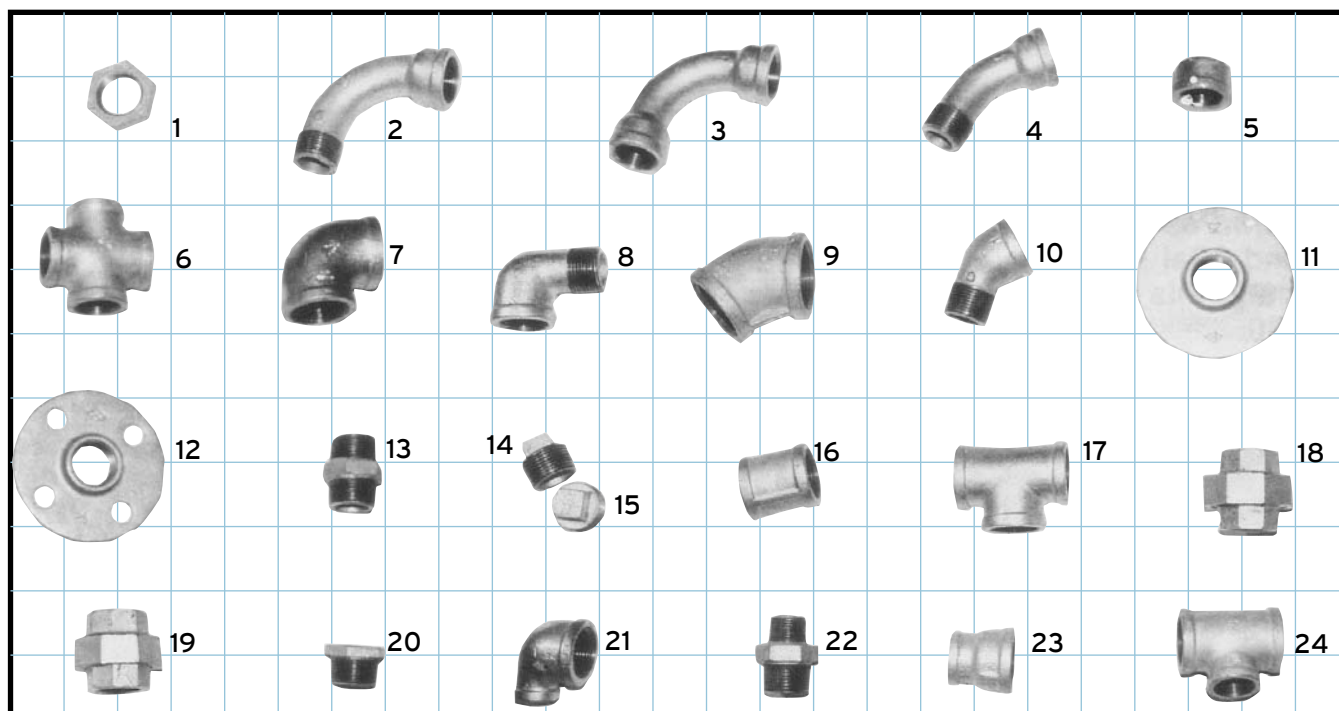
## UNEQUAL SIZES

When ordering Reducing Sockets, Nipples, Bushes and Elbows, always state largest size first – e.g. 80 x 40 bush.

When ordering 3- or 4- way fittings, the sizing sequence illustrated below should be adopted.



# Galvanised Malleable Fittings



| Nominal Range - Equal & Reducing Fittings (all sizes shown in mm) |                           |              |              |
|---|---------------------------|--------------|--------------|
| Number  | Item                      | Minimum Size | Maximum Size |
|   | Adaptor (not illustrated) | 15           | 50           |
| 1   | Backnut                   | 8            | 150          |
| 2   | Bend 90° M&F              | 8            | 150          |
| 3   | Bend 90° F&F              | 8            | 100          |
| 4   | Bend 45° M&F              | 15           | 50           |
| 5   | Cap                       | 8            | 150          |
| 6   | Cross                     | 10           | 100          |
| 7   | Elbow 90° F&F             | 8            | 150          |
| 8   | Elbow 90° M&F             | 8            | 100          |
| 9   | Elbow 45° F&F             | 15           | 100          |
| 10  | Elbow 45° M&F             | 15           | 50           |
| 11  | Flange – Undrilled        | 15           | 150          |
| 12  | Flange – Drilled          | 15           | 150          |
| 13  | Hex Nipple                | 8            | 150          |
| 14  | Plug – Hollow.            | 8            | 150          |
| 15  | Plug – Solid              | 15           | 50           |
| 16  | Socket                    | 8            | 150          |
| 17  | Tee                       | 8            | 150          |
| 18  | Union – Flat Seat         | 8            | 150          |
| 19  | Union – Brass Seat F&F    | 8            | 100          |
| 20  | Bush – Reducing           | 10 x 6       | 150 x 125    |
| 21  | Elbow – Reducing F&F      | 15 x 8       | 50 x 40      |
| 22  | Hex Nipple – Reducing     | 10 x 8       | 100 x 80     |
| 23  | Sockets – Reducing        | 10 x 8       | 100 x 80     |
| 24  | Tees – Reducing           | 15 x 8       | 100 x 80     |
| 24  | Tees – Reducing Special   | 20 x 15      | 80 x 50      |

# Black & Galvanised Steel Fittings

Screwed Steel Pipe fittings are designed for use with "Medium" and "Heavy" pipes to AS 1074. These BS EN 10241 fittings are the recognised Standard for Medium Pressure Screwed Pipework. Tubular items in this range conform to AS 1074.

## SPECIFICATION

BS EN 10241 "Steel Threaded Pipe Fittings, Screwed BSP Thread".

Australian Standard 1074 "Steel Tubes and Tubulars Threaded or suitable for Threading with Pipe Threads of Whitworth Form".

Australian Standard 1650 "Galvanised Coatings on Ferrous Articles".

## MATERIAL

**Tubulars:** These are manufactured from tubing made in accordance with AS 1074 from steel with 0.06 max sulphur and 0.06 max phosphorus.

**Machined Fittings:** These are manufactured to dimensions in BS EN 10241:2000 and generally made from "Free Cutting Steel".

## FINISH

### Surface Condition

- Black Steel:** These fittings are generally degreased and protected with a coating of light oil.
- Zinc Protective Coating:** Fittings may be supplied zinc plated using the Electrolytic Zinc Coating process on finished Black Fittings.
- Hot Dip Zinc Galvanising:** Galvanising of fittings shall be performed before the thread cutting operation, by means of the hot dip method.
- Zinc Flake:** Fittings may be supplied Zinc Flake Coated. This process being performed on Finished Black Fittings.

## THREADING

Threads for the screwed ends of fittings comply to the appropriate requirements of AS 1722

Part 1: Sealing pipe threads and also ISO 7-1.

**Female Ends:** Normally supplied with parallel thread.

**Male Ends:** Normally supplied with taper threads.

## PERMISSIBLE WORKING PRESSURES

TABLE 1 TAPER/PARALLEL THREAD – NON-GAS APPLICATIONS

| Type of Service            |                               |      |                         |                        |     |                       |     |  |     |                       |     |
|----------------------------|-------------------------------|------|-------------------------|------------------------|-----|-----------------------|-----|--|-----|-----------------------|-----|
| Nominal<br>Bore of<br>Pipe | Water & Inert Oil<br>Med. Hvy |      | L.P.G.<br>Med &<br>Hvy. | Fuel Oil               |     |                       |     | Other Applications (Inc.<br>Steam & Compressed Air |     |                       |     |
|                            |                               |      |                         | Medium Press.<br>Temp. |     | Heavy Press.<br>Temp. |     | Medium Press.<br>Temp.                             |     | Heavy Press.<br>Temp. |     |
|                            | mm                            | kPa  | kPa                     | kPa                    | kPa | C <sup>o</sup>        | kPa | C <sup>o</sup>                                     | kPa | C <sup>o</sup>        | kPa |
| *25                        | 2070                          | 2410 | 140                     | 1030                   | 100 | 1210                  | 192 | 1210   | 100 | 1210                  | 192 |
| 32                         | 1720                          | 2070 | 140                     | 1030                   | 100 | 1030                  | 192 | 1030   | 100 | 1030                  | 192 |
| 40                         | 1720                          | 2070 | 140                     | 1030                   | 100 | 1030                  | 192 | 1030   | 100 | 1030                  | 192 |
| 50                         | 1380                          | 1720 | 140                     | 860                    | 100 | 860                   | 192 | 860  | 100 | 860                   | 192 |
| 65                         | 1380                          | 1720 |                         | 860                    | 100 | 860                   | 192 | 860  | 100 | 860                   | 192 |
| 80                         | 1380                          | 1720 |                         | 860                    | 100 | 860                   | 192 | 860  | 100 | 860                   | 192 |
| 100                        | 1030                          | 1380 |                         | 690                    | 100 | 860                   | 192 | 690  | 100 | 690                   | 192 |
| 125                        | 1030                          | 1380 |                         |                        |     |                       |     |  |     |                       |     |
| 150                        | 860                           | 1030 |                         |                        |     |                       |     |  |     |                       |     |

\*Up to and including

TABLE 2 TAPER/TAPER THREAD – NON-GAS APPLICATIONS

| Type of Service            |                               |      |                         |                        |     |                       |     |   |     |                       |     |
|----------------------------|-------------------------------|------|-------------------------|------------------------|-----|-----------------------|-----|---|-----|-----------------------|-----|
| Nominal<br>Bore of<br>Pipe | Water & Inert Oil<br>Med. Hvy |      | L.P.G.<br>Med &<br>Hvy. | Fuel Oil               |     |                       |     | Other Applications (Inc.<br>Steam & Compressed Air) |     |                       |     |
|                            |                               |      |                         | Medium Press.<br>Temp. |     | Heavy Press.<br>Temp. |     | Medium Press.<br>Temp.                              |     | Heavy Press.<br>Temp. |     |
|                            | mm                            | kPa  | kPa                     | kPa                    | kPa | C <sup>o</sup>        | kPa | C <sup>o</sup>                                      | kPa | C <sup>o</sup>        | kPa |
| *25                        | 3450                          | 4140 | 340                     | 1030                   | 100 | 1210                  | 192 | 1210  | 100 | 1210                  | 192 |
| 32                         | 2760                          | 3450 | 340                     | 1030                   | 100 | 1210                  | 192 | 1210  | 100 | 1210                  | 192 |
| 40                         | 2760                          | 3450 | 340                     | 1030                   | 100 | 1210                  | 192 | 1210  | 100 | 1210                  | 192 |
| 50                         | 2410                          | 3100 | 340                     | 1030                   | 100 | 1210                  | 192 | 1210  | 100 | 1210                  | 192 |
| 65                         | 2410                          | 3100 |                         | 1030                   | 100 | 1210                  | 192 | 1210  | 100 | 1210                  | 192 |
| 80                         | 2070                          | 2760 |                         | 1030                   | 100 | 1210                  | 192 | 1210  | 100 | 1210                  | 192 |
| 100                        | 1720                          | 2070 |                         | 1030                   | 100 | 1030                  | 192 | 1030  | 100 | 1210                  | 192 |
| 125                        | 1720                          | 2070 |                         |                        |     |                       |     |   |     |                       |     |
| 150                        | 1380                          | 1720 |                         |                        |     |                       |     |   |     |                       |     |

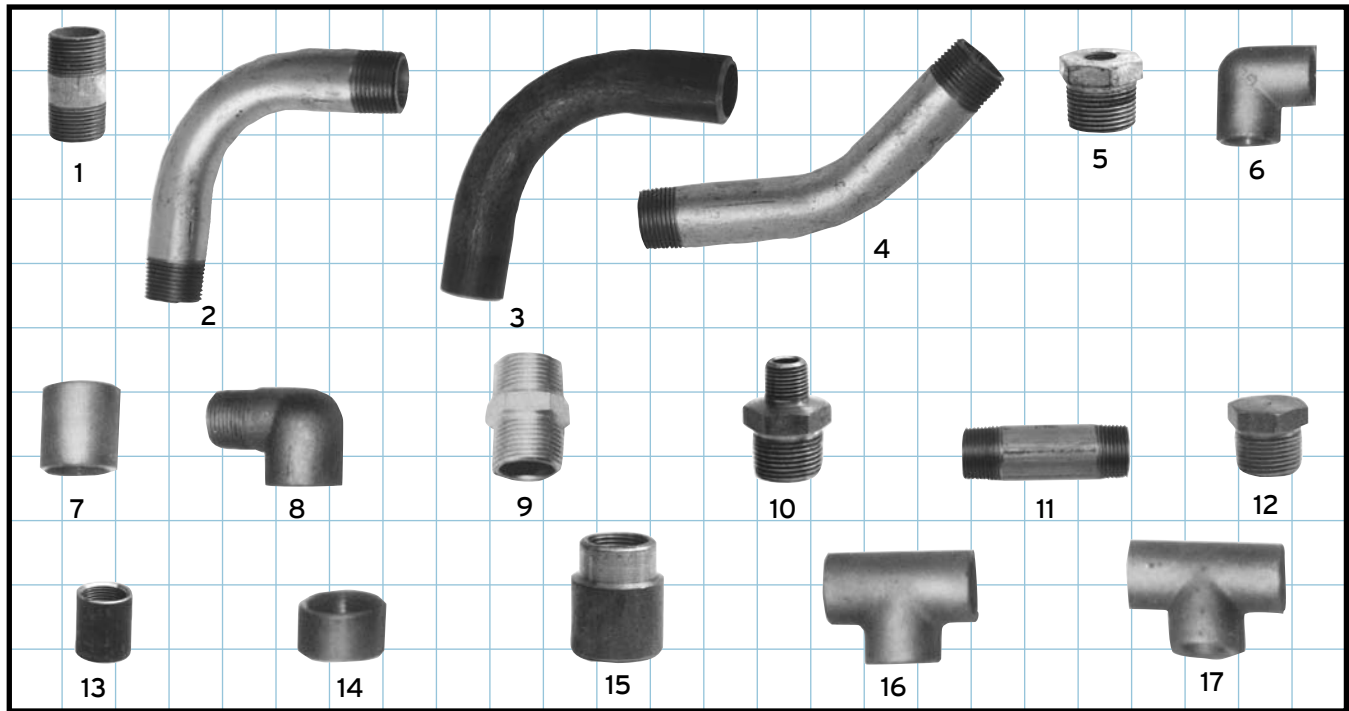
\*Up to and including

TABLE 3 TAPER/TAPER THREAD – GAS APPLICATIONS TO AS 1697

| Nominal Bore of Pipe | Med & Hvy. |
|----------------------|------------|
| mm                   | kPa        |
| *25                  | 1030       |
| 32                   | 1030       |
| 40                   | 1030       |
| 50                   | 1030       |
| 65                   | 1030       |
| 80                   | 1030       |
| 100                  | 1030       |

\*Up to and including

# Black & Galvanised Steel Fittings



| Nominal Stock Ranges (all sizes shown in mm) |  |                       |  |
|--|--|-----------------------|--|
| Number                                       | Item   | Minimum Size          | Maximum Size                             |
| 1  | Barrel Nipple (Manufactured from heavy pipe) | 8                     | 80                                       |
| 2  | 90° Bend (M&M)                               | 8                     | 150                                      |
| 3  | 90° Bend (B/E) (Available black only)        | 8                     | 150                                      |
| 4  | 45° Bend (M&M)                               | 15                    | 100                                      |
| 5  | Reducing Bush                                | 8 x 6                 | 100 x 80                                 |
| 6  | Elbow F&F                                    | 6                     | 150                                      |
| 7  | Cap  | 8                     | 100                                      |
| 8  | Elbow (M&F)                                  | 8                     | 100                                      |
| 9  | Hex Nipple (Equal)                           | 6                     | 100                                      |
| 10   | Hex Nipple (Reducing)                        | 8 x 6                 | 100 x 80                                 |
| 11   | Pipe Piece (Manufactured from medium pipe).  | Dia. 15<br>Length 100 | Dia. 50<br>Length 600 in 50mm increments |
| 12   | Plug (Hexagon)                               | 6                     | 100                                      |
| 13   | Socket (Equal) (To AS 1074)                  | 6                     | 150                                      |
| 14   | Half Socket                                  | 6                     | 150                                      |
| 15   | Socket (Reducing)                            | 8 x 6                 | 150 x 100                                |
| 16   | Tee (Equal)                                  | 6                     | 150                                      |
| 17   | Tee (Reducing)                               | 10 x 8                | 150 x 100                                |

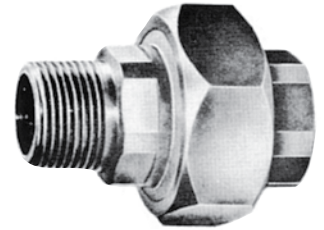
\*Larger sizes available to order.

# Black & Galvanised Steel Unions

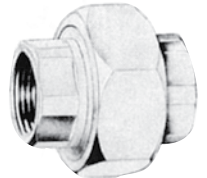
**BLACK STEEL UNIONS** are used in a wide range of make-and-break joints requiring periodic disconnection. Available in Steel-Steel, Steel-Bronze and Bronze-Bronze seats in Female-Female and Male-Female types.

Black Steel Unions are all-purpose unions coated in black oxide to give protection to the fitting until assembled to piping.

**ZINC-COATED UNIONS** are Electro Zinc Plated. This process gives a complete coating both externally and internally which protects the Union at thread and vital seat areas.



Black



Zinc Coated

## WORKING PRESSURES

- For standard screwed unions  
8 to 25mm up to 21000 kPa Cold Working Pressure  
32 to 100mm up to 14000 kPa Cold Working Pressure  
For Steam Pressures and Temperatures refer to SAA Boiler Code

## RANGE

- 6mm to 100mm nominal pipe size

## SEATINGS

Steel-Steel. A general purpose combination recommended where vibration is present, the most economically priced.

Steel-Bronze. A good combination where corrosion is present and when periodic disconnection is required.

Bronze-Bronze. Should corrosion be a major factor, and where consistent disconnection is required.

## THREADING

- BSP Taper M and F Threads to AS 1722 Part 1.

# Stainless Steel Screwed Fittings - BSP



## RANGE

Caps, Elbows 90°, Elbows 45°, Hex Nipples (equal and reducing), Plugs, Sockets (equal and reducing), Tees (equal and reducing), Bushes, Unions, Barrel Nipples and Flanges.

## MATERIAL

ASTM A351 Grade 316 (CF8M).

## THREAD

BSP (Male – taper, female – parallel).

## PRESSURE

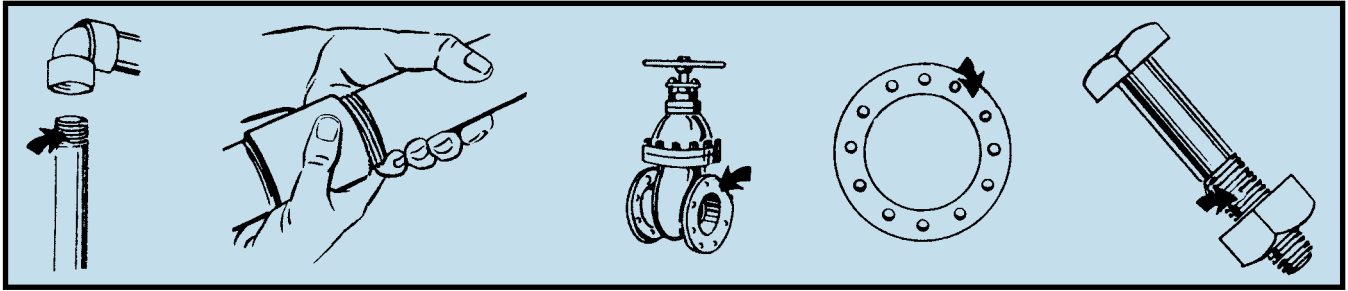
Nominal 1000 kPa working pressure, 2000 kPa test.

## SIZE RANGE

Generally 6-50mm, with larger sizes available to order.



# Sealants for Threaded Joints



Our comprehensive piping package includes a variety of accessory products for use with pipes and fittings. These include flange bolts, as well as a range of sealing materials for threaded and flanged joints. For threaded joints the most popular materials are shown below.

## PTFE ("TEFLON") TAPE

For high or low temperature sealing. Ideal for gas or liquid lines, it is one of the cleanest and easiest ways to connect threaded pipes, fittings and valves.

A 50% overlap should be allowed when applying PTFE Tape.

A variety of tapes are available to suit specific needs including:

|                       |  |
|-----------------------|--|
| WHITE GENERAL PURPOSE | 10m roll x 12, 19 or 25mm wide<br>(19mm and 25mm comply with BS4375) |
| YELLOW GAS TAPE       | 10m roll x 12mm wide<br>AGA Approval No. 5582                        |
| PINK PLUMBERS TAPE    | 10m roll x 12mm wide   |



## PLUMBERS HEMP

26m rolls, for use with soap or any jointing paste which is compatible with the line fluid.



## PLUMBERS SOAP

Principally for water use, available in 500gm bars.



# Flanges to Australian Standards

## FLANGE TYPES

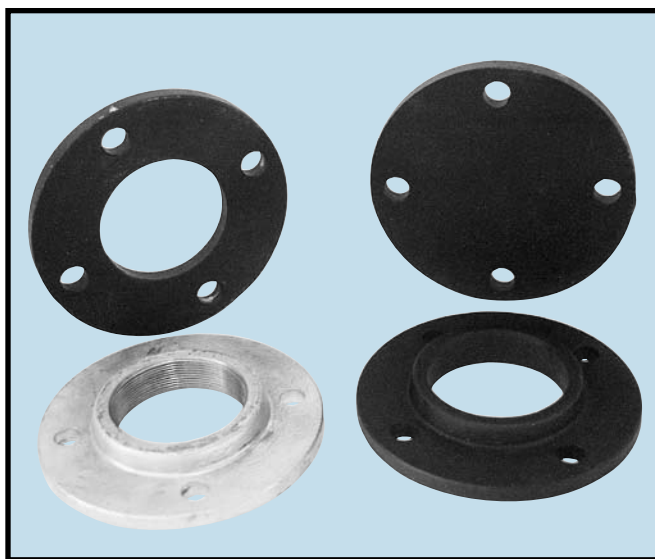
Specification AS 2129 covers plain face, raised face, plain face with "O"-ring flanges in plate or forged as specified. Types available are slip-on weld or blank in plate and threaded, slip-on or weldneck in forged material. Standard flanges are flat faced.

## THREADING

Boss Flanges not exceeding 150mm may be supplied threaded with a parallel or taper thread in accordance with AS 1722.

## MATERIAL

This section covers flanges made from steel forgings and plates, but AS 2129 also applies to Stainless Steel. Forged steel flanges conform to BS 10.



## RANGE

| FORGED                                  | NOM SIZE |
|---|----------|
| Table D (Galv) Threaded                 | 15-150mm |
| Table D (Black) Slip-on weld            | 15-200mm |
| Table E (Black) Slip-on weld & Threaded | 15-200mm |
| Table H (Black) Slip-on weld & Threaded | 15-200mm |

| PLATE                    | NOM SIZE |
|--------------------------|----------|
| Table D & E Slip-on weld | 15-600mm |
| Table D & E Blank        | 15-600mm |
| Table H Slip-on weld     | 15-600mm |
| Table H Blank            | 15-600mm |

## TEMPERATURE-PRESSURE RATINGS FOR CARBON STEEL FLANGES

| Flange<br>Table | Pressure, kPa*  |               |        |        |        |        |        |        |        |       |       |       | Max hydro-<br>static test<br>pressure<br>kPa |
|-----------------|-----------------|---------------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|--|
|                 | Temperature, °C |               |        |        |        |        |        |        |        |       |       |       |  |
|                 | -18 to<br>120   | -50 to<br>232 | 250    | 275    | 300    | 325    | 350    | 375    | 400    | 425   | 450   | 475   |  |
| D               |                 | 700           | 650    | 600    | 570    | 550    | 500    | 450    | 400    | 350   |       |       | 1 050  |
| C               | 1 200           |               |        |        |        |        |        |        |        |       |       |       | 1 800  |
| E               |                 | 1 400         | 1 300  | 1 200  | 1 100  | 1 000  | 950    | 900    | 800    | 700   |       |       | 2 100  |
| F               |                 | 2 100         | 2 000  | 1 800  | 1 700  | 1 600  | 1 400  | 1 300  | 1 200  | 1 100 |       |       | 3 150  |
| H               |                 | 3 500         | 3 300  | 3 100  | 2 900  | 2 600  | 2 400  | 2 200  | 2 000  | 1 700 | 1 300 | 900   | 5 250  |
| J               |                 | 4 800         | 4 600  | 4 300  | 4 000  | 3 700  | 3 400  | 3 100  | 2 700  | 2 400 | 1 900 | 1 300 | 7 200  |
| K               |                 | 6 200         | 5 900  | 5 500  | 5 100  | 4 700  | 4 300  | 3 900  | 3 500  | 3 100 | 2 400 | 1 600 | 9 300  |
| R               |                 | 8 300         | 7 900  | 7 400  | 6 800  | 6 300  | 5 800  | 5 200  | 4 700  | 4 200 | 3 200 | 2 200 | 12 450                                       |
| S               |                 | 12 400        | 11 800 | 11 100 | 10 300 | 9 500  | 8 700  | 7 900  | 7 100  | 6 300 | 4 800 | 3 300 | 18 600                                       |
| T               |                 | 19 300        | 18 400 | 17 200 | 16 000 | 14 700 | 13 500 | 12 200 | 11 000 | 9 800 | 7 500 | 5 100 | 28 950                                       |

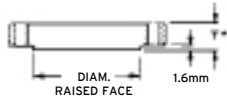
## TEMPERATURE-PRESSURE RATINGS FOR ALLOY STEEL FLANGES

| Flange<br>Table | Pressure, kPa*  |        |        |        |        |        |        |        |        |        |       |       |       |       | Max hydro-<br>static test<br>pressure<br>kPa |
|-----------------|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|-------|--|
|                 | Temperature, °C |        |        |        |        |        |        |        |        |        |       |       |       |       |  |
|                 | -100 to<br>232  | 250    | 275    | 300    | 325    | 350    | 375    | 400    | 425    | 450    | 475   | 482   | 500   | 525   |  |
| H               | 3 500           | 3 300  | 3 200  | 3 000  | 2 800  | 2 600  | 2 500  | 2 300  | 2 100  | 2 000  | 1800  | 1700  | 1200  | 500   | 5 250  |
| J               | 4 800           | 4 700  | 4 400  | 4 200  | 3 900  | 3 700  | 3 500  | 3 200  | 3 000  | 2 700  | 2 500 | 2 400 | 1700  | 700   | 7 200  |
| K               | 6 200           | 6 000  | 5 700  | 5 400  | 5 100  | 4 700  | 4 400  | 4 100  | 3 800  | 3 500  | 3 200 | 3 100 | 2 200 | 940   | 9 300  |
| R               | 8 300           | 8 000  | 7 600  | 7 200  | 6 700  | 6 300  | 5 900  | 5 500  | 5 100  | 4 700  | 4 300 | 4 100 | 3 000 | 1300  | 12 450                                       |
| S               | 12 400          | 12 000 | 11 400 | 10 700 | 10 100 | 9 500  | 8 900  | 8 300  | 7 600  | 7 000  | 6 400 | 6 200 | 4 400 | 1900  | 18 600                                       |
| T               | 19 300          | 18 600 | 17 600 | 16 700 | 15 700 | 14 800 | 13 800 | 12 800 | 11 900 | 10 900 | 9 900 | 9 700 | 6 900 | 3 000 | 28 950                                       |

\*Intermediate values are to be obtained by linear interpolation.  
Note: Carbon steel standard material stocked. Alloy steel available to special order.



# Flanges to Australian Standards

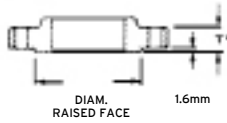


BLANK OR BLIND FLANGE

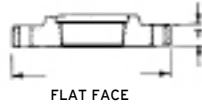


FLAT FACE

## DIMENSIONS FOR LOOSE FLANGES



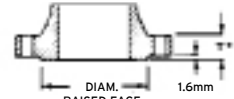
BOSS FLANGE - SLIP ON WELD OR SCR. B.S.P.



FLAT FACE



PLATE FLANGE  
SLIP ON WELD



WELD NECK FLANGE

### COPPER ALLOY

T.3 - Plate or Boss or Blank  
T.10 - Plate or Boss  
T.11 - Blank

### FORGED OR PLATE STEEL

T.6 - Plate or Boss or Blank, or Weldneck (except for valves)  
T.18 - Plate or Blank or Weldneck (except for valves)

| Nominal<br>Size<br>DN | Table D |           |             |                              |                 |                        | Table E |           |           |             |                              |                 | Table F                |       |           |           |             |                              | Nominal<br>Size<br>DN |                 |                        |
|-----------------------|---------|-----------|-------------|------------------------------|-----------------|------------------------|---------|-----------|-----------|-------------|------------------------------|-----------------|------------------------|-------|-----------|-----------|-------------|------------------------------|-----------------------|-----------------|------------------------|
|                       | Flange  |           |             | Drilling                     |                 |                        | Flange  |           |           | Drilling    |                              |                 | Flange                 |       |           | Drilling  |             |                              |                       |                 |                        |
|                       | OD mm   | Thickness |             | Bolt<br>Circle<br>Dia.<br>mm | No. of<br>Bolts | Dia. of<br>Bolts<br>mm | OD mm   | Thickness |           |             | Bolt<br>Circle<br>Dia.<br>mm | No. of<br>Bolts | Dia. of<br>Bolts<br>mm | OD mm | Thickness |           |             | Bolt<br>Circle<br>Dia.<br>mm |                       | No. of<br>Bolts | Dia. of<br>Bolts<br>mm |
|                       |         | T3 mm     | ** T6<br>mm |                              |                 |                        |         | T10<br>mm | T11<br>mm | ** T6<br>mm |                              |                 |                        |       | T10<br>mm | T11<br>mm | ** T6<br>mm |                              |                       |                 |                        |
| 15                    | 95      | 6         | 5           | 67                           | 4               | M12                    | 95      | 6         | 6         | 6           | 67                           | 4               | M12                    | 95    | 8         | 8         | 10          | 67                           | 4                     | M12             | 15                     |
| 20                    | 100     | 6         | 5           | 73                           | 4               | M12                    | 100     | 6         | 6         | 6           | 73                           | 4               | M12                    | 100   | 8         | 8         | 10          | 73                           | 4                     | M12             | 20                     |
| 25                    | 115     | 8         | 5           | 83                           | 4               | M12                    | 115     | 8         | 8         | 7           | 83                           | 4               | M12                    | 120   | 10        | 10        | 10          | 87                           | 4                     | M16             | 25                     |
| 32                    | 120     | 8         | 6           | 87                           | 4               | M12                    | 120     | 8         | 8         | 8           | 87                           | 4               | M12                    | 135   | 10        | 10        | 13          | 98                           | 4                     | M16             | 32                     |
| 40                    | 135     | 10        | 6           | 98                           | 4               | M12                    | 135     | 10        | 10        | 9           | 98                           | 4               | M12                    | 140   | 11        | 11        | 13          | 105                          | 4                     | M16             | 40                     |
| 50                    | 150     | 10        | 8           | 114                          | 4               | M16                    | 150     | 10        | 10        | 10          | 114                          | 4               | M16                    | 165   | 11        | 12        | 16          | 127                          | 4                     | M16             | 50                     |
| 65                    | 165     | 11        | 8           | 127                          | 4               | M16                    | 165     | 11        | 11        | 10          | 127                          | 4               | M16                    | 185   | 13        | 13        | 16          | 146                          | 8                     | M16             | 65                     |
| 80                    | 185     | 13        | 10          | 146                          | 4               | M16                    | 185     | 13        | 13        | 11          | 146                          | 4               | M16                    | 205   | 14        | 15        | 16          | 165                          | 8                     | M16             | 80                     |
| 100                   | 215     | 16        | 10          | 178                          | 4               | M16                    | 215     | 16        | 16        | 13          | 178                          | 8               | M16                    | 230   | 17        | 17        | 19          | 191                          | 8                     | M16             | 100                    |
| 125                   | 255     | 17        | 13          | 210                          | 8               | M16                    | 255     | 17        | 17        | 14          | 210                          | 8               | M16                    | 280   | 19        | 20        | 22          | 235                          | 8                     | M20             | 125                    |
| 150                   | 280     | 17        | 13          | 235                          | 8               | M16                    | 280     | 17        | 17        | 17          | 235                          | 8               | M20                    | 305   | 22        | 23        | 22          | 260                          | 12                    | M20             | 150                    |
| 200                   | 335     | 19        | 13          | 292                          | 8               | M16                    | 335     | 19        | 20        | 19          | 292                          | 8               | M20                    | 370   | 25        | 28        | 25          | 324                          | 12                    | M20             | 200                    |
| 250                   | 405     | 19        | 16          | 356                          | 8               | M20                    | 405     | 22        | 25        | 22          | 356                          | 12              | M20                    | 430   | 25        | 32        | 29          | 381                          | 12                    | M24             | 250                    |
| 300                   | 455     | 22        | 19          | 406                          | 12              | M20                    | 455     | 25        | 28        | 25          | 406                          | 12              | M24                    | 490   | 29        | 37        | 32          | 438                          | 16                    | M24             | 300                    |
| 350                   | 525     | 25        | 22          | 470                          | 12              | M24                    | 525     | 25        | 32        | 29          | 470                          | 12              | M24                    | 550   | 32        | 42        | 35          | 495                          | 16                    | M27             | 350                    |
| 400                   | 580     | 25        | 22          | 521                          | 12              | M24                    | 580     | 25        | 36        | 32          | 521                          | 12              | M24                    | 610   | 32        | 47        | 41          | 552                          | 20                    | M27             | 400                    |
| 450                   | 640     | 29        | 25          | 584                          | 12              | M24                    | 640     | 29        | 41        | 35          | 584                          | 16              | M24                    | 675   | 35        | 52        | 44          | 610                          | 20                    | M30             | 450                    |
| 500                   | 705     | 32        | 29          | 641                          | 16              | M24                    | 705     | 32        | 46        | 38          | 641                          | 16              | M24                    | 735   | 38        | 57        | 51          | 673                          | 24                    | M30             | 500                    |
| 600                   | 825     | 35        | 32          | 756                          | 16              | M27                    | 825     | 38        | -         | 48          | 756                          | 16              | M30                    | 850   | 41        | 68        | 57          | 781                          | 24                    | M33             | 600                    |
| 700                   | 910     | -         | 35          | 845                          | 20              | M27                    | 910     | -         | -         | 51          | 845                          | 20              | M30                    | 935   | -         | -         | 60          | 857                          | 24                    | M33             | 700                    |
| 750                   | 995     | -         | 41          | 927                          | 20              | M30                    | 995     | -         | -         | 54          | 927                          | 20              | M33                    | 1015  | -         | -         | 67          | 940                          | 28                    | M33             | 750                    |
| 800                   | 1060    | -         | 41          | 984                          | 20              | M33                    | 1060    | -         | -         | 54          | 984                          | 20              | M33                    | 1060  | -         | -         | 68          | 984                          | 28                    | M33             | 800                    |
| 900                   | 1175    | -         | 48          | 1092                         | 24              | M33                    | 1175    | -         | -         | 64          | 1092                         | 24              | M33                    | 1185  | -         | -         | 76          | 1105                         | 32                    | M36             | 900                    |
| 1000                  | 1255    | -         | 51          | 1175                         | 24              | M33                    | 1255    | -         | -         | 67          | 1175                         | 24              | M36                    | 1275  | -         | -         | 83          | 1194                         | 36                    | M36             | 1000                   |
| 1200                  | 1490    | -         | 60          | 1410                         | 32              | M33                    | 1490    | -         | -         | 79          | 1410                         | 32              | M36                    | 1530  | -         | -         | 95          | 1441                         | 40                    | M39             | 1200                   |

| Nominal<br>Size<br>DN | Table H  |           |           |            |                     |                              |                 |                        | Table J  |                      |                   |                              |                 |                        | Table R  |                       |                   |                              |                 |                        | Nominal<br>Size<br>DN |
|-----------------------|----------|-----------|-----------|------------|---------------------|------------------------------|-----------------|------------------------|----------|----------------------|-------------------|------------------------------|-----------------|------------------------|----------|-----------------------|-------------------|------------------------------|-----------------|------------------------|-----------------------|
|                       | Flange   |           |           |            | Drilling            |                              |                 |                        | Flange   |                      | Drilling          |                              |                 |                        | Flange   |                       | Drilling          |                              |                 |                        |                       |
|                       | OD<br>mm | Thickness |           |            | † Dia.<br>R/F<br>mm | Bolt<br>Circle<br>Dia.<br>mm | No. of<br>Bolts | Dia. of<br>Bolts<br>mm | OD<br>mm | Thickness<br>* T6 mm | Dia.<br>R/F<br>mm | Bolt<br>Circle<br>Dia.<br>mm | No. of<br>Bolts | Dia. of<br>Bolts<br>mm | OD<br>mm | Thickness<br>* T18 mm | Dia.<br>R/F<br>mm | Bolt<br>Circle<br>Dia.<br>mm | No. of<br>Bolts | Dia. of<br>Bolts<br>mm |                       |
|                       |          | T10<br>mm | T11<br>mm | * T6<br>mm |                     |                              |                 |                        |          |                      |                   |                              |                 |                        |          |                       |                   |                              |                 |                        |                       |
| 15                    | 115      | 10        | 11        | 13         | 57                  | 83                           | 4               | M16                    | 115      | 16                   | 57                | 83                           | 4               | M16                    | 115      | 19                    | 64                | 83                           | 4               | M16                    | 15                    |
| 20                    | 115      | 10        | 11        | 13         | 57                  | 83                           | 4               | M16                    | 115      | 16                   | 57                | 83                           | 4               | M16                    | 115      | 19                    | 64                | 83                           | 4               | M16                    | 20                    |
| 25                    | 120      | 11        | 12        | 14         | 64                  | 87                           | 4               | M16                    | 120      | 19                   | 64                | 87                           | 4               | M16                    | 125      | 22                    | 76                | 95                           | 4               | M16                    | 25                    |
| 32                    | 135      | 11        | 13        | 17         | 76                  | 98                           | 4               | M16                    | 135      | 19                   | 76                | 98                           | 4               | M16                    | 135      | 22                    | 76                | 98                           | 4               | M16                    | 32                    |
| 40                    | 140      | 13        | 14        | 17         | 83                  | 105                          | 4               | M16                    | 140      | 22                   | 83                | 105                          | 4               | M16                    | 150      | 25                    | 89                | 114                          | 4               | M20                    | 40                    |
| 50                    | 165      | 13        | 16        | 19         | 102                 | 127                          | 4               | M16                    | 165      | 25                   | 102               | 127                          | 4               | M20                    | 165      | 25                    | 102               | 127                          | 8               | M16                    | 50                    |
| 65                    | 185      | 14        | 17        | 19         | 114                 | 146                          | 8               | M16                    | 185      | 25                   | 114               | 146                          | 8               | M20                    | 185      | 29                    | 114               | 146                          | 8               | M20                    | 65                    |
| 80                    | 205      | 16        | 19        | 22         | 127                 | 165                          | 8               | M16                    | 205      | 32                   | 127               | 165                          | 8               | M20                    | 205      | 32                    | 127               | 165                          | 8               | M20                    | 80                    |
| 100                   | 230      | 19        | 23        | 25         | 152                 | 191                          | 8               | M16                    | 230      | 35                   | 152               | 191                          | 8               | M20                    | 240      | 35                    | 152               | 197                          | 8               | M24                    | 100                   |
| 125                   | 280      | 22        | 27        | 29         | 178                 | 235                          | 8               | M20                    | 280      | 38                   | 178               | 235                          | 8               | M24                    | 280      | 41                    | 178               | 235                          | 12              | M24                    | 125                   |
| 150                   | 305      | 25        | 30        | 29         | 210                 | 260                          | 12              | M20                    | 305      | 38                   | 210               | 260                          | 12              | M24                    | 305      | 44                    | 210               | 260                          | 12              | M24                    | 150                   |
| 200                   | 370      | 32        | 39        | 32         | 260                 | 324                          | 12              | M20                    | 370      | 41                   | 260               | 324                          | 12              | M24                    | 370      | 51                    | 260               | 324                          | 12              | M27                    | 200                   |
| 250                   | 430      | 35        | 45        | 35         | 311                 | 381                          | 12              | M24                    | 430      | 48                   | 311               | 381                          | 12              | M27                    | 430      | 60                    | 311               | 387                          | 16              | M27                    | 250                   |
| 300                   | 490      | 38        | 52        | 41         | 362                 | 438                          | 16              | M24                    | 490      | 51                   | 362               | 438                          | 16              | M27                    | 510      | 70                    | 362               | 457                          | 16              | M30                    | 300                   |
| 350                   | 550      | 41        | 58        | 48         | 419                 | 495                          | 16              | M27                    | 550      | 57                   | 419               | 495                          | 16              | M30                    | 585      | 79                    | 419               | 527                          | 16              | M33                    | 350                   |
| 400                   | 610      | 44        | 64        | 54         | 483                 | 552                          | 20              | M27                    | 610      | 64                   | 483               | 552                          | 20              | M30                    | 640      | 89                    | 483               | 584                          | 20              | M33                    | 400                   |
| 450                   | 675      | 48        | 71        | 60         | 533                 | 610                          | 20              | M30                    | 675      | 70                   | 533               | 610                          | 20              | M33                    | 735      | 98                    | 572               | 673                          | 20              | M36                    | 450                   |
| 500                   | 735      | 51        | 78        | 67         | 597                 | 673                          | 24              | M30                    | 735      | 79                   | 597               | 673                          | 24              | M33                    | 805      | 105                   | 622               | 730                          | 20              | M39                    | 500                   |
| 600                   | 850      | 57        | 92        | 76         | 699                 | 781                          | 24              | M33                    | 850      | 92                   | 699               | 781                          | 24              | M36                    | -        | -                     | -                 | -                            | -               | -                      | -                     |

### NOTES:

- (1) All dimensions are in millimetres (mm).
- (2) Only metric preferred sizes listed, except for DN 750 which is a non-preferred size.
- (3) It is impractical to use flange thickness less than 12mm for Steel Plate Flanges.
- (4) Thickness includes 1.6mm height for the Raised Face.
- (5) The Raised Face is non-preferred for Table "H".
- (6) It is normal practice to supply Steel Flanges to Tables A, D, C, E, F and H. - Flat Faced.

**IMPORTANT:** For DN 65, DN 125 and DN 150 Flanges, the O.D. of pipe being used must be specified.

# Bolting for Australian Flanges

## I.S.O. METRIC HEXAGON STEEL BOLTS FOR USE WITH AS. 2129 FLANGES

Steel Hexagon Bolts and Nuts (XOX) are typically used within a temperature range of -50°C to +300°C. Outside of this temperature range, Stud Bolts may be selected based on AS. 2528.

A quick reference chart for sizing bolts and nuts for a range of regularly used standard flanges is given below.

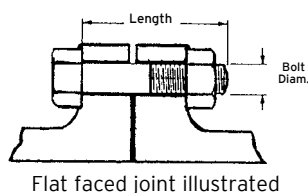
### APPLICABLE TO PLATE AND FORGED STEEL LOOSE FLANGES ONLY

NOTE: Integral valve flanges quite often differ in thickness to equivalent loose flanges.

When integral flanges are involved due allowance should be made to bolt lengths.

| Nominal Flange Size DN | Table D              |                             | Table E              |                             | Table F              |                             | Table H              |                             |
|------------------------|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|----------------------|-----------------------------|
|                        | No. Bolts Per Flange | XOX Bolt & Nut dia. x lgth. | No. Bolts Per Flange | XOX Bolt & Nut dia. x lgth. | No. Bolts Per Flange | XOX Bolt & Nut dia. x lgth. | No. Bolts Per Flange | XOX Bolt & Nut dia. x lgth. |
| 15                     | 4                    | M12 x 40 mm*                | 4                    | M12 x 40 mm*                | 4                    | M12 x 40 mm*                | 4                    | M16 x 45 mm*                |
| 20                     | 4                    | M12 x 40 mm*                | 4                    | M12 x 40 mm*                | 4                    | M12 x 40 mm*                | 4                    | M16 x 45 mm*                |
| 25                     | 4                    | M12 x 40 mm*                | 4                    | M12 x 40 mm*                | 4                    | M16 x 45 mm*                | 4                    | M16 x 50 mm*                |
| 32                     | 4                    | M12 x 40 mm*                | 4                    | M12 x 40 mm*                | 4                    | M16 x 45 mm*                | 4                    | M16 x 55 mm*                |
| 40                     | 4                    | M12 x 40 mm*                | 4                    | M12 x 40 mm*                | 4                    | M16 x 45 mm*                | 4                    | M16 x 55 mm*                |
| 50                     | 4                    | M16 x 45 mm*                | 4                    | M16 x 45 mm*                | 4                    | M16 x 50 mm*                | 4                    | M16 x 60 mm*                |
| 65                     | 4                    | M16 x 45 mm*                | 4                    | M16 x 45 mm*                | 8                    | M16 x 50 mm*                | 8                    | M16 x 60 mm*                |
| 80                     | 4                    | M16 x 45 mm*                | 4                    | M16 x 45 mm*                | 8                    | M16 x 50 mm*                | 8                    | M16 x 65 mm*                |
| 100                    | 4                    | M16 x 45 mm*                | 8                    | M16 x 45 mm*                | 8                    | M16 x 60 mm*                | 8                    | M16 x 70 mm*                |
| 125                    | 8                    | M16 x 45 mm*                | 8                    | M16 x 50 mm*                | 8                    | M20 x 70 mm*                | 8                    | M20 x 80 mm*                |
| 150                    | 8                    | M16 x 45 mm*                | 8                    | M20 x 60 mm*                | 12                   | M20 x 70 mm*                | 12                   | M20 x 80 mm*                |
| 200                    | 8                    | M16 x 45 mm*                | 8                    | M20 x 60 mm*                | 12                   | M20 x 75 mm*                | 12                   | M20 x 90 mm*                |
| 250                    | 8                    | M20 x 55 mm*                | 12                   | M20 x 70 mm*                | 12                   | M24 x 85 mm*                | 12                   | M24 x 100 mm*               |
| 300                    | 12                   | M20 x 60 mm*                | 12                   | M24 x 80 mm*                | 16                   | M24 x 100 mm*               | 16                   | M24 x 110 mm*               |
| 350                    | 12                   | M24 x 75 mm*                | 12                   | M24 x 85 mm*                | 16                   | M27 x 100 mm*               | 16                   | M27 x 130 mm*               |
| 400                    | 12                   | M24 x 75 mm*                | 12                   | M24 x 100 mm*               | 20                   | M27 x 120 mm*               | 20                   | M27 x 140 mm*               |
| 450                    | 12                   | M24 x 80 mm*                | 16                   | M24 x 100 mm*               | 20                   | M30 x 130 mm*               | 20                   | M30 x 160 mm*               |
| 500                    | 16                   | M24 x 85 mm*                | 16                   | M24 x 110 mm*               | 24                   | M30 x 140 mm*               | 24                   | M30 x 170 mm*               |
| 600                    | 16                   | M27 x 100 mm*               | 16                   | M30 x 130 mm*               | 24                   | M33 x 150 mm*               | 24                   | M33 x 190 mm*               |
| 700                    | 20                   | M27 x 100 mm*               | 20                   | M30 x 140 mm*               | 24                   | M33 x 160 mm*               |                      |                             |
| 750                    | 20                   | M30 x 120 mm*               | 20                   | M33 x 150 mm*               | 28                   | M33 x 170 mm*               |                      |                             |
| 800                    | 20                   | M33 x 120 mm*               | 20                   | M33 x 150 mm*               | 28                   | M33 x 180 mm*               |                      |                             |
| 900                    | 24                   | M33 x 140 mm*               | 24                   | M33 x 170 mm*               | 32                   | M36 x 200 mm*               |                      |                             |
| 1000                   | 24                   | M33 x 140 mm*               | 24                   | M36 x 180 mm*               | 36                   | M36 x 220 mm*               |                      |                             |
| 1200                   | 32                   | M33 x 160 mm*               | 32                   | M36 x 200 mm*               | 40                   | M39 x 240 mm*               |                      |                             |

All dimensions are in millimetres – (mm)



Bolt lengths listed apply to flat-faced or 1.6mm raised face flanges with allowance for 1.6mm gasket thickness.

\* For approximate Stud Bolt Lengths take the XOX Bolt Length and add the metric diameter in mm rounded to the nearest 5mm increment up.

NOTE: This does not include length of point.

Inch series bolts interchangeable as follows:

| FOR   | USE | FOR    | USE |
|-------|-----|--------|-----|
| 1/4"  | M6  | 7/8"   | M24 |
| 5/16" | M8  | 1"     | M27 |
| 3/8"  | M10 | 1-1/8" | M30 |
| 1/2"  | M12 | 1-1/4" | M33 |
| 5/8"  | M16 | 1-3/8" | M36 |
| 3/4"  | M20 | 1-1/2" | M39 |

## BOLT HOLE DIAMETERS

For bolts to M24, clearance hole 2mm larger.  
Above M24, clearance hole 3mm larger.

## XOX BOLTS & NUTS

XOX is the trade term used for H.R.H. commercial steel bolts and nuts.

H.R.H. denotes Hexagon Head x Round Shank x Hexagon Nut.

# Denso Corrosion Protection Systems



A Quality Commitment

Backed by over 80 years of practical experience in protecting metal substrates against corrosion both above and below ground, and under immersed conditions, Denso Long Life Anti-corrosion Systems have been specifically formulated to enable cold application and do not require elaborate surface preparation or equipment. Denso Systems readily conform to suit most irregular contours and profiles.

Technical advice, specifications and problem solving together with on site instructions in the correct application of the Denso Systems are all part of the service offered by Denso.

## SYSTEM SELECTION GUIDE

| STRUCTURE  | ENVIRONMENT  | RECOMMENDED SYSTEM   | TEMP.                                     |
|--|--|--|---|
| Pipe lengths<br>Bends, Joints                    | Above ground<br>No mechanical impact or abrasion             | Densyl KF ColourTape<br>(Self-extinguishes in 60 s)  | (To 60°C)                                 |
| Pipe lengths<br>Bends, Joints                    | Above ground<br>Infrequent mechanical impact or abrasion     | <u>Steelcoat 400 System</u><br>Penetrating Primer<br>Ultraseal tape<br>Acrylic Topcoat   | (To 65°C)                                 |
| Pipe lengths<br>Bends, Joints                    | Above ground<br>Frequent mechanical impact<br>Heavy abrasion | <u>Steelcoat 400 System</u><br>Penetrating Primer<br>Ultraseal tape<br>UrethaneTopcoat   | (To 65°C)                                 |
| Pipe lengths<br>Bends, Joints                    | Below ground<br>Selected Backfill                            | <u>Denso or Densyl Petrolatum System</u><br>MP Primer<br>Denso or Densyl Tape<br>PVC Self-Adhesive Tape  | Denso<br>(To 55°C)<br>Densyl<br>(To 75°C) |
| Pipe lengths<br>Bends, Joints                    | Below ground<br>Original Backfill                            | Primer D<br>Denso Ultraflex 1500 or Densopol 60HT<br>Tape  | (To 75°C)                                 |
| Pipe lengths<br>Bends, Joints                    | Below ground<br>Rock Backfill                                | Primer D<br>Denso Ultraflex 1500 or Densopol 60HT<br>Tape<br>Denso Rockmesh  | (To 75°C)                                 |
| Valves, fittings and<br>other irregular profiles | Below ground   | <u>Denso or Densyl Petrolatum System</u><br>MP Primer<br>Denso Mastic or Densyl Supersoft Mastic<br>Denso or Densyl Tape<br>PVC Self-Adhesive Tape | Denso<br>(To 55°C)<br>Densyl<br>(To 75°C) |
| Valves, fittings and<br>other irregular profiles | Above ground<br>No mechanical impact or abrasion             | Densyl Supersoft Mastic<br>Densyl KF ColourTape  | (To 60°C)                                 |
| Valves, fittings and<br>other irregular profiles | Above ground<br>Infrequent mechanical impact or abrasion     | <u>Steelcoat 400 System</u><br>Penetrating Primer<br>Densyl Supersoft Mastic<br>Ultraseal Tape<br>Acrylic Topcoat                                  | (To 65°C)                                 |
| Valves, fittings and<br>other irregular profiles | Above ground<br>Frequent mechanical impact<br>Heavy abrasion | <u>Steelcoat 400 System</u><br>Penetrating Primer<br>Densyl Supersoft Mastic<br>Ultraseal tape<br>Urethane Topcoat                                 | (To 65°C)                                 |

Note: In colder climates, it is suggested that Densopol 60HT is substituted for Densopol 60.



## DENSO PETROLATUM SYSTEM

The Denso Multi-purpose long life corrosion protection system is a multi-component system which remains permanently plastic and flexible and offers excellent conformability and shelf life. Based upon blended Petrolatum and selected inhibitors the system provides unrivalled corrosion protection in terms of surface preparation requirements and ease of application. It is typically used for in-situ and shop application alike.



## STEELCOAT 400 SYSTEM

Denso Steelcoat 400 System comprising of penetrating primer (Denso Penetrating Primer), an easily applied layer of semi-coated acrylic backed bitumen tape (Denso Ultraseal Tape) and a choice of final topcoats (Denso Acrylic or Urethane Topcoat). The final topcoat can be reinforced with a selected reinforcing scrim (Denso D5 or D10 Scrim) for sections of steelwork or pipework which require additional impact resistance. After priming, Denso Supersoft Mastic is first utilised to seal and profile back to back angles, voids, flanges or fittings, before application of Denso Ultraseal Tape and selected topcoat.



## ULTRAFLEX 1500 SYSTEM

The Ultraflex 1500 System comprises Denso Primer 'D' and Ultraflex 1500 Tape. The Ultraflex 1500 System presents one of the most rugged pipewraps ever developed, combining both durability and hi-conformability. This combined with a specially callendered hi-impact PVC backing, results in impact resistance values, unrivalled by other pipe coating products.

The Ultraflex 1500 System is characterised by superb adhesion to self, to steel and shop coatings and when applied with a 55% overlap results in a 3000 microns finished coating thickness.

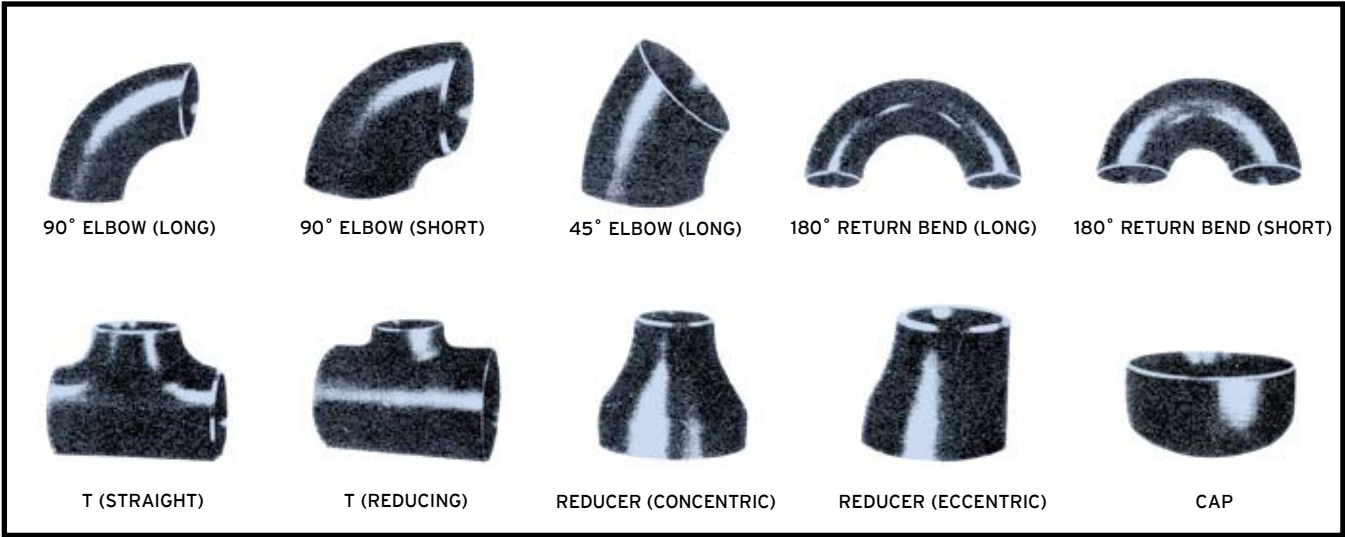
# Denso Corrosion Protection Systems



| PRODUCT DESCRIPTION & CARTON QUANTITIES  |                                |
|--|--------------------------------|
| Product Description  | Units / Carton                 |
| Denso MP Primer - 4kg tin<br>(Also available in 1kg tin and 20kg drum)   | 4                              |
| Denso Mastic - 3kg block   | 8                              |
| Densyl Supersoft Mastic - 3kg  | 8                              |
| Denso Tape<br>50mm x 10m roll<br>75mm x 10m roll<br>100mm x 10m roll<br>150mm x 10m roll<br>200mm x 10m roll<br>300mm x 10m roll | 36<br>24<br>18<br>12<br>9<br>6 |
| Densyl Tape<br>50mm x 10m roll<br>75mm x 10m roll<br>100mm x 10m roll<br>150mm x 10m roll  | 36<br>24<br>18<br>12           |
| Densyl KF ColourTape<br>50mm x 10m roll<br>75mm x 10m roll<br>100mm x 10m roll<br>150mm x 10m roll                               | 36<br>24<br>18<br>12           |
| Denso PVC Self-Adhesive Tape<br>50mm x 30m roll<br>100mm x 30m roll<br>150mm x 30m roll  | 40<br>20<br>15                 |
| Denso Primer 'D' 4lt Tin   | 4                              |
| Denso Ultraflex 1500 - 100mm x 10m roll  | 12                             |
| Denso Ultraflex 1500 - 150mm x 10m roll  | 8                              |
| Densopol 60 HT - 50mm x 10m roll   | 18                             |
| Densopol 60 HT - 100mm x 10m roll  | 9                              |
| Densopol 60 HT - 150mm x 10m roll  | 6                              |
| Denso Penetrating Primer - 4lt Tin   | 4                              |
| Denso Acrylic Top Coat - 4lt Tin (Available in White & Lt. Aircraft Grey)  | 4                              |
| Denso Ultraseal Tape - 50mm x 15m roll   | 20                             |
| Denso Ultraseal Tape - 100mm x 15m roll  | 12                             |
| Denso Ultraseal Tape - 150mm x 15m roll  | 8                              |
| Denso Ultraseal Tape - 225mm x 15m roll  | 6                              |
| Denso Ultraseal Tape - 475mm x 15m roll  | 2                              |



# Buttweld Fittings



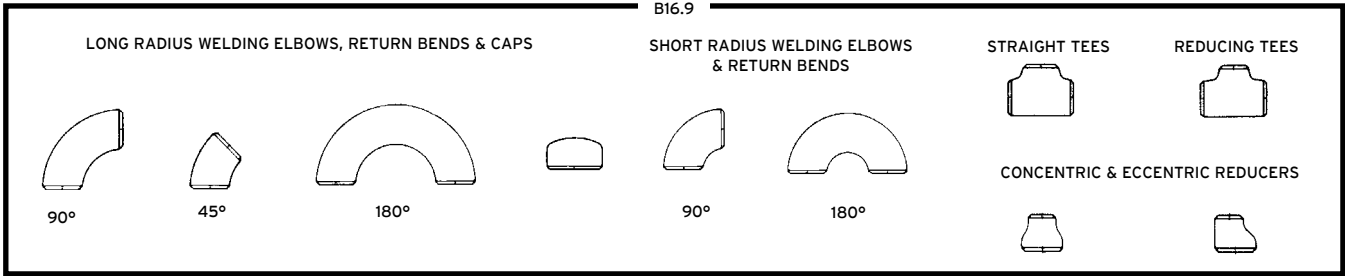
Buttweld Pipe Fittings are the recognised standard for leak-proof pipe fabrication in medium and high pressure systems and in pipelines handling corrosive and hazardous fluids.

OneSteel carries premium quality buttweld fittings covered by major international oil and petrochemical company approvals, and an alternative low-cost range of OneSteel approved fittings for other applications.

All stock carbon steel buttweld fittings comply fully with the material and manufacturing standards detailed here, with the added advantage of .23% maximum carbon content for optimum weld-joint integrity.

## DIMENSIONAL SPECIFICATIONS

**ASME B16.9:** Steel buttweld fittings. Covers dimensions and tolerance of buttweld fittings 15 to 600mm.



**ASME B16.25:** Buttweld ends. Covers the preparation and design details of buttweld ends for all components of buttwelded pipe systems.

**MSS SP-48:** Steel buttweld fittings 650mm and larger. Covers dimensions and tolerance of long radius elbows, tees and reducers in sizes 650 to 900mm.



# Buttweld Fittings

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## MATERIAL SPECIFICATIONS

**SEAMLESS CARBON STEEL:** Buttweld fittings are made to the material specifications of ASTM A234, grades WPA, WPB or WPC; which correspond exactly to the material specifications of seamless carbon steel pipes to ASTM A106 grades A, B, or C.

**AUSTENITIC STAINLESS STEEL FITTINGS:** OneSteel stocks stainless steel fittings in ASTM grades 304L and 316L. Other grades available to order.

**LOW TEMPERATURE FITTINGS:** For low temperature applications, a wide range of fittings in materials to ASTM A420 can be offered.

**HIGH YIELD FITTINGS:** On an indent basis, we offer a range of fittings having a high yield strength suitable for use with the various grades of API 5LX linepipe.

**FERRITIC ALLOY STEEL FITTINGS:** For high temperatures, OneSteel offers a range of alloy fittings to ASTM specification A335, in the following grades:

P1 - 1/2%Mo  
P5 - 5%Cr1/2%Mo  
P7 - 7%Cr1/2%Mo  
P9 - 9%Cr1%Mo

P11 - 1 1/4%Cr1/2%Mo  
P12 - 1%Cr1/2%Mo  
P22 - 2 1/4%Cr1%Mo

## WORKING PRESSURES

Buttweld fittings are designed and manufactured to standards which demand a bursting strength equal to or greater than that of Seamless Pipe of the same material specification, nominal diameter and wall thickness, and their allowable working pressures are equal to those shown for pipe in the OneSteel pipe catalogue. Maximum allowable working pressures for:

**CARBON STEEL FITTINGS:** Equal to seamless pipes to ASTM A106 (Grade B unless otherwise specified).

**STAINLESS STEEL:** Fittings (Grades 304 and 316, also 304L and 316L) are equal to stainless steel pipes to ASTM A312 of equal grade and schedule.

**HIGH TEMPERATURE (Ferritic Alloy):** Fittings (Grades WP5, WP11 etc.), are equal to seamless pipes to ASTM A335 of similar grade (P5, P11, etc.).

**LOW TEMPERATURE:** Fittings (Grade WPL6-ASTM A420) are equal to seamless pipes to Grade 6 - ASTM A333.

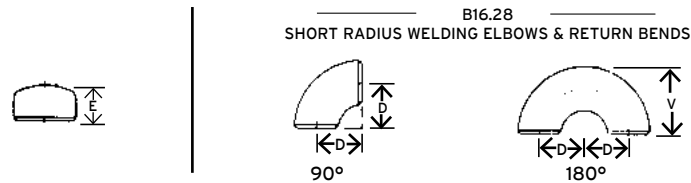
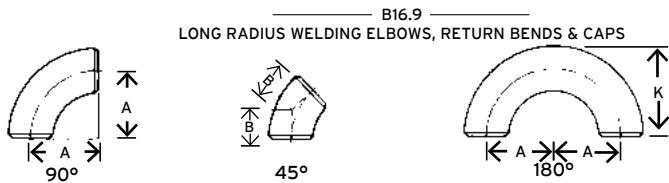
NB: Stainless Steel Fittings in Schedule 10S and 5S are not designed for applications where pressure is a prime consideration, and the relevant standard, MSS SP43 establishes the working pressures substantially lower than those yielded by the application of the basic formula.

## QUALITY CONTROL

Buttweld fittings from OneSteel are subject to strict quality control. Manufacturers' plants are visited regularly, and the source of mother tube is verified. Test certificates are available as required. OneSteel liaises with major customers to ensure that all fittings are obtained from sources approved by the customer or by specific industry groups.

# Butt Weld Fittings

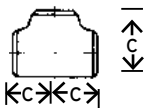
## CARBON STEEL BUTT WELDED FITTINGS TO ASME B16.9, B16.28 & BS.1640



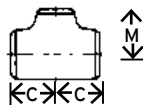
Nominal Sizes shown are ⌘ DN: SI Metric Term + NPS: ASME Term

| Nom. Size DN |          | Pipe<br>OD mm | Wall Thickness (mm) |         |         |             |         |         |        |         |          |          |          |          |              | A    | B    | K    | D    | V    | E. Std.<br>Wt. & Ex.<br>Sta. | Nom. Size DN |          |
|--------------|----------|---------------|---------------------|---------|---------|-------------|---------|---------|--------|---------|----------|----------|----------|----------|--------------|------|------|------|------|------|------------------------------|--------------|----------|
| ⌘<br>DN      | +<br>NPS |               | Sch. 10             | Sch. 20 | Sch. 30 | Std.<br>Wt. | Sch. 40 | Sch. 60 | X Stg. | Sch. 80 | Sch. 100 | Sch. 120 | Sch. 140 | Sch. 160 | X.X.<br>Stg. |      |      |      |      |      |                              | ⌘<br>DN      | +<br>NPS |
| 15           | 1/2      | 21.3          | -                   | -       | -       | 2.77        |         | -       | 3.73   |         | -        | -        | -        | 4.78     | 7.47         | 38   | 16   | 47.5 | -    | -    | 25.4                         | 15           | 1/2      |
| 20           | 3/4      | 26.7          | -                   | -       | -       | 2.87        |         | -       | 3.91   |         | -        | -        | -        | 5.56     | 7.82         | 38   | 19   | 43   | 19   | 33   | 25.4                         | 20           | 3/4      |
| 25           | 1        | 33.4          | -                   | -       | -       | 3.38        |         | -       | 4.55   |         | -        | -        | -        | 6.35     | 9.09         | 38   | 22   | 55.5 | 25.4 | 41   | 38.1                         | 25           | 1        |
| 32           | 1 1/4    | 42.2          | -                   | -       | -       | 3.56        |         | -       | 4.85   |         | -        | -        | -        | 6.35     | 9.70         | 47.5 | 25.4 | 70   | 32   | 52   | 38.1                         | 32           | 1 1/4    |
| 40           | 1 1/2    | 48.3          | -                   | -       | -       | 3.68        |         | -       | 5.08   |         | -        | -        | -        | 7.14     | 10.15        | 57   | 29   | 82.5 | 38   | 62   | 38.1                         | 40           | 1 1/2    |
| 50           | 2        | 60.3          | -                   | -       | -       | 3.91        |         | -       | 5.54   |         | -        | -        | -        | 8.74     | 11.07        | 76   | 35   | 106  | 51   | 81   | 38.1                         | 50           | 2        |
| 65           | 2 1/2    | 73            | -                   | -       | -       | 5.16        |         | -       | 7.01   |         | -        | -        | -        | 9.53     | 14.02        | 95   | 44.5 | 132  | 63.5 | 100  | 38.1                         | 65           | 2 1/2    |
| 80           | 3        | 88.9          | -                   | -       | -       | 5.49        |         | -       | 7.62   |         | -        | -        | -        | 11.13    | 15.24        | 114  | 51   | 159  | 76   | 121  | 50.8                         | 80           | 3        |
| 90           | 3 1/2    | 101.6         | -                   | -       | -       | 5.74        |         | -       | 8.08   |         | -        | -        | -        | -        | 16.15        | 133  | 57   | 184  | 89   | 140  | 63.5                         | 90           | 3 1/2    |
| 100          | 4        | 114.3         | -                   | -       | -       | 6.02        |         | -       | 8.56   |         | -        | 11.13    | -        | 13.49    | 17.12        | 152  | 63.5 | 210  | 102  | 159  | 63.5                         | 100          | 4        |
| 125          | 5        | 141.3         | -                   | -       | -       | 6.55        |         | -       | 9.53   |         | -        | 12.70    | -        | 15.88    | 19.05        | 190  | 79   | 262  | 127  | 197  | 76.2                         | 125          | 5        |
| 150          | 6        | 168.3         | -                   | -       | -       | 7.11        |         | -       | 10.97  |         | -        | 14.27    | -        | 18.26    | 21.95        | 229  | 95   | 313  | 152  | 237  | 88.9                         | 150          | 6        |
| 200          | 8        | 219.1         | -                   | 6.35    | 7.04    | 8.18        |         | 10.31   | 12.70  |         | 15.09    | 18.26    | 20.62    | 23.01    | 22.23        | 305  | 127  | 414  | 203  | 313  | 102                          | 200          | 8        |
| 250          | 10       | 273.1         | -                   | 6.35    | 7.80    | 9.27        |         | 12.70   | 12.70  | 5.09    | 18.26    | 21.44    | 25.40    | 28.58    | 25.40        | 381  | 159  | 517  | 254  | 390  | 127                          | 250          | 10       |
| 300          | 12       | 323.9         | -                   | 6.35    | 8.38    | 9.53        | 10.31   | 14.27   | 12.70  | 17.48   | 21.44    | 25.4     | 28.58    | 33.32    | 25.40        | 457  | 190  | 619  | 305  | 467  | 152                          | 300          | 12       |
| 350          | 14       | 355.6         | 6.35                | 7.92    | 9.53    | 9.53        | 11.13   | 15.09   | 12.70  | 19.05   | 23.83    | 27.79    | 31.75    | 35.71    | -            | 533  | 222  | 711  | 356  | 533  | 165                          | 350          | 14       |
| 400          | 16       | 406.4         | 6.35                | 7.92    | 9.53    | 9.53        | 12.70   | 16.66   | 12.70  | 21.44   | 26.19    | 30.96    | 36.53    | 40.49    | -            | 610  | 254  | 813  | 406  | 610  | 178                          | 400          | 16       |
| 450          | 18       | 457           | 6.35                | 7.92    | 11.13   | 9.53        | 14.27   | 19.05   | 12.70  | 23.83   | 29.36    | 34.93    | 39.67    | 45.24    | -            | 686  | 286  | 914  | 457  | 686  | 203                          | 450          | 18       |
| 500          | 20       | 508           | 6.35                | 9.53    | 12.70   | 9.53        | 15.09   | 20.62   | 12.70  | 26.19   | 32.54    | 38.10    | 44.45    | 50.01    | -            | 762  | 318  | 1016 | 508  | 762  | 229                          | 500          | 20       |
| 600          | 24       | 610           | 6.35                | 9.53    | 14.27   | 9.53        | 17.48   | 24.61   | 12.70  | 30.96   | 38.89    | 46.02    | 52.37    | 59.54    | -            | 914  | 381  | 1219 | 610  | 914  | 267                          | 600          | 24       |
| 750          | 30       | 762           | 7.92                | 12.70   | 15.88   | 9.53        | -       | -       | 12.70  | -       | -        | -        | -        | -        | -            | 1143 | 470  | 1524 | 762  | 1143 | 267                          | 750          | 30       |
| 900          | 36       | 914           | 7.92                | 12.70   | 15.88   | 9.53        | 19.05   | -       | 12.70  | -       | -        | -        | -        | -        | -            | 1372 | 565  | -    | 914  | 1372 | 267                          | 900          | 36       |

STRAIGHT TEES (B16.9)



REDUCING TEES (B16.9)



CONCENTRIC & ECCENTRIC REDUCERS (B16.9)



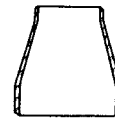
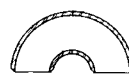
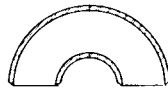
Nominal Sizes shown are ⌘ DN: SI Metric Term + NPS: ASME Term

| Nominal Size |           |           |           | C     | M    | H    | Nominal Size |           |           |           | C    | M   | H   | Nominal Size |           |           |           | C   | M   | H   |
|--------------|-----------|-----------|-----------|-------|------|------|--------------|-----------|-----------|-----------|------|-----|-----|--------------|-----------|-----------|-----------|-----|-----|-----|
| DN ⌘         |           | NPS +     |           |       |      |      | DN ⌘         |           | NPS +     |           |      |     |     | DN ⌘         |           | NPS +     |           |     |     |     |
| Large End    | Small End | Large End | Small End |       |      |      | Large End    | Small End | Large End | Small End |      |     |     | Large End    | Small End | Large End | Small End |     |     |     |
| 20           | 20        | 3/4       | 3/4       | 28.6  | -    | -    | 100          | 100       | 4         | 105       | -    | -   | 400 | 400          | 16        | 305       | -         | -   |     |     |
|              | 15        |           | 1/2       | 28.6  | 28.6 | 38.1 |              | 90        | 3 1/2     | 105       | 102  | 102 |     |              | 350       | 14        | 305       | 305 | 356 |     |
|              | 25        |           | 1         | 38.1  | -    | -    |              | 80        | 3         | 105       | 98.4 | 102 |     |              | 300       | 12        | 305       | 295 | 356 |     |
| 25           | 20        | 1         | 3/4       | 38.1  | 38.1 | 50.8 |              | 65        | 2 1/2     | 105       | 95.3 | 102 |     |              | 250       | 10        | 305       | 283 | 356 |     |
|              | 15        |           | 1/2       | 38.1  | 38.1 | 50.8 |              | 50        | 2         | 105       | 88.9 | 102 |     | 200          | 8         | 305       | 273       | 356 |     |     |
| 32           | 32        | 1 1/4     | 1 1/4     | 47.6  | -    | -    |              | 40        | 1 1/2     | 105       | 85.7 | 102 |     | 150          | 6         | 305       | 264       | 356 |     |     |
|              | 25        |           |           | 1     | 47.6 | 47.6 | 50.8         | 125       | 125       | 5         | 124  | -   | -   | 450          | 450       | 18        | 343       | -   | -   |     |
|              | 20        |           |           | 3/4   | 47.6 | 47.6 | 50.8         | 100       | 100       | 4         | 124  | 117 | 127 |              | 400       | 16        | 343       | 330 | 381 |     |
|              | 15        |           |           | 1/2   | 47.6 | 47.6 | 50.8         | 90        | 90        | 3 1/2     | 124  | 114 | 127 |              | 350       | 14        | 343       | 330 | 381 |     |
| 40           | 40        | 1 1/2     | 1 1/2     | 57.2  | -    | -    | 125          | 80        | 3         | 124       | 111  | 127 | 450 | 300          | 12        | 343       | 321       | 381 |     |     |
|              |           |           | 32        | 1 1/4 | 57.2 | 57.2 |              | 63.5      | 65        | 2 1/2     | 124  | 108 |     | 127          |           | 250       | 10        | 343 | 308 | 381 |
|              |           |           | 25        | 1     | 57.2 | 57.2 |              | 63.5      | 50        | 2         | 124  | 105 |     | 127          |           | 200       | 8         | 343 | 298 | 381 |
|              |           |           | 20        | 3/4   | 57.2 | 57.2 |              | 63.5      | 150       | 6         | 143  | -   |     | -            |           | 500       | 20        | 381 | -   | -   |
| 50           | 50        | 2         | 1/2       | 57.2  | 57.2 | 63.5 | 150          | 125       | 5         | 143       | 137  | 140 | 500 | 450          | 18        | 381       | 368       | 508 |     |     |
|              |           |           | 40        | 2     | 63.5 | -    |              | -         | 100       | 4         | 143  | 130 |     | 140          |           | 400       | 16        | 381 | 356 | 508 |
|              |           |           | 32        | 1 1/2 | 63.5 | 60.3 |              | 76.2      | 90        | 3 1/2     | 143  | 127 |     | 140          |           | 350       | 14        | 381 | 356 | 508 |
|              |           |           | 25        | 1 1/4 | 63.5 | 57.2 |              | 76.2      | 80        | 3         | 143  | 124 |     | 140          |           | 300       | 12        | 381 | 346 | 508 |
| 65           | 65        | 2 1/2     | 1         | 63.5  | 50.8 | 76.2 | 200          | 65        | 2 1/2     | 143       | 121  | 140 | 600 | 250          | 10        | 381       | 333       | 508 |     |     |
|              |           |           | 40        | 3/4   | 63.5 | 44.5 |              | 76.2      | 200       | 8         | 178  | -   |     | -            |           | 200       | 8         | 381 | 324 | 508 |
|              |           |           | 32        | 2 1/2 | 76.2 | -    |              | -         | 150       | 6         | 178  | 168 |     | 152          |           | 600       | 24        | 432 | -   | -   |
|              |           |           | 25        | 2     | 76.2 | 69.9 |              | 88.9      | 125       | 5         | 178  | 162 |     | 152          |           | 500       | 20        | 432 | 432 | 508 |
| 80           | 80        | 3         | 1 1/2     | 76.2  | 66.7 | 88.9 | 250          | 100       | 4         | 178       | 155  | 152 | 750 | 450          | 18        | 432       | 419       | 508 |     |     |
|              |           |           | 32        | 1 1/4 | 76.2 | 63.5 |              | 88.9      | 80        | 3         | 178  | 152 |     | 152          |           | 400       | 16        | 432 | 406 | 508 |
|              |           |           | 25        | 1     | 76.2 | 57.2 |              | 88.9      | 250       | 10        | 216  | -   |     | -            |           | 350       | 14        | 432 | 406 | 508 |
|              |           |           | 65        | 3     | 85.7 | -    |              | -         | 200       | 8         | 216  | 203 |     | 178          |           | 300       | 12        | 432 | 397 | 508 |
| 90           | 90        | 3 1/2     | 2 1/2     | 85.7  | 82.6 | 88.9 | 300          | 150       | 6         | 216       | 194  | 178 | 900 | 250          | 10        | 432       | 384       | 508 |     |     |
|              |           |           | 50        | 2     | 85.7 | 76.2 |              | 88.9      | 125       | 5         | 216  | 191 |     | 178          |           | 750       | 30        | 559 | -   | -   |
|              |           |           | 40        | 1 1/2 | 85.7 | 73.0 |              | 88.9      | 100       | 4         | 216  | 184 |     | 178          |           | 600       | 24        | 559 | 533 | 610 |
|              |           |           | 32        | 1 1/4 | 85.7 | 69.9 |              | 88.9      | 300       | 12        | 254  | -   |     | -            |           | 500       | 20        | 559 | 508 | 610 |
| 90           | 90        | 3 1/2     | 1         | 85.7  | 69.9 | 88.9 | 350          | 250       | 10        | 254       | 241  | 203 | 900 | 450          | 18        | 559       | 495       | 610 |     |     |
|              |           |           | 65        | 3 1/2 | 95.3 | -    |              | -         | 200       | 8         | 254  | 229 |     | 203          |           | 400       | 16        | 559 | 483 | 610 |
|              |           |           | 50        | 2 1/2 | 95.3 | 88.9 |              | 102       | 150       | 6         | 254  | 219 |     | 203          |           | 300       | 12        | 559 | 483 | 610 |
|              |           |           | 40        | 2     | 95.3 | 82.6 |              | 102       | 100       | 4         | 254  | 210 |     | 203          |           | 250       | 10        | 559 | 483 | 610 |
|              |           |           | 1 1/2     | 95.3  | 79.4 | 102  |              | 350       | 12        | 279       | 270  | 330 |     | 900          | 36        | 673       | 610       | 610 |     |     |
|              |           |           |           |       |      |      |              | 300       | 10        | 279       | 257  | 330 |     |              | 750       | 30        | 673       | 610 | 610 |     |
|              |           |           |           |       |      |      |              | 250       | 8         | 279       | 248  | 330 |     |              | 600       | 24        | 673       | 610 | 610 |     |
|              |           |           |           |       |      |      |              | 150       | 6         | 279       | 238  | 330 |     |              | 450       | 18        | 673       | 572 | 610 |     |

NOTE: All dimensions are in millimetres - (mm)

# Buttweld Fittings

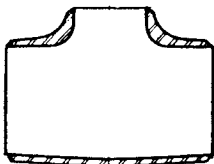
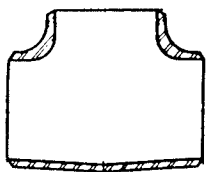
MASS  
(weight)



| Size<br>mm | 90° Elbows          |        |           |        | 45° Elbows  |        | 180° Returns        |        |           |       | Reducers            |       | Caps  |       |
|------------|---------------------|--------|-----------|--------|-------------|--------|---------------------|--------|-----------|-------|---------------------|-------|-------|-------|
|            | LONG RAD            |        | SHORT RAD |        | LONG RAD    |        | LONG RAD            |        | SHORT RAD |       | CON & ECC           |       |       |       |
|            | Approx. Weight (kg) |        |           |        | Approx. Wt. |        | Approx. Weight (kg) |        |           |       | Approx. Weight (kg) |       |       |       |
|            | STD                 | XS     | STD       | XS     | STD         | XS     | STD                 | XS     | STD       | XS    | STD                 | XS    | STD   | XS    |
| 15         | 0.08                | 0.10   | –         | –      | 0.04        | 0.05   | 0.16                | 0.20   | –         | –     | –                   | –     | –     | –     |
| 20         | 0.08                | 0.10   | –         | –      | 0.04        | 0.05   | 0.16                | 0.20   | –         | –     | 0.07                | 0.10  | –     | –     |
| 25         | 0.15                | 0.20   | 0.10      | –      | 0.11        | 0.14   | 0.31                | 0.40   | 0.21      | –     | 0.13                | 0.16  | 0.10  | 0.14  |
| 32         | 0.26                | 0.34   | 0.17      | –      | 0.17        | 0.22   | 0.53                | 0.69   | 0.35      | –     | 0.17                | 0.23  | 0.14  | 0.18  |
| 40         | 0.38                | 0.48   | 0.25      | 0.33   | 0.23        | 0.29   | 0.76                | 1.00   | 0.50      | 0.66  | 0.26                | 0.34  | 0.18  | 0.23  |
| 50         | 0.68                | 0.91   | 0.45      | 0.60   | 0.37        | 0.49   | 1.36                | 1.85   | 0.90      | 1.22  | 0.41                | 0.57  | 0.27  | 0.32  |
| 65         | 1.32                | 1.73   | 0.88      | 1.14   | 0.74        | 0.95   | 2.67                | 3.50   | 1.78      | 2.32  | 0.77                | 1.01  | 0.41  | 0.45  |
| 80         | 2.08                | 2.78   | 1.38      | 1.83   | 1.10        | 1.47   | 4.19                | 5.62   | 2.78      | 3.72  | 1.00                | 1.36  | 0.64  | 0.82  |
| 90         | 2.92                | 3.96   | 1.93      | 2.61   | 1.49        | 2.90   | 5.90                | 7.98   | 3.90      | 5.31  | 1.36                | 1.89  | 0.95  | 1.27  |
| 100        | 3.95                | 5.40   | 2.62      | 3.58   | 1.96        | 2.66   | 7.94                | 10.98  | 5.26      | 7.30  | 1.63                | 2.27  | 1.13  | 1.54  |
| 125        | 6.67                | 9.34   | 4.42      | 6.21   | 3.31        | 4.63   | 13.47               | 18.96  | 8.94      | 12.56 | 2.77                | 3.92  | 1.91  | 2.59  |
| 150        | 10.39               | 15.47  | 6.89      | 10.25  | 5.13        | 7.58   | 20.91               | 31.25  | 13.93     | 20.73 | 3.95                | 5.94  | 2.95  | 4.10  |
| 200        | 20.87               | 31.34  | 13.83     | 20.68  | 10.34       | 15.42  | 41.91               | 63.50  | 27.94     | 42.00 | 6.49                | 9.84  | 5.00  | 7.30  |
| 250        | 36.97               | 49.44  | 24.49     | 32.89  | 18.33       | 24.45  | 74.39               | 100.25 | 49.44     | 66.48 | 10.70               | 14.47 | 9.10  | 11.80 |
| 300        | 53.98               | 71.22  | 36.06     | 47.17  | 26.99       | 35.52  | 109.32              | 143.79 | 72.58     | 95.26 | 15.01               | 19.78 | 13.60 | 17.20 |
| 350        | 69.85               | 91.63  | 46.27     | 61.24  | 34.70       | 45.36  | –                   | –      | –         | –     | 26.85               | 35.35 | 15.90 | 20.80 |
| 400        | 91.17               | 120.20 | 61.24     | 80.29  | 45.36       | 59.88  | –                   | –      | –         | –     | 33.11               | 44.00 | 20.00 | 26.30 |
| 450        | 116.12              | 153.32 | 77.57     | 102.06 | 58.06       | 76.20  | –                   | –      | –         | –     | –                   | –     | 26.00 | 34.00 |
| 500        | 143.79              | 190.06 | 96.16     | 126.10 | 71.67       | 94.35  | –                   | –      | –         | –     | –                   | –     | 33.00 | 43.00 |
| 550        | 174.64              | 230.43 | –         | –      | 87.09       | 114.76 | –                   | –      | –         | –     | –                   | –     | –     | –     |
| 600        | 207.75              | 274.88 | 138.35    | 183.25 | 103.87      | 141.52 | –                   | –      | –         | –     | –                   | –     | 46.00 | 61.00 |
| 650        | 244.49              | 323.42 | –         | –      | 122.02      | 161.03 | –                   | –      | –         | –     | –                   | –     | –     | –     |
| 700        | 326.59              | 432.28 | 217.73    | 287.58 | 162.39      | 215.46 | –                   | –      | –         | –     | –                   | –     | –     | –     |
| 750        | 471.74              | 625.97 | 313.89    | 414.14 | 234.96      | 311.17 | –                   | –      | –         | –     | –                   | –     | –     | –     |

## TEES – Straight and Reducing

Note: Weights given for reducing Tees are based on branch one size smaller than run size.



| RUN | BR | STD  | XS   | RUN | BR  | STD   | XS    |
|-----|----|------|------|-----|-----|-------|-------|
| 15  | 15 | 0.11 | 0.16 | 90  | 90  | 4.47  | 5.72  |
|     | 16 | 0.10 | 0.13 |     | 80  | 4.09  | 5.31  |
| 20  | 20 | 0.17 | 0.21 | 100 | 100 | 5.72  | 7.44  |
|     | 15 | 0.15 | 0.19 |     | 90  | 5.26  | 6.94  |
| 25  | 25 | 0.34 | 0.42 | 125 | 125 | 8.98  | 4.98  |
|     | 20 | 0.29 | 0.36 |     | 100 | 8.21  | 10.98 |
| 32  | 32 | 0.61 | 0.74 | 150 | 150 | 13.29 | 19.05 |
|     | 25 | 0.53 | 0.66 |     | 125 | 21.11 | 17.15 |
| 40  | 40 | 0.92 | 1.12 | 200 | 200 | 24.36 | 34.66 |
|     | 32 | 0.80 | 1.00 |     | 150 | 22.09 | 31.93 |
| 50  | 50 | 1.34 | 1.69 | 250 | 250 | 41.37 | 53.52 |
|     | 40 | 1.21 | 1.54 |     | 200 | 37.65 | 49.44 |
| 65  | 65 | 2.36 | 2.92 | 300 | 300 | 59.88 | 75.75 |
|     | 50 | 2.08 | 2.61 |     | 250 | 54.89 | 70.31 |
| 80  | 80 | 3.37 | 4.29 | 350 | 350 | 76.20 | 92.08 |
|     | 55 | 3.09 | 3.90 |     | 300 | 65.32 | 84.37 |

# Olet Fittings

## WELDOLETS

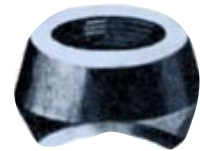
Used to make full size and reducing branch connections from 6 to 750mm from run pipes 10 to 900mm in order to:

- Facilitate header construction.
- Construct the joint to full pipe strength.
- Meet code design requirements for reinforced branch joints.
- Improve flow.
- Assure economical, clean and strong connections.

Weldolet



Thredolet



Sockolet

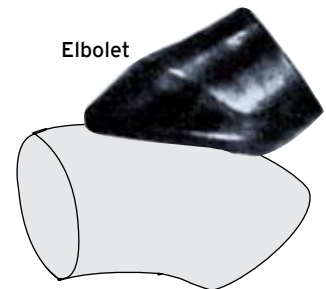


## THREDOLETS AND SOCKOLETS

Used for making relatively small branch outlet connections.

Thredolets and Sockolets are "half couplings" that are bevelled for convenience, tapered for strength, flared for fluid flow and drop forged for the ultimate in strength and ruggedness.

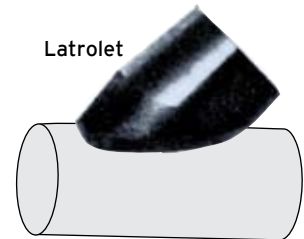
Elbolet



## ELBOLETS AND LATROLETS

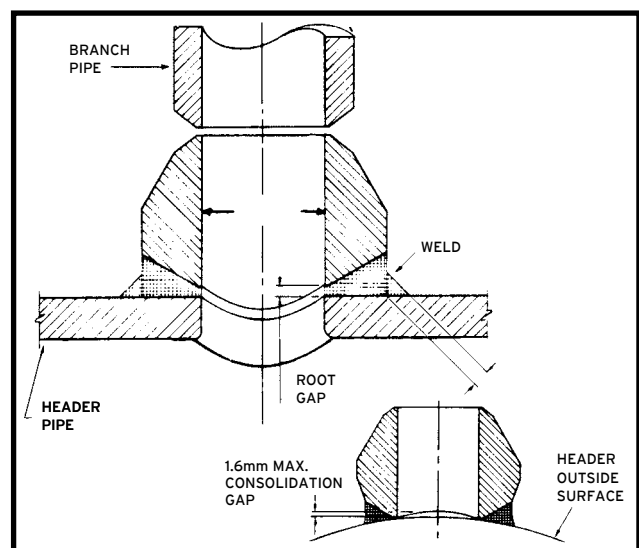
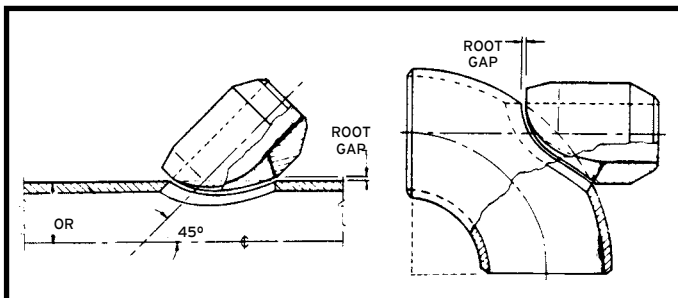
Used for making threaded, socket-weld or butt-weld outlets tangentially to elbows or as 45° branch connections on straight pipe. The design provides for a full penetration weld. These fittings provide greatly improved flow conditions compared with 90° connections and are advantageous for many instrument connection applications.

Latrolet



## INSTALLATION GUIDE

Less fit up time is required for Olets than for most other fittings or fabricated connections. When proper welding procedure is followed, the resultant cost is more economical than constructing branch connections by any other method.



# Olet Fittings

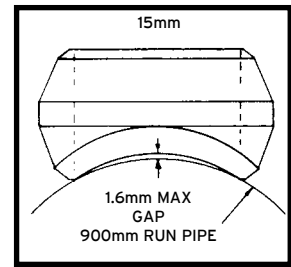
## RANGE OF OLETS

The following range of Olets are available:

• Weldolets • Thredolets • Sockolets • Elbolets • Latrolets • Nipolets • Sweepolets

## HOW IT WORKS

Each outlet size indicated on chart is designed to fit a number of run pipe sizes, e.g. The 15mm fitting marked 900-100x15 will fit all run pipe sizes from 100mm to 900mm. When placed on a 900mm run pipe, there will be a maximum gap of 1.6mm between the top of the run pipe and the base of the fitting at the crotch as shown on sketch. This gap is negligible when welding.



## SIZE SELECTION CHART

### Standard Weight and Extra Strong Weldolets, Sockolets and 3000# Thredolets

|                |                |                |                |   |
|----------------|----------------|----------------|----------------|---|
| 10 x 6         | 20 x 20        | 40 x 40        | 65 x 65        | 90 x 90   |
| 15 x 6         | 25 x 20        | 50 x 40        | 80 x 65        | 100 x 90  |
| 25 - 20 x 6    | 40 - 32 x 20   | 65 x 40        | 90 x 65        | 125 x 90  |
| 65 - 32 x 6    | 65 - 50 x 20   | 80 x 40        | 100 x 65       | 150 x 90  |
| 900 - 80 x 6   | 125 - 80 x 20  | 100 - 90 x 40  | 125 x 65       | 200 x 90  |
| 10 x 8         | 300 - 150 x 20 | 150 - 125 x 40 | 150 x 65       | 250 x 90  |
| 15 x 8         | 900 - 350 x 20 | 300 - 200 x 40 | 200 x 65       | 350 - 300 x 90  |
| 25 - 20 x 8    | 25 x 25        | 600 - 350 x 40 | 300 - 250 x 65 | 500 - 400 x 90  |
| 65 - 32 x 8    | 32 x 25        | 900 - 650 x 40 | 450 - 350 x 65 | 900 - 600 x 90  |
| 900 - 80 x 8   | 40 x 25        | 50 x 50        | 900 - 500 x 65 | 100 x 100   |
| 15 x 10        | 50 x 25        | 65 x 50        | 80 x 80        | 125 x 100   |
| 25 - 20 x 10   | 65 x 25        | 80 x 50        | 90 x 80        | 150 x 100   |
| 65 - 32 x 10   | 90 - 80 x 25   | 90 x 50        | 100 x 80       | 200 x 100   |
| 900 - 80 x 10  | 125 - 100 x 25 | 100 x 50       | 125 x 80       | 250 x 100   |
| 15 x 15        | 250 - 150 x 25 | 125 x 50       | 150 x 80       | 350 - 300 x 100   |
| 20 x 15        | 900 - 300 x 25 | 150 x 50       | 200 x 80       | 500 - 400 x 100   |
| 25 x 15        | 32 x 32        | 250 - 200 x 50 | 250 x 80       | 900 - 600 x 100   |
| 40 - 32 x 15   | 40 x 32        | 450 - 300 x 50 | 350 - 300 x 80 | Outlet Sizes:<br>125, 150, 200, 250, 300,<br>350, 400, 450, 500, 600,<br>650, 750<br>Order to specific size<br>combination. |
| 65 - 50 x 15   | 50 x 32        | 900 - 500 x 50 | 500 - 400 x 80 |   |
| 200 - 80 x 15  | 65 x 32        |                | 900 - 600 x 80 |   |
| 900 - 250 x 15 | 90 - 80 x 32   |                |                |   |
|                | 125 - 100 x 32 |                |                |   |
|                | 200 - 150 x 32 |                |                |   |
|                | 900 - 500 x 32 |                |                |   |

### 6000# Thredolets, Schedule 160 and Double Extra Strong Sockolets

|                |                |                |                |                |
|----------------|----------------|----------------|----------------|----------------|
| 20 x 15        | 40 - 32 x 25   | 40 x 32        | 50 x 40        | 65 x 50        |
| 32 x 15        | 65 - 50 x 25   | 65 - 50 x 32   | 65 x 40        | 80 x 80        |
| 65 x 15        | 250 - 80 x 25  | 90 - 80 x 32   | 90 - 80 x 40   | 100 x 50       |
| 900 - 200 x 15 | 900 - 300 x 25 | 200 - 100 x 32 | 125 - 100 x 40 | 125 x 50       |
| 25 x 20        |                | 500 - 250 x 32 | 200 - 150 x 40 | 150 x 50       |
| 65 - 32 x 20   |                | 900 - 600 x 32 | 450 - 250 x 40 | 250 - 200 x 50 |
| 250 - 80 x 20  |                |                | 900 - 500 x 40 | 500 - 300 x 50 |
| 900 - 300 x 20 |                |                |                | 900 - 600 x 50 |

### Schedule 160 and Double Extra Strong Weldolets

|               |                |                |                |   |
|---------------|----------------|----------------|----------------|---|
| 15 x 15       | 25 x 25        | 40 x 40        | 50 x 50        | Outlet Sizes:<br>65, 80, 100, 125, 150,<br>200, 250, 300.<br>Order to specific size<br>combination. |
| 32 - 20 x 15  | 65 - 32 x 25   | 65 - 50 x 40   | 65 x 50        |   |
| 900 - 40 x 15 | 250 - 80 x 25  | 90 - 80 x 40   | 90 - 80 x 50   |   |
| 20 x 20       | 900 - 300 x 25 | 200 - 100 x 40 | 125 - 100 x 50 |   |
| 32 x 20       | 40 - 32 x 32   | 400 - 250 x 40 | 200 - 150 x 50 |   |
| 40 x 20       | 65 - 50 x 32   | 900 - 600 x 40 | 450 - 250 x 50 |   |
| 200 x 20      | 250 - 80 x 32  |                | 900 - 500 x 50 |   |
|               | 900 - 300 x 32 |                |                |   |

# High Pressure Fittings

## SCREWED & SOCKET-WELD 3000 & 6000 lb

The high pressure pipe fittings illustrated in the following pages are designed for use with American Standard Linepipe and are used extensively in the fabrication of screwed or socket-weld high pressure piping systems.

They are found throughout refinery, petrochemical and industrial plants, on pressure vessels, hydraulic lines, refrigeration plants and wherever high pressures and/or temperatures occur.

Pipe/Fitting combinations are as follows:

| Fitting Pressure Class | Corresponding Max. Pipe Schedule |
|------------------------|----------------------------------|
| Threaded Fittings      |                                  |
| 3000 lbs               | Sch. 80                          |
| 6000 lbs               | XXS                              |
| Socket-Weld Fittings   |                                  |
| 3000 lbs               | Sch. 80                          |
| 6000 lbs               | Sch. 160                         |



90° ELBOW



45° ELBOW



TEE



CROSS



COUPLING



UNION



HEXAGON HEAD PLUG



HEXAGON HEAD BUSHING



ROUND HEAD PLUG



SQUARE HEAD PLUG



90° ELBOW



45° ELBOW



TEE



CROSS



COUPLING



CAP



TYPE 2



TYPE 1

SOCKET WELDING REDUCER INSERTS

## DIMENSIONAL SPECIFICATIONS

ASME B16.11 – Forged Steel Fittings, Socket-Weld and Threaded.

BS3799 - Forged Steel Pipe Fittings, screwed and socket-weld for the petroleum industry - based on ASME B16.11.

## MATERIAL SPECIFICATIONS

Carbon Steel – forgings to ASTM A105, or Barstock.

Grade F11 (Chrome-Moly, for high temperatures), Grade F316L (Stainless Steel, for temperature and corrosion resistance).

Stainless and Alloy Steels to ASTM A182 of the appropriate grades, including:–

ASTM A350 Gr-LF1 (Carbon Steel for low temperatures).

## WORKING PRESSURES

### PRESSURE/TEMPERATURE RATINGS

| Nominal Pressure Ratings                     | SERVICE TEMPERATURE °CELSIUS |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|--|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|  | 38                           | 66    | 93    | 121   | 149   | 177   | 204   | 232   | 260   | 288   | 316   | 343   | 371   | 399   | 427   | 427*  |
| 3000 lb                                      | 20670                        | 20359 | 20084 | 19808 | 19602 | 19360 | 19119 | 18706 | 17948 | 16949 | 15915 | 14813 | 13504 | 12229 | 10507 | 8612  |
| 6000 lb                                      | 41340                        | 40754 | 40168 | 39617 | 39232 | 38756 | 38239 | 37412 | 37412 | 33933 | 31831 | 29627 | 27008 | 24459 | 21014 | 17225 |
| Non-shock Working Pressures tabulated in kPa |                              |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |

\*These pressures are in accordance with the ANSI Code for Pressure Piping (ASME B31.1).  
† Suggest Alloy Steel above 482°C.

All high pressure fittings must be used within the pressure/temperature limitations of the pipes to which they are attached.

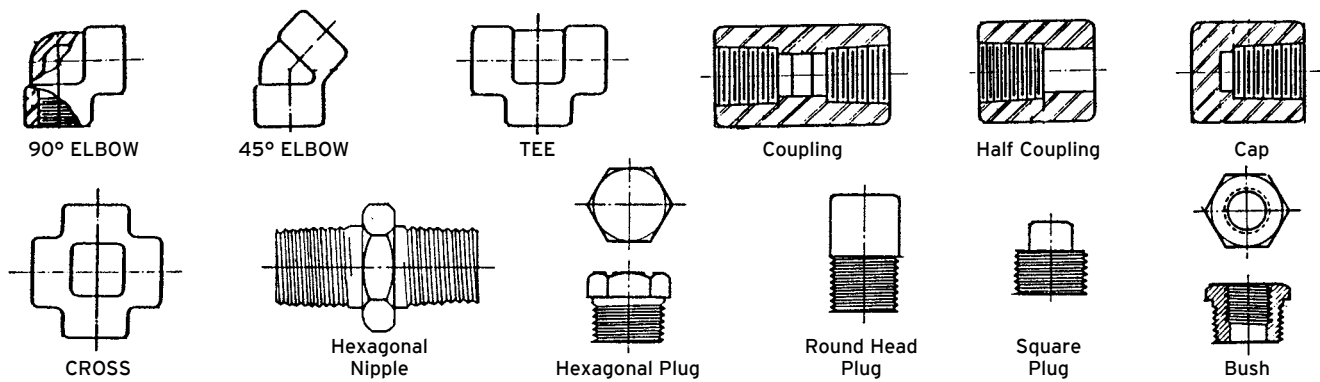
## FINISH

Fittings are normally self-coloured or phosphate-finished. Galvanised or cadmium-plated finish is available at extra cost.



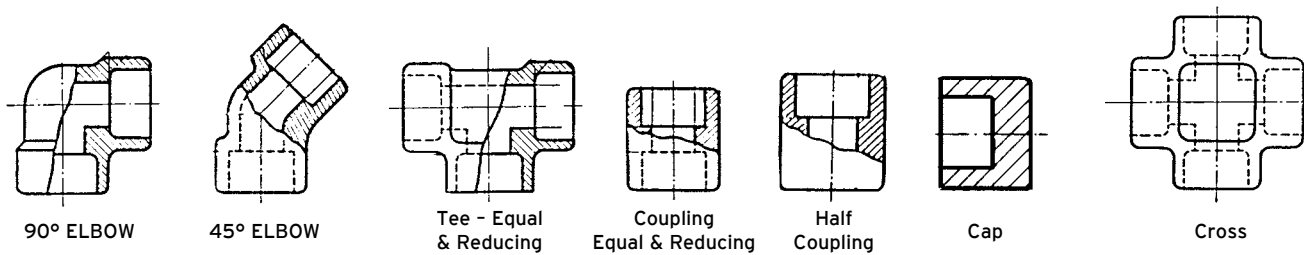
# High Pressure Fittings

Standard Range: **SCREWED NPT.** (BSP available to order).



|                  | 3000 lb                       | 6000 lb | Size Range | Normal Manufacture |
|------------------|-------------------------------|---------|------------|--------------------|
| 90° Elbow        | ✓                             | ✓       | 6-100mm    | Forged             |
| 45° Elbow        | ✓                             | ✓       | 6-100mm    | Forged             |
| Tee              | ✓                             | ✓       | 6-100mm    | Forged             |
| Coupling         | ✓                             | ✓       | 6-100mm    | Barstock           |
| Half Coupling    | ✓                             | ✓       | 6-100mm    | Barstock           |
| Cap              | ✓                             | ✓       | 6-100mm    | Barstock           |
| Cross            | ✓                             | ✓       | 6-100mm    | Forged             |
| Hexagonal Nipple | ✓                             | ✓       |            |                    |
|                  | All conform to 6000 lb rating |         | 6-100mm    | Forged or Barstock |
| Hexagonal Plug   | ✓                             | ✓       | 6-100mm    | Forged or Barstock |
| Round Head Plug  | ✓                             | ✓       | 6-100mm    | Barstock           |
| Square Plug      | ✓                             | ✓       | 6-100mm    | Barstock           |
| Bush             | ✓                             | ✓       | 6-100mm    | Forged or Barstock |

Standard Range: **SOCKET-WELD**



|               | 3000 lb | 6000 lb | Size Range | Normal Manufacture |
|---------------|---------|---------|------------|--------------------|
| 90° Elbow     | ✓       | ✓       | 8-80mm     | Forged             |
| 45° Elbow     | ✓       | ✓       | 8-80mm     | Forged             |
| Tee           | ✓       | ✓       | 8-80mm     | Forged             |
| Coupling      | ✓       | ✓       | 8-80mm     | Barstock           |
| Half Coupling | ✓       | ✓       | 8-80mm     | Barstock           |
| Cap           | ✓       | ✓       | 8-80mm     | Barstock           |
| Cross         | ✓       | ✓       | 8-80mm     | Forged             |

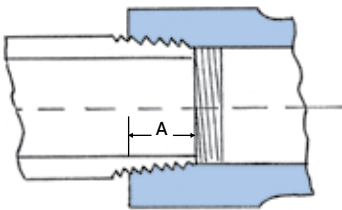
# High Pressure Fittings

## SCREWED & SOCKET-WELD 2000, 3000 & 6000 lb

Screwed Fittings are taper-threaded in accordance with ASME B1.20.1, having thread lengths in accordance with applicable tables.

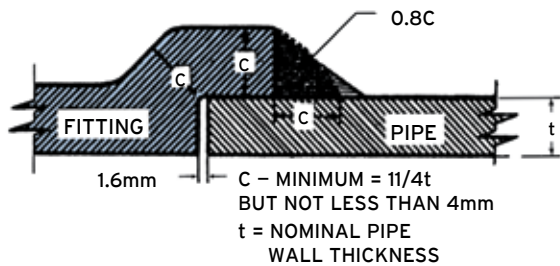
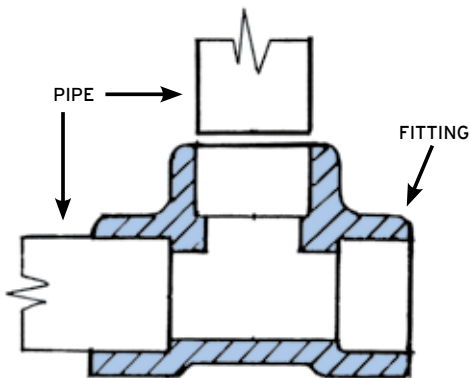
The actual and theoretical axes of the threads may diverge by not more than 1.6 mm in 300 mm.

Fittings can be threaded to British Standard Taper (BS 21) if required. ASME B 1.20.1, the American Standard for pipe threads, determines length of thread engagement as shown below.



| Length of Thread Screwed into Valves or Fittings |      |      |      |      |       |       |       |       |       |       |      |       |       |       |       |
|--|------|------|------|------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|
| SIZE   | 6    | 8    | 10   | 15   | 20    | 25    | 32    | 40    | 50    | 65    | 80   | 90    | 100   | 125   | 150   |
| A<br>mm  | 7.93 | 9.52 | 11.1 | 12.7 | 14.28 | 17.46 | 17.46 | 17.46 | 17.46 | 23.81 | 24.6 | 26.98 | 28.57 | 30.16 | 30.16 |

Socket-Weld Fittings are designed for welding to American standard pipes (3000 lb. fittings to Sch. 80 pipe and 6000 lb. fittings to Sch. 160 pipe).

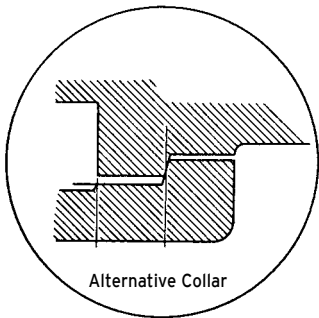
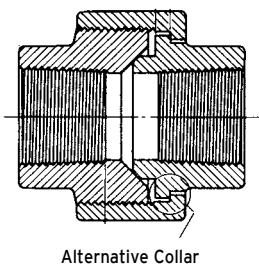


Minimum dimensions required for socket-weld fittings as specified in the American Standard Code for Pressure Piping, ASME B31.1.

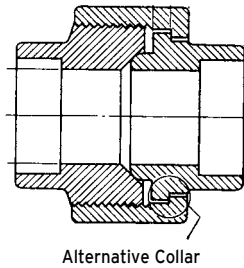
## UNIONS SCREWED & SOCKET-WELD

Dimensions for high pressure unions are listed in BS 3799. Dimensions may vary according to manufacturer's specifications.

### SCREWED UNIONS

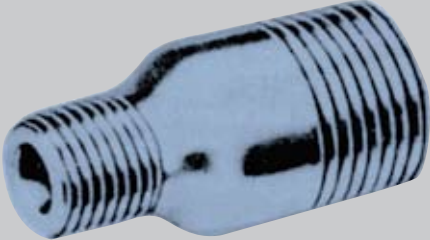
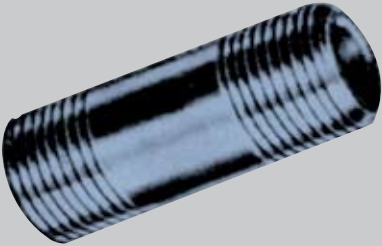
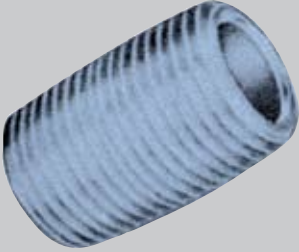


### SOCKET-WELD UNIONS

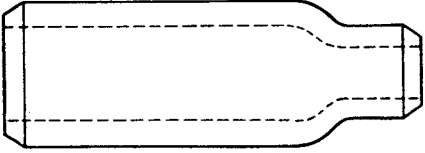

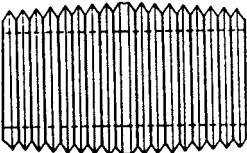
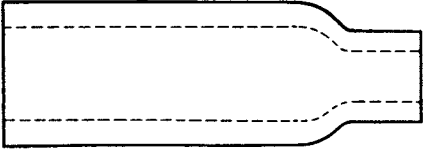
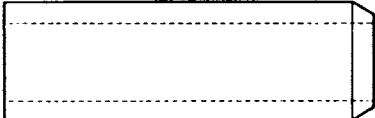


# High Pressure Fittings

## TUBULAR FITTINGS

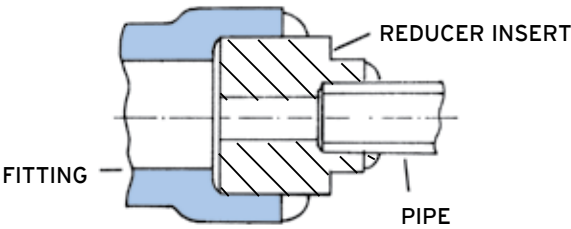
|  |   |   |
|--|---|---|
| <b>SWAGE NIPPLES</b><br>Ends Screwed, Plain or Bevelled for Welding, Concentric and Eccentric.<br><br>Swage Nipples as illustrated are manufactured from Seamless Steel Pipe to ASTM A106, Grade 'B'. They can also be machined from Barstock material. | <b>PIPE NIPPLES</b><br>Seamless Tubular, Ends Screwed, Plain or Bevelled.<br> | <b>CLOSE-TAPER NIPPLES</b><br>Seamless Tubular, Screwed.<br> |
|--|---|---|

Swage and Pipe Nipples can also be supplied with non-standard end connections – e.g. One End Screwed, One End Bevelled, or One End Sch. 80, One End Sch. 40.

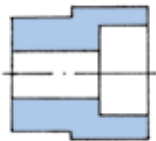
|   |  |   |
|---|--|---|
| <br>BUTTWELD TYPE   | <br>SCREWED TYPE              |   |
| <br>PLAIN END TYPE | <br>PLAIN END      BEVEL END | OneSteel offers a range of Swage and Pipe Nipples in a wide variety of diameters, lengths, wall thicknesses and materials. Please consult us for your requirements. |

## SOCKET-WELD REDUCER INSERTS ASTM A105 FORGINGS

The purpose of socket-weld reducer inserts is to avoid the delays and extra costs that naturally occur in producing regular socket-weld fittings with reduced outlets. Designed for use with straight size fittings, reducer inserts serve the same purpose as threaded bushings used with screwed fittings. The drawing at right illustrates the simplicity of their application.



TYPE 1  
For use with Schedule 40 & 80 pipe.



TYPE 2  
For use with Schedule 160 pipe.



SIZE RANGE: From 15 x 10mm to 100 x 25mm, in all standard reducing sizes.

# Flanges to American Standards

## SPECIFICATIONS

Forged Carbon, Alloy and Stainless Steel Flanges to American Standards are designed for use with pipes and fittings to American Standards, but can also be attached, in certain sizes to pipes made to British and Australian Standards.



## SIZES 15 - 600mm

**CLASS 150, 300, 400, 600, 900, 1500 & 2500**

Dimensions shown are for Flanges made to the dimensional requirements of ASME B16.5 which is the accepted American Standard for all Flanges in sizes to 600mm bore.

## SIZES ABOVE 600mm

Steel Flanges above 600mm bore are made to various standards, as follows:

**CLASS 150, 300, 400, 600, 900**

Dimensions to MSS-SP44\* or BS 2393. OneSteel stocks slip-on and weld-neck flanges to BS 3293 and blinds to MSS SP44.

### \*MSS-SP44

A Standard developed by the Manufacturers Standardisation Society (of the Valves and Fittings Industry) to provide uniform dimensions of flanges for use with high pressure pipelines larger than 600mm diameter. These designs were predicated on flanges being used with API 5LX line-pipe of 52,000 lbs. minimum yield strength, and were proportioned accordingly.

This Standard can be taken as being the extension of ASME B16.5 in sizes above 600mm bore.

## ANSI FLANGES



# Flanges to American Standards

## ANSI FLANGES

### MATERIAL SPECIFICATIONS

American Standard Pipe Flanges are manufactured in a variety of Carbon, Alloy and Stainless Steels and selection of a particular grade is determined by the usual criteria of pressure/temperature requirements and corrosion resistance.

Since these factors determine pipe and fittings to be used in a piping system, it is then necessary only to select flanges of a similar material.

## LARGE DIAMETER FLANGE STANDARDS

### ASME B16.1b

This Standard establishes dimensions for Class 250 Cast Iron Flanges above 600mm, (as ASME B16.1 gives dimensions for large diameter Class 125 Cast Iron Flanges).

### API 605

American Petroleum Institute Standard intended primarily for use in Oil and Gas production. API 605 dimensions DO NOT match ASME, MSS or BS dimensions of similar pressure class.

### AWWA C207-54T

This is a Standard published by the American Waterworks Association for steel Flanges to be used on waterworks and sewerage pipes. These flanges match Class 125 Cast Iron Flanges (ASME B16.1) in most dimensions.

### CLASSES 125LW, 175 & 350

These are Standards developed over the years by a number of manufacturers, not all using exactly the same dimensions.

### TEMA FLANGES

The Tubular Exchangers Manufacturers Association (TEMA) lays down standards for dimensions and material specifications for Shell Flanges, Cover Flanges, Long Welding Necks for Nozzles and other heat exchanger components.

### BS.3293

This British Standard established dimensions for flanges for petroleum industry use, in Class 150, 300, 400 and 600, in sizes above 600mm, which correspond exactly to those of MSS SP-44 in Class 300, 400 and 600.

Class 900 is not included in the British Standard, but dimensions are given for Class 150, 600-700mm which are similar to those of ASME B16.1, Class 125.

### BS.1560

This British Standard is based on ASME B16.5, and lists Steel Pipe Flanges to the same dimensions, pressure classes and in the same sizes as the American Standard up to 600mm.

| Guide to Material Specifications  |   |
|---|---|
| General Classification  | Applicable ASTM Specification - Forgings  |
| Carbon Steel (Refer Table pg. 28)   | A105  |
| Carbon Steel (low temp.)  | A350 Grade LF1†<br>other grades also available  |
| Carbon Moly (Refer Table pg. 28)  | A182-55T Grade F1   |
| Chrome-Moly Alloy Steels<br>1/2 Cr 1/2 Mo<br>1 Cr 1/2 Mo<br>1 1/4 Cr 1/2 Mo<br>2 1/4 Cr 1 Mo<br>3 Cr 1 Mo<br>5 Cr 1/2 Mo<br>5 Cr 1/2 Mo-Si<br>9 Cr 1 Mo | A335 Grade P2†<br>A182 Grade F12<br>A182 Grade F11<br>A182 Grade F22<br>A335 Grade P21†<br>A182 Grade F5a<br>A335 Grade P5b†<br>A182 Grade F9 |
| Chrome-Nickel Stainless Steels<br>Type 304<br>Type 310<br>Type 347<br>Type 321<br>Type 316<br>H & L Grades also available                               | A182 Grade F304<br>A182 Grade F310<br>A182 Grade F347<br>A182 Grade F321<br>A182 Grade F316   |
| Nickel Steel<br>3 1/2 Ni.   | A350-55T Grade LF3†   |

The classifications are used to group materials for Flanges Class 150 through Class 2500.

† ASTM Specifications directly covering forged flanges for these general materials specifications do not presently exist. Flanges of these materials shall be specified to conform to the nearest grade in A182, except chemistry to conform to the ASTM specification listed.

‡ Intended primarily for use for subzero service. The ratings at -29° to 38°C given for the materials on page 28 shall also apply at lower temperatures.



# Flanges to American Standards

## ASTM A105

| Chemical Requirements   |                         |
|---|-------------------------|
| Note - For each reduction of 0.01% below the specified carbon maximum (0.35%), an increase of 0.06% manganese above the specified maximum (1.05%) will be permitted up to a maximum of 1.35%. |                         |
| Element   | Composition, %          |
| Carbon  | 0.35 max                |
| Manganese   | 0.60-1.05               |
| Phosphorus  | 0.040 max               |
| Sulfur  | 0.050 max               |
| Silicon   | 0.10-0.35               |
| Copper  | 0.40 max <sup>A</sup>   |
| Nickel  | 0.40 max <sup>A</sup>   |
| Chromium  | 0.30 max <sup>A,B</sup> |
| Molybdenum  | 0.12 max <sup>A,B</sup> |
| Vanadium  | 0.03 max <sup>C</sup>   |
| Columbium   | 0.02 max <sup>C</sup>   |

<sup>A</sup> The sum of copper, nickel, chromium and molybdenum shall not exceed 1.00%.

<sup>B</sup> The sum of chromium and molybdenum shall not exceed 0.32%.

<sup>C</sup> By agreement between the manufacturer and the purchaser, the limits for vanadium and columbium, or both, may be increased to 0.10% and 0.05% respectively.

| Mechanical Requirements - nominal *   |     |
|---------------------------------------|-----|
| Tensile strength, min, MPa            | 485 |
| Yield strength, min, MPa <sup>c</sup> | 250 |
| Elongation in 50mm, min %             | 30  |
| Reduction of area, min %              | 30  |
| Hardness, HB, max                     | 187 |

\*For complete explanation, refer detailed specification, Table 3, ASTM A 105/A105M.

Heat treatment of flange forgings above Class 300 is mandatory under ASTM A105. All A105 flanges stocked by OneSteel including Class 150 and 300 are heat treated (normalised).

| TEMPERATURE / PRESSURE RATINGS  |                                       |           |           |           |            |            |
|---|---------------------------------------|-----------|-----------|-----------|------------|------------|
| Carbon Steel Pipe Flanges to ASME B16.5 (BS. 1560)<br>Forgings to ASTM A105 - Not recommended for prolonged use above 427°C<br>Forgings to ASTM A350 - LF2 - Not to be used above 343°C |                                       |           |           |           |            |            |
| Temperature<br>in °C  | Maximum Working Pressure in kPa by PN |           |           |           |            |            |
|   | PN20                                  | PN50      | PN100     | PN150     | PN250      | PN420      |
|   | Class 150                             | Class 300 | Class 600 | Class 900 | Class 1500 | Class 2500 |
| -29 to 38   | 1960                                  | 5110      | 10210     | 15320     | 25530      | 42550      |
| 50  | 1920                                  | 5010      | 10020     | 15020     | 25040      | 41730      |
| 100   | 1770                                  | 4640      | 9280      | 13910     | 23190      | 38650      |
| 150   | 1580                                  | 4520      | 9050      | 13570     | 22610      | 37690      |
| 200   | 1400                                  | 4380      | 8760      | 13150     | 21910      | 36520      |
| 250   | 1210                                  | 4170      | 8340      | 12520     | 20860      | 34770      |
| 300   | 1020                                  | 3870      | 7750      | 11620     | 19370      | 32280      |
| 350   | 840                                   | 3700      | 7390      | 11090     | 18480      | 30800      |
| 375   | 740                                   | 3650      | 7290      | 10940     | 18230      | 30390      |
| 400   | 650                                   | 3450      | 6900      | 10350     | 17250      | 28750      |
| 425   | 560                                   | 2880      | 5750      | 8630      | 14380      | 23960      |
| 450   | 470                                   | 2000      | 4010      | 6010      | 10020      | 16690      |
| 475   | 370                                   | 1350      | 2710      | 4060      | 6770       | 11290      |
| 500   | 280                                   | 880       | 1760      | 2640      | 4400       | 7330       |
| 525   | 190                                   | 520       | 1040      | 1550      | 2590       | 4320       |
| 540   | 130                                   | 330       | 650       | 980       | 1630       | 2720       |

FLANGES ABOVE DN 600 ARE NOT INCLUDED IN ASME B16.5 AND THE CLASS DESIGNATIONS IN THESE LARGE DIAMETERS DO NOT IMPLY SPECIFIC TEMPERATURE/PRESSURE RATINGS



# Flanges to American Standards

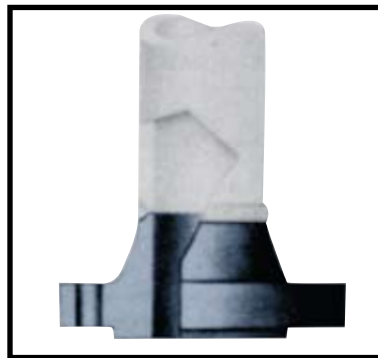
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## METHODS OF ATTACHMENT



### SLIP-ON FLANGES

Although recommended practice in attaching Slip-On type flanges is to weld both at the flange hub and the pipe end, for mild service conditions only one is sometimes employed. In this case the weld is normally made at the pipe end.



### WELDING NECK FLANGES

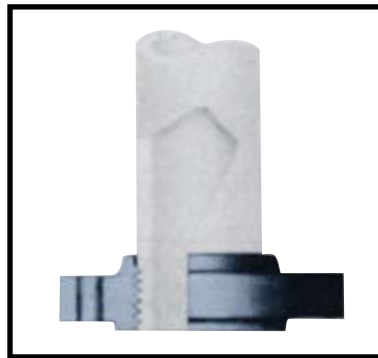
This type of flange is attached by butt welding to the adjoining pipe or shell. The weld may be made either manually or automatically with or without a backing strip. Sound welds are readily obtained with any recognised welding procedure.



### LAP JOINT FLANGES

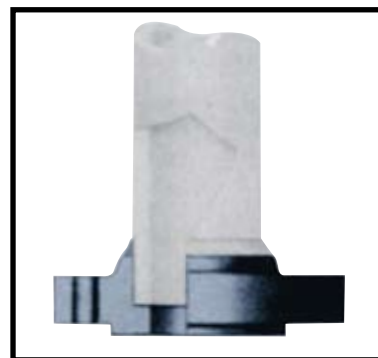
Lap joint flanges are most frequently used with lap joint stub ends, (Type A), although in some cases the lap is formed on the pipe end. Since they are free to rotate or swivel, there is no problem of bolt hole alignment. Such joints may be readily broken for inspection, cleaning, etc. The radius at the ID of the flange face accommodates that at the back of the lap, thus permitting more uniform application of loading.

Lap Joint flanges find their most common application when used with stainless steel stub ends.



### THREADED FLANGES

Threaded flanges are, of course, attached by screwing to threaded pipe ends.

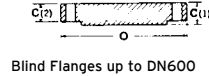
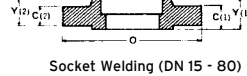
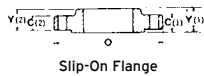
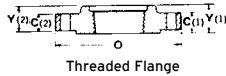
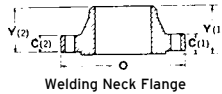


### SOCKET-WELD FLANGES

In attaching socket-weld flanges, the pipe end is inserted into the socket and then welded at the flange hub. An inside weld at the pipe end is frequently made for greater strength or, with grinding, to provide a smooth bore without pockets or recesses.

# Flanges to American Standards

DN 15 to 600 are to ASME B16.5 (BS 1560). DN 750 & 900 are to BS 3293 for Slip-On & Weldneck only.



Blind Flanges up to DN600  
(Above DN600 see notes – below†)

NOMINAL SIZES SHOWN ARE \*DN : SI METRIC TERM +NPS : ASME TERM

| Nominal Flange Size DN |       | PN20 (Class 150) |                               |                               |                 |                     |                    |              | PN50 (Class 300) |                               |                               |                 |                     |                    |              | PN100 (Class 600) |                               |                               |                 |                     |                    |              | Nominal Flange Size DN |       |
|------------------------|-------|------------------|-------------------------------|-------------------------------|-----------------|---------------------|--------------------|--------------|------------------|-------------------------------|-------------------------------|-----------------|---------------------|--------------------|--------------|-------------------|-------------------------------|-------------------------------|-----------------|---------------------|--------------------|--------------|------------------------|-------|
| ⌘ DN                   | + NPS | Dia. of Fig. 0   | Thick-ness of Fig. Min. C(1)* | Length Thru Hub               |                 | Dia. of Bolt Circle | Dia. of Bolt Holes | No. of Bolts | Dia. of Fig. 0   | Thick-ness of Fig. Min. C(1)* | Length Thru Hub               |                 | Dia. of Bolt Circle | Dia. of Bolt Holes | No. of Bolts | Dia. of Fig. 0    | Thick-ness of Fig. Min. C(2)† | Length Thru Hub               |                 | Dia. of Bolt Circle | Dia. of Bolt Holes | No. of Bolts | ⌘ DN                   | + NPS |
|                        |       |                  |                               | Thrd. Slip-On Soc/ Weld Y(1)* | Weld Neck Y(1)* |                     |                    |              |                  |                               | Thrd. Slip-On Soc/ Weld Y(1)* | Weld Neck Y(1)* |                     |                    |              |                   |                               | Thrd. Slip-On Soc/ Weld Y(2)† | Weld Neck Y(2)† |                     |                    |              |                        |       |
| 15                     | 1/2   | 90               | 11.5                          | 16                            | 48              | 60.5                | 16                 | 4            | 95               | 14.5                          | 22                            | 52              | 66.5                | 16                 | 4            | 95                | 14.5                          | 22                            | 52              | 66.5                | 16                 | 4            | 15                     | 1/2   |
| 20                     | 3/4   | 100              | 13.0                          | 16                            | 52              | 70.0                | 16                 | 4            | 120              | 16.0                          | 25                            | 57              | 82.5                | 20                 | 4            | 120               | 16.0                          | 25                            | 57              | 82.5                | 20                 | 4            | 20                     | 3/4   |
| 25                     | 1     | 110              | 14.5                          | 17                            | 56              | 79.5                | 16                 | 4            | 125              | 17.5                          | 27                            | 62              | 89.0                | 20                 | 4            | 125               | 17.5                          | 27                            | 62              | 89.0                | 20                 | 4            | 25                     | 1     |
| 32                     | 1 1/4 | 120              | 16.0                          | 21                            | 57              | 89.0                | 16                 | 4            | 135              | 19.5                          | 27                            | 65              | 98.5                | 20                 | 4            | 135               | 21.0                          | 29                            | 67              | 98.5                | 20                 | 4            | 32                     | 1 1/4 |
| 40                     | 1 1/2 | 130              | 17.5                          | 22                            | 62              | 98.5                | 16                 | 4            | 155              | 21.0                          | 30                            | 68              | 114.5               | 22                 | 4            | 155               | 22.5                          | 32                            | 70              | 114.5               | 22                 | 4            | 40                     | 1 1/2 |
| 50                     | 2     | 150              | 19.5                          | 25                            | 64              | 120.5               | 20                 | 4            | 165              | 22.5                          | 33                            | 70              | 127.0               | 20                 | 8            | 165               | 26.5                          | 37                            | 73              | 127.0               | 20                 | 8            | 50                     | 2     |
| 65                     | 2 1/2 | 180              | 22.5                          | 29                            | 70              | 139.5               | 20                 | 4            | 190              | 25.5                          | 38                            | 76              | 149.0               | 22                 | 8            | 190               | 29.0                          | 41                            | 79              | 149.0               | 22                 | 8            | 65                     | 2 1/2 |
| 80                     | 3     | 190              | 24.0                          | 30                            | 70              | 152.5               | 20                 | 4            | 210              | 29.0                          | 43                            | 79              | 168.5               | 22                 | 8            | 210               | 32.0                          | 46                            | 83              | 168.5               | 22                 | 8            | 80                     | 3     |
| 90                     | 3 1/2 | 215              | 24.0                          | 32                            | 71              | 178.0               | 20                 | 8            | 230              | 30.5                          | 44                            | 81              | 184.0               | 22                 | 8            | 230               | 35.0                          | 49                            | 86              | 184.0               | 26                 | 8            | 90                     | 3 1/2 |
| 100                    | 4     | 230              | 24.0                          | 33                            | 76              | 190.5               | 20                 | 8            | 255              | 32.0                          | 48                            | 86              | 200.0               | 22                 | 8            | 275               | 38.5                          | 54                            | 102             | 216.0               | 26                 | 8            | 100                    | 4     |
| 125                    | 5     | 255              | 24.0                          | 36                            | 89              | 216.0               | 22                 | 8            | 280              | 35.0                          | 51                            | 98              | 235.0               | 22                 | 8            | 330               | 44.5                          | 60                            | 114             | 267.0               | 30                 | 8            | 125                    | 5     |
| 150                    | 6     | 280              | 25.5                          | 40                            | 89              | 241.5               | 22                 | 8            | 320              | 37.0                          | 52                            | 98              | 270.0               | 22                 | 12           | 355               | 48.0                          | 67                            | 117             | 292.0               | 30                 | 12           | 150                    | 6     |
| 200                    | 8     | 345              | 29.0                          | 44                            | 102             | 298.5               | 22                 | 8            | 380              | 41.5                          | 62                            | 111             | 330.0               | 26                 | 12           | 420               | 55.5                          | 76                            | 133             | 349.0               | 33                 | 12           | 200                    | 8     |
| 250                    | 10    | 405              | 30.5                          | 49                            | 102             | 362.0               | 26                 | 12           | 445              | 48.0                          | 67                            | 117             | 387.5               | 30                 | 16           | 510               | 63.5                          | 86                            | 152             | 432.0               | 36                 | 16           | 250                    | 10    |
| 300                    | 12    | 485              | 32.0                          | 56                            | 114             | 432.0               | 26                 | 12           | 520              | 51.0                          | 73                            | 130             | 451.0               | 33                 | 16           | 560               | 66.5                          | 92                            | 156             | 489.0               | 36                 | 20           | 300                    | 12    |
| 350                    | 14    | 535              | 35.0                          | 57                            | 127             | 476.0               | 30                 | 12           | 585              | 54.0                          | 76                            | 143             | 514.5               | 33                 | 20           | 605               | 70.0                          | 94                            | 165             | 527.0               | 39                 | 20           | 350                    | 14    |
| 400                    | 16    | 600              | 37.0                          | 64                            | 127             | 540.0               | 30                 | 16           | 650              | 57.5                          | 83                            | 146             | 571.5               | 36                 | 20           | 685               | 76.5                          | 106                           | 178             | 603.0               | 42                 | 20           | 400                    | 16    |
| 450                    | 18    | 635              | 40.0                          | 68                            | 140             | 578.0               | 33                 | 16           | 710              | 60.5                          | 89                            | 159             | 628.5               | 36                 | 24           | 745               | 83.0                          | 117                           | 184             | 654.0               | 45                 | 20           | 450                    | 18    |
| 500                    | 20    | 700              | 43.0                          | 73                            | 145             | 635.0               | 33                 | 20           | 775              | 63.5                          | 95                            | 162             | 686.0               | 36                 | 24           | 815               | 89.0                          | 127                           | 190             | 724.0               | 45                 | 24           | 500                    | 20    |
| 600                    | 24    | 815              | 48.0                          | 83                            | 152             | 749.5               | 36                 | 20           | 915              | 70.0                          | 106                           | 168             | 813.0               | 42                 | 24           | 940               | 102.0                         | 140                           | 203             | 838.0               | 52                 | 24           | 600                    | 24    |
| 750                    | 30    | 985              | 54.0 †                        | 89                            | 130.2           | 914.0               | 35                 | 28           | 1090             | 92.0                          | 210                           | 210             | 997.0               | 48                 | 28           | 1130              | 114.0                         | 248                           | 248             | 1022                | 54                 | 28           | 750                    | 30    |
| 900                    | 36    | 1170             | 60.3 †                        | 95                            | 136.5           | 1086                | 41                 | 32           | 1270             | 105.0                         | 241                           | 241             | 1168.0              | 54                 | 32           | 1315              | 124.0                         | 283                           | 283             | 1194                | 67                 | 28           | 900                    | 36    |

| Nominal Flange Size DN |       | PN150 (Class 900)                   |                               |                     |                 |                     |                    |              | PN250 (Class 1500) |                               |                               |                 |                     |                    |              | PN420 (Class 2500) |                               |                               |                 |                     |                    |              | Nominal Flange Size DN |       |    |
|------------------------|-------|-------------------------------------|-------------------------------|---------------------|-----------------|---------------------|--------------------|--------------|--------------------|-------------------------------|-------------------------------|-----------------|---------------------|--------------------|--------------|--------------------|-------------------------------|-------------------------------|-----------------|---------------------|--------------------|--------------|------------------------|-------|----|
| DN                     | NPS   | Dia. of Fig. 0                      | Thick-ness of Fig. Min. C(2)† | Length Thru Hub     |                 | Dia. of Bolt Circle | Dia. of Bolt Holes | No. of Bolts | Dia. of Fig. 0     | Thick-ness of Fig. Min. C(2)† | Length Thru Hub               |                 | Dia. of Bolt Circle | Dia. of Bolt Holes | No. of Bolts | Dia. of Fig. 0     | Thick-ness of Fig. Min. C(2)† | Length Thru Hub               |                 | Dia. of Bolt Circle | Dia. of Bolt Holes | No. of Bolts | DN                     | NPS   |    |
|                        |       |                                     |                               | Thrd. Slip-On Y(2)† | Weld Neck Y(2)† |                     |                    |              |                    |                               | Thrd. Slip-On Soc/ Weld Y(2)† | Weld Neck Y(2)† |                     |                    |              |                    |                               | Thrd. Slip-On Soc/ Weld Y(2)† | Weld Neck Y(2)† |                     |                    |              |                        |       |    |
| 15                     | 1/2   | USE PN250 DIMENSIONS IN THESE SIZES |                               |                     |                 |                     |                    |              | 120                | 22.5                          | 32                            | 60              | 82.5                | 22                 | 4            | 135                | 30.5                          | 40                            | 73              | 89.0                | 22                 | 4            | 15                     | 1/2   |    |
| 20                     | 3/4   |                                     |                               |                     |                 |                     |                    |              | 130                | 25.5                          | 35                            | 70              | 89.0                | 22                 | 4            | 140                | 32.0                          | 43                            | 79              | 95.0                | 22                 | 4            | 20                     | 3/4   |    |
| 25                     | 1     |                                     |                               |                     |                 |                     |                    |              | 150                | 29.0                          | 41                            | 73              | 101.5               | 26                 | 4            | 160                | 35.0                          | 48                            | 89              | 108.0               | 26                 | 4            | 25                     | 1     |    |
| 32                     | 1 1/4 |                                     |                               |                     |                 |                     |                    |              | 160                | 29.0                          | 41                            | 73              | 111.0               | 26                 | 4            | 185                | 38.5                          | 52                            | 95              | 130.0               | 30                 | 4            | 32                     | 1 1/4 |    |
| 40                     | 1 1/2 |                                     |                               |                     |                 |                     |                    |              | 180                | 32.0                          | 44                            | 83              | 124.0               | 30                 | 4            | 205                | 44.5                          | 60                            | 111             | 146.0               | 33                 | 4            | 40                     | 1 1/2 |    |
| 50                     | 2     |                                     |                               |                     |                 |                     |                    |              | 215                | 38.5                          | 57                            | 102             | 165.0               | 26                 | 8            | 235                | 51.0                          | 70                            | 127             | 171.5               | 30                 | 8            | 50                     | 2     |    |
| 65                     | 2 1/2 |                                     |                               |                     |                 |                     |                    |              | 245                | 41.5                          | 64                            | 105             | 190.5               | 30                 | 8            | 270                | 57.5                          | 79                            | 143             | 197.0               | 33                 | 8            | 65                     | 2 1/2 |    |
| 80                     | 3     | 240                                 | 38.5                          | 54                  | 102             | 190.5               | 26                 | 8            | 270                | 48.0                          | 73                            | 118             | 203.0               | 33                 | 8            | 305                | 67.0                          | 92                            | 168             | 228.5               | 36                 | 8            | 80                     | 3     |    |
| 100                    | 4     | 295                                 | 44.5                          | 70                  | 114             | 235.0               | 32                 | 8            | 310                | 54.0                          | 90                            | 124             | 241.5               | 36                 | 8            | 355                | 76.5                          | 108                           | 190             | 273.0               | 42                 | 8            | 100                    | 4     |    |
| 125                    | 5     | 350                                 | 51.0                          | 79                  | 127             | 279.5               | 35                 | 8            | 375                | 73.5                          | 105                           | 155             | 292.0               | 42                 | 8            | 420                | 92.5                          | 130                           | 229             | 324.0               | 48                 | 8            | 125                    | 5     |    |
| 150                    | 6     | 380                                 | 56.0                          | 86                  | 140             | 317.5               | 32                 | 12           | 395                | 83.0                          | 119                           | 171             | 317.5               | 39                 | 12           | 485                | 108.0                         | 152                           | 273             | 368.5               | 56                 | 8            | 150                    | 6     |    |
| 200                    | 8     | 470                                 | 63.5                          | 102                 | 162             | 393.5               | 39                 | 12           | 485                | 92.0                          | 143                           | 213             | 393.5               | 45                 | 12           | 550                | 127.0                         | 178                           | 318             | 438.0               | 56                 | 12           | 200                    | 8     |    |
| 250                    | 10    | 545                                 | 70.0                          | 108                 | 184             | 470.0               | 39                 | 16           | 585                | 108.0                         | 159                           | 254             | 482.5               | 52                 | 12           | 675                | 165.5                         | 229                           | 419             | 539.5               | 68                 | 12           | 250                    | 10    |    |
| 300                    | 12    | 610                                 | 79.5                          | 117                 | 200             | 533.5               | 39                 | 20           | 675                | 124.0                         | 181                           | 283             | 571.5               | 56                 | 16           | 760                | 184.5                         | 254                           | 464             | 619.0               | 76                 | 12           | 300                    | 12    |    |
| 350                    | 14    | 640                                 | 86.0                          | 130                 | 213             | 559.0               | 42                 | 20           | 750                | 133.5                         |                               | 298             | 635.0               | 60                 | 16           |                    |                               |                               |                 |                     |                    |              |                        | 350   | 14 |
| 400                    | 16    | 705                                 | 89.0                          | 133                 | 216             | 616.0               | 45                 | 20           | 825                | 146.5                         |                               | 311             | 705.0               | 68                 | 16           |                    |                               |                               |                 |                     |                    |              |                        | 400   | 16 |
| 450                    | 18    | 785                                 | 102.0                         | 152                 | 229             | 686.0               | 52                 | 20           | 915                | 162.0                         |                               | 327             | 774.5               | 76                 | 16           |                    |                               |                               |                 |                     |                    |              |                        | 450   | 18 |
| 500                    | 20    | 855                                 | 108.0                         | 159                 | 248             | 749.5               | 54                 | 20           | 985                | 178.0                         |                               | 356             | 832.0               | 80                 | 16           |                    |                               |                               |                 |                     |                    |              |                        | 500   | 20 |
| 600                    | 24    | 1040                                | 140.0                         | 203                 | 292             | 901.5               | 68                 | 20           | 1170               | 203.5                         |                               | 406             | 990.5               | 94                 | 16           |                    |                               |                               |                 |                     |                    |              |                        | 600   | 24 |

- NOTES:**  
All dimensions are shown in millimetres - mm.
- \* 1. The 2mm Raised Face is included in thickness C(1) and length through hub Y(1). This applies to PN20 and PN50 Pressure Ratings.
  - † 2. The 7mm Raised Face is not included in thickness C(2) and length through hub Y(2). PN100, 150, 250 and 420 Pressure Ratings are regularly furnished with 7mm Raised Face which is additional to the flange thickness C(2) and Y(2).
  - 3. Always specify bore when ordering weldneck flanges. Bore dimensions shown opposite also provide inside pipe diameters.

**LARGE DIAMETER FLANGES ABOVE DN 600**  
† For Blind Flanges refer to MSS SP44.  
BS 3293 covers Slip-On and Weldneck but excludes Blind Flanges.  
MSS SP44 covers Blind and Weldneck but excludes Slip-On Flanges.  
BS 3293 Weldneck PN20 flange thickness, C(1), is less than MSS SP44 equivalents.  
API - 605 Dimensions for Large Diameter Flanges vary considerably from both BS 3293 and MSS SP44 - Details on request.

| Raised Face Diam.     | Nominal Size DN |       | O.D. of Pipe mm | Approximate Welding Neck Flange Bores - mm |         |         |          |                  |         |           |         |          |          |          |          |         |  |  |  |  |  |
|-----------------------|-----------------|-------|-----------------|--|---------|---------|----------|------------------|---------|-----------|---------|----------|----------|----------|----------|---------|--|--|--|--|--|
| All Press. Ratings mm | DN              | + NPS |                 | SCH. 10                                    | SCH. 20 | SCH. 30 | STD. WT. | SCH. 40          | SCH. 60 | EXT. STG. | SCH. 80 | SCH. 100 | SCH. 120 | SCH. 140 | SCH. 160 | X.X STG |  |  |  |  |  |
| 35                    | 15              | 1/2   | 21.3            |  |         |         | 15.8     | Same as STD. WT. |         | 13.9      |         |          |          |          | 11.8     | 6.4     |  |  |  |  |  |
| 43                    | 20              | 3/4   | 26.7            |  |         |         | 20.9     |                  |         | 18.9      |         |          |          |          | 15.5     | 11.0    |  |  |  |  |  |
| 51                    | 25              | 1     | 33.4            |  |         |         | 26.6     |                  |         | 24.3      |         |          |          |          | 20.7     | 15.2    |  |  |  |  |  |
| 64                    | 32              | 1 1/4 | 42.2            |  |         |         | 35.1     |                  |         | 32.5      |         |          |          |          | 29.5     | 22.8    |  |  |  |  |  |
| 73                    | 40              | 1 1/2 | 48.3            |  |         |         | 40.9     |                  |         | 38.1      |         |          |          |          | 34.0     | 27.9    |  |  |  |  |  |
| 92                    | 50              | 2     | 60.3            |  |         |         | 52.5     |                  |         | 49.2      |         |          |          |          | 42.9     | 38.2    |  |  |  |  |  |
| 105                   | 65              | 2 1/2 | 73.0            |  |         |         | 62.7     |                  |         | 59.0      |         |          |          |          | 54.0     | 45.0    |  |  |  |  |  |
| 127                   | 80              | 3     | 88.9            |  |         |         | 77.9     |                  |         | 73.7      |         |          |          |          | 66.7     | 58.4    |  |  |  |  |  |
| 140                   | 90              | 3 1/2 | 101.6           |  |         |         | 90.1     |                  |         | 85.4      |         |          |          |          | --       | --      |  |  |  |  |  |
| 157                   | 100             | 4     | 114.3           |  |         |         | 102.3    |                  |         | 97.2      |         |          | 92.1     |          | 87.3     | 80.1    |  |  |  |  |  |
| 186                   | 125             | 5     | 141.3           |  |         |         | 128.2    |                  | 122.3   |           |         | 115.9    |          | 109.6    | 103.2    |         |  |  |  |  |  |
| 216                   | 150             | 6     | 168.3           |  |         |         | 154.1    |                  | 146.3   |           |         | 139.7    |          | 131.8    | 124.4    |         |  |  |  |  |  |
| 270                   | 200             | 8     | 219.1           |  | 206.4   | 205.0   | 202.7    |                  | 198.5   | 193.7     | 188.9   | 182.6    | 177.8    | 173.1    | 174.6    |         |  |  |  |  |  |
| 324                   | 250             | 10    | 273.1           |  | 260.3   | 257.5   | 254.5    |                  | 247.7   | 247.7     | 242.9   | 236.5    | 230.2    | 222.3    | 215.9    | 222.3   |  |  |  |  |  |
| 381                   | 300             | 12    | 323.9           |  | 311.1   | 307.1   | 304.8    |                  | 295.3   | 298.5     | 288.9   | 281.0    | 273.1    | 266.7    | 257.2    | 273.1   |  |  |  |  |  |
| 413                   | 350             | 14    | 355.6           | 342.9                                      | 339.8   | 336.6   | 333.6    | 333.3            | 325.4   | 330.2     | 317.5   | 307.9    | 300.0    | 292.1    | 284.2    |         |  |  |  |  |  |
| 470                   | 400             | 16    | 406.4           | 393.7                                      | 390.6   | 387.4   | 387.4    | 381.0            | 373.1   | 381.0     | 363.5   | 354.0    | 344.5    | 333.3    | 325.4    |         |  |  |  |  |  |
| 533                   | 450             | 18    | 457.0           | 444.5                                      | 441.4   | 434.9   | 438.2    | 428.7            | 419.1   | 431.8     | 409.5   | 398.5    | 387.4    | 377.9    | 366.7    |         |  |  |  |  |  |
| 584                   | 500             | 20    | 508.0           | 495.3                                      | 489     | 482.6   | 489.0    | 477.8            | 466.8   | 482.6     | 455.6   | 442.9    | 431.8    | 419.1    | 408.0    |         |  |  |  |  |  |
| 692                   | 600             | 24    | 610.0           | 596.9                                      | 590.6   | 581.1   | 590.6    | 574.6            | 560.4   | 584.2     | 547.7   | 531.8    | 517.6    | 504.9    | 490.5    |         |  |  |  |  |  |
| 857                   | 750             | 30    | 762.0           | 746.2                                      | 736.6   | 730.2   | 743.0    |                  |         | 736.6     |         |          |          |          |          |         |  |  |  |  |  |
| 1022                  | 900             | 36    | 914.0           | 898.6                                      | 889.0   | 882.6   | 895.4    | 876.3            |         | 889.0     |         |          |          |          |          |         |  |  |  |  |  |

# Flanges to American Standards

## GASKET SURFACE

Flanges, and other products designed for bolted connection, when furnished with raised face (or flat face) may have any type of gasket surface finish that is required. The more common finishes are described in the following paragraphs.

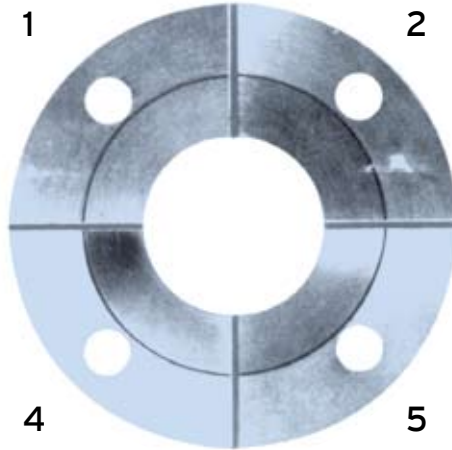
### 1 STOCK FINISH:

This is a continuous spiral groove. For nominal sizes 300mm and smaller it is generated by a 1.58mm radius round-nosed tool at a feed of 0.79mm per revolution. For sizes above 300mm the tool nose is radiused to 3.17mm and the feed is 1.19mm per revolution.

NB OneSteel stocks flanges with surface finish in the range 3.2-6.3 microns, typically used with both spiral-wound and ring gaskets.

### 4 SMOOTH FINISH:

This finish, which can be produced by several shapes of tools, shows no definite tool markings apparent to the naked eye. In the past this finish was sometimes known as "Smooth Plane". This term however, should be avoided because of a tendency to confuse it with "flat faced" which, of course, applies to the flange facing and not to the gasket surface finish.



### 2 SPIRAL SERRATED:

This too, is a continuous spiral groove, but it differs from the stock finish in that the groove is generated with a 90° included angle "V" tool. The groove is .39mm deep and the feed is .79mm for all sizes.

### 3 CONCENTRIC SERRATED: (Not illustrated)

As the name suggests this surface finish is made up of concentric grooves. A 90° included angle "V" tool is used and the grooves are .39mm deep and .79mm apart.

### 5 COLD WATER FINISH:

Produced by using a wide tool at high speeds, this finish is equivalent to that of a ground surface. It is mirror-like in appearance and surfaces finished in this manner are usually expected to be used without gaskets.

## AMERICAN STANDARD FACINGS – To ASME B.16.5



RAISED FACE



LAPPED JOINT



FLAT FACE



RING JOINT



SMALL TONGUE and GROOVE\*



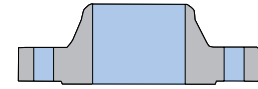
LARGE TONGUE and GROOVE\*



SMALL MALE and FEMALE



SMALL MALE and FEMALE



LARGE MALE - FEMALE

\*It is necessary to modify facing dimensions in order to furnish slip-on flanges 40mm and smaller and welding neck flanges with bores larger than Schedule 40, in sizes 40mm and smaller, for large tongue and groove facing.

# Flange Gaskets

## FLANGE GASKETS

Full Face Gaskets: To suit Table D, E and H flanges to AS 2129

Ring Gaskets: To suit Class 150 and 300lb raised face flanges to ANSI B16.5

Gasket materials include:

### INSERTION RUBBER

Full face to suit AS 2129 Table D or E. Made from 3mm natural rubber, usually fabric reinforced. Suitable for liquids and gases at ambient temperature, within the rated pressure of the flange.



Full Face Rubber Gasket

### COMPRESSED NON-ASBESTOS FIBRE

Ring or full face. Usually Klingsil C4430. Suitable for most liquids and gases including hydrocarbons and steam. AGA approved (number 5237). Potable water approved to AS 4020.



Full Face Fibre Gasket



Ring Gasket

### SPIRAL WOUND GASKETS

Constructed from a spirally wound "V" section austenitic stainless steel strip, with a non-asbestos filler between each turn. Offering high pressure and temperature resistance and ease of replacement.

There are two popular styles in the Klinger range of spiral gaskets:

### SELF CENTERING, MEDIUM PRESSURE TYPE CR

Type CR gaskets have an outer ring which facilitates accurate centering of the gasket in the joint, provides additional radial strength, helps prevent blow-out and serves as a reference point to determine the amount of compression during bolt pullup. Recommended up to Class 600 flanges or equivalent, general service. Maximum temperature 350° with graphite filler - check range suitability.

### SELF CENTERING, HIGH PRESSURE TYPE CRIR

Type CRIR gaskets are the same construction as Type CR but have an additional inner ring. The inner ring provides additional radial strength, acts as a barrier to vacuum and corrosive/abrasive media. Recommended for Class 150 to 2500 flanges or equivalent, and any application requiring advantages of an inner ring. Maximum temperatures 540°C with graphite filler - check flange suitability. Higher temperature rated materials available on request.

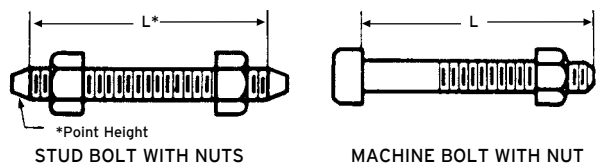


Spiral Gasket  
Type CRIR

# Bolting for ANSI Flanges

## BOLTING

To suit R.F. Flange sizes DN 15 to 600 to ASME – B16.5 (BS. 1560) and DN 750 & 900 to BS. 3293



**Diameter of Bolts** is shown in inches. For nominal diameters 1 inch and smaller, threads are U.N.C.; nominal diameters 1-1/8 inch and larger threads are 8 U.N. (8 T.P.I.).

**Length of Bolts (L)** is shown in millimetres rounded to the nearest 5 mm. Stud Bolt lengths (L\*) do not include the height of points. Machine Bolt lengths (L) include the height of point. The length shown includes the height of the Raised Face in all cases.

NOMINAL SIZES SHOWN ARE \* DN : SI METRIC TERM    † NPS : ASME TERM

| Nominal<br>Flange<br>Size DN |          | PN 20 (Class 150) |                       |                     |                      | PN 50 (Class 300) |                       |                     |                      | PN 100 (Class 600) |                       |     | PN 150 (Class 900)                        |                       |     | PN 250 (Class 1500) |                       |     | PN 420 (Class 2500) |                       |     | Nominal<br>Flange<br>Size DN |          |
|------------------------------|----------|-------------------|-----------------------|---------------------|----------------------|-------------------|-----------------------|---------------------|----------------------|--------------------|-----------------------|-----|---|-----------------------|-----|---------------------|-----------------------|-----|---------------------|-----------------------|-----|------------------------------|----------|
|                              |          | No.<br>Bolts      | Dia.<br>Bolts<br>ins. | L                   |                      | No.<br>Bolts      | Dia.<br>Bolts<br>ins. | L                   |                      | No.<br>Bolts       | Dia.<br>Bolts<br>ins. | L   | No.<br>Bolts                              | Dia.<br>Bolts<br>ins. | L   | No.<br>Bolts        | Dia.<br>Bolts<br>ins. | L   | No.<br>Bolts        | Dia.<br>Bolts<br>ins. | L   |                              |          |
|                              |          |                   |                       | Stud<br>Bolts<br>mm | Mach.<br>Bolts<br>mm |                   |                       | Stud<br>Bolts<br>mm | Mach.<br>Bolts<br>mm |                    |                       |     |   |                       |     |                     |                       |     |                     |                       |     |                              |          |
| *<br>DN                      | +<br>NPS |                   |                       |                     |                      |                   |                       |                     |                      |                    |                       |     |   |                       |     |                     |                       |     |                     |                       |     | *<br>DN                      | +<br>NPS |
| 15                           | 1/2      | 4                 | 1/2                   | 60                  | 45                   | 4                 | 1/2                   | 65                  | 55                   | 4                  | 1/2                   | 80  | USE PN250<br>DIMENSIONS IN<br>THESE SIZES |                       |     | 4                   | 3/4                   | 105 | 4                   | 3/4                   | 125 | 15                           | 1/2      |
| 20                           | 3/4      | 4                 | 1/2                   | 65                  | 50                   | 4                 | 5/8                   | 75                  | 60                   | 4                  | 5/8                   | 90  |   |                       |     | 4                   | 3/4                   | 115 | 4                   | 3/4                   | 125 | 20                           | 3/4      |
| 25                           | 1        | 4                 | 1/2                   | 65                  | 55                   | 4                 | 5/8                   | 80                  | 65                   | 4                  | 5/8                   | 90  |   |                       |     | 4                   | 7/8                   | 125 | 4                   | 7/8                   | 140 | 25                           | 1        |
| 32                           | 1 1/4    | 4                 | 1/2                   | 70                  | 55                   | 4                 | 5/8                   | 80                  | 65                   | 4                  | 5/8                   | 100 |   |                       |     | 4                   | 7/8                   | 125 | 4                   | 1                     | 150 | 32                           | 1 1/4    |
| 40                           | 1 1/2    | 4                 | 1/2                   | 70                  | 60                   | 4                 | 3/4                   | 90                  | 75                   | 4                  | 3/4                   | 105 |   |                       |     | 4                   | 1                     | 140 | 4                   | 1 - 1/8               | 170 | 40                           | 1 1/2    |
| 50                           | 2        | 4                 | 5/8                   | 80                  | 65                   | 8                 | 5/8                   | 90                  | 75                   | 8                  | 5/8                   | 105 |   |                       |     | 8                   | 7/8                   | 145 | 8                   | 1                     | 175 | 50                           | 2        |
| 65                           | 2 1/2    | 4                 | 5/8                   | 90                  | 75                   | 8                 | 3/4                   | 100                 | 85                   | 8                  | 3/4                   | 120 |   |                       |     | 8                   | 1                     | 160 | 8                   | 1 - 1/8               | 195 | 65                           | 2 1/2    |
| 80                           | 3        | 4                 | 5/8                   | 90                  | 75                   | 8                 | 3/4                   | 110                 | 90                   | 8                  | 3/4                   | 125 | 8   | 7/8                   | 145 | 8                   | 1 - 1/8               | 180 | 8                   | 1 - 1/4               | 220 | 80                           | 3        |
| 90                           | 3 1/2    | 8                 | 5/8                   | 90                  | 75                   | 8                 | 3/4                   | 110                 | 95                   | 8                  | 7/8                   | 140 | -   | -                     | -   | -                   | -                     | -   | -                   | -                     | -   | 90                           | 3 1/2    |
| 100                          | 4        | 8                 | 5/8                   | 90                  | 75                   | 8                 | 3/4                   | 110                 | 95                   | 8                  | 7/8                   | 145 | 8   | 1 - 1/8               | 170 | 8                   | 1 - 1/4               | 195 | 8                   | 1 - 1/2               | 255 | 100                          | 4        |
| 125                          | 5        | 8                 | 3/4                   | 90                  | 80                   | 8                 | 3/4                   | 120                 | 100                  | 8                  | 1                     | 165 | 8   | 1 - 1/4               | 190 | 8                   | 1 - 1/2               | 250 | 8                   | 1 - 3/4               | 300 | 125                          | 5        |
| 150                          | 6        | 8                 | 3/4                   | 100                 | 85                   | 12                | 3/4                   | 125                 | 105                  | 12                 | 1                     | 170 | 12  | 1 - 1/8               | 195 | 12                  | 1 - 3/8               | 260 | 8                   | 2                     | 345 | 150                          | 6        |
| 200                          | 8        | 8                 | 3/4                   | 110                 | 90                   | 12                | 7/8                   | 140                 | 110                  | 12                 | 1 - 1/8               | 195 | 12  | 1 - 3/8               | 220 | 12                  | 1 - 5/8               | 290 | 12                  | 2                     | 380 | 200                          | 8        |
| 250                          | 10       | 12                | 7/8                   | 115                 | 95                   | 16                | 1                     | 155                 | 130                  | 16                 | 1 - 1/4               | 215 | 16  | 1 - 3/8               | 235 | 12                  | 1 - 7/8               | 335 | 12                  | 2 - 1/2               | 485 | 250                          | 10       |
| 300                          | 12       | 12                | 7/8                   | 120                 | 100                  | 16                | 1 - 1/8               | 170                 | 145                  | 20                 | 1 - 1/4               | 220 | 20  | 1 - 3/8               | 255 | 16                  | 2                     | 375 | 12                  | 2 - 3/4               | 540 | 300                          | 12       |
| 350                          | 14       | 12                | 1                     | 130                 | 110                  | 20                | 1 - 1/8               | 175                 | 150                  | 20                 | 1 - 3/8               | 235 | 20  | 1 - 1/2               | 275 | 16                  | 2 - 1/4               | 405 |                     |                       |     | 350                          | 14       |
| 400                          | 16       | 16                | 1                     | 135                 | 115                  | 20                | 1 - 1/4               | 190                 | 160                  | 20                 | 1 - 1/2               | 255 | 20  | 1 - 5/8               | 285 | 16                  | 2 - 1/2               | 445 |                     |                       |     | 400                          | 16       |
| 450                          | 18       | 16                | 1 - 1/8               | 150                 | 125                  | 24                | 1 - 1/4               | 195                 | 170                  | 20                 | 1 - 5/8               | 275 | 20  | 1 - 7/8               | 325 | 16                  | 2 - 3/4               | 495 |                     |                       |     | 450                          | 18       |
| 500                          | 20       | 20                | 1 - 1/8               | 160                 | 135                  | 24                | 1 - 1/4               | 205                 | 180                  | 24                 | 1 - 5/8               | 290 | 20  | 2                     | 345 | 16                  | 3                     | 540 |                     |                       |     | 500                          | 20       |
| 600                          | 24       | 20                | 1 - 1/4               | 175                 | 145                  | 24                | 1 - 1/2               | 230                 | 195                  | 24                 | 1 - 7/8               | 330 | 20  | 2 - 1/2               | 435 | 16                  | 3 - 1/2               | 615 |                     |                       |     | 600                          | 24       |
| 750                          | 30       | 28                | 1 - 1/4               | 190                 | 160                  | 28                | 1 - 3/4               | 290                 | 250                  | 28                 | 2                     | 355 | PN150, 250 & 420 - NOT LISTED IN BS 3293  |                       |     |                     |                       |     |                     |                       | 750 | 30                           |          |
| 900                          | 36       | 32                | 1 - 1/2               | 215                 | 180                  | 32                | 2                     | 325                 | 280                  | 28                 | 2 - 1/2               | 400 |   |                       |     |                     |                       |     |                     |                       | 900 | 36                           |          |

Raised Face height of 2 mm for PN20 & 50 and 7 mm for PN100, 150, 250 & 420 is included in dimension L (Bolt Length).

## MATERIAL SPECIFICATIONS

### ASTM A193 Grade B7

Standard specification for alloy steel and stainless steel bolting materials for high temperature service.

### ASTM A194 Grade 2H

Standard specification for carbon and alloy steel nuts for bolts for high pressure and high temperature service.

### ASTM A320

Standard specification for alloy steel bolting materials for low temperature service.

Grade L7 covers alloy steel stud bolts.

Grade L4 covers alloy steel nuts to suit Grade L7 stud bolts.

# Roll Grooved System

OneSteel Piping Systems is the Australian distributor of the Shurjoint and Mech range of roll groove products.



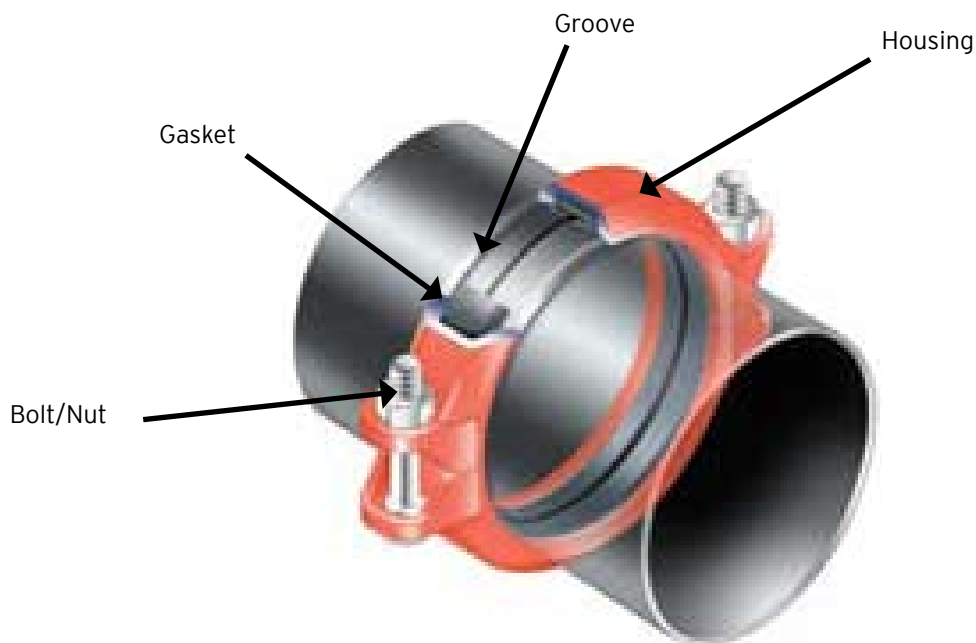
Shurjoint has over three decades of experience and is recognised as a world leader in the design and manufacturer of mechanical piping system components. Shurjoint manufactures the highest quality products by continually investing in research, engineering and development, which enables them to develop new and innovative solutions for the changing needs of industry.



Mech is manufactured by the largest pipe fittings manufacturer in the world, Jinan Meide Casting Co. Jinan Meide's core value of quality provides product of premium levels employing the latest manufacturing technology. MECH's commitment to quality is reflected in the fact that every product, even down to the smallest galvanised malleable fitting, is pressure tested. OneSteel has enjoyed a very successful relationship with Jinan Meide and their MECH product range. MECH products are sold in over 60 countries and are world leaders both in quality and value.

The Grooved System is one of the most advanced, versatile, economical and reliable systems available today. After the pipe ends are grooved, a gasket is stretched over the pipe ends. The coupling segments are then placed over the gasket and bolts and nuts are fastened resulting in a secure joint.

A coupling can be installed 3-4 times faster than a comparable welded or brazed joint and there is no need for a flame or welding torch on the job site. A coupling can be installed by fastening a pair of bolts and nuts while using only a spanner, whereas a comparable flanged joint requires the fastening of many bolts and nuts. The grooved system allows for easy material take-offs and unlike the threaded system, there is no need to allow for added pipe length for thread engagement. With the removal of just a few bolts, one can easily access the system for cleaning, maintenance, changes and or system expansion.





# Roll Grooved System

## RIGID COUPLINGS

Rigid couplings are the most popular and most widely used couplings today. They can be used in applications that require a rigid joint similar to that of a traditional flanged, welded and or threaded connection.

### Angle Pad Design

- As the bolts are tightened, the angled bolt pads slide in opposite directions causing the coupling keys to tightly grip the pipe, while at the same time the grooves are forced outwards against the coupling keys.



### Tongue and Groove Design

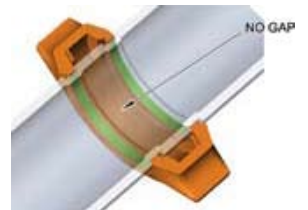
- The T & G Design mechanism provides a mechanical and frictional interlock resulting in a rigid joint which reduces undesired angular movement.



### Butt-Joint Design

- The Unique butt-joint design eliminates the gap in between pipe ends, thus eliminating not only angular and rotational movement but also axial displacement under normal service conditions\*.

\*Pipes must be cut true and square to achieve a butt-joint.



## FLEXIBLE COUPLINGS

Flexible couplings allow for full design features in applications such as curved or deflected layouts and/or when systems are exposed to outside forces beyond normal static conditions, such as seismic events or where vibration and/or noise attenuation are a concern. The ability to design in controlled flexibility is an advantageous feature when compared to traditional rigid jointing methods such as threading, flanging and welding. When designing with flexible couplings, allow for proper support to the system so as to eliminate undesired stress.



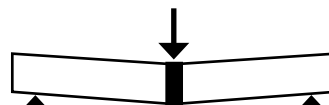
## PIPE SYSTEMS TERMINOLOGY



Rotational Movement



Axial Displacement

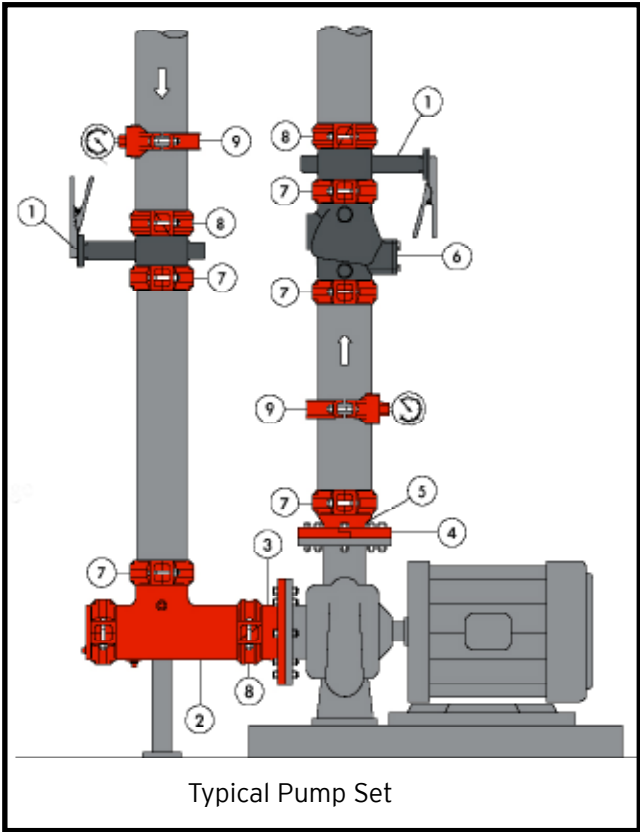


Angular Movement

# Roll Grooved System

The Roll Grooved system allows for:

- Easy system access with removable joints
- Good vibration and attenuation performance
- Easy alignment of pipe work and valves
- Reduce space with the use of Suction Diffuser
- Time and money savings in installation



| Number | Product                                |
|--------|--|
| 1      | Butterfly valve                        |
| 2      | Suction Diffuser                       |
| 3      | Flange to Roll Groove Adaptor (Stub)   |
| 4      | Flange to Roll Groove Adaptor (Hinged) |
| 5      | Concentric Reducer                     |
| 6      | Check Valve                            |
| 7      | Flexible Couplings                     |
| 8      | Rigid Coupling                         |
| 9      | Mechanical Tee                         |

## COUPLING MATERIALS



- Ductile Iron - Standard couplings housings are made of Ductile Iron.



- Stainless Steel - OneSteel offers a variety of stainless steel materials depending on the intended application.



- Gaskets - Available in a variety of configurations and compounds to meet your specific requirements.

## STANDARDS

The roll grooved product range has numerous approvals and standards for the global and local market. Please ask our sales team about your specific needs.

# Roll Grooved System - Couplings & Fittings

**1GS - Rigid Coupling Light Duty**



- Can be used in services up to 2070Kpa and is available in Painted Hot Dipped Galvanised.
- The built-in teeth on the coupling grip the groove shoulder and serve to reduce linear movement.
- The T&G mechanism features a slight offset at the foot of the coupling halves which serve to protect the gasket from exposure.
- With the T&G style coupling no metal-to-metal contact of the pads is required. There is normally a 1.6mm to 3.2mm gap between the bolt pads when installed.

**1N - Flexible Coupling Light Duty**



- Accommodates pipe deflection and or non-alignment: If nominal diameter <DN200, deflection angle is  $\geq 1^\circ$ ; if nominal diameter  $\geq$ DN200, deflection angle is  $\geq 0.5^\circ$  but  $< 1^\circ$ .
- The C-shaped rubber gasket provides excellent self-sealing capabilities in both low and high-pressure services as well as under certain vacuum conditions.
- The design and construction of the coupling with elastomeric gaskets can provide significant noise and vibration absorption as well as seismic stress.
- Coupling keys engage the full circumference of the grooves and provide significant pressure and end load restraint against pipe movement from internal and external forces.

**1G - Rigid Coupling**



- Can be used in services up to 3450Kpa and is available in painted or hot dipped galvanised.
- The built-in teeth on the coupling grip the groove shoulder and serve to reduce linear movement.
- The T&G mechanism features a slight offset at the foot of the coupling halves which serve to protect the gasket from exposure.
- With the T&G style coupling no metal-to-metal contact of the pads is required. There is normally a 1.6mm to 3.2mm gap between the bolt pads when installed.

**90S - 90deg Elbow Light Duty**  
**130S - Light Duty Tee**  
**120 - Elbow 45deg**  
**300 - Cap**



- Painted in acrylic enamel (MSDS available).
- Made to ASTM A-536 - Specification for Ductile Iron Castings Grade.
- Available in Galvanised finish. Galvanising conforms to ASTM A-153.
- Also available - Concentric Reducers, Eccentric Reducers, Reducing Tees and more.

**3G - Mechanical Tee Grooved**  
**3J - Mechanical Tee Threaded**



- Designed for creating an easy and effective branch/outlet in pipe work.
- Made to ASTM A-536 - Specification for Ductile Iron Castings Grade.
- Available in Galvanised finish. Galvanising conforms to ASTM A-153.
- Available with threaded or grooved outlets.

**321G - Flange Adaptor Stub**



- Holes are incorporated into the fitting, available in different hole configurations.
- Painted in acrylic enamel (MSDS available).
- Made to ASTM A-536 - Specification for Ductile Iron Castings Grade.
- Available in Galvanised. Galvanising conforms to ASTM A-153.

# Roll Grooved System - Couplings & Fittings

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**Z07-Rigid Coupling Heavy Duty**



- Angle-pad design standard rigid coupling for general piping applications where rigidity is required.
- Made to ASTM A-536 - Specification for Ductile Iron Castings Grade.
- Also available in Galvanised. Galvanising conforms to ASTM A-153.

**7707 Flexible Coupling Heavy Duty**



- Features flexibility that can deal with misalignment, distortion, thermal stress, vibration and noise and also resist seismic tremors.
- Designed for use in a variety of general piping applications of moderate or high-pressure services.
- Made to ASTM A-536 - Specification for Ductile Iron Castings Grade.
- Available in Galvanised. Galvanising conforms to ASTM A-153.

**7041 Flange Adaptor Hinged Type**



- This fitting allows quick and direct connection to PN10 or PN16 flanges.
- The specially designed gasket enables the transition from a grooved system to a flanged system in one fitting.
- Made to ASTM A-536 - Specification for Ductile Iron Castings Grade.
- Available in Galvanised. Galvanising conforms to ASTM A-153.

**XH-70EP- Rigid Coupling Extra Heavy**



- The wider housing keys grip the grooves with the aid of heavy duty bolts and nuts for high pressure services.
- Made to ASTM A-536 - Specification for Ductile Iron Castings Grade.
- Housings are designed to be incorporated with the specially engineered EP cut-grooves on the pipe (enquire for details).
- Painted in green enamel.

**Heavy Duty Fittings**

7110 - 90deg Elbow

7111 - 45deg Elbow

7150 - Concentric Reducer

7120 - Equal Tee

7160 - Cap



- Painted in acrylic enamel (MSDS available).
- Pressure rating conforms to the coupling and/ or pipe that is being used.
- Available in Galvanised. Galvanising conforms to ASTM A-153.

# Roll Grooved System - Valves

**Butterfly Valve SJ-300N Lever & Gear Type**



- The valve consists of epoxy coated ductile iron body and EPDM or Nitrile rubber encapsulated dual-seal disc.
- Available in 10 position lever handle or a worm gear operator.
- Sizes 50mm-600mm.

**Check Valve Model SJ-915**



- Grooved-end dual-plate check valve designed to provide positive and silent protection against backflow in piping systems.
- Sizes 65mm - 600mm.

**Suction Diffuser Model 725G**



- Installed in the inlet side of a pump that gives significant space saving capability. Also features an integrated strainer with easy access.
- Sizes 65mm - 400mm.

**Check Valve Model SJ-900**



- Features a spring-loaded wide-open clapper and non-stick tight EPDM rubber seal. Can be installed in the vertical or horizontal position.
- Sizes 65mm - 600mm.

**Y-Strainer Model 726**



- Straight flow design to remove debris with lower pressure drop. The stainless steel screen is easily accessible by removing a single coupling.
- Sizes 50mm - 400mm.

## FIRE VALVES

**Monitored Butterfly Valve Model BB-G - Fire**



- Specifically used for indoor use only for fire services. Installed with a UL Approved Dual Tamper Switch.
- Sizes 50mm - 65mm.

**Monitored Butterfly Valve Model BO-G300 - Fire**



- Fire service butterfly valve that has a factory installed UL approved tampered switch for indoor and outdoor use.
- Sizes 65mm - 200mm.

**Check Valve Model DCG-300 - Fire**



- The clapper design provides low pressure drop in a compact body. Ductile Iron body with EPDM encapsulated disc.
- Sizes 50mm - 200mm.

**Distributed in Australia by Antec Engineering Pty Limited:**



**Free call:** 1300 55 34 73

**Email:** [anteceng@antec.com.au](mailto:anteceng@antec.com.au)

**Web:** [www.antec.com.au](http://www.antec.com.au)