HUMBLE FORGING LLP

ISO 9001:2015 Certified Precision Forging and CNC Machining Facility

# ANSI B16.5 FLANGES

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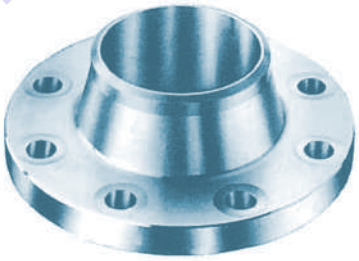
# ANSI B16.5 Flanges

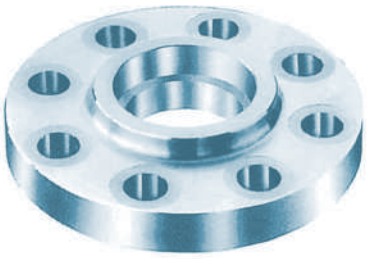
| | | | |
|---|---|---|---|
| **Dimensions** | : | ANSI B16.5 | |
| **Material Grades** | : | Carbon Steel | : ASTM / ASME A/SA 105 ASTM / ASME A 350 , ASTM A 181 LF 2 / A516 Gr.70 A36, A694 F42, F46, F52, F60, F65, F706. |
| | | Alloy Steel | : ASTM / ASME A/SA 182 & A 387 F1, F5, F9, F11, F12, F22, F91. |
| | | Stainless Steel | : ASTM A 182, A 240 F 304, 304L, 304H, 316, 316L, 316Ti, 310, 310S, 321, 321H, 317, 347, 347H, 904L |
| | | Duplex & Super Duplex Steel | : ASTM / ASME A/SA 182 F 44, F 45, F51, F 53, F 55, F 60, F 61. |
| | | Copper Alloy | : ASTM SB 61 , SB62 , SB151 , SB152 UNS No. C 70600 (Cu-Ni 90/10), C 71500 (Cu-Ni 70/30), UNS No. C 10100, 10200, 10300, 10800, 12000, 12200. |
| | | Nickel Alloy | : ASTM SB564, SB160, SB472, SB162 Nickel 200 (UNS No. N02200), Nickel 201 (UNS No. N02201), Monel 400 (UNS No. N04400), Monel 500 (UNS No. N05500), Inconel 800 (UNS No. N08800), Inconel 825 (UNS No. N08825), Inconel 600 (UNS No. N06600), Inconel 625 (UNS No. N06625), Inconel 601 (UNS No. N06601), Hastelloy C 276 (UNS No. N10276), Alloy 20 (UNS No. N08020). |
| **Class** | : | 150, 300, 400, 600, 900, 1500, 2500. | |
| **Size** | : | 1/2" (15 NB) to 24" (600NB). | |
| **Flange Face Type** | : | Flate Face (FF), Raised Face (RF), Ring Type Joint (RTJ). | |



**SLIP ON**



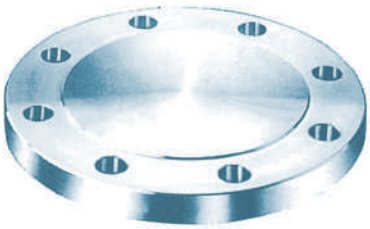
**WELD NECK**



**SOCKET WELD**

**THREADED**

**LAP JOINT**



**BLIND**



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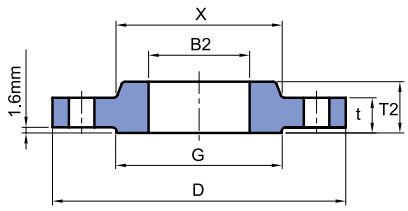
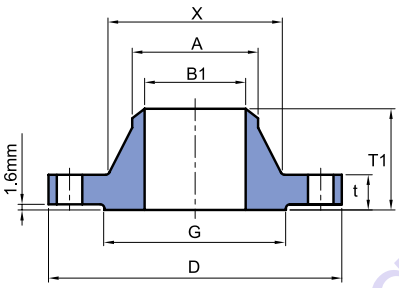
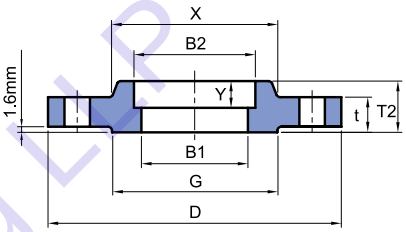
# CLASS 150 FLANGES




SLIP-ON




WELDING NECK




SOCKET WELDING

## ANSI B 16.5 Forged Flanges

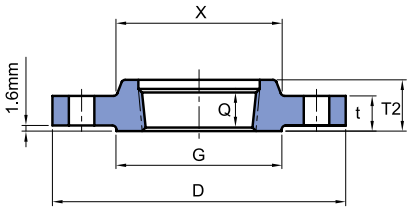
Unit : mm

| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE | | | LENGTH THRU HUB | | | Diam. of Hub at Bevel | Radius of Fillet | Thread Length | Depth of Socket |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Welding Neck Socket Welding | Slip-on Socket Welding | Lap Joint | Welding Neck | Slip-on Threaded Socket Welding | Lap Joint | | | | |
| | D | X | G | t | B1 | B2 | B3 | T1 | T2 | T3 | A | R | Q | Y |
| 1/2 | 89 | 30.2 | 35.1 | 11.2 | 15.8 | 22.4 | 22.9 | 47.8 | 15.7 | 15.7 | 21.3 | 3.0 | 15.7 | 9.7 |
| 3/4 | 99 | 38.1 | 42.9 | 12.7 | 20.8 | 27.7 | 28.2 | 52.3 | 15.7 | 15.7 | 26.7 | 3.0 | 15.7 | 11.2 |
| 1 | 108 | 49.3 | 50.8 | 14.2 | 26.7 | 34.5 | 35.1 | 55.6 | 17.5 | 17.5 | 33.5 | 3.0 | 17.5 | 12.7 |
| 1 1/4 | 117 | 58.7 | 63.5 | 15.7 | 35.1 | 43.2 | 43.7 | 57.2 | 20.6 | 20.6 | 42.2 | 4.8 | 20.6 | 14.2 |
| 1 1/2 | 127 | 65.0 | 73.2 | 17.5 | 40.9 | 49.5 | 50.0 | 62.0 | 22.4 | 22.4 | 48.3 | 6.4 | 22.4 | 15.8 |
| 2 | 152 | 77.7 | 91.9 | 19.1 | 52.6 | 62.0 | 62.5 | 63.5 | 25.4 | 25.4 | 60.5 | 7.9 | 25.4 | 17.5 |
| 2 1/2 | 178 | 90.4 | 104.6 | 22.4 | 62.7 | 74.7 | 75.4 | 69.9 | 28.4 | 28.4 | 73.2 | 7.9 | 28.4 | 19.1 |
| 3 | 191 | 108.0 | 127.0 | 23.9 | 78.0 | 90.7 | 91.4 | 69.9 | 30.2 | 30.2 | 88.9 | 9.7 | 30.2 | 20.6 |
| 3 1/2 | 216 | 122.2 | 139.7 | 23.9 | 90.2 | 103.4 | 104.1 | 71.4 | 31.8 | 31.8 | 101.6 | 9.7 | 31.8 | 22.4 |
| 4 | 229 | 134.9 | 157.2 | 23.9 | 102.4 | 116.1 | 116.8 | 76.2 | 33.3 | 33.3 | 114.3 | 11.2 | 33.3 | 23.9 |
| 5 | 254 | 163.6 | 185.7 | 23.9 | 128.3 | 143.8 | 144.5 | 88.9 | 36.6 | 36.6 | 141.2 | 11.2 | 36.6 | 23.9 |
| 6 | 279 | 192.0 | 215.9 | 25.4 | 154.2 | 170.7 | 171.5 | 88.9 | 39.6 | 39.6 | 168.4 | 12.7 | 39.6 | 26.9 |
| 8 | 343 | 246.1 | 269.7 | 28.4 | 202.7 | 221.5 | 222.3 | 101.6 | 44.5 | 44.5 | 219.2 | 12.7 | 44.5 | 31.8 |
| 10 | 406 | 304.8 | 323.9 | 30.2 | 254.5 | 276.4 | 277.4 | 101.6 | 49.3 | 49.3 | 273.1 | 12.7 | 49.3 | 33.3 |
| 12 | 483 | 365.3 | 381.0 | 31.8 | 304.8 | 327.2 | 328.2 | 114.3 | 55.6 | 55.6 | 323.9 | 12.7 | 55.6 | 39.6 |
| 14 | 533 | 400.1 | 412.8 | 35.1 | 336.6 | 359.2 | 360.2 | 127.0 | 57.2 | 79.2 | 355.6 | 12.7 | 57.2 | 41.4 |
| 16 | 597 | 457.2 | 469.9 | 36.6 | 387.4 | 410.5 | 411.2 | 127.0 | 63.5 | 87.4 | 406.4 | 12.7 | 63.5 | 44.5 |
| 18 | 635 | 505.0 | 533.4 | 39.6 | 438.2 | 461.8 | 462.3 | 139.7 | 68.3 | 96.8 | 457.2 | 12.7 | 68.3 | 49.3 |
| 20 | 699 | 558.8 | 584.2 | 42.9 | 489.0 | 513.1 | 514.4 | 144.5 | 73.2 | 103.1 | 508.0 | 12.7 | 73.2 | 54.1 |
| 24 | 813 | 663.4 | 692.2 | 47.8 | 590.6 | 616.0 | 616.0 | 152.4 | 82.6 | 111.3 | 609.6 | 12.7 | 82.6 | 63.5 |

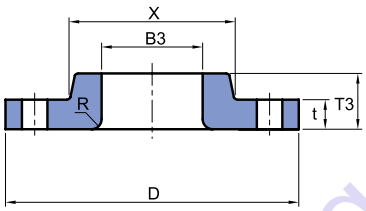
NOTE :

1. For the 'Bore' (B1) other Standard Wall Thickness, refer to page 24 & 25.
2. Class 150 flanges except Lap Joint will be furnished with 0.06" (1.6mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
3. For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.

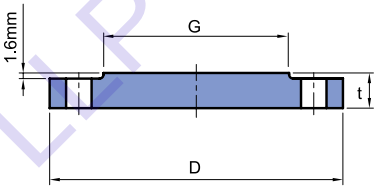





THREADED




LAP JOINT



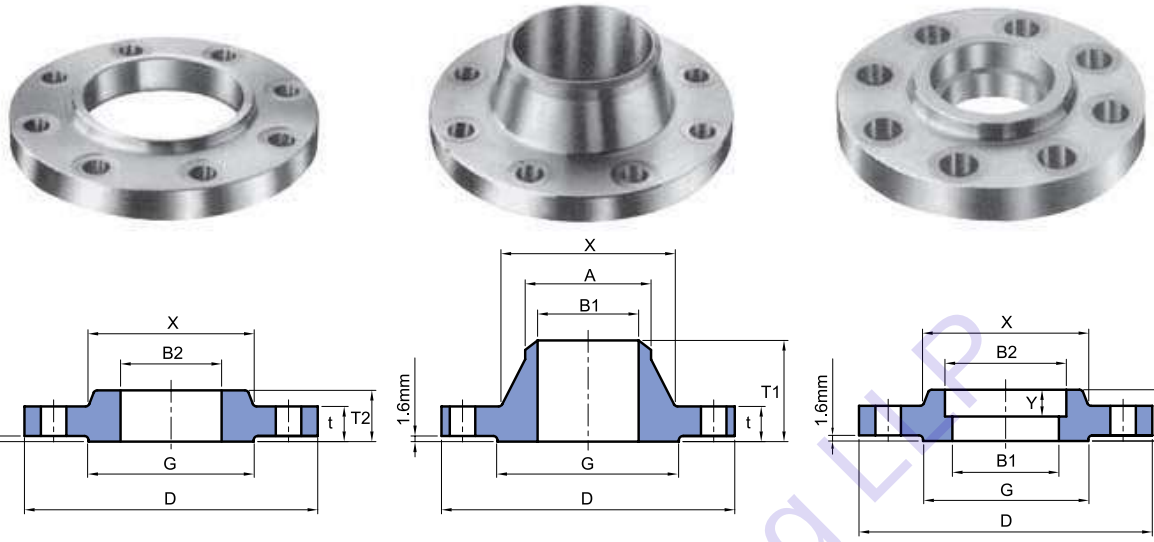

BLIND

Unit : mm

| Nominal Pipe Size | DRILLING | | | BOLTING | | | | APPROXIMATE WEIGHT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bolt Circle Diam. | Number of Holes | Diam. of Holes | Diam. of Bolts (inch) | Machine Bolt Length | Stud Bolt Length | | Welding Neck | | Slip-on and Threaded | | Lap Joint | | Blind | | Socket Welding | |
| | | | | | Raised Face | Raised Face | Ring Joint | Kg | lb | Kg | lb | Kg | lb | Kg | lb | Kg | lb |
| 1/2 | 60.5 | 4 | 15.7 | 1/2 | 50.8 | 57.2 | - | 0.51 | 1.10 | 0.47 | 1.00 | 0.51 | 1.00 | 0.47 | 1.00 | 0.47 | 1.00 |
| 3/4 | 69.9 | 4 | 15.7 | 1/2 | 50.8 | 63.5 | - | 0.73 | 1.60 | 0.58 | 1.30 | 0.64 | 1.40 | 0.63 | 1.40 | 0.59 | 1.30 |
| 1 | 79.3 | 4 | 15.7 | 1/2 | 57.2 | 63.5 | 76.2 | 1.07 | 2.40 | 0.86 | 1.90 | 0.93 | 1.80 | 0.94 | 2.10 | 0.87 | 1.90 |
| 1 1/4 | 88.9 | 4 | 15.7 | 1/2 | 57.2 | 69.9 | 82.6 | 1.40 | 3.10 | 1.08 | 2.40 | 1.16 | 2.00 | 1.23 | 2.70 | 1.11 | 2.40 |
| 1 1/2 | 98.6 | 4 | 15.7 | 1/2 | 63.5 | 69.9 | 82.6 | 1.81 | 4.00 | 1.41 | 3.10 | 1.51 | 3.30 | 1.62 | 3.60 | 1.45 | 3.20 |
| 2 | 120.7 | 4 | 19.1 | 5/8 | 69.9 | 82.6 | 95.3 | 2.59 | 5.70 | 2.26 | 5.00 | 2.38 | 5.20 | 2.64 | 5.80 | 2.33 | 5.00 |
| 2 1/2 | 139.7 | 4 | 19.1 | 5/8 | 76.2 | 88.9 | 101.6 | 4.28 | 9.40 | 3.43 | 7.60 | 3.60 | 7.90 | 4.06 | 9.00 | 3.55 | 7.80 |
| 3 | 152.4 | 4 | 19.1 | 5/8 | 76.2 | 88.9 | 101.6 | 5.18 | 11.40 | 3.87 | 8.50 | 4.04 | 8.90 | 4.90 | 10.80 | 4.02 | 8.90 |
| 3 1/2 | 177.8 | 8 | 19.1 | 5/8 | 76.2 | 88.9 | 101.6 | 5.45 | 12.00 | 4.99 | 11.00 | 4.99 | 11.00 | 5.90 | 13.00 | 4.99 | 11.00 |
| 4 | 190.5 | 8 | 19.1 | 5/8 | 76.2 | 88.9 | 101.6 | 7.32 | 16.10 | 5.75 | 12.70 | 5.96 | 13.00 | 7.41 | 16.30 | 5.99 | 13.20 |
| 5 | 215.9 | 8 | 22.4 | 3/4 | 82.6 | 95.3 | 108.0 | 8.91 | 19.60 | 6.22 | 13.70 | 6.44 | 14.00 | 8.76 | 19.30 | 6.68 | 14.70 |
| 6 | 241.3 | 8 | 22.4 | 3/4 | 82.6 | 101.6 | 114.3 | 11.26 | 24.80 | 7.38 | 16.30 | 7.59 | 16.70 | 11.31 | 24.90 | 7.99 | 17.60 |
| 8 | 298.5 | 8 | 22.4 | 3/4 | 88.9 | 108.0 | 120.7 | 17.68 | 39.00 | 12.36 | 27.30 | 12.66 | 27.90 | 19.92 | 43.90 | 13.29 | 29.30 |
| 10 | 362.0 | 12 | 25.4 | 7/8 | 101.6 | 114.3 | 127.0 | 24.79 | 54.70 | 17.10 | 37.70 | 16.78 | 37.00 | 29.39 | 64.80 | 19.50 | 43.00 |
| 12 | 431.8 | 12 | 25.4 | 7/8 | 101.6 | 120.7 | 133.4 | 38.98 | 85.90 | 27.68 | 61.00 | 28.30 | 62.40 | 43.70 | 96.30 | 29.03 | 64.00 |
| 14 | 476.3 | 12 | 28.5 | 1 | 114.3 | 133.4 | 146.1 | 51.71 | 114.00 | 35.20 | 77.60 | 41.50 | 91.50 | 59.42 | 140.00 | 38.56 | 85.00 |
| 16 | 539.8 | 16 | 28.5 | 1 | 114.3 | 133.4 | 146.1 | 64.41 | 142.00 | 42.18 | 93.00 | 52.98 | 116.80 | 77.11 | 170.00 | 44.49 | 98.00 |
| 18 | 577.9 | 16 | 31.8 | 1 1/8 | 127.0 | 146.1 | 158.8 | 74.84 | 165.00 | 49.71 | 109.60 | 59.00 | 130.00 | 94.80 | 209.00 | 54.43 | 120.00 |
| 20 | 635.0 | 20 | 31.8 | 1 1/8 | 139.7 | 158.8 | 171.5 | 89.36 | 197.00 | 65.50 | 140.00 | 72.12 | 159.00 | 123.38 | 272.00 | 70.31 | 155.00 |
| 24 | 749.3 | 20 | 35.1 | 1 1/4 | 152.4 | 171.5 | 184.2 | 119.66 | 263.80 | 90.50 | 199.50 | 99.02 | 218.30 | 188.24 | 415.00 | 95.25 | 210.00 |

4. Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
5. The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).
6. Depth of Socket (Y) is covered by ANSI B 16.5 only in sizes through 3 inch, over 3 inch is at the manufacturer's option.

# CLASS 300 FLANGES




SLIP-ON | WELDING NECK | SOCKET WELDING

## ANSI B 16.5 Forged Flanges

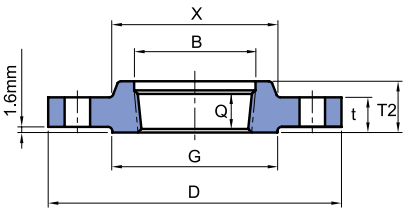
Unit : mm

| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE | | | | LENGTH THRU HUB | | | Diam. of Hub at Bevel | Radius of Fillet | Thread Length | Depth of Socket |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Welding Neck Socket Welding | Slip-on Socket Welding | Lap Joint | Counter Bore Min. | Welding Neck | Slip-on Threaded Socket Welding | Lap Joint | | | | |
| | D | X | G | t | B1 | B2 | B3 | B | T1 | T2 | T3 | A | R | Q | Y |
| 1/2 | 95 | 38.1 | 35.1 | 14.2 | 15.7 | 22.4 | 22.9 | 23.6 | 52.3 | 22.4 | 22.4 | 21.3 | 3.0 | 15.7 | 9.7 |
| 3/4 | 117 | 47.8 | 42.9 | 15.7 | 20.8 | 27.7 | 28.2 | 29.0 | 57.2 | 25.4 | 25.4 | 26.7 | 3.0 | 15.7 | 11.2 |
| 1 | 124 | 53.8 | 50.8 | 17.5 | 26.7 | 34.5 | 35.1 | 35.8 | 62.0 | 26.9 | 26.9 | 33.5 | 3.0 | 17.5 | 12.7 |
| 1 1/4 | 133 | 63.5 | 63.5 | 19.1 | 35.1 | 43.2 | 43.7 | 44.5 | 65.0 | 26.9 | 26.9 | 42.2 | 4.8 | 20.6 | 14.2 |
| 1 1/2 | 155 | 69.9 | 73.2 | 20.6 | 40.9 | 49.5 | 50.0 | 50.5 | 68.3 | 30.2 | 30.2 | 48.3 | 6.4 | 22.4 | 15.7 |
| 2 | 165 | 84.1 | 91.9 | 22.4 | 52.6 | 62.0 | 62.5 | 63.5 | 69.9 | 33.3 | 33.3 | 60.5 | 7.9 | 28.4 | 17.5 |
| 2 1/2 | 191 | 100.1 | 104.6 | 25.4 | 62.7 | 74.7 | 75.4 | 76.2 | 76.2 | 38.1 | 38.1 | 73.2 | 7.9 | 31.8 | 19.1 |
| 3 | 210 | 117.3 | 127.0 | 28.4 | 78.0 | 90.7 | 91.4 | 92.2 | 79.2 | 42.9 | 42.9 | 88.9 | 9.7 | 31.8 | 20.6 |
| 3 1/2 | 229 | 133.4 | 139.7 | 30.2 | 90.2 | 103.4 | 104.1 | 104.9 | 81.0 | 44.5 | 44.5 | 101.6 | 9.7 | 36.6 | 22.4 |
| 4 | 254 | 146.1 | 157.2 | 31.8 | 102.4 | 116.1 | 116.8 | 117.6 | 85.9 | 47.8 | 47.8 | 114.3 | 11.2 | 36.6 | 23.9 |
| 5 | 279 | 177.8 | 185.7 | 35.1 | 128.3 | 143.8 | 144.5 | 144.5 | 98.6 | 50.8 | 50.8 | 141.2 | 11.2 | 42.9 | 23.9 |
| 6 | 318 | 206.2 | 215.9 | 36.6 | 154.2 | 170.7 | 171.5 | 171.5 | 98.6 | 52.3 | 52.3 | 168.4 | 12.7 | 46.0 | 26.9 |
| 8 | 381 | 260.4 | 269.7 | 41.1 | 202.7 | 221.5 | 222.3 | 222.3 | 111.3 | 62.0 | 62.0 | 219.2 | 12.7 | 50.8 | 31.8 |
| 10 | 445 | 320.5 | 323.9 | 47.8 | 254.5 | 276.4 | 277.4 | 276.4 | 117.3 | 66.5 | 95.3 | 273.1 | 12.7 | 55.6 | 33.3 |
| 12 | 521 | 374.7 | 381.0 | 50.8 | 304.8 | 327.2 | 328.2 | 328.7 | 130.0 | 73.2 | 101.6 | 323.9 | 12.7 | 60.5 | 39.6 |
| 14 | 584 | 425.5 | 412.8 | 53.8 | 336.6 | 359.2 | 360.2 | 360.4 | 142.7 | 76.2 | 111.3 | 355.6 | 12.7 | 63.5 | 41.4 |
| 16 | 648 | 482.6 | 469.9 | 57.2 | 387.4 | 410.5 | 411.2 | 411.2 | 146.1 | 82.6 | 120.7 | 406.4 | 12.7 | 68.3 | 44.5 |
| 18 | 711 | 533.4 | 533.4 | 60.5 | 438.2 | 461.8 | 462.3 | 462.0 | 158.8 | 88.9 | 130.0 | 457.2 | 12.7 | 69.9 | 49.3 |
| 20 | 775 | 587.2 | 584.2 | 63.5 | 489.0 | 513.1 | 514.4 | 512.8 | 162.1 | 95.3 | 139.7 | 508.0 | 12.7 | 73.2 | 54.1 |
| 24 | 914 | 701.5 | 692.2 | 69.9 | 590.6 | 616.0 | 616.0 | 614.4 | 168.1 | 106.4 | 152.4 | 609.6 | 12.7 | 82.6 | 63.5 |

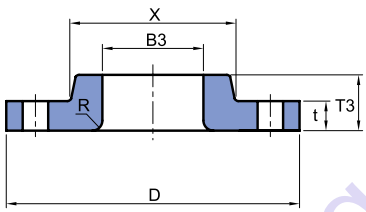
NOTE :

1. For the 'Bore' (B1) other Standard Wall Thickness, refer to page 24 & 25
2. Class 300 flanges except Lap Joint will be furnished with 0.06" (1.6mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
3. For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.

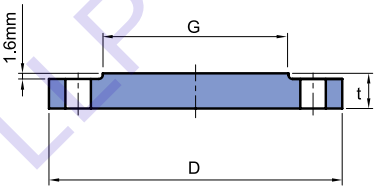





THREADED




LAP JOINT



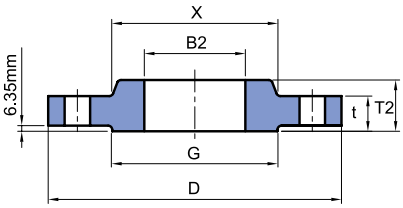

BLIND

Unit : mm

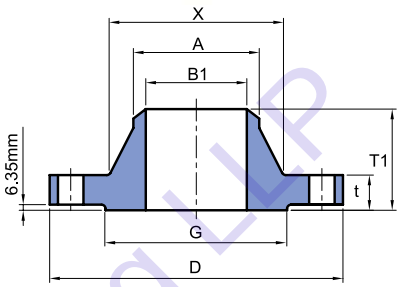
| Nominal Pipe Size | DRILLING | | | BOLTING | | | | APPROXIMATE WEIGHT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bolt Circle Diam. | Number of Holes | Diam. of Holes | Diam. of Bolts (inch) | Machine Bolt Length | Stud Bolt Length | | Welding Neck | | Slip-on and Threaded | | Lap Joint | | Blind | | Socket Welding | |
| | | | | | Raised Face | Raised Face | Ring Joint | Kg | lb | Kg | lb | Kg | lb | Kg | lb | Kg | lb |
| 1/2 | 66.5 | 4 | 15.7 | 1/2 | 57.2 | 63.5 | 76.2 | 0.78 | 1.70 | 0.62 | 1.40 | 0.61 | 1.30 | 0.62 | 1.40 | 0.62 | 1.40 |
| 3/4 | 82.6 | 4 | 19.1 | 5/8 | 63.5 | 76.2 | 88.9 | 1.34 | 3.00 | 1.15 | 2.50 | 1.15 | 2.50 | 1.16 | 2.50 | 1.19 | 2.60 |
| 1 | 88.9 | 4 | 19.1 | 5/8 | 63.5 | 76.2 | 88.9 | 1.64 | 3.60 | 1.39 | 3.10 | 1.38 | 3.00 | 1.42 | 3.00 | 1.44 | 3.20 |
| 1 1/4 | 98.6 | 4 | 19.1 | 5/8 | 69.9 | 82.6 | 95.3 | 2.06 | 4.50 | 1.67 | 3.70 | 1.66 | 3.70 | 1.79 | 3.90 | 1.73 | 3.80 |
| 1 1/2 | 114.3 | 4 | 22.4 | 3/4 | 76.2 | 88.9 | 101.6 | 3.06 | 6.70 | 2.53 | 5.60 | 2.52 | 5.60 | 2.68 | 5.90 | 2.62 | 5.80 |
| 2 | 127.0 | 8 | 19.1 | 5/8 | 76.2 | 88.9 | 101.6 | 3.40 | 7.50 | 2.80 | 6.20 | 2.79 | 6.20 | 3.09 | 6.80 | 2.94 | 6.50 |
| 2 1/2 | 149.4 | 8 | 22.4 | 3/4 | 82.6 | 101.6 | 114.3 | 5.31 | 11.70 | 4.25 | 9.40 | 4.22 | 9.30 | 4.75 | 10.50 | 4.49 | 9.90 |
| 3 | 168.1 | 8 | 22.4 | 3/4 | 88.9 | 108.0 | 120.7 | 7.32 | 16.10 | 5.81 | 12.80 | 5.78 | 12.70 | 6.79 | 14.90 | 6.20 | 13.70 |
| 3 1/2 | 184.2 | 8 | 22.4 | 3/4 | 95.3 | 108.0 | 127.0 | 8.17 | 18.00 | 7.72 | 17.00 | 7.72 | 17.00 | 9.53 | 21.00 | - | - |
| 4 | 200.2 | 8 | 22.4 | 3/4 | 95.3 | 114.3 | 127.0 | 11.30 | 24.90 | 10.13 | 22.30 | 10.07 | 22.20 | 12.00 | 26.50 | - | - |
| 5 | 235.0 | 8 | 22.4 | 3/4 | 108.0 | 120.7 | 133.4 | 15.12 | 33.30 | 12.58 | 27.70 | 12.52 | 27.60 | 15.96 | 35.20 | - | - |
| 6 | 269.7 | 12 | 22.4 | 3/4 | 108.0 | 120.7 | 139.7 | 19.68 | 43.40 | 16.04 | 35.40 | 15.95 | 35.20 | 21.20 | 46.70 | - | - |
| 8 | 330.2 | 12 | 25.4 | 7/8 | 120.7 | 139.7 | 152.4 | 30.48 | 67.20 | 24.50 | 54.00 | 24.37 | 53.70 | 34.60 | 76.30 | - | - |
| 10 | 387.4 | 16 | 28.4 | 1 | 139.7 | 158.8 | 171.5 | 43.74 | 96.40 | 34.16 | 75.30 | 39.92 | 88.00 | 55.34 | 122.00 | - | - |
| 12 | 450.9 | 16 | 31.8 | 1 1/8 | 146.1 | 171.5 | 184.2 | 64.41 | 142.00 | 51.26 | 113.00 | 58.70 | 129.40 | 78.90 | 174.00 | - | - |
| 14 | 514..4 | 20 | 31.8 | 1 1/8 | 158.8 | 177.8 | 190.5 | 88.30 | 194.70 | 72.12 | 159.00 | 83.46 | 184.00 | 107.05 | 236.00 | - | - |
| 16 | 571.5 | 20 | 35.1 | 1 1/4 | 165.1 | 190.5 | 203.2 | 112.94 | 249.00 | 90.40 | 199.30 | 106.14 | 234.00 | 139.25 | 307.00 | - | - |
| 18 | 628.7 | 24 | 35.1 | 1 1/4 | 171.5 | 196.9 | 209.6 | 138.34 | 305.00 | 109.00 | 240.30 | 133.95 | 295.30 | 176.90 | 396.00 | - | - |
| 20 | 685.8 | 24 | 35.1 | 1 1/4 | 184.2 | 203.2 | 222.3 | 167.37 | 369.00 | 136.00 | 300.00 | 157.65 | 347.60 | 223.17 | 492.00 | - | - |
| 24 | 812.8 | 24 | 41.1 | 1 1/2 | 203.2 | 228.6 | 254.0 | 235.41 | 519.00 | 204.00 | 449.70 | 240.40 | 530.00 | 342.00 | 754.00 | - | - |

4. Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
5. The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).
6. Depth of Socket (Y) is covered by ANSI B 16.5 only in sizes through 3 inch, over 3 inch is at the manufacturer's option.

# CLASS 400 FLANGES




SLIP-ON




WELDING NECK

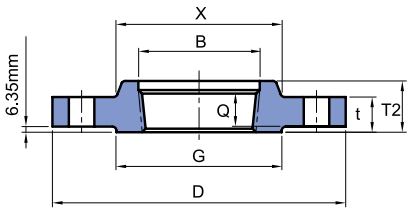
## ANSI B 16.5 Forged Flanges

Unit : mm

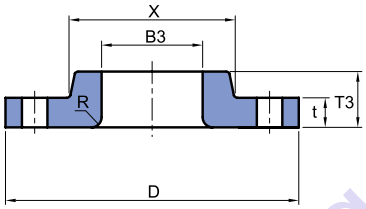
| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE | | | | LENGTH THRU HUB | | | Diam. of Hub at Bevel | Radius of Fillet | Thread Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Welding Neck | Slip-on | Lap Joint | Counter Bore Min. | Welding Neck | Slip-on Threaded | Lap Joint | | | |
| | D | X | G | t | B1 | B2 | B3 | B | T1 | T2 | T3 | A | R | Q |
| 1/2 | 95 | 38.1 | 35.1 | 14.2 | See Note (1) To be specified by purchaser. | 22.4 | 22.9 | 23.6 | 52.3 | 22.4 | 22.4 | 21.3 | 3.0 | 15.7 |
| 3/4 | 117 | 47.8 | 42.9 | 15.7 | | 27.7 | 28.2 | 29.0 | 57.2 | 25.4 | 25.4 | 26.7 | 3.0 | 15.7 |
| 1 | 124 | 53.8 | 50.8 | 17.5 | | 34.5 | 35.1 | 35.8 | 62.0 | 26.9 | 26.9 | 33.5 | 3.0 | 17.5 |
| 1 1/4 | 133 | 63.5 | 63.5 | 20.6 | | 43.2 | 43.7 | 44.5 | 66.5 | 28.4 | 28.4 | 42.2 | 4.8 | 20.6 |
| 1 1/2 | 155 | 69.9 | 73.2 | 22.4 | | 49.5 | 50.0 | 50.5 | 69.9 | 31.8 | 31.8 | 48.3 | 6.4 | 22.4 |
| 2 | 165 | 84.1 | 91.9 | 25.4 | | 62.0 | 62.5 | 63.5 | 73.2 | 36.6 | 36.6 | 60.5 | 7.9 | 28.4 |
| 2 1/2 | 191 | 100.1 | 104.6 | 28.4 | | 74.7 | 75.4 | 76.2 | 79.2 | 41.1 | 41.1 | 73.2 | 7.9 | 31.8 |
| 3 | 210 | 117.3 | 127.0 | 31.8 | | 90.7 | 91.4 | 92.2 | 82.6 | 46.0 | 46.0 | 88.9 | 9.7 | 35.1 |
| 3 1/2 | 229 | 133.4 | 139.7 | 35.1 | | 103.4 | 104.1 | 104.9 | 85.9 | 49.3 | 49.3 | 101.6 | 9.7 | 39.6 |
| 4 | 254 | 146.1 | 157.2 | 35.1 | | 116.1 | 116.8 | 117.6 | 88.9 | 50.8 | 50.8 | 114.3 | 11.2 | 36.6 |
| 5 | 279 | 177.8 | 185.7 | 38.1 | | 143.8 | 144.5 | 144.5 | 101.6 | 53.8 | 53.8 | 141.2 | 11.2 | 42.9 |
| 6 | 318 | 206.2 | 215.9 | 41.1 | | 170.7 | 171.5 | 171.5 | 103.1 | 57.2 | 57.2 | 168.4 | 12.7 | 46.0 |
| 8 | 381 | 260.4 | 269.7 | 47.8 | | 221.5 | 222.3 | 222.3 | 117.3 | 68.3 | 68.3 | 219.2 | 12.7 | 50.8 |
| 10 | 445 | 320.5 | 323.9 | 53.8 | | 276.4 | 277.4 | 276.4 | 124.0 | 73.2 | 101.6 | 273.1 | 12.7 | 55.6 |
| 12 | 521 | 374.7 | 381.0 | 57.2 | | 327.2 | 328.2 | 328.7 | 136.7 | 79.2 | 108.0 | 323.9 | 12.7 | 60.5 |
| 14 | 584 | 425.5 | 412.8 | 60.5 | | 359.2 | 360.2 | 360.4 | 149.4 | 84.1 | 117.3 | 355.6 | 12.7 | 63.5 |
| 16 | 648 | 482.6 | 469.9 | 63.5 | | 410.5 | 411.2 | 411.2 | 152.4 | 93.7 | 127.0 | 406.4 | 12.7 | 68.3 |
| 18 | 711 | 533.4 | 533.4 | 66.5 | | 461.8 | 462.3 | 462.0 | 165.1 | 98.6 | 136.7 | 457.2 | 12.7 | 69.9 |
| 20 | 775 | 587.2 | 584.2 | 69.9 | | 513.1 | 514.4 | 512.8 | 168.1 | 101.6 | 146.1 | 508.0 | 12.7 | 73.2 |
| 24 | 914 | 701.5 | 692.2 | 76.2 | | 616.0 | 616.0 | 614.4 | 174.8 | 114.3 | 158.8 | 609.6 | 12.7 | 82.6 |

NOTE :

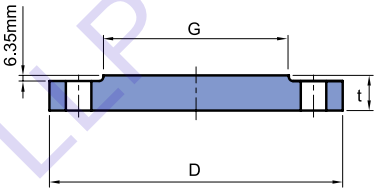
1. For the 'Bore' (B1) other Standard Wall Thickness, refer to page 24 & 25.
2. Class 400 flanges except Lap Joint will be furnished with 0.25" (6.35mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
3. For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.




THREADED




LAP JOINT



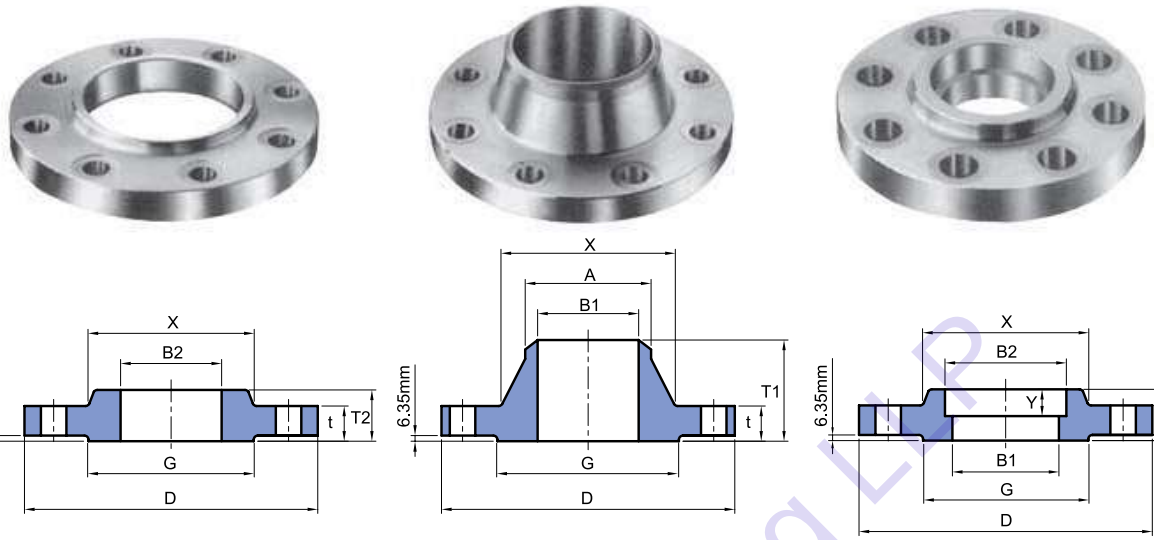

BLIND

Unit : mm

| Nominal Pipe Size | DRILLING | | | BOLTING | | | | APPROXIMATE WEIGHT | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bolt Circle Diam. | Number of Holes | Diam. of Holes | Diam. of Bolts (inch) | Stud Bolt Length | | | Welding Neck | | Slip-on and Threaded | | Lap Joint | | Blind | |
| | | | | | 0.25″ Raised Face | Male-Female Tongue-Groove | Ring Joint | Kg | lb | Kg | lb | Kg | lb | Kg | lb |
| 1/2 | 66.5 | 4 | 15.7 | 1/2 | 76.2 | 69.9 | 76.2 | 1.36 | 3.00 | 0.91 | 2.00 | 0.80 | 1.80 | 0.91 | 2.00 |
| 3/4 | 82.6 | 4 | 19.1 | 5/8 | 88.9 | 82.6 | 88.9 | 1.59 | 3.50 | 1.36 | 3.00 | 1.36 | 3.00 | 1.40 | 3.00 |
| 1 | 88.9 | 4 | 19.1 | 5/8 | 88.9 | 82.6 | 88.9 | 1.81 | 4.00 | 1.59 | 3.50 | 1.59 | 3.50 | 1.70 | 3.80 |
| 1 1/4 | 98.6 | 4 | 19.1 | 5/8 | 95.3 | 88.9 | 95.3 | 2.50 | 5.50 | 2.10 | 4.60 | 2.04 | 4.50 | 2.27 | 5.00 |
| 1 1/2 | 114.3 | 4 | 22.4 | 3/4 | 108.0 | 101.6 | 108.0 | 3.63 | 8.00 | 3.10 | 6.80 | 2.95 | 6.50 | 3.40 | 7.50 |
| 2 | 127.0 | 8 | 19.1 | 5/8 | 108.0 | 101.6 | 108.0 | 4.54 | 10.00 | 3.63 | 8.00 | 3.63 | 8.00 | 4.40 | 9.70 |
| 2 1/2 | 149.4 | 8 | 22.4 | 3/4 | 120.7 | 114.3 | 120.7 | 6.35 | 14.00 | 5.44 | 12.00 | 4.99 | 11.00 | 6.80 | 15.00 |
| 3 | 168.1 | 8 | 22.4 | 3/4 | 127.0 | 120.7 | 127.0 | 8.17 | 18.00 | 7.26 | 16.00 | 6.35 | 14.00 | 8.90 | 19.60 |
| 3 1/2 | 184.2 | 8 | 25.4 | 7/8 | 139.7 | 133.4 | 139.7 | 11.80 | 26.00 | 9.53 | 21.00 | 9.08 | 20.00 | 13.17 | 29.00 |
| 4 | 200.2 | 8 | 25.4 | 7/8 | 139.7 | 133.4 | 139.7 | 13.61 | 30.00 | 10.89 | 24.00 | 9.98 | 22.00 | 14.40 | 31.70 |
| 5 | 235.0 | 8 | 25.4 | 7/8 | 146.1 | 139.7 | 146.1 | 17.69 | 39.00 | 14.07 | 31.00 | 13.15 | 29.00 | 19.50 | 43.00 |
| 6 | 269.7 | 12 | 25.4 | 7/8 | 152.4 | 146.1 | 152.4 | 22.23 | 49.00 | 19.98 | 44.00 | 16.78 | 37.00 | 27.67 | 61.00 |
| 8 | 330.2 | 12 | 28.4 | 1 | 171.5 | 165.1 | 171.5 | 35.38 | 78.00 | 30.40 | 67.00 | 26.16 | 59.00 | 45.36 | 100.00 |
| 10 | 387.4 | 16 | 31.8 | 1 1/8 | 190.5 | 184.2 | 190.5 | 49.89 | 110.00 | 41.28 | 91.00 | 43.09 | 95.00 | 68.00 | 150.00 |
| 12 | 450.9 | 16 | 35.1 | 1 1/4 | 203.2 | 196.9 | 203.2 | 72.57 | 160.00 | 59.02 | 130.00 | 68.95 | 152.00 | 98.00 | 216.00 |
| 14 | 514..4 | 20 | 35.1 | 1 1/4 | 209.6 | 203.2 | 209.6 | 105.69 | 233.00 | 81.72 | 180.00 | 95.25 | 210.00 | 131.66 | 290.00 |
| 16 | 571.5 | 20 | 38.1 | 1 3/8 | 222.3 | 215.9 | 222.3 | 133.30 | 294.00 | 106.69 | 235.00 | 127.00 | 280.00 | 167.00 | 368.00 |
| 18 | 628.7 | 24 | 38.1 | 1 3/8 | 228.6 | 222.3 | 228.6 | 158.90 | 350.30 | 129.39 | 285.30 | 156.49 | 345.00 | 206.57 | 455.40 |
| 20 | 685.8 | 24 | 41.1 | 1 1/2 | 241.3 | 235.0 | 247.7 | 193.00 | 425.50 | 152.00 | 335.00 | 190.51 | 420.00 | 261.00 | 575.40 |
| 24 | 812.8 | 24 | 47.8 | 1 3/4 | 266.7 | 260.4 | 279.4 | 281.48 | 620.50 | 231.54 | 510.50 | 278.96 | 615.00 | 395.00 | 870.80 |

4. Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
5. The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).
6. Dimensions of size 1/2″ through 3 1/2″ are the same as for Class 600 Flanges.

# CLASS 600 FLANGES




SLIP-ON WELDING NECK SOCKET WELDING

## ANSI B 16.5 Forged Flanges

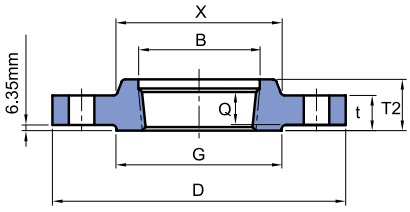
Unit : mm

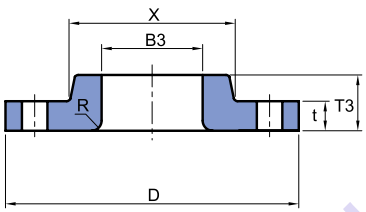
| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE | | | | LENGTH THRU HUB | | | Diam. of Hub at Bevel | Radius of Fillet | Thread Length | Depth of Socket |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Welding Neck Socket Welding | Slip-on Socket Welding | Lap Joint | Counter Bore Min. | Welding Neck | Slip-on Threaded Socket Welding | Lap Joint | | | | |
| | D | X | G | t | B1 | B2 | B3 | B | T1 | T2 | T3 | A | R | Q | Y |
| 1/2 | 95 | 38.1 | 35.1 | 14.2 | See Note (1) To be specified by purchaser. | 22.4 | 22.9 | 23.6 | 52.3 | 22.4 | 22.4 | 21.3 | 3.0 | 15.7 | 9.7 |
| 3/4 | 117 | 47.8 | 42.9 | 15.7 | | 27.7 | 28.2 | 29.0 | 57.2 | 25.4 | 25.4 | 26.7 | 3.0 | 15.7 | 11.2 |
| 1 | 124 | 53.8 | 50.8 | 17.5 | | 34.5 | 35.1 | 35.8 | 62.0 | 26.9 | 26.9 | 33.5 | 3.0 | 17.5 | 12.7 |
| 1 1/4 | 133 | 63.5 | 63.5 | 20.6 | | 43.2 | 43.7 | 44.5 | 66.5 | 28.4 | 28.4 | 42.2 | 4.8 | 20.6 | 14.2 |
| 1 1/2 | 155 | 69.9 | 73.2 | 22.4 | | 49.5 | 50.0 | 50.5 | 69.9 | 31.8 | 31.8 | 48.3 | 6.4 | 22.4 | 15.7 |
| 2 | 165 | 84.1 | 91.9 | 25.4 | | 62.0 | 62.5 | 63.5 | 73.2 | 36.6 | 36.6 | 60.5 | 7.9 | 28.4 | 17.5 |
| 2 1/2 | 191 | 100.1 | 104.6 | 28.4 | | 74.7 | 75.4 | 76.2 | 79.2 | 41.1 | 41.1 | 73.2 | 7.9 | 31.8 | 19.1 |
| 3 | 210 | 117.3 | 127.0 | 31.8 | | 90.7 | 91.4 | 92.2 | 82.6 | 46.0 | 46.0 | 88.9 | 9.7 | 35.1 | 20.6 |
| 3 1/2 | 229 | 133.4 | 139.7 | 35.1 | | 103.4 | 104.1 | 104.9 | 85.9 | 49.3 | 49.3 | 101.6 | 9.7 | 39.6 | 22.4 |
| 4 | 273 | 152.4 | 157.2 | 38.1 | | 116.1 | 116.8 | 117.6 | 101.6 | 53.8 | 53.8 | 114.3 | 11.2 | 41.1 | 23.9 |
| 5 | 330 | 189.0 | 185.7 | 44.5 | | 143.8 | 144.5 | 144.5 | 114.3 | 60.5 | 60.5 | 141.2 | 11.2 | 47.8 | 23.9 |
| 6 | 356 | 222.3 | 215.9 | 47.8 | | 170.7 | 171.5 | 171.5 | 117.3 | 66.5 | 66.5 | 168.4 | 12.7 | 50.8 | 26.9 |
| 8 | 419 | 273.1 | 269.7 | 55.6 | | 221.5 | 222.3 | 222.3 | 133.4 | 76.2 | 76.2 | 219.2 | 12.7 | 57.2 | 31.8 |
| 10 | 508 | 342.9 | 323.9 | 63.5 | | 276.4 | 277.4 | 276.4 | 152.4 | 85.9 | 111.3 | 273.1 | 12.7 | 65.0 | 33.3 |
| 12 | 559 | 400.1 | 381.0 | 66.5 | | 327.2 | 328.2 | 328.7 | 155.4 | 91.9 | 117.3 | 323.9 | 12.7 | 69.9 | 39.6 |
| 14 | 603 | 431.8 | 412.8 | 69.9 | | 359.2 | 360.2 | 360.4 | 165.1 | 93.7 | 127.0 | 355.6 | 12.7 | 73.2 | 41.4 |
| 16 | 686 | 495.3 | 469.9 | 76.2 | | 410.5 | 411.2 | 411.2 | 177.8 | 106.4 | 139.7 | 406.4 | 12.7 | 77.7 | 44.5 |
| 18 | 743 | 546.1 | 533.4 | 82.6 | | 461.8 | 462.3 | 462.0 | 184.2 | 117.3 | 152.4 | 457.2 | 12.7 | 79.2 | 49.3 |
| 20 | 813 | 609.6 | 584.2 | 88.9 | | 513.1 | 514.4 | 512.8 | 190.5 | 127.0 | 165.1 | 508.0 | 12.7 | 82.6 | 54.1 |
| 24 | 940 | 717.6 | 692.2 | 101.6 | | 616.0 | 616.0 | 614.4 | 203.2 | 139.7 | 184.2 | 609.6 | 12.7 | 91.9 | 63.5 |

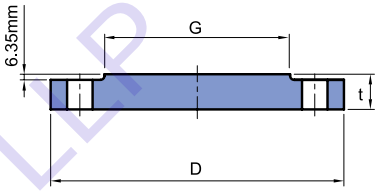
NOTE :

1. For the 'Bore' (B1) other Standard Wall Thickness, refer to page 24 & 25.
2. Class 600 flanges except Lap Joint will be furnished with 0.25" (6.35mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
3. For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.





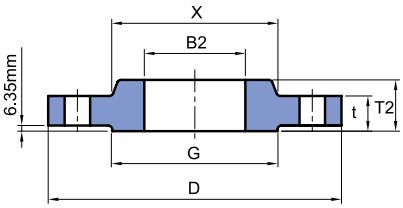

THREADED LAP JOINT BLIND

Unit : mm

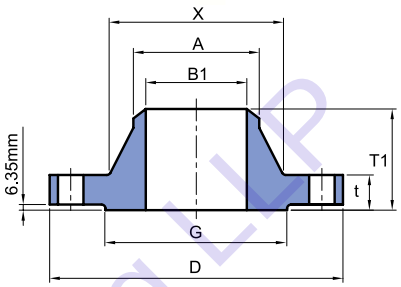
| Nominal Pipe Size | DRILLING | | | BOLTING | | | | APPROXIMATE WEIGHT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | STUD BOLT LENGTH | | | Welding Neck | | Slip-on and Threaded | | Lap Joint | | Blind | | Socket Welding | |
| | Bolt Circle Diam. | Number of Holes | Diam. of Holes | Diam. of Bolts (inch) | 0.25″ Raised Face | Male - Female Tongue - Groove | Ring Joint | Kg | lb | Kg | lb | Kg | lb | Kg | lb | Kg | lb |
| 1/2 | 66.5 | 4 | 15.7 | 1/2 | 76.2 | 69.9 | 76.2 | 0.90 | 2.00 | 0.91 | 2.00 | 0.80 | 1.80 | 0.91 | 2.00 | 0.91 | 2.00 |
| 3/4 | 82.6 | 4 | 19.1 | 5/8 | 88.9 | 82.6 | 88.9 | 1.59 | 3.50 | 1.40 | 3.00 | 1.36 | 3.00 | 1.40 | 3.00 | 1.36 | 3.00 |
| 1 | 88.9 | 4 | 19.1 | 5/8 | 88.9 | 82.6 | 88.9 | 1.90 | 4.00 | 1.70 | 3.70 | 1.59 | 3.50 | 1.81 | 4.00 | 1.81 | 4.00 |
| 1 1/4 | 98.6 | 4 | 19.1 | 5/8 | 95.3 | 88.9 | 95.3 | 2.49 | 5.50 | 2.27 | 5.00 | 2.04 | 4.50 | 2.40 | 5.30 | 2.60 | 5.70 |
| 1 1/2 | 114.3 | 4 | 22.4 | 3/4 | 108.0 | 101..6 | 108.0 | 3.63 | 8.00 | 3.10 | 6.80 | 2.95 | 6.50 | 3.40 | 7.50 | 3.18 | 7.00 |
| 2 | 127.0 | 8 | 19.1 | 5/8 | 108.0 | 101.6 | 108.0 | 4.54 | 10.00 | 3.63 | 8.00 | 3.63 | 8.00 | 4.40 | 9.70 | 3.90 | 8.60 |
| 2 1/2 | 149.4 | 8 | 22.4 | 3/4 | 120.7 | 114.3 | 120.7 | 6.35 | 14.00 | 5.44 | 12.00 | 4.99 | 11.00 | 6.80 | 15.00 | 5.90 | 13.00 |
| 3 | 168.1 | 8 | 22.4 | 3/4 | 127.0 | 120.7 | 127.0 | 8.16 | 18.00 | 7.26 | 16.00 | 6.35 | 14.00 | 8.90 | 19.60 | 7.40 | 16.30 |
| 3 1/2 | 184.2 | 8 | 25.4 | 7/8 | 139.7 | 133.4 | 139.7 | 11.80 | 26.00 | 9.53 | 21.00 | 9.08 | 20.00 | 13.17 | 29.00 | - | - |
| 4 | 215.9 | 8 | 25.4 | 7/8 | 146.1 | 139.7 | 146.1 | 16.78 | 37.00 | 14.97 | 33.00 | 14.06 | 31.00 | 18.60 | 41.00 | - | - |
| 5 | 266.7 | 8 | 28.4 | 1 | 165.1 | 158.8 | 165.1 | 30.87 | 68.00 | 28.50 | 62.80 | 27.50 | 60.60 | 30.84 | 68.00 | - | - |
| 6 | 292.1 | 12 | 28.4 | 1 | 171.5 | 165.1 | 171.5 | 36.77 | 80.00 | 36.32 | 80.00 | 35.38 | 78.00 | 38.00 | 83.80 | - | - |
| 8 | 349.3 | 12 | 31.8 | 1 1/8 | 190.5 | 184.2 | 196.9 | 50.80 | 112.00 | 44.00 | 97.00 | 50.80 | 112.00 | 62.20 | 137.00 | - | - |
| 10 | 431.8 | 16 | 35.1 | 1 1/4 | 215.9 | 209.6 | 215.9 | 86.26 | 190.00 | 76.20 | 168.00 | 74.00 | 163.00 | 102.00 | 224.90 | - | - |
| 12 | 489.0 | 20 | 35.1 | 1 1/4 | 222.3 | 215.9 | 222.3 | 102.51 | 226.00 | 97.52 | 215.00 | 108.86 | 240.00 | 132.00 | 291.00 | - | - |
| 14 | 527.1 | 20 | 38.1 | 1 3/8 | 235.0 | 228.6 | 235.0 | 121.56 | 268.00 | 102.00 | 224.80 | 111.00 | 244.70 | 158.00 | 348.30 | - | - |
| 16 | 603.3 | 20 | 41.1 | 1 1/2 | 254.0 | 247.7 | 254.0 | 177.06 | 290.00 | 149.82 | 330.20 | 165.71 | 365.30 | 224.73 | 495.40 | - | - |
| 18 | 654.1 | 20 | 44.5 | 1 5/8 | 273.1 | 266.7 | 273.1 | 215.65 | 475.40 | 180.10 | 412.30 | 194.00 | 427.70 | 285.00 | 628.30 | - | - |
| 20 | 723.9 | 24 | 44.5 | 1 5/8 | 285.8 | 279.4 | 292.1 | 267.86 | 590.50 | 231.54 | 510.50 | 258.78 | 570.50 | 365.00 | 804.70 | - | - |
| 24 | 838.2 | 24 | 50.8 | 1 7/8 | 330.2 | 323.9 | 336.6 | 372.00 | 820.00 | 330.00 | 725.50 | 362.00 | 798.00 | 533.45 | 1176.00 | - | - |

4. Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
5. The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).
6 Dimensions of sizes 1/2″ through 3 1/2″ are the same as for Class 400 Flanges.
7. Depth of Socket (Y) is covered by ANSI B 16.5 only in sizes through 3 inch, over 3 inch is at the manufacturer's option.

# CLASS 900 FLANGES




SLIP-ON




WELDING NECK

## ANSI B 16.5 Forged Flanges

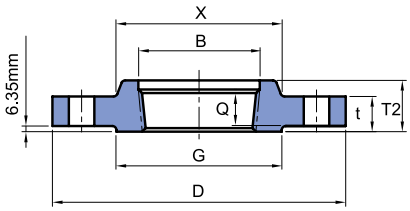
Unit : mm

| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE | | | | LENGTH THRU HUB | | | Diam. of Hub at Bevel | Radius of Fillet | Thread Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Welding Neck | Slip-on | Lap Joint | Counter Bore Min. | Welding Neck | Slip-on Threaded | Lap Joint | | | |
| | D | X | G | t | B1 | B2 | B3 | B | T1 | T2 | T3 | A | R | Q |
| 1/2 | 121 | 38.1 | 35.1 | 22.4 | See Note (1) To be specified by purchaser. | 22.4 | 22.9 | 23.6 | 60.5 | 31.8 | 31.8 | 21.3 | 3.0 | 22.4 |
| 3/4 | 130 | 44.5 | 42.9 | 25.4 | | 27.7 | 28.2 | 29.0 | 69.9 | 35.1 | 35.1 | 26.7 | 3.0 | 25.4 |
| 1 | 149 | 52.3 | 50.8 | 28.4 | | 34.5 | 35.1 | 35.8 | 73.2 | 41.1 | 41.1 | 33.5 | 3.0 | 28.4 |
| 1 1/4 | 159 | 63.5 | 63.5 | 28.4 | | 43.2 | 43.7 | 44.5 | 73.2 | 41.1 | 41.1 | 42.2 | 4.8 | 30.2 |
| 1 1/2 | 178 | 69.9 | 73.2 | 31.8 | | 49.5 | 50.0 | 50.5 | 82.6 | 44.5 | 44.5 | 48.3 | 6.4 | 31.8 |
| 2 | 216 | 104.6 | 91.9 | 38.1 | | 62.0 | 62.5 | 63.5 | 101.6 | 57.2 | 57.2 | 60.5 | 7.9 | 38.1 |
| 2 1/2 | 244 | 124.0 | 104.6 | 41.1 | | 74.7 | 75.4 | 76.2 | 104.6 | 63.5 | 63.5 | 73.2 | 7.9 | 47.8 |
| 3 | 241 | 127.0 | 127.0 | 38.1 | | 90.7 | 91.4 | 92.2 | 101.6 | 53.8 | 53.8 | 88.9 | 9.7 | 41.1 |
| 4 | 292 | 158.8 | 157.2 | 44.5 | | 116.1 | 116.8 | 117.6 | 114.3 | 69.9 | 69.9 | 114.3 | 11.2 | 47.8 |
| 5 | 349 | 190.5 | 185.7 | 50.8 | | 143.8 | 144.5 | 144.5 | 127.0 | 79.2 | 79.2 | 141.2 | 11.2 | 53.8 |
| 6 | 381 | 235.0 | 215.9 | 55.6 | | 170.7 | 171.5 | 171.5 | 139.7 | 85.9 | 85.9 | 168.4 | 12.7 | 57.2 |
| 8 | 470 | 298.5 | 269.7 | 63.5 | | 221.5 | 222.3 | 222.3 | 162.1 | 101.6 | 114.3 | 219.2 | 12.7 | 63.5 |
| 10 | 546 | 368.3 | 323.9 | 69.9 | | 276.4 | 277.4 | 276.4 | 184.2 | 108.0 | 127.0 | 273.1 | 12.7 | 71.4 |
| 12 | 610 | 419.1 | 381.0 | 79.2 | | 327.2 | 328.2 | 328.7 | 200.2 | 117.3 | 142.7 | 323.9 | 12.7 | 76.2 |
| 14 | 641 | 450.9 | 412.8 | 85.9 | | 359.2 | 360.2 | 360.4 | 212.9 | 130.0 | 155.4 | 355.6 | 12.7 | 82.6 |
| 16 | 705 | 508.0 | 469.9 | 88.9 | | 410.5 | 411.2 | 411.2 | 215.9 | 133.4 | 165.1 | 406.4 | 12.7 | 85.9 |
| 18 | 787 | 565.2 | 533.4 | 101.6 | | 461.8 | 462.3 | 462.0 | 228.6 | 152.4 | 190.5 | 457.2 | 12.7 | 88.9 |
| 20 | 857 | 622.3 | 584.2 | 108.0 | | 513.1 | 514.4 | 512.8 | 247.7 | 158.8 | 209.6 | 508.0 | 12.7 | 91.9 |
| 24 | 1041 | 749.3 | 692.2 | 139.7 | | 616.0 | 616.0 | 614.4 | 292.1 | 203.2 | 266.7 | 609.6 | 12.7 | 101.6 |

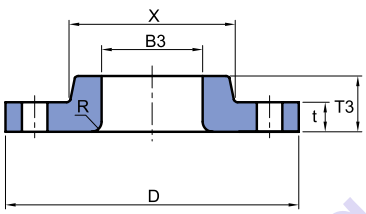
NOTE :

1. For the 'Bore' (B1) other Standard Wall Thickness, refer to page 24 & 25.
2. Class 900 flanges except Lap Joint will be furnished with 0.25˝ (6.35mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
3. For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.

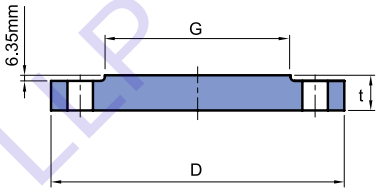





THREADED




LAP JOINT



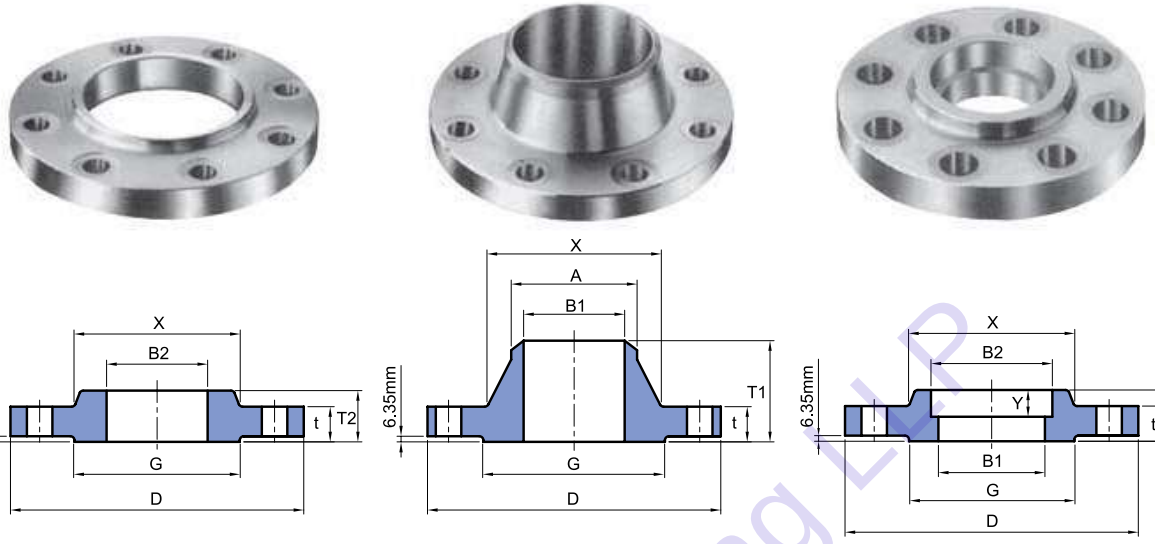

BLIND

Unit : mm

| Nominal Pipe Size | DRILLING | | | BOLTING | | | | APPROXIMATE WEIGHT | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | STUD BOLT LENGTH | | | Welding Neck | | Slip-on and Threaded | | Lap Joint | | Blind | |
| | Bolt Circle Diam. | Number of Holes | Diam. of Holes | Diam. of Bolts (inch) | 0.25″ Raised Face | Male - Female Tongue - Groove | Ring Joint | Kg | lb | Kg | lb | Kg | lb | Kg | lb |
| 1/2 | 82.6 | 4 | 22.4 | 3/4 | 108.0 | 101.6 | 108.0 | 2.10 | 4.60 | 1.81 | 4.00 | 1.81 | 4.00 | 1.90 | 4.20 |
| 3/4 | 88.9 | 4 | 22.4 | 3/4 | 114.3 | 108.0 | 114.3 | 2.72 | 6.00 | 2.40 | 5.30 | 2.30 | 5.00 | 2.70 | 6.00 |
| 1 | 101.6 | 4 | 25.4 | 7/8 | 127.0 | 120.7 | 127.0 | 3.86 | 8.50 | 3.41 | 7.50 | 3.40 | 7.50 | 4.09 | 9.00 |
| 1 1/4 | 111.3 | 4 | 25.4 | 7/8 | 127.0 | 120.7 | 127.0 | 4.54 | 10.00 | 4.10 | 9.00 | 4.09 | 9.00 | 4.54 | 10.00 |
| 1 1/2 | 124.0 | 4 | 28.4 | 1 | 139.7 | 133.4 | 139.7 | 5.90 | 13.00 | 5.45 | 12.00 | 5.40 | 11.90 | 5.90 | 13.00 |
| 2 | 165.1 | 8 | 25.4 | 7/8 | 146.1 | 139.7 | 146.1 | 10.89 | 24.00 | 9.98 | 22.00 | 9.53 | 21.00 | 11.34 | 25.00 |
| 2 1/2 | 190.5 | 8 | 28.4 | 1 | 158.8 | 152.4 | 158.8 | 16.33 | 36.00 | 15.80 | 34.80 | 13.15 | 29.00 | 16.00 | 35.30 |
| 3 | 190.5 | 8 | 25.4 | 7/8 | 146.1 | 139.7 | 146.1 | 15.00 | 33.00 | 11.80 | 26.00 | 11.34 | 25.00 | 13.17 | 29.00 |
| 4 | 235.0 | 8 | 31.8 | 1 1/8 | 171.5 | 165.1 | 171.5 | 23.13 | 51.00 | 23.20 | 51.00 | 22.60 | 48.50 | 24.50 | 54.00 |
| 5 | 279.4 | 8 | 35.1 | 1 1/4 | 190.5 | 184.2 | 190.5 | 38.50 | 84.90 | 37.65 | 83.00 | 36.74 | 81.00 | 39.46 | 87.00 |
| 6 | 317.5 | 12 | 31.8 | 1 1/8 | 190.5 | 184.2 | 196.9 | 49.89 | 110.00 | 48.30 | 106.50 | 47.50 | 104.70 | 51.50 | 113.50 |
| 8 | 393.7 | 12 | 38.1 | 1 3/8 | 222.3 | 215.9 | 222.3 | 79.45 | 175.00 | 75.00 | 166.30 | 86.00 | 189.60 | 89.00 | 106.20 |
| 10 | 469.9 | 16 | 38.1 | 1 3/8 | 235.0 | 228.6 | 235.0 | 118.04 | 260.00 | 111.13 | 245.00 | 125.64 | 277.00 | 131.54 | 290.00 |
| 12 | 533.4 | 20 | 38.1 | 1 3/8 | 254.0 | 247.7 | 254.0 | 157.00 | 346.00 | 146.00 | 321.80 | 167.00 | 368.00 | 187.00 | 412.30 |
| 14 | 558.8 | 20 | 41.1 | 1 1/2 | 273.1 | 266.7 | 279.4 | 181.60 | 400.40 | 172.36 | 380.00 | 180.07 | 397.00 | 224.07 | 494.00 |
| 16 | 616.0 | 20 | 44.5 | 1 5/8 | 285.8 | 279.4 | 292.1 | 224.73 | 495.50 | 192.95 | 425.40 | 211.11 | 465.40 | 272.40 | 600.50 |
| 18 | 685.8 | 20 | 50.8 | 1 7/8 | 323.9 | 317.5 | 336.6 | 308.72 | 680.60 | 272.40 | 600.50 | 295.10 | 650.60 | 385.90 | 850.80 |
| 20 | 749.3 | 20 | 53.8 | 2 | 349.3 | 342.9 | 362.0 | 376.82 | 830.70 | 331.42 | 730.60 | 367.74 | 810.70 | 488.00 | 1076.00 |
| 24 | 901.7 | 20 | 66.5 | 2 1/2 | 438.2 | 431.8 | 457.2 | 685.00 | 1510.00 | 632.00 | 1393.30 | 700.00 | 1543.00 | 905.00 | 1995.00 |

4. Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
5. The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).
6. Dimensions of size 1/2″ through 2 1/2″ are the same as for Class 1500 Flanges.

# CLASS 1500 FLANGES




SLIP-ON WELDING NECK SOCKET WELDING

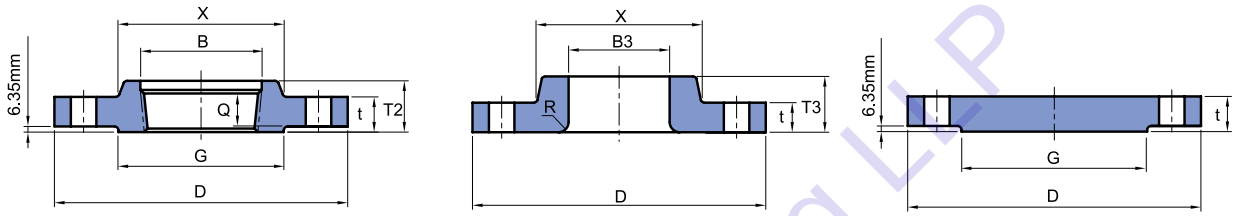
## ANSI B 16.5 Forged Flanges

Unit : mm

| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE | | | | LENGTH THRU HUB | | | Diam. of Hub at Bevel | Radius of Fillet | Thread Length | Depth of Socket |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Welding Neck Socket Welding | Slip-on Socket Welding | Lap Joint | Counter Bore Min. | Welding Neck | Slip-on Threaded Socket Welding | Lap Joint | | | | |
| | D | X | G | t | B1 | B2 | B3 | B | T1 | T2 | T3 | A | R | Q | Y |
| 1/2 | 121 | 38.1 | 35.1 | 22.4 | See Note (1) To be specified by purchaser. | 22.4 | 22.9 | 23.6 | 60.5 | 31.8 | 31.8 | 21.3 | 3.0 | 22.4 | 9.7 |
| 3/4 | 130 | 44.5 | 42.9 | 25.4 | | 27.7 | 28.2 | 29.0 | 69.9 | 35.1 | 35.1 | 26.7 | 3.0 | 25.4 | 11.2 |
| 1 | 149 | 52.3 | 50.8 | 28.4 | | 34.5 | 35.1 | 35.8 | 73.2 | 41.1 | 41.1 | 33.5 | 3.0 | 28.4 | 12.7 |
| 1 1/4 | 159 | 63.5 | 63.5 | 28.4 | | 43.2 | 43.7 | 44.5 | 73.2 | 41.1 | 41.1 | 42.2 | 4.8 | 30.2 | 14.2 |
| 1 1/2 | 178 | 69.9 | 73.2 | 31.8 | | 49.5 | 50.0 | 50.5 | 82.6 | 44.5 | 44.5 | 48.3 | 6.4 | 31.8 | 15.7 |
| 2 | 216 | 104.6 | 91.9 | 38.1 | | 62.0 | 62.5 | 63.5 | 101.6 | 57.2 | 57.2 | 60.5 | 7.9 | 38.1 | 17.5 |
| 2 1/2 | 244 | 124.0 | 104.6 | 41.1 | | 74.7 | 75.4 | 76.2 | 104.6 | 63.5 | 63.5 | 73.2 | 7.9 | 47.8 | 19.1 |
| 3 | 267 | 133.4 | 127.0 | 47.8 | | 90.7 | 91.4 | 92.2 | 117.3 | 73.2 | 73.2 | 88.9 | 9.7 | 50.8 | 20.6 |
| 4 | 311 | 162.1 | 157.2 | 53.8 | | 116.1 | 116.8 | 117.6 | 124.0 | 90.4 | 90.4 | 114.3 | 11.2 | 57.2 | 23.9 |
| 5 | 375 | 196.9 | 185.7 | 73.2 | | 143.8 | 144.5 | 144.5 | 155.4 | 104.6 | 104.6 | 141.2 | 11.2 | 63.5 | 23.9 |
| 6 | 394 | 228.6 | 215.9 | 82.6 | | 170.7 | 171.5 | 171.5 | 171.5 | 119.1 | 119.1 | 168.4 | 12.7 | 69.9 | 26.9 |
| 8 | 483 | 292.1 | 269.7 | 91.9 | | 221.5 | 222.3 | 222.3 | 212.9 | 142.7 | 142.7 | 219.2 | 12.7 | 76.2 | 31.8 |
| 10 | 584 | 368.3 | 323.9 | 108.0 | | 276.4 | 277.4 | 276.4 | 254.0 | 158.8 | 177.8 | 273.1 | 12.7 | 84.1 | 33.3 |
| 12 | 673 | 450.9 | 381.0 | 124.0 | | 327.1 | 328.2 | 328.7 | 282.4 | 180.8 | 218.9 | 323.9 | 12.7 | 91.9 | 39.6 |
| 14 | 749 | 495.3 | 412.8 | 133.4 | | 359.2 | 360.2 | 360.4 | 298.5 | - | 241.3 | 355.6 | 12.7 | - | 41.4 |
| 16 | 826 | 552.5 | 469.9 | 146.1 | | 410.5 | 411.2 | 411.2 | 311.2 | - | 260.4 | 406.4 | 12.7 | - | 44.5 |
| 18 | 914 | 596.9 | 533.4 | 162.1 | | 461.8 | 462.3 | 462.0 | 327.2 | - | 276.4 | 457.2 | 12.7 | - | 49.3 |
| 20 | 984 | 641.4 | 584.2 | 177.8 | | 513.1 | 514.4 | 512.8 | 355.6 | - | 292.1 | 508.0 | 12.7 | - | 54.1 |
| 24 | 1168 | 762.0 | 692.2 | 203.2 | | 616.0 | 616.0 | 614.4 | 406.4 | - | 330.2 | 609.6 | 12.7 | - | 63.5 |

NOTE :

1. For the 'Bore' (B1) other Standard Wall Thickness, refer to page 24 & 25.
2. Class 1500 flanges except Lap Joint will be furnished with 0.25″ (6.35mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
3. For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.



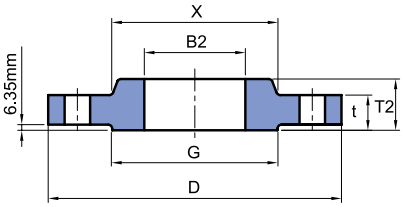

THREADED LAP JOINT BLIND

Unit : mm

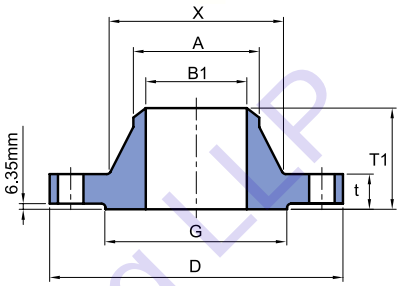
| Nominal Pipe Size | DRILLING | | | BOLTING | | | | APPROXIMATE WEIGHT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | STUD BOLT LENGTH | | | Welding Neck | | Slip-on and Threaded | | Lap Joint | | Blind | | Socket Welding | |
| | Bolt Circle Diam. | Number of Holes | Diam. of Holes | Diam. of Bolts (inch) | 0.25˝ Raised Face | Male - Female Tongue - Groove | Ring Joint | Kg | lb | Kg | lb | Kg | lb | Kg | lb | Kg | lb |
| 1/2 | 82.6 | 4 | 22.4 | 3/4 | 108.0 | 101.6 | 108.0 | 2.10 | 4.60 | 1.80 | 4.00 | 1.80 | 4.00 | 1.90 | 4.00 | 1.81 | 4.00 |
| 3/4 | 88.9 | 4 | 22.4 | 3/4 | 114.3 | 108.0 | 114.3 | 2.72 | 6.00 | 2.27 | 5.00 | 2.27 | 5.00 | 2.72 | 6.00 | 2.81 | 6.20 |
| 1 | 101.6 | 4 | 25.4 | 7/8 | 127.0 | 120.7 | 127.0 | 3.86 | 8.50 | 3.40 | 7.50 | 3.40 | 7.50 | 4.08 | 9.00 | 3.61 | 8.00 |
| 1 1/4 | 111.3 | 4 | 25.4 | 7/8 | 127.0 | 120.7 | 127.0 | 4.54 | 10.00 | 4.10 | 9.00 | 4.09 | 10.80 | 4.30 | 9.50 | 4.99 | 11.00 |
| 1 1/2 | 124.0 | 4 | 28.4 | 1 | 139.7 | 133.4 | 139.7 | 5.90 | 13.00 | 5.45 | 12.00 | 5.40 | 11.90 | 5.90 | 13.00 | 6.76 | 14.90 |
| 2 | 165.1 | 8 | 25.4 | 7/8 | 146.1 | 139.7 | 146.1 | 10.89 | 24.00 | 10.50 | 23.00 | 9.53 | 21.00 | 11.30 | 25.00 | 10.89 | 24.00 |
| 2 1/2 | 190.5 | 8 | 28.4 | 1 | 158.8 | 152.4 | 158.8 | 16.34 | 36.00 | 15.80 | 34.80 | 13.15 | 29.00 | 16.00 | 35.30 | 16.34 | 36.00 |
| 3 | 203.2 | 8 | 31.8 | 1 1/8 | 177.8 | 171.5 | 177.8 | 21.79 | 48.00 | 21.77 | 48.00 | 17.24 | 38.00 | 21.79 | 48.00 | - | - |
| 4 | 241.3 | 8 | 35.1 | 1 1/4 | 196.9 | 190.5 | 196.9 | 31.30 | 69.00 | 31.00 | 68.40 | 29.00 | 63.90 | 33.11 | 73.00 | - | - |
| 5 | 292.1 | 8 | 41.1 | 1 1/2 | 247.7 | 241.3 | 247.7 | 59.02 | 130.00 | 58.80 | 129.60 | 54.00 | 119.00 | 60.00 | 132.30 | - | - |
| 6 | 317.5 | 12 | 38.1 | 1 3/8 | 260.4 | 254.0 | 266.7 | 74.91 | 165.00 | 74.00 | 163.00 | 62.00 | 136.70 | 75.00 | 165.30 | - | - |
| 8 | 393.7 | 12 | 44.5 | 1 5/8 | 292.1 | 285.8 | 323.9 | 123.83 | 273.00 | 117.73 | 258.00 | 129.73 | 236.00 | 136.98 | 302.00 | - | - |
| 10 | 482.6 | 12 | 50.8 | 1 7/8 | 336.6 | 330.2 | 342.9 | 205.93 | 454.00 | 197.49 | 435.40 | 220.19 | 485.40 | 229.97 | 507.00 | - | - |
| 12 | 571.5 | 16 | 53.8 | 2 | 374.7 | 368.3 | 387.4 | 306.00 | 674.60 | 264.00 | 582.00 | 286.02 | 630.60 | 316.00 | 696.70 | - | - |
| 14 | 635.0 | 16 | 60.5 | 2 1/4 | 406.4 | 400.1 | 425.5 | 416.00 | 917.00 | - | - | 404.06 | 890.80 | 421.00 | 928.00 | - | - |
| 16 | 704.9 | 16 | 66.5 | 2 1/2 | 444.5 | 438.2 | 469.9 | 567.50 | 1250.00 | - | - | 522.10 | 1151.00 | 559.00 | 1232.70 | - | - |
| 18 | 774.7 | 16 | 73.2 | 2 3/4 | 495.3 | 489.0 | 527.1 | 736.00 | 1622.60 | - | - | 669.65 | 1476.30 | 761.00 | 1677.70 | - | - |
| 20 | 831.9 | 16 | 79.2 | 3 | 539.8 | 533.4 | 565.2 | 929.00 | 2048.00 | - | - | 805.85 | 1776.60 | 967.00 | 2131.80 | - | - |
| 24 | 990.6 | 16 | 91.9 | 3 1/2 | 616.0 | 609.6 | 647.7 | 1504.00 | 3315.70 | - | - | 1285.55 | 2834.00 | 1568.00 | 3456.80 | - | - |

4. Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
5. The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).
6 Dimensions of sizes 1/2˝ through 2 1/2˝ are the same as for Class 900 Flanges.
7. Depth of Socket (Y) is covered by ANSI B 16.5 only in sizes through 2 1/2 inch, over 2 1/2 inch is at the manufacturer's option.

# CLASS 2500 FLANGES




SLIP-ON




WELDING NECK

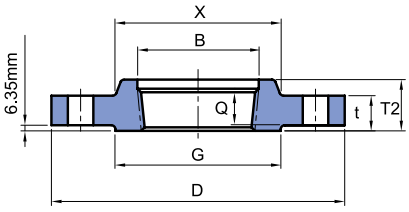
## ANSI B 16.5 Forged Flanges

Unit : mm

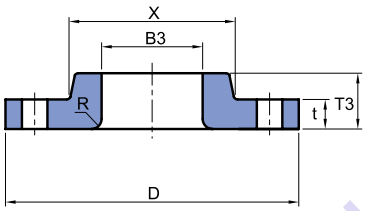
| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE | | | | LENGTH THRU HUB | | | Diam. of Hub at Bevel | Radius of Fillet | Thread Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Welding Neck | Slip-on | Lap Joint | Counter Bore Min. | Welding Neck | Slip-on Threaded | Lap Joint | | | |
| | D | X | G | t | B1 | B2 | B3 | B | T1 | T2 | T3 | A | R | Q |
| 1/2 | 133 | 42.9 | 35.1 | 30.2 | To be specified by purchaser. | 22.4 | 22.9 | 23.6 | 73.2 | 39.6 | 39.6 | 21.3 | 3.0 | 28.4 |
| 3/4 | 140 | 50.8 | 42.9 | 31.8 | | 27.7 | 28.2 | 29.0 | 79.2 | 42.9 | 42.9 | 26.7 | 3.0 | 31.8 |
| 1 | 159 | 57.2 | 50.8 | 35.1 | | 34.5 | 35.1 | 35.8 | 88.9 | 47.8 | 47.8 | 33.5 | 3.0 | 35.1 |
| 1 1/4 | 184 | 73.2 | 63.5 | 38.1 | | 43.2 | 43.7 | 44.5 | 95.3 | 52.3 | 52.3 | 42.2 | 4.8 | 38.1 |
| 1 1/2 | 203 | 79.2 | 73.2 | 44.5 | | 49.5 | 50.0 | 50.5 | 111.3 | 60.5 | 60.5 | 48.3 | 6.4 | 44.5 |
| 2 | 235 | 95.3 | 91.9 | 50.8 | | 62.0 | 62.5 | 63.5 | 127.0 | 69.9 | 69.9 | 60.5 | 7.9 | 50.8 |
| 2 1/2 | 267 | 114.3 | 104.6 | 57.2 | | 74.7 | 75.4 | 76.2 | 142.7 | 79.2 | 79.2 | 73.2 | 7.9 | 57.2 |
| 3 | 305 | 133.4 | 127.0 | 66.5 | | 90.7 | 91.4 | 92.2 | 168.1 | 91.9 | 91.9 | 88.9 | 9.7 | 63.5 |
| 4 | 356 | 165.1 | 157.2 | 76.2 | | 116.1 | 116.8 | 117.6 | 190.5 | 108.0 | 108.0 | 114.3 | 11.2 | 69.9 |
| 5 | 419 | 203.2 | 185.7 | 91.9 | | 143.8 | 144.5 | 144.5 | 228.6 | 130.0 | 130.0 | 141.2 | 11.2 | 76.2 |
| 6 | 483 | 235.0 | 215.9 | 108.0 | | 170.7 | 171.5 | 171.5 | 273.1 | 152.4 | 152.4 | 168.4 | 12.7 | 82.6 |
| 8 | 552 | 304.8 | 269.7 | 127.0 | | 221.5 | 222.3 | 222.3 | 317.5 | 177.8 | 177.8 | 219.2 | 12.7 | 95.3 |
| 10 | 673 | 374.7 | 323.9 | 165.1 | | 276.4 | 277.4 | 276.4 | 419.1 | 228.6 | 228.6 | 273.1 | 12.7 | 108.0 |
| 12 | 762 | 441.5 | 381.0 | 184.2 | | 327.2 | 328.2 | 328.7 | 463.6 | 254.0 | 254.0 | 323.9 | 12.7 | 120.7 |

NOTE :

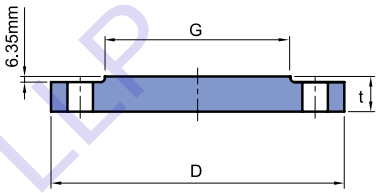
1. For the 'Bore' (B1) other Standard Wall Thickness, refer to page 24 & 25.
2. Class 2500 flanges except Lap Joint will be furnished with 0.25˝ (6.35mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
3. For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.




THREADED




LAP JOINT




BLIND

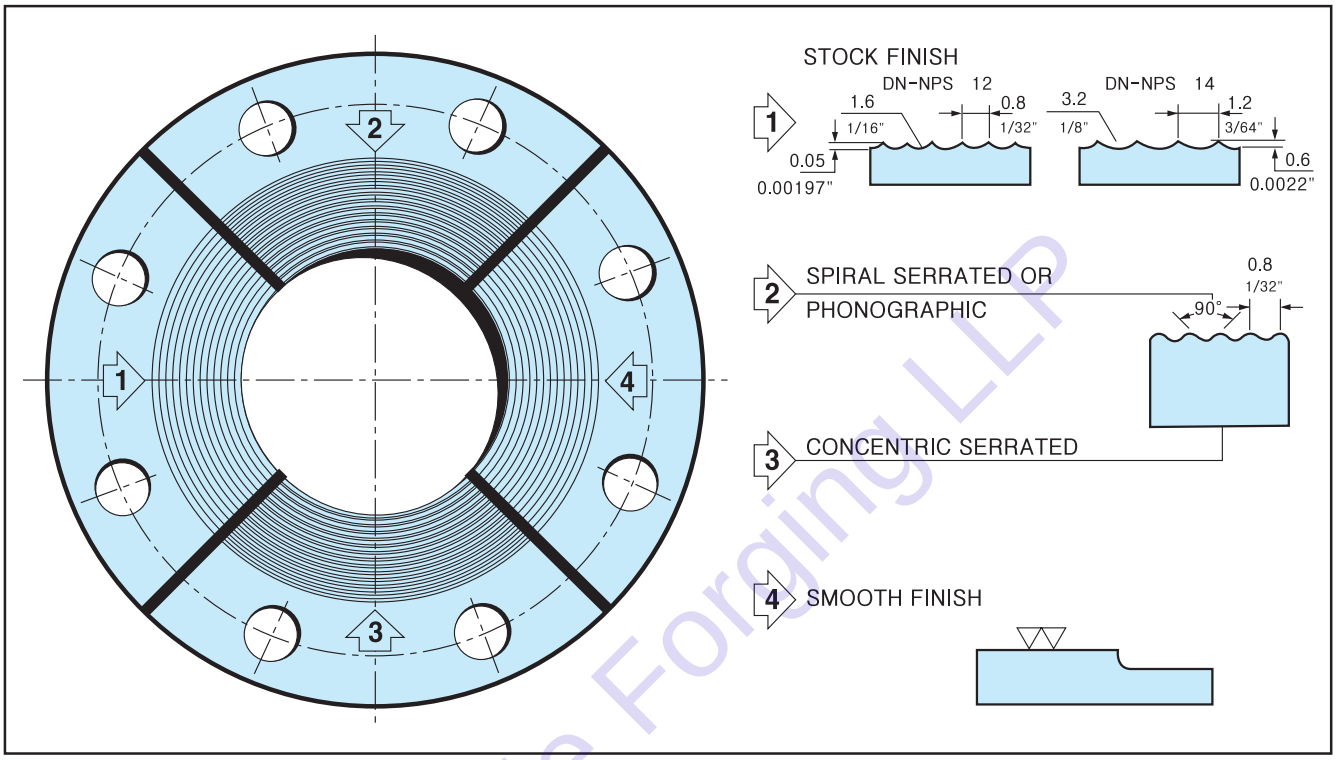
Unit : mm

| Nominal Pipe Size | DRILLING | | | BOLTING | | | | APPROXIMATE WEIGHT | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | STUD BOLT LENGTH | | | Welding Neck | | Slip-on and Threaded | | Lap Joint | | Blind | |
| | Bolt Circle Diam. | Number of Holes | Diam. of Holes | Diam. of Bolts (inch) | 0.25˝ Raised Face | Male - Female Tongue - Groove | Ring Joint | Kg | lb | Kg | lb | Kg | lb | Kg | lb |
| 1/2 | 88.9 | 4 | 22.4 | 3/4 | 120.7 | 114.3 | 120.7 | 3.18 | 7.00 | 3.18 | 7.00 | 3.00 | 6.60 | 3.18 | 7.00 |
| 3/4 | 95.3 | 4 | 22.4 | 3/4 | 127.0 | 120.7 | 127.0 | 4.08 | 9.00 | 4.08 | 9.00 | 3.63 | 8.00 | 4.54 | 10.00 |
| 1 | 108.0 | 4 | 25.4 | 7/8 | 139.7 | 133.4 | 139.7 | 5.45 | 12.00 | 5.44 | 12.00 | 4.99 | 11.00 | 5.44 | 12.00 |
| 1 1/4 | 130.0 | 4 | 28.4 | 1 | 152.4 | 146.1 | 152.4 | 9.07 | 20.00 | 8.16 | 18.00 | 7.26 | 16.00 | 8.16 | 18.00 |
| 1 1/2 | 146.1 | 4 | 31.8 | 1 1/8 | 171.5 | 165.1 | 171.5 | 11.35 | 25.00 | 11.00 | 24.30 | 9.99 | 22.00 | 10.44 | 23.00 |
| 2 | 171.5 | 8 | 28.4 | 1 | 177.8 | 171.5 | 177.8 | 19.07 | 42.00 | 17.25 | 38.00 | 16.80 | 37.00 | 17.71 | 39.00 |
| 2 1/2 | 196.9 | 8 | 31.8 | 1 1/8 | 196.9 | 190.5 | 203.2 | 23.61 | 52.00 | 24.97 | 55.00 | 24.06 | 53.00 | 25.42 | 56.00 |
| 3 | 228.6 | 8 | 35.1 | 1 1/4 | 222.3 | 215.9 | 228.6 | 42.68 | 94.00 | 37.68 | 83.00 | 36.32 | 80.00 | 39.04 | 86.00 |
| 4 | 273.1 | 8 | 41.1 | 1 1/2 | 254.0 | 247.7 | 260.4 | 64.00 | 141.00 | 58.00 | 127.90 | 54.48 | 120.00 | 60.38 | 133.00 |
| 5 | 323.9 | 8 | 47.8 | 1 3/4 | 298.5 | 292.1 | 311.2 | 110.68 | 244.00 | 95.25 | 210.00 | 92.53 | 204.00 | 101.15 | 223.00 |
| 6 | 368.3 | 8 | 53.8 | 2 | 342.9 | 336.6 | 355.6 | 176.46 | 378.00 | 146.51 | 323.00 | 143.01 | 315.30 | 156.63 | 345.30 |
| 8 | 438.2 | 12 | 53.8 | 2 | 381.0 | 374.7 | 393.7 | 261.27 | 576.00 | 219.99 | 485.00 | 213.38 | 470.40 | 240.62 | 530.50 |
| 10 | 539.8 | 12 | 66.5 | 2 1/2 | 489.0 | 482.6 | 508.0 | 484.43 | 1068.00 | 419.57 | 925.00 | 408.60 | 900.80 | 465.36 | 1026.00 |
| 12 | 619.3 | 12 | 73.2 | 2 3/4 | 539.8 | 533.4 | 558.8 | 692.35 | 1526.30 | 590.20 | 1301.00 | 572.95 | 1263.00 | 664.06 | 1464.00 |

4. Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.
5. The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).
7. Class 2500 Slip-on Flanges are not covered by ANSI B16.5, slip-on flanges are at the manufacture's option.

# STANDARD FINISH

## STANDARD FINISHES for Face of Flange (ANSI B16.5)






**STOCK FINISH :** The most widely used of any gasket finish, because practically, is suitable for all ordinary service conditions. This is a continuous spiral groove. Flanges sizes 12″(304.8mm) and smaller are produced with a 1/16″ round-nosed tool at a feed of 1/32″ per revolution. For sizes 14″(355.6mm) and larger, the finish is made with 1/8″ round-nosed tool at a feed of 3/64″ per revolution.

**SPIRAL SERRATED OR PHONOGRAPHIC :** This finish is produced by using a 90° round-nosed tool.

**CONCENTRIC SERRATED :** This finish is produced by using a 90° round-nosed tool.

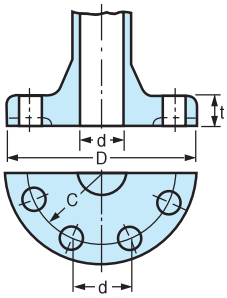
**SMOOTH FINISH :** The cutting tool employed shall have an approximate 0.06" radius.
The resultant surface finish shall have a 125$\mu$ inch to 250$\mu$ inch (ANSI B16.5 para 6.4, 4.1)

1. **RAISED FACE, AND LARGE MALE AND FEMALE**
   Either a serrated-concentric or serrated-spiral finish having from 45 to 55 grooves per inch is used. The cutting tool employed has an approximate 0.06 in radius. The resultant surface finish shall have a 125$\mu$ inch (3.2$\mu$) to 250$\mu$ inch (6.4$\mu$m) approximate roughness.
2. **TONGUE AND GROOVE, AND SMALL MALE AND FEMALE**
   The gasket contact surface does not exceed 125$\mu$ in (3.2$\mu$m) roughness.
3. **RING JOINT**
   The inside wall surface of gasket groove does not exceed 63$\mu$ in (1.6$\mu$m) roughness.
4. **BLIND**
   Blind flanges need not be faced in the center if when this center part is raised its diameter is at least 1 in. smaller than the inside diameter of fittings of the corresponding pressure class. When the center part is depressed, its diameter is not greater than the inside diameter of the corresponding pressure class fittings. Machining of the derpressed center is not required.

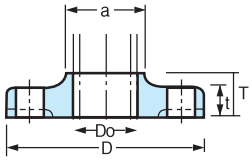
# TOLERANCE

## ANSI B16.5 FORGED FLANGES

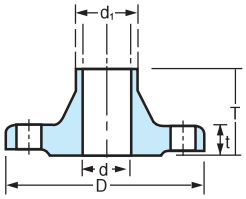
SOLID FLANGE




SLIP–ON FLANGE

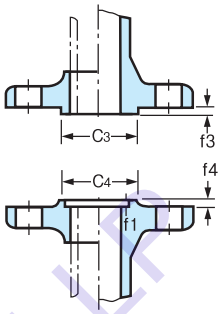



WELDING NECK FLANGE

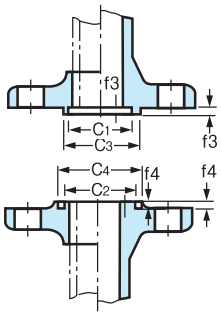



TYPE OF GASKET SURFACE

MALE & FEMALE TYPE




TONGUE & GROOVE TYPE




### THREAD, SOCKET-WELDING, SLIP-ON, LAP JOINT AND BLIND.

| | | |
|---|---|---|
| Outside Diameter | When O.D. is 24″ or less | ±1/16″(1.6mm)* |
| | When O.D. is Over 24″ | ±1/8″(3.2mm)* |
| Inside Diameter | Threaded | Within limits on boring gauge |
| | Socket–Welding, Slip–on and Lap joint | 10″ & Smaller +1/32″ (0.8mm), 0″ 12″ & Larger +1/16″ (1.6mm), 0″ |
| Outside Diameter of Hub | 5″ and Smaller | +3/32″ (2.4mm)* −1/32″ (0.8mm) |
| | 6″ and Larger | +5/32″ (4.0mm) −1/32″ (0.8mm) |
| Diameter of Contact Face | 1/16″ Raised Face | ±1/32″(0.8mm) |
| | 1/4″ Raised Face Tongue & Groove Male, Female | ±1/64″(0.4mm) |
| Diameter of Counterbore | Same as for Inside Diameter | |
| Drilling | Bolt Circle | ±1/16″(1.6mm) |
| | Bolt Hole Spacing | ±1/32″(0.8mm) |
| | Eccentricity of Bolt Circle with Respect to Facing | 2 1/2″ Smaller 1/32″ (0.8mm) Max. 3″ & Larger 1/16″ (1.6mm) Max. |
| | Eccentricity of Bolt Circle with Respect to bore | 1/32″ (0.8mm) Max.* |
| | Eccentricity of Facing with Respect to Bore | 1/32″ (0.8mm) Max.* |
| Thickness | 18″ and Smaller | +1/8″(3.2mm), −0″ |
| | 20″ and Larger | +3/16″(4.8mm), −0″ |
| Length Thru Hub | 10″ and Smaller | ±1/16″(1.6mm) |
| | 12″ and Larger | ±1/8″(3.2mm) |

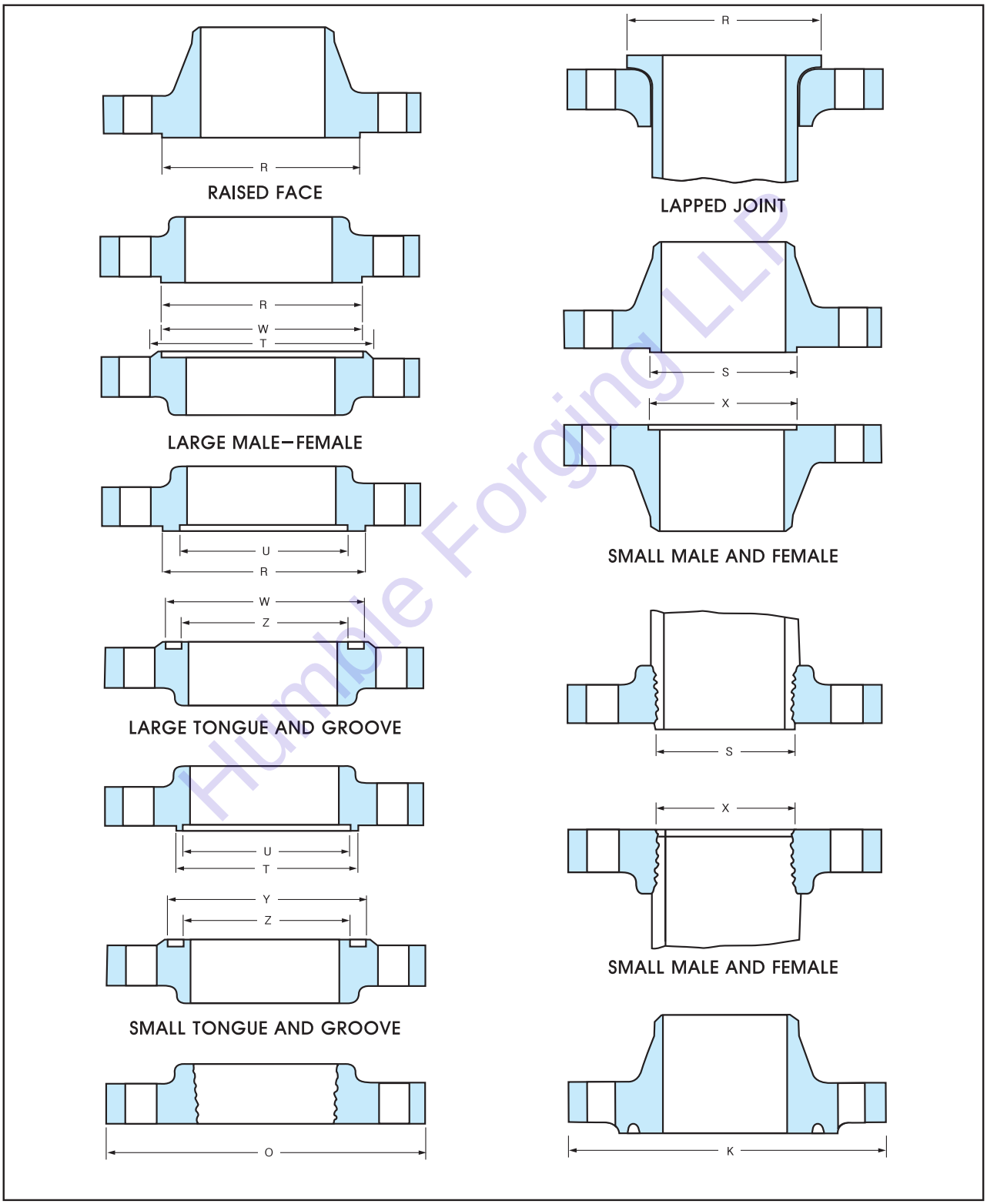
### WELDING NECK

| | | |
|---|---|---|
| Outside Diameter | When O.D. is 24″ or Less | ±1/16″(1.6mm)* |
| | When O.D. is Over 24″ | ±1/8″(3.2mm)* |
| Inside Diameter | 10″ and Smaller | ±1/32″(0.8mm) |
| | 12″ thru 18″ | ±1/16″(1.6mm) |
| | 20″ and Larger | +1/8″(3.2mm) −1/16″(1.6mm) |
| Diameter of Contact Face | 1/16″ Raised Face | ±1/32″(0.8mm) |
| | 1/4″ Raised Face Tongue & Groove Male, Female | ±1/64″(0.4mm) |
| Diameter of Hub at Base | When Hub Base is 24″ or Smaller | ±1/16″(1.6mm)* |
| | When Hub Base is Over 24″ | ±1/8″(3.2mm)* |
| Diameter of Hub at Point of Welding | 5″ and Smaller | +3/32″ (2.4mm) −1/32″ (0.8mm) |
| | 6″ and Larger | +5/32″ (4.0mm) 1/32″ (0.8mm) |
| Drilling | Bolt Circle | ±1/16″(1.6mm) |
| | Bolt Hole Spacing | ±1/32″(0.8mm) |
| | Eccentricity of Bolt Circle with Respect to Facing | 2 1/2″ & Smaller 1/32″ (0.8mm) Max. 3″ & Larger 1/16″ (1.6mm) Max. |
| | Eccentricity of Bolt Circle with Respect to Bore | 1/32″ (0.8mm) Max.* |
| | Eccentricity of Facing with Respect to Bore | 1/32″ (0.8mm) Max.* |
| Thickness | 18″ and Smaller | +1/8″(3.2mm), −0″ |
| | 20″ and Larger | +3/16″(4.8mm), −0″ |
| Length Thru Hub | 10″ and Smaller | ±1/16″(1.6mm) |
| | 12″ and Larger | ±1/8″(3.2mm) |

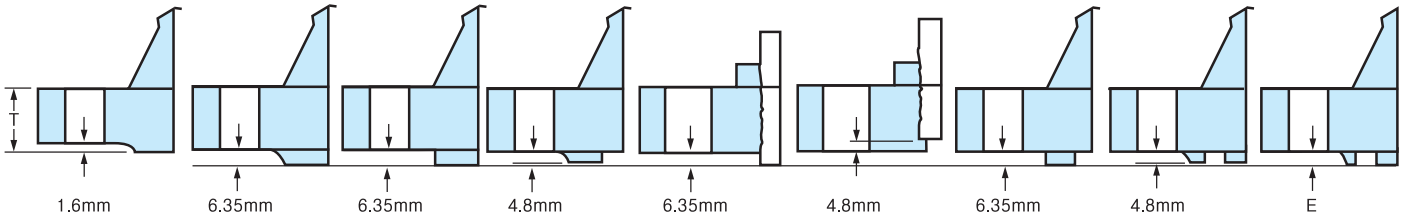
**Note:** *This tolerance is not covered in ANSI B16.5, but maker´s option.

# FLANGES FACINGS

## DIMENSIONS OF FLANGE FACINGS



CLASS 150 & 300RF | CLASS 400 & UPWARD RF | MALE | FEMALE | THREADED MALE | THREADED FEMALE | TONGUE | GROOVE | RING JOINT




# ANSI B16.5 FORGED FLANGES

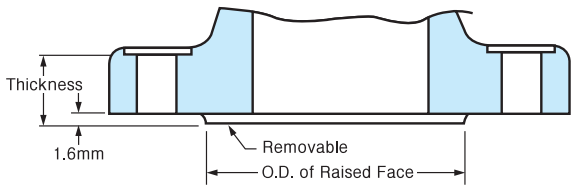
Unit : mm

| Nominal Pipe Size | OUTSIDE DIAMETER | | | I.D. of Lager and Small Tongue | OUTSIDE DIAMETER | | | | I.D. of Large and Groove | HEIGHT | | Depth of Groove or Female |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Raised Face, Lapped Large Male and Large Tongue | Small Male | Small Tongue | | Large Female and Large Groove | | Small Female | Small Groove | | Raised Face, and 300 ST' DS | Raised Face, Large and Small Male and Tongue Classes 400 2500 ST' DS | |
| | R | S | T | U | W | L | X | Y | Z | | | |
| 1/2 | 35.1 | 18.3 | 35.1 | 25.4 | 36.6 | 46.0 | 19.8 | 36.6 | 23.9 | 1.5 | 6.4 | 4.8 |
| 3/4 | 42.9 | 23.9 | 42.9 | 33.3 | 44.5 | 53.8 | 25.4 | 44.5 | 31.8 | 1.5 | 6.4 | 4.8 |
| 1 | 50.8 | 30.2 | 47.8 | 38.1 | 52.3 | 62.0 | 31.8 | 49.3 | 36.6 | 1.5 | 6.4 | 4.8 |
| 1 1/4 | 63.5 | 38.1 | 57.2 | 47.8 | 65.0 | 74.7 | 39.6 | 58.7 | 46.0 | 1.5 | 6.4 | 4.8 |
| 1 1/2 | 73.2 | 44.5 | 63.5 | 53.8 | 74.7 | 84.1 | 46.0 | 65.0 | 52.3 | 1.5 | 6.4 | 4.8 |
| 2 | 91.9 | 57.2 | 82.6 | 73.2 | 93.7 | 103.1 | 58.7 | 84.1 | 71.4 | 1.5 | 6.4 | 4.8 |
| 2 1/2 | 104.6 | 68.3 | 95.3 | 85.9 | 106.4 | 115.8 | 69.9 | 96.8 | 84.1 | 1.5 | 6.4 | 4.8 |
| 3 | 127.0 | 84.1 | 117.3 | 108.0 | 128.5 | 138.2 | 85.9 | 119.1 | 106.4 | 1.5 | 6.4 | 4.8 |
| 3 1/2 | 139.7 | 96.8 | 130.0 | 120.7 | 141.2 | 150.9 | 98.6 | 131.8 | 119.1 | 1.5 | 6.4 | 4.8 |
| 4 | 157.2 | 109.5 | 144.5 | 131.8 | 158.8 | 168.1 | 111.3 | 146.1 | 130.0 | 1.5 | 6.4 | 4.8 |
| 5 | 185.7 | 136.7 | 173.0 | 160.3 | 187.5 | 196.9 | 138.2 | 174.8 | 158.8 | 1.5 | 6.4 | 4.8 |
| 6 | 215.9 | 162.1 | 203.2 | 190.5 | 217.4 | 227.1 | 163.6 | 204.7 | 189.0 | 1.5 | 6.4 | 4.8 |
| 8 | 269.7 | 212.9 | 254.0 | 238.3 | 271.5 | 280.9 | 214.4 | 255.5 | 236.5 | 1.5 | 6.4 | 4.8 |
| 10 | 323.9 | 266.7 | 304.8 | 285.8 | 325.4 | 335.0 | 268.2 | 306.3 | 284.2 | 1.5 | 6.4 | 4.8 |
| 12 | 381.0 | 317.5 | 362.0 | 342.9 | 382.5 | 392.2 | 319.0 | 363.5 | 341.4 | 1.5 | 6.4 | 4.8 |
| 14 | 412.8 | 349.3 | 393.7 | 374.7 | 414.3 | 423.9 | 350.8 | 395.2 | 373.1 | 1.5 | 6.4 | 4.8 |
| 16 | 469.9 | 400.1 | 447.5 | 425.5 | 471.4 | 481.1 | 401.6 | 449.3 | 423.9 | 1.5 | 6.4 | 4.8 |
| 18 | 533.4 | 450.9 | 511.0 | 489.0 | 534.9 | 544.6 | 452.4 | 512.8 | 487.4 | 1.5 | 6.4 | 4.8 |
| 20 | 584.2 | 501.7 | 558.8 | 533.4 | 585.7 | 595.4 | 503.2 | 560.3 | 531.9 | 1.5 | 6.4 | 4.8 |
| 24 | 692.2 | 603.3 | 666.8 | 641.4 | 693.7 | 703.3 | 604.8 | 668.3 | 639.8 | 1.5 | 6.4 | 4.8 |



**Notes:**

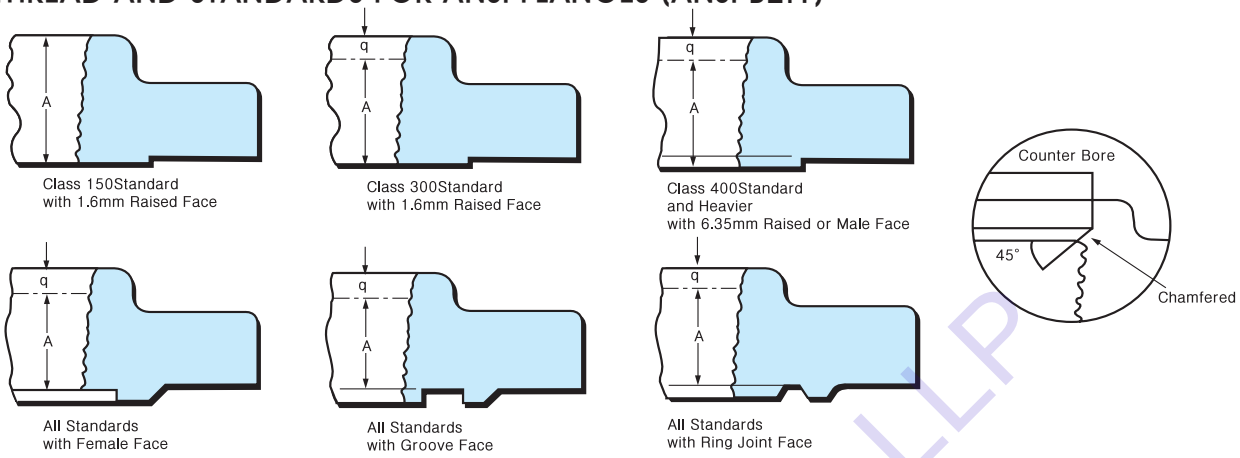
(1) Small male and female faces are not applicable to Slip-on Flange.
(2) Large male and female faces are not applicable to Class 150 Flanges.
(3) For flanges of Class 150 and 300 where they are to be bolted to ANSI Class 125 and 250 Cast-Iron Flanges or required with flat face, flat face can be made by removing raised face.




- Tolerances are ±0.03″(+0.8mm) for 0.06″(1.6mm) RF and ±0.02″(+0.5mm) for 0.25″(6.35mm) RF Large Male and Large Tongue.

# THREAD DETAILS

## THREAD AND STANDARDS FOR ANSI FLANGES (ANSI B2.1)




## ANSI B16.5 FORGED FLANGES

Unit : mm

| Nominal Pipe Size | A–THREAD LENGTHS | | | | | | |
|---|---|---|---|---|---|---|---|
| | Class 150 | Class 300 | Class 400 | Class 600 | Class 900 | Class 1500 | Class 2500 |
| 1/2 | 15.9 | 15.9 | 15.9 | 15.9 | 22.2 | 22.2 | 28.6 |
| 3/4 | 15.9 | 15.9 | 15.9 | 15.9 | 25.4 | 25.4 | 31.8 |
| 1 | 17.5 | 17.5 | 17.5 | 17.5 | 28.6 | 28.6 | 34.9 |
| 1 1/4 | 20.7 | 20.7 | 20.7 | 20.7 | 30.2 | 30.2 | 38.1 |
| 1 1/2 | 22.2 | 22.2 | 22.2 | 22.2 | 31.8 | 31.8 | 44.5 |
| 2 | 25.4 | 28.6 | 28.6 | 28.6 | 38.1 | 38.1 | 50.8 |
| 2 1/2 | 28.6 | 31.8 | 31.8 | 31.8 | 47.6 | 47.6 | 57.2 |
| 3 | 30.1 | 31.8 | 34.9 | 34.9 | 41.3 | 50.8 | 63.5 |
| 3 1/2 | 31.8 | 36.5 | 39.7 | 39.7 | | | |
| 4 | 33.4 | 36.5 | 36.5 | 41.3 | 47.6 | 57.2 | 69.9 |
| 5 | 36.5 | 42.9 | 42.9 | 47.6 | 54.0 | 63.5 | 76.2 |
| 6 | 39.7 | 46.1 | 46.1 | 50.8 | 57.2 | 69.9 | 82.6 |
| 8 | 44.5 | 50.8 | 50.8 | 60.3 | 63.5 | 76.2 | 95.3 |
| 10 | 49.2 | 55.6 | 55.6 | 65.1 | 71.5 | 84.2 | 108.0 |
| 12 | 55.6 | 60.3 | 60.3 | 69.9 | 76.2 | 92.1 | 120.7 |
| 14 | 57.2 | 63.5 | 63.5 | 73.0 | 82.6 | | |
| 16 | 63.5 | 68.3 | 68.3 | 77.8 | 85.7 | | |
| 18 | 68.3 | 69.9 | 69.9 | 78.4 | 88.9 | | |
| 20 | 69.9 | 73.0 | 73.0 | 82.6 | 92.1 | | |
| 24 | 82.6 | 82.6 | 82.6 | 92.1 | 101.6 | | |

**Notes:**

(1) Except flanges with Small Male/Female Face (on pipe end), threaded flanges, have an American National Standard taper pipe thread conforming to ANSI B2.1.

(2) The thread is concentric with the axis of the flange and variations in alignment do not exceed 0.06(1.6mm) in. per foot (0.5 percent)

(3) Class 150 flanges are made without counterbore. The threads are chamfered approximately to the major diameter of the thread at the back of the flange at an angle of approximately 45 degrees with the axis of thread. The chamfer is concentric with the thread and included in the measurement of the thread length.

(4) Class 300 and higher pressure flanges are made with a counterbore at the back of the flange. The threads are chamfered to the diameter of the counterbore at an angle of approximately 45 degrees with the axis of the thread. The counterbore and chamfer are concentric with the thread.

(5) The minimum length of effective thread in reducing flanges is at least equal to dimension Q of the corresponding class of threaded flange as shown in the above tables. Threads do not necessarily extend to the face to the flange.





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# PIPE DIMENSIONS

## WELDED AND SEAMLESS PIPE CARBON AND ALLOY STEELS

## ANSI B36.10

Unit : mm

| Nominal Pipe | | Outside Diam | I.D Wall | Nominal Inside diameter and Wall thickness | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inch (B) | mm (DN) | | | Sch. 5 | Sch. 10 | Sch. 20 | Sch. 30 | STD | Sch. 40 | Sch. 60 | Sch. XS | Sch. 80 | Sch. 100 | Sch. 120 | Sch. 140 | Sch. 160 | Sch. XXS |
| 1/8 | 6 | 10.3 | I.D | | 7.8 | | 7.4 | 6.8 | 6.8 | | 5.5 | 5.5 | | | | | |
| | | | Wall | | 1.2 | | 1.5 | 1.7 | 1.7 | | 2.4 | 2.4 | | | | | |
| 1/4 | 8 | 13.7 | I.D | | 10.4 | | 10.0 | 9.2 | 9.2 | | 7.7 | 7.7 | | | | | |
| | | | Wall | | 1.7 | | 1.9 | 2.2 | 2.2 | | 3.0 | 3.0 | | | | | |
| 3/8 | 10 | 17.1 | I.D | | 13.8 | | 13.4 | 12.5 | 12.5 | | 10.7 | 10.7 | | | | | |
| | | | Wall | | 1.7 | | 1.9 | 2.3 | 2.3 | | 3.2 | 3.2 | | | | | |
| 1/2 | 15 | 21.3 | I.D | 18.0 | 17.1 | | 16.5 | 15.8 | 15.8 | | 13.8 | 13.8 | | | | 11.7 | 6.4 |
| | | | Wall | 1.7 | 2.1 | | 2.4 | 2.8 | 2.8 | | 3.7 | 3.7 | | | | 4.8 | 7.5 |
| 3/4 | 20 | 26.7 | I.D | 23.4 | 22.5 | | 21.9 | 21.0 | 21.0 | | 18.9 | 18.9 | | | | 15.6 | 11.1 |
| | | | Wall | 1.7 | 2.1 | | 2.4 | 2.9 | 2.9 | | 3.9 | 3.9 | | | | 5.6 | 7.8 |
| 1 | 25 | 33.4 | I.D | 30.1 | 27.9 | | 27.6 | 26.6 | 26.6 | | 24.3 | 24.3 | | | | 20.7 | 15.2 |
| | | | Wall | 1.7 | 2.8 | | 2.9 | 3.4 | 3.4 | | 4.6 | 4.6 | | | | 6.4 | 9.1 |
| 1 1/4 | 32 | 42.2 | I.D | 38.9 | 36.7 | | 36.3 | 35.1 | 35.1 | | 32.5 | 32.5 | | | | 29.5 | 22.8 |
| | | | Wall | 1.7 | 2.8 | | 3.0 | 3.6 | 3.6 | | 4.9 | 4.9 | | | | 6.4 | 9.7 |
| 1 1/2 | 40 | 48.3 | I.D | 45.0 | 42.8 | | 41.9 | 40.9 | 40.9 | | 38.1 | 38.1 | | | | 34.0 | 28.0 |
| | | | Wall | 1.7 | 2.8 | | 3.2 | 3.7 | 3.7 | | 5.1 | 5.1 | | | | 7.1 | 10.2 |
| 2 | 50 | 60.3 | I.D | 57.0 | 54.8 | | 53.9 | 52.5 | 52.5 | | 49.2 | 49.2 | | | | 42.8 | 38.2 |
| | | | Wall | 1.7 | 2.8 | | 3.2 | 3.9 | 3.9 | | 5.5 | 5.5 | | | | 8.7 | 11.1 |
| 2 1/2 | 65 | 73.0 | I.D | 68.8 | 66.9 | | 63.4 | 62.7 | 62.7 | | 59.0 | 59.0 | | | | 53.9 | 45.0 |
| | | | Wall | 2.1 | 3.1 | | 4.8 | 5.2 | 5.2 | | 7.0 | 7.0 | | | | 9.5 | 14.0 |
| 3 | 80 | 88.9 | I.D | 84.7 | 82.8 | | 79.3 | 77.9 | 77.9 | | 73.7 | 73.7 | | | | 66.6 | 58.4 |
| | | | Wall | 2.1 | 3.1 | | 4.8 | 5.5 | 5.5 | | 7.6 | 7.6 | | | | 11.1 | 15.2 |
| 3 1/2 | 90 | 101.6 | I.D | 97.4 | 95.5 | | 92.0 | 90.1 | 909.1 | | 85.4 | 85.4 | | | | | |
| | | | Wall | 2.1 | 3.1 | | 4.8 | 5.7 | 5.7 | | 8.1 | 8.1 | | | | | |
| 4 | 100 | 114.3 | I.D | 110.1 | 108.2 | | 104.7 | 102.3 | 102.3 | | 97.2 | 97.2 | | 92.0 | | 87.3 | 80.1 |
| | | | Wall | 2.1 | 3.1 | | 4.8 | 6.0 | 6.0 | | 8.6 | 8.6 | | 11.1 | | 13.5 | 17.1 |
| 5 | 125 | 141.3 | I.D | 135.8 | 134.5 | | | 128.2 | 128.2 | | 122.2 | 122.2 | | 115.9 | | 109.5 | 103.2 |
| | | | Wall | 2.8 | 3.4 | | | 6.6 | 6.6 | | 9.5 | 9.5 | | 12.7 | | 15.9 | 19.1 |
| 6 | 150 | 168.3 | I.D | 162.8 | 161.5 | | | 154.1 | 154.1 | | 146.4 | 146.4 | | 139.8 | | 131.8 | 124.4 |
| | | | Wall | 2.8 | 3.4 | | | 7.1 | 7.1 | | 11.0 | 11.0 | | 14.3 | | 18.3 | 22.0 |
| 8 | 200 | 219.1 | I.D | 213.6 | 211.6 | 206.4 | 205.0 | 202.7 | 202.7 | 198.5 | 193.7 | 193.7 | 188.9 | 182.6 | 177.9 | 173.1 | 174.6 |
| | | | Wall | 2.8 | 3.8 | 6.4 | 7.0 | 8.2 | 8.2 | 10.3 | 12.7 | 12.7 | 15.1 | 18.3 | 20.6 | 23.0 | 22.2 |
| 10 | 250 | 273.0 | I.D | 266.2 | 264.6 | 260.3 | 257.4 | 254.5 | 254.5 | 247.6 | 247.6 | 242.8 | 236.5 | 230.1 | 222.2 | 215.8 | 222.2 |
| | | | Wall | 3.4 | 4.2 | 6.4 | 7.8 | 9.3 | 9.3 | 12.7 | 12.7 | 15.1 | 18.3 | 21.4 | 25.4 | 28.6 | 25.4 |
| 12 | 300 | 323.8 | I.D | 315.9 | 314.7 | 311.1 | 307.0 | 304.7 | 303.2 | 295.3 | 298.4 | 288.8 | 280.9 | 273.0 | 266.6 | 257.2 | 273.0 |
| | | | Wall | 4.0 | 4.6 | 6.4 | 8.4 | 9.5 | 10.3 | 14.3 | 12.7 | 17.5 | 21.4 | 25.4 | 28.6 | 33.3 | 25.4 |
| 14 | 350 | 355.6 | I.D | 347.7 | 342.9 | 339.8 | 336.5 | 336.5 | 333.3 | 325.4 | 330.2 | 317.5 | 307.9 | 300.0 | 292.1 | 284.2 | |
| | | | Wall | 4.0 | 3.7 | 7.9 | 9.5 | 9.5 | 11.1 | 15.1 | 12.7 | 19.1 | 23.8 | 27.8 | 31.8 | 35.7 | |
| 16 | 400 | 406.4 | I.D | 398.0 | 393.7 | 390.6 | 387.3 | 387.3 | 381.0 | 373.1 | 381.0 | 363.5 | 354.0 | 344.5 | 333.3 | 325.4 | |
| | | | Wall | 4.2 | 6.4 | 7.9 | 9.5 | 9.5 | 12.7 | 16.7 | 12.7 | 21.4 | 26.2 | 31.0 | 36.5 | 40.5 | |
| 18 | 450 | 457.0 | I.D | 448.6 | 444.3 | 441.2 | 434.7 | 437.9 | 428.5 | 418.9 | 431.6 | 409.3 | 398.3 | 387.1 | 377.7 | 366.5 | |
| | | | Wall | 4.2 | 6.4 | 7.9 | 11.1 | 9.5 | 14.3 | 19.1 | 12.7 | 23.8 | 29.4 | 34.9 | 39.7 | 45.2 | |
| 20 | 500 | 508.0 | I.D | 498.4 | 495.3 | 488.9 | 482.6 | 488.9 | 477.8 | 466.8 | 482.6 | 455.6 | 442.9 | 431.8 | 419.1 | 408.0 | |
| | | | Wall | 4.8 | 6.4 | 9.5 | 12.7 | 9.5 | 15.1 | 20.6 | 12.7 | 26.2 | 32.5 | 38.1 | 44.5 | 50.0 | |
| 22 | 550 | 559.0 | I.D | 549.4 | 546.3 | 539.9 | 533.6 | 539.9 | | 514.5 | 533.6 | 501.8 | 489.1 | 476.4 | 463.7 | 451.0 | |
| | | | Wall | 4.8 | 6.4 | 9.5 | 12.7 | 9.5 | | 22.2 | 12.7 | 28.6 | 34.9 | 41.3 | 47.6 | 54.0 | |
| 24 | 600 | 610.0 | I.D | 598.9 | 597.3 | 590.9 | 581.5 | 590.9 | 575.0 | 560.8 | 584.6 | 548.1 | 532.2 | 518.0 | 505.3 | 490.9 | |
| | | | Wall | 5.5 | 6.4 | 9.5 | 14.3 | 9.5 | 17.5 | 24.6 | 12.7 | 31.0 | 38.9 | 46.0 | 52.4 | 59.5 | |



▶ **Not included B36.10**

The wall thickness shown represent nominal wall dimensions which are subject to a−12 1/2% mill tolerance.
Note that schedule 40 in, size 12″(304.8mm) and larger and that schedule 80 in, size 10″(254mm) and larger do not agree with schedules 40S and 80S of ANSI B36. 19 nor with standard weight and extra strong respectively.

# WELDED AND SEAMLESS PIPE STAINLESS STEELS

## ANSI B36.19

Unit : mm

| Nominal Pipe Size | | Outside Diam | I.D Wall | Nominal Inside diameter and Wall thickness | | | |
|---|---|---|---|---|---|---|---|
| Inch (B) | mm (DN) | | | Sch. 5S | Sch. 10S | Sch. 40S | Sch. 80S |
| 1/8 | 6 | 10.3 | I.D | | 7.8 | 6.8 | 5.5 |
| | | | Wall | | 1.2 | 1.7 | 2.4 |
| 1/4 | 8 | 13.7 | I.D | | 10.4 | 9.2 | 7.7 |
| | | | Wall | | 1.7 | 2.2 | 3.0 |
| 3/8 | 10 | 17.1 | I.D | | 13.8 | 12.5 | 10.7 |
| | | | Wall | | 1.7 | 2.3 | 3.2 |
| 1/2 | 15 | 21.3 | I.D | 18.0 | 17.1 | 15.8 | 13.8 |
| | | | Wall | 1.7 | 2.1 | 2.8 | 3.7 |
| 3/4 | 20 | 26.7 | I.D | 23.4 | 22.5 | 21.0 | 18.9 |
| | | | Wall | 1.7 | 2.1 | 2.9 | 3.9 |
| 1 | 25 | 33.4 | I.D | 30.1 | 27.9 | 26.6 | 24.3 |
| | | | Wall | 1.7 | 2.8 | 3.4 | 4.6 |
| 1 1/4 | 32 | 42.2 | I.D | 38.9 | 36.7 | 35.1 | 32.5 |
| | | | Wall | 1.7 | 2.8 | 3.6 | 4.9 |
| 1 1/2 | 40 | 48.3 | I.D | 45.0 | 42.8 | 40.9 | 38.1 |
| | | | Wall | 1.7 | 2.8 | 3.7 | 5.1 |
| 2 | 50 | 60.3 | I.D | 57.0 | 54.8 | 52.5 | 49.2 |
| | | | Wall | 1.7 | 2.8 | 3.9 | 5.5 |
| 2 1/2 | 65 | 73.0 | I.D | 68.8 | 66.9 | 62.7 | 59.0 |
| | | | Wall | 2.1 | 3.1 | 5.2 | 7.0 |
| 3 | 80 | 88.9 | I.D | 84.7 | 82.8 | 77.9 | 73.7 |
| | | | Wall | 2.1 | 3.1 | 5.5 | 7.6 |
| 3 1/2 | 90 | 101.6 | I.D | 97.4 | 95.5 | 90.1 | 85.4 |
| | | | Wall | 2.1 | 3.1 | 5.7 | 8.1 |
| 4 | 100 | 114.3 | I.D | 110.1 | 108.2 | 102.3 | 97.2 |
| | | | Wall | 2.1 | 3.1 | 6.0 | 8.6 |
| 5 | 125 | 141.3 | I.D | 135.8 | 134.5 | 128.2 | 122.2 |
| | | | Wall | 2.8 | 3.4 | 6.6 | 9.5 |
| 6 | 150 | 168.3 | I.D | 162.8 | 161.5 | 154.1 | 146.4 |
| | | | Wall | 2.8 | 3.4 | 7.1 | 11.0 |
| 8 | 200 | 219.1 | I.D | 213.6 | 211.6 | 202.7 | 193.7 |
| | | | Wall | 2.8 | 3.8 | 8.2 | 12.7 |
| 10 | 250 | 273.0 | I.D | 266.2 | 264.7 | 254.6 | 247.7 |
| | | | Wall | 3.4 | 4.2 | 9.3 | 12.7 |
| 12 | 300 | 323.8 | I.D | 315.9 | 317.8 | 304.8 | 298.5 |
| | | | Wall | 4.0 | 4.6 | 9.5 | 12.7 |
| 14 | 350 | 355.6 | I.D | 347.7 | 346.0 | | |
| | | | Wall | 4.0 | 4.8 | | |
| 16 | 400 | 406.4 | I.D | 398.0 | 396.8 | | |
| | | | Wall | 4.2 | 4.8 | | |
| 18 | 450 | 457.0 | I.D | 448.6 | 447.4 | | |
| | | | Wall | 4.2 | 4.8 | | |
| 20 | 500 | 508.0 | I.D | 498.4 | 496.9 | | |
| | | | Wall | 4.8 | 5.5 | | |
| 22 | 550 | 559.0 | I.D | 549.4 | 547.9 | | |
| | | | Wall | 4.8 | 5.5 | | |
| 24 | 600 | 610.0 | I.D | 598.9 | 597.3 | | |
| | | | Wall | 5.5 | 6.35 | | |

The wall thickness shown represent nominal or average wall dimensions which are subject to a-12 1/2% mill tolerance. Sizes 14″(355.6mm) through 30″(762.0mm) are not at publication date covered in B36.19, and dimensions listed are those commonly used in the industry.

*Schedules 5S and 10S wall thicknesses do not permit threading in accordance with ANSI B2.1.

*Note that schedule 40S and schedule 80S in these size do not agree with schedule 40 and schedule 80 of ANSI B36.10. and that they are identical to standard weight and extra strong respectively of ANSI B36.10.





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# MATERIAL GRADE

| GRADE | COMPOSITION | | | | | | | | | | UNS NO. | DIN | TensileStrength | Yield Strength | Brinell |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Mn | P | S | Si | Ni | Cr | Mo | N | V | | | Min, ksi(MPa) | Min, ksi(MPa) | Hardness |
| **LOW ALLOY STEELS** | | | | | | | | | | | | | | | |
| F1 | 0.28 | 0.06–0.90 | 0.045 | 0.045 | 0.15–0.35 | | | 0.44–0.65 | | | K12822 | 15Mo3 | 70(485) | 40(275) | 143–192 |
| F5 | 0.15 | 0.30–0.60 | 0.03 | 0.03 | 0.5 | 0.5 | 4.0–6.0 | 0.44–0.65 | | | K41545 | 12CrMo19–5 | 70(485) | 40(275) | 143–217 |
| F9 | 0.15 | 0.30–0.60 | 0.03 | 0.03 | 0.50–1.10 | | 8.0–10.0 | 0.90–1.10 | | | K90941 | 12–CrMo9–1 | 85(585) | 55(380) | 179–217 |
| F91 | 0.08–0.12 | 0.30–0.60 | 0.02 | 0.01 | 0.20–0.50 | 0.4 | 8.0–9.5 | 0.85–1.05 | | | K90901 | X10CrMoN69–1 | 85(585) | 60(415) | 248max |
| F92 | 0.07–0.13 | 0.30–0.60 | 0.02 | 0.01 | 0.5 | 0.4 | 8.50–9.50 | 0.30–0.60 | | | | | 90(620) | 64(440) | 269max |
| F11 | 0.05–0.15 | 0.30–0.60 | 0.03 | 0.03 | 0.50–1.00 | | 1.00–1.50 | 0.44–0.65 | | | K11597 | 13CrMo44 | 60(615) | 30(205) | 121–174 |
| F12 | 0.05–0.15 | 0.30–0.60 | 0.045 | 0.045 | 0.50 | | 0.80–1.25 | 0.44–0.65 | | | K11562 | 16CrMo44 | 60(415) | 32(220) | 121–174 |
| F22 | 0.05–0.15 | 0.30–0.60 | 0.04 | 0.04 | 0.5 | | 2.00–2.50 | 0.87–1.13 | | | K21590 | 10CrMo9–10 | 60(415) | 30(205) | 170max |
| F23 | 0.04–0.10 | 0.10–0.60 | 0.03 | 0.01 | 0.5 | | 1.92–2.60 | 0.05–0.30 | | | K41650 | | 74(510) | 58(400) | 220max |
| SCM440 | 0.38–0.43 | 0.60–0.90 | 0.03 | 0.03 | 0.15–0.35 | 0.25 | 0.90–1.20 | 0.15–0.30 | | | | 42CrMo4 | | | |
| SNCM439 | 0.36–0.43 | 0.60–0.90 | 0.03 | 0.03 | 0.15–0.35 | 1.60–2.00 | 0.60–1.00 | 0.15–0.30 | | | | 36CrNiMo4 | | | |
| **STAINLESS STEELS (MARTENSITEC)** | | | | | | | | | | | | | | | |
| F6 | 0.15 | 1 | 0.04 | 0.03 | 1 | 0.5 | 11.5–13.5 | | | | S41000 | X12Cr13 | 70(485) | 40(275) | 143–207 |
| **STAINLESS STEELS (FERRITIC)** | | | | | | | | | | | | | | | |
| F429 | 0.12 | 1 | 0.04 | 0.03 | 0.75 | 0.5 | 14.0–16.0 | | | | S42900 | | 60(415) | 35(240) | 190max |
| F430 | 0.12 | 1 | 0.04 | 0.03 | 0.75 | 0.5 | 16.0–18.0 | | | | S43000 | | 60(415) | 35(240) | 190max |
| **STAINLESS STEELS(AUSTENITIC)** | | | | | | | | | | | | | | | |
| F304L | 0.03 | 2 | 0.045 | 0.03 | 1 | 8.0–13.0 | 18.0–20.0 | | | | S30403 | X2CrNi19–11 | 70(485) | 25(170) | |
| F310 | 0.25 | 2 | 0.045 | 0.03 | 1 | 19.0–22.0 | 24.0–26.0 | | | | S31000 | X12CrNi25–20 | 75(515) | 30(205) | |
| F316L | 0.03 | 2 | 0.045 | 0.03 | 1 | 10.0–15.0 | 16.0–18.0 | 2.0–3.0 | | | S31603 | X2CrNiMo18–14–3 | 70(485) | 25(170) | |
| F317L | 0.03 | 2 | 0.045 | 0.03 | 1 | 11.0–15.0 | 18.0–20.0 | 3.0–4.0 | | | S31703 | | 70(485) | 25(170) | |
| F321 | 0.08 | 2 | 0.045 | 0.03 | 1 | 9.0–12.0 | 17.0–19.0 | | | | S32100 | X6CrNiTi18–10 | 75(515) | 30(205) | |
| F347 | 0.08 | 2 | 0.045 | 0.03 | 1 | 9.0–13.0 | 17.0–20.0 | | | | S34700 | X6CrNiNb18–10 | 75(515) | 30(205) | |
| F44 | 0.02 | 1 | 0.03 | 0.01 | 0.8 | 17.5–18.5 | 19.5–20.5 | 6.0–6.5 | | | S31254 | | 94(650) | 44(300) | |
| **STAINLESS STEELS (DUPLEX)** | | | | | | | | | | | | | | | |
| F51 | 0.03 | 2 | 0.03 | 0.02 | 1 | 4.5–6.5 | 21.0–23.0 | 2.5–3.5 | | | S31803 | X2CrNiMoN22–5–3 | 90(620) | 65(450) | |
| F53 | 0.03 | 1.2 | 0.035 | 0.02 | 0.8 | 6.8–8.0 | 24.0–26.0 | 3.0–5.0 | | | S32750 | X2CrNiMoCuWN25–7–4 | 116(800) | 80(550) | 310max |
| F904L | 0.02 | 2 | 0.04 | 0.03 | 1 | 23.0–28.0 | 19.0–23.0 | 4.0–5.0 | | | NO8904 | | 71(490) | 31(215) | |
| SUSF329J3L | 0.03 | 2.0 | 0.04 | 0.030 | 1.00 | 4.50–6.50 | 21.0–24.0 | 2.50–3.50 | 0.08–0.20 | | | | | | |
| F60 | | | | | | | | | | | S32205 | | | | |
| **CARBON STEELS** | | | | | | | | | | | | | | | |
| A105 | 0.35 | 0.60–1.05 | 0.035 | 0.04 | 0.10–0.35 | 0.4 | 0.3 | 0.12 | | | | CK25 | 70(485) | 36(250) | 187 |
| A350LF2 | 0.3 | 0.60–1.35 | 0.035 | 0.04 | 0.15–0.30 | 0.4 | 0.3 | 0.12 | | | | | 70–95 (485–655) | 36(250) | 197 |
| A350LF3 | 0.2 | 0.9 | 0.035 | 0.04 | 0.20–0.35 | 3.3–3.7 | 0.3 | 0.12 | | | | | 70–95 (485–655) | 37.5(260) | |
| A694/F65 | 0.26 | 1.4 | 0.025 | 0.025 | 0.15–0.35 | | | | | | | | 77(530) | 65(450) | |
| S45C | 0.42–0.48 | 0.60–0.90 | 0.30 | 0.35 | 0.15–0.35 | | | | | | | CK45 | | | |
| **ALLOY STEELS** | | | | | | | | | | | | | | | |
| ALLOY20 | 0.07 | 2 | 0.45 | 0.35 | 1 | 32–38 | 19–21 | 2.0–3.0 | | | NO8020 | | | | |
| ALLOY625 | 0.1 | 0.5 | 0.015 | 0.015 | 0.5 | 58 | 20–23 | 8.0–10.0 | | | NO6625 | | | | |
| ALLOY800 | 0.1 | 1.5 | | 0.015 | 1 | 30–35 | 19–23 | | | | NO8800 | | | | |
| A800H/HT | 0.05–0.10 | 1.5 | | 0.015 | 1 | 30–35 | 19–23 | | | | NO8810/11 | | | | |
| ALLOY825 | 0.05 | 1 | | 0.03 | 0.5 | 38–46 | 19.5–23.5 | 2.50–3.50 | | | NO8825 | | | | |

# MATERIAL SPECIFICATIONS

## APPLICABLE ASTM SPECIFICATIONS

| GROUP 1 MATERLALS | | | | PRODUCT FORMS | | | |
|---|---|---|---|---|---|---|---|
| Material Group No. | Normal Designation Steel | Forgings Spec. –Gr. | Notes | Castings Spec. –Gr. | Notes | Forgings Spec. –Gr. | Notes |
| 1.1 | Carbon | A105<br>A350–LF2 | (1)(3) | A216–WCB | (1) | A515–70<br>A516–70 | (1)<br>(1) |
| | C–Mn–Si | | | | | A537–C1.1 | |
| 1.2 | Carbon | | | A216–WCC<br>A352–LCC | (1) | | |
| | 2–1 2 Ni | | | A352–LC2 | | A203–B | |
| | 3–1 2 Ni | A350–LF3 | | A352–LC3 | | A302–E | |
| 1.3 | Carbon | | | A352–LCB | (1) | A203–A<br>A203–D<br>A515–65<br>A516–65 | |
| 1.4 | Carbon | A350–LF1 | | | | A515–60<br>A516–60 | (1) |
| 1.5 | C–1 2 Mo | A182–F1 | (2) | A217–WC1<br>A352–LC1 | (2)(4) | A204–A<br>A204–B | (2)<br>(2) |
| 1.7 | C–1 2 Mo | | | | | A204–C | (2) |
| | 1 2 Cr–1 2 Mo | A182–F2 | | | | | |
| | Ni–Cr–1 2 Mo | | | A217–WC4 | (4) | | |
| | Ni–Cr–1 Mo | | | A217–WC5 | (4) | | |
| 1.9 | 1 Cr–1 2 Mo | A182–F12 | (4) | | | | |
| | 1–1 4 Cr–1 2 Mo | A182–F11 | (4) | A217–WC6 | (4) | A387–11 C1.2 | |
| 1.10 | 2–1 4 Cr–1 Mo | A182–F22 | | A217–WC9 | (4) | A387–22 C1.2 | |
| 1.13 | 5 Cr–1 2 Mo | A181–F5<br>A182–F5a | | A217–C5 | (4) | | |
| 1.14 | 9 Cr–1 Mo | A182–F9 | | A217–C12 | (4) | | |

| GROUP 2 MATERIALS | | | | PRODUCT FORMS | | | |
|---|---|---|---|---|---|---|---|
| 2.1 | 18 Cr–8 Ni<br>18 Cr–8 Ni | A182–F304<br>A182–F304H | (5) | A351–CF3<br>A351–CF8 | (5) | A240–304<br>A240–304H | (5)(6) |
| 2.2 | 16 Cr–12 Ni–2 Mo | A182–F316<br>A182–F316H | (5) | | | A240–316<br>A240–316H | (5)(6) |
| | 18 Cr–13 Ni–3 Mo | | | | | A240–317 | (5)(6) |
| | 18 Cr–9 Ni–2 Mo | | | A351–CF3M<br>A351–CF8M | (5) | | |
| 2.3 | 18 Cr–8 Ni<br>16 Cr–12 Ni–2 Mo | A182–F304L<br>A182–F316L | | | | A240–304L<br>A240–316L | |
| 2.4 | 18 Cr–10–Ni–Ti | A182–F321<br>A182–F321H | (5) | | | A240–321<br>A240–321H | (5)(6) |
| 2.5 | 18 Cr–10 Ni–Cb | A182–F347<br>A182–F347H<br>A182–F348<br>A182–F348H | (5) | A351–CF8C | (5) | A240–347<br>A240–347H<br>A240–348<br>A240–348H | (5)(6)<br><br>(5)(6) |
| 2.6 | 25 Cr–12 Ni | | | A351–CH8<br>A351–CH20 | (5)<br>(5) | | |
| | 23 Cr–12 Ni | | | | | A240–309S | (5)(6) |
| 2.7 | 25 Cr–20 Ni | A182–F310 | (5)(7) | A351–CK20 | (5) | A240–310S | (5)(6)(7) |

**General Notes:**

(a) For temperature limitations see footnotes in ANSI B16.5 TABLES. (PRESSURE–TEMPERATURE RATINGS)
(b) Plate meterials are listed only for use as blind flanges (see 5.1). Additional plate materials listed in ANSI B16.34 may also be used, with corresponding B16.34 Standard Class ratings.
(c) Material Groups not listed in Table 1A are intended for use in valves. See ANSI B16.34.

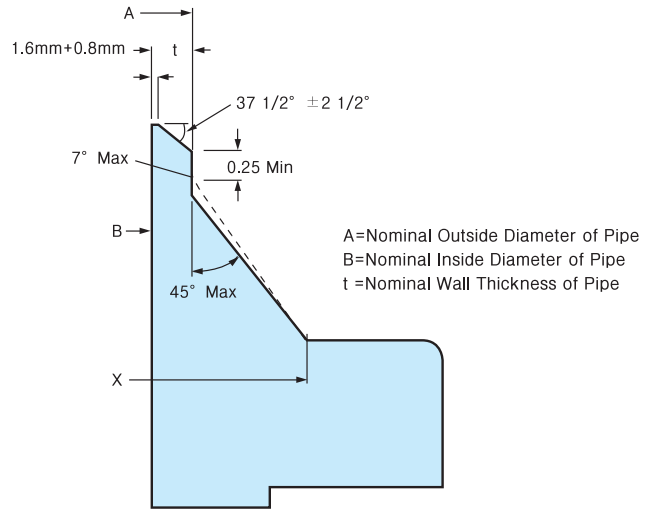
**Notes:**

(1) Upon prolonged exposure to temperatures above about 800°F(425°C), the carbide phase of carbon steel may be converted to garphite.
(2) Upon prolonged exposure to temperatures above about 875°F(470°C), the carbide phase of carbon–molybdenum steel may be converted to garphite.
(3) Only killed steel shall be used above 850°F (455°C).
(4) Use normalized and tempered material only.
(5) At temperatures over 1000°F (540°C), use only when the carbon content is 0.04 percent or higher.
(6) For temperatures above 1000°F (540°C), use only if the material is heat treated by heating it to a temperature of at least 1900°F (1040℃) and quenching in water or rapidly coolingby other means.

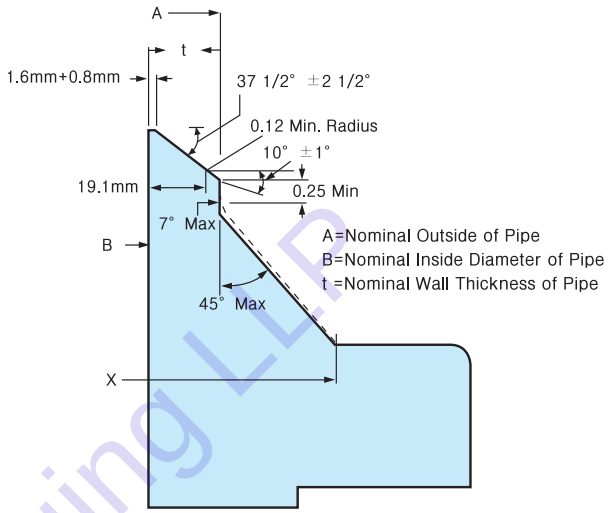
# WELDING ENDS

## ANSI B16.5 FORGED FLANGES

BEVEL FOR WALL THICKNESSES (t)
0.19 IN TO 0.88 IN. INCLUSIVE




BEVEL FOR WALL THICKNESS (t)
GREATER THAN 0.88 IN.

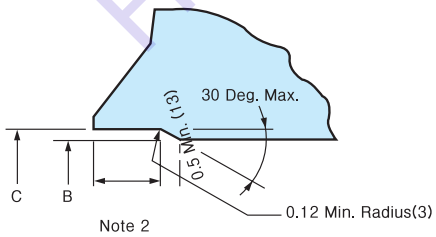



**Notes:**

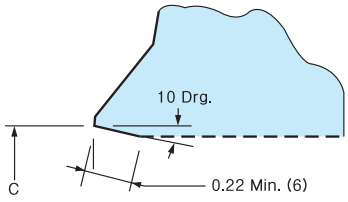
When the thickness of the hub at the bevel is greater than that of the pipe to which the flange is joined and the additional thickness is provided on the outside diameter, a taper weld having a slop not exceeding 1 to 3 may be employed or, alternatively, the greater outside diameter may be tapered, at the same maximum slope or less, from a point on the welding bevel equal to the OD at the mating pipe. Similarly, when the greater thickness is provided on the inside of the flange, it shall be taper-bored from the welding end at a slope not exceeding 1 to 3.

When flanges covered by this standard are intended for services with light wall, higher strength pipe, the thickness of the hub at the bevel may be greater than that of the pipe to which the flange is joined. Under these conditions a single taper hub may be provided and the outside diameter of the hub at the base (Dimension X) may also be modified.

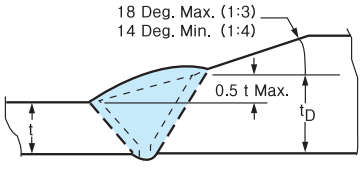
The additional thickness may be provided on either inside or outside or partially on each side, but the total additional thickness shall not exceed one-half times the nominal wall thickness of intened mating pipe.



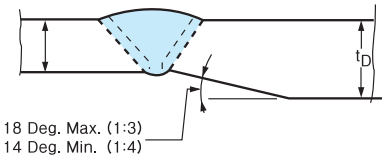

INSIDE CONTOUR FOR USE WITH
RECTANGULAR BACKING RING



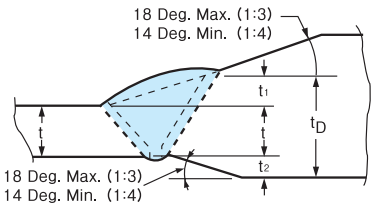

INSIDE CONTOUR FOR USE WITH TAPER
BACKING RING




BEVEL FOR OUTSIDE THICKNESS




BEVEL FOR INSIDE THICKNESS




BEVEL FOR COMBINED THICKNESS

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