

# Flanges

High Technology Valve & Flange & Fitting Series



 **SUPERLOK<sup>®</sup>**

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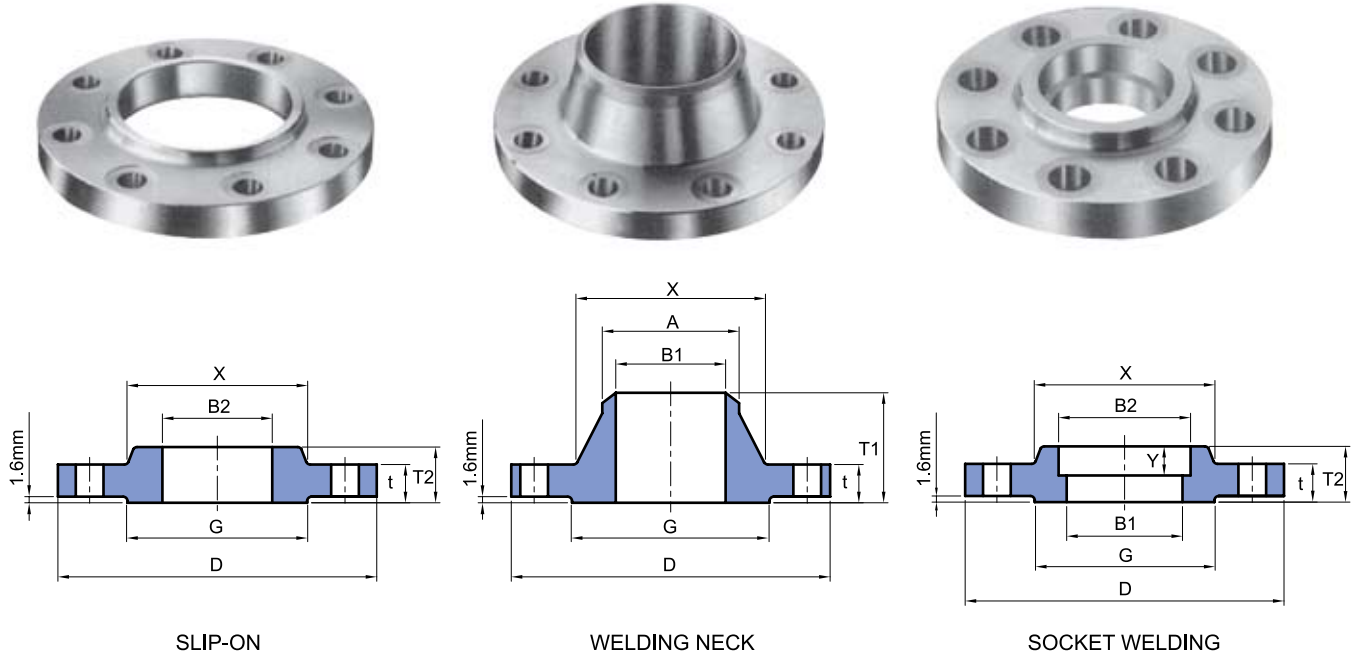
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# ANSI FLANGES

- Class 150 Flanges
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- Class 400 Flanges
- Class 600 Flanges
- Class 900 Flanges
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## CLASS 150 FLANGES



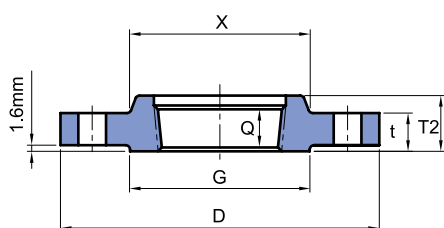
## ANSI B 16.5 Forged Flanges

Unit : mm

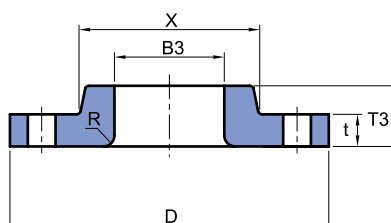
| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE                        |                        |           | LENGTH THRU HUB |                                 |           | Diam. of Hub at Bevel | Radius of Fillet | Thread Length | Depth of Socket |
|-------------------|---------------|----------------------|--------------------|-----------|-----------------------------|------------------------|-----------|-----------------|---------------------------------|-----------|-----------------------|------------------|---------------|-----------------|
|                   |               |                      |                    |           | 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 :

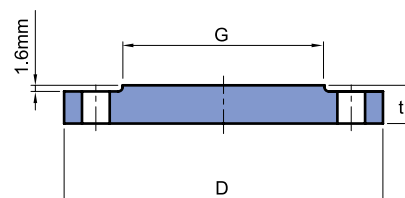
- For the 'Bore' (B1) other Standard Wall Thickness, refer to page 46,47
- Class 150 flanges except Lap Joint will be furnished with 0.06" (1.6mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
- For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.



THREADED



LAP JOINT



BLIND

Unit : mm

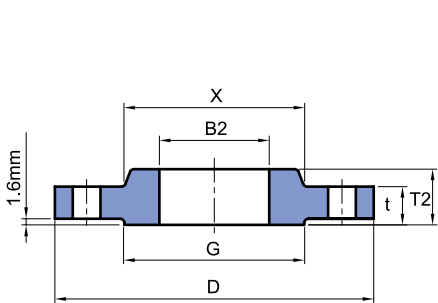
| Nominal Pipe Size | DRILLING          |                 |                | BOLTING               |                     |                  |            | APPROXIMATE WEIGHT |        |                      |        |           |        |        |        |                |        |
|-------------------|-------------------|-----------------|----------------|-----------------------|---------------------|------------------|------------|--------------------|--------|----------------------|--------|-----------|--------|--------|--------|----------------|--------|
|                   | 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      | 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.

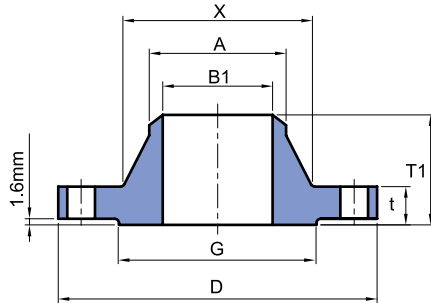
5. The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).

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.

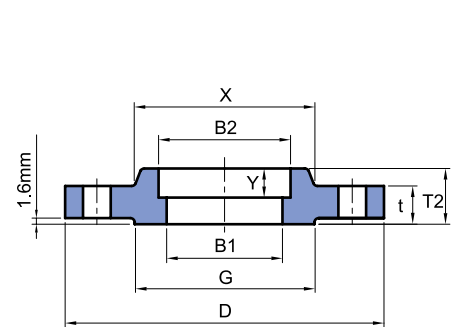
## CLASS 300 FLANGES



SLIP-ON



WELDING NECK



SOCKET WELDING

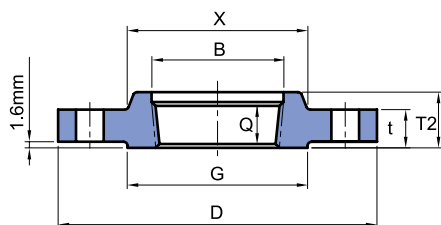
## ANSI B 16.5 Forged Flanges

Unit : mm

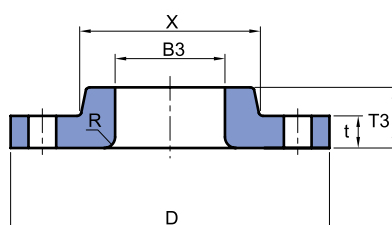
| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE                        |                        |           |                   | LENGTH THRU HUB |                                 |           | Diam. of Hub at Bevel | Radius of Fillet | Thread Length | 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 :

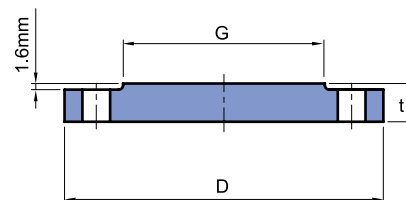
- For the 'Bore' (B1) other Standard Wall Thickness, refer to page 46,47
- Class 300 flanges except Lap Joint will be furnished with 0.06" (1.6mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
- For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.



THREADED



LAP JOINT



BLIND

Unit : mm

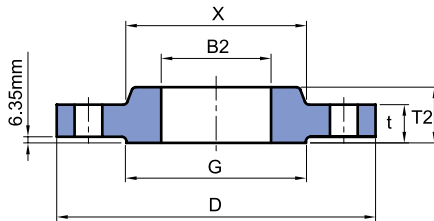
| Nominal<br>Pipe<br>Size | DRILLING                |                       |                      | BOLTING                        |                           |                     |               | APPROXIMATE WEIGHT |        |                            |        |              |        |        |        |                   |       |
|-------------------------|-------------------------|-----------------------|----------------------|--------------------------------|---------------------------|---------------------|---------------|--------------------|--------|----------------------------|--------|--------------|--------|--------|--------|-------------------|-------|
|                         | Bolt<br>Circle<br>Diam. | Number<br>of<br>Holes | Diam.<br>of<br>Holes | Diam.<br>of<br>Bolts<br>(inch) | Machine<br>Bolt<br>Length | Stud Bolt<br>Length |               | Welding<br>Neck    |        | Slip-on<br>and<br>Threaded |        | Lap<br>Joint |        | Blind  |        | Socket<br>Welding |       |
|                         |                         |                       |                      |                                |                           |                     |               |                    |        |                            |        |              |        |        |        |                   |       |
|                         |                         |                       |                      |                                | Raised<br>Face            | Raised<br>Face      | Ring<br>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.

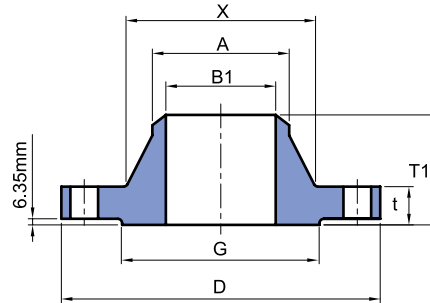
5. The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).

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

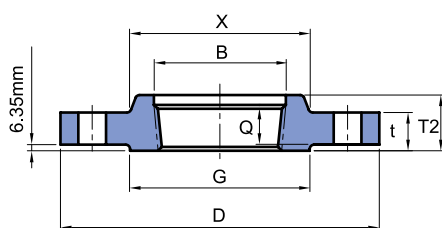
## ANSI B 16.5 Forged Flanges

Unit : mm

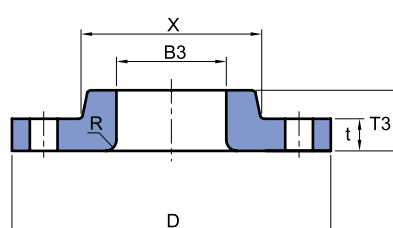
| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE                                          |         |           |                   | LENGTH THRU HUB |                  |           | Diam. of Hub at Bevel | Radius of Fillet | Thread Length |
|-------------------|---------------|----------------------|--------------------|-----------|-----------------------------------------------|---------|-----------|-------------------|-----------------|------------------|-----------|-----------------------|------------------|---------------|
|                   |               |                      |                    |           | 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)<br>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 :**

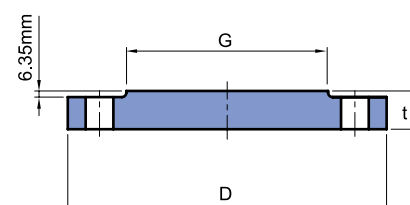
- For the 'Bore' (B1) other Standard Wall Thickness, refer to page 46,47
- Class 400 flanges except Lap Joint will be furnished with 0.25" (6.35mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
- For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.



THREADED



LAP JOINT



BLIND

Unit : mm

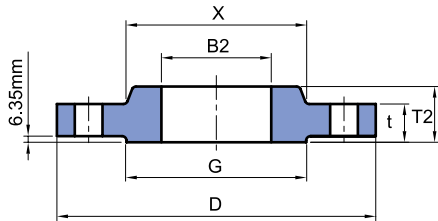
| Nominal<br>Pipe<br>Size | DRILLING                |                       |                      | BOLTING                        |                         |                                      |               | APPROXIMATE WEIGHT |        |                            |        |              |        |        |        |
|-------------------------|-------------------------|-----------------------|----------------------|--------------------------------|-------------------------|--------------------------------------|---------------|--------------------|--------|----------------------------|--------|--------------|--------|--------|--------|
|                         | Bolt<br>Circle<br>Diam. | Number<br>of<br>Holes | Diam.<br>of<br>Holes | Diam.<br>of<br>Bolts<br>(inch) | Stud Bolt Length        |                                      |               | Welding<br>Neck    |        | Slip-on<br>and<br>Threaded |        | Lap<br>Joint |        | Blind  |        |
|                         |                         |                       |                      |                                | 0.25"<br>Raised<br>Face | Male-<br>Female<br>Tongue-<br>Groove | Ring<br>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.

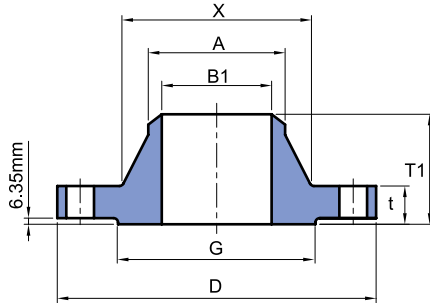
5. The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).

6. Dimensions of size 1/2" through 3 1/2" are the same as for Class 600 Flanges.

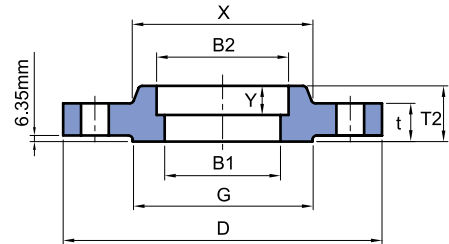
## CLASS 600 FLANGES



SLIP-ON



WELDING NECK



SOCKET WELDING

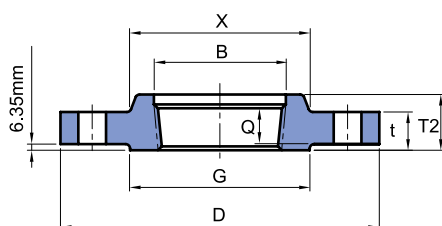
## ANSI B 16.5 Forged Flanges

Unit : mm

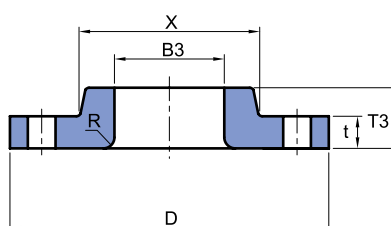
| Nominal<br>Pipe<br>Size | Outside<br>Diam. | Diam.<br>at Base<br>of Hub | O.D of<br>Raised<br>Face | Thickness | BORE                                          |                              |              |                         | LENGTH THRU HUB |                                          |              | Diam. of<br>Hub at<br>Bevel | Radius<br>of<br>Fillet | Thread<br>Length | Depth<br>of<br>Socket |
|-------------------------|------------------|----------------------------|--------------------------|-----------|-----------------------------------------------|------------------------------|--------------|-------------------------|-----------------|------------------------------------------|--------------|-----------------------------|------------------------|------------------|-----------------------|
|                         |                  |                            |                          |           | Welding<br>Neck<br>Socket<br>Welding          | Slip-on<br>Socket<br>Welding | Lap<br>Joint | Counter<br>Bore<br>Min. | Welding<br>Neck | Slip-on<br>Threaded<br>Socket<br>Welding | Lap<br>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)<br>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 :

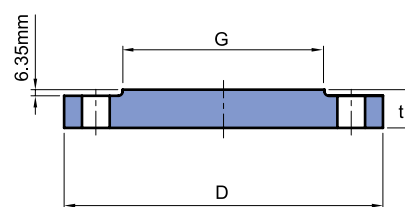
- For the 'Bore' (B1) other Standard Wall Thickness, refer to page 46,47
- Class 600 flanges except Lap Joint will be furnished with 0.25" (6.35mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
- For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the 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<br>Pipe<br>Size | DRILLING                |                       |                      | BOLTING                        |                         |                                        |               | APPROXIMATE WEIGHT |        |                            |        |              |        |        |         |                   |       |
|-------------------------|-------------------------|-----------------------|----------------------|--------------------------------|-------------------------|----------------------------------------|---------------|--------------------|--------|----------------------------|--------|--------------|--------|--------|---------|-------------------|-------|
|                         | Bolt<br>Circle<br>Diam. | Number<br>of<br>Holes | Diam.<br>of<br>Holes | Diam.<br>of<br>Bolts<br>(inch) | STUD BOLT LENGTH        |                                        |               | Welding<br>Neck    |        | Slip-on<br>and<br>Threaded |        | Lap<br>Joint |        | Blind  |         | Socket<br>Welding |       |
|                         |                         |                       |                      |                                | 0.25"<br>Raised<br>Face | Male -<br>Female<br>Tongue -<br>Groove | Ring<br>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 | -                 | -     |

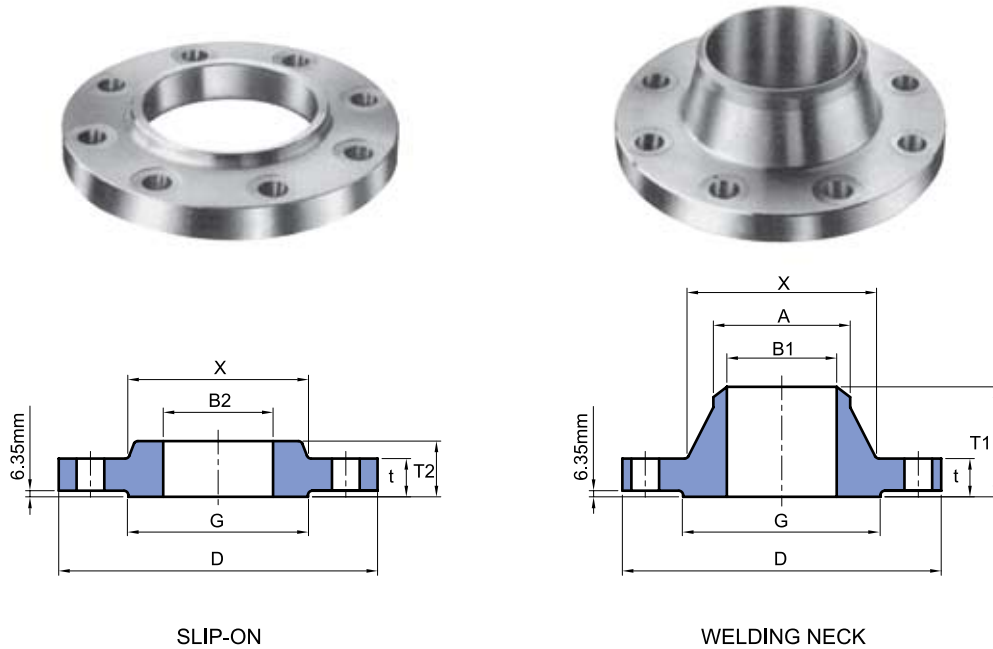
4. Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.

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



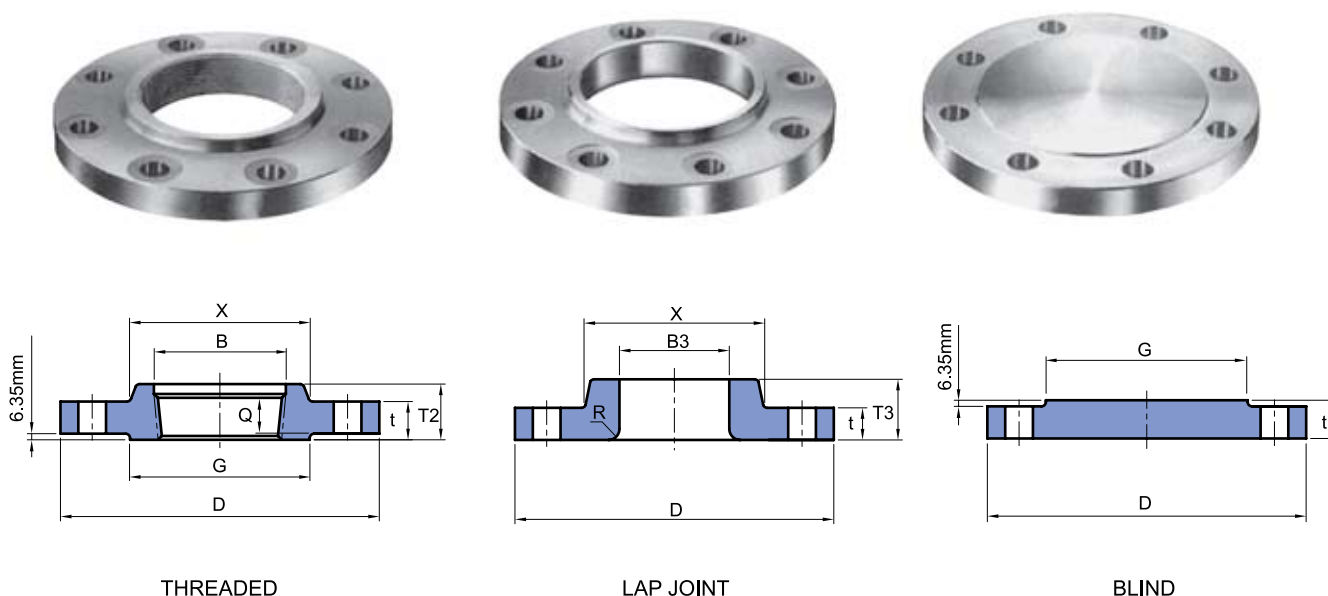
## ANSI B 16.5 Forged Flanges

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)<br>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 :

- For the 'Bore' (B1) other Standard Wall Thickness, refer to page 46,47
- 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).
- 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.



Unit : mm

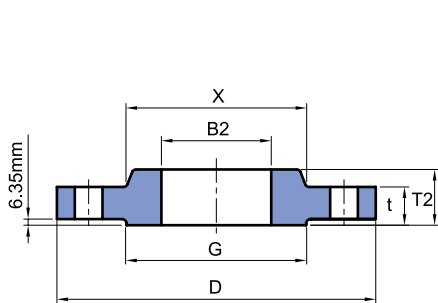
| Nominal<br>Pipe<br>Size | DRILLING                |                       |                      | BOLTING                        |                         |                                        |               | APPROXIMATE WEIGHT |         |                            |         |              |         |        |         |
|-------------------------|-------------------------|-----------------------|----------------------|--------------------------------|-------------------------|----------------------------------------|---------------|--------------------|---------|----------------------------|---------|--------------|---------|--------|---------|
|                         | Bolt<br>Circle<br>Diam. | Number<br>of<br>Holes | Diam.<br>of<br>Holes | Diam.<br>of<br>Bolts<br>(inch) | STUD BOLT LENGTH        |                                        |               | Welding<br>Neck    |         | Slip-on<br>and<br>Threaded |         | Lap<br>Joint |         | Blind  |         |
|                         |                         |                       |                      |                                | 0.25"<br>Raised<br>Face | Male -<br>Female<br>Tongue -<br>Groove | Ring<br>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.

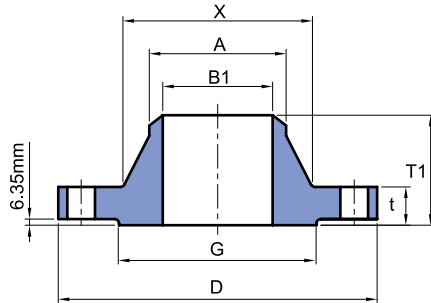
5. The gasket surface and backside (bearing surface for bolting) are made parallel within 1 degree. To accomplish parallelism, spot facing is carried out according to MSS SP-9, without reducing thickness (t).

6. Dimensions of size 1/2" through 2 1/2" are the same as for Class 1500 Flanges.

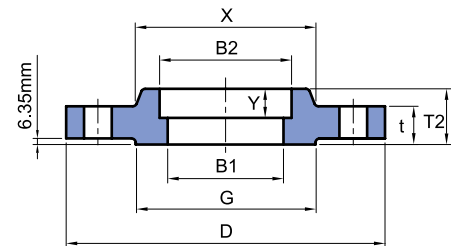
## CLASS 1500 FLANGES



SLIP-ON



WELDING NECK



SOCKET WELDING

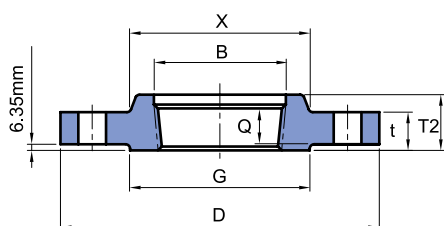
## ANSI B 16.5 Forged Flanges

Unit : mm

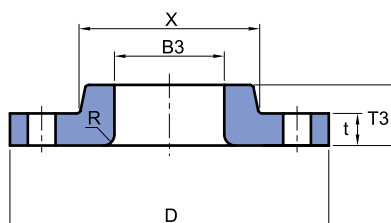
| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE                                          |                        |           |                   | LENGTH THRU HUB |                                 |           | Diam. of Hub at Bevel | Radius of Fillet | 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)<br>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 :

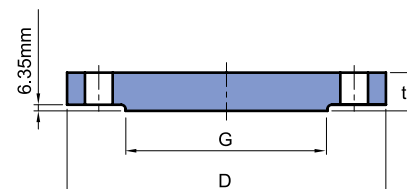
- For the 'Bore' (B1) other Standard Wall Thickness, refer to page 46,47
- Class 1500 flanges except Lap Joint will be furnished with 0.25" (6.35mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
- For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the 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<br>Pipe<br>Size | DRILLING                |                       |                      | BOLTING                        |                         |                                        |               | APPROXIMATE WEIGHT |         |                            |        |              |         |         |         |                   |       |
|-------------------------|-------------------------|-----------------------|----------------------|--------------------------------|-------------------------|----------------------------------------|---------------|--------------------|---------|----------------------------|--------|--------------|---------|---------|---------|-------------------|-------|
|                         | Bolt<br>Circle<br>Diam. | Number<br>of<br>Holes | Diam.<br>of<br>Holes | Diam.<br>of<br>Bolts<br>(inch) | STUD BOLT LENGTH        |                                        |               | Welding<br>Neck    |         | Slip-on<br>and<br>Threaded |        | Lap<br>Joint |         | Blind   |         | Socket<br>Welding |       |
|                         |                         |                       |                      |                                | 0.25"<br>Raised<br>Face | Male -<br>Female<br>Tongue -<br>Groove | Ring<br>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 | -                 | -     |

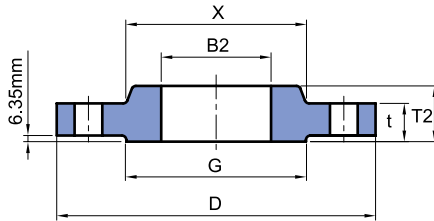
4. Blind Flanges may be made with the same hub as that used for Slip-on Flanges or without hub.

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).

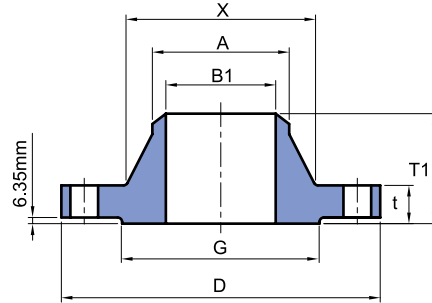
6 Dimensions of sizes 1/2" through 2 1/2" are the same as for Class 900 Flanges.

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

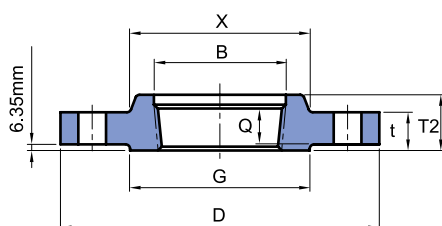
## ANSI B 16.5 Forged Flanges

Unit : mm

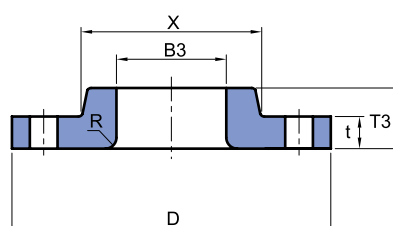
| Nominal Pipe Size | Outside Diam. | Diam. at Base of Hub | O.D of Raised Face | Thickness | BORE                          |         |           |                   | LENGTH THRU HUB |                  |           | Diam. of Hub at Bevel | Radius of Fillet | Thread Length |
|-------------------|---------------|----------------------|--------------------|-----------|-------------------------------|---------|-----------|-------------------|-----------------|------------------|-----------|-----------------------|------------------|---------------|
|                   |               |                      |                    |           | 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 :**

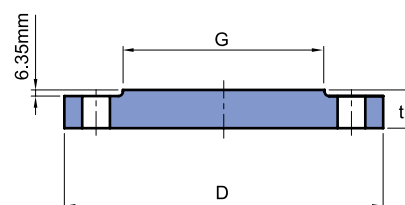
1. For the 'Bore' (B1) other Standard Wall Thickness, refer to page 46,47
2. Class 2500 flanges except Lap Joint will be furnished with 0.25" (6.35mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T1), (T2).
3. For Slip-on, Threaded, Socket Welding and Lap Joint Flanges, the hubs can be shaped either vertical from base to top or tapered within the limits of 7 degrees.



THREADED



LAP JOINT



BLIND

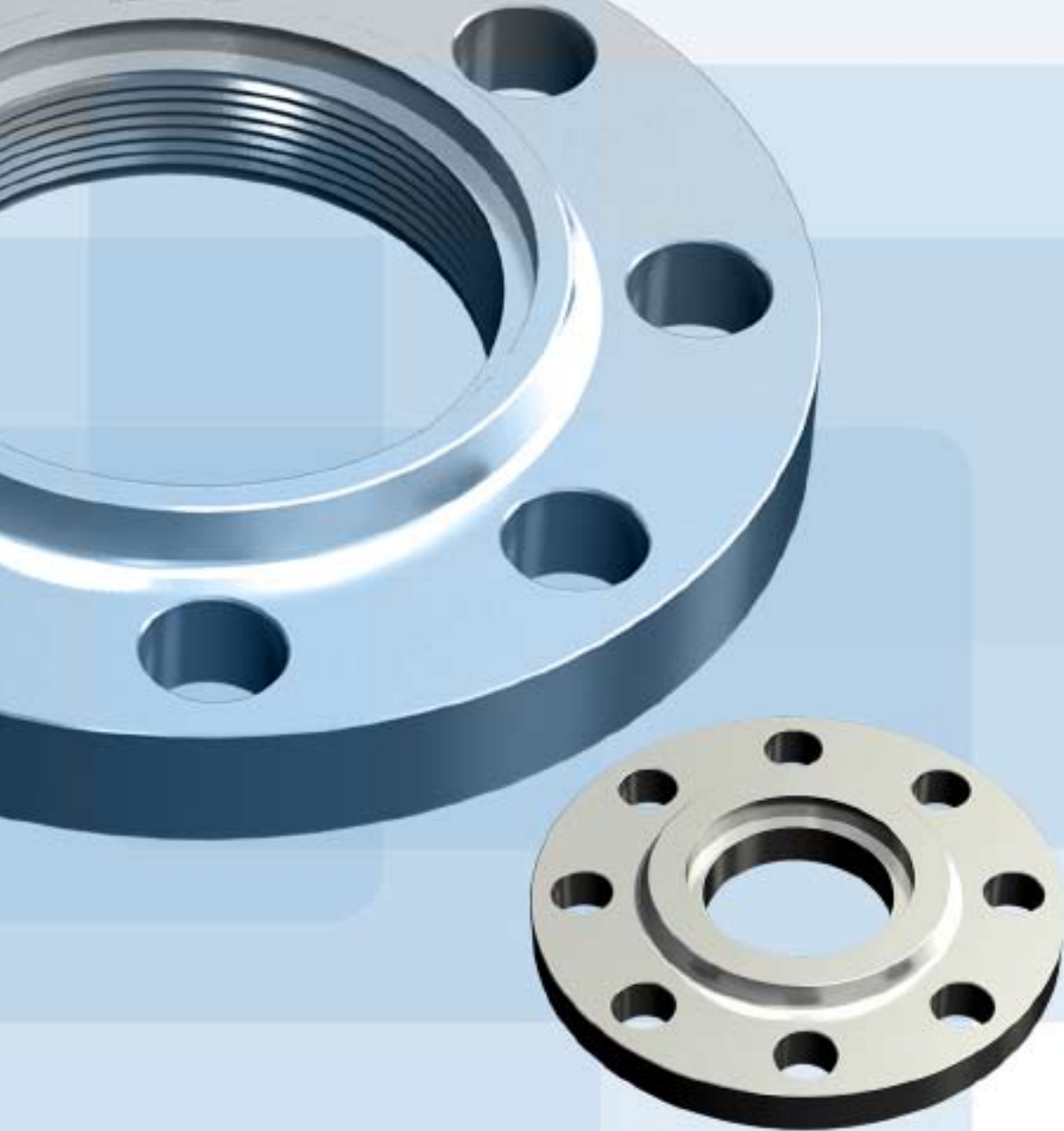
Unit : mm

| Nominal<br>Pipe<br>Size | DRILLING                |                       |                      | BOLTING                        |                         |                                        |               | APPROXIMATE WEIGHT |         |                            |         |              |         |        |         |
|-------------------------|-------------------------|-----------------------|----------------------|--------------------------------|-------------------------|----------------------------------------|---------------|--------------------|---------|----------------------------|---------|--------------|---------|--------|---------|
|                         | Bolt<br>Circle<br>Diam. | Number<br>of<br>Holes | Diam.<br>of<br>Holes | Diam.<br>of<br>Bolts<br>(inch) | STUD BOLT LENGTH        |                                        |               | Welding<br>Neck    |         | Slip-on<br>and<br>Threaded |         | Lap<br>Joint |         | Blind  |         |
|                         |                         |                       |                      |                                | 0.25"<br>Raised<br>Face | Male -<br>Female<br>Tongue -<br>Groove | Ring<br>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.

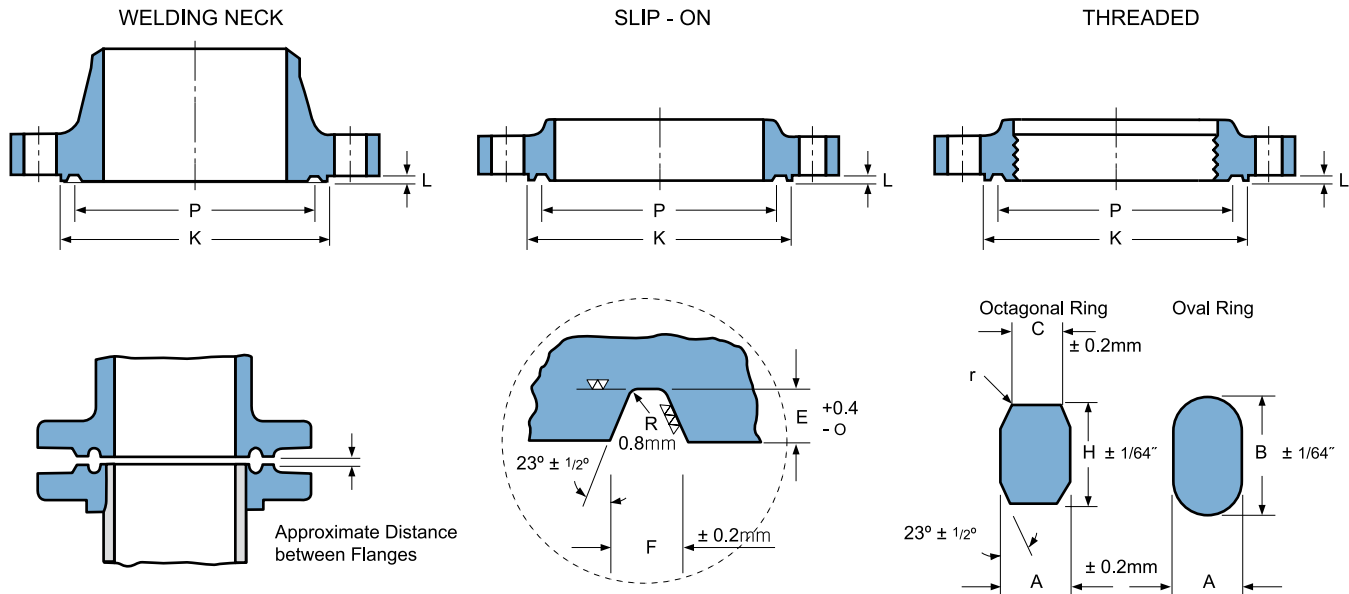


# RING JOINT FLANGES

- Class 150 Flanges
- Class 300 / 400 / 600 Flanges
- Class 900 Flanges
- Class 1500 Flanges
- Class 2500 Flanges

# CLASS 150 FLANGES

## Ring Joint Flanges Facing Dimensions



## ANSI B 16.5 Forged Flanges

Unit : mm

| Nominal Pipe Size | Pitch Diam. of Ring and Groove | Width of Ring | HEIGHT OF RING |           | Width of Flat on Octagonal Rings | Width of Groove | Depth of Groove | Diameter of Raised Face for Ring Joint or Lapped | Ring Number | Approximate Distance Between Flange of Ring Joints When Ring is Compressed |
|-------------------|--------------------------------|---------------|----------------|-----------|----------------------------------|-----------------|-----------------|--------------------------------------------------|-------------|----------------------------------------------------------------------------|
|                   |                                |               | Oval           | Octagonal |                                  |                 |                 |                                                  |             |                                                                            |
| P                 | A                              | B             | H              | C         | F                                | E(L*)           | K(Min)          |                                                  |             |                                                                            |
| 1                 | 47.6                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 63.5                                             | R15         | 4.1                                                                        |
| 1 1/4             | 57.2                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 73.2                                             | R17         | 4.1                                                                        |
| 1 1/2             | 65.1                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 82.6                                             | R19         | 4.1                                                                        |
| 2                 | 82.6                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 101.6                                            | R22         | 4.1                                                                        |
| 2 1/2             | 101.6                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 120.7                                            | R25         | 4.1                                                                        |
| 3                 | 114.3                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 133.4                                            | R29         | 4.1                                                                        |
| 3 1/2             | 131.8                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 153.9                                            | R33         | 4.1                                                                        |
| 4                 | 149.2                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 171.5                                            | R36         | 4.1                                                                        |
| 5                 | 171.5                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 193.5                                            | R40         | 4.1                                                                        |
| 6                 | 193.7                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 218.9                                            | R43         | 4.1                                                                        |
| 8                 | 247.7                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 273.1                                            | R48         | 4.1                                                                        |
| 10                | 304.8                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 330.2                                            | R52         | 4.1                                                                        |
| 12                | 381.0                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 406.4                                            | R56         | 4.1                                                                        |
| 14                | 396.9                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 425.5                                            | R59         | 3.0                                                                        |
| 16                | 454.0                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 482.6                                            | R64         | 3.0                                                                        |
| 18                | 517.5                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 546.1                                            | R68         | 3.0                                                                        |
| 20                | 558.8                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 596.9                                            | R72         | 3.0                                                                        |
| 24                | 673.1                          | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 711.2                                            | R76         | 3.0                                                                        |

### NOTE :

1. Unless other wise specified by the customer, Ring Type Joint Flanges will be furnished in accordance with these details.

2. The depth of groove is added to the minimum flange thickness.

\* Raised face " L " is equal to groove dimension " E " but is not subject to tolerances for " E "

\* A plus tolerance of 3/64 in, for heights B and H is permitted providing the variation in the height of any given ring does not exceed 1/64 in, throughout its entire circumference.

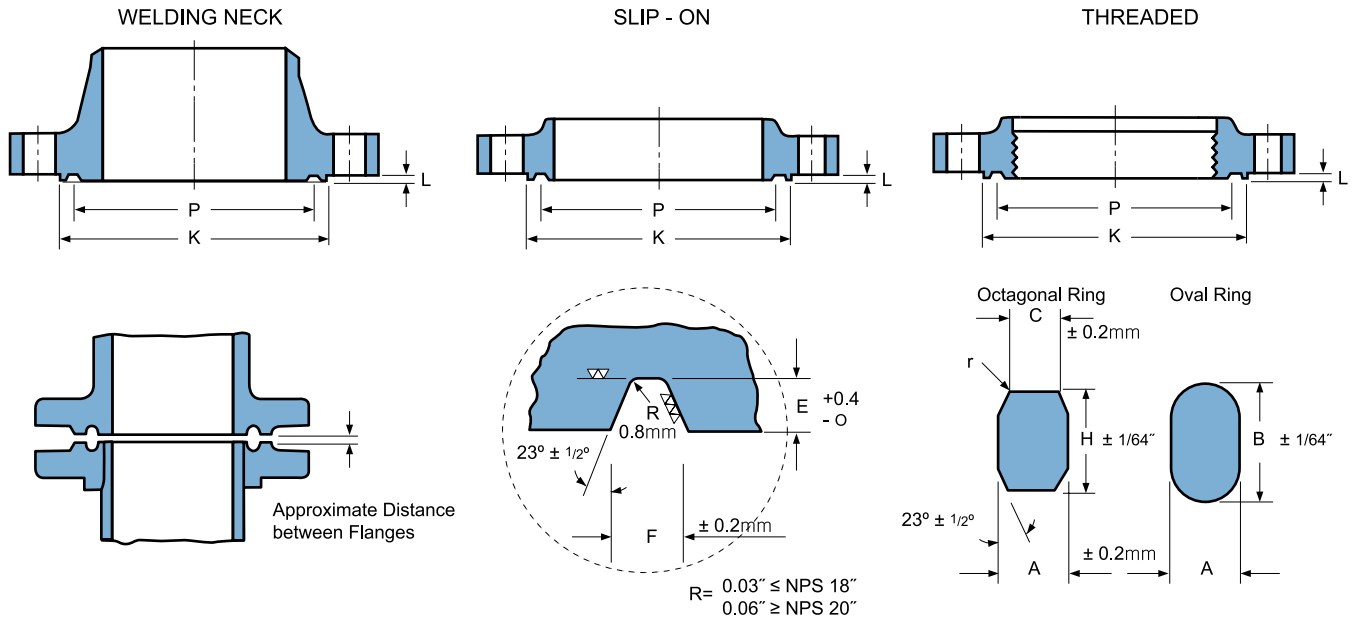
3. Dimension " R " is max.

4. Radius " r " is 1/16" for ring widths 7/8" and less and 3/32" for ring widths 1"(25.4mm) and over.

# RING JOINT FLANGES

## CLASS 300 / 400 / 600 FLANGES

### Ring Joint Flanges Facing Dimensions



## ANSI B 16.5 Forged Flanges

Unit : mm

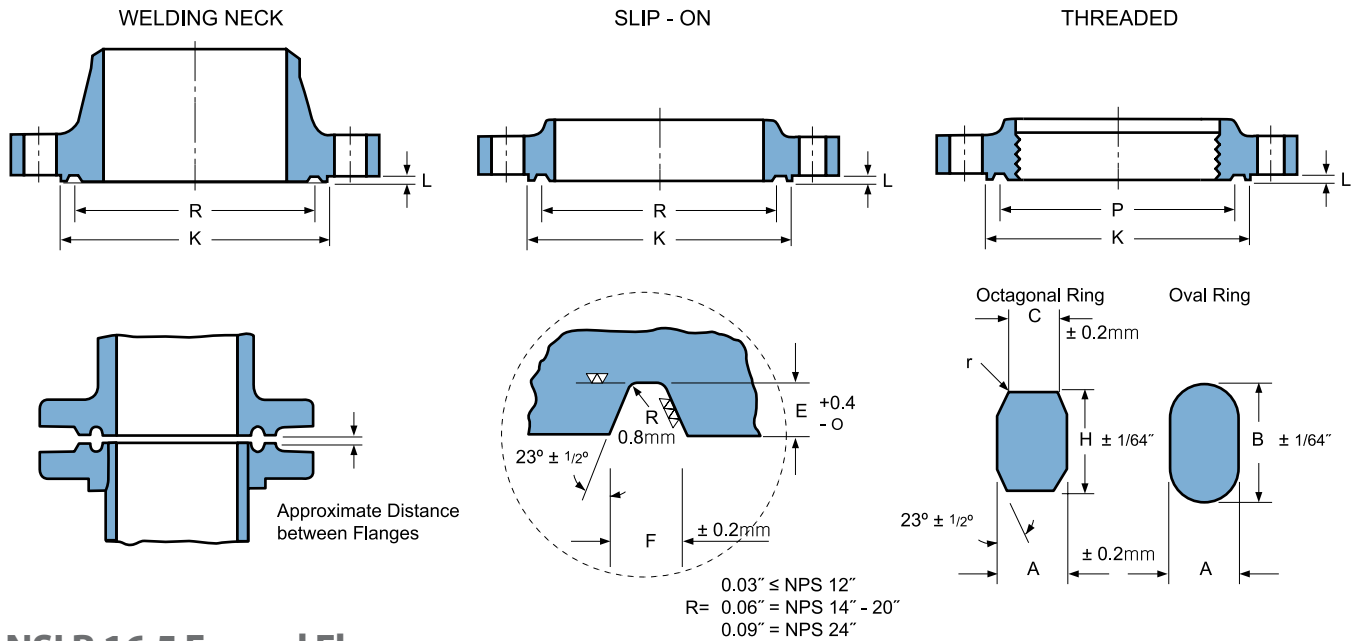
| Nominal Pipe Size | Pitch Diam. of Ring and Groove | Width of Ring | HEIGHT OF RING |           | Width of Flat on Octagonal Rings | Width of Groove | Depth of Groove | Diameter of Raised Face for Ring Joint or Lapped | Ring Number | Approximate Distance Between Flange of Ring Joints When Ring is Compressed |           |           |
|-------------------|--------------------------------|---------------|----------------|-----------|----------------------------------|-----------------|-----------------|--------------------------------------------------|-------------|----------------------------------------------------------------------------|-----------|-----------|
|                   |                                |               | Oval           | Octagonal |                                  |                 |                 |                                                  |             | Class 300                                                                  | Class 400 | Class 600 |
|                   | P                              | A             | B              | H         | C                                | F               | E(L*)           | K(Min)                                           |             |                                                                            |           |           |
| 1/2               | 34.1                           | 6.4           | 11.1           | 9.5       | 4.3                              | 7.1             | 5.6             | 50.8                                             | R11         | 3.0                                                                        | -         | 3.0       |
| 3/4               | 42.9                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 63.5                                             | R13         | 4.1                                                                        | -         | 4.1       |
| 1                 | 50.8                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 69.9                                             | R16         | 4.1                                                                        | -         | 4.1       |
| 1 1/4             | 60.3                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 79.5                                             | R18         | 4.1                                                                        | -         | 4.1       |
| 1 1/2             | 68.3                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 90.4                                             | R20         | 4.1                                                                        | -         | 4.1       |
| 2                 | 82.6                           | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 108.0                                            | R23         | 5.6                                                                        | -         | 4.8       |
| 2 1/2             | 101.6                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 127.0                                            | R26         | 5.6                                                                        | -         | 4.8       |
| 3                 | 123.8                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 146.1                                            | R31         | 5.6                                                                        | -         | 4.8       |
| 3 1/2             | 131.8                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 158.8                                            | R34         | 5.6                                                                        | -         | 4.8       |
| 4                 | 149.2                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 174.8                                            | R37         | 5.6                                                                        | 5.6       | 4.8       |
| 5                 | 181.0                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 209.6                                            | R41         | 5.6                                                                        | 5.6       | 4.8       |
| 6                 | 211.2                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 241.3                                            | R45         | 5.6                                                                        | 5.6       | 4.8       |
| 8                 | 269.9                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 301.8                                            | R49         | 5.6                                                                        | 5.6       | 4.8       |
| 10                | 323.9                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 355.6                                            | R53         | 5.6                                                                        | 5.6       | 4.8       |
| 12                | 381.0                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 412.8                                            | R57         | 5.6                                                                        | 5.6       | 4.8       |
| 14                | 419.1                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 457.2                                            | R61         | 5.6                                                                        | 5.6       | 4.8       |
| 16                | 469.9                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 508.0                                            | R65         | 5.6                                                                        | 5.6       | 4.8       |
| 18                | 533.4                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 574.8                                            | R69         | 5.6                                                                        | 5.6       | 4.8       |
| 20                | 584.2                          | 12.7          | 19.1           | 17.5      | 8.7                              | 13.5            | 9.5             | 635.0                                            | R73         | 5.6                                                                        | 5.6       | 4.8       |
| 24                | 692.2                          | 15.9          | 22.2           | 20.7      | 10.5                             | 16.7            | 11.1            | 749.3                                            | R77         | 6.4                                                                        | 6.4       | 5.6       |

#### NOTE :

- Unless other wise specified by the customer, Ring Type Joint Flanges will be furnished in accordance with these details.
- The depth of groove is added to the minimum flange thickness.
  - \* Raised face " L " is equal to groove dimension " E " but is not subject to tolerances for " E "
  - \* A plus tolerance of 3/64 in, for heights B and H is permitted providing the variation in the height of any given ring does not exceed 1/64 in, throughout its entire circumference.
- Dimension " R " is max.
- Radius " r " is 1/16" for ring widths 7/8" and less and 3/32" for ring widths 1"(25.4mm) and over.

# CLASS 900 FLANGES

## Ring Joint Flanges Facing Dimensions



## ANSI B 16.5 Forged Flanges

Unit : mm

| Nominal Pipe Size | Pitch Diam. of Ring and Groove | Width of Ring | HEIGHT OF RING |           | Width of Flat on Octagonal Rings | Width of Groove | Depth of Groove | Diameter of Raised Face for Ring Joint or Lapped | Ring Number | Approximate Distance Between Flange of Ring Joints When Ring is Compressed |
|-------------------|--------------------------------|---------------|----------------|-----------|----------------------------------|-----------------|-----------------|--------------------------------------------------|-------------|----------------------------------------------------------------------------|
|                   |                                |               | Oval           | Octagonal |                                  |                 |                 |                                                  |             |                                                                            |
| P                 | A                              | B             | H              | C         | F                                | E(L*)           | K(Min)          |                                                  |             |                                                                            |

For size 2 1/2 and smaller, use Class 1500 Ring Joint Flanges

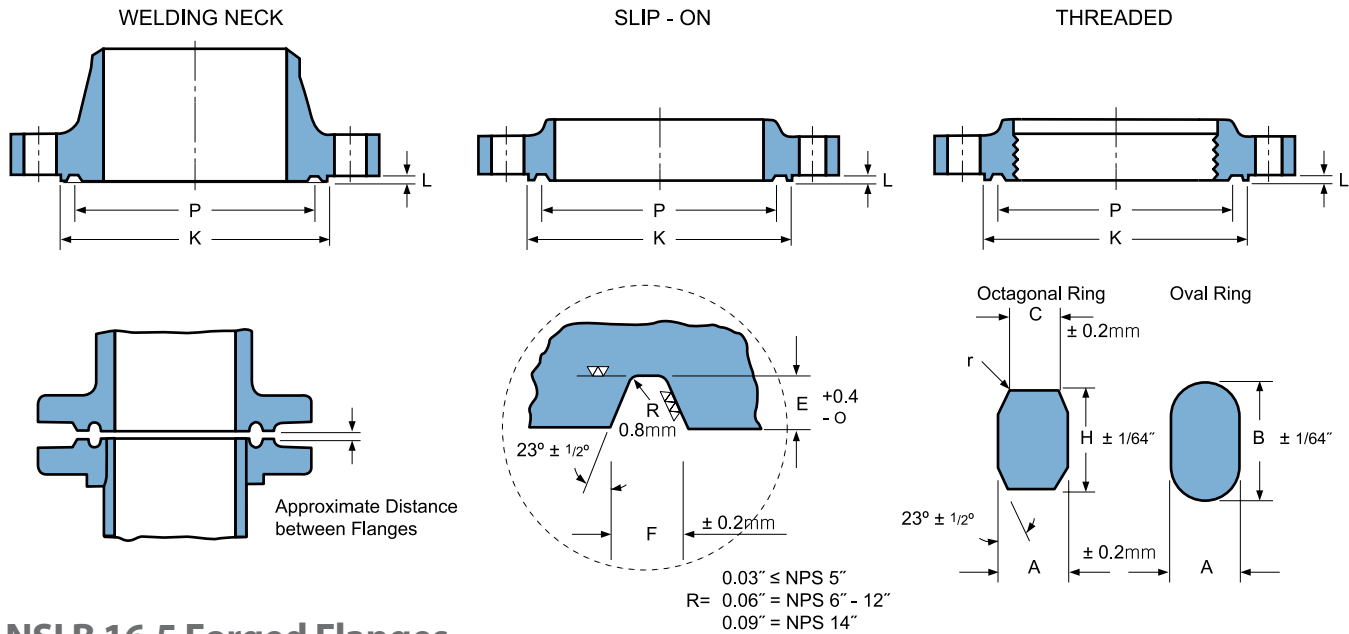
|    |       |      |      |      |      |      |      |       |     |     |
|----|-------|------|------|------|------|------|------|-------|-----|-----|
| 3  | 123.8 | 11.1 | 17.5 | 15.9 | 7.7  | 11.9 | 7.9  | 155.4 | R31 | 4.1 |
| 4  | 149.2 | 11.1 | 17.5 | 15.9 | 7.7  | 11.9 | 7.9  | 180.8 | R37 | 4.1 |
| 5  | 181.0 | 11.1 | 17.5 | 15.9 | 7.7  | 11.9 | 7.9  | 215.9 | R41 | 4.1 |
| 6  | 211.2 | 11.1 | 17.5 | 15.9 | 7.7  | 11.9 | 7.9  | 241.3 | R45 | 4.1 |
| 8  | 269.9 | 11.1 | 17.5 | 15.9 | 7.7  | 11.9 | 7.9  | 307.8 | R49 | 4.1 |
| 10 | 323.9 | 11.1 | 17.5 | 15.9 | 7.7  | 11.9 | 7.9  | 362.0 | R53 | 4.1 |
| 12 | 381.0 | 11.1 | 17.5 | 15.9 | 7.7  | 11.9 | 7.9  | 419.1 | R57 | 4.1 |
| 14 | 419.1 | 15.9 | 22.2 | 20.7 | 10.5 | 16.7 | 11.1 | 466.9 | R62 | 4.1 |
| 16 | 469.9 | 15.9 | 22.2 | 20.7 | 10.5 | 16.7 | 11.1 | 523.7 | R66 | 4.1 |
| 18 | 533.4 | 19.1 | 25.4 | 23.8 | 11.1 | 19.8 | 12.7 | 593.9 | R70 | 4.8 |
| 20 | 584.2 | 19.1 | 25.4 | 23.8 | 12.3 | 19.8 | 12.7 | 647.7 | R74 | 4.8 |
| 24 | 692.2 | 25.4 | 33.4 | 31.8 | 17.3 | 27.0 | 15.9 | 771.7 | R78 | 5.6 |

**NOTE :**

1. Unless other wise specified by the customer, Ring Type Joint Flanges will be furnished in accordance with these details.
2. The depth of groove is added to the minimum flange thickness.
  - \* Raised face " L " is equal to groove dimension " E " but is not subject to tolerances for " E "
  - \* A plus tolerance of 3/64 in, for heights B and H is permitted providing the variation in the height of any given ring does not exceed 1/64 in, throughout its entire circumference.
3. Dimension " R " is max.
4. Radius " r " is 1/16" for ring widths 7/8" and less and 3/32" for ring widths 1"(25.4mm) and over.

## CLASS 1500 FLANGES

### Ring Joint Flanges Facing Dimensions



### ANSI B 16.5 Forged Flanges

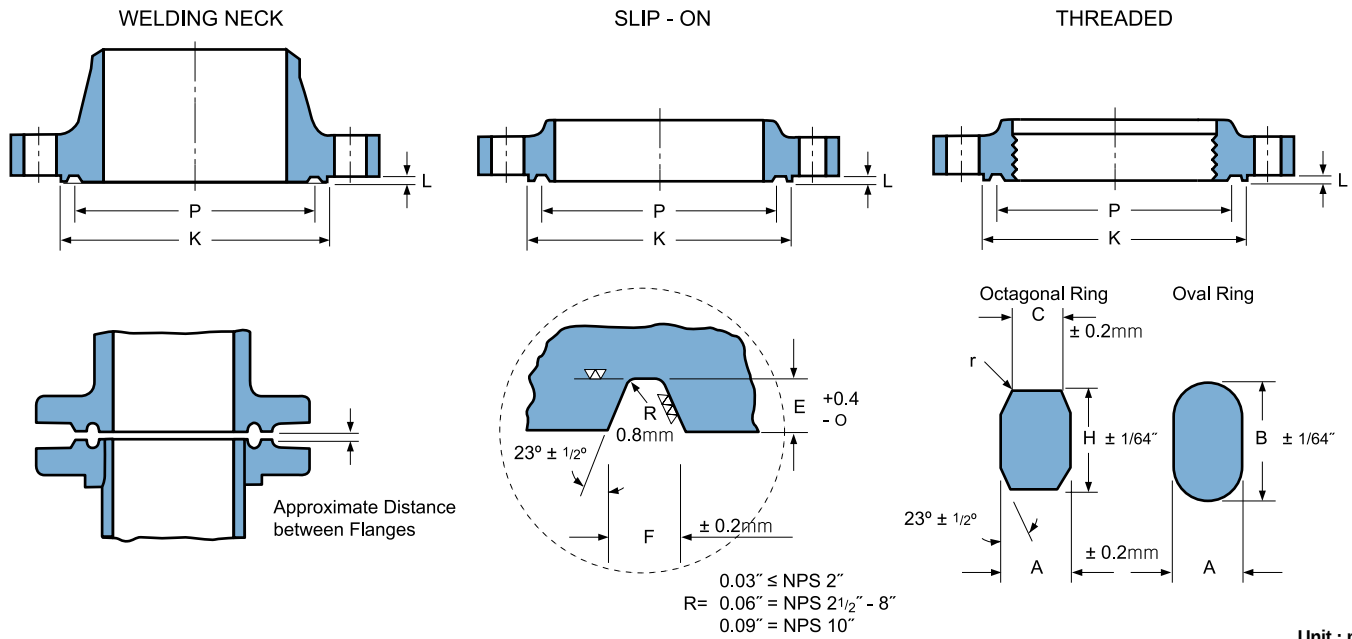
| Nominal Pipe Size | Pitch Diam. of Ring and Groove | Width of Ring | HEIGHT OF RING |           | Width of Flat on Octagonal Rings | Width of Groove | Depth of Groove | Diameter of Raised Face for Ring Joint or Lapped | Ring Number | Approximate Distance Between Flange of Ring Joints When Ring is Compressed |
|-------------------|--------------------------------|---------------|----------------|-----------|----------------------------------|-----------------|-----------------|--------------------------------------------------|-------------|----------------------------------------------------------------------------|
|                   |                                |               | Oval           | Octagonal |                                  |                 |                 |                                                  |             |                                                                            |
| P                 | A                              | B             | H              | C         | F                                | E(L*)           | K(Min)          |                                                  |             |                                                                            |
| 1/2               | 39.7                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 60.5                                             | R12         | 4.1                                                                        |
| 3/4               | 44.5                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 66.8                                             | R14         | 4.1                                                                        |
| 1                 | 50.8                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 71.4                                             | R16         | 4.1                                                                        |
| 1 1/4             | 60.3                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 81.0                                             | R18         | 4.1                                                                        |
| 1 1/2             | 68.3                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 92.2                                             | R20         | 4.1                                                                        |
| 2                 | 95.3                           | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 124.0                                            | R24         | 3.0                                                                        |
| 2 1/2             | 108.0                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 136.7                                            | R27         | 3.0                                                                        |
| 3                 | 136.5                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 168.4                                            | R35         | 3.0                                                                        |
| 4                 | 161.9                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 193.8                                            | R39         | 3.0                                                                        |
| 5                 | 193.7                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 228.6                                            | R44         | 3.0                                                                        |
| 6                 | 211.2                          | 12.7          | 19.1           | 17.5      | 8.7                              | 13.5            | 9.5             | 247.7                                            | R46         | 3.0                                                                        |
| 8                 | 269.9                          | 15.9          | 22.2           | 20.7      | 10.5                             | 16.7            | 11.1            | 317.5                                            | R50         | 4.1                                                                        |
| 10                | 323.9                          | 15.9          | 22.2           | 20.7      | 10.5                             | 16.7            | 11.1            | 371.6                                            | R54         | 4.1                                                                        |
| 12                | 381.0                          | 22.2          | 28.6           | 27.0      | 14.8                             | 23.0            | 14.3            | 438.2                                            | R58         | 4.8                                                                        |
| 14                | 419.1                          | 25.4          | 33.4           | 31.8      | 17.3                             | 27.0            | 15.9            | 489.0                                            | R64         | 5.6                                                                        |
| 16                | 469.9                          | 28.6          | 36.5           | 34.9      | 19.8                             | 30.2            | 17.5            | 546.1                                            | R67         | 7.9                                                                        |
| 18                | 533.4                          | 28.6          | 36.5           | 34.9      | 19.8                             | 30.2            | 17.5            | 612.9                                            | R71         | 7.9                                                                        |
| 20                | 584.2                          | 31.8          | 39.7           | 38.1      | 22.3                             | 33.4            | 17.5            | 673.1                                            | R75         | 9.7                                                                        |
| 24                | 692.2                          | 34.9          | 44.5           | 41.3      | 24.8                             | 36.5            | 20.6            | 793.8                                            | R79         | 11.2                                                                       |

#### NOTE :

- Unless other wise specified by the customer, Ring Type Joint Flanges will be furnished in accordance with these details.
- The depth of groove is added to the minimum flange thickness.
  - \* Raised face " L " is equal to groove dimension " E " but is not subjected to tolerances for " E "
  - \* A plus tolerance of 3/64 in, for heights B and H is permitted providing the variation in the height of any given ring does not exceed 1/64 in, throughout its entire circumference.
- Dimension " R " is max.
- Radius " r " is 1/16" for ring widths 7/8" and less and 3/32" for ring widths 1"(25.4mm) and over.

# CLASS 2500 FLANGES

## Ring Joint Flanges Facing Dimensions



| Nominal Pipe Size | Pitch Diam. of Ring and Groove | Width of Ring | HEIGHT OF RING |           | Width of Flat on Octagonal Rings | Width of Groove | Depth of Groove | Diameter of Raised Face for Ring Joint or Lapped | Ring Number | Approximate Distance Between Flange of Ring Joints When Ring is Compressed |
|-------------------|--------------------------------|---------------|----------------|-----------|----------------------------------|-----------------|-----------------|--------------------------------------------------|-------------|----------------------------------------------------------------------------|
|                   |                                |               | Oval           | Octagonal |                                  |                 |                 |                                                  |             |                                                                            |
| P                 | A                              | B             | H              | C         | F                                | E(L*)           | K(Min)          |                                                  |             |                                                                            |
| 1/2               | 42.9                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 65.0                                             | R13         | 4.1                                                                        |
| 3/4               | 50.8                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 73.2                                             | R16         | 4.1                                                                        |
| 1                 | 60.3                           | 8.0           | 14.3           | 12.7      | 5.2                              | 8.7             | 6.4             | 82.6                                             | R18         | 4.1                                                                        |
| 1 1/4             | 72.2                           | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 101.6                                            | R21         | 3.0                                                                        |
| 1 1/2             | 82.6                           | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 114.3                                            | R23         | 3.0                                                                        |
| 2                 | 101.6                          | 11.1          | 17.5           | 15.9      | 7.7                              | 11.9            | 7.9             | 133.4                                            | R26         | 3.0                                                                        |
| 2 1/2             | 111.1                          | 12.7          | 19.1           | 17.5      | 8.7                              | 13.5            | 9.5             | 149.4                                            | R28         | 3.0                                                                        |
| 3                 | 127.0                          | 12.7          | 19.1           | 17.5      | 8.7                              | 13.5            | 9.5             | 168.4                                            | R32         | 3.0                                                                        |
| 4                 | 157.2                          | 15.9          | 22.2           | 20.7      | 10.5                             | 16.7            | 11.1            | 203.2                                            | R38         | 4.1                                                                        |
| 5                 | 190.5                          | 19.1          | 25.4           | 23.8      | 12.3                             | 19.8            | 12.7            | 241.3                                            | R42         | 4.1                                                                        |
| 6                 | 228.6                          | 19.1          | 25.4           | 23.8      | 12.3                             | 19.8            | 12.7            | 279.4                                            | R47         | 4.1                                                                        |
| 8                 | 279.4                          | 22.2          | 28.6           | 27.0      | 14.8                             | 23.0            | 14.3            | 339.9                                            | R51         | 4.8                                                                        |
| 10                | 342.9                          | 28.6          | 36.5           | 34.9      | 19.8                             | 30.2            | 17.5            | 425.5                                            | R55         | 6.4                                                                        |
| 12                | 406.4                          | 31.8          | 39.7           | 38.1      | 22.3                             | 33.4            | 17.5            | 495.3                                            | R60         | 7.9                                                                        |

### NOTE :

1. Unless other wise specified by the customer, Ring Type Joint Flanges will be furnished in accordance with these details.
2. The depth of groove is added to the minimum flange thickness.
  - \* Raised face " L " is equal to groove dimension " E " but is not subjected to tolerances for " E "
  - \* A plus tolerance of 3/64 in, for heights B and H is permitted providing the variation in the height of any given ring does not exceed 1/64 in, throughout its entire circumference.
3. Dimension " R " is max.
4. Radius " r " is 1/16" for ring widths 7/8" and less and 3/32" for ring widths 1"(25.4mm) and over.



# ORIFICE FLANGES

- ANSI Orifice Flanges
- Class 300 Flanges
- Class 400 Flanges
- Class 600 Flanges
- Class 900 Flanges
- Class 1500 Flanges
- Class 2500 Flanges

# ANSI ORIFICE FLANGES

## (ANSI B16.36) Forged Flanges

ORIFICE FLANGES are widely used in conjunction with orifice meters for measuring the rate of flow of liquids and gases. They are basically the same as standard welding neck, slip-on and screwed flanges except for the provision of radial, tapped holes in the flange ring for meter connections and additional bolts to act as jack screws to facilitate separating the flanges for inspection or replacement of the orifice plate.

### NOTES :

#### ■ JACK SCREW PROVISION

- (1) Each Flange shall have a machine bolt mounted in a hole drilled on the flange centerline at 90 deg. from the pressure taps, for use as a jackscrew, Machine bolt shall be regular, with one heavy hex, nut.
- (2) A slot shall be provided in the flange 0.06 in. (1.6mm) wider than the width across flats of the nut. The depth of the slot shall admit the nut so that there is no interference with the joining of the flanges when bolted together without orifice plate.

#### ■ PRESSURE TAPS

- (1) Each orifice flange is provided with two pressure tap holes extending radially from the outside diameter of the flange to the inside diameter of the flange. Corner taps may be used on NPS 1 1/2 and smaller if space permits.  
Each pressure tap hole shall be equipped with a pipe plug.
- (2) The 0.94 in. (23.8) locating dimension for raised face and 0.75 in. (19.1mm) for ring joint shall be measured at the bore.
- (3) Each pressure tap hole shall be equipped with a pipe plug.

#### ■ FACING

The finish of Contact Faces Shall Conform to the Requirements of ASME / ANSI B 16.5

#### ■ FLANGE THREADS

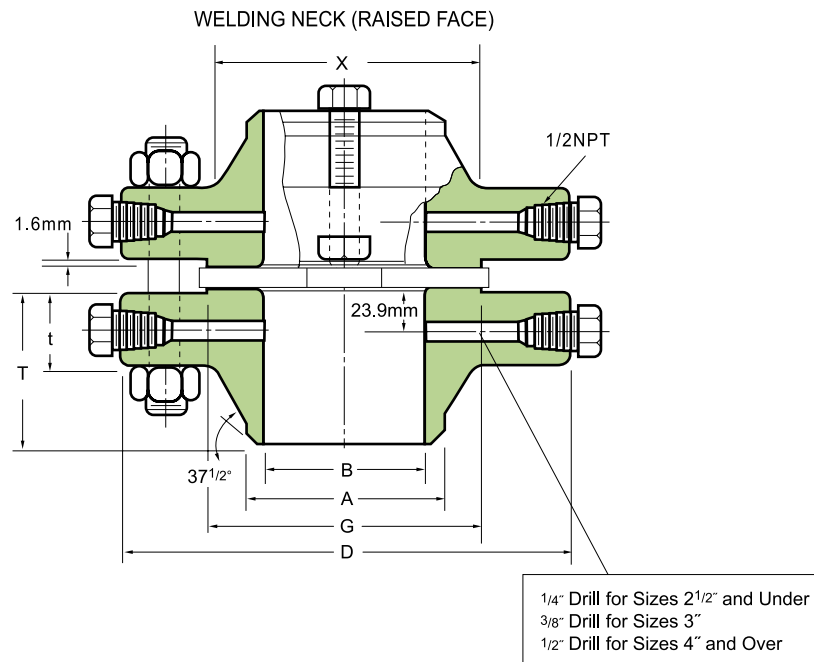
- (1) Threaded flanges shall have an American National Standard taper pipe thread conforming to ANSI B 2.1
- (2) The thread shall be concentric with the axis of the flange and variations in alignment shall not exceed 0.06 in (1.6mm) per foot.
- (3) The flanges are made with counterbored at the back of the flange and the threads shall be chamfered to the diameter of the counterbore at an angle of approximately 45 degrees with the axis of the thread to afford easy entrance in making a joint.  
The chamfer shall be concentric with the thread.
- (4) In order to permit the pipe to be inserted to the flange, the threads should have full root diameters through to the face of the flange, or shall have a counterbore at the face of the flange.
- (5) The gaging notch of the working gage shall come flush with the bottom of the chamfer in all threaded flanges and shall be considered as being the intersection of the chamfer cone and the pitch cone of the thread.  
This depth of chamfer is approximately equal to 1/2 of the pitch of the thread.
- (6) The maximum allowable thread variation is one turn large or small from the gaging notch.

#### ■ TOLERANCES

Tolerances on all dimensions shall be as shown ANSI B16.5 except for those shown below.

- (1) Tolerance on location of center of pressure tap hole from flange face shall be :
  - a. Flanges smaller than nominal size 4  $\pm 0.02$  in (0.5mm)
  - b. Flanges nominal size 4 and larger  $\pm 0.03$  in (0.8mm)
- (2) Bore diameter tolerance (welding neck flanges only) is  $\pm 0.5\%$  of nominal value.

## CLASS 300 ORIFICE FLANGES



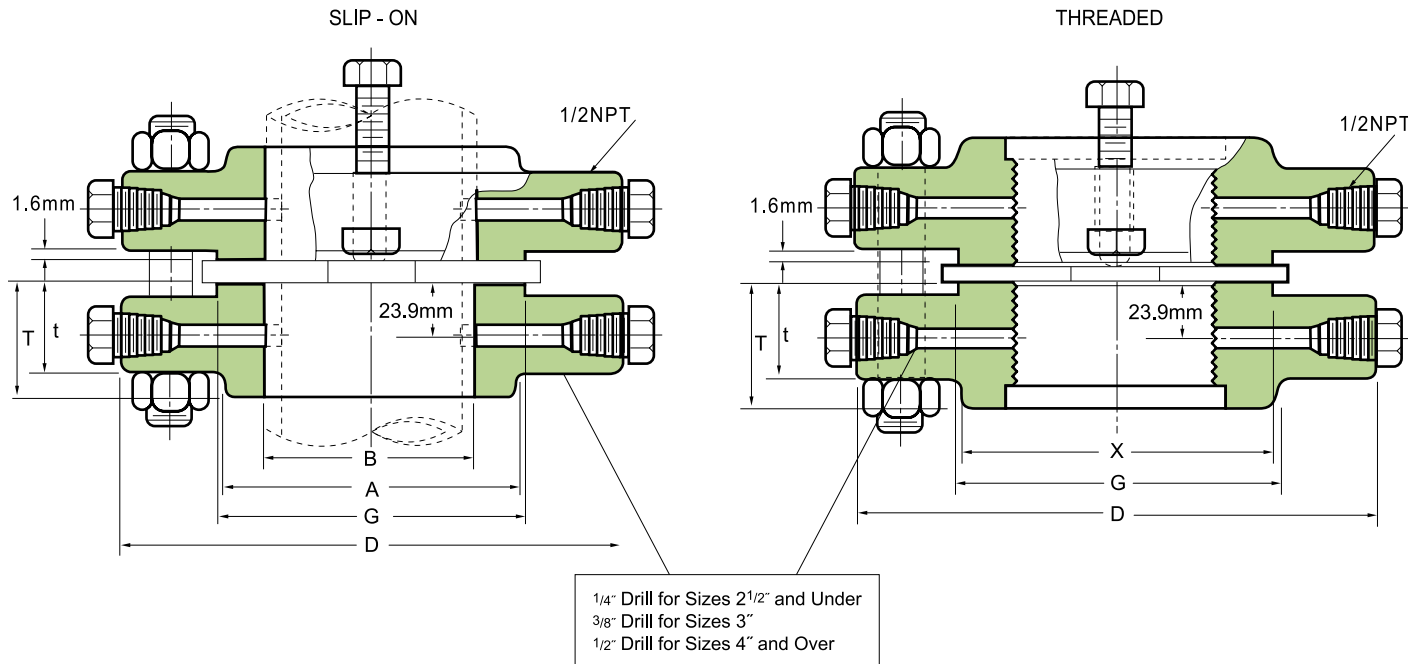
## ANSI B 16.36 Forged Flanges

Unit : mm

| Nominal<br>Pipe<br>Size | Outside<br>Diam. of<br>Flange | THICKNESS OF<br>FLANGE (t) | Diam. of<br>Hub at<br>Base | Diam. of<br>Raised<br>Base | Diam. of<br>Hub of<br>Bevel | LENGTH THRU HUB (T) |                 | BORE (B)              |                 |
|-------------------------|-------------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|---------------------|-----------------|-----------------------|-----------------|
|                         |                               | Raised Face                |                            |                            |                             |                     | Welding<br>Neck | Slip-on &<br>Threaded | Welding<br>Neck |
|                         | D                             |                            | X                          | G                          | A                           | Raised Face         | Raised Face     |                       |                 |
| 1                       | 124                           | 38.1                       | 53.8                       | 50.8                       | 33.5                        | 82.6                | 47.8            | 26.7                  | 34.5            |
| 1 1/4                   | 133                           | 38.1                       | 63.5                       | 63.5                       | 42.2                        | 84.1                | 46.0            | 35.1                  | 43.2            |
| 1 1/2                   | 155                           | 38.1                       | 69.9                       | 73.2                       | 48.3                        | 85.9                | 47.8            | 40.9                  | 49.5            |
| 2                       | 165                           | 38.1                       | 84.1                       | 91.9                       | 60.5                        | 85.9                | 49.3            | 52.6                  | 62.0            |
| 2 1/2                   | 191                           | 38.1                       | 100.1                      | 104.6                      | 73.2                        | 88.9                | 50.8            | 62.7                  | 74.7            |
| 3                       | 210                           | 38.1                       | 117.3                      | 127.0                      | 88.9                        | 88.9                | 52.3            | 78.0                  | 90.7            |
| 4                       | 254                           | 38.1                       | 146.1                      | 157.2                      | 114.3                       | 91.9                | 53.8            | 102.4                 | 116.1           |
| 5                       | 279                           | 38.1                       | 177.8                      | 185.7                      | 141.2                       | 101.6               | 53.8            | 128.3                 | 143.8           |
| 6                       | 318                           | 38.1                       | 206.2                      | 215.9                      | 168.4                       | 100.1               | 53.8            | 154.2                 | 170.7           |
| 8                       | 381                           | 41.1                       | 260.4                      | 269.7                      | 219.2                       | 111.3               | 62.0            | 202.7                 | 221.5           |
| 10                      | 445                           | 47.8                       | 320.5                      | 323.9                      | 273.1                       | 117.3               | 66.5            | 254.5                 | 276.4           |
| 12                      | 521                           | 50.8                       | 374.7                      | 381.0                      | 323.9                       | 130.0               | 73.2            | 304.8                 | 327.2           |
| 14                      | 584                           | 53.8                       | 425.5                      | 412.8                      | 355.6                       | 142.7               | 76.2            | 336.6                 | 359.2           |
| 16                      | 648                           | 57.2                       | 482.6                      | 469.9                      | 406.4                       | 146.1               | 82.6            | 387.4                 | 410.5           |
| 18                      | 711                           | 60.5                       | 533.4                      | 533.4                      | 457.2                       | 158.8               | 88.9            | 438.2                 | 461.8           |
| 20                      | 775                           | 63.5                       | 587.2                      | 584.2                      | 508.0                       | 162.1               | 95.3            | 489.0                 | 513.1           |
| 24                      | 914                           | 69.9                       | 701.5                      | 692.2                      | 609.6                       | 168.1               | 106.4           | 590.6                 | 616.0           |

### NOTE :

1. For the 'Bore' (B) of Welding Neck Flanges other than Standard Wall Thickness, refer to 46,47
2. Class 300 Welding Neck Flanges of sizes 24" (609.6mm) and smaller will be bored to match Standard Wall Pipe unless otherwise specified.
3. Class 300 Orifice Flanges will be furnished with 0.06" (1.6mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T)
4. Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25" (6.4mm) for NPS 1-12 and 0.38" (9.7mm) for sizes 14-24



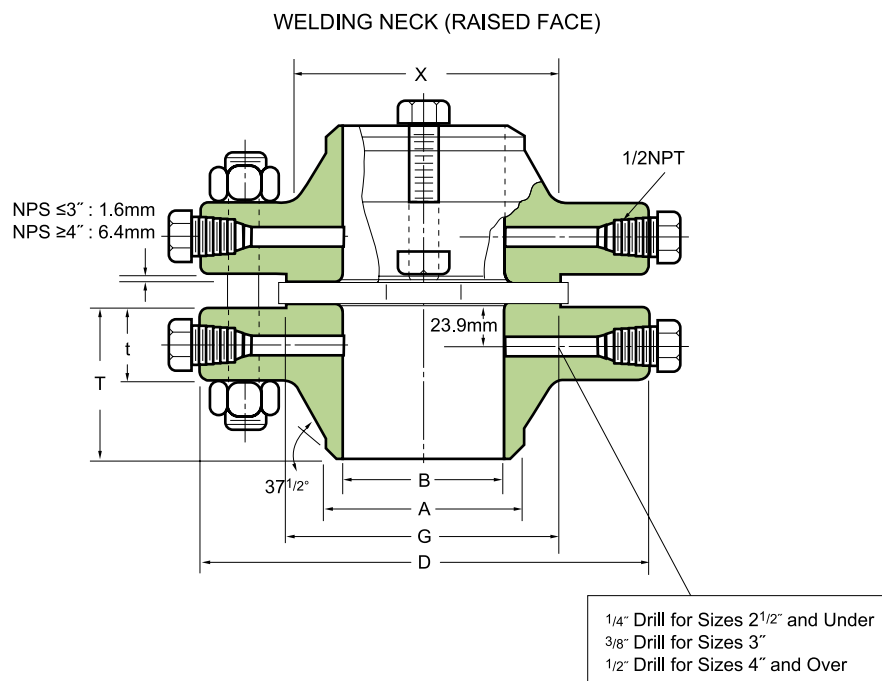
Unit : mm

| Nominal<br>Pipe<br>Size | Pitch<br>Diam. of<br>Ring and<br>Groove | Ring<br>Number | DEPTH OF<br>JACK<br>SCREW SLOT | JACK SCREW<br>SIZE                                                                 | DRILLING TEMPLATE       |                    |                                  |                         |                         |
|-------------------------|-----------------------------------------|----------------|--------------------------------|------------------------------------------------------------------------------------|-------------------------|--------------------|----------------------------------|-------------------------|-------------------------|
|                         |                                         |                |                                |                                                                                    | Diam. of<br>Bolt Circle | Number of<br>Bolts | Diam. of<br>Stud Bolts<br>(inch) | Diam. of<br>Bolts Holes | Length of<br>Stud Bolts |
|                         | P                                       |                | Raised<br>Face                 | Raised<br>Face                                                                     |                         |                    |                                  |                         | Raised Face             |
| 1                       | 50.8                                    | R16            | 9.7                            | Jack screw size for 1 thru 24 are those shown<br>for length and diameter of bolts. | 88.9                    | 4                  | 5/8                              | 17.5                    | 139.7                   |
| 1 1/4                   | 60.3                                    | R18            | 9.7                            |                                                                                    | 98.6                    | 4                  | 5/8                              | 17.5                    | 152.4                   |
| 1 1/2                   | 68.3                                    | R20            | 12.7                           |                                                                                    | 114.3                   | 4                  | 3/4                              | 20.6                    | 152.4                   |
| 2                       | 82.6                                    | R23            | 9.7                            |                                                                                    | 127.0                   | 8                  | 5/8                              | 17.5                    | 152.4                   |
| 2 1/2                   | 101.6                                   | R26            | 12.7                           |                                                                                    | 149.4                   | 8                  | 3/4                              | 20.6                    | 152.4                   |
| 3                       | 123.8                                   | R31            | 12.7                           |                                                                                    | 168.1                   | 8                  | 3/4                              | 20.6                    | 152.4                   |
| 4                       | 149.2                                   | R37            | 12.7                           |                                                                                    | 200.2                   | 8                  | 3/4                              | 20.6                    | 152.4                   |
| 5                       | 181.0                                   | R41            | 12.7                           |                                                                                    | 235.0                   | 8                  | 3/4                              | 22.4                    | 152.4                   |
| 6                       | 211.1                                   | R45            | 12.7                           |                                                                                    | 269.7                   | 12                 | 3/4                              | 22.4                    | 152.4                   |
| 8                       | 269.9                                   | R49            | 15.7                           |                                                                                    | 330.2                   | 12                 | 7/8                              | 25.4                    | 158.8                   |
| 10                      | 323.9                                   | R53            | 19.1                           |                                                                                    | 387.4                   | 16                 | 1                                | 28.4                    | 165.1                   |
| 12                      | 381.0                                   | R57            | 22.4                           |                                                                                    | 450.9                   | 16                 | 1 1/8                            | 31.8                    | 177.8                   |
| 14                      | 419.1                                   | R61            | 22.4                           |                                                                                    | 514.4                   | 20                 | 1 1/8                            | 31.8                    | 184.2                   |
| 16                      | 469.9                                   | R65            | 25.4                           |                                                                                    | 571.5                   | 20                 | 1 1/4                            | 35.1                    | 196.9                   |
| 18                      | 533.4                                   | R69            | 25.4                           |                                                                                    | 628.7                   | 24                 | 1 1/4                            | 35.1                    | 203.2                   |
| 20                      | 584.2                                   | R73            | 25.4                           |                                                                                    | 685.8                   | 24                 | 1 1/4                            | 35.1                    | 215.9                   |
| 24                      | 692.2                                   | R77            | 31.8                           |                                                                                    | 812.8                   | 24                 | 1 1/2                            | 41.1                    | 241.3                   |

NOTE :

5. Unless otherwise specified, unions of 1 (25.4mm) thru 24 (609.6mm) furnished with carbon steel regular square headed bolts with semifinished American Standard heavy series hex nuts.

## CLASS 400 ORIFICE FLANGES



## ANSI B 16.36 Forged Flanges

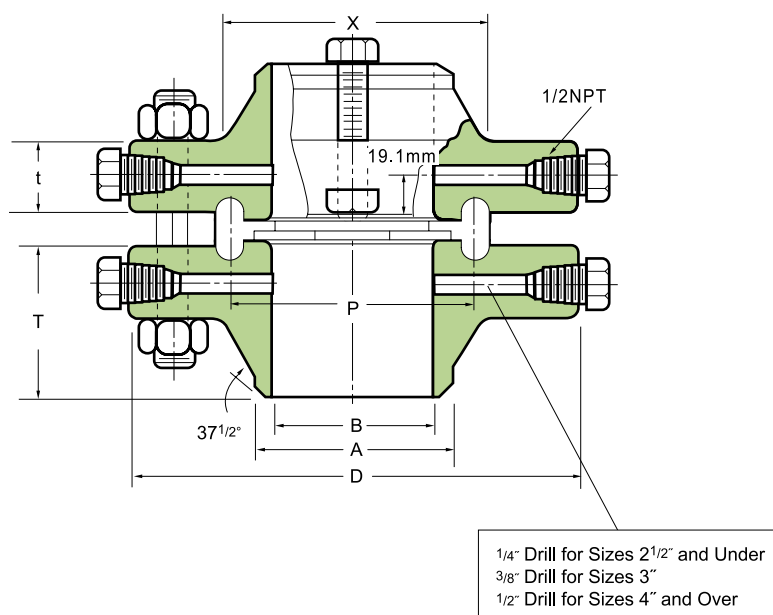
Unit : mm

| Nominal<br>Pipe<br>Size | Outside<br>Diam. of<br>Flange | THICKNESS OF<br>FLANGE (t) |               | Diam. of<br>Hub at<br>Base | Diam. of<br>Raised<br>Base | Diam. of<br>Hub of<br>Bevel | LENGTH THRU HUB (T) |               |                    |               | BORE (B)                                    |         |
|-------------------------|-------------------------------|----------------------------|---------------|----------------------------|----------------------------|-----------------------------|---------------------|---------------|--------------------|---------------|---------------------------------------------|---------|
|                         |                               | Raised<br>Face             | Ring<br>Joint |                            |                            |                             | Welding Neck        |               | Slip-on & Threaded |               | Welding<br>Neck                             | Slip-on |
|                         |                               |                            |               |                            |                            |                             | Raised Face         | Ring<br>Joint | Raised Face        | Ring<br>Joint |                                             |         |
|                         | D                             |                            |               |                            | X                          | G                           | A                   |               |                    |               |                                             |         |
| 1                       | 124                           | 38.1                       | 31.8          | 53.8                       | 50.8                       | 33.5                        | 82.6                | 76.2          | 47.8               | 41.1          | See Note 1.<br>To be specified by purchaser | 34.5    |
| 1 1/4                   | 133                           | 38.1                       | 31.8          | 63.5                       | 63.5                       | 42.2                        | 84.1                | 77.7          | 46.0               | 39.6          |                                             | 43.2    |
| 1 1/2                   | 155                           | 38.1                       | 31.8          | 69.9                       | 73.2                       | 48.3                        | 85.9                | 79.2          | 47.8               | 41.1          |                                             | 49.5    |
| 2                       | 165                           | 38.1                       | 31.8          | 84.1                       | 91.9                       | 60.5                        | 85.9                | 79.2          | 49.3               | 42.9          |                                             | 62.0    |
| 2 1/2                   | 191                           | 38.1                       | 31.8          | 100.1                      | 104.6                      | 73.2                        | 88.9                | 82.6          | 50.8               | 44.5          |                                             | 74.7    |
| 3                       | 210                           | 38.1                       | 31.8          | 117.3                      | 127.0                      | 88.9                        | 88.9                | 82.6          | 52.3               | 46.0          |                                             | 90.7    |
| 4                       | 254                           | 35.1                       | 35.1          | 146.1                      | 157.2                      | 114.3                       | 88.9                | 88.9          | 50.8               | 50.8          |                                             | 116.1   |
| 5                       | 279                           | 38.1                       | 38.1          | 177.8                      | 185.7                      | 141.2                       | 101.6               | 101.6         | 53.8               | 53.8          |                                             | 143.8   |
| 6                       | 318                           | 41.1                       | 41.1          | 206.2                      | 215.9                      | 168.4                       | 103.1               | 103.1         | 57.2               | 57.2          |                                             | 170.7   |
| 8                       | 381                           | 47.8                       | 47.8          | 260.4                      | 269.7                      | 219.2                       | 117.3               | 117.3         | 68.3               | 68.3          |                                             | 221.5   |
| 10                      | 445                           | 53.8                       | 53.8          | 320.5                      | 323.9                      | 273.1                       | 124.0               | 124.0         | 73.2               | 73.2          |                                             | 276.4   |
| 12                      | 521                           | 57.2                       | 57.2          | 374.7                      | 381.0                      | 323.9                       | 136.7               | 136.7         | 79.2               | 79.2          |                                             | 327.2   |
| 14                      | 584                           | 60.7                       | 60.7          | 425.5                      | 412.8                      | 355.6                       | 149.4               | 149.4         | -                  | -             |                                             | 359.2   |
| 16                      | 648                           | 63.5                       | 63.5          | 482.6                      | 469.9                      | 406.4                       | 152.4               | 152.4         | -                  | -             |                                             | 410.5   |
| 18                      | 711                           | 66.5                       | 66.5          | 533.4                      | 533.4                      | 457.2                       | 165.1               | 165.1         | -                  | -             |                                             | 461.8   |
| 20                      | 775                           | 69.9                       | 69.9          | 587.2                      | 584.2                      | 508.0                       | 168.1               | 168.1         | -                  | -             |                                             | 513.1   |
| 24                      | 914                           | 76.2                       | 76.2          | 701.5                      | 692.2                      | 609.6                       | 174.8               | 174.8         | -                  | -             |                                             | 564.4   |

### NOTE :

- For the inside diameter of pipes (corresponding to 'Bore' (B) of Welding Neck Flanges), refer to page 46,47
- Class 400 Flanges of sizes 3" and smaller will be furnished with 0.06" (1.6mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T)  
The 0.25" (6.35mm) raised face for sizes 4" and larger is not included in (t) and (T)
- Each union includes two carbon steel jack screw bolts with hex nuts.

# WELDING NECK (RING-TYPE JOINT)



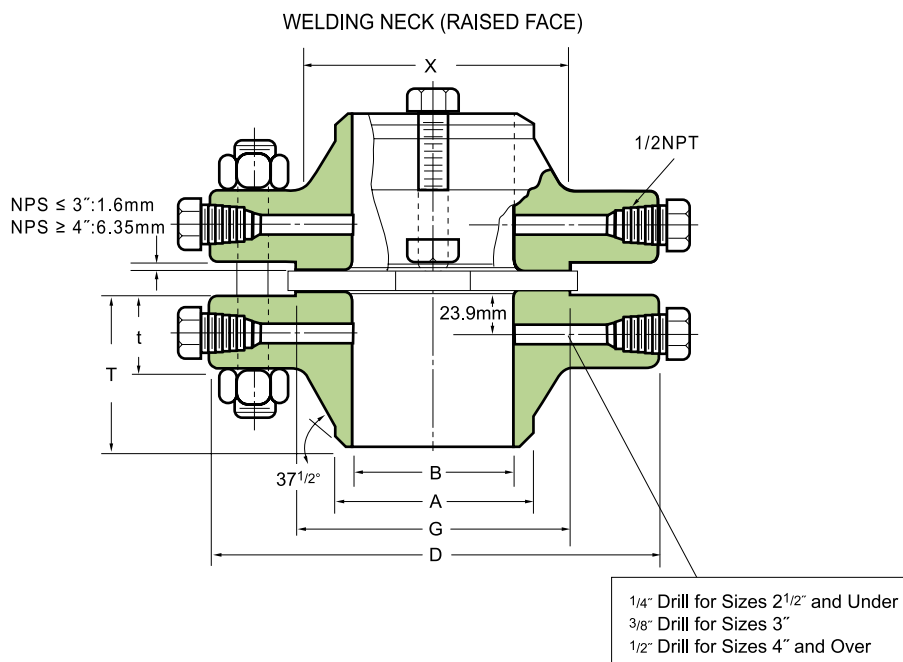
Unit : mm

| Nominal Pipe Size | Pitch Diam. of Ring and Groove | Ring Number | DEPTH OF JACK SCREW SLOT |            | JACK SCREW SIZE    |                   | DRILLING TEMPLATE    |                 |                            |                      |                      |            |
|-------------------|--------------------------------|-------------|--------------------------|------------|--------------------|-------------------|----------------------|-----------------|----------------------------|----------------------|----------------------|------------|
|                   |                                |             | Raised Face              | Ring Joint | Raised Face (inch) | Ring Joint (inch) | Diam. of Bolt Circle | Number of Bolts | Diam. of Stud Bolts (inch) | Diam. of Bolts Holes | Length of Stud Bolts |            |
|                   | P                              |             |                          |            |                    |                   |                      |                 |                            |                      | Raised Face          | Ring Joint |
| 1                 | 50.8                           | R16         | 9.7                      | 6.4        | 5/8X4.00           | 5/8X4.75          | 88.9                 | 4               | 5/8                        | 17.5                 | 127.0                | 146.1      |
| 1 1/4             | 60.3                           | R18         | 9.7                      | 6.4        | 5/8X4.00           | 5/8X4.75          | 98.6                 | 4               | 5/8                        | 17.5                 | 127.0                | 120.7      |
| 1 1/2             | 68.3                           | R20         | 12.7                     | 6.4        | 3/4X4.25           | 3/4X5.00          | 114.3                | 4               | 3/4                        | 21.0                 | 133.4                | 152.4      |
| 2                 | 82.6                           | R23         | 9.7                      | 6.4        | 5/8X4.00           | 5/8X4.75          | 127.0                | 8               | 5/8                        | 17.5                 | 127.0                | 152.4      |
| 2 1/2             | 101.6                          | R26         | 12.7                     | 6.4        | 3/4X4.25           | 3/4X5.00          | 149.4                | 8               | 3/4                        | 20.6                 | 133.4                | 158.8      |
| 3                 | 123.8                          | R31         | 12.7                     | 6.4        | 3/4X4.25           | 3/4X5.00          | 168.1                | 8               | 3/4                        | 20.6                 | 133.4                | 158.8      |
| 4                 | 149.2                          | R37         | 6.4                      | 15.7       | 3/4X3.00           | 3/4X4.00          | 200.2                | 8               | 7/8                        | 25.4                 | 139.7                | 152.4      |
| 5                 | 181.0                          | R41         | 6.4                      | 15.7       | 3/4X3.00           | 3/4X4.00          | 235.0                | 8               | 7/8                        | 25.4                 | 146.1                | 158.8      |
| 6                 | 211.1                          | R45         | 12.7                     | 22.4       | 1X3.50             | 1X4.00            | 269.7                | 12              | 7/8                        | 25.4                 | 158.8                | 165.1      |
| 8                 | 269.9                          | R49         | 12.7                     | 22.4       | 1X3.50             | 1X4.50            | 330.2                | 12              | 1                          | 28.4                 | 171.5                | 184.2      |
| 10                | 323.9                          | R53         | 12.7                     | 22.4       | 1X4.00             | 1X4.50            | 387.4                | 16              | 1 1/8                      | 31.8                 | 190.5                | 203.2      |
| 12                | 381.0                          | R57         | 12.7                     | 22.4       | 1X4.00             | 1X5.00            | 450.9                | 16              | 1 1/4                      | 35.1                 | 203.2                | 215.9      |
| 14                | 419.1                          | R61         | 12.7                     | 22.4       | 1X4.25             | 1X5.00            | 514.4                | 20              | 1 1/4                      | 35.1                 | 209.6                | 228.6      |
| 16                | 469.9                          | R65         | 12.7                     | 22.4       | 1X4.25             | 1X5.00            | 571.5                | 20              | 1 3/8                      | 38.1                 | 222.3                | 235.0      |
| 18                | 533.4                          | R69         | 12.7                     | 22.4       | 1X4.50             | 1X5.00            | 628.7                | 24              | 1 3/8                      | 38.1                 | 235.0                | 241.3      |
| 20                | 584.2                          | R73         | 12.7                     | 22.4       | 1X4.75             | 1X5.50            | 685.8                | 24              | 1 1/2                      | 41.1                 | 247.7                | 260.4      |
| 24                | 692.2                          | R77         | 12.7                     | 22.4       | 1X5.00             | 1X6.00            | 812.8                | 24              | 1 3/4                      | 47.8                 | 279.4                | 285.8      |

## NOTE :

- Unless otherwise specified, raised face unions are furnished with alloy bolt studs per ASTM A193 Grade B7 with American Standard heavy series hex nuts ASTM A194 Class 2H.
- On ring joint flanges having a groove depth 0.375" (9.5mm) and less, the distance from the center line of the tap hole to the flange face is 0.750" (19.1mm). When the depth of groove is 0.438" (11.1mm) or greater, changes in drill size or method of drilling are necessary.
- Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25" (6.4mm) for sizes 4-12 and 0.38" (9.7mm) for sizes 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62" (15.7mm) for sizes 4-10, 0.75" (19.1mm) for sizes 12-18 and 0.88" (22.4mm) for size 20.

## CLASS 600 ORIFICE FLANGES



## ANSI B 16.36 Forged Flanges

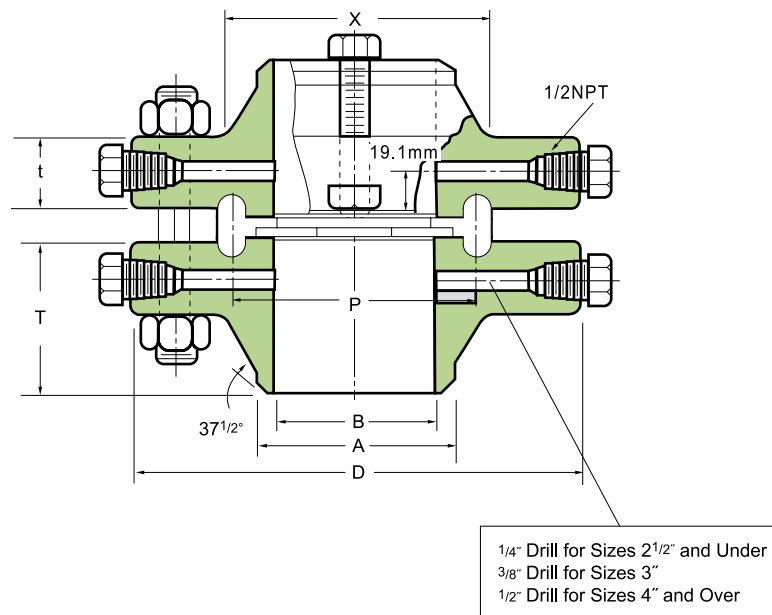
Unit : mm

| Nominal<br>Pipe<br>Size | Outside<br>Diam. of<br>Flange | THICKNESS OF<br>FLANGE (t) |               | Diam. of<br>Hub at<br>Base | Diam. of<br>Raised<br>Base | Diam. of<br>Hub of<br>Bevel | LENGTH THRU HUB (T) |               |                    |               | BORE (B)                                    |         |
|-------------------------|-------------------------------|----------------------------|---------------|----------------------------|----------------------------|-----------------------------|---------------------|---------------|--------------------|---------------|---------------------------------------------|---------|
|                         |                               | Raised<br>Face             | Ring<br>Joint |                            |                            |                             | Welding Neck        |               | Slip-on & Threaded |               | Welding<br>Neck                             | Slip-on |
|                         |                               |                            |               |                            |                            |                             | Raised Face         | Ring<br>Joint | Raised Face        | Ring<br>Joint |                                             |         |
|                         | D                             |                            |               |                            | X                          | G                           | A                   |               |                    |               |                                             |         |
| 1                       | 124                           | 38.1                       | 31.8          | 53.8                       | 50.8                       | 33.5                        | 82.6                | 76.2          | 47.8               | 41.1          | See Note 1.<br>To be specified by purchaser | 34.5    |
| 1 1/4                   | 133                           | 38.1                       | 31.8          | 63.5                       | 63.5                       | 42.2                        | 84.1                | 77.7          | 46.0               | 39.6          |                                             | 43.2    |
| 1 1/2                   | 155                           | 38.1                       | 31.8          | 69.9                       | 73.2                       | 48.3                        | 85.9                | 79.2          | 47.8               | 41.1          |                                             | 49.5    |
| 2                       | 165                           | 38.1                       | 31.8          | 84.1                       | 91.9                       | 60.5                        | 85.9                | 79.2          | 49.3               | 42.9          |                                             | 62.0    |
| 2 1/2                   | 191                           | 38.1                       | 31.8          | 100.1                      | 104.6                      | 73.2                        | 88.9                | 82.6          | 50.8               | 44.5          |                                             | 74.7    |
| 3                       | 210                           | 38.1                       | 31.8          | 117.3                      | 127.0                      | 88.9                        | 88.9                | 82.6          | 52.3               | 46.0          |                                             | 90.7    |
| 4                       | 273                           | 38.1                       | 38.1          | 152.4                      | 157.2                      | 114.3                       | 101.6               | 101.6         | 53.8               | 53.8          |                                             | 116.1   |
| 5                       | 330                           | 44.5                       | 44.5          | 189.0                      | 185.7                      | 141.2                       | 114.3               | 114.3         | 60.5               | 60.5          |                                             | 143.8   |
| 6                       | 356                           | 47.8                       | 47.8          | 222.3                      | 215.9                      | 168.4                       | 117.3               | 117.3         | 66.5               | 66.5          |                                             | 170.7   |
| 8                       | 419                           | 55.6                       | 55.6          | 273.1                      | 269.7                      | 219.2                       | 133.4               | 133.4         | 76.5               | 76.2          |                                             | 221.5   |
| 10                      | 508                           | 63.5                       | 63.5          | 342.9                      | 323.9                      | 273.1                       | 152.4               | 152.4         | 85.9               | 85.9          |                                             | 276.4   |
| 12                      | 559                           | 66.5                       | 66.5          | 400.1                      | 381.0                      | 323.9                       | 155.4               | 155.4         | 91.9               | 91.9          |                                             | 327.2   |
| 14                      | 603                           | 69.9                       | 69.9          | 431.8                      | 412.8                      | 355.6                       | 165.4               | 165.1         | -                  | -             |                                             | -       |
| 16                      | 686                           | 76.2                       | 76.2          | 495.3                      | 469.9                      | 406.4                       | 177.8               | 177.8         | -                  | -             |                                             | -       |
| 18                      | 743                           | 82.6                       | 82.6          | 546.1                      | 533.4                      | 457.2                       | 184.2               | 184.2         | -                  | -             |                                             | -       |
| 20                      | 813                           | 88.9                       | 88.9          | 609.6                      | 584.2                      | 508.0                       | 190.5               | 190.5         | -                  | -             |                                             | -       |
| 24                      | 940                           | 101.6                      | 101.6         | 717.6                      | 692.2                      | 609.6                       | 203.2               | 203.2         | -                  | -             |                                             | -       |

### NOTE :

- For the inside diameter of pipes (corresponding to 'Bore' (B) of Welding Neck Flanges), refer to page 46,47
- Class 600 Flanges of sizes 3" and smaller will be furnished with 0.06" (1.6mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T)  
The 0.25" (6.35mm) raised face for sizes 4" and larger is not included in (t) and (T)
- Each union includes two carbon steel jack screw bolts with hex nuts.
- Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25" (6.4mm) for sizes 1-12 and 0.38" (9.7mm) for sizes 14-24.  
Bolt lengths for ring type joint flanges include allowance of 0.62" (15.7mm) for sizes 1-10, 0.75" (19.1mm) for sizes 12-18 and 0.88" (22.4mm) for size 20.

### WELDING NECK (RING-TYPE JOINT)



Unit : mm

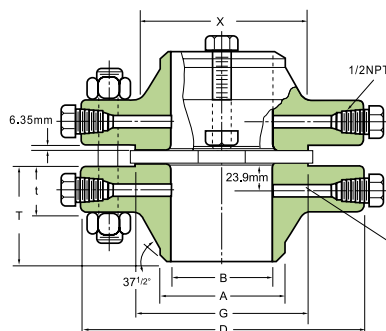
| Nominal<br>Pipe Size | Pitch<br>Diam. of<br>Ring and<br>Groove | Ring<br>Number | DEPTH OF JACK<br>SCREW SLOT |               | JACK SCREW SIZE          |                         | DRILLING TEMPLATE       |                    |                                  |                              |      |                         |               |
|----------------------|-----------------------------------------|----------------|-----------------------------|---------------|--------------------------|-------------------------|-------------------------|--------------------|----------------------------------|------------------------------|------|-------------------------|---------------|
|                      |                                         |                | Raised<br>Face              | Ring<br>Joint | Raised<br>Face<br>(inch) | Ring<br>Joint<br>(inch) | Diam. of<br>Bolt Circle | Number of<br>Bolts | Diam. of<br>Stud Bolts<br>(inch) | Diam. of Stud<br>Bolts Holes |      | Length of<br>Stud Bolts |               |
|                      | P                                       |                |                             |               |                          |                         |                         |                    |                                  | RF                           | RTJ  | Raised<br>Face          | Ring<br>Joint |
| 1                    | 50.8                                    | R16            | 9.7                         | 6.4           | 5/8X4.00                 | 5/8X4.75                | 88.9                    | 4                  | 5/8                              | 17.5                         | 19.1 | 127.0                   | 146.1         |
| 1 1/4                | 60.3                                    | R18            | 9.7                         | 6.4           | 5/8X4.00                 | 5/8X4.75                | 98.6                    | 4                  | 5/8                              | 17.5                         | -    | 127.0                   | 120.7         |
| 1 1/2                | 68.3                                    | R20            | 12.7                        | 6.4           | 3/4X4.25                 | 3/4X5.00                | 114.3                   | 4                  | 3/4                              | 20.6                         | 22.4 | 133.4                   | 152.4         |
| 2                    | 82.6                                    | R23            | 9.7                         | 6.4           | 5/8X4.00                 | 5/8X4.75                | 127.0                   | 8                  | 5/8                              | 17.5                         | 19.7 | 127.0                   | 152.4         |
| 2 1/2                | 101.6                                   | R26            | 12.7                        | 6.4           | 3/4X4.25                 | 3/4X5.00                | 149.4                   | 8                  | 3/4                              | 20.6                         | 22.4 | 133.4                   | 158.8         |
| 3                    | 123.8                                   | R31            | 12.7                        | 6.4           | 3/4X4.25                 | 3/4X5.00                | 168.1                   | 8                  | 3/4                              | 20.6                         | 22.4 | 133.4                   | 158.8         |
| 4                    | 149.2                                   | R37            | 6.4                         | 15.7          | 3/4X3.00                 | 3/4X4.00                | 215.9                   | 8                  | 7/8                              | 25.4                         | 25.4 | 152.4                   | 165.1         |
| 5                    | 181.0                                   | R41            | 6.4                         | 15.7          | 3/4X3.50                 | 3/4X4.50                | 266.7                   | 8                  | 1                                | 28.4                         | 28.4 | 139.7                   | 177.8         |
| 6                    | 211.1                                   | R45            | 12.7                        | 22.4          | 1X4.00                   | 1X4.50                  | 292.1                   | 12                 | 1                                | 28.4                         | 28.4 | 177.8                   | 190.5         |
| 8                    | 269.9                                   | R49            | 12.7                        | 22.4          | 1X4.00                   | 1X4.75                  | 349.3                   | 12                 | 1 1/8                            | 31.8                         | 31.8 | 196.9                   | 209.6         |
| 10                   | 323.9                                   | R53            | 12.7                        | 22.4          | 1X4.00                   | 1X5.00                  | 431.8                   | 16                 | 1 1/4                            | 35.1                         | 35.1 | 222.3                   | 235.0         |
| 12                   | 381.0                                   | R57            | 12.7                        | 22.4          | 1X4.50                   | 1X5.00                  | 489.0                   | 20                 | 1 1/4                            | 35.1                         | 35.1 | 228.6                   | 241.3         |
| 14                   | 419.1                                   | R61            | 12.7                        | 22.4          | 1X5.00                   | 1X5.50                  | 527.1                   | 20                 | 1 3/8                            | 38.1                         | 38.1 | 241.3                   | 254.0         |
| 16                   | 469.9                                   | R65            | 12.7                        | 22.4          | 1X5.00                   | 1X5.50                  | 603.3                   | 20                 | 1 1/2                            | 41.1                         | 41.1 | 260.4                   | 273.1         |
| 18                   | 533.4                                   | R69            | 12.7                        | 22.4          | 1X5.00                   | 1X5.75                  | 654.1                   | 20                 | 1 5/8                            | 44.5                         | 44.5 | 297.4                   | 292.1         |
| 20                   | 584.2                                   | R73            | 12.7                        | 22.4          | 1X6.00                   | 1X6.25                  | 723.9                   | 24                 | 1 5/8                            | 44.5                         | 44.5 | 298.5                   | 317.5         |
| 24                   | 692.2                                   | R77            | 12.7                        | 22.4          | 1X6.00                   | 1X7.00                  | 838.2                   | 24                 | 1 7/8                            | 50.8                         | 50.8 | 336.6                   | 342.9         |

#### NOTE :

- Unless otherwise specified, raised face unions are furnished with alloy bolt studs per ASTM A193 Grade B7 with American Standard heavy series hex nuts ASTM A194 Class 2H.
- On ring joint flanges having a groove depth 0.375" (9.5mm) and less, the distance from the center line of the tap hole to the flange face is 0.750" (19.1mm). When the depth of groove is 0.438" (11.1mm) or greater, changes in drill size or method of drilling are necessary.

## CLASS 900 / 1500 ORIFICE FLANGES

WELDING NECK  
(RAISED FACE)



1/4" Drill for Sizes 2 1/2" and Under  
3/8" Drill for Sizes 3"  
1/2" Drill for Sizes 4" and Over

### ANSI B 16.36 Forged Flanges

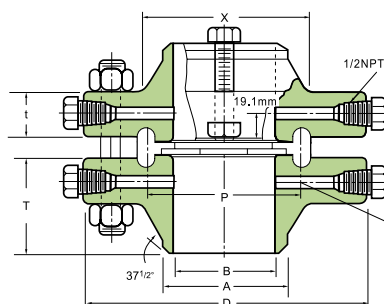
Unit : mm

| Nominal<br>Pipe<br>Size | Outside<br>Diam. of<br>Flange | THICKNESS OF<br>FLANGE (t) |               | Diam. of<br>Hub at<br>Base | Diam. of<br>Raised<br>Base | Diam. of<br>Hub of<br>Bevel | LENGTH THRU HUB (T) |               |                    |               | BORE (B)                     |         |
|-------------------------|-------------------------------|----------------------------|---------------|----------------------------|----------------------------|-----------------------------|---------------------|---------------|--------------------|---------------|------------------------------|---------|
|                         |                               | Raised<br>Face             | Ring<br>Joint |                            |                            |                             | Welding Neck        |               | Slip-on & Threaded |               | Welding<br>Neck              | Slip-on |
|                         |                               |                            |               |                            |                            |                             | Raised Face         | Ring<br>Joint | Raised Face        | Ring<br>Joint |                              |         |
|                         | D                             |                            |               |                            | X                          | G                           | A                   |               |                    |               |                              |         |
| CLASS 900               |                               |                            |               |                            |                            |                             |                     |               |                    |               |                              |         |
| 3                       | 241                           | 38.1                       | 38.1          | 127.0                      | 127.0                      | 88.9                        | 101.6               | 101.6         | 53.8               | 53.8          | To be specified by purchaser | 90.7    |
| 4                       | 292                           | 44.5                       | 44.5          | 158.8                      | 157.2                      | 114.3                       | 114.3               | 114.3         | 69.9               | 69.9          |                              | 116.1   |
| 5                       | 349                           | 50.8                       | 50.8          | 190.5                      | 185.7                      | 141.2                       | 127.0               | 127.0         | 79.2               | 79.2          |                              | 143.8   |
| 6                       | 381                           | 55.6                       | 55.6          | 235.0                      | 215.9                      | 168.4                       | 139.7               | 139.7         | 85.9               | 85.9          |                              | 170.7   |
| 8                       | 470                           | 63.5                       | 63.5          | 298.5                      | 269.7                      | 219.2                       | 162.1               | 162.1         | 101.6              | 101.6         |                              | 221.5   |
| 10                      | 546                           | 69.9                       | 69.9          | 368.3                      | 323.9                      | 273.1                       | 184.2               | 184.2         | 108.0              | 108.0         |                              | 276.4   |
| 12                      | 610                           | 79.2                       | 79.2          | 419.1                      | 381.0                      | 323.9                       | 200.2               | 200.2         | 117.3              | 117.3         |                              | 327.2   |
| 14                      | 641                           | 85.9                       | -             | 450.9                      | 412.8                      | 355.6                       | 212.9               | -             | -                  | -             |                              | -       |
| 16                      | 705                           | 88.9                       | -             | 508.0                      | 469.9                      | 406.4                       | 215.9               | -             | -                  | -             |                              | -       |
| 18                      | 787                           | 101.6                      | -             | 565.2                      | 533.4                      | 457.2                       | 228.6               | -             | -                  | -             |                              | -       |
| 20                      | 857                           | 108.0                      | -             | 622.3                      | 584.2                      | 508.0                       | 247.7               | -             | -                  | -             |                              | -       |
| 24                      | 1041                          | 139.7                      | -             | 749.3                      | 692.2                      | 609.6                       | 292.1               | -             | -                  | -             | -                            |         |
| CLASS 1500              |                               |                            |               |                            |                            |                             |                     |               |                    |               |                              |         |
| 1                       | 149                           | 38.1                       | 38.1          | 52.3                       | 50.8                       | 33.5                        | 82.6                | 82.6          | 47.8               | 44.5          | To be specified by purchaser | 34.5    |
| 1 1/4                   | 158                           | 35.1                       | 35.1          | 63.5                       | 63.5                       | 42.2                        | 73.2                | 73.2          | 47.8               | 44.5          |                              | 43.2    |
| 1 1/2                   | 178                           | 38.1                       | 38.1          | 69.9                       | 73.2                       | 48.3                        | 88.9                | 88.9          | 47.8               | 44.5          |                              | 49.5    |
| 2                       | 216                           | 38.1                       | 38.1          | 104.6                      | 91.9                       | 60.5                        | 101.6               | 101.6         | 57.2               | 57.2          |                              | 62.0    |
| 2 1/2                   | 244                           | 41.1                       | 41.1          | 124.0                      | 104.6                      | 73.2                        | 104.6               | 104.6         | 63.5               | 63.5          |                              | 74.7    |
| 3                       | 267                           | 47.8                       | 47.8          | 133.4                      | 127.0                      | 88.9                        | 117.3               | 117.3         | 73.2               | 73.2          |                              | 90.7    |
| 4                       | 311                           | 53.8                       | 53.8          | 162.1                      | 157.2                      | 114.3                       | 124.0               | 124.0         | 90.4               | 90.4          |                              | 116.1   |
| 5                       | 375                           | 73.2                       | 73.2          | 196.9                      | 185.7                      | 141.2                       | 155.4               | 104.6         | 104.6              | 104.6         |                              | 143.8   |
| 6                       | 394                           | 82.6                       | 82.6          | 228.6                      | 215.9                      | 168.4                       | 171.5               | 171.5         | 119.1              | 119.1         |                              | 170.7   |
| 8                       | 483                           | 91.9                       | 91.9          | 292.1                      | 269.7                      | 219.2                       | 212.9               | 212.9         | 142.7              | 142.7         |                              | 221.5   |
| 10                      | 584                           | 108.0                      | 108.0         | 368.3                      | 323.9                      | 273.1                       | 254.0               | 254.0         | 158.8              | 158.5         |                              | 276.4   |
| 12                      | 673                           | 124.0                      | 124.0         | 450.9                      | 381.0                      | 323.9                       | 282.4               | 282.4         | 180.8              | 180.8         |                              | 327.2   |
| 14                      | 749                           | 133.4                      | -             | 495.3                      | 412.8                      | 355.6                       | 298.5               | -             | -                  | -             |                              | -       |
| 16                      | 826                           | 146.1                      | -             | 552.5                      | 469.9                      | 406.4                       | 311.2               | -             | -                  | -             |                              | -       |
| 18                      | 914                           | 162.1                      | -             | 596.9                      | 533.4                      | 457.2                       | 327.2               | -             | -                  | -             |                              | -       |
| 20                      | 984                           | 177.8                      | -             | 641.4                      | 584.2                      | 508.0                       | 355.6               | -             | -                  | -             |                              | -       |
| 24                      | 1168                          | 203.2                      | -             | 762.0                      | 692.2                      | 609.6                       | 406.4               | -             | -                  | -             |                              | -       |

#### NOTE :

- For the inside diameter of pipes (corresponding to 'Bore' (B) of Welding Neck Flanges), refer to page 46,47
- Class 900 Flanges of sizes 1" (25.4mm) through 2 1/2" are the same as for Class 1500.
- Class 900 and 1500 is not included in "thickness' (t) and 'Length through Hub' (t).
- Each union includes two carbon steel jack screw bolts with hex nuts.

WELDING NECK  
(RING-TYPE JOINT)



1/4" Drill for Sizes 2 1/2" and Under  
3/8" Drill for Sizes 3"  
1/2" Drill for Sizes 4" and Over

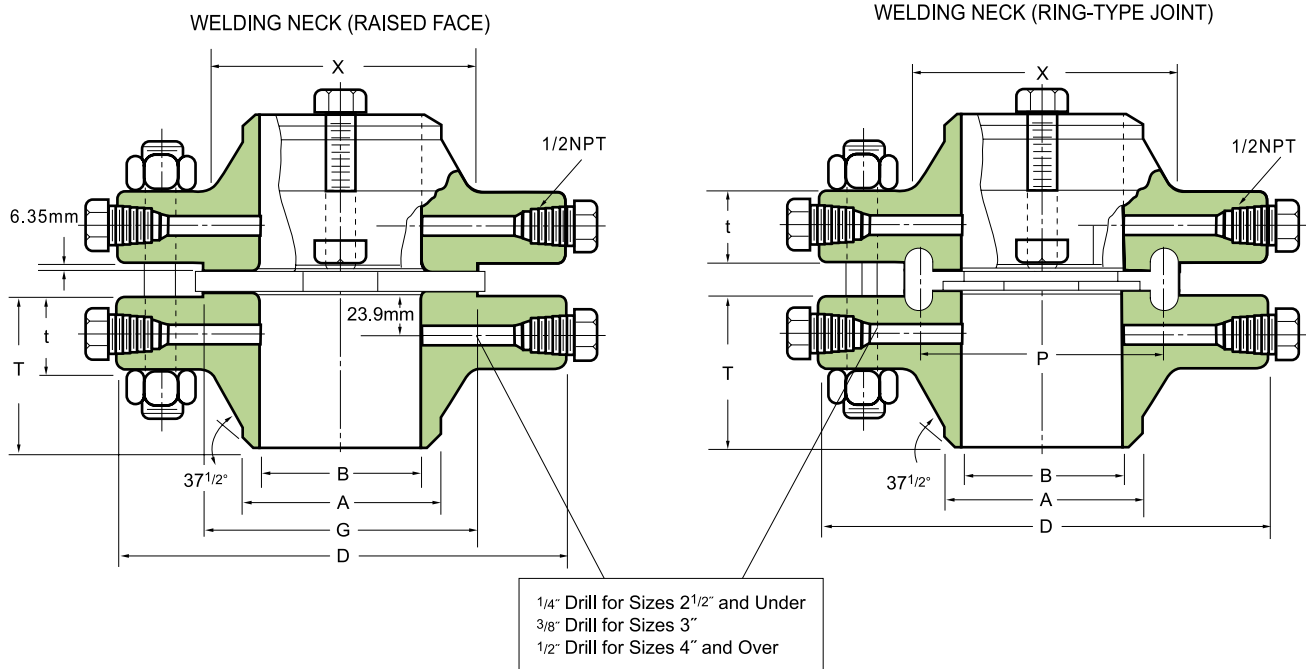
Unit : mm

| Nominal<br>Pipe<br>Size | Pich<br>Diam. of<br>Ring and<br>Groove | Ring<br>Number | DEPTH OF JACK<br>SCREW SLOT |               | JACK SCREW SIZE          |                         | DRILLING TEMPLATE       |                    |                                  |                         |                         |       |
|-------------------------|----------------------------------------|----------------|-----------------------------|---------------|--------------------------|-------------------------|-------------------------|--------------------|----------------------------------|-------------------------|-------------------------|-------|
|                         |                                        |                | Raised<br>Face              | Ring<br>Joint | Raised<br>Face<br>(inch) | Ring<br>Joint<br>(inch) | Diam. of<br>Bolt Circle | Number of<br>Bolts | Diam. of<br>Stud Bolts<br>(inch) | Diam. of<br>Bolts Holes | Length of<br>Stud Bolts |       |
|                         | Raised<br>Face                         |                |                             |               |                          |                         |                         |                    |                                  |                         | Ring<br>Joint           |       |
| CLASS 900               |                                        |                |                             |               |                          |                         |                         |                    |                                  |                         |                         |       |
| 3                       | 123.8                                  | R31            | 9.7                         | 15.7          | 3/4X3.50                 | 3/4X4.00                | 190.5                   | 8                  | 7/8                              | 25.4                    | 152.4                   | 165.1 |
| 4                       | 149.2                                  | R37            | 9.7                         | 15.7          | 3/4X3.50                 | 3/4X4.50                | 235.0                   | 8                  | 1 1/8                            | 31.8                    | 177.8                   | 190.5 |
| 5                       | 181.0                                  | R41            | 9.7                         | 15.7          | 3/4X3.50                 | 3/4X4.50                | 279.4                   | 8                  | 1 1/4                            | 35.1                    | 190.5                   | 203.2 |
| 6                       | 211.1                                  | R45            | 15.7                        | 22.4          | 1X4.50                   | 1X4.75                  | 317.5                   | 12                 | 1 1/8                            | 31.8                    | 196.9                   | 209.6 |
| 8                       | 269.9                                  | R49            | 15.7                        | 22.4          | 1X4.50                   | 1X5.00                  | 393.7                   | 12                 | 1 3/8                            | 38.1                    | 228.6                   | 241.3 |
| 10                      | 323.9                                  | R53            | 15.7                        | 22.4          | 1X4.50                   | 1X5.25                  | 469.9                   | 16                 | 1 3/8                            | 38.1                    | 241.3                   | 254.0 |
| 12                      | 381.0                                  | R57            | 15.7                        | 22.4          | 1X4.50                   | 1X5.50                  | 533.4                   | 20                 | 1 3/8                            | 38.1                    | 260.4                   | 273.1 |
| 14                      | -                                      | -              | -                           | -             | -                        | -                       | 558.8                   | 20                 | 1 1/2                            | 41.1                    | 279.4                   | -     |
| 16                      | -                                      | -              | -                           | -             | -                        | -                       | 616.0                   | 20                 | 1 5/8                            | 44.5                    | 292.1                   | -     |
| 18                      | -                                      | -              | -                           | -             | -                        | -                       | 685.8                   | 20                 | 1 7/8                            | 50.8                    | 330.2                   | -     |
| 20                      | -                                      | -              | -                           | -             | -                        | -                       | 749.3                   | 20                 | 2                                | 53.8                    | 355.6                   | -     |
| 24                      | -                                      | -              | -                           | -             | -                        | -                       | 901.7                   | 20                 | 2 1/2                            | 66.5                    | 444.5                   | -     |
| CLASS 1500              |                                        |                |                             |               |                          |                         |                         |                    |                                  |                         |                         |       |
| 1                       | 50.8                                   | R16            | 6.4                         | 12.7          | 5/8X3.00                 | 5/8X3.50                | 101.6                   | 4                  | 7/8                              | 25.4                    | 152.4                   | 158.8 |
| 1 1/4                   | 60.3                                   | R18            | 6.4                         | 12.7          | 5/8X3.00                 | 5/8X3.50                | 111.3                   | 4                  | 7/8                              | 25.4                    | 139.7                   | 146.1 |
| 1 1/2                   | 68.3                                   | R20            | 6.4                         | 12.7          | 5/8X3.00                 | 5/8X3.50                | 124.0                   | 4                  | 1                                | 28.4                    | 158.8                   | 165.1 |
| 2                       | 95.3                                   | R24            | 6.4                         | 12.7          | 5/8X3.00                 | 5/8X4.00                | 165.1                   | 8                  | 7/8                              | 25.4                    | 152.4                   | 165.1 |
| 2 1/2                   | 108.0                                  | R27            | 6.4                         | 12.7          | 5/8X3.00                 | 5/8X4.00                | 190.5                   | 8                  | 1                                | 28.4                    | 165.1                   | 177.8 |
| 3                       | 136.5                                  | R35            | 9.7                         | 15.7          | 5/8X3.50                 | 3/4X4.50                | 203.2                   | 8                  | 1 1/8                            | 31.8                    | 184.2                   | 196.9 |
| 4                       | 161.9                                  | R39            | 9.7                         | 15.7          | 5/8X3.50                 | 3/4X4.50                | 241.3                   | 8                  | 1 1/4                            | 35.1                    | 203.2                   | 215.9 |
| 5                       | 193.7                                  | R44            | 9.7                         | 15.7          | 5/8X3.50                 | 3/4X4.50                | 292.1                   | 8                  | 1 1/2                            | 41.1                    | 247.7                   | 260.4 |
| 6                       | 211.1                                  | R46            | 15.8                        | 22.4          | 1X6.00                   | 1X6.50                  | 317.5                   | 12                 | 1 3/8                            | 38.1                    | 266.7                   | 279.4 |
| 8                       | 269.9                                  | R50            | 15.7                        | 22.4          | 1X6.50                   | 1X6.50                  | 393.7                   | 12                 | 1 5/8                            | 44.5                    | 298.5                   | 317.5 |
| 10                      | 323.9                                  | R54            | 15.7                        | 22.4          | 1X6.50                   | 1X7.00                  | 482.6                   | 12                 | 1 7/8                            | 50.8                    | 342.9                   | 362.0 |
| 12                      | 381.0                                  | R58            | 15.7                        | 22.4          | 1X6.50                   | 1X8.00                  | 571.5                   | 16                 | 2                                | 53.8                    | 381.0                   | 406.4 |
| 14                      | -                                      | -              | -                           | -             | -                        | -                       | 635.0                   | 16                 | 2 1/4                            | 60.5                    | 412.8                   | -     |
| 16                      | -                                      | -              | -                           | -             | -                        | -                       | 704.9                   | 16                 | 2 1/2                            | 66.5                    | 450.9                   | -     |
| 18                      | -                                      | -              | -                           | -             | -                        | -                       | 774.7                   | 16                 | 2 3/4                            | 73.2                    | 501.7                   | -     |
| 20                      | -                                      | -              | -                           | -             | -                        | -                       | 831.9                   | 16                 | 3                                | 79.2                    | 546.1                   | -     |
| 24                      | -                                      | -              | -                           | -             | -                        | -                       | 990.6                   | 16                 | 3 1/2                            | 91.9                    | 622.3                   | -     |

NOTE :

- Unless otherwise specified, raised face unions are furnished with alloy bolt studs per ASTM A193 Grade B7 with American Standard heavy series hex nuts ASTM A194 Class 2H.
- On ring joint flanges having a groove depth 0.375" (9.5mm) and less, the distance from the center line of the tap hole to the flange face is 0.750" (19.1mm). When the depth of groove is 0.438" (11.1mm) or greater, changes in drill size or method of drilling are necessary.
- Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25" (6.4mm) for sizes 3-12 and 0.38" (9.7mm) for sizes 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62" (15.7mm) for sizes 3-10, 0.75" (19.1mm) for sizes 12-18 and 0.88" (22.4mm) for size 20.

## CLASS 2500 ORIFICE FLANGES



## ANSI B 16.36 Forged Flanges

Unit : mm

| Nominal<br>Pipe<br>Size | O.D. of<br>Flange<br>Face | O.D. of<br>Raised<br>Flange | THK'S<br>of Hub<br>Min | Length<br>Thru | Diam.<br>of Hub | Diam.<br>of Hub<br>at Bevel | Bore                                        | Ring Type<br>Joining | Ring<br>Number | DRILLING TEMPLATE       |                    |                   |                             | LENGTH OF<br>STUD BOLTS |               |
|-------------------------|---------------------------|-----------------------------|------------------------|----------------|-----------------|-----------------------------|---------------------------------------------|----------------------|----------------|-------------------------|--------------------|-------------------|-----------------------------|-------------------------|---------------|
|                         |                           |                             |                        |                |                 |                             |                                             | Pitch<br>Diam.       |                | Diam.<br>Bolt<br>Circle | Number<br>of Holes | Diam.<br>of Holes | Diam.<br>of Bolts<br>(inch) | Raised<br>Face          | Ring<br>Joint |
|                         | D                         | G                           | t                      | T              | X               | A                           | B                                           | P                    |                |                         |                    |                   |                             |                         |               |
| 1                       | 159                       | 50.8                        | 38.1                   | 91.9           | 57.2            | 33.5                        | See Note 1.<br>To be specified by purchaser | 60.3                 | R18            | 108.0                   | 4                  | 25.4              | 7/8                         | 152.4                   | 158.8         |
| 1 1/2                   | 203                       | 73.2                        | 44.5                   | 111.3          | 79.2            | 48.3                        |                                             | 82.6                 | R23            | 146.1                   | 4                  | 31.8              | 1 1/8                       | 177.8                   | 190.5         |
| 2                       | 235                       | 91.9                        | 50.8                   | 127.0          | 95.3            | 60.5                        |                                             | 101.6                | R26            | 171.5                   | 8                  | 28.4              | 1                           | 184.2                   | 196.9         |
| 2 1/2                   | 267                       | 104.6                       | 57.2                   | 142.7          | 114.3           | 73.2                        |                                             | 111.1                | R28            | 196.9                   | 8                  | 31.8              | 1 1/8                       | 203.2                   | 215.9         |
| 3                       | 305                       | 127.0                       | 66.5                   | 168.1          | 133.4           | 88.9                        |                                             | 127.0                | R32            | 228.6                   | 8                  | 35.1              | 1 1/4                       | 228.6                   | 241.3         |
| 4                       | 356                       | 157.2                       | 76.2                   | 190.5          | 165.1           | 114.3                       |                                             | -                    | -              | 273.1                   | 8                  | 41.1              | 1 1/2                       | 260.4                   | -             |
| 6                       | 483                       | 215.9                       | 108.0                  | 273.1          | 235.0           | 168.4                       |                                             | -                    | -              | 368.3                   | 8                  | 53.8              | 2                           | 349.3                   | -             |
| 8                       | 552                       | 269.7                       | 127.0                  | 317.5          | 304.8           | 219.2                       |                                             | -                    | -              | 438.2                   | 12                 | 53.8              | 2                           | 387.4                   | -             |
| 10                      | 673                       | 323.9                       | 165.1                  | 419.1          | 374.7           | 273.1                       |                                             | -                    | -              | 539.8                   | 12                 | 66.5              | 2 1/2                       | 489.0                   | -             |
| 12                      | 762                       | 381.0                       | 184.2                  | 463.6          | 441.5           | 323.9                       |                                             | -                    | -              | 619.3                   | 12                 | 73.2              | 2 3/4                       | 539.8                   | -             |

### NOTE :

- For the inside diameter of pipes (corresponding to 'Bore' (B) of Welding Neck Flanges), refer to page 46,47
- Class 2500 Flanges will be furnished with 0.25" (6.4mm) raised face, which is included in 'Thickness' (t) and 'Length through Hub' (T)
- Each union includes two carbon steel jack screw bolts with hex nuts.
- Unless otherwise specified, raised face unions are furnished with alloy bolt studs per ASTM A193 Grade B7 with American Standard heavy series hex nuts ASTM A194 Class 2H.
- On ring joint flanges having a groove depth 0.375" (9.5mm) and less, the distance from the center line of the tap hole to the flange face is 0.750" (19.1mm). When the depth of groove is 0.438" (11.1mm) or greater, changes in drill size or method of drilling are necessary.
- Class 2500 Slip-on flanges are not covered by ANSI B16.5.
- Bolt lengths for raised face flanges include allowance for orifice and gasket thickness of 0.25" (6.4mm) for sizes 1-12 and 0.38" (9.7mm) for sizes 14-24. Bolt lengths for ring type joint flanges include allowance of 0.62" (15.7mm) for sizes 1-6.

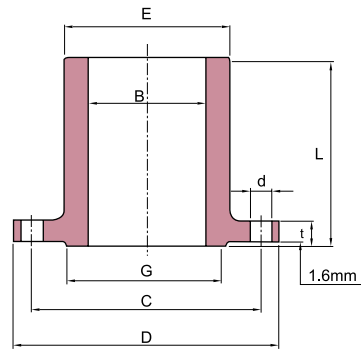


# LONG WELDING NECK FLANGES

- Class 150 Flanges
- Class 300 Flanges
- Class 400 Flanges
- Class 600 Flanges
- Class 900 Flanges
- Class 1500 Flanges
- Class 2500 Flanges

# LONG WELDING NECK FLANGES

## CLASS 150 FLANGES



Unit : mm

| Nominal Pipe Size | Outside Diam. | O.D of Raised Face | Hub Diameter of Bevel | Diameter of Bore | Thickness of Flange Min | Length Through Hub | DRILLING                |                 |                   |
|-------------------|---------------|--------------------|-----------------------|------------------|-------------------------|--------------------|-------------------------|-----------------|-------------------|
|                   |               |                    |                       |                  |                         |                    | Diameter of Bolt Circle | Number of Holes | Diameter of Holes |
|                   | D             | G                  | E                     | B                | t                       | L                  | C                       |                 | d                 |
| 1/2               | 89            | 34.9               | 30.2                  | 12.7             | 11.2                    | 228.6              | 60.5                    | 4               | 15.7              |
| 3/4               | 99            | 42.9               | 38.1                  | 19.1             | 12.7                    | 228.6              | 69.9                    | 4               | 15.7              |
| 1                 | 108           | 50.8               | 50.8                  | 25.4             | 14.2                    | 228.6              | 79.2                    | 4               | 15.7              |
| 1 1/4             | 117           | 63.5               | 60.5                  | 31.8             | 15.7                    | 228.6              | 88.9                    | 4               | 15.7              |
| 1 1/2             | 127           | 73.0               | 66.5                  | 38.1             | 17.5                    | 228.6              | 98.6                    | 4               | 15.7              |
| 2                 | 152           | 91.9               | 82.6                  | 50.8             | 19.1                    | 228.6              | 120.7                   | 4               | 19.1              |
| 2 1/2             | 178           | 104.6              | 95.3                  | 63.5             | 22.4                    | 228.6              | 139.7                   | 4               | 19.1              |
| 3                 | 191           | 127.0              | 108.0                 | 76.2             | 23.9                    | 228.6              | 152.4                   | 4               | 19.1              |
| 3 1/2             | 216           | 139.7              | 124.0                 | 88.9             | 23.9                    | 228.6              | 177.8                   | 8               | 19.1              |
| 4                 | 229           | 157.2              | 139.7                 | 101.6            | 23.9                    | 304.8              | 190.5                   | 8               | 19.1              |
| 5                 | 254           | 185.7              | 165.1                 | 127.0            | 23.9                    | 304.8              | 215.9                   | 8               | 22.4              |
| 6                 | 279           | 215.9              | 196.9                 | 152.4            | 25.4                    | 304.8              | 241.3                   | 8               | 22.4              |
| 8                 | 343           | 269.7              | 247.7                 | 203.2            | 28.4                    | 304.8              | 298.5                   | 8               | 22.4              |
| 10                | 406           | 323.9              | 304.8                 | 254.0            | 30.2                    | 304.8              | 362.0                   | 12              | 25.4              |
| 12                | 483           | 381.0              | 365.3                 | 304.8            | 31.8                    | 304.8              | 431.8                   | 12              | 25.4              |
| 14                | 533           | 412.8              | 406.4                 | 355.6            | 35.1                    | 304.8              | 476.3                   | 12              | 28.4              |
| 16                | 597           | 469.9              | 457.2                 | 406.4            | 36.6                    | 304.8              | 539.8                   | 16              | 28.4              |
| 18                | 635           | 533.4              | 508.0                 | 457.2            | 39.6                    | 304.8              | 577.9                   | 16              | 31.8              |
| 20                | 699           | 584.2              | 558.8                 | 508.0            | 42.9                    | 304.8              | 635.0                   | 20              | 31.8              |
| 24                | 813           | 692.2              | 666.8                 | 609.6            | 47.8                    | 304.8              | 749.3                   | 20              | 35.1              |

## CLASS 300 FLANGES

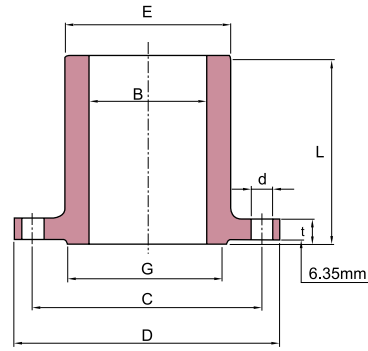
Unit : mm

| Nominal Pipe Size | Outside Diam. | O.D of Raised Face | Hub Diameter of Bevel | Diameter of Bore | Thickness of Flange Min | Length Through Hub | DRILLING                |                 |                   |
|-------------------|---------------|--------------------|-----------------------|------------------|-------------------------|--------------------|-------------------------|-----------------|-------------------|
|                   |               |                    |                       |                  |                         |                    | Diameter of Bolt Circle | Number of Holes | Diameter of Holes |
|                   | D             | G                  | E                     | B                | t                       | L                  | C                       |                 | d                 |
| 1/2               | 95            | 35.1               | 38.1                  | 12.7             | 14.2                    | 228.6              | 66.5                    | 4               | 15.7              |
| 3/4               | 117           | 42.9               | 47.8                  | 19.1             | 15.7                    | 228.6              | 82.6                    | 4               | 19.1              |
| 1                 | 124           | 50.8               | 53.8                  | 25.4             | 17.5                    | 228.6              | 88.9                    | 4               | 19.1              |
| 1 1/4             | 133           | 63.5               | 63.5                  | 31.8             | 19.1                    | 228.6              | 98.6                    | 4               | 19.1              |
| 1 1/2             | 155           | 73.2               | 69.9                  | 38.1             | 20.6                    | 228.6              | 114.3                   | 4               | 22.4              |
| 2                 | 165           | 91.9               | 84.1                  | 50.8             | 22.4                    | 228.6              | 127.0                   | 8               | 19.1              |
| 2 1/2             | 191           | 104.6              | 100.1                 | 63.5             | 25.4                    | 228.6              | 149.4                   | 8               | 22.4              |
| 3                 | 210           | 127.0              | 117.3                 | 76.2             | 28.4                    | 228.6              | 168.1                   | 8               | 22.4              |
| 3 1/2             | 229           | 139.7              | 133.4                 | 88.9             | 30.2                    | 228.6              | 184.2                   | 8               | 22.4              |
| 4                 | 254           | 157.2              | 146.1                 | 101.6            | 31.8                    | 304.8              | 200.2                   | 8               | 22.4              |
| 5                 | 279           | 185.7              | 177.8                 | 127.0            | 35.1                    | 304.8              | 235.0                   | 8               | 22.4              |
| 6                 | 318           | 215.9              | 206.2                 | 152.4            | 36.6                    | 304.8              | 269.7                   | 12              | 22.4              |
| 8                 | 381           | 269.7              | 260.4                 | 203.2            | 41.1                    | 304.8              | 330.2                   | 12              | 25.4              |
| 10                | 445           | 323.9              | 320.5                 | 254.0            | 47.8                    | 304.8              | 387.4                   | 16              | 28.4              |
| 12                | 521           | 381.0              | 374.7                 | 304.8            | 50.8                    | 304.8              | 450.9                   | 16              | 31.8              |
| 14                | 584           | 412.8              | 425.5                 | 355.6            | 53.8                    | 304.8              | 514.4                   | 20              | 31.8              |
| 16                | 648           | 469.9              | 482.6                 | 406.4            | 57.2                    | 304.8              | 571.5                   | 20              | 35.1              |
| 18                | 711           | 533.4              | 533.4                 | 457.2            | 60.5                    | 304.8              | 628.7                   | 24              | 35.1              |
| 20                | 775           | 584.2              | 587.2                 | 508.0            | 63.5                    | 304.8              | 685.8                   | 24              | 35.1              |
| 24                | 914           | 692.2              | 701.5                 | 609.6            | 69.9                    | 304.8              | 812.8                   | 24              | 41.1              |

NOTE : 1. Bore (B) is the same as nominal pipe size.

2. Welding necks longer than listed are available in all sizes on special order.

## CLASS 400 FLANGES



Unit : mm

| Nominal Pipe Size | Outside Diam. | O.D of Raised Face | Hub Diameter of Bevel | Diameter of Bore | Thickness of Flange Min | Length Through Hub | DRILLING                |                 |                   |
|-------------------|---------------|--------------------|-----------------------|------------------|-------------------------|--------------------|-------------------------|-----------------|-------------------|
|                   |               |                    |                       |                  |                         |                    | Diameter of Bolt Circle | Number of Holes | Diameter of Holes |
|                   | D             | G                  | E                     | B                | t                       | L                  | C                       |                 | d                 |
| 1/2               |               |                    |                       |                  |                         |                    |                         |                 |                   |
| 3/4               |               |                    |                       |                  |                         |                    |                         |                 |                   |
| 1                 |               |                    |                       |                  |                         |                    |                         |                 |                   |
| 1 1/4             |               |                    |                       |                  |                         |                    |                         |                 |                   |
| 1 1/2             |               |                    |                       |                  |                         |                    |                         |                 |                   |
| 2                 |               |                    |                       |                  |                         |                    |                         |                 |                   |
| 2 1/2             |               |                    |                       |                  |                         |                    |                         |                 |                   |
| 3                 |               |                    |                       |                  |                         |                    |                         |                 |                   |
| 3 1/2             |               |                    |                       |                  |                         |                    |                         |                 |                   |
| 4                 | 254           | 157.2              | 146.1                 | 101.6            | 35.1                    | 304.8              | 200.2                   | 8               | 25.4              |
| 5                 | 279           | 185.7              | 177.8                 | 127.0            | 38.1                    | 304.8              | 235.0                   | 8               | 25.4              |
| 6                 | 318           | 215.9              | 206.2                 | 152.4            | 41.1                    | 304.8              | 269.7                   | 12              | 25.4              |
| 8                 | 381           | 269.7              | 260.4                 | 203.2            | 47.8                    | 304.8              | 330.2                   | 12              | 28.4              |
| 10                | 445           | 323.9              | 320.5                 | 254.0            | 53.8                    | 304.8              | 387.4                   | 16              | 31.8              |
| 12                | 521           | 381.0              | 374.7                 | 304.8            | 57.2                    | 304.8              | 450.9                   | 16              | 35.1              |
| 14                | 584           | 412.8              | 425.5                 | 355.6            | 60.5                    | 304.8              | 514.4                   | 20              | 35.1              |
| 16                | 648           | 469.9              | 482.6                 | 406.4            | 63.5                    | 304.8              | 571.5                   | 20              | 38.1              |
| 18                | 711           | 533.4              | 533.4                 | 457.2            | 66.5                    | 304.8              | 628.7                   | 24              | 38.1              |
| 20                | 775           | 584.2              | 587.2                 | 508.0            | 69.9                    | 304.8              | 685.8                   | 24              | 41.1              |
| 24                | 914           | 692.2              | 701.5                 | 609.6            | 76.2                    | 304.8              | 812.8                   | 24              | 47.8              |

Use Class 600 dimensions in these sizes.

## CLASS 600 FLANGES

Unit : mm

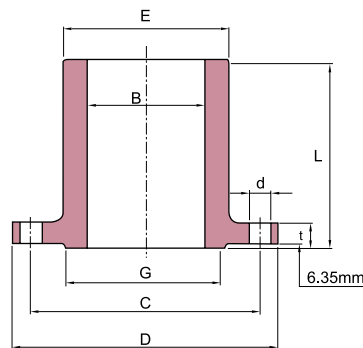
| Nominal Pipe Size | Outside Diam. | O.D of Raised Face | Hub Diameter of Bevel | Diameter of Bore | Thickness of Flange Min | Length Through Hub | DRILLING                |                 |                   |
|-------------------|---------------|--------------------|-----------------------|------------------|-------------------------|--------------------|-------------------------|-----------------|-------------------|
|                   |               |                    |                       |                  |                         |                    | Diameter of Bolt Circle | Number of Holes | Diameter of Holes |
|                   | D             | G                  | E                     | B                | t                       | L                  | C                       |                 | d                 |
| 1                 | 124           | 50.8               | 53.8                  | 25.4             | 17.5                    | 228.6              | 88.9                    | 4               | 19.1              |
| 1 1/4             | 133           | 63.5               | 63.5                  | 31.8             | 20.6                    | 228.6              | 98.6                    | 4               | 19.1              |
| 1 1/2             | 155           | 73.2               | 69.9                  | 38.1             | 22.4                    | 228.6              | 114.3                   | 4               | 22.4              |
| 2                 | 165           | 91.9               | 84.1                  | 50.8             | 25.4                    | 228.6              | 127.0                   | 8               | 19.1              |
| 2 1/2             | 191           | 104.6              | 100.1                 | 63.5             | 28.4                    | 228.6              | 149.4                   | 8               | 22.4              |
| 3                 | 210           | 127.0              | 117.3                 | 76.2             | 31.8                    | 228.6              | 168.1                   | 8               | 22.4              |
| 3 1/2             | 229           | 139.7              | 133.4                 | 88.9             | 35.1                    | 228.6              | 184.2                   | 8               | 25.4              |
| 4                 | 273           | 157.2              | 152.4                 | 101.6            | 38.1                    | 304.8              | 215.9                   | 8               | 25.4              |
| 5                 | 330           | 185.7              | 190.5                 | 127.0            | 44.5                    | 304.8              | 266.7                   | 8               | 28.4              |
| 6                 | 356           | 215.9              | 222.3                 | 152.4            | 47.8                    | 304.8              | 292.1                   | 12              | 28.4              |
| 8                 | 419           | 269.7              | 273.1                 | 203.2            | 55.6                    | 304.8              | 349.3                   | 12              | 31.8              |
| 10                | 508           | 323.9              | 342.9                 | 254.0            | 63.5                    | 304.8              | 431.8                   | 16              | 35.1              |
| 12                | 559           | 381.0              | 400.1                 | 304.8            | 66.5                    | 304.8              | 489.0                   | 16              | 35.1              |
| 14                | 603           | 412.8              | 431.8                 | 355.6            | 69.9                    | 304.8              | 527.1                   | 20              | 38.1              |
| 16                | 686           | 469.9              | 495.3                 | 406.4            | 76.2                    | 304.8              | 603.3                   | 20              | 41.1              |
| 18                | 743           | 533.4              | 546.1                 | 457.2            | 82.6                    | 304.8              | 654.1                   | 20              | 44.5              |
| 20                | 813           | 584.2              | 609.6                 | 508.0            | 88.9                    | 304.8              | 723.9                   | 24              | 44.5              |
| 24                | 940           | 692.2              | 717.6                 | 609.6            | 101.6                   | 304.8              | 838.2                   | 24              | 50.8              |

NOTE : 1. Bore (B) is the same as nominal pipe size.

2. Welding necks longer than listed are available in all sizes on special order.

# LONG WELDING NECK FLANGES

## CLASS 900 FLANGES



Unit : mm

| Nominal Pipe Size | Outside Diam. | O.D of Raised Face | Hub Diameter of Bevel | Diameter of Bore | Thickness of Flange Min | Length Through Hub            | DRILLING                |                 |                   |
|-------------------|---------------|--------------------|-----------------------|------------------|-------------------------|-------------------------------|-------------------------|-----------------|-------------------|
|                   |               |                    |                       |                  |                         |                               | Diameter of Bolt Circle | Number of Holes | Diameter of Holes |
|                   | D             | G                  | E                     | B                | t                       | L                             | C                       |                 | d                 |
| 1                 |               |                    |                       |                  |                         |                               |                         |                 |                   |
| 1 1/4             |               |                    |                       |                  |                         |                               |                         |                 |                   |
| 1 1/2             |               |                    |                       |                  |                         |                               |                         |                 |                   |
| 2                 |               |                    |                       |                  |                         |                               |                         |                 |                   |
| 2 1/2             |               |                    |                       |                  |                         |                               |                         |                 |                   |
| 3                 | 241           | 127.0              | 127.0                 | 76.2             | 38.1                    | 304.8                         | 190.5                   | 8               | 22.4              |
| 4                 | 292           | 157.2              | 158.8                 | 101.6            | 44.5                    | 304.8                         | 235.0                   | 8               | 31.8              |
| 5                 | 349           | 185.7              | 190.5                 | 127.0            | 50.8                    | 304.8                         | 279.4                   | 8               | 35.1              |
| 6                 | 381           | 215.9              | 235.0                 | 152.4            | 55.6                    | 304.8                         | 317.5                   | 12              | 31.8              |
| 8                 | 470           | 269.7              | 298.5                 | 203.2            | 63.5                    | 304.8                         | 393.7                   | 12              | 38.1              |
| 10                | 546           | 323.9              | 368.3                 | 254.0            | 69.9                    | 406.4                         | 469.9                   | 16              | 38.1              |
| 12                | 610           | 381.0              | 419.1                 | 304.8            | 79.2                    | 406.4                         | 533.4                   | 20              | 38.1              |
| 14                | 641           | 412.8              | 450.9                 | 355.6            | 85.9                    | To be specified by Purchaser. | 558.8                   | 20              | 41.1              |
| 16                | 705           | 469.9              | 508.0                 | 406.4            | 88.9                    |                               | 616.0                   | 20              | 44.5              |
| 18                | 787           | 533.4              | 565.2                 | 457.2            | 101.6                   |                               | 685.8                   | 20              | 50.8              |
| 20                | 857           | 584.2              | 622.3                 | 508.0            | 108.0                   |                               | 749.3                   | 20              | 53.8              |
| 24                | 1041          | 692.2              | 749.3                 | 609.6            | 139.7                   |                               | 901.7                   | 20              | 66.5              |

Use Class 1500 dimensions in these sizes.

## CLASS 1500 FLANGES

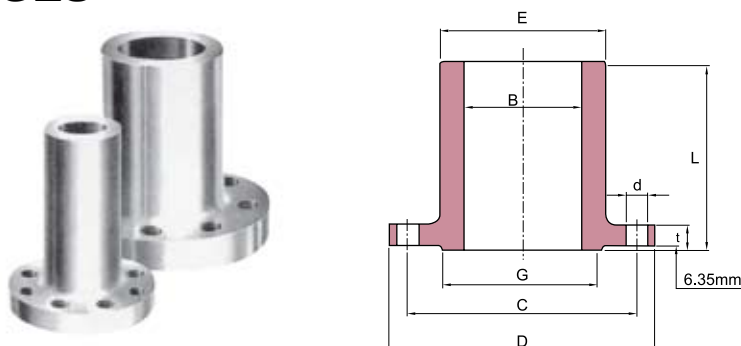
Unit : mm

| Nominal Pipe Size | Outside Diam. | O.D of Raised Face | Hub Diameter of Bevel | Diameter of Bore | Thickness of Flange Min | Length Through Hub            | DRILLING                |                 |                   |
|-------------------|---------------|--------------------|-----------------------|------------------|-------------------------|-------------------------------|-------------------------|-----------------|-------------------|
|                   |               |                    |                       |                  |                         |                               | Diameter of Bolt Circle | Number of Holes | Diameter of Holes |
|                   | D             | G                  | E                     | B                | t                       | L                             | C                       |                 | d                 |
| 1                 | 149           | 50.8               | 52.4                  | 25.4             | 28.4                    | 228.6                         | 101.6                   | 4               | 25.4              |
| 1 1/4             | 159           | 63.5               | 63.5                  | 31.8             | 28.4                    | 228.6                         | 111.3                   | 4               | 25.4              |
| 1 1/2             | 178           | 73.2               | 69.9                  | 38.1             | 31.8                    | 228.6                         | 124.0                   | 4               | 28.4              |
| 2                 | 216           | 91.9               | 104.6                 | 50.8             | 38.1                    | 228.6                         | 165.1                   | 8               | 25.4              |
| 2 1/2             | 244           | 104.6              | 124.0                 | 63.5             | 41.1                    | 304.8                         | 190.5                   | 8               | 28.4              |
| 3                 | 267           | 127.0              | 133.4                 | 76.2             | 47.8                    | 304.8                         | 203.2                   | 8               | 31.8              |
| 4                 | 311           | 157.2              | 162.1                 | 101.6            | 53.8                    | 304.8                         | 241.3                   | 8               | 35.1              |
| 5                 | 375           | 185.7              | 196.9                 | 127.0            | 73.2                    | 304.8                         | 292.1                   | 8               | 41.1              |
| 6                 | 394           | 215.9              | 228.6                 | 152.4            | 82.6                    | 304.8                         | 317.5                   | 12              | 38.1              |
| 8                 | 483           | 269.7              | 292.1                 | 203.2            | 91.9                    | 304.8                         | 393.7                   | 12              | 44.5              |
| 10                | 584           | 323.9              | 368.3                 | 254.0            | 108.0                   | 406.4                         | 482.6                   | 12              | 50.8              |
| 12                | 673           | 381.0              | 450.9                 | 304.8            | 124.0                   | 406.4                         | 571.5                   | 16              | 53.8              |
| 14                | 749           | 412.8              | 495.3                 | 355.6            | 133.4                   | To be specified by Purchaser. | 635.0                   | 16              | 60.5              |
| 16                | 826           | 469.9              | 552.5                 | 406.4            | 146.1                   |                               | 704.9                   | 16              | 66.5              |
| 18                | 914           | 533.4              | 596.9                 | 457.2            | 162.1                   |                               | 774.7                   | 16              | 73.2              |
| 20                | 984           | 584.2              | 641.4                 | 508.0            | 177.8                   |                               | 831.9                   | 16              | 79.2              |
| 24                | 1168          | 692.2              | 762.0                 | 609.6            | 203.2                   |                               | 990.6                   | 16              | 91.9              |

NOTE : 1. Bore (B) is the same as nominal pipe size.

2. Welding necks longer than listed are available in all sizes on special order.

## CLASS 2500 FLANGES



Unit : mm

| Nominal Pipe Size | Outside Diam. | O.D of Raised Face | Hub Diameter of Bevel | Diameter of Bore | Thickness of Flange Min | Length Through Hub | DRILLING                |                 |                   |
|-------------------|---------------|--------------------|-----------------------|------------------|-------------------------|--------------------|-------------------------|-----------------|-------------------|
|                   |               |                    |                       |                  |                         |                    | Diameter of Bolt Circle | Number of Holes | Diameter of Holes |
|                   | D             | G                  | E                     | B                | t                       | L                  | C                       |                 | d                 |
| 1                 | 159           | 50.8               | 57.2                  | 25.4             | 35.1                    | 228.6              | 108.0                   | 4               | 25.4              |
| 1 1/4             | 184           | 63.5               | 73.2                  | 31.8             | 38.1                    | 228.6              | 130.0                   | 4               | 28.4              |
| 1 1/2             | 203           | 73.2               | 79.2                  | 38.1             | 44.5                    | 228.6              | 146.1                   | 4               | 31.8              |
| 2                 | 235           | 91.9               | 95.3                  | 50.8             | 50.8                    | 228.6              | 171.5                   | 8               | 28.4              |
| 2 1/2             | 267           | 104.6              | 114.3                 | 63.5             | 57.2                    | 304.8              | 196.9                   | 8               | 31.8              |
| 3                 | 305           | 127.0              | 133.4                 | 76.2             | 66.5                    | 304.8              | 228.6                   | 8               | 35.1              |
| 4                 | 356           | 157.2              | 165.1                 | 101.6            | 76.2                    | 304.8              | 273.1                   | 8               | 41.1              |
| 5                 | 419           | 185.7              | 203.2                 | 127.0            | 91.9                    | 304.8              | 323.9                   | 8               | 47.8              |
| 6                 | 483           | 215.9              | 235.0                 | 152.4            | 108.0                   | 304.8              | 368.3                   | 8               | 53.8              |
| 8                 | 552           | 269.7              | 304.8                 | 203.2            | 127.0                   | 304.8              | 438.2                   | 12              | 53.8              |
| 10                | 673           | 323.9              | 374.7                 | 254.0            | 165.1                   | 406.4              | 539.8                   | 12              | 66.5              |
| 12                | 762           | 381.0              | 441.5                 | 304.8            | 184.2                   | 406.4              | 619.3                   | 16              | 73.2              |

## GUIDE TO MATERIAL LAYOUT & SPECIFICATIONS

| Pipe           | Weld Fittings | Screwed & Socket Fittings | Flanges                   | Valves                   |
|----------------|---------------|---------------------------|---------------------------|--------------------------|
| A-53           | A-234 WPB     | A-105, A-181 Gr. 60 or 70 | A-105, A-181 Gr. 60 or 70 | A-105<br>A-216 WCB       |
| A-106B         | A-234 WPB     | A-105, Gr. 60 or 70       | A-105, Gr. 60 or 70       | A-105<br>A-216 WCB       |
| A-312 T304     | A-403 WP-304  | A-182 F-304               | A-182 F-304               | A-182<br>F-304 CMO       |
| A-312 T316     | A-403 WP-316  | A-182 F-316               | A-182 F-316               | A-182<br>F-316 CM 8MO    |
| A-333 Gr. 1or6 | A-420 WPL 1&6 | A-350 LF-1                | A-350 LF-1                | A-350 LF-1<br>A-352 LCB  |
| A-333 Gr. 3    | A-420 WPL-3   | A-350 LF-3                | A-350 LF-3                | A-350 LF-3<br>A-352 LC3  |
| A-335 P-1      | A-234 WP-1    | A-182 F-1                 | A-182 F-1                 | A-217 WC-6               |
| A-335 P-11     | A-234 WP-11   | A-182 F-11                | A-182 F-11                | A-182 F-11<br>A-217 WC-6 |
| A-335 P-12     | A-234 WP-12   | A-182 F-12                | A-182 F-12                | A-217 WC-6               |
| A-335 P-22     | A-234 WP-22   | A-182 F-22                | A-182 F-22                | A-182 F-22<br>A-217 WC-9 |
| A-335 P-5      | A-234 WP-5    | A-182 F-5                 | A-182 F-5                 | A-182 F-5<br>A-216 WC-5  |
| A-335 P-7      | A-234 WP-7    | A-182 F-7                 | A-182 F-7                 | A-182 F-7<br>A-217 WC-12 |
| A-335 P-9      | A-234 WP-9    | A-182 F-9                 | A-182 F-9                 | A-182 F-9<br>A-217 WC-12 |

NOTE : 1. Bore (B) is the same as nominal pipe size.  
2. Welding necks longer than listed are available in all sizes on special order.

## REDUCING FLANGES

### Threaded and Slip-on Types

#### ■ HUB

For hub diameter (X) and height of hub above the back of the flange (N) refer to the list of standard flange specification of the same type and pressure and use the dimensions of a flange one nominal pipe size smaller than the nominal pipe size from which the reduction is being made.

#### ■ FLANGE O.D., DRILLING TEMPLATE AND THICKNESS

Outside diameter, drilling template and flange thickness Q (See note on FACINGS) agree with the dimensions of a standard flange of the nominal pipe size from which the reduction is being made.

#### ■ FACING

Facing dimensions also agree with the dimensions of a standard flange of the nominal pipe size from which the reduction is being made.

150 lb. and 300 lb. forged steel Threaded, Slip-On, Welding Neck and Blind flanges are furnished with American Standard 1/16" raised face which is included in flange thickness. Q. 400 lb., 600 lb., 900 lb., 1500 lb. and 2500 lb. flange are supplied with American Standard 1/4" raised face which is not included in flange thickness (Q)

#### ■ BORE OR TAPPING

The bore or tapping is machined to accept a pipe of the nominal pipe size to which the reduction is being made. For reduction to size smaller than shown, BLIND FLANGE are tapped or bored to specified nominal pipe size.

#### EXAMPLE :

A 300 lb. threaded flange used in reducing from a 6" (152.4mm) to 3" (76.2mm) nominal pipe size should be specified as a 3" (76.2mm) x 12 1/2" - 300 lb. Threaded Reducing Flange. It would have the following dimensional characteristics :

Diameter of Hub (X) - 7" (177.8mm).

Height of Hub (N) - 5/8".

Hub dimensions are those of a 5" (127.0mm), 300lb, Standard flange.

Outside Diameter - 12 1/2"

Thickness (Q) - 1 7/16"

Raised face - 1/16".

O.D., Flange Thickness Q., Raised Face and Drilling Template are those of a 6" (152.4mm), 300lb. Standard Flange.

Tapping - 3" (76.2mm) I.P.S.

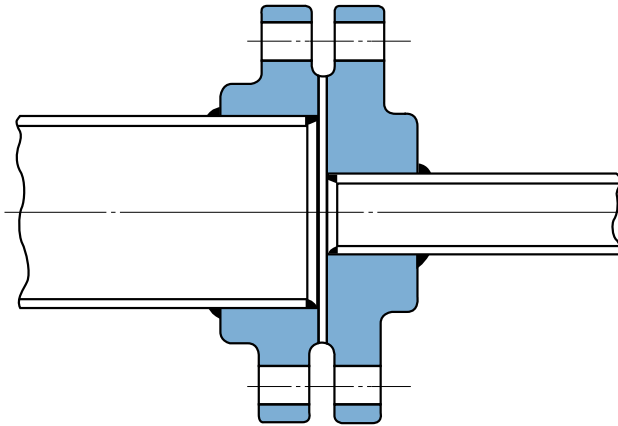
Flange is tapped to the nominal pipe size to which reduction is being made.

#### WELDING NECK TYPES

On Reducing Welding Neck Flanges, which are made only on special order, the hub dimensions agree with the hub dimensions of standard flanges of the size to which reduction is being made. Other flange dimensions, including the drilling template, agree with the standard dimensions of the size from which the reduction is being made.

# REDUCING FLANGES

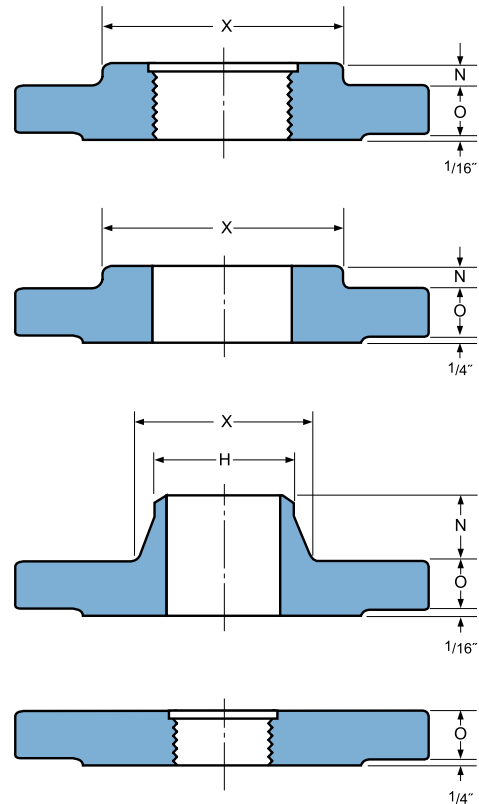
## Threaded-Slip-on-Welding neck



In ordering Reducing Flanges : specify (1) nominal pipe size of the tapping or bore to which the reduction is being made.  
(2) the outside diameter of the flange from which the reduction is being made and (3) pressure rating.

### EXAMPLE :

A 300 lb. Reducing flange for reducing from a 6" (152.4mm) to a 3" (76.2mm) nominal pipe size should be designated as a 3" (76.2mm) x 12 1/2" - 300 lb. Reducing Flange. Whether Threaded, Slip-On, or Welding Neck type is desired must also be specified.



## ANSI B 16.5 Forged Flanges

Dimensions inches.

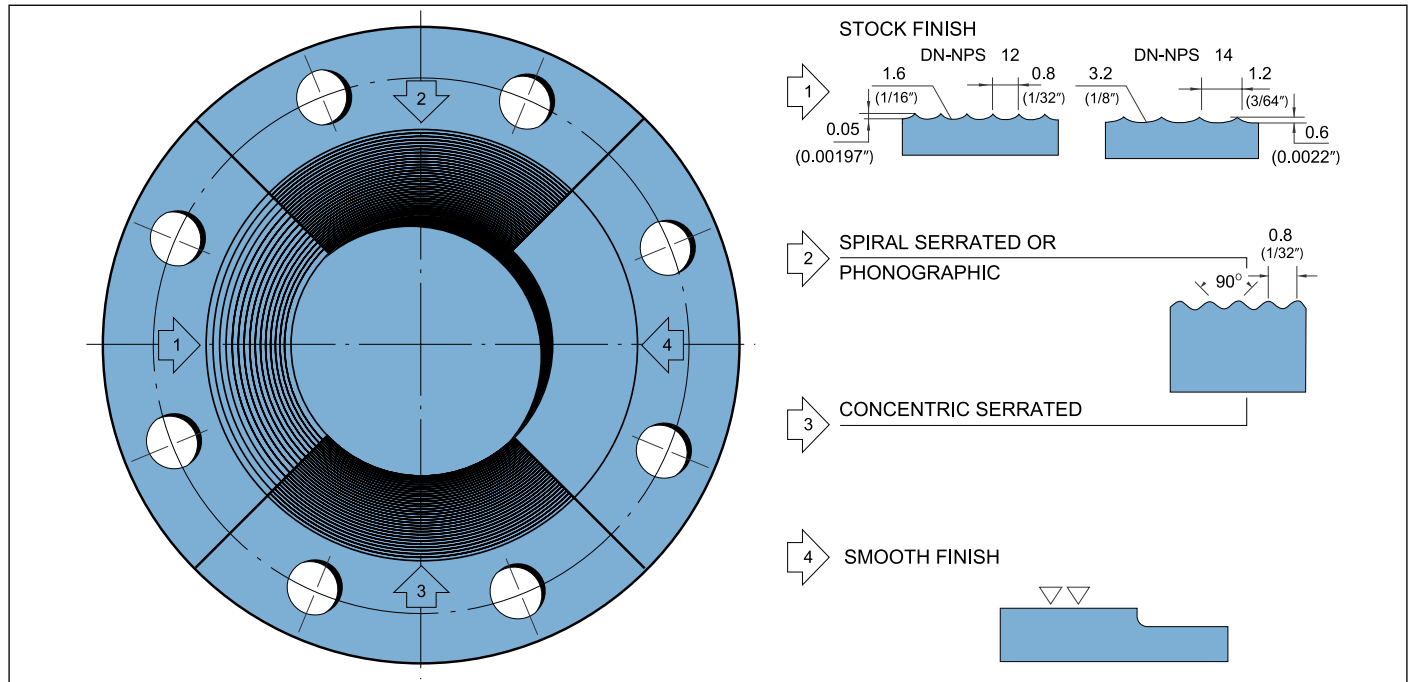
|                                                                                                      | Nominal<br>Flange | OUTSIDE DIAMETER OF FLANGE FROM WHICH REDUCTION IS BEING MADE |                     |                     |                     |                     |                      |                      | Smallest<br>Size Bore<br>or Tapping<br>Requiring<br>Hub Flange |
|------------------------------------------------------------------------------------------------------|-------------------|---------------------------------------------------------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|----------------------------------------------------------------|
|                                                                                                      |                   | 150 lb.<br>Standard                                           | 300 lb.<br>Standard | 400 lb.<br>Standard | 600 lb.<br>Standard | 900 lb.<br>Standard | 1500 lb.<br>Standard | 2500 lb.<br>Standard |                                                                |
| Nominal<br>Pipe size<br>to Which<br>Reduction<br>is to be<br>Maed to be<br>Specified by<br>Purchaser | 3/4               | 3 7/8                                                         | 4 5/8               | 4 5/8               | 4 5/8               | 5 1/8               | 5 1/8                | 5 1/2                | 1/2                                                            |
|                                                                                                      | 1                 | 4 1/4                                                         | 4 7/8               | 4 7/8               | 4 7/8               | 5 7/8               | 5 7/8                | 6 1/4                | 1/2                                                            |
|                                                                                                      | 1 1/4             | 4 5/8                                                         | 5 1/4               | 5 1/4               | 5 1/4               | 6 1/4               | 6 1/4                | 7 1/4                | 1/2                                                            |
|                                                                                                      | 1 1/2             | 5                                                             | 6 1/8               | 6 1/8               | 6 1/8               | 7                   | 7                    | 8                    | 1/2                                                            |
|                                                                                                      | 2                 | 6                                                             | 6 1/2               | 6 1/2               | 6 1/2               | 8 1/2               | 8 1/2                | 9 1/4                | 1                                                              |
|                                                                                                      | 2 1/2             | 7                                                             | 7 1/2               | 7 1/2               | 7 1/2               | 9 5/8               | 9 5/8                | 10 1/2               | 1 1/4                                                          |
|                                                                                                      | 3                 | 7 1/2                                                         | 8 1/4               | 8 1/4               | 8 1/4               | 9 1/2               | 10 1/2               | 12                   | 1 1/4                                                          |
|                                                                                                      | 3 1/2             | 8 1/2                                                         | 9                   | 9                   | 9                   | -                   | -                    | -                    | 1 1/2                                                          |
|                                                                                                      | 4                 | 9                                                             | 10                  | 10                  | 10 3/4              | 11 1/2              | 12 1/4               | 14                   | 1 1/2                                                          |
|                                                                                                      | 5                 | 10                                                            | 11                  | 11                  | 13                  | 13 3/4              | 14 3/4               | 16 1/2               | 1 1/2                                                          |
|                                                                                                      | 6                 | 11                                                            | 12 1/2              | 12 1/2              | 14                  | 15                  | 15 1/2               | 19                   | 2 1/2                                                          |
|                                                                                                      | 8                 | 13 1/2                                                        | 15                  | 15                  | 16 1/2              | 18 1/2              | 19                   | 21 3/4               | 3                                                              |
|                                                                                                      | 10                | 16                                                            | 17 1/2              | 17 1/2              | 20                  | 21 1/2              | 23                   | 26 1/2               | 3 1/2                                                          |
|                                                                                                      | 12                | 19                                                            | 20 1/2              | 20 1/2              | 22                  | 24                  | 26 1/2               | 30                   | 3 1/2                                                          |
|                                                                                                      | 14                | 21                                                            | 23                  | 23                  | 23 3/4              | 25 1/4              | -                    | -                    | 3 1/2                                                          |
|                                                                                                      | 16                | 23 1/2                                                        | 25 1/2              | 25 1/2              | 27                  | 27 3/4              | -                    | -                    | 4                                                              |
|                                                                                                      | 18                | 25                                                            | 28                  | 28                  | 29 1/4              | 31                  | -                    | -                    | 4                                                              |
|                                                                                                      | 20                | 27 1/2                                                        | 30 1/2              | 30 1/2              | 32                  | 33 3/4              | -                    | -                    | 4                                                              |
|                                                                                                      | 24                | 32                                                            | 36                  | 36                  | 37                  | 41                  | -                    | -                    | 4                                                              |

NOTE :

For reductions to size smaller than shown, blind flange are tapped or bored for specified nominal pipe size.

## 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 B 16.5 para 6, 4, 4)

#### ■ 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 $\mu$ m), to 250  $\mu$  inch (6.4 $\mu$ m) approximate roughness.

#### ■ TONGUE AND GROOVE, AND SMALL MALE AND FEMALE

The gasket contact surface does not exceed 125  $\mu$  in (3.2 $\mu$ m) roughness.

#### ■ RING JOINT

The inside wall surface of gasket groove does not exceed 63  $\mu$  in (1.6 $\mu$ m) roughness.

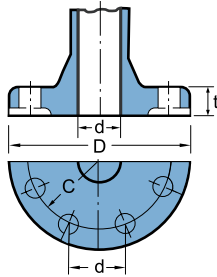
#### ■ BLIND

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. Maching of the depressed center is not required.

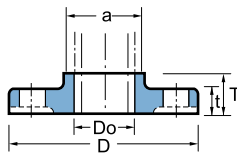
# TOLERANCE

## ANSI B16.5 Forged Flanges

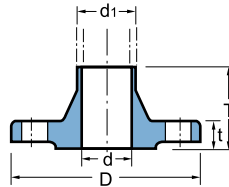
SOLID FANAGE



SLIP-ON FLANGE

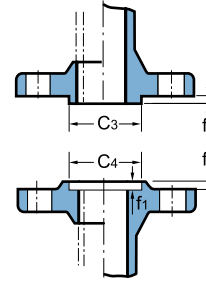


WELDING NECK FLANGE

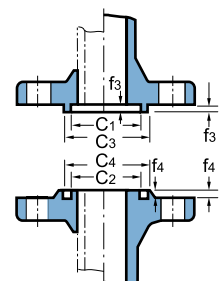


TYPE OF GASKET SURFACE

MALE & FEMALE TYPE



TONGUE & GROOVE TYPE



### THREADED, SOCKET-WELDING, SLIP-ON, LAP JOINT AND BLIND

|                          |                                                    |                                                                                 |
|--------------------------|----------------------------------------------------|---------------------------------------------------------------------------------|
| Outside Diameter         | When O.D. is 24" or less                           | $\pm 1 \frac{1}{16}"$ (1.6mm)*                                                  |
|                          | When O.D. is Over 24"                              | $\pm 1/8"$ (3.2mm)*                                                             |
| Inside Diameter          | Threaded                                           | Within limits on boring gauge                                                   |
|                          | Socket-Welding, Slip-on and Lap joint              | 10" & Smaller<br>$+1/32"$ (0.8mm), -0"<br>12" & Larger<br>$+1/16"$ (1.6mm), -0" |
| Outside Diameter of Hub  | 5" and Smaller                                     | $+3/32"$ (2.4mm)*<br>$-1/32"$ (0.8mm)                                           |
|                          | 6" and Larger                                      | $+5/32"$ (4.0mm)<br>$-1/32"$ (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                                        | $\pm 1/16"$ (1.6mm)                                                             |
|                          | Bolt Hole Spacing                                  | $\pm 1/32"$ (0.8mm)                                                             |
|                          | Eccentricity of Bolt Circle with Respect to Facing | 2 1/2" & Smaller<br>$1/32"$ (0.8mm) Max.<br>3" & Larger<br>$1/16"$ (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                                    | $\pm 1/16"$ (1.6mm)                                                             |
|                          | 12" and Larger                                     | $\pm 1/8"$ (3.2mm)                                                              |

NOTE : \* This tolerance is not covered in ANSI B16.5, but maker's option

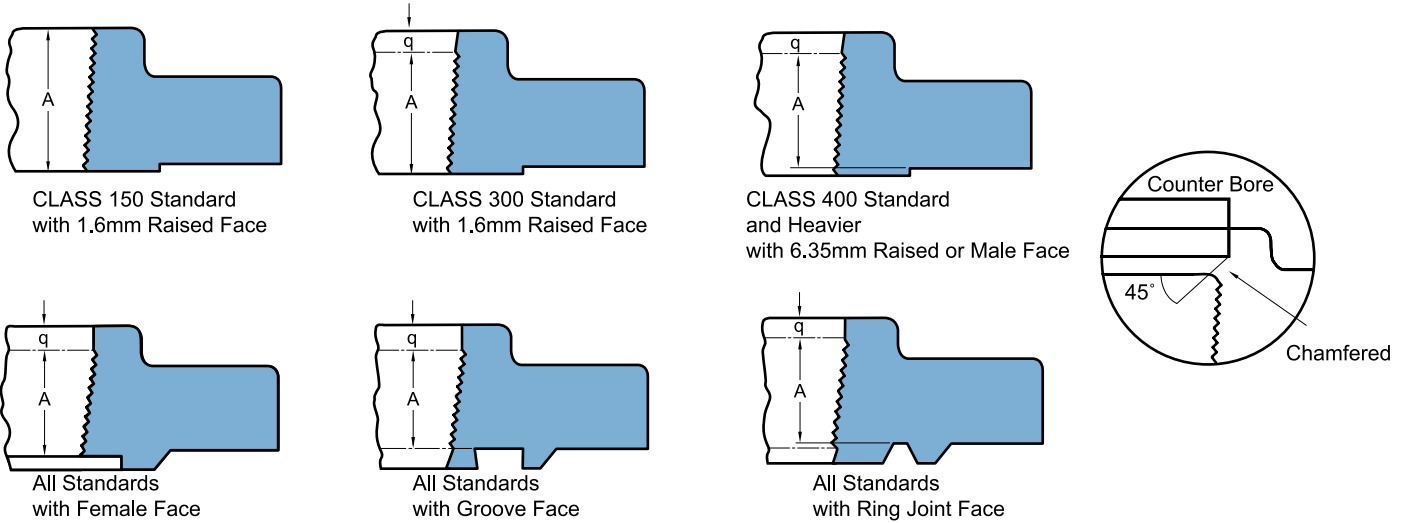
### WELDING NECK

|                                     |                                                    |                                                                                 |
|-------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------|
| Outside Diameter                    | When O.D. is 24" or less                           | $\pm 1 \frac{1}{16}"$ (1.6mm)*                                                  |
|                                     | When O.D. is Over 24"                              | $\pm 1/8"$ (3.2mm)*                                                             |
| Inside Diameter                     | 10" and Smaller                                    | $\pm 1/32"$ (0.8mm)                                                             |
|                                     | 12" thru 18"                                       | $\pm 1/16"$ (1.6mm)                                                             |
|                                     | 20" and Larger                                     | $+1/8"$ (3.2mm)<br>$-1/16"$ (1.6mm)                                             |
| Diameter of Contact Face            | 1/16" Raised Face                                  | $\pm 1/32"$ (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                    | $\pm 1/16"$ (1.6mm)                                                             |
|                                     | When Hub Base is Over 24"                          | $\pm 1/8"$ (3.2mm)                                                              |
| Diameter of Hub at Point of Welding | 5" and Smaller                                     | $+3/32"$ (2.4mm)<br>$-1/32"$ (0.8mm)                                            |
|                                     | 6" and Larger                                      | $+5/32"$ (4.0mm)<br>$-1/32"$ (0.8mm)                                            |
| Drilling                            | Bolt Circle                                        | $\pm 1/16"$ (1.6mm)                                                             |
|                                     | Bolt Hole Spacing                                  | $\pm 1/32"$ (0.8mm)                                                             |
|                                     | Eccentricity of Bolt Circle with Respect to Facing | 2 1/2" & Smaller<br>$1/32"$ (0.8mm) Max.<br>3" & Larger<br>$1/16"$ (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                     | 4" and Smaller                                     | $\pm 1/16"$ (1.6mm)                                                             |
|                                     | 5" ~ 10"                                           | $+1.6 \sim 3.0$ mm                                                              |
|                                     | 12" and Larger                                     | $+3.0 \sim 5.0$ mm                                                              |

NOTE : \* This tolerance is not covered in ANSI B16.5, but maker's option

## THREAD

### Thread and Standards for ANSI Flanges (ANSI B2.1)



### ANSI B 16.5 Forged Flanges

Unit : mm

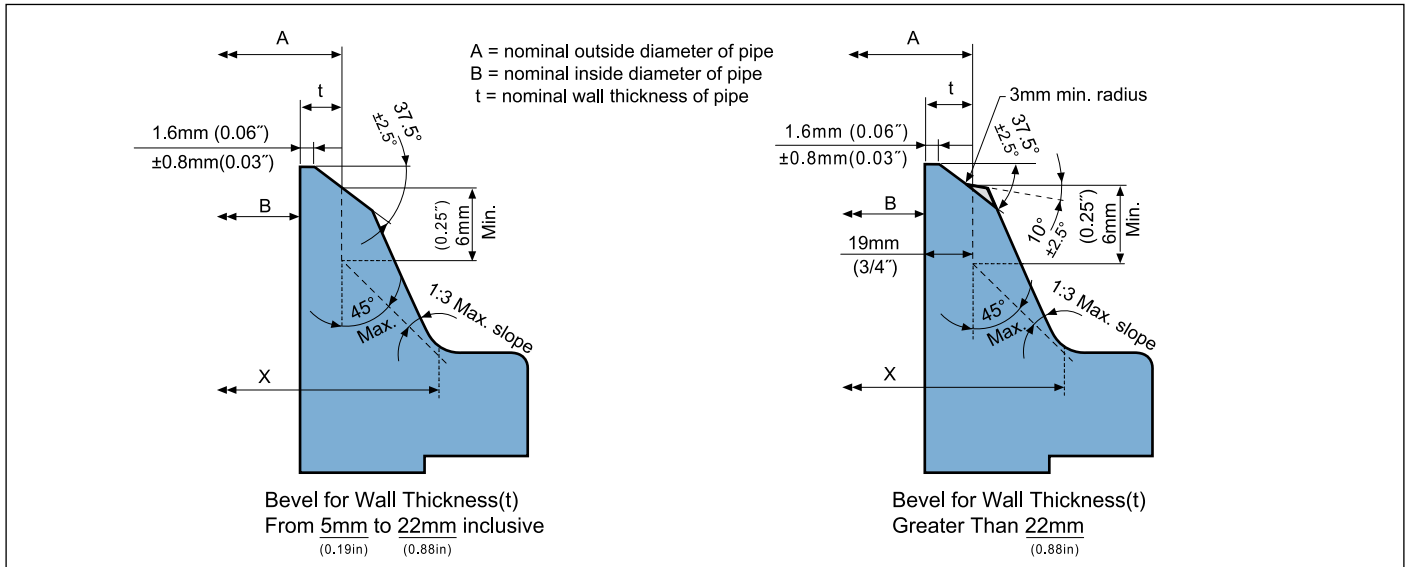
| Nominal Pipe Size | A-THREAD LENGTHS |           |           |           |           |            |            |
|-------------------|------------------|-----------|-----------|-----------|-----------|------------|------------|
|                   | Class 150        | Class 300 | Class 400 | Class 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      | 79.4      | 88.9      | -          | -          |
| 20                | 69.9             | 73.0      | 73.0      | 82.6      | 92.1      | -          | -          |
| 24                | 82.6             | 82.6      | 82.6      | 92.1      | 101.6     | -          | -          |

**NOTE :**

- 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
- The thread is concentric with the axis of the flange and variations in alignment do not exceed 0.06"(1.6mm)in, per foot (05. percent).
- 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 the thread. The chamfer is concentric with the thread and included in the measurement of the thread length.
- 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.
- 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 table. Threads do not necessarily extend to the face to the flange.

# WELDING ENDS

## ANSI B16.5 Forged Flanges

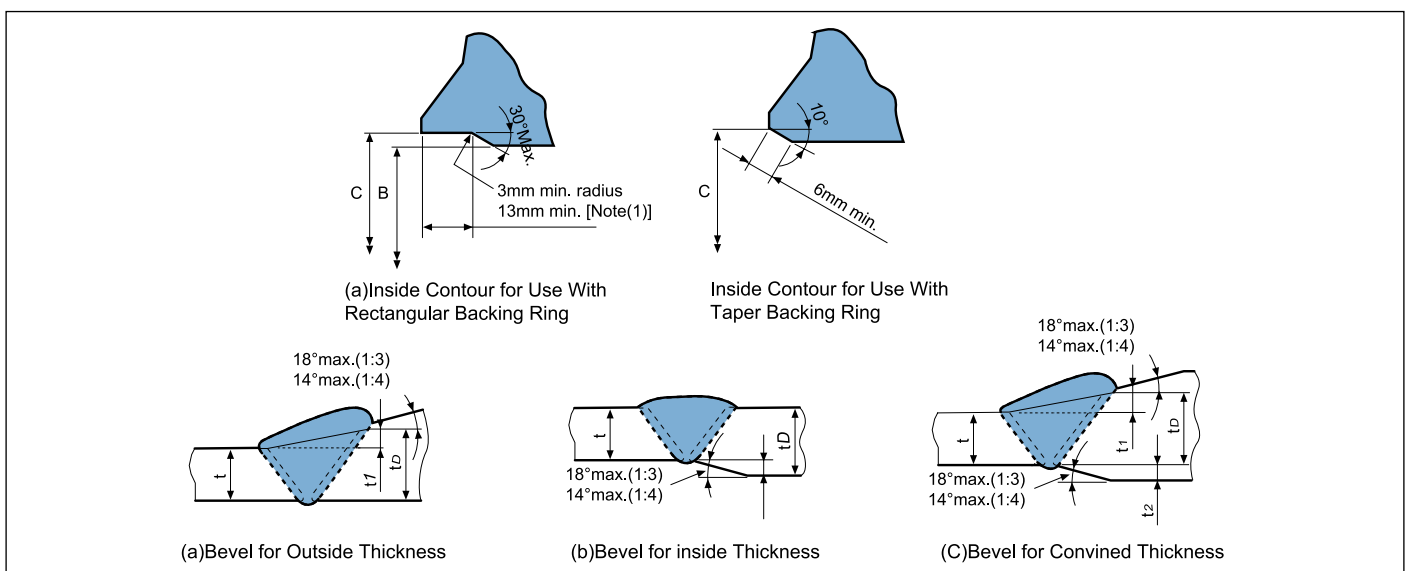


### Notes :

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 slope 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 O.D. 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 intended mating pipe.



### Notes :

- (1) When the materials joined have equal minimum specified yield strength, there shall be no restriction on the minimum slope.
- (2) Neither  $t_1$ ,  $t_2$ ,  $t_3$  nor their sum ( $t_1 + t_2$ ) shall exceed  $0.5t$
- (3) When the minimum specified yield strengths of the sections to be joined are unequal, the value of  $t_3$  shall at least equal  $t$  time the ratio of minimum specified yield strength of the pipe to minimum specified yield strength of the flange.

## PIPE&FITTINGS WALL THICKNESS SCHEDULES DIMENSION

| Nominal Pipe Size |       | Outside Diam. | Wall I.D. | Nominal Wall Thickness (Stainless steel) |        |        |        |        | Nominal Wall Thickness (Carbon & Low Alloy Steel) |        |        |        |
|-------------------|-------|---------------|-----------|------------------------------------------|--------|--------|--------|--------|---------------------------------------------------|--------|--------|--------|
| A                 | B     |               |           | S5S*                                     | S10S*  | S20S   | S40S   | S80S   | S5                                                | S10    | S20    | S30    |
| 6                 | 1/8   | 10.3          | W.T       | -                                        | 1.24   | -      | 1.73   | 2.41   | -                                                 | 1.24   | -      | 1.45   |
|                   |       |               | I.D       | -                                        | 7.82   | -      | 6.84   | 5.48   | -                                                 | 7.82   | -      | 7.40   |
| 8                 | 1/4   | 13.7          | W.T       | -                                        | 1.65   | -      | 2.24   | 3.02   | -                                                 | 1.65   | -      | 1.85   |
|                   |       |               | I.D       | -                                        | 10.40  | -      | 9.22   | 7.66   | -                                                 | 10.40  | -      | 10.00  |
| 10                | 3/8   | 17.1          | W.T       | -                                        | 1.65   | -      | 2.31   | 3.20   | -                                                 | 1.65   | -      | 1.85   |
|                   |       |               | I.D       | -                                        | 13.80  | -      | 12.48  | 10.70  | -                                                 | 13.80  | -      | 13.40  |
| 15                | 1/2   | 21.3          | W.T       | 1.65                                     | 2.11   | -      | 2.77   | 3.73   | 1.65                                              | 2.11   | -      | 2.41   |
|                   |       |               | I.D       | 18.00                                    | 17.08  | -      | 15.76  | 13.84  | 18.00                                             | 17.08  | -      | 16.48  |
| 20                | 3/4   | 26.7          | W.T       | 1.65                                     | 2.11   | -      | 2.87   | 3.91   | 1.65                                              | 2.11   | -      | 2.41   |
|                   |       |               | I.D       | 23.40                                    | 22.48  | -      | 20.96  | 18.88  | 23.40                                             | 22.48  | -      | 21.88  |
| 25                | 1     | 33.4          | W.T       | 1.65                                     | 2.77   | -      | 3.38   | 4.55   | 1.65                                              | 2.77   | -      | 2.90   |
|                   |       |               | I.D       | 30.10                                    | 27.86  | -      | 26.64  | 24.30  | 30.10                                             | 27.86  | -      | 27.60  |
| 32                | 1 1/4 | 42.2          | W.T       | 1.65                                     | 2.77   | -      | 3.56   | 4.85   | 1.65                                              | 2.77   | -      | 2.97   |
|                   |       |               | I.D       | 38.90                                    | 36.66  | -      | 35.08  | 32.50  | 38.90                                             | 36.66  | -      | 36.26  |
| 40                | 1 1/2 | 48.3          | W.T       | 1.65                                     | 2.77   | -      | 3.68   | 5.08   | 1.65                                              | 2.77   | -      | 3.18   |
|                   |       |               | I.D       | 45.00                                    | 42.76  | -      | 40.94  | 38.14  | 45.00                                             | 42.76  | -      | 41.94  |
| 50                | 2     | 60.3          | W.T       | 1.65                                     | 2.77   | -      | 3.91   | 5.54   | 1.65                                              | 2.77   | -      | 3.18   |
|                   |       |               | I.D       | 57.00                                    | 54.76  | -      | 52.48  | 49.22  | 57.00                                             | 54.76  | -      | 53.94  |
| 65                | 2 1/2 | 73.0          | W.T       | 2.11                                     | 3.05   | -      | 5.16   | 7.01   | 2.11                                              | 3.05   | -      | 4.78   |
|                   |       |               | I.D       | 68.78                                    | 66.90  | -      | 62.68  | 58.98  | 68.78                                             | 66.90  | -      | 63.44  |
| 80                | 3     | 88.9          | W.T       | 2.11                                     | 3.05   | -      | 5.49   | 7.62   | 2.11                                              | 3.05   | -      | 4.78   |
|                   |       |               | I.D       | 84.68                                    | 82.80  | -      | 77.92  | 73.66  | 84.68                                             | 82.80  | -      | 79.34  |
| 90                | 3 1/2 | 101.6         | W.T       | 2.11                                     | 3.05   | -      | 5.74   | 8.08   | 2.11                                              | 3.05   | -      | 4.78   |
|                   |       |               | I.D       | 97.38                                    | 95.50  | -      | 90.12  | 85.44  | 97.38                                             | 95.50  | -      | 92.04  |
| 100               | 4     | 114.3         | W.T       | 2.11                                     | 3.05   | -      | 6.02   | 8.56   | 2.11                                              | 3.05   | -      | 4.78   |
|                   |       |               | I.D       | 110.08                                   | 108.20 | -      | 102.26 | 97.18  | 110.08                                            | 108.20 | -      | 104.74 |
| 125               | 5     | 141.3         | W.T       | 2.77                                     | 3.40   | -      | 6.55   | 9.53   | 2.77                                              | 3.40   | -      | -      |
|                   |       |               | I.D       | 135.76                                   | 134.50 | -      | 128.20 | 122.24 | 135.76                                            | 134.50 | -      | -      |
| 150               | 6     | 168.3         | W.T       | 2.77                                     | 3.40   | -      | 7.11   | 10.97  | 2.77                                              | 3.40   | -      | -      |
|                   |       |               | I.D       | 162.76                                   | 161.50 | -      | 154.08 | 146.36 | 162.76                                            | 161.50 | -      | -      |
| 200               | 8     | 219.1         | W.T       | 2.77                                     | 3.76   | -      | 8.18   | 12.70  | 2.77                                              | 3.76   | 6.35   | 7.04   |
|                   |       |               | I.D       | 213.56                                   | 211.58 | -      | 202.74 | 193.70 | 213.56                                            | 211.58 | 20.640 | 205.02 |
| 250               | 10    | 273.1         | W.T       | 3.40                                     | 4.19   | -      | 9.27   | 12.70  | 3.40                                              | 4.19   | 6.35   | 7.80   |
|                   |       |               | I.D       | 266.30                                   | 264.72 | -      | 254.56 | 247.70 | 266.30                                            | 264.72 | 260.40 | 257.50 |
| 300               | 12    | 323.9         | W.T       | 3.96                                     | 4.57   | -      | 9.53   | 12.70  | 3.96                                              | 4.57   | 6.35   | 8.38   |
|                   |       |               | I.D       | 315.98                                   | 314.76 | -      | 304.84 | 298.50 | 315.98                                            | 314.76 | 311.20 | 307.14 |
| 350               | 14    | 355.6         | W.T       | 3.96                                     | 4.78   | -      | 9.53   | 12.70  | 3.96                                              | 6.35   | 7.92   | 9.53   |
|                   |       |               | I.D       | 347.68                                   | 346.04 | -      | 336.54 | 330.20 | 347.68                                            | 342.90 | 339.76 | 336.54 |
| 400               | 16    | 406.4         | W.T       | 4.19                                     | 4.78   | -      | 9.53   | 12.70  | 4.19                                              | 6.35   | 7.92   | 9.53   |
|                   |       |               | I.D       | 398.02                                   | 396.84 | -      | 387.34 | 381.00 | 398.02                                            | 393.70 | 390.56 | 387.34 |
| 450               | 18    | 457.0         | W.T       | 4.19                                     | 4.78   | -      | 9.53   | 12.70  | 4.19                                              | 6.35   | 7.92   | 11.13  |
|                   |       |               | I.D       | 448.62                                   | 447.44 | -      | 437.94 | 431.60 | 448.62                                            | 444.30 | 441.16 | 434.74 |
| 500               | 20    | 508.0         | W.T       | 4.78                                     | 5.54   | 7.90   | 9.53   | 12.70  | 4.78                                              | 6.35   | 9.53   | 12.70  |
|                   |       |               | I.D       | 498.44                                   | 496.62 | 492.20 | 488.94 | 482.60 | 498.44                                            | 495.30 | 488.94 | 482.60 |
| 550               | 22    | 559.0         | W.T       | 4.78                                     | 5.54   | -      | -      | -      | 4.78                                              | 6.35   | 9.53   | 12.70  |
|                   |       |               | I.D       | 549.44                                   | 547.92 | -      | -      | -      | 549.44                                            | 546.30 | 539.34 | 533.60 |
| 600               | 24    | 610.0         | W.T       | 5.54                                     | 6.35   | -      | 9.53   | 12.70  | 5.54                                              | 6.35   | 9.53   | 14.27  |
|                   |       |               | I.D       | 598.92                                   | 597.30 | -      | 590.94 | 584.60 | 598.92                                            | 597.30 | 590.94 | 581.46 |

### • Carbon & Low Alloy Steel (B36.10M)

The wall thickness shown represent nominal or average 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.

# ASME B36.10M & ASME B36.19M - 2004

| -Nominal Wall Thickness (Carbon & Low Alloy Steel)- |        |        |        |        |        |        |        |        |        | Outside<br>Diam. | Nominal Pipe Size |       |
|-----------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|------------------|-------------------|-------|
| STD                                                 | S40    | S60    | XS     | S80    | S100   | S120   | S140   | S160   | XXS    |                  | A                 | B     |
| 1.73                                                | 1.73   | -      | 2.41   | 2.41   | -      | -      | -      | -      | -      | 10.3             | 6                 | 1/8   |
| 6.84                                                | 6.84   | -      | 5.48   | 5.48   | -      | -      | -      | -      | -      |                  |                   |       |
| 2.24                                                | 2.24   | -      | 3.02   | 3.02   | -      | -      | -      | -      | -      | 13.7             | 8                 | 1/4   |
| 9.22                                                | 9.22   | -      | 7.66   | 7.66   | -      | -      | -      | -      | -      |                  |                   |       |
| 2.31                                                | 2.31   | -      | 3.20   | 3.20   | -      | -      | -      | -      | -      | 17.1             | 10                | 3/8   |
| 12.48                                               | 12.48  | -      | 10.70  | 10.70  | -      | -      | -      | -      | -      |                  |                   |       |
| 2.77                                                | 2.77   | -      | 3.73   | 3.73   | -      | -      | -      | 4.78   | 7.47   | 21.3             | 15                | 1/2   |
| 15.76                                               | 15.76  | -      | 13.84  | 13.84  | -      | -      | -      | 11.74  | 6.36   |                  |                   |       |
| 2.87                                                | 2.87   | -      | 3.91   | 3.91   | -      | -      | -      | 5.56   | 7.82   | 26.7             | 20                | 3/4   |
| 20.96                                               | 20.96  | -      | 18.88  | 18.88  | -      | -      | -      | 15.58  | 11.06  |                  |                   |       |
| 3.38                                                | 3.38   | -      | 4.55   | 4.55   | -      | -      | -      | 6.35   | 9.09   | 33.4             | 25                | 1     |
| 26.64                                               | 26.64  | -      | 24.30  | 24.30  | -      | -      | -      | 20.70  | 15.22  |                  |                   |       |
| 3.56                                                | 3.56   | -      | 4.85   | 4.85   | -      | -      | -      | 6.35   | 9.70   | 42.2             | 32                | 1 1/4 |
| 35.08                                               | 35.08  | -      | 32.50  | 32.50  | -      | -      | -      | 29.50  | 22.80  |                  |                   |       |
| 3.68                                                | 3.68   | -      | 5.08   | 5.08   | -      | -      | -      | 7.14   | 10.15  | 48.3             | 40                | 1 1/2 |
| 40.94                                               | 40.94  | -      | 38.14  | 38.14  | -      | -      | -      | 34.02  | 28.00  |                  |                   |       |
| 3.91                                                | 3.91   | -      | 5.54   | 5.54   | -      | -      | -      | 8.74   | 11.07  | 60.3             | 50                | 2     |
| 52.46                                               | 52.48  | -      | 49.22  | 49.22  | -      | -      | -      | 42.82  | 38.16  |                  |                   |       |
| 5.16                                                | 5.16   | -      | 7.01   | 7.01   | -      | -      | -      | 9.53   | 14.02  | 73.0             | 65                | 2 1/2 |
| 62.68                                               | 62.68  | -      | 58.98  | 58.98  | -      | -      | -      | 53.94  | 44.96  |                  |                   |       |
| 5.49                                                | 5.49   | -      | 7.62   | 7.62   | -      | -      | -      | 11.13  | 15.24  | 88.9             | 80                | 3     |
| 77.92                                               | 77.92  | -      | 73.66  | 73.66  | -      | -      | -      | 66.64  | 58.24  |                  |                   |       |
| 5.74                                                | 5.74   | -      | 8.08   | 8.08   | -      | -      | -      | 12.70  | -      | 101.6            | 90                | 3 1/2 |
| 90.12                                               | 90.12  | -      | 85.44  | 85.44  | -      | -      | -      | 76.20  | -      |                  |                   |       |
| 6.02                                                | 6.02   | -      | 8.56   | 8.56   | -      | 11.13  | -      | 13.49  | 17.12  | 114.3            | 100               | 4     |
| 102.26                                              | 102.26 | -      | 97.18  | 97.18  | -      | 92.04  | -      | 87.32  | 80.06  |                  |                   |       |
| 6.55                                                | 6.55   | -      | 9.53   | 9.53   | -      | 12.70  | -      | 15.88  | 19.05  | 141.3            | 125               | 5     |
| 128.20                                              | 128.20 | -      | 122.24 | 122.24 | -      | 115.90 | -      | 109.54 | 103.20 |                  |                   |       |
| 7.11                                                | 7.11   | -      | 10.97  | 10.97  | -      | 14.27  | -      | 18.26  | 21.95  | 168.3            | 150               | 6     |
| 154.08                                              | 154.08 | -      | 146.36 | 146.36 | -      | 139.76 | -      | 131.78 | 124.40 |                  |                   |       |
| 8.18                                                | 8.18   | 10.31  | 12.70  | 12.70  | 15.09  | 18.26  | 20.62  | 23.01  | 22.23  | 219.1            | 200               | 8     |
| 202.74                                              | 202.74 | 198.48 | 193.70 | 193.70 | 188.92 | 182.58 | 177.86 | 173.08 | 174.63 |                  |                   |       |
| 9.27                                                | 9.27   | 12.70  | 12.70  | 15.09  | 18.26  | 21.44  | 25.40  | 28.58  | 25.40  | 273.1            | 250               | 10    |
| 254.56                                              | 254.56 | 247.70 | 247.70 | 242.92 | 236.58 | 230.22 | 222.30 | 215.94 | 222.30 |                  |                   |       |
| 9.53                                                | 10.31  | 14.27  | 12.70  | 17.48  | 21.44  | 25.40  | 28.58  | 33.32  | 25.40  | 323.9            | 300               | 12    |
| 304.84                                              | 303.28 | 295.36 | 298.50 | 288.94 | 281.02 | 273.10 | 266.74 | 257.26 | 273.10 |                  |                   |       |
| 9.53                                                | 11.13  | 15.09  | 12.70  | 19.05  | 23.83  | 27.79  | 31.75  | 35.71  | -      | 355.6            | 350               | 14    |
| 336.54                                              | 333.34 | 325.42 | 330.20 | 317.50 | 307.94 | 300.02 | 292.10 | 284.18 | -      |                  |                   |       |
| 9.53                                                | 12.70  | 16.66  | 12.70  | 21.44  | 26.19  | 30.96  | 36.53  | 40.49  | -      | 406.4            | 400               | 16    |
| 387.34                                              | 381.00 | 373.08 | 381.00 | 363.52 | 354.02 | 344.48 | 333.34 | 325.42 | -      |                  |                   |       |
| 9.53                                                | 14.27  | 19.05  | 12.70  | 23.83  | 29.36  | 34.93  | 39.67  | 45.24  | -      | 457.0            | 450               | 18    |
| 437.94                                              | 428.46 | 418.90 | 431.60 | 409.34 | 398.28 | 387.14 | 377.66 | 366.52 | -      |                  |                   |       |
| 9.53                                                | 15.09  | 20.62  | 12.70  | 26.19  | 32.54  | 38.10  | 44.45  | 50.01  | -      | 508.0            | 500               | 20    |
| 488.94                                              | 477.82 | 466.76 | 482.60 | 455.62 | 442.92 | 431.80 | 419.10 | 407.98 | -      |                  |                   |       |
| 9.53                                                | -      | 22.23  | 12.70  | 28.58  | 34.93  | 41.28  | 47.63  | 53.98  | -      | 559.0            | 550               | 22    |
| 539.94                                              | -      | 514.54 | 533.60 | 501.84 | 489.14 | 476.44 | 463.74 | 451.04 | -      |                  |                   |       |
| 9.53                                                | 17.48  | 24.61  | 12.70  | 30.96  | 38.89  | 46.02  | 52.37  | 59.54  | -      | 610.0            | 600               | 24    |
| 590.94                                              | 575.04 | 560.78 | 584.60 | 548.08 | 532.22 | 517.96 | 505.26 | 490.92 | -      |                  |                   |       |

## • Stainless steel (B36.19M)

The wall thickness shown represent nominal or average wall dimensions which are subject to a-12 1/2% mill tolerance.

\*Size 14"(355.6mm) through 30"(762.0mm) are not at publication data 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 ASME B2 1.

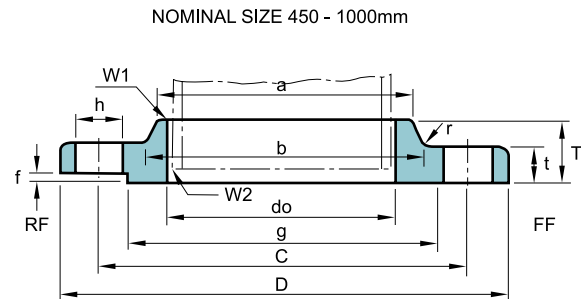
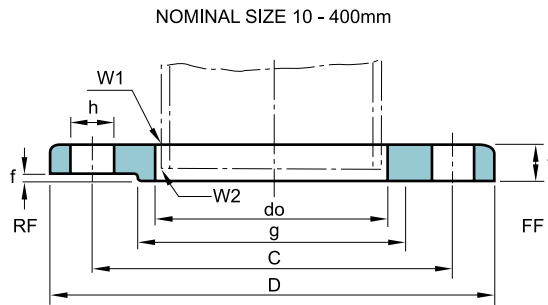
\*\*Note that schedule 40S and schedule 80S in these sizes do not agree with schedule 40 and schedule 80 of ASME B36.10.and that they are identical to standard weight and extra strong respectively of ASME B36.10.



# JIS / KS FLANGES

- Class 5K Flanges
- Class 10K Flanges
- Class 16K Flanges
- Class 20K Flanges
- Class 30K Flanges
- Class 40K Flanges
- Class 210Kgf/cm<sup>2</sup> Flanges for Oil Pressure
- Class 280Kgf/cm<sup>2</sup> Flanges for Oil Pressure
- Class 350Kgf/cm<sup>2</sup> Flanges for Oil Pressure
- Tolerance for pipe Flanges

# 5K KS B1503 / JIS B2220



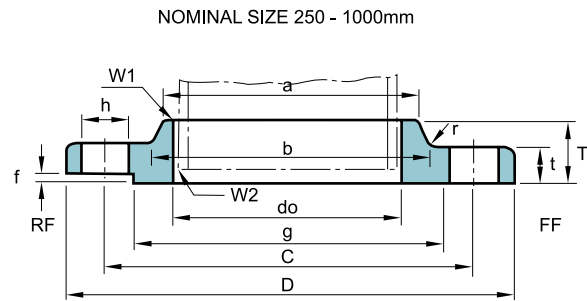
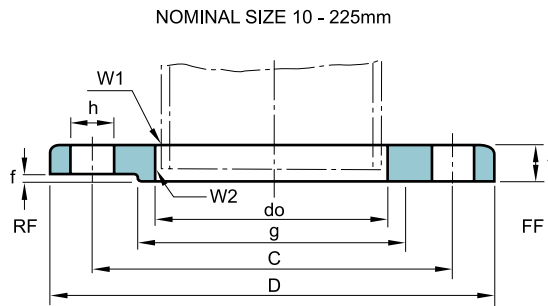
Unit : mm

| Nominal<br>Bore of<br>Flange | Outside<br>Dia. of<br>Appli-<br>Cable<br>pipe | Inside<br>Dia. of<br>Flange | Outside<br>Dia. of<br>Flange | SECTIONAL DIMENSIONS OF FLANGE |    |             |      |        |                |                           | DIA. OF BOLT              |                            |              | Nominal<br>Bolt<br>Size | Welding |     | Weight<br>(kg) |
|------------------------------|-----------------------------------------------|-----------------------------|------------------------------|--------------------------------|----|-------------|------|--------|----------------|---------------------------|---------------------------|----------------------------|--------------|-------------------------|---------|-----|----------------|
|                              |                                               |                             |                              | t                              | T  | Dia. of Hub |      | Radius | Raised<br>Face | Dia. of<br>Raised<br>Face | Dia. of<br>Bolt<br>Circle | Number of<br>Bolt<br>Holes | Hole<br>Dia. |                         | W1      | W2  |                |
|                              |                                               |                             |                              |                                |    | a           | b    |        |                |                           |                           |                            |              |                         |         |     |                |
| (10)                         | 17.3                                          | 17.8                        | 75                           | 9                              | -  | -           | -    | -      | 1              | 39                        | 55                        | 4                          | 12           | M10                     | 5.0     | 2.5 | 0.27           |
| 15                           | 21.7                                          | 22.2                        | 80                           | 9                              | -  | -           | -    | -      | 1              | 44                        | 60                        | 4                          | 12           | M10                     | 5.0     | 3.0 | 0.30           |
| (20)                         | 27.2                                          | 27.7                        | 85                           | 10                             | -  | -           | -    | -      | 1              | 49                        | 65                        | 4                          | 12           | M10                     | 5.0     | 3.0 | 0.37           |
| 25                           | 34.0                                          | 34.5                        | 95                           | 10                             | -  | -           | -    | -      | 1              | 59                        | 75                        | 4                          | 12           | M10                     | 5.0     | 3.0 | 0.45           |
| (32)                         | 42.7                                          | 43.2                        | 115                          | 12                             | -  | -           | -    | -      | 2              | 70                        | 90                        | 4                          | 15           | M12                     | 6.0     | 3.0 | 0.78           |
| 40                           | 48.6                                          | 49.1                        | 120                          | 12                             | -  | -           | -    | -      | 2              | 75                        | 95                        | 4                          | 15           | M12                     | 6.0     | 3.0 | 0.83           |
| 50                           | 60.5                                          | 61.1                        | 130                          | 14                             | -  | -           | -    | -      | 2              | 85                        | 105                       | 4                          | 15           | M12                     | 6.0     | 3.0 | 1.07           |
| 65                           | 76.3                                          | 77.1                        | 155                          | 14                             | -  | -           | -    | -      | 2              | 110                       | 130                       | 4                          | 15           | M12                     | 6.0     | 4.0 | 1.49           |
| 80                           | 89.1                                          | 90.0                        | 180                          | 14                             | -  | -           | -    | -      | 2              | 121                       | 145                       | 4                          | 19           | M16                     | 6.0     | 4.0 | 1.99           |
| (90)                         | 101.6                                         | 102.6                       | 190                          | 14                             | -  | -           | -    | -      | 2              | 131                       | 155                       | 4                          | 19           | M16                     | 6.0     | 4.0 | 2.09           |
| 100                          | 114.3                                         | 115.4                       | 200                          | 16                             | -  | -           | -    | -      | 2              | 141                       | 165                       | 8                          | 19           | M16                     | 7.0     | 4.0 | 2.39           |
| 125                          | 139.8                                         | 141.2                       | 235                          | 16                             | -  | -           | -    | -      | 2              | 176                       | 200                       | 8                          | 19           | M16                     | 7.0     | 4.0 | 3.23           |
| 150                          | 165.2                                         | 166.6                       | 265                          | 18                             | -  | -           | -    | -      | 2              | 206                       | 230                       | 8                          | 19           | M16                     | 7.0     | 5.0 | 4.41           |
| (175)                        | 190.7                                         | 192.1                       | 300                          | 18                             | -  | -           | -    | -      | 2              | 232                       | 260                       | 8                          | 23           | M20                     | 7.5     | 5.0 | 5.51           |
| 200                          | 216.3                                         | 218.0                       | 320                          | 20                             | -  | -           | -    | -      | 2              | 252                       | 280                       | 8                          | 23           | M20                     | 8.5     | 6.0 | 6.33           |
| (225)                        | 241.8                                         | 243.7                       | 345                          | 20                             | -  | -           | -    | -      | 2              | 277                       | 305                       | 12                         | 23           | M20                     | 9.0     | 6.0 | 6.64           |
| 250                          | 267.4                                         | 269.5                       | 385                          | 22                             | -  | -           | -    | -      | 2              | 317                       | 345                       | 12                         | 23           | M20                     | 10.0    | 6.0 | 9.45           |
| 300                          | 318.5                                         | 321.0                       | 430                          | 22                             | -  | -           | -    | -      | 3              | 360                       | 390                       | 12                         | 23           | M20                     | 10.0    | 6.0 | 10.30          |
| 350                          | 355.6                                         | 358.1                       | 480                          | 24                             | -  | -           | -    | -      | 3              | 403                       | 435                       | 12                         | 25           | M22                     | 12.0    | 7.0 | 14.00          |
| 400                          | 406.4                                         | 409.0                       | 540                          | 24                             | -  | -           | -    | -      | 3              | 463                       | 495                       | 16                         | 25           | M22                     | 12.0    | 7.0 | 16.90          |
| 450                          | 457.2                                         | 460.0                       | 605                          | 24                             | 40 | 495         | 500  | 5      | 3              | 523                       | 555                       | 16                         | 25           | M22                     | 12.0    | 7.0 | 24.80          |
| 500                          | 508.0                                         | 511.0                       | 655                          | 24                             | 40 | 546         | 552  | 5      | 3              | 573                       | 605                       | 20                         | 25           | M22                     | 12.0    | 7.0 | 26.90          |
| 550                          | 558.8                                         | 562.0                       | 720                          | 26                             | 42 | 597         | 603  | 5      | 3              | 630                       | 665                       | 20                         | 27           | M24                     | 12.0    | 7.0 | 34.10          |
| 600                          | 609.6                                         | 613.0                       | 770                          | 26                             | 44 | 648         | 654  | 5      | 3              | 680                       | 715                       | 20                         | 27           | M24                     | 12.0    | 7.0 | 37.50          |
| 650                          | 660.4                                         | 664.0                       | 825                          | 26                             | 48 | 702         | 708  | 5      | 3              | 735                       | 770                       | 24                         | 27           | M24                     | 12.0    | 7.0 | 42.80          |
| 700                          | 711.2                                         | 715.0                       | 875                          | 26                             | 48 | 751         | 758  | 5      | 3              | 785                       | 820                       | 24                         | 27           | M24                     | 12.0    | 7.0 | 45.40          |
| 750                          | 762.0                                         | 766.0                       | 945                          | 28                             | 52 | 802         | 810  | 5      | 3              | 840                       | 880                       | 24                         | 33           | M30                     | 12.0    | 7.0 | 57.40          |
| 800                          | 812.8                                         | 817.0                       | 995                          | 28                             | 52 | 854         | 862  | 5      | 3              | 890                       | 930                       | 24                         | 33           | M30                     | 13.0    | 8.0 | 60.80          |
| 850                          | 863.6                                         | 868.0                       | 1045                         | 28                             | 54 | 904         | 912  | 5      | 3              | 940                       | 980                       | 24                         | 33           | M30                     | 13.0    | 8.0 | 63.50          |
| 900                          | 914.4                                         | 919.0                       | 1095                         | 30                             | 56 | 956         | 964  | 5      | 3              | 990                       | 1030                      | 24                         | 33           | M30                     | 13.0    | 8.0 | 75.30          |
| 1000                         | 1016.0                                        | 1021.0                      | 1195                         | 32                             | 60 | 1058        | 1066 | 5      | 3              | 1090                      | 1130                      | 28                         | 33           | M30                     | 14.0    | 9.0 | 88.50          |
| *(1100)                      | 1117.6                                        | 1123.0                      | 1305                         | 32                             | -  | -           | -    | -      | 3              | 1200                      | 1240                      | 28                         | 33           | M30                     | -       | -   | -              |
| *1200                        | 1219.2                                        | 1225.0                      | 1420                         | 34                             | -  | -           | -    | -      | 3              | 1305                      | 1350                      | 32                         | 33           | M30                     | -       | -   | -              |
| *1350                        | 1371.6                                        | -                           | 1575                         | 34                             | -  | -           | -    | -      | 3              | 1460                      | 1505                      | 32                         | 33           | M30                     | -       | -   | -              |
| *1500                        | 1524.0                                        | -                           | 1730                         | 36                             | -  | -           | -    | -      | 3              | 1615                      | 1660                      | 36                         | 33           | M30                     | -       | -   | -              |

## Notes

1. Flanges of parenthesized nominal diameter had letter not be used.
2. The facing of flanges shall conform to KS B1519 (JIS B2202) 1987.
3. Nominal diameter over 1000 is manufacturer's standard (\*)

## 10K KS B1503 / JIS B2220



Unit : mm

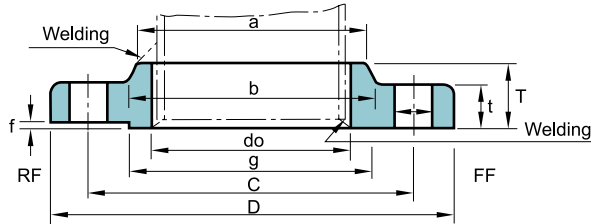
| Nominal<br>Bore of<br>Flange | Outside<br>Dia. of<br>Appli-<br>Cable<br>pipe | Inside<br>Dia. of<br>Flange | Outside<br>Dia. of<br>Flange | SECTIONAL DIMENSIONS OF FLANGE |    |             |      |        |                |                           | DIA. OF BOLT              |                            |              | Nominal<br>Bolt<br>Size | Welding |      | Weight<br>(kg) |
|------------------------------|-----------------------------------------------|-----------------------------|------------------------------|--------------------------------|----|-------------|------|--------|----------------|---------------------------|---------------------------|----------------------------|--------------|-------------------------|---------|------|----------------|
|                              |                                               |                             |                              | t                              | T  | Dia. of Hub |      | Radius | Raised<br>Face | Dia. of<br>Raised<br>Face | Dia. of<br>Bolt<br>Circle | Number of<br>Bolt<br>Holes | Hole<br>Dia. |                         | W1      | W2   |                |
|                              |                                               | a                           | b                            |                                |    | r           | f    |        |                |                           |                           |                            |              |                         |         |      |                |
| 10                           | 17.3                                          | 17.8                        | 90                           | 12                             | -  | -           | -    | -      | 1              | 46                        | 65                        | 4                          | 15           | M12                     | 5.0     | 2.5  | 0.52           |
| 15                           | 21.7                                          | 22.2                        | 95                           | 12                             | -  | -           | -    | -      | 1              | 51                        | 70                        | 4                          | 15           | M12                     | 5.0     | 3.0  | 0.57           |
| 20                           | 27.2                                          | 27.7                        | 100                          | 14                             | -  | -           | -    | -      | 1              | 56                        | 75                        | 4                          | 15           | M12                     | 5.0     | 3.0  | 0.73           |
| 25                           | 34.0                                          | 34.5                        | 125                          | 14                             | -  | -           | -    | -      | 1              | 67                        | 90                        | 4                          | 19           | M16                     | 5.0     | 3.0  | 1.13           |
| 32                           | 42.7                                          | 43.2                        | 135                          | 16                             | -  | -           | -    | -      | 2              | 76                        | 100                       | 4                          | 19           | M16                     | 6.0     | 3.0  | 1.48           |
| 40                           | 48.6                                          | 49.1                        | 140                          | 16                             | -  | -           | -    | -      | 2              | 81                        | 105                       | 4                          | 19           | M16                     | 6.0     | 3.0  | 1.56           |
| 50                           | 60.5                                          | 61.1                        | 155                          | 16                             | -  | -           | -    | -      | 2              | 96                        | 120                       | 4                          | 19           | M16                     | 6.0     | 3.0  | 1.88           |
| 65                           | 76.3                                          | 77.1                        | 175                          | 18                             | -  | -           | -    | -      | 2              | 116                       | 140                       | 4                          | 19           | M16                     | 6.5     | 4.0  | 2.60           |
| 80                           | 89.1                                          | 90.0                        | 185                          | 18                             | -  | -           | -    | -      | 2              | 126                       | 150                       | 8                          | 19           | M16                     | 6.5     | 4.0  | 2.61           |
| (90)                         | 101.6                                         | 102.6                       | 195                          | 18                             | -  | -           | -    | -      | 2              | 136                       | 160                       | 8                          | 19           | M16                     | 6.5     | 4.0  | 2.76           |
| 100                          | 114.3                                         | 115.4                       | 210                          | 18                             | -  | -           | -    | -      | 2              | 151                       | 175                       | 8                          | 19           | M16                     | 7.0     | 4.0  | 3.14           |
| 125                          | 139.8                                         | 141.2                       | 250                          | 20                             | -  | -           | -    | -      | 2              | 182                       | 210                       | 8                          | 23           | M20                     | 7.5     | 4.0  | 4.77           |
| 150                          | 165.2                                         | 166.6                       | 280                          | 22                             | -  | -           | -    | -      | 2              | 212                       | 240                       | 8                          | 23           | M20                     | 8.0     | 5.0  | 6.34           |
| (175)                        | 190.7                                         | 192.1                       | 305                          | 22                             | -  | -           | -    | -      | 2              | 237                       | 265                       | 12                         | 23           | M20                     | 9.0     | 5.0  | 6.82           |
| 200                          | 216.3                                         | 218.0                       | 330                          | 22                             | -  | -           | -    | -      | 2              | 262                       | 290                       | 12                         | 23           | M20                     | 9.0     | 6.0  | 7.53           |
| (225)                        | 241.8                                         | 243.7                       | 350                          | 22                             | -  | -           | -    | -      | 2              | 282                       | 310                       | 12                         | 23           | M20                     | 9.0     | 6.0  | 7.74           |
| 250                          | 267.4                                         | 269.5                       | 400                          | 24                             | 36 | 288         | 292  | 6      | 2              | 324                       | 355                       | 12                         | 25           | M22                     | 10.0    | 6.0  | 12.70          |
| 300                          | 318.5                                         | 321.0                       | 445                          | 24                             | 38 | 340         | 346  | 6      | 3              | 368                       | 400                       | 16                         | 25           | M22                     | 10.0    | 6.0  | 13.80          |
| 350                          | 355.6                                         | 358.1                       | 490                          | 26                             | 42 | 380         | 386  | 6      | 3              | 413                       | 445                       | 16                         | 25           | M22                     | 12.0    | 7.0  | 18.20          |
| 400                          | 406.4                                         | 409.0                       | 560                          | 28                             | 44 | 436         | 442  | 6      | 3              | 475                       | 510                       | 16                         | 27           | M24                     | 12.0    | 7.0  | 25.20          |
| 450                          | 457.2                                         | 460.0                       | 620                          | 30                             | 48 | 496         | 502  | 6      | 3              | 530                       | 565                       | 20                         | 27           | M24                     | 14.0    | 8.0  | 33.00          |
| 500                          | 508.0                                         | 511.0                       | 675                          | 30                             | 48 | 548         | 554  | 6      | 3              | 585                       | 620                       | 20                         | 27           | M24                     | 14.0    | 8.0  | 37.60          |
| 550                          | 558.8                                         | 562.0                       | 745                          | 32                             | 52 | 604         | 610  | 6      | 3              | 640                       | 680                       | 20                         | 33           | M30                     | 15.0    | 9.0  | 49.70          |
| 600                          | 609.6                                         | 613.0                       | 795                          | 32                             | 52 | 656         | 662  | 6      | 3              | 690                       | 730                       | 24                         | 33           | M30                     | 16.0    | 10.0 | 52.60          |
| 650                          | 660.4                                         | 664.0                       | 845                          | 34                             | 56 | 706         | 712  | 6      | 3              | 740                       | 780                       | 24                         | 33           | M30                     | 16.0    | 10.0 | 60.60          |
| 700                          | 711.2                                         | 715.0                       | 905                          | 34                             | 58 | 762         | 770  | 6      | 3              | 800                       | 840                       | 24                         | 33           | M30                     | 17.0    | 10.0 | 70.60          |
| 750                          | 762.0                                         | 766.0                       | 970                          | 36                             | 62 | 816         | 824  | 6      | 3              | 855                       | 900                       | 24                         | 33           | M30                     | 18.0    | 11.0 | 85.80          |
| 800                          | 812.8                                         | 817.0                       | 1020                         | 36                             | 64 | 868         | 876  | 6      | 3              | 905                       | 950                       | 28                         | 33           | M30                     | 19.0    | 12.0 | 91.20          |
| (850)                        | 863.6                                         | 868.0                       | 1070                         | 36                             | 66 | 920         | 928  | 6      | 3              | 955                       | 1000                      | 28                         | 33           | M30                     | 19.0    | 12.0 | 98.60          |
| 900                          | 914.4                                         | 919.0                       | 1120                         | 38                             | 70 | 971         | 979  | 6      | 3              | 1005                      | 1050                      | 28                         | 33           | M30                     | 22.0    | 14.0 | 109.00         |
| 1000                         | 1016.0                                        | 1021.0                      | 1235                         | 40                             | 74 | 1073        | 1081 | 6      | 3              | 1110                      | 1160                      | 28                         | 39           | M36                     | 22.0    | 14.0 | 133.00         |
| *(1100)                      | 1117.6                                        | 1123.0                      | 1345                         | 42                             | 76 | -           | -    | -      | 3              | 1220                      | 1270                      | 28                         | 39           | M36                     | -       | -    | -              |
| *1200                        | 1219.2                                        | 1225.0                      | 1465                         | 44                             | 78 | -           | -    | -      | 3              | 1325                      | 1380                      | 32                         | 39           | M36                     | -       | -    | -              |
| *1350                        | 1371.6                                        | -                           | 1630                         | 48                             | 82 | -           | -    | -      | 3              | 1480                      | 1540                      | 36                         | 45           | M42                     | -       | -    | -              |
| *1500                        | 1524.0                                        | -                           | 1795                         | 50                             | 90 | -           | -    | -      | 3              | 1635                      | 1700                      | 40                         | 45           | M42                     | -       | -    | -              |

### Notes

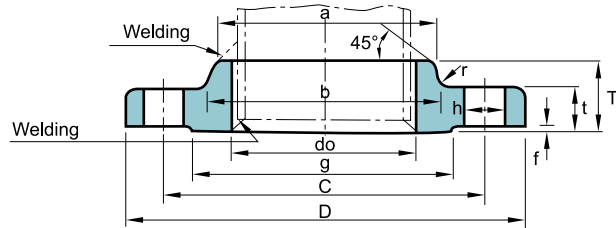
1. Flanges of parenthesized nominal diameter had letter not be used.
2. The facing of flanges shall conform to KS B1519 (JIS B2202) 1987.
3. Nominal diameter over 1000 is manufacturer's standard (\*)

# 16K KS B1503 / JIS B2220

NOMINAL SIZE 10 - 600mm



NOMINAL SIZE 650 - 1200mm



Unit : mm

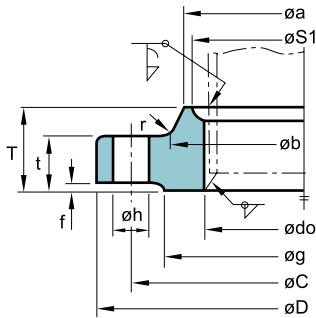
| Nominal<br>Bore of<br>Flange | Outside<br>Dia. of<br>Steel<br>pipe | Inside<br>Dia. of<br>Flange | Outside<br>Dia. of<br>Flange | SECTIONAL DIMENSIONS OF FLANGE |     |             |      |        |   |      | DIA. OF BOLT           |                            |           | Nominal<br>Bolt<br>Size | Weight<br>(kg) |
|------------------------------|-------------------------------------|-----------------------------|------------------------------|--------------------------------|-----|-------------|------|--------|---|------|------------------------|----------------------------|-----------|-------------------------|----------------|
|                              |                                     |                             |                              | t                              | T   | Dia. of Hub |      | Radius | f | g    | Bolt<br>Circle<br>Dia. | Number<br>of Bolt<br>Holes | Hole Dia. |                         |                |
|                              |                                     | do                          | D                            |                                |     | a           | b    |        |   |      |                        |                            |           |                         |                |
| 10                           | 17.3                                | 17.8                        | 90                           | 12                             | 16  | 26          | 28   | 4      | 1 | 46   | 65                     | 4                          | 15        | M12                     | 0.52           |
| 15                           | 21.7                                | 22.2                        | 95                           | 12                             | 16  | 30          | 32   | 4      | 1 | 51   | 70                     | 4                          | 15        | M12                     | 0.58           |
| 20                           | 27.2                                | 27.7                        | 100                          | 14                             | 20  | 38          | 42   | 4      | 1 | 56   | 75                     | 4                          | 15        | M12                     | 0.75           |
| 25                           | 34.0                                | 34.5                        | 125                          | 14                             | 20  | 46          | 50   | 4      | 1 | 67   | 90                     | 4                          | 19        | M16                     | 1.16           |
| 32                           | 42.7                                | 43.2                        | 135                          | 16                             | 22  | 56          | 60   | 5      | 2 | 76   | 100                    | 4                          | 19        | M16                     | 1.53           |
| 40                           | 48.6                                | 49.1                        | 140                          | 16                             | 24  | 62          | 66   | 5      | 2 | 81   | 105                    | 4                          | 19        | M16                     | 1.64           |
| 50                           | 60.5                                | 61.1                        | 155                          | 16                             | 24  | 76          | 80   | 5      | 2 | 96   | 120                    | 8                          | 19        | M16                     | 1.83           |
| 65                           | 76.3                                | 77.1                        | 175                          | 18                             | 26  | 94          | 98   | 5      | 2 | 116  | 140                    | 8                          | 19        | M16                     | 2.58           |
| 80                           | 89.1                                | 90.0                        | 200                          | 20                             | 28  | 108         | 112  | 6      | 2 | 132  | 160                    | 8                          | 23        | M20                     | 3.66           |
| (90)                         | 101.6                               | 102.6                       | 210                          | 20                             | 30  | 120         | 124  | 6      | 2 | 145  | 170                    | 8                          | 23        | M20                     | 3.95           |
| 100                          | 114.3                               | 115.4                       | 225                          | 22                             | 34  | 134         | 138  | 6      | 2 | 160  | 185                    | 8                          | 23        | M20                     | 4.94           |
| 125                          | 139.8                               | 141.2                       | 270                          | 22                             | 34  | 164         | 170  | 6      | 2 | 195  | 225                    | 8                          | 25        | M22                     | 7.00           |
| 150                          | 165.2                               | 166.6                       | 305                          | 24                             | 38  | 196         | 202  | 6      | 2 | 230  | 260                    | 12                         | 25        | M22                     | 9.62           |
| 200                          | 216.3                               | 218.0                       | 350                          | 26                             | 40  | 244         | 252  | 6      | 2 | 275  | 305                    | 12                         | 25        | M22                     | 12.10          |
| 250                          | 267.4                               | 269.5                       | 430                          | 28                             | 44  | 304         | 312  | 6      | 2 | 345  | 380                    | 12                         | 27        | M24                     | 20.00          |
| 300                          | 318.5                               | 321.0                       | 480                          | 30                             | 48  | 354         | 364  | 8      | 3 | 395  | 430                    | 16                         | 27        | M24                     | 24.40          |
| 350                          | 355.6                               | 358.1                       | 540                          | 34                             | 52  | 398         | 408  | 8      | 3 | 440  | 480                    | 16                         | 33        | M30X3                   | 35.00          |
| 400                          | 406.4                               | 409.0                       | 605                          | 38                             | 60  | 446         | 456  | 10     | 3 | 495  | 540                    | 16                         | 33        | M30X3                   | 46.20          |
| 450                          | 457.2                               | 460.0                       | 675                          | 40                             | 64  | 504         | 514  | 10     | 3 | 560  | 605                    | 20                         | 33        | M30X3                   | 61.90          |
| 500                          | 508.0                               | 511.0                       | 730                          | 42                             | 68  | 558         | 568  | 10     | 3 | 615  | 660                    | 20                         | 33        | M30X3                   | 73.25          |
| (550)                        | 558.8                               | 562.0                       | 795                          | 44                             | 70  | 612         | 622  | 10     | 3 | 670  | 720                    | 20                         | 39        | M36X3                   | 88.10          |
| 600                          | 609.6                               | 613.0                       | 845                          | 46                             | 74  | 666         | 676  | 10     | 3 | 720  | 770                    | 24                         | 39        | M36X3                   | 98.80          |
| (650)                        | 660.4                               | 664.0                       | 895                          | 48                             | 77  | 704         | 726  | 10     | 5 | 770  | 820                    | 24                         | 39        | M36X3                   | 101.00         |
| 700                          | 711.2                               | 715.0                       | 960                          | 50                             | 80  | 754         | 776  | 10     | 5 | 820  | 875                    | 24                         | 42        | M39X3                   | 120.00         |
| (750)                        | 762.0                               | 766.0                       | 1020                         | 52                             | 83  | 806         | 832  | 10     | 5 | 880  | 935                    | 24                         | 42        | M39X3                   | 141.00         |
| 800                          | 812.8                               | 817.0                       | 1085                         | 54                             | 86  | 865         | 885  | 10     | 5 | 930  | 990                    | 24                         | 48        | M45X3                   | 161.00         |
| (850)                        | 863.6                               | 868.0                       | 1135                         | 56                             | 89  | 916         | 936  | 10     | 5 | 980  | 1040                   | 24                         | 48        | M45X3                   | 177.00         |
| 900                          | 914.4                               | 919.0                       | 1185                         | 58                             | 93  | 968         | 986  | 10     | 5 | 1030 | 1090                   | 28                         | 48        | M45X3                   | 191.00         |
| 1000                         | 1016.0                              | 1021.0                      | 1320                         | 62                             | 99  | 1070        | 1098 | 12     | 5 | 1140 | 1210                   | 28                         | 56        | M52X3                   | 230.00         |
| (1100)                       | 1117.6                              | 1123.0                      | 1420                         | 66                             | 105 | 1180        | 1200 | 12     | 5 | 1240 | 1310                   | 32                         | 56        | M52X3                   | 289.00         |
| 1200                         | 1219.2                              | 1225.0                      | 1530                         | 70                             | 112 | 1282        | 1302 | 12     | 5 | 1350 | 1420                   | 32                         | 56        | M52X3                   | 348.00         |

## Notes

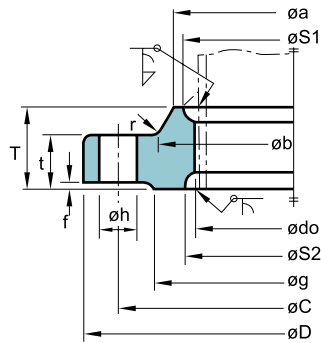
1. Flanges of parenthesized nominal diameter had letter not be used.
2. The facing of flanges shall conform to KS B1519 (JIS B2202) 1987.
3. The dimension of flange of 650A and larger in nominal sizes excluding 850A, are in accordance with the nominal pressure 25 BAR specified in ISO2084-1974

## 20K KS B1503 / JIS B2220

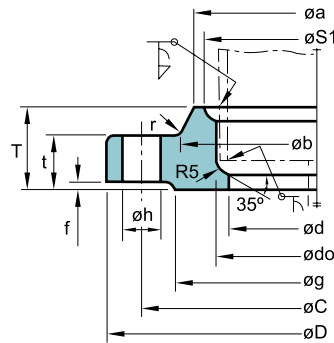
TYPE A  
NOMINAL SIZE 10 - 50mm



TYPE B  
NOMINAL SIZE 10 - 50mm



TYPE C  
NOMINAL SIZE 65 - 600mm



Unit : mm

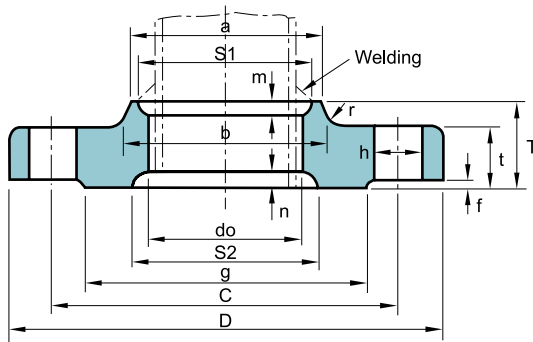
| Nominal<br>Bore of<br>Flange | Outside<br>Dia. of<br>Steel<br>pipe | Inside<br>Dia. of<br>Flange | Outside<br>Dia. of<br>Flange | SECTIONAL DIMENSIONS OF FLANGE |    |             |     |             |   |      |       |      | BOLT HOLE              |                            |              | Nominal<br>Bolt<br>Size | REFERENCE |    |     |   |        | Weight<br>(kg) |
|------------------------------|-------------------------------------|-----------------------------|------------------------------|--------------------------------|----|-------------|-----|-------------|---|------|-------|------|------------------------|----------------------------|--------------|-------------------------|-----------|----|-----|---|--------|----------------|
|                              |                                     |                             |                              |                                |    | Dia. of Hub |     | Ra-<br>dius |   |      |       |      | Bolt<br>Circle<br>Dia. | Number<br>of Bolt<br>Holes | Hole<br>Dia. |                         | S1        | m  | S2  | n | l      |                |
|                              |                                     |                             |                              |                                |    | a           | b   |             |   |      |       |      |                        |                            |              |                         |           |    |     |   |        |                |
| 10                           | 17.3                                | 17.8                        | 90                           | 14                             | 20 | 30          | 32  | 4           | 1 | 46   | -     | 65   | 4                      | 15                         | M12          | 27                      | 4         | 27 | 4   | - | 0.59   |                |
| 15                           | 21.7                                | 22.2                        | 95                           | 14                             | 20 | 34          | 36  | 4           | 1 | 51   | -     | 70   | 4                      | 15                         | M12          | 31                      | 4         | 31 | 4   | - | 0.65   |                |
| 20                           | 27.2                                | 27.7                        | 100                          | 16                             | 22 | 40          | 42  | 4           | 1 | 56   | -     | 75   | 4                      | 15                         | M12          | 37                      | 4         | 37 | 4   | - | 0.81   |                |
| 25                           | 34.0                                | 34.5                        | 125                          | 16                             | 24 | 48          | 50  | 4           | 1 | 67   | -     | 90   | 4                      | 19                         | M16          | 44                      | 4         | 44 | 4.5 | - | 1.29   |                |
| 32                           | 42.7                                | 43.2                        | 135                          | 18                             | 26 | 56          | 60  | 5           | 2 | 76   | -     | 100  | 4                      | 19                         | M16          | 52                      | 4         | 53 | 5   | - | 1.60   |                |
| 40                           | 48.6                                | 49.1                        | 140                          | 18                             | 26 | 62          | 66  | 5           | 2 | 81   | -     | 105  | 4                      | 19                         | M16          | 58                      | 4         | 59 | 5.5 | - | 1.69   |                |
| 50                           | 60.5                                | 61.1                        | 155                          | 18                             | 26 | 76          | 80  | 5           | 2 | 96   | -     | 120  | 8                      | 19                         | M16          | 70                      | 4         | 72 | 5.5 | - | 1.89   |                |
| 65                           | 76.3                                | 77.7                        | 175                          | 20                             | 30 | 100         | 104 | 5           | 2 | 116  | 65.9  | 140  | 8                      | 19                         | M16          | 94                      | 6         | -  | -   | 6 | 2.60   |                |
| 80                           | 89.1                                | 90.0                        | 200                          | 22                             | 34 | 113         | 117 | 6           | 2 | 132  | 78.1  | 160  | 8                      | 23                         | M20          | 107                     | 6         | -  | -   | 6 | 3.93   |                |
| (90)                         | 101.6                               | 102.6                       | 210                          | 24                             | 36 | 126         | 130 | 6           | 2 | 145  | 90.2  | 170  | 8                      | 23                         | M20          | 120                     | 6         | -  | -   | 6 | 4.56   |                |
| 100                          | 114.3                               | 115.4                       | 225                          | 24                             | 36 | 138         | 142 | 6           | 2 | 160  | 102.3 | 185  | 8                      | 23                         | M20          | 132                     | 6         | -  | -   | 6 | 5.13   |                |
| 125                          | 139.8                               | 141.2                       | 270                          | 26                             | 40 | 166         | 172 | 6           | 2 | 195  | 126.6 | 225  | 8                      | 25                         | M22          | 160                     | 7         | -  | -   | 6 | 8.30   |                |
| 150                          | 165.2                               | 166.6                       | 305                          | 28                             | 42 | 196         | 202 | 6           | 2 | 230  | 151.0 | 260  | 12                     | 25                         | M22          | 186                     | 8         | -  | -   | 6 | 10.60  |                |
| 200                          | 216.3                               | 218.0                       | 350                          | 30                             | 46 | 244         | 252 | 6           | 2 | 275  | 199.9 | 305  | 12                     | 25                         | M22          | 237                     | 9         | -  | -   | 6 | 13.30  |                |
| 250                          | 267.4                               | 269.5                       | 430                          | 34                             | 52 | 304         | 312 | 6           | 2 | 345  | 248.8 | 380  | 12                     | 27                         | M24          | 290                     | 10        | -  | -   | 6 | 23.40  |                |
| 300                          | 318.5                               | 321.0                       | 480                          | 36                             | 56 | 354         | 364 | 8           | 3 | 395  | 297.9 | 430  | 16                     | 27                         | M24          | 345                     | 11        | -  | -   | 6 | 27.70  |                |
| 350                          | 355.6                               | 358.1                       | 540                          | 40                             | 62 | 398         | 408 | 8           | 3 | 440  | 333.4 | 480  | 16                     | 33                         | M30X3        | 384                     | 12        | -  | -   | 6 | 39.20  |                |
| 400                          | 406.4                               | 409.0                       | 605                          | 46                             | 70 | 446         | 456 | 10          | 3 | 495  | 381.0 | 540  | 16                     | 33                         | M30X3        | 437                     | 13        | -  | -   | 7 | 54.20  |                |
| 450                          | 457.2                               | 460.0                       | 675                          | 48                             | 78 | 504         | 514 | 10          | 3 | 560  | 431.8 | 605  | 20                     | 33                         | M30X3        | 490                     | 15        | -  | -   | 7 | 71.70  |                |
| 500                          | 508.0                               | 511.0                       | 730                          | 50                             | 84 | 558         | 568 | 10          | 3 | 615  | 482.6 | 660  | 20                     | 33                         | M30X3        | 544                     | 16        | -  | -   | 7 | 86.20  |                |
| (550)                        | 558.8                               | 562.0                       | 795                          | 52                             | 90 | 612         | 622 | 10          | 3 | 670  | 533.4 | 720  | 20                     | 39                         | M36X3        | 595                     | 16        | -  | -   | 7 | 105.00 |                |
| 600                          | 609.6                               | 613.0                       | 845                          | 54                             | 96 | 666         | 676 | 10          | 3 | 720  | 584.2 | 770  | 24                     | 39                         | M36X3        | 646                     | 18        | -  | -   | 7 | 119.00 |                |
| *650                         | 660.4                               | 664.0                       | 945                          | 60                             | -  | -           | -   | -           | 5 | 790  | -     | 850  | 24                     | 48                         | M45X3        | -                       | -         | -  | -   | - |        |                |
| *700                         | 711.2                               | 715.0                       | 995                          | 64                             | -  | -           | -   | -           | 5 | 840  | -     | 900  | 24                     | 48                         | M45X3        | -                       | -         | -  | -   | - |        |                |
| *750                         | 762.0                               | 766.0                       | 1080                         | 68                             | -  | -           | -   | -           | 5 | 900  | -     | 970  | 24                     | 56                         | M52X3        | -                       | -         | -  | -   | - |        |                |
| *800                         | 812.8                               | 817.0                       | 1140                         | 72                             | -  | -           | -   | -           | 5 | 960  | -     | 1030 | 24                     | 56                         | M52X3        | -                       | -         | -  | -   | - |        |                |
| *850                         | 863.6                               | 868.0                       | 1200                         | 74                             | -  | -           | -   | -           | 5 | 1020 | -     | 1090 | 24                     | 56                         | M52X3        | -                       | -         | -  | -   | - |        |                |
| *900                         | 914.4                               | 919.0                       | 1250                         | 76                             | -  | -           | -   | -           | 5 | 1070 | -     | 1140 | 28                     | 56                         | M52X3        | -                       | -         | -  | -   | - |        |                |

### Notes

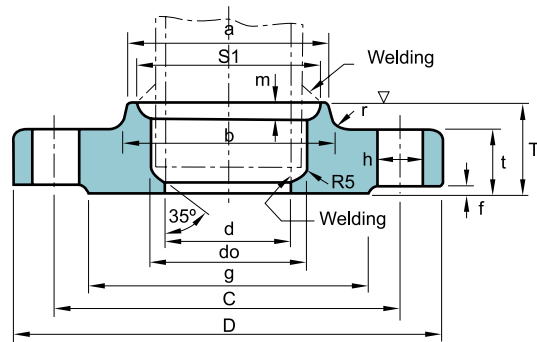
- Flanges of parenthesized nominal diameter had letter not be used.
- "d" is an example of pipe thickness for schedule 40 for nominal diameter 400 and under, and for schedule 12.7 mm for 450 through 600 of KS D3562 and KS D3507 (JIS G3454, JIS G3456)
- The dimension of the notch (m, n, S1, S2) for welding can decided between conerned parties.
- Nominal diameter over 600 is manufacturer's standard (\*)

## 30K KS B1503 / JIS B2220

NOMINAL SIZE 10 - 50mm (TYPE B)



NOMINAL SIZE 65 - 400mm (TYPE C)



Unit : mm

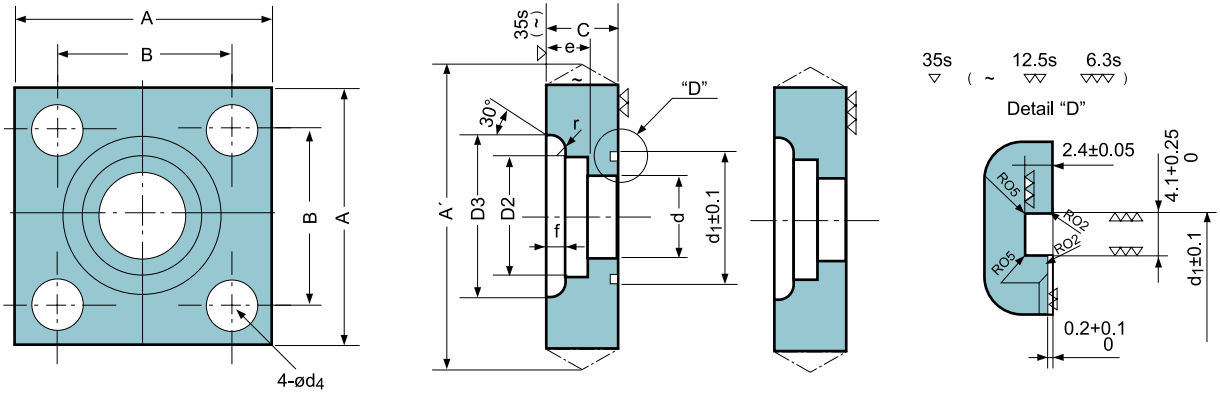
| Nominal Bore of Flange | Outside Dia. of Steel pipe | Inside Dia. of Flange | Outside Dia. of Flange | SECTIONAL DIMENSIONS OF FLANGE |    |     |     |    |   |     |       | BOLT HOLE        |                      |           | Nominal Bolt Size | REFERENCE |      |    |   |   | Weight (kg) |
|------------------------|----------------------------|-----------------------|------------------------|--------------------------------|----|-----|-----|----|---|-----|-------|------------------|----------------------|-----------|-------------------|-----------|------|----|---|---|-------------|
|                        |                            |                       |                        | t                              | T  | a   | b   | r  | f | g   | d     | Bolt Circle Dia. | Number of Bolt Holes | Hole Dia. |                   | S1        | m    | S2 | n | l |             |
| 10                     | 17.3                       | 17.8                  | 110                    | 16                             | 24 | 30  | 34  | 4  | 1 | 52  | -     | 75               | 4                    | 19        | M16               | -         | -    | -  | - | - | 0.99        |
| 15                     | 21.7                       | 22.2                  | 115                    | 18                             | 26 | 36  | 40  | 5  | 1 | 55  | -     | 80               | 4                    | 19        | M16               | 31        | 4.0  | 40 | 5 | - | 1.23        |
| 20                     | 27.2                       | 27.7                  | 120                    | 18                             | 28 | 42  | 46  | 5  | 1 | 60  | -     | 85               | 4                    | 19        | M16               | 37        | 5.0  | 44 | 5 | - | 1.34        |
| 25                     | 34.0                       | 34.5                  | 130                    | 20                             | 30 | 50  | 54  | 5  | 1 | 70  | -     | 95               | 4                    | 19        | M16               | 55        | 6.0  | 52 | 5 | - | 1.76        |
| 32                     | 42.7                       | 43.2                  | 140                    | 22                             | 32 | 60  | 64  | 6  | 2 | 80  | -     | 105              | 4                    | 19        | M16               | 52        | 6.0  | 60 | 5 | - | 2.15        |
| 40                     | 48.6                       | 49.1                  | 160                    | 22                             | 34 | 66  | 70  | 6  | 2 | 90  | -     | 120              | 4                    | 23        | M20               | 58        | 6.0  | 66 | 5 | - | 2.82        |
| 50                     | 60.5                       | 61.1                  | 165                    | 22                             | 36 | 82  | 86  | 6  | 2 | 105 | -     | 130              | 8                    | 19        | M16               | 70        | 6.5  | 78 | 5 | - | 2.89        |
| 65                     | 76.3                       | 77.1                  | 200                    | 26                             | 40 | 102 | 106 | 8  | 2 | 130 | 65.9  | 160              | 8                    | 23        | M20               | 96        | 9.5  | 94 | 5 | 6 | 4.70        |
| 80                     | 89.1                       | 90.0                  | 210                    | 28                             | 44 | 115 | 121 | 8  | 2 | 140 | 78.1  | 170              | 8                    | 23        | M20               | 109       | 9.5  | -  | - | 6 | 5.36        |
| (90)                   | 101.6                      | 102.6                 | 230                    | 30                             | 46 | 128 | 134 | 8  | 2 | 150 | 90.2  | 185              | 8                    | 25        | M22               | 122       | 9.5  | -  | - | 6 | 6.85        |
| 100                    | 114.3                      | 115.4                 | 240                    | 32                             | 48 | 141 | 147 | 8  | 2 | 160 | 102.3 | 195              | 8                    | 25        | M22               | 135       | 9.5  | -  | - | 6 | 7.89        |
| 125                    | 139.8                      | 141.2                 | 275                    | 36                             | 54 | 166 | 172 | 8  | 2 | 195 | 126.6 | 230              | 8                    | 25        | M22               | 160       | 9.5  | -  | - | 6 | 11.40       |
| 150                    | 165.2                      | 166.6                 | 325                    | 38                             | 58 | 196 | 204 | 8  | 2 | 235 | 151.0 | 275              | 12                   | 27        | M24               | 186       | 9.5  | -  | - | 6 | 16.70       |
| 200                    | 216.3                      | 218.0                 | 370                    | 42                             | 64 | 248 | 256 | 8  | 2 | 280 | 199.9 | 320              | 12                   | 27        | M24               | 237       | 9.5  | -  | - | 6 | 20.60       |
| 250                    | 267.4                      | 269.5                 | 450                    | 48                             | 72 | 306 | 314 | 10 | 2 | 345 | 248.8 | 390              | 12                   | 22        | M30               | 290       | 10.0 | -  | - | 6 | 36.10       |
| 300                    | 318.5                      | 321.0                 | 515                    | 52                             | 78 | 360 | 370 | 10 | 3 | 405 | 297.9 | 450              | 16                   | 33        | M30               | 345       | 12.0 | -  | - | 6 | 49.90       |
| 350                    | 355.6                      | 358.1                 | 560                    | 54                             | 84 | 402 | 412 | 12 | 3 | 450 | 333.4 | 495              | 16                   | 33        | M30               | 383       | 13.0 | -  | - | 6 | 61.20       |
| 400                    | 406.4                      | 409.0                 | 630                    | 60                             | 92 | 456 | 468 | 15 | 3 | 510 | 381.0 | 560              | 16                   | 39        | M36               | 435       | 14.0 | -  | - | 7 | 85.20       |

### Notes

- Flanges of parenthesized nominal diameter had letter not be used.
- "d" is an example of pipe thickness for schedule 40 of KS D3562 and KS D3507 (JIS G3454, JIS G3456). if required, purchaser can specify for other pipe wall thickness.
- This dimension of bolt holes (h) shall be in accordance with Class 3 of KS B1007 (Grade 3 of JIS B1001) where the nominal designation of screw thread of bolt is not more than M16, and in accordance with Class 2 of KS B1007 (Grade 2 of JIS B1001) where the nominal designation of screw thread of bolt is not less than M30 × 3.
- The dimension of the notch (m, n, S1, S2) for welding can decided between conerned parties agreement between parties concerned.

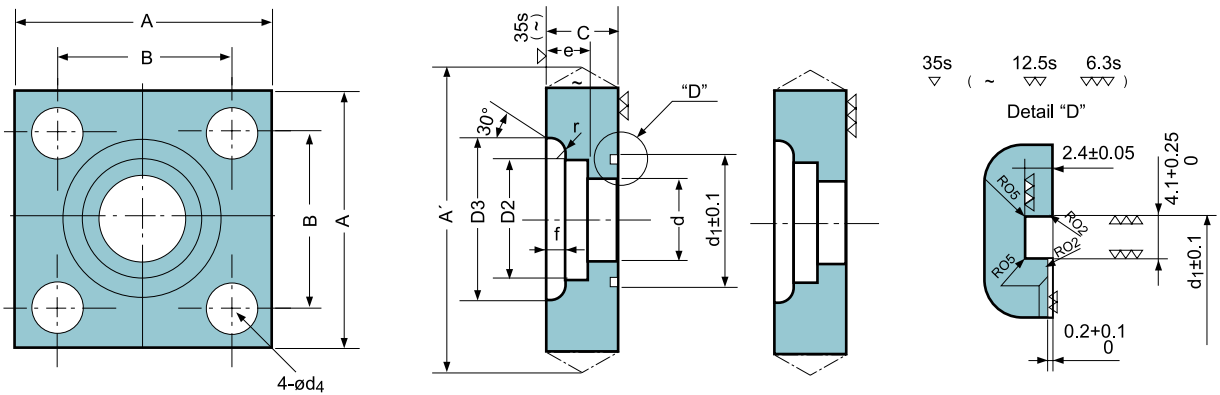
## 210Kgf/cm<sup>2</sup> (JIS B2291 SQUARE FLANGES)

Flange for Oil Pressure



Unit : mm

| Nominal<br>Bore | A   |      | A'<br>(Max) | B   |      | C  |      | d    | d1 | d2   |      | e         | d3 | d4  | f  | r    | Weight<br>(kg) | G 계열<br>O 링 |     |
|-----------------|-----|------|-------------|-----|------|----|------|------|----|------|------|-----------|----|-----|----|------|----------------|-------------|-----|
| 15              | 63  | ±1.0 | 67          | 40  | ±0.2 | 22 | 0    | 16.0 | 30 | ±0.1 | 22.2 | +0.2<br>0 | 11 | 32  | 11 | 3.5  | 5              | 0.6         | G25 |
| 20              | 68  |      | 72          | 45  |      | 22 | -1   | 20.0 | 35 |      | 27.7 |           | 12 | 38  | 11 | 4.0  | 5              | 0.7         | G30 |
| 25              | 80  | ±1.2 | 85          | 53  |      | 28 | 0    | 25.0 | 40 |      | 34.5 | +0.3<br>0 | 14 | 45  | 13 | 4.0  | 5              | 1.2         | G35 |
| 32              | 90  |      | 95          | 63  |      | 28 | -1.5 | 31.5 | 45 |      | 43.2 |           | 16 | 56  | 13 | 6.0  | 5              | 1.5         | G40 |
| 40              | 100 | ±1.5 | 106         | 70  | ±0.4 | 36 | 0    | 37.5 | 55 |      | 49.1 | +0.4<br>0 | 18 | 63  | 18 | 7.0  | 5              | 2.4         | G50 |
| 50              | 112 |      | 118         | 80  |      | 36 |      | 47.5 | 65 |      | 61.1 |           | 20 | 75  | 18 | 7.0  | 5              | 2.8         | G60 |
| 65              | 140 | ±2.0 | 148         | 100 |      | 45 | -2   | 60.0 | 80 |      | 77.1 | +0.4<br>0 | 22 | 95  | 22 | 9.5  | 6              | 5.3         | G75 |
| 80              | 155 |      | 163         | 112 |      | 45 |      | 71.0 | 90 |      | 90.0 |           | 25 | 108 | 24 | 11.0 | 6              | 6.2         | G85 |



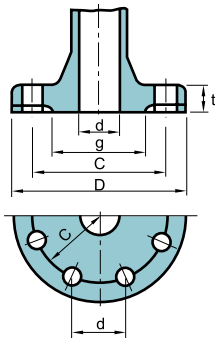
Unit : mm

| Nominal Bore | A   |      | A' (Max) | B   |      | C    |         | d    | d1   | d2   |      | e         | d3 | d4        | f  | r   | Weight (kg) |      |
|--------------|-----|------|----------|-----|------|------|---------|------|------|------|------|-----------|----|-----------|----|-----|-------------|------|
| 15           | 54  | ±1.0 | 58       | 36  | ±0.2 | 22   | 0       | 16.0 | 30   | ±0.1 | 22.2 | +0.2<br>0 | 11 | 32        | 11 | 3.5 | 5           | 0.5  |
| 20           | 58  |      | 62       | 40  |      | 22   | -1      | 20.0 | 35   |      | 27.7 |           | 12 | 38        | 11 | 4.0 | 5           | 0.6  |
| 25           | 68  |      | 73       | 48  |      | 28   | 0       | 25.0 | 40   |      | 34.5 |           | 14 | 45        | 13 | 4.0 | 5           | 0.8  |
| 32           | 76  | 81   | 56       | 28  |      | -1.5 | 31.5    | 45   | 43.2 |      | 16   | 56        | 13 | 6.0       | 5  | 1.0 |             |      |
| 40           | 92  | ±1.5 | 98       | 65  | ±0.4 | 36   | 0<br>-2 | 37.5 | 55   |      | 49.1 | +0.3<br>0 | 18 | 63        | 18 | 7.0 | 5           | 1.9  |
| 50           | 100 |      | 106      | 73  |      | 36   |         | 47.5 | 65   |      | 61.1 |           | 20 | 75        | 18 | 7.0 | 5           | 2.0  |
| 65           | 128 |      | 136      | 92  |      | 45   |         | 60.0 | 80   |      | 77.1 |           | 22 | 95        | 22 | 9.5 | 6           | 4.1  |
| 80           | 140 | ±2.0 | 148      | 103 |      | 45   |         |      |      |      | 71.0 | 90        |    | +0.4<br>0 | 25 | 108 | 24          | 11.0 |

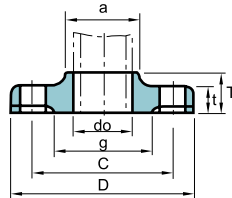
# TOLERANCE FOR PIPE FLANGES

KS B1502 / JIS B2203

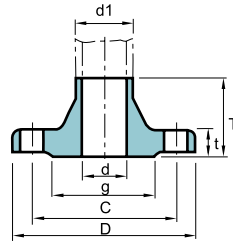
SOLID



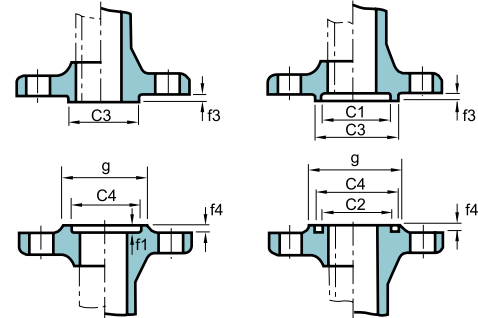
SLIP - ON



WELDING NECK



TYPE OF GASKET SURFACE



| Flange Section    |                       | Surface Condition | Basic Size          | Dimensional Tolerance  |
|-------------------|-----------------------|-------------------|---------------------|------------------------|
| Outside Dia.<br>D |                       | As Forged<br>(1)  | 300 & below         | +not specified<br>-2.0 |
|                   |                       |                   | over 300 thru 600   |                        |
|                   |                       |                   | over 600 thru 1000  |                        |
|                   |                       |                   | over 1000 thru 1500 | +not specified<br>-3.0 |
|                   |                       |                   | over 1500           |                        |
|                   |                       | Finish            | 300 & below         | ±1                     |
|                   |                       |                   | over 300 thru 600   | ±1.5                   |
|                   |                       |                   | over 600 thru 1000  | ±2                     |
|                   |                       |                   | over 1000 thru 1500 | ±2.5                   |
|                   |                       |                   | over 1500           | ±3                     |
| Inside Dia.       | Solid Flange<br>d(2)  | As Forged<br>(1)  | 16 & below          | ±1                     |
|                   |                       |                   | over 16 thru 63     | ±1.5                   |
|                   |                       |                   | over 63 thru 125    | ±2                     |
|                   |                       |                   | over 125 thru 150   | ±2.5                   |
|                   |                       |                   | over 250 thru 500   | ±3                     |
|                   |                       |                   | over 500 thru 1000  | ±4                     |
|                   |                       |                   | over 1000           | ±5, 0                  |
|                   | Slip-on Flange<br>do  | Finish            | 100 & below         | +0.5, 0                |
|                   |                       |                   | over 100 thru 400   | +1, 0                  |
|                   |                       |                   | over 400 thru 600   | +1.5, 0                |
|                   |                       |                   | over 600 thru 800   | +2.0, 0                |
|                   |                       |                   | over 800 thru 1000  | +2.5, 0                |
|                   |                       |                   | over 1000           | +3, 0                  |
|                   |                       |                   | 100 & below         | 0, -0.5                |
|                   |                       |                   | over 100 thru 400   | 0, -1                  |
|                   |                       |                   | over 400 thru 600   | 0, -1.5                |
|                   |                       |                   | over 600 thru 800   | 0, -2                  |
|                   |                       |                   | over 800 thru 1000  | 0, -2.5                |
|                   |                       |                   | over 1000           | 0, -3                  |
| Bolt Hole         | Bolt Circle<br>Dia. c |                   | 250 & below         | ±0.5                   |
|                   |                       |                   | over 250 thru 550   | ±0.6                   |
|                   |                       |                   | over 550 thru 950   | ±0.8                   |
|                   |                       |                   | over 950 thru 1350  | ±1                     |
|                   |                       |                   | over 1350           | ±1.5                   |

| Flange Section  |                                                 | Surface Condition | Basic Size          | Dimensional Tolerance |
|-----------------|-------------------------------------------------|-------------------|---------------------|-----------------------|
| Bolt Hole       | Pitch of Hole P                                 | Drilling Hole     |                     | ±0.5                  |
| Dia. of Hub     | Slip-on Flange (a) and Welding Neck Flange (d1) | As Forged (1)     | 220 & below         | +2, 0                 |
|                 |                                                 |                   | over 220 thru 450   | +3, 0                 |
|                 |                                                 |                   | over 450 thru 650   | +4, 0                 |
|                 |                                                 |                   | over 650 thru 850   | +6, 0                 |
|                 |                                                 |                   | over 850 thru 1000  | +7, 0                 |
|                 |                                                 |                   | over 1000           | +8, 0                 |
|                 |                                                 | Finish            | 220 & below         | +1, 0                 |
|                 |                                                 |                   | over 220 thru 450   | +1.5, 0               |
|                 |                                                 |                   | over 450 thru 650   | +2, 0                 |
|                 |                                                 |                   | over 650 thru 850   | +2.5, 0               |
|                 |                                                 |                   | over 850 thru 1000  | +3, 0                 |
| Gasket Seat     | C1, C2, C3, C4                                  | Finish            | 500 & below         | ±0.3                  |
|                 |                                                 |                   | over 500 thru 1000  | ±0.35                 |
|                 |                                                 |                   | over 1000 thru 1500 | ±0.4                  |
|                 |                                                 |                   | over 1500           | ±0.5                  |
|                 | f3, f4                                          | Finish            | 8 & below           | ±0.2                  |
|                 |                                                 |                   | over 8              | ±0.25                 |
|                 | g                                               | Finish            | 200 & below         | ±0.8                  |
|                 |                                                 |                   | over 200 thru 650   | ±0.9                  |
|                 |                                                 |                   | over 650 thru 1000  | ±1                    |
|                 |                                                 |                   | over 1000           | ±1.2                  |
| Thickness       |                                                 | One-side Finish   | 20 & below          | +1.5, 0               |
|                 |                                                 |                   | over 20 thru 50     | +2, 0                 |
|                 |                                                 |                   | over 50 thru 100    | +3, 0                 |
|                 |                                                 | Bolt-side Finish  | 20 & below          | +1, 0                 |
|                 |                                                 |                   | over 20 thru 50     | +1.5, 0               |
|                 |                                                 |                   | over 50 thru 100    | +2, 0                 |
| Hub Height<br>T | Flange with pipe Inserted                       | Finish            | 50 & below          | ±1                    |
|                 |                                                 |                   | over 50 thru 100    | ±1.5                  |
|                 | Flange with Butt-Welded Pipe                    | Finish            | over 100 thru 200   | ±2                    |
|                 |                                                 |                   | over 200 & below    | +2, 0                 |
|                 |                                                 |                   | over 200 thru 300   | +3, 0                 |

## Notes

1. This dimensional tolerance applies to the machined surface, as required.
2. This dimension d has been specified only for the flange, of which the bore part is cylindrical in shape.

## Remarks

1. The dimensions d of bore part of the solid flanges with surface, as forged of valves, pumps, etc. are allowed up to plus 100% of the above dimensional tolerance. Provided that the required thickness shall be free from its influence.
2. The thickness of flange of valve and the like, of which the dimension between flange faces is limited to a fixed value, are allowed up to plus 100% of the above dimensional tolerance in the column of thickness.
3. In the case of spot facing of the single surface finishing, the thickness of spot facing is allowed up to 70% of the dimensional tolerance in the above column of thickness in negative side.
4. The chain double-lines in the figures of solid flange and socket welding type flange illustrate the cases of large raised face flange.

## Valve Series

- Key Operation Ball Valves
- Key Operation Needle Valves
- Ball Valves
- Integral Bonnet Needle Valves
- Union Bonnet Needle Valves
- Check Valves
- High Pressure Check Valves
- High Pressure Needle Valves
- Plug Valves
- Manifold Valves
- Vacuum Clamps
- Water Regulators
- Flexible Hoses
- Double Block & Bleed Valves
- Swing-Out Ball Valves
- Toggle Valves
- Bleed & Purge Valves
- Quick Connectors
- High Pressure Ball Valves
- Hydraulic Ball Valves
- Trunnion Ball Valves
- Rising Plug Valves
- Relief Valves
- Cryogenic Needle Valves
- Cryogenic Ball Valves
- Micron in-Line Filters
- Gauge Root Valves
- Hydraulic Flange and Components

## Fitting Series

Tube Fittings (Compression Type)  
Instrument Thread Fittings  
Forged Fittings  
Bite Type Tube Fittings (DIN2353)  
Bite Type Tube Fittings (JIS B2351)  
37 Flared Tube Fittings (SAE J514)  
O-Ring Face Seal Fittings  
Hose Connectors & Push-On Hose Fittings

## Electric

MCPD(Molded Case Power Distributor)

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Fax. 82-55-783-1111  
[www.superlok.com](http://www.superlok.com)  
[superlok@superlok.com](mailto:superlok@superlok.com)

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