

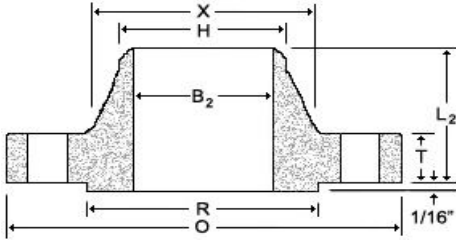


# Table of Contents

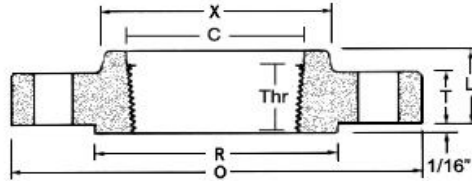
|  |   |
|--|---|
| ANSI B16.5 Class 150 Forged Flanges..... | 2 |
| ANSI B16.5 Class 300 Forged Flanges..... | 3 |
| ANSI B16.5 Class 600 Forged Flanges..... | 4 |
| Dimensional Tolerances B16.5 – 2003..... | 5 |
| Bolt and Stud Dimensions ASME B16.5..... | 7 |
| Wall Thicknesses.....                    | 8 |
| Weld Neck Flange Bores.....              | 9 |



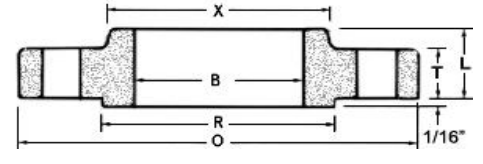
## ANSI B16.5 Class 150 Forged Flanges



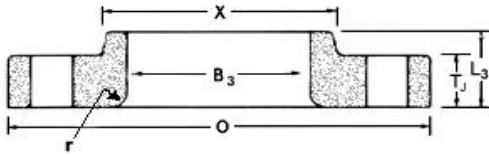
Weld Neck



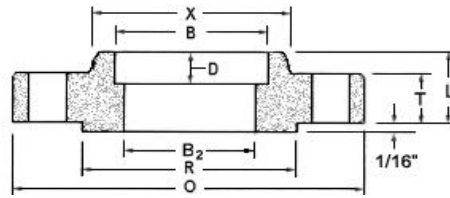
Threaded



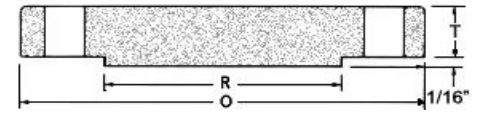
Slip-On



Lap Joint



Socket Weld



Blind

| Nom. Pipe Size | O     | T    | T <sub>J</sub> | R     | X     | #/Dia of Holes <sup>a</sup> | Bolt Circle Dia | B     | B <sub>2</sub> <sup>b</sup> | B <sub>3</sub> | H     | L    | L <sub>2</sub> | L <sub>3</sub> <sup>c</sup> | r    | D    | Thr  |
|----------------|-------|------|----------------|-------|-------|-----------------------------|-----------------|-------|-----------------------------|----------------|-------|------|----------------|-----------------------------|------|------|------|
| 1/2            | 3.50  | 0.38 | 0.44           | 1.38  | 1.19  | 4-0.62                      | 2.38            | 0.88  | 0.62                        | 0.90           | 0.84  | 0.56 | 1.81           | 0.62                        | 0.12 | 0.38 | 0.62 |
| 3/4            | 3.88  | 0.44 | 0.50           | 1.69  | 1.50  | 4-0.62                      | 2.75            | 1.09  | 0.82                        | 1.11           | 1.05  | 0.56 | 2.00           | 0.62                        | 0.12 | 0.44 | 0.62 |
| 1              | 4.25  | 0.50 | 0.56           | 2.00  | 1.94  | 4-0.62                      | 3.12            | 1.36  | 1.05                        | 1.38           | 1.32  | 0.62 | 2.12           | 0.69                        | 0.12 | 0.50 | 0.69 |
| 1 1/4          | 4.62  | 0.56 | 0.62           | 2.50  | 2.31  | 4-0.62                      | 3.50            | 1.70  | 1.38                        | 1.72           | 1.66  | 0.75 | 2.19           | 0.81                        | 0.19 | 0.56 | 0.81 |
| 1 1/2          | 5.00  | 0.62 | 0.69           | 2.88  | 2.56  | 4-0.62                      | 3.88            | 1.95  | 1.61                        | 1.97           | 1.90  | 0.81 | 2.38           | 0.88                        | 0.25 | 0.62 | 0.88 |
| 2              | 6.00  | 0.69 | 0.75           | 3.62  | 3.06  | 4-0.75                      | 4.75            | 2.44  | 2.07                        | 2.46           | 2.38  | 0.94 | 2.44           | 1.00                        | 0.31 | 0.69 | 1.00 |
| 2 1/2          | 7.00  | 0.81 | 0.88           | 4.12  | 3.56  | 4-0.75                      | 5.50            | 2.94  | 2.47                        | 2.97           | 2.88  | 1.06 | 2.69           | 1.12                        | 0.31 | 0.75 | 1.12 |
| 3              | 7.50  | 0.88 | 0.94           | 5.00  | 4.25  | 4-0.75                      | 6.00            | 3.57  | 3.07                        | 3.60           | 3.50  | 1.12 | 2.69           | 1.19                        | 0.38 | 0.81 | 1.19 |
| 3 1/2          | 8.50  | 0.88 | 0.94           | 5.50  | 4.81  | 8-0.75                      | 7.00            | 4.07  | 3.55                        | 4.10           | 4.00  | 1.19 | 2.75           | 1.25                        | 0.38 | 0.88 | 1.25 |
| 4              | 9.00  | 0.88 | 0.94           | 6.19  | 5.31  | 8-0.75                      | 7.50            | 4.57  | 4.03                        | 4.60           | 4.50  | 1.25 | 2.94           | 1.31                        | 0.44 | 0.94 | 1.31 |
| 5              | 10.00 | 0.88 | 0.94           | 7.31  | 6.44  | 8-0.88                      | 8.50            | 5.66  | 5.05                        | 5.69           | 5.56  | 1.38 | 3.44           | 1.44                        | 0.44 | 0.94 | 1.44 |
| 6              | 11.00 | 0.94 | 1.00           | 8.50  | 7.56  | 8-0.88                      | 9.50            | 6.72  | 6.07                        | 6.75           | 6.63  | 1.50 | 3.44           | 1.56                        | 0.50 | 1.06 | 1.56 |
| 8              | 13.50 | 1.06 | 1.12           | 10.62 | 9.69  | 8-0.88                      | 11.75           | 8.72  | 7.98                        | 8.75           | 8.63  | 1.69 | 3.94           | 1.75                        | 0.50 | 1.25 | 1.75 |
| 10             | 16.00 | 1.12 | 1.19           | 12.75 | 12.00 | 12-1.00                     | 14.25           | 10.88 | 10.02                       | 10.92          | 10.75 | 1.88 | 3.94           | 1.94                        | 0.50 | 1.31 | 1.94 |
| 12             | 19.00 | 1.19 | 1.25           | 15.00 | 14.38 | 12-1.00                     | 17.00           | 12.88 | 12.00                       | 12.92          | 12.75 | 2.12 | 4.44           | 2.19                        | 0.50 | 1.56 | 2.19 |
| 14             | 21.00 | 1.31 | 1.38           | 16.25 | 15.75 | 12-1.12                     | 18.75           | 14.14 | 13.25                       | 14.18          | 14.00 | 2.19 | 4.94           | 3.12                        | 0.50 | 1.63 | 2.25 |
| 16             | 23.50 | 1.38 | 1.44           | 18.50 | 18.00 | 16-1.12                     | 21.25           | 16.16 | 15.25                       | 16.19          | 16.00 | 2.44 | 4.94           | 3.44                        | 0.50 | 1.75 | 2.50 |
| 18             | 25.00 | 1.50 | 1.56           | 21.00 | 19.88 | 16-1.25                     | 22.75           | 18.18 | 17.25                       | 18.20          | 18.00 | 2.62 | 5.44           | 3.81                        | 0.50 | 1.94 | 2.69 |
| 20             | 27.50 | 1.62 | 1.69           | 23.00 | 22.00 | 20-1.25                     | 25.00           | 20.20 | 19.25                       | 20.25          | 20.00 | 2.81 | 5.62           | 4.06                        | 0.50 | 2.13 | 2.88 |
| 22             | 29.50 | 1.75 | 1.81           | 25.25 | 24.25 | 20-1.38                     | 27.25           | 22.22 | 21.25                       | 22.25          | 22.00 | 3.07 | 5.82           | 4.25                        | 0.50 | 2.38 | 3.13 |
| 24             | 32.00 | 1.81 | 1.88           | 27.25 | 26.12 | 20-1.38                     | 29.50           | 24.25 | 23.25                       | 24.25          | 24.00 | 3.19 | 5.94           | 4.38                        | 0.50 | 2.50 | 3.25 |

Dimensions are in inches.

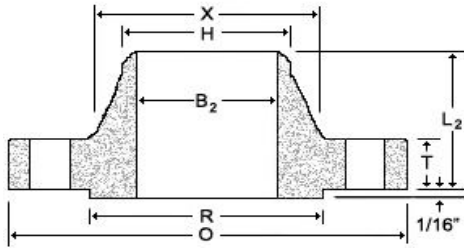
(a)- Bolt hole diameter 1/8 in. larger than bolt diameter.

(b)- Standard bore dimensions provided. See bore chart for other wall thicknesses.

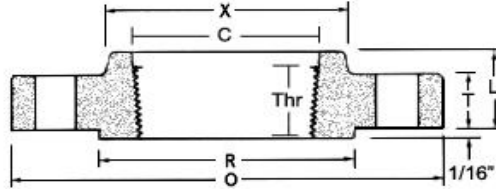
(c)- This dimension is commonly associated with "true" lap joints. Industry standard is to make to the slip on length through the hub.



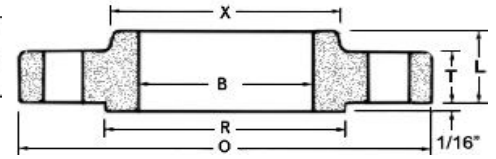
## ANSI B16.5 Class 300 Forged Flanges



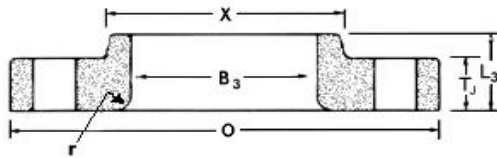
Weld neck



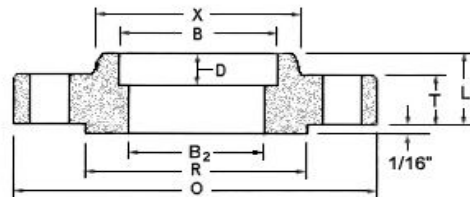
Threaded



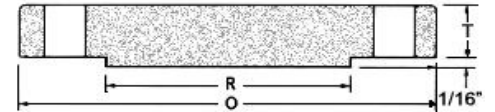
Slip-On



Lap Joint



Socket Weld



Blind

| om. Pipe Size | O     | T    | T <sub>J</sub> | R     | X     | #/Dia of Holes <sup>a</sup> | Bolt Circle Dia | B     | B <sub>2</sub> <sup>b</sup> | B <sub>3</sub> | H     | L    | L <sub>2</sub> | L <sub>3</sub> <sup>c</sup> | r    | C     | D    | Thr  |
|---------------|-------|------|----------------|-------|-------|-----------------------------|-----------------|-------|-----------------------------|----------------|-------|------|----------------|-----------------------------|------|-------|------|------|
| ½             | 3.75  | 0.50 | 0.56           | 1.38  | 1.50  | 4-0.63                      | 2.62            | 0.88  | 0.62                        | 0.90           | 0.84  | 0.81 | 2.00           | 0.88                        | 0.12 | 0.93  | 0.38 | 0.62 |
| ¾             | 4.62  | 0.56 | 0.62           | 1.69  | 1.88  | 4-0.75                      | 3.25            | 1.09  | 0.82                        | 1.11           | 1.05  | 0.94 | 2.19           | 1.00                        | 0.12 | 1.14  | 0.44 | 0.62 |
| 1             | 4.88  | 0.62 | 0.69           | 2.00  | 2.12  | 4-0.75                      | 3.50            | 1.36  | 1.05                        | 1.38           | 1.32  | 1.00 | 2.38           | 1.06                        | 0.12 | 1.41  | 0.50 | 0.69 |
| 1¼            | 5.25  | 0.69 | 0.75           | 2.50  | 2.50  | 4-0.75                      | 3.88            | 1.70  | 1.38                        | 1.72           | 1.66  | 1.00 | 2.50           | 1.06                        | 0.19 | 1.75  | 0.56 | 0.81 |
| 1½            | 6.12  | 0.75 | 0.81           | 2.88  | 2.75  | 4-0.88                      | 4.50            | 1.95  | 1.61                        | 1.97           | 1.90  | 1.13 | 2.63           | 1.19                        | 0.25 | 1.98  | 0.62 | 0.88 |
| 2             | 6.50  | 0.81 | 0.88           | 3.62  | 3.31  | 8-0.75                      | 5.00            | 2.44  | 2.07                        | 2.46           | 2.38  | 1.25 | 2.69           | 1.31                        | 0.31 | 2.50  | 0.69 | 1.12 |
| 2½            | 7.50  | 0.94 | 1.00           | 4.12  | 3.94  | 8-0.88                      | 5.88            | 2.94  | 2.47                        | 2.97           | 2.88  | 1.44 | 2.94           | 1.50                        | 0.31 | 3.00  | 0.75 | 1.25 |
| 3             | 8.25  | 1.06 | 1.12           | 5.00  | 4.62  | 8-0.88                      | 6.62            | 3.57  | 3.07                        | 3.60           | 3.50  | 1.63 | 3.06           | 1.69                        | 0.38 | 3.63  | 0.81 | 1.25 |
| 3½            | 9.00  | 1.12 | 1.19           | 5.50  | 5.25  | 8-0.88                      | 7.25            | 4.07  | 3.55                        | 4.10           | 4.00  | 1.69 | 3.13           | 1.75                        | 0.38 | 4.13  | .... | 1.44 |
| 4             | 10.00 | 1.19 | 1.25           | 6.19  | 5.75  | 8-0.88                      | 7.88            | 4.57  | 4.03                        | 4.60           | 4.50  | 1.82 | 3.32           | 1.88                        | 0.44 | 4.63  | .... | 1.44 |
| 5             | 11.00 | 1.31 | 1.38           | 7.31  | 7.00  | 8-0.88                      | 9.25            | 5.66  | 5.05                        | 5.69           | 5.56  | 1.94 | 3.82           | 2.00                        | 0.44 | 5.69  | .... | 1.69 |
| 6             | 12.50 | 1.38 | 1.44           | 8.50  | 8.12  | 12-0.88                     | 10.62           | 6.72  | 6.07                        | 6.75           | 6.63  | 2.00 | 3.82           | 2.06                        | 0.50 | 6.75  | .... | 1.81 |
| 8             | 15.00 | 1.56 | 1.62           | 10.62 | 10.25 | 12-1.00                     | 13.00           | 8.72  | 7.98                        | 8.75           | 8.63  | 2.38 | 4.32           | 2.44                        | 0.50 | 8.75  | .... | 2.00 |
| 10            | 17.50 | 1.81 | 1.88           | 12.75 | 12.62 | 16-1.12                     | 15.25           | 10.88 | 10.02                       | 10.92          | 10.75 | 2.56 | 4.56           | 3.75                        | 0.50 | 10.88 | .... | 2.19 |
| 12            | 20.50 | 1.94 | 2.00           | 15.00 | 14.75 | 16-1.25                     | 17.75           | 12.88 | 12.00                       | 12.92          | 12.75 | 2.82 | 5.06           | 4.00                        | 0.50 | 12.94 | .... | 2.38 |
| 14            | 23.00 | 2.06 | 2.12           | 16.25 | 16.75 | 20-1.25                     | 20.25           | 14.14 | 13.25                       | 14.18          | 14.00 | 2.94 | 5.56           | 4.38                        | 0.50 | 14.19 | .... | 2.50 |
| 16            | 25.50 | 2.19 | 2.25           | 18.50 | 19.00 | 20-1.38                     | 22.50           | 16.16 | 15.25                       | 16.19          | 16.00 | 3.19 | 5.69           | 4.75                        | 0.50 | 16.19 | .... | 2.69 |
| 18            | 28.00 | 2.31 | 2.38           | 21.00 | 21.00 | 24-1.38                     | 24.75           | 18.18 | 17.25                       | 18.20          | 18.00 | 3.44 | 6.19           | 5.12                        | 0.50 | 18.19 | .... | 2.75 |
| 20            | 30.50 | 2.44 | 2.50           | 23.00 | 23.12 | 24-1.38                     | 27.00           | 20.20 | 19.25                       | 20.25          | 20.00 | 3.69 | 6.32           | 5.50                        | 0.50 | 20.19 | .... | 2.88 |
| 22            | 33.00 | 2.57 | 2.63           | 25.25 | 25.25 | 24-1.63                     | 29.25           | 22.22 | 21.25                       | 22.25          | 22.00 | 3.93 | 6.43           | 5.75                        | 0.50 | 22.19 | .... | 3.13 |
| 24            | 36.00 | 2.69 | 2.75           | 27.25 | 27.62 | 24-1.63                     | 32.00           | 24.25 | 23.25                       | 24.25          | 24.00 | 4.13 | 6.56           | 6.00                        | 0.50 | 24.19 | .... | 3.25 |

Dimensions are in inches.

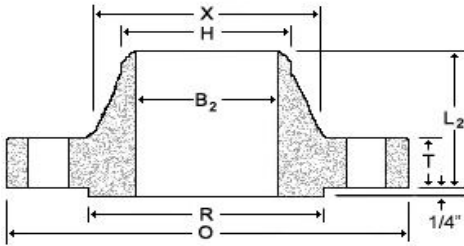
(a)- Bolt hole diameter 1/8 in. larger than bolt diameter.

(b)- Standard bore dimensions provided. See bore chart for other wall thicknesses.

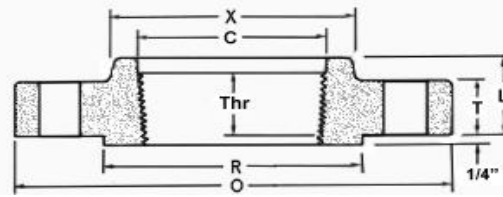
(c)- This dimension is commonly associated with "true" lap joints. Industry standard is to make to the slip on length through the hub.



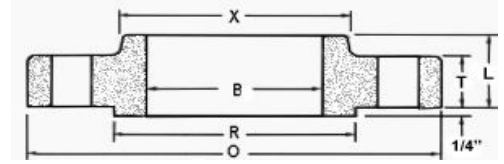
## ANSI B16.5 Class 600 Forged Flanges



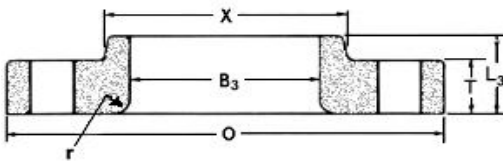
Weld Neck



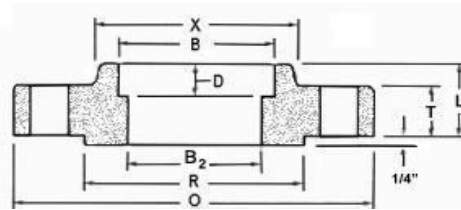
Threaded



Slip-On



Lap Joint



Socket Weld



Blind

| Nom. Pipe Size | OTRX  |      |       |       | #/Dia of Holes <sup>a</sup> | Bolt Circle Dia | B     | B <sub>2</sub> <sup>b</sup>   | B <sub>3</sub> | HL    | L <sub>2</sub> | L <sub>3</sub> <sup>c</sup> | r    | C    | D     | Thr  |      |
|----------------|-------|------|-------|-------|-----------------------------|-----------------|-------|-------------------------------|----------------|-------|----------------|-----------------------------|------|------|-------|------|------|
| 1/2            | 3.75  | 0.56 | 1.38  | 1.50  | 4-0.63                      | 2.62            | 0.88  | To be specified by Purchaser. | 0.90           | 0.84  | 0.88           | 2.06                        | 0.88 | 0.12 | 0.93  | 0.38 | 0.62 |
| 3/4            | 4.62  | 0.62 | 1.69  | 1.88  | 4-0.75                      | 3.25            | 1.09  |                               | 1.11           | 1.05  | 1.00           | 2.25                        | 1.00 | 0.12 | 1.14  | 0.44 | 0.62 |
| 1              | 4.88  | 0.69 | 2.00  | 2.12  | 4-0.75                      | 3.50            | 1.36  |                               | 1.38           | 1.32  | 1.06           | 2.44                        | 1.06 | 0.12 | 1.41  | 0.50 | 0.69 |
| 1 1/4          | 5.25  | 0.81 | 2.50  | 2.50  | 4-0.75                      | 3.88            | 1.70  |                               | 1.72           | 1.66  | 1.12           | 2.62                        | 1.12 | 0.19 | 1.75  | 0.56 | 0.81 |
| 1 1/2          | 6.12  | 0.88 | 2.88  | 2.75  | 4-0.88                      | 4.50            | 1.95  |                               | 1.97           | 1.90  | 1.25           | 2.75                        | 1.25 | 0.25 | 1.99  | 0.62 | 0.88 |
| 2              | 6.50  | 1.00 | 3.62  | 3.31  | 8-0.75                      | 5.00            | 2.44  |                               | 2.46           | 2.38  | 1.44           | 2.88                        | 1.44 | 0.31 | 2.50  | 0.69 | 1.12 |
| 2 1/2          | 7.50  | 1.12 | 4.12  | 3.94  | 8-0.88                      | 5.88            | 2.94  |                               | 2.97           | 2.88  | 1.62           | 3.12                        | 1.62 | 0.31 | 3.00  | 0.75 | 1.25 |
| 3              | 8.25  | 1.25 | 5.00  | 4.62  | 8-0.88                      | 6.62            | 3.57  |                               | 3.60           | 3.50  | 1.81           | 3.25                        | 1.81 | 0.38 | 3.63  | 0.81 | 1.38 |
| 3 1/2          | 9.00  | 1.38 | 5.50  | 5.25  | 8-1.00                      | 7.25            | 4.07  |                               | 4.10           | 4.00  | 1.94           | 3.38                        | 1.94 | 0.38 | 4.13  | .... | 1.56 |
| 4              | 10.75 | 1.50 | 6.19  | 6.00  | 8-1.00                      | 8.50            | 4.57  |                               | 4.60           | 4.50  | 2.12           | 4.00                        | 2.12 | 0.44 | 4.63  | .... | 1.62 |
| 5              | 13.00 | 1.75 | 7.31  | 7.44  | 8-1.12                      | 10.50           | 5.66  |                               | 5.69           | 5.56  | 2.38           | 4.50                        | 2.38 | 0.44 | 5.69  | .... | 1.88 |
| 6              | 14.00 | 1.88 | 8.50  | 8.75  | 12-1.12                     | 11.50           | 6.72  |                               | 6.75           | 6.63  | 2.62           | 4.62                        | 2.62 | 0.50 | 6.75  | .... | 2.00 |
| 8              | 16.50 | 2.19 | 10.62 | 10.75 | 12-1.25                     | 13.75           | 8.72  |                               | 8.75           | 8.63  | 3.00           | 5.25                        | 3.00 | 0.50 | 8.75  | .... | 2.25 |
| 10             | 20.00 | 2.50 | 12.75 | 13.50 | 16-1.38                     | 17.00           | 10.88 |                               | 10.92          | 10.75 | 3.38           | 6.00                        | 4.38 | 0.50 | 10.88 | .... | 2.56 |
| 12             | 22.00 | 2.62 | 15.00 | 15.75 | 20-1.38                     | 19.25           | 12.88 |                               | 12.92          | 12.75 | 3.62           | 6.12                        | 4.62 | 0.50 | 12.94 | .... | 2.75 |
| 14             | 23.75 | 2.75 | 16.25 | 17.00 | 20-1.50                     | 20.75           | 14.14 |                               | 14.18          | 14.00 | 3.69           | 6.50                        | 5.00 | 0.50 | 14.19 | .... | 2.88 |
| 16             | 27.00 | 3.00 | 18.50 | 19.50 | 20-1.63                     | 23.75           | 16.16 |                               | 16.19          | 16.00 | 4.19           | 7.00                        | 5.50 | 0.50 | 16.19 | .... | 3.06 |
| 18             | 29.25 | 3.25 | 21.00 | 21.50 | 20-1.75                     | 25.75           | 18.18 |                               | 18.20          | 18.00 | 4.62           | 7.25                        | 6.00 | 0.50 | 18.19 | .... | 3.12 |
| 20             | 32.00 | 3.50 | 23.00 | 24.00 | 24-1.75                     | 28.50           | 20.20 |                               | 20.25          | 20.00 | 5.00           | 7.50                        | 6.50 | 0.50 | 20.19 | .... | 3.25 |
| 22             | 34.25 | 3.75 | 25.25 | 26.25 | 24-1.88                     | 30.63           | 22.22 |                               | 22.25          | 22.00 | 5.25           | 7.75                        | 6.88 | 0.50 | ....  | .... | --   |
| 24             | 37.00 | 4.00 | 27.25 | 28.25 | 24-2.00                     | 33.00           | 24.25 |                               | 24.25          | 24.00 | 5.50           | 8.00                        | 7.25 | 0.50 | 24.19 | .... | 3.62 |

Dimensions are in inches.

(a)- Bolt hole diameter 1/8 in. larger than bolt diameter.

(b)- See bore chart for wall thicknesses.

(c)- This dimension is commonly associated with "true" lap joints. Industry standard is to make to the slip on length through the hub.



## Dimensional Tolerances B16.5 - 2003

| Threaded, Socket-Welding, Slip-On, Lap Joint, and Blind |   |  |
|---|---|--|
| Outside Diameter (1)                                    | when the O.D. is 24" or less                  | $\pm 1/16"$  |
|   | when the O.D. is over 24"                     | $\pm 1/8"$   |
| Inside Diameter   | Threaded                                      | within limites on boring gauge                     |
|   | Socket-Welding, Slip-On and Lap-Joint         | $\leq 10" + 1/32", -0"$<br>$\geq 12" + 1/16", -0"$ |
| Outside Diameter of Hub (1)                             | $\leq 12"$                                    | $+3/32"$<br>$-1/16"$                               |
|   | $\geq 14"$<br>Slip-On and Lap-                | $\pm 1/8"$   |
| Diameter of Contact Face                                | 1/16" Raised Face                             | $\pm 1/32"$  |
|   | 1/4" Raised Face Tongue & Groove Male, Female | $\pm 1/64"$  |

| Weld Neck                   |   |                     |
|-----------------------------|---|---------------------|
| Outside Diameter (1)        | when the O.D. is 24" or less                  | $\pm 1/16"$         |
|                             | when the O.D. is over 24"                     | $\pm 1/8"$          |
| Inside Diameter             | $\leq 10"$                                    | $\pm 1/32"$         |
|                             | 12" through 18"                               | $\pm 1/16"$         |
|                             | $\geq 20"$                                    | $+1/8"$<br>$-1/16"$ |
| Diameter of Contact Face    | 1/16" Raised Face                             | $\pm 1/32"$         |
|                             | 1/4" Raised Face Tongue & Groove Male, Female | $\pm 1/64"$         |
| Diameter of Hub at Base (1) | when Hub Base is 24" or less                  | $+1/16"$            |
|                             | when Hub Base is over 24"                     | $\pm 1/8"$          |



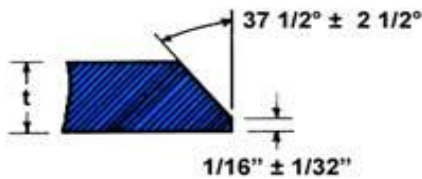
## Dimensional Tolerances B16.5 - 2003

|                            |   |  |
|----------------------------|---|--|
| Diameter of Counterbore    | Same as for Inside Diameter                         |  |
| Drilling                   | Bolt Circle   | $\pm 1/16"$                            |
|                            | Bolt Hole Spacing                                   | $\pm 1/32"$                            |
|                            | Concentricity of Bolt Circle with Respect to Facing | NPS $\leq 2 \frac{1}{2}"$<br>1/32" max |
| NPS $\geq 3"$<br>1/16" max |   |  |
| Thickness                  | $\leq 18"$  | +1/8", -0"                             |
|                            | $\geq 20"$  | +3/16", -0"                            |
| Length Through the Hub (1) | $\leq 18"$  | +1/8", -1/32"                          |
|                            | $\geq 20"$  | +3/16", -1/16"                         |

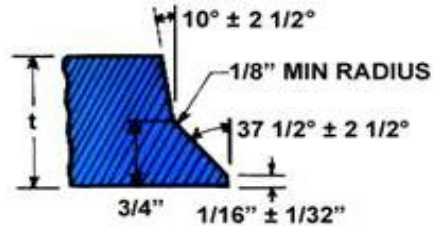
|                                     |   |  |
|-------------------------------------|---|--|
| Diameter of Hub at Point of Welding | NPS $\leq 5"$                                       | +3/32"<br>-1/32"                       |
|                                     | NPS $\geq 6"$                                       | +5/32"<br>-1/32"                       |
| Drilling                            | Bolt Circle   | $\pm 1/16"$                            |
|                                     | Bolt Hole Spacing                                   | $\pm 1/32"$                            |
|                                     | Concentricity of Bolt Circle with Respect to Facing | NPS $\leq 2 \frac{1}{2}"$<br>1/32" max |
| NPS $\geq 3"$<br>1/16" max          |   |  |
| Thickness                           | $\leq 18"$  | +1/8", -0"                             |
|                                     | $\geq 20"$  | +3/16", -0"                            |
| Length Through the Hub              | NPS $\leq 4"$                                       | $\pm 1/16"$                            |
|                                     | $5 \leq \text{NPS} \leq 10"$                        | +1/16", -1/8"                          |
|                                     | $\geq 12"$  | +1/8", -3/16"                          |

### WELDING BEVEL STANDARDS

for Wall Thickness "t" 3/16" to 3/4" incl.



for Wall Thickness "t" greater than 3/4"



(1) Tolerances not listed in B16.5-2003



## Bolt and Stud Dimensions ASME B16.5

| Nominal Pipe Size | 150 LB. Flanges  |                       |                |       | 300 LB. Flanges  |                       |                |       | 600 LB. Flanges  |                       |                |        |
|-------------------|------------------|-----------------------|----------------|-------|------------------|-----------------------|----------------|-------|------------------|-----------------------|----------------|--------|
|                   | # Bolts or Studs | Dia of Bolts or Studs | Length of Stud |       | # Bolts or Studs | Dia of Bolts or Studs | Length of Stud |       | # Bolts or Studs | Dia of Bolts or Studs | Length of Stud |        |
|                   |                  |                       | 1/16 RF        | RTJ   |                  |                       | 1/16 RF        | RTJ   |                  |                       | 1/4 RF         | RTJ    |
| 1/2               | 4                | 0.50                  | 2-1/4          | -     | 4                | 0.50                  | 2-1/2          | 3     | 4                | 0.50                  | 3              | 3      |
| 3/4               | 4                | 0.50                  | 2-1/2          | -     | 4                | 0.63                  | 3              | 3-1/2 | 4                | 0.63                  | 3-1/2          | 3-1/2  |
| 1                 | 4                | 0.50                  | 2-1/2          | 3     | 4                | 0.63                  | 3              | 3-1/2 | 4                | 0.63                  | 3-1/2          | 3-1/2  |
| 1-1/4             | 4                | 0.50                  | 2-3/4          | 3-1/4 | 4                | 0.63                  | 3-1/4          | 3-3/4 | 4                | 0.63                  | 3-3/4          | 3-3/4  |
| 1-1/2             | 4                | 0.50                  | 2-3/4          | 3-1/4 | 4                | 0.75                  | 3-1/2          | 4     | 4                | 0.75                  | 4-1/4          | 4-1/4  |
| 2                 | 4                | 0.63                  | 3-1/4          | 3-3/4 | 8                | 0.63                  | 3-1/2          | 4     | 8                | 0.63                  | 4-1/4          | 4-1/4  |
| 2-1/2             | 4                | 0.63                  | 3-1/2          | 4     | 8                | 0.75                  | 4              | 4-1/2 | 8                | 0.75                  | 4-3/4          | 4-3/4  |
| 3                 | 4                | 0.63                  | 3-1/2          | 4     | 8                | 0.75                  | 4-1/4          | 4-3/4 | 8                | 0.75                  | 5              | 5      |
| 3-1/2             | 8                | 0.63                  | 3-1/2          | 4     | 8                | 0.75                  | 4-1/4          | 5     | 8                | 0.88                  | 5-1/2          | 5-1/2  |
| 4                 | 8                | 0.63                  | 3-1/2          | 4     | 8                | 0.75                  | 4-1/2          | 5     | 8                | 0.88                  | 5-3/4          | 5-3/4  |
| 5                 | 8                | 0.75                  | 3-3/4          | 4-1/4 | 8                | 0.75                  | 4-3/4          | 5-1/4 | 8                | 1.00                  | 6-1/2          | 6-1/2  |
| 6                 | 8                | 0.75                  | 4              | 4-1/2 | 12               | 0.75                  | 4-3/4          | 5-1/2 | 12               | 1.00                  | 6-3/4          | 6-3/4  |
| 8                 | 8                | 0.75                  | 4-1/4          | 4-3/4 | 12               | 0.88                  | 5-1/2          | 6     | 12               | 1.13                  | 7-1/2          | 7-3/4  |
| 10                | 12               | 0.88                  | 4-1/2          | 5     | 16               | 1.00                  | 6-1/4          | 6-3/4 | 16               | 1.25                  | 8-1/2          | 8-1/2  |
| 12                | 12               | 0.88                  | 4-3/4          | 5-1/4 | 16               | 1.13                  | 6-3/4          | 7-1/4 | 20               | 1.25                  | 8-3/4          | 8-3/4  |
| 14                | 12               | 1.00                  | 5-1/4          | 5-3/4 | 20               | 1.13                  | 7              | 7-1/2 | 20               | 1.38                  | 9-1/4          | 9-1/4  |
| 16                | 16               | 1.00                  | 5-1/4          | 5-3/4 | 20               | 1.25                  | 7-1/2          | 8     | 20               | 1.50                  | 10             | 10     |
| 18                | 16               | 1.13                  | 5-3/4          | 6-1/4 | 24               | 1.25                  | 7-3/4          | 8-1/4 | 20               | 1.63                  | 10-3/4         | 10-3/4 |
| 20                | 20               | 1.13                  | 6-1/4          | 6-3/4 | 24               | 1.25                  | 8              | 8-3/4 | 24               | 1.63                  | 11-1/4         | 11-1/2 |
| 24                | 20               | 1.25                  | 6-3/4          | 7-1/4 | 24               | 1.50                  | 9              | 10    | 24               | 1.88                  | 13             | 13-1/4 |

*Dimensions are in inches.*



## Wall Thicknesses

| Nom Pipe Size | OD     | NOMINAL WALL THICKNESS |        |        |          |        |        |         |        |         |         |         |         |        |
|---------------|--------|------------------------|--------|--------|----------|--------|--------|---------|--------|---------|---------|---------|---------|--------|
|               |        | Sch 10                 | Sch 20 | Sch 30 | STD Wall | Sch 40 | Sch 60 | EXT Hvy | Sch 80 | Sch 100 | Sch 120 | Sch 140 | Sch 160 | XX Hvy |
| ½             | 0.840  | 0.083                  | .....  | .....  | 0.109    | 0.109  | .....  | 0.147   | 0.147  | .....   | .....   | .....   | 0.188   | 0.294  |
| ¾             | 1.050  | 0.083                  | .....  | .....  | 0.113    | 0.113  | .....  | 0.154   | 0.154  | .....   | .....   | .....   | 0.219   | 0.308  |
| 1             | 1.315  | 0.109                  | .....  | .....  | 0.133    | 0.133  | .....  | 0.179   | 0.179  | .....   | .....   | .....   | 0.250   | 0.358  |
| 1 ¼           | 1.660  | 0.109                  | .....  | .....  | 0.140    | 0.140  | .....  | 0.191   | 0.191  | .....   | .....   | .....   | 0.250   | 0.382  |
| 1 ½           | 1.900  | 0.109                  | .....  | .....  | 0.145    | 0.145  | .....  | 0.200   | 0.200  | .....   | .....   | .....   | 0.281   | 0.400  |
| 2             | 2.375  | 0.109                  | .....  | .....  | 0.154    | 0.154  | .....  | 0.218   | 0.218  | .....   | .....   | .....   | 0.344   | 0.436  |
| 2 ½           | 2.875  | 0.120                  | .....  | .....  | 0.203    | 0.203  | .....  | 0.276   | 0.276  | .....   | .....   | .....   | 0.375   | 0.552  |
| 3             | 3.500  | 0.120                  | .....  | .....  | 0.216    | 0.216  | .....  | 0.300   | 0.300  | .....   | .....   | .....   | 0.438   | 0.600  |
| 3 ½           | 4.000  | 0.120                  | .....  | .....  | 0.226    | 0.226  | .....  | 0.318   | 0.318  | .....   | .....   | .....   | .....   | 0.636  |
| 4             | 4.500  | 0.120                  | .....  | .....  | 0.237    | 0.237  | .....  | 0.337   | 0.337  | .....   | 0.438   | .....   | 0.531   | 0.674  |
| 5             | 5.563  | 0.134                  | .....  | .....  | 0.258    | 0.258  | .....  | 0.375   | 0.375  | .....   | 0.500   | .....   | 0.625   | 0.750  |
| 6             | 6.625  | 0.134                  | .....  | .....  | 0.280    | 0.280  | .....  | 0.432   | 0.432  | .....   | 0.562   | .....   | 0.719   | 0.864  |
| 8             | 8.625  | 0.148                  | 0.250  | 0.277  | 0.322    | 0.322  | 0.406  | 0.500   | 0.500  | 0.594   | 0.719   | 0.812   | 0.906   | 0.875  |
| 10            | 10.750 | 0.165                  | 0.250  | 0.307  | 0.365    | 0.365  | 0.500  | 0.500   | 0.594  | 0.719   | 0.844   | 1.000   | 1.125   | 1.000  |
| 12            | 12.750 | 0.180                  | 0.250  | 0.330  | 0.375    | 0.406  | 0.562  | 0.500   | 0.688  | 0.844   | 1.000   | 1.125   | 1.312   | 1.000  |
| 14            | 14.000 | 0.250                  | 0.312  | 0.375  | 0.375    | 0.438  | 0.594  | 0.500   | 0.750  | 0.938   | 1.094   | 1.250   | 1.406   | .....  |
| 16            | 16.000 | 0.250                  | 0.312  | 0.375  | 0.375    | 0.500  | 0.656  | 0.500   | 0.844  | 1.031   | 1.219   | 1.438   | 1.594   | .....  |
| 18            | 18.000 | 0.250                  | 0.312  | 0.438  | 0.375    | 0.562  | 0.750  | 0.500   | 0.938  | 1.156   | 1.375   | 1.562   | 1.781   | .....  |
| 20            | 20.000 | 0.250                  | 0.375  | 0.500  | 0.375    | 0.594  | 0.812  | 0.500   | 1.031  | 1.281   | 1.500   | 1.750   | 1.969   | .....  |
| 22            | 22.000 | 0.250                  | .....  | .....  | 0.375    | .....  | .....  | 0.500   | .....  | .....   | .....   | .....   | .....   | .....  |
| 24            | 24.000 | 0.250                  | 0.375  | 0.562  | 0.375    | 0.688  | 0.969  | 0.500   | 1.219  | 1.531   | 1.812   | 2.062   | 2.344   | .....  |
| 26            | 26.000 | .....                  | .....  | .....  | 0.375    | .....  | .....  | 0.500   | .....  | .....   | .....   | .....   | .....   | .....  |
| 30            | 30.000 | 0.312                  | 0.500  | 0.625  | 0.375    | .....  | .....  | 0.500   | .....  | .....   | .....   | .....   | .....   | .....  |
| 36            | 36.000 | 0.312                  | 0.500  | 0.625  | 0.375    | 0.750  | .....  | 0.500   | .....  | .....   | .....   | .....   | .....   | .....  |
| 40            | 40.000 | .....                  | .....  | .....  | 0.375    | .....  | .....  | 0.500   | .....  | .....   | .....   | .....   | .....   | .....  |
| 42            | 42.000 | .....                  | .....  | .....  | 0.375    | .....  | .....  | 0.500   | .....  | .....   | .....   | .....   | .....   | .....  |
| 48            | 48.000 | .....                  | .....  | .....  | 0.375    | .....  | .....  | 0.500   | .....  | .....   | .....   | .....   | .....   | .....  |

*Dimensions are in inches.*

1. Light Wall thicknesses are identical to stainless steel Schedule 10S in sizes through 12", and to Schedule 10 sizes 14", and larger.
2. Standard Wall thicknesses are identical to stainless steel Schedule 40S in sizes though 10".
3. Extra Heavy Wall thicknesses are identical to stainless steel Schedule 80S in sizes through 8".
4. Other types, sizes, and thicknesses of flanges can be provided to meet application.
5. Stocked and manufactured in carbon steel, stainless steel, and variety of other metals and alloy.
6. Inside pipe diameters are provide on the following page.





## Weld Neck Flange Bores

| Nom Pipe Size | OD     | NOMINAL BORE |        |        |          |        |        |         |        |         |         |         |         |        |
|---------------|--------|--------------|--------|--------|----------|--------|--------|---------|--------|---------|---------|---------|---------|--------|
|               |        | Sch 10       | Sch 20 | Sch 30 | STD Wall | Sch 40 | Sch 60 | EXT Hvy | Sch 80 | Sch 100 | Sch 120 | Sch 140 | Sch 160 | XX Hvy |
| ½             | 0.840  | 0.674        | .....  | .....  | 0.622    | 0.622  | .....  | 0.546   | 0.546  | .....   | .....   | .....   | 0.464   | 0.252  |
| ¾             | 1.050  | 0.884        | .....  | .....  | 0.824    | 0.824  | .....  | 0.742   | 0.742  | .....   | .....   | .....   | 0.612   | 0.434  |
| 1             | 1.315  | 1.097        | .....  | .....  | 1.049    | 1.049  | .....  | 0.957   | 0.957  | .....   | .....   | .....   | 0.815   | 0.599  |
| 1 ¼           | 1.660  | 1.442        | .....  | .....  | 1.380    | 1.380  | .....  | 1.278   | 1.278  | .....   | .....   | .....   | 1.160   | 0.896  |
| 1 ½           | 1.900  | 1.682        | .....  | .....  | 1.610    | 1.610  | .....  | 1.500   | 1.500  | .....   | .....   | .....   | 1.338   | 1.100  |
| 2             | 2.375  | 2.157        | .....  | .....  | 2.067    | 2.067  | .....  | 1.939   | 1.939  | .....   | .....   | .....   | 1.687   | 1.503  |
| 2 ½           | 2.875  | 2.635        | .....  | .....  | 2.469    | 2.469  | .....  | 2.323   | 2.323  | .....   | .....   | .....   | 2.125   | 1.771  |
| 3             | 3.500  | 3.260        | .....  | .....  | 3.068    | 3.068  | .....  | 2.900   | 2.900  | .....   | .....   | .....   | 2.624   | 2.300  |
| 3 ½           | 4.000  | 3.760        | .....  | .....  | 3.548    | 3.548  | .....  | 3.364   | 3.364  | .....   | .....   | .....   | .....   | 2.728  |
| 4             | 4.500  | 4.260        | .....  | .....  | 4.026    | 4.026  | .....  | 3.826   | 3.826  | .....   | 3.624   | .....   | 3.438   | 3.152  |
| 5             | 5.563  | 5.295        | .....  | .....  | 5.047    | 5.047  | .....  | 4.813   | 4.813  | .....   | 4.563   | .....   | 4.313   | 4.063  |
| 6             | 6.625  | 6.357        | .....  | .....  | 6.065    | 6.065  | .....  | 5.761   | 5.761  | .....   | 5.501   | .....   | 5.187   | 4.897  |
| 8             | 8.625  | 8.329        | 8.125  | 8.071  | 7.981    | 7.981  | 7.813  | 7.625   | 7.625  | 7.437   | 7.187   | 7.001   | 6.813   | 6.875  |
| 10            | 10.750 | 10.420       | 10.250 | 10.136 | 10.020   | 10.020 | 9.750  | 9.750   | 9.562  | 9.312   | 9.062   | 8.750   | 8.500   | 8.750  |
| 12            | 12.750 | 12.390       | 12.250 | 12.090 | 12.000   | 11.938 | 11.626 | 11.750  | 11.374 | 11.062  | 10.750  | 10.500  | 10.126  | 10.750 |
| 14            | 14.000 | 13.500       | 13.376 | 13.250 | 13.250   | 13.124 | 12.812 | 13.000  | 12.500 | 12.124  | 11.812  | 11.500  | 11.188  | .....  |
| 16            | 16.000 | 15.500       | 15.376 | 15.250 | 15.250   | 15.000 | 14.688 | 15.000  | 14.312 | 13.938  | 13.562  | 13.124  | 12.812  | .....  |
| 18            | 18.000 | 17.500       | 17.376 | 17.124 | 17.250   | 16.876 | 16.500 | 17.000  | 16.124 | 15.688  | 15.250  | 14.876  | 14.438  | .....  |
| 20            | 20.000 | 19.500       | 19.250 | 19.000 | 19.250   | 18.812 | 18.376 | 19.000  | 17.938 | 17.438  | 17.000  | 16.500  | 16.062  | .....  |
| 22            | 22.000 | 21.500       | .....  | .....  | 21.250   | .....  | .....  | 21.000  | .....  | .....   | .....   | .....   | .....   | .....  |
| 24            | 24.000 | 23.500       | 23.250 | 22.876 | 23.250   | 22.624 | 22.062 | 23.000  | 21.562 | 20.938  | 20.376  | 19.876  | 19.312  | .....  |
| 26            | 26.000 | .....        | .....  | .....  | 25.250   | .....  | .....  | 25.000  | .....  | .....   | .....   | .....   | .....   | .....  |
| 30            | 30.000 | 29.376       | 29.000 | 28.750 | 29.250   | .....  | .....  | 29.000  | .....  | .....   | .....   | .....   | .....   | .....  |
| 36            | 36.000 | 35.376       | 35.000 | 34.750 | 35.250   | 34.500 | .....  | 35.000  | .....  | .....   | .....   | .....   | .....   | .....  |
| 40            | 40.000 | .....        | .....  | .....  | 39.250   | .....  | .....  | 39.000  | .....  | .....   | .....   | .....   | .....   | .....  |
| 42            | 42.000 | .....        | .....  | .....  | 41.250   | .....  | .....  | 41.000  | .....  | .....   | .....   | .....   | .....   | .....  |
| 48            | 48.000 | .....        | .....  | .....  | 47.250   | .....  | .....  | 47.000  | .....  | .....   | .....   | .....   | .....   | .....  |

Dimensions are in inches.

1. Source: ANSI B36.10
2. These dimensions are the same for inside pipe diameter. **ALWAYS** specify bore when ordering.
3. Other types, sizes, and thicknesses of flanges can be provided to meet application.
4. Stocked and manufactured in carbon steel, stainless steel, and a variety of other metals and alloys.
5. Wall thicknesses are provided on the previous page.