

### Cast-Iron Flanged Fittings

Cast-iron flanged fittings are produced in accordance with ASME B16.1. The standard specifies pressure-temperature ratings, sizes, marking, minimum requirements for materials, dimensions and tolerances, bolting, gasketing, and testing requirements. The fittings are manufactured in a variety of configurations (tees, elbows, crosses, laterals, etc.) in pressure Classes 25, 125, 250, and 800. Not all sizes and styles are available in all ratings. The sizes available in each class are listed below:

| Pressure class | Size range, NPS (DN)      |
|----------------|---------------------------|
| 25             | 4 (100) through 72 (1800) |
| 125            | 1 (25) through 96 (2400)  |
| 250            | 1 (25) through 30 (750)   |
| 800            | 2 (50) through 12 (300)   |

The nonshock pressure-temperature ratings for the four pressure classes are listed in Table A2.6. The materials of construction are ASTM A 126 class A or B, as shown in Table A2.6.

### Cast- and Forged-Steel and Nickel-Alloy Flanged Fittings

Flanged fittings of steel and nickel alloys are manufactured in accordance with ASME B16.5. The standard covers ratings, materials, dimensions, tolerances, marking, testing, and methods of designating openings for pipe flanges and flanged fittings in sizes NPS ½ (DN 15) through NPS 24 (DN 600) and in rating Classes 150, 300, 400, 600, 900, 1500, and 2500. However, not all sizes are available in all pressure classes. Dimensions of more commonly used fittings are given in Table A2.7. The standard also contains recommendations and requirements for bolting and gaskets.

Within each pressure class, the dimensions of the fittings are held constant, irrespective of the materials being used. Since the physical properties of different materials vary, the pressure-temperature ratings within each pressure class vary with the material. As an example, a Class 600 forged carbon steel (A105) flange is rated at 1270 psig at 400°F, whereas a Class 600 forged stainless steel (A182, F304) flange is rated at 940 psig at 400°F. The matrix of materials and pressure classes is too numerous to reproduce here; therefore, the reader is referred to ASME B16.5 for the flanged fitting pressure-temperature ratings. Figures A2.1, A2.2, and A2.3 illustrate the reduction in pressure rating with increase in temperature for group 1.1 (ASTM A105), 1.10 (ASTM A182, Gr. F22, Cl. 3), and 2.1 (ASTM A182, Gr. F304) materials.

### Forged-Steel Threaded and Socket-Welding Fittings

Forged-steel socket welding and threaded fittings are manufactured in accordance with ASME B16.11. The standard covers pressure-temperature ratings, dimensions, tolerances, marking, and material requirements for forged carbon and alloy steel fittings in the styles and sizes listed in Tables A2.8 and A2.9. Acceptable material forms are forgings, bars, seamless pipe, and seamless tubes which conform to the

**TABLE A2.6** Pressure-Temperature Rating of Cast-Iron Pipe Flanges and Flanged Fittings  
(ASME B16.1-1989).

| Temperature, °F | Class 25*,<br>ASTM A 126,<br>Class A |              | Class 125, ASTM A 126 |             |              |              | Class 250, * ASTM A 126 |             |              | Class 800,*<br>ASTM A<br>126, Class B |     |
|-----------------|--------------------------------------|--------------|-----------------------|-------------|--------------|--------------|-------------------------|-------------|--------------|---------------------------------------|-----|
|                 | Class A                              |              | Class A               |             | Class B      |              | Class A                 |             | Class B      |                                       | NPS |
|                 | NPS<br>4-36                          | NPS<br>42-96 | NPS<br>1-12           | NPS<br>1-12 | NPS<br>14-24 | NPS<br>30-48 | NPS<br>1-12             | NPS<br>1-12 | NPS<br>14-24 | NPS<br>30-48                          |     |
| -20 to 150      | 45                                   | 25           | 175                   | 200         | 150          | 150          | 400                     | 500         | 300          | 300                                   | 800 |
| 200             | 40                                   | 25           | 165                   | 190         | 135          | 115          | 370                     | 460         | 280          | 250                                   | ... |
| 225             | 35                                   | 25           | 155                   | 180         | 130          | 100          | 355                     | 440         | 270          | 225                                   | ... |
| 250             | 30                                   | 25           | 150                   | 175         | 125          | 85           | 340                     | 415         | 260          | 200                                   | ... |
| 275             | 25                                   | 25           | 145                   | 170         | 120          | 65           | 325                     | 395         | 250          | 175                                   | ... |
| 300             | ...                                  | ...          | 140                   | 165         | 110          | 50           | 310                     | 375         | 240          | 150                                   | ... |
| 325             | ...                                  | ...          | 130                   | 155         | 105          | ...          | 295                     | 355         | 230          | 125                                   | ... |
| 353†            | ...                                  | ...          | 125                   | 150         | 100          | ...          | 280                     | 335         | 220          | 100                                   | ... |
| 375             | ...                                  | ...          | ...                   | 145         | ...          | ...          | 265                     | 315         | 210          | ...                                   | ... |
| 406‡            | ...                                  | ...          | ...                   | 140         | ...          | ...          | 250                     | 290         | 200          | ...                                   | ... |
| 425             | ...                                  | ...          | ...                   | 130         | ...          | ...          | ...                     | 270         | ...          | ...                                   | ... |
| 450             | ...                                  | ...          | ...                   | 125         | ...          | ...          | ...                     | 250         | ...          | ...                                   | ... |

Pressure is in lb/in<sup>2</sup> gauge.

NPS is nominal pipe size.

Hydrostatic tests are not required unless specified by user. The test pressure is equal to 1.5 times the 100°F pressure rating.

\* Limitations:

(1) Class 25. When Class 25 cast-iron flanges and flanged fittings are used for gaseous service, the maximum pressure shall be limited to 25 psig. Tabulated pressure-temperature ratings above 25 psig for Class 25 cast-iron flanges and flanged fittings are applicable for nonshock hydraulic service only.

(2) Class 250. When used for liquid service, the tabulated pressure-temperature ratings in NPS 14 and larger are applicable to Class 250 flanges only and not to Class 250 fittings.

(3) Class 800. The tabulated rating is not a steam rating and applies to nonshock hydraulic pressure only.

† 353°F (max.) to reflect the temperature of saturated steam at 125 psig.

‡ 406°F (max.) to reflect the temperature of saturated steam at 250 psig.

**TABLE A2.7** Dimensions of Typical Commercial Cast-Steel Flanged Fittings (from ASME B16.5-1996)

| Nominal<br>pipe<br>size |  | 1/16-in raised-face |        |       |        |       |       |        |        | Ring joint |        |       |              |      |    |      |      |
|-------------------------|--|---------------------|--------|-------|--------|-------|-------|--------|--------|------------|--------|-------|--------------|------|----|------|------|
|                         |  | AA                  | BB     | CC    | EE     | FF    | GG    | HH     | JJ     | KK         | LL     | MM    | NN           | L*   | D† |      |      |
| Class 150               |  |                     |        |       |        |       |       |        |        |            |        |       |              |      |    |      |      |
| 1                       |  | 3 1/2               | 5      | 1 3/4 | 5 3/4  | 1 3/4 | 4 1/2 | 3 3/4  | 5 1/4  | 2          | 6      | 2     | See<br>note‡ |      |    | 5/32 |      |
| 1 1/4                   |  | 3 3/4               | 5 1/2  | 2     | 6 1/4  | 1 3/4 | 4 1/2 | 4      | 5 3/4  | 2 1/4      | 6 1/2  | 2     |              |      |    | 1/4  | 5/32 |
| 1 1/2                   |  | 4                   | 6      | 2 1/4 | 7      | 2     | 4 1/2 | 4 1/4  | 6 1/4  | 2 1/2      | 7 1/4  | 2 1/4 |              |      |    | 1/4  | 5/32 |
| 2                       |  | 4 1/2               | 6 1/2  | 2 1/2 | 8      | 2 1/2 | 5     | 4 3/4  | 6 3/4  | 2 3/4      | 8 1/4  | 2 3/4 |              |      |    | 1/4  | 5/32 |
| 2 1/2                   |  | 5                   | 7      | 3     | 9 1/2  | 2 1/2 | 5 1/2 | 5 1/4  | 7 1/4  | 3 1/4      | 9 3/4  | 2 3/4 |              |      |    | 1/4  | 5/32 |
| 3                       |  | 5 1/2               | 7 3/4  | 3     | 10     | 3     | 6     | 5 3/4  | 8      | 3 3/4      | 10 1/4 | 3 1/4 |              |      |    | 1/4  | 5/32 |
| 3 1/2                   |  | 6                   | 8 1/2  | 3 1/2 | 11 1/2 | 3     | 6 1/2 | 6 1/4  | 8 3/4  | 3 3/4      | 11 3/4 | 3 1/4 |              |      |    | 1/4  | 5/32 |
| 4                       |  | 6 1/2               | 9      | 4     | 12     | 3     | 7     | 6 3/4  | 9 1/4  | 4 1/4      | 12 1/4 | 3 1/4 |              |      |    | 1/4  | 5/32 |
| 5                       |  | 7 1/2               | 10 1/4 | 4 1/2 | 13 1/2 | 3 1/2 | 8     | 7 3/4  | 10 1/2 | 4 3/4      | 13 3/4 | 3 3/4 |              |      |    | 1/4  | 5/32 |
| 6                       |  | 8                   | 11 1/2 | 5     | 14 1/2 | 3 1/2 | 9     | 8 1/4  | 11 3/4 | 5 1/4      | 14 3/4 | 3 3/4 |              |      |    | 1/4  | 5/32 |
| 8                       |  | 9                   | 14     | 5 1/2 | 17 1/2 | 4 1/4 | 11    | 9 1/4  | 14 1/4 | 5 3/4      | 17 3/4 | 4 3/4 | 1/4          | 5/32 |    |      |      |
| 10                      |  | 11                  | 16 1/2 | 6 1/2 | 20 1/2 | 5     | 12    | 11 1/4 | 16 3/4 | 6 3/4      | 20 3/4 | 5 1/4 | 1/4          | 5/32 |    |      |      |
| 12                      |  | 12                  | 19     | 7 1/2 | 24 1/2 | 5 1/2 | 14    | 12 1/4 | 19 1/4 | 7 3/4      | 24 3/4 | 5 3/4 | 1/4          | 5/32 |    |      |      |
| 14                      |  | 14                  | 21 1/2 | 7 3/2 | 27     | 6     | 16    | 14 1/4 | 21 3/4 | 7 3/4      | 27 1/4 | 6 1/4 | 1/4          | 1/8  |    |      |      |
| 16                      |  | 15                  | 24     | 8     | 30     | 6 1/2 | 18    | 15 1/4 | 24 1/4 | 8 1/4      | 30 1/4 | 6 3/4 | 1/4          | 1/8  |    |      |      |
| 18                      |  | 16 1/2              | 26 1/2 | 8 1/2 | 32     | 7     | 19    | 16 3/4 | 26 3/4 | 8 3/4      | 32 1/4 | 7 1/4 | 1/4          | 1/8  |    |      |      |
| 20                      |  | 18                  | 29     | 9 1/2 | 35     | 8     | 20    | 18 1/4 | 29 1/4 | 9 3/4      | 35 1/4 | 8 1/4 | 1/4          | 1/8  |    |      |      |
| 24                      |  | 22                  | 34     | 11    | 40 1/2 | 9     | 24    | 22 1/4 | 34 1/4 | 11 1/4     | 40 3/4 | 9 1/4 | 1/4          | 1/8  |    |      |      |
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**TABLE A2.7** Dimensions of Typical Commercial Cast-Steel Flanged Fittings (from ASME B16.5-1996) (*Continued*)

| Nominal<br>pipe<br>size | 1/16-in raised-face |        |        |        |       |       | Ring joint |          |         |          |         |              |      |      |
|-------------------------|---------------------|--------|--------|--------|-------|-------|------------|----------|---------|----------|---------|--------------|------|------|
|                         | Class 300           |        |        |        |       |       |            |          |         |          |         |              |      |      |
|                         | AA                  | BB     | CC     | EE     | FF    | GG    | HH         | JJ       | KK      | LL       | MM      | NN           | L*   | D†   |
| 1                       | 4                   | 5      | 2 1/4  | 6 1/2  | 2     | 4 1/2 | 4 1/4      | 5 1/4    | 2 1/2   | 6 3/4    | 2 1/4   | See<br>note‡ | 1/4  | 5/32 |
| 1 1/4                   | 4 1/4               | 5 1/2  | 2 1/2  | 7 1/4  | 2 1/4 | 4 1/2 | 4 1/2      | 5 3/4    | 2 3/4   | 7 1/2    | 2 1/2   |              | 1/4  | 5/32 |
| 1 1/2                   | 4 1/2               | 6      | 2 3/4  | 8 1/2  | 2 1/2 | 4 1/2 | 4 3/4      | 6 1/4    | 3       | 8 3/4    | 2 3/4   |              | 1/4  | 5/32 |
| 2                       | 5                   | 6 1/2  | 3      | 9      | 2 1/2 | 5     | 5 1/2      | 6 13/16  | 3 3/16  | 9 5/16   | 2 15/16 |              | 5/16 | 7/32 |
| 2 1/2                   | 5 1/2               | 7      | 3 1/2  | 10 1/2 | 2 1/2 | 5 1/2 | 5 3/8      | 7 5/16   | 3 13/16 | 10 13/16 | 2 5/8   |              | 5/16 | 7/32 |
| 3                       | 6                   | 7 3/4  | 3 1/2  | 11     | 3     | 6     | 6 1/2      | 8 1/8    | 3 13/16 | 11 1/8   | 3 3/16  |              | 5/16 | 7/32 |
| 3 1/2                   | 6 1/2               | 8 1/2  | 4      | 12 1/2 | 3     | 6 1/2 | 6 3/8      | 8 13/16  | 4 3/16  | 12 13/16 | 3 5/16  |              | 5/16 | 7/32 |
| 4                       | 7                   | 9      | 4 1/2  | 13 1/2 | 3     | 7     | 7 1/4      | 9 5/16   | 4 13/16 | 13 13/16 | 3 5/16  |              | 5/16 | 7/32 |
| 5                       | 8                   | 10 1/4 | 5      | 15     | 3 1/2 | 8     | 8 5/8      | 10 5/8   | 5 5/16  | 15 5/16  | 3 13/16 |              | 5/16 | 7/32 |
| 6                       | 8 1/2               | 11 1/2 | 5 1/2  | 17 1/2 | 4     | 9     | 8 3/4      | 11 3/8   | 5 13/16 | 17 13/16 | 4 3/16  |              | 5/16 | 7/32 |
| 8                       | 10                  | 14     | 6      | 20 1/2 | 5     | 11    | 10 3/8     | 14 1/8   | 6 5/16  | 20 3/16  | 5 1/16  |              | 5/16 | 7/32 |
| 10                      | 11 1/2              | 16 1/2 | 7      | 24     | 5 1/2 | 12    | 11 3/4     | 16 13/16 | 7 5/16  | 24 5/16  | 5 13/16 |              | 5/16 | 7/32 |
| 12                      | 13                  | 19     | 8      | 27 1/2 | 6     | 14    | 13 3/8     | 19 1/8   | 8 5/16  | 27 13/16 | 6 1/16  |              | 5/16 | 7/32 |
| 14                      | 15                  | 21 1/2 | 8 1/2  | 31     | 6 1/2 | 16    | 15 5/8     | 21 13/16 | 8 13/16 | 31 5/16  | 6 13/16 |              | 5/16 | 7/32 |
| 16                      | 16 1/2              | 24     | 9 1/2  | 34 1/2 | 7 1/2 | 18    | 16 3/4     | 24 5/16  | 9 13/16 | 34 13/16 | 7 1/16  |              | 5/16 | 7/32 |
| 18                      | 18                  | 26 1/2 | 10     | 37 1/2 | 8     | 19    | 18 5/8     | 26 13/16 | 10 5/16 | 37 13/16 | 8 5/16  |              | 5/16 | 7/32 |
| 20                      | 19 1/2              | 29     | 10 1/2 | 40 1/2 | 8 1/2 | 20    | 19 1/4     | 29 5/8   | 10 7/8  | 40 7/8   | 8 7/8   |              | 3/8  | 7/32 |
| 24                      | 22 1/2              | 34     | 12     | 47 1/2 | 10    | 24    | 22 5/8     | 34 1/8   | 12 1/2  | 47 13/16 | 10 7/16 |              | 7/16 | 1/4  |

**TABLE A2.7** Dimensions of Typical Commercial Cast-Steel Flanged Fittings (from ASME B16.5-1996) (*Continued*)

| Nominal<br>pipe<br>size                                |     | ¼-in raised-face |     |     |     |     | Ring joint |     |     |              |    |     |    |
|--------------------------------------------------------|-----|------------------|-----|-----|-----|-----|------------|-----|-----|--------------|----|-----|----|
|                                                        |     | AA               | CC  | EE  | FF  | GG  | HH         | KK  | LL  | MM           | NN | L * | D† |
| Class 400 (for sizes smaller than NPS 4 use Class 600) |     |                  |     |     |     |     |            |     |     |              |    |     |    |
| 4                                                      | 8   | 5½               | 16  | 4½  | 8¼  | 8½  | 5½         | 16½ | 4½  | See<br>note‡ | 5½ | 7½  |    |
| 5                                                      | 9   | 6                | 16½ | 5   | 9¼  | 9½  | 6½         | 16¾ | 5½  |              | 5½ | 7½  |    |
| 6                                                      | 9¾  | 6¼               | 18  | 5¼  | 10  | 9½  | 6½         | 18¾ | 5½  |              | 5½ | 7½  |    |
| 8                                                      | 11¾ | 6¾               | 22¼ | 5¾  | 12  | 11½ | 6¾         | 22¾ | 5¾  |              | 5½ | 7½  |    |
| 10                                                     | 13¼ | 7¾               | 25¼ | 6¼  | 13½ | 13¾ | 7¾         | 25¾ | 6¾  |              | 5½ | 7½  |    |
| 12                                                     | 15  | 8¾               | 29¾ | 6½  | 15¼ | 15½ | 8¾         | 29¾ | 6¾  |              | 5½ | 7½  |    |
| 14                                                     | 16¼ | 9¼               | 32¾ | 7   | 16½ | 16¾ | 9¼         | 32¾ | 7½  |              | 5½ | 7½  |    |
| 16                                                     | 17¾ | 10¼              | 36¼ | 8   | 18½ | 17½ | 10½        | 36½ | 8½  |              | 5½ | 7½  |    |
| 18                                                     | 19¼ | 10¾              | 39¼ | 8½  | 19½ | 19¾ | 10¾        | 39¾ | 8¾  |              | 5½ | 7½  |    |
| 20                                                     | 20¾ | 11¼              | 42¾ | 9   | 21  | 20¾ | 11¾        | 42¾ | 9½  |              | ¾  | 7½  |    |
| 24                                                     | 24¼ | 12¾              | 50¼ | 10½ | 24½ | 24¾ | 12¾        | 50¾ | 10½ |              | 7½ | ¼   |    |
| Class 600                                              |     |                  |     |     |     |     |            |     |     |              |    |     |    |
| ½                                                      | 3¼  | 2                | 5¼  | 1¾  | 5   | 3½  | 1¾         | 5¾  | 1¾  | See<br>note‡ | 7½ | 1½  |    |
| ¾                                                      | 3¾  | 2½               | 6¾  | 2   | 5   | 3¾  | 2½         | 6¾  | 2   |              | ¼  | 1½  |    |
| 1                                                      | 4¼  | 2½               | 7¼  | 2¼  | 5   | 4¼  | 2½         | 7¼  | 2¼  |              | ¼  | 1½  |    |
| 1¼                                                     | 4½  | 2¾               | 8   | 2½  | 5   | 4½  | 2¾         | 8   | 2½  |              | ¼  | 1½  |    |
| 1½                                                     | 4¾  | 3                | 9   | 2¾  | 5   | 4¾  | 3          | 9   | 2¾  |              | ¼  | 1½  |    |
| 2                                                      | 5¼  | 4¼               | 10¼ | 3½  | 6   | 5¼  | 4¾         | 10¾ | 3¾  |              | 5½ | ¾   | 1½ |
| 2½                                                     | 6½  | 4½               | 11½ | 3½  | 6¾  | 6½  | 4¾         | 11¾ | 3¾  |              | 5½ | ¾   | 1½ |
| 3                                                      | 7   | 5                | 12¾ | 4   | 7¼  | 7½  | 5½         | 12¾ | 4¾  |              | 5½ | ¾   | 1½ |
| 3½                                                     | 7½  | 5½               | 14  | 4½  | 7¾  | 7¾  | 5½         | 14½ | 4¾  |              | 5½ | ¾   | 1½ |
| 4                                                      | 8½  | 6                | 16½ | 4½  | 8¾  | 8½  | 6½         | 16¾ | 4¾  |              | 5½ | ¾   | 1½ |
| 5                                                      | 10  | 7                | 19½ | 6   | 10¼ | 10½ | 7½         | 19½ | 6½  |              | 5½ | ¾   | 1½ |
| 6                                                      | 11  | 7½               | 21  | 6½  | 11¼ | 11½ | 7¾         | 21¾ | 6¾  |              | 5½ | ¾   | 1½ |
| 8                                                      | 13  | 8½               | 24½ | 7   | 13¼ | 13½ | 8¾         | 24¾ | 7½  |              | 5½ | ¾   | 1½ |
| 10                                                     | 15½ | 9½               | 29½ | 8   | 15¾ | 15¾ | 9¾         | 29¾ | 8½  |              | 5½ | ¾   | 1½ |
| 12                                                     | 16½ | 10               | 31½ | 8½  | 16¾ | 16¾ | 10½        | 31¾ | 8¾  |              | 5½ | ¾   | 1½ |
| 14                                                     | 17½ | 10¾              | 34¼ | 9   | 17¾ | 17¾ | 10¾        | 34¾ | 9½  |              | 5½ | ¾   | 1½ |
| 16                                                     | 19½ | 11¾              | 38½ | 10  | 19¾ | 19¾ | 11¾        | 38¾ | 10½ |              | 5½ | ¾   | 1½ |
| 18                                                     | 21½ | 12¼              | 42  | 10½ | 21¾ | 21¾ | 12¾        | 42¾ | 10¾ |              | 5½ | ¾   | 1½ |
| 20                                                     | 23½ | 13               | 45½ | 11  | 23¾ | 23¾ | 13½        | 45¾ | 11½ |              | 5½ | ¾   | 1½ |
| 24                                                     | 27½ | 14¾              | 53  | 13  | 27¾ | 27¾ | 14¾        | 53¾ | 13½ |              | 7½ | ¾   | 1½ |

**TABLE A2.7** Dimensions of Typical Commercial Cast-Steel Flanged Fittings (from ASME B16.5-1996) (*Continued*)

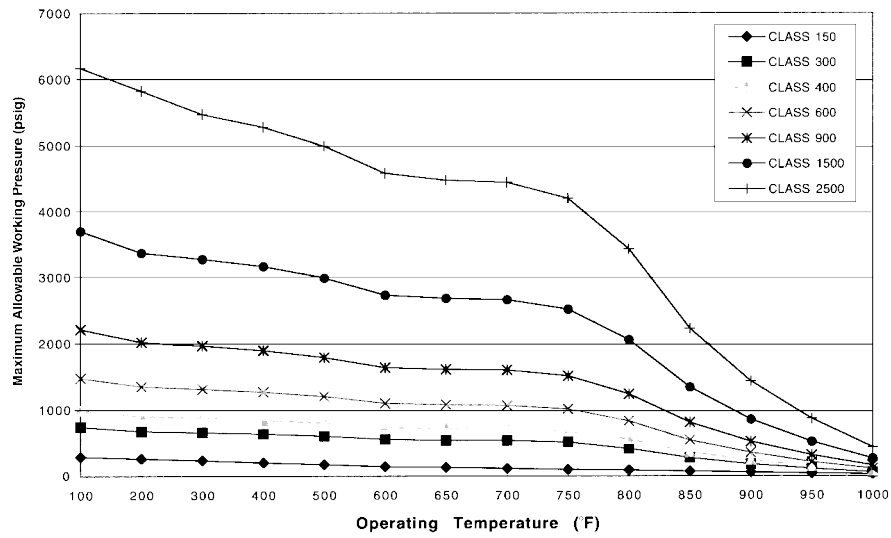
| Nominal<br>pipe<br>size                                 |        | 1/4-in raised-face |        |        |        |        | Ring joint |          |          |              |        |      |
|---------------------------------------------------------|--------|--------------------|--------|--------|--------|--------|------------|----------|----------|--------------|--------|------|
|                                                         |        | AA                 | CC     | EE     | FF     | GG     | HH         | KK       | LL       | MM           | NN     | L*   |
| Class 900 (for sizes smaller than NPS 3 use Class 1500) |        |                    |        |        |        |        |            |          |          |              |        |      |
| 3                                                       | 7 1/2  | 5 1/2              | 14 1/2 | 4 1/2  | 7 3/4  | 7 3/4  | 5 9/16     | 14 3/4   | 4 7/16   | See<br>note‡ | 5/16   | 5/32 |
| 4                                                       | 9      | 6 1/2              | 17 1/2 | 5 1/2  | 9 1/4  | 9 1/4  | 6 7/16     | 17 3/4   | 5 9/16   |              | 5/16   | 5/32 |
| 5                                                       | 11     | 7 1/2              | 21     | 6 1/2  | 11 1/4 | 11 1/4 | 7 9/16     | 21 1/4   | 6 9/16   |              | 5/16   | 5/32 |
| 6                                                       | 12     | 8                  | 22 1/2 | 6 3/4  | 12 1/4 | 12 1/4 | 8 1/8      | 22 3/4   | 6 9/16   |              | 5/16   | 5/32 |
| 8                                                       | 14 1/2 | 9                  | 27 1/2 | 7 1/2  | 14 3/4 | 14 3/4 | 9 1/4      | 27 3/4   | 7 9/16   |              | 5/16   | 5/32 |
| 10                                                      | 16 1/2 | 10                 | 31 1/2 | 8 1/2  | 16 3/4 | 16 3/4 | 10 1/4     | 31 3/4   | 8 9/16   |              | 5/16   | 5/32 |
| 12                                                      | 19     | 11                 | 34 1/2 | 9      | 17 3/4 | 19 1/4 | 11 1/4     | 34 3/4   | 9 1/4    |              | 5/16   | 5/32 |
| 14                                                      | 20 1/4 | 11 1/2             | 36 1/2 | 9 1/2  | 19     | 20 3/4 | 11 1/4     | 36 1 1/4 | 9 1 1/4  |              | 7/16   | 5/32 |
| 16                                                      | 22 1/4 | 12 1/2             | 40 1/2 | 10 1/2 | 21     | 22 3/4 | 12 1/4     | 40 5/16  | 10 1 1/4 |              | 7/16   | 5/32 |
| 18                                                      | 24     | 13 1/4             | 45 1/2 | 12     | 24 1/2 | 24 1/2 | 13 1/2     | 45 1/4   | 12 1/2   |              | 7/16   | 5/32 |
| 20                                                      | 26     | 14 1/2             | 50 1/4 | 13     | 26 1/2 | 26 1/4 | 14 3/4     | 50 1/2   | 13 1/4   |              | 7/16   | 5/32 |
| 24                                                      | 30 1/2 | 18                 | 60     | 15 1/2 | 30 3/4 | 30 3/4 | 18 3/4     | 60 3/4   | 15 3/4   |              | 7/16   | 5/32 |
| Class 1500                                              |        |                    |        |        |        |        |            |          |          |              |        |      |
| 1/2                                                     | 4 1/4  | 3                  | .....  | .....  | .....  | 4 1/4  | 3          | .....    | .....    | See<br>note‡ | 1/4    | 5/32 |
| 3/4                                                     | 4 1/2  | 3 1/4              | .....  | .....  | .....  | 4 1/2  | 3 1/4      | .....    | .....    |              | 1/4    | 5/32 |
| 1                                                       | 5      | 3 1/2              | 9      | 2 1/2  | 5      | 5      | 3 1/2      | 9        | 2 1/2    |              | 1/4    | 5/32 |
| 1 1/4                                                   | 5 1/2  | 4                  | 10     | 3      | 5 1/4  | 5 1/4  | 4          | 10       | 3        |              | 1/4    | 5/32 |
| 1 1/2                                                   | 6      | 4 3/4              | 11     | 3 1/2  | 6 1/4  | 6      | 4 3/4      | 11       | 3 1/2    |              | 1/4    | 5/32 |
| 2                                                       | 7 1/4  | 4 3/4              | 13 1/4 | 4      | 7 1/4  | 7 3/4  | 4 3/4      | 13 3/4   | 4 1/4    |              | 5/16   | 1/2  |
| 2 1/2                                                   | 8 1/4  | 5 1/4              | 15 1/4 | 4 1/2  | 8 1/4  | 8 3/4  | 5 1/4      | 15 5/4   | 4 3/4    |              | 5/16   | 1/2  |
| 3                                                       | 9 1/4  | 5 3/4              | 17 1/4 | 5      | 9 1/4  | 9 3/4  | 5 3/4      | 17 3/4   | 5 1/4    |              | 5/16   | 1/2  |
| 4                                                       | 10 3/4 | 7 1/4              | 19 1/4 | 6      | 10 3/4 | 10 3/4 | 7 3/4      | 19 3/4   | 6 1/4    |              | 5/16   | 1/2  |
| 5                                                       | 13 1/4 | 8 3/4              | 23 1/4 | 7 1/2  | 13 3/4 | 13 3/4 | 8 3/4      | 23 3/4   | 7 3/4    |              | 5/16   | 1/2  |
| 6                                                       | 13 3/4 | 9 3/4              | 24 1/4 | 8 1/4  | 14 1/2 | 14     | 9 1/2      | 25       | 8 1/4    |              | 3/8    | 1/2  |
| 8                                                       | 16 3/4 | 10 3/4             | 29 3/4 | 9 3/4  | 17     | 16 3/4 | 11 1/4     | 30 3/4   | 9 3/4    |              | 7/16   | 5/32 |
| 10                                                      | 19 1/2 | 12                 | 36     | 10 1/4 | 20 1/4 | 19 1/4 | 12 3/4     | 36 3/4   | 10 3/4   |              | 7/16   | 5/32 |
| 12                                                      | 22 1/4 | 13 1/4             | 40 1/4 | 12     | 23     | 22 3/4 | 13 3/4     | 41 1/4   | 12 3/4   |              | 9/16   | 5/32 |
| 14                                                      | 24 3/4 | 14 1/4             | 44     | 12 1/2 | 25 3/4 | 25 1/4 | 14 3/4     | 44 3/4   | 12 3/4   |              | 9/16   | 5/32 |
| 16                                                      | 27 1/4 | 16 1/4             | 48 1/4 | 14 1/4 | 28 1/4 | 27 1/4 | 16 3/4     | 48 1 1/4 | 13 3/4   |              | 1 1/16 | 5/16 |
| 18                                                      | 30 1/4 | 17 3/4             | 53 1/4 | 16 1/2 | 31 1/2 | 30 3/4 | 18 3/4     | 53 1/4   | 16 1/2   | 1 1/16       | 5/16   |      |
| 20                                                      | 32 3/4 | 18 3/4             | 57 1/4 | 17 1/2 | 34     | 33 3/4 | 19 1/4     | 58 3/4   | 18 3/4   | 1 1/16       | 5/16   |      |
| 24                                                      | 38 1/4 | 20 3/4             | 67 1/4 | 20 1/2 | 39 3/4 | 38 3/4 | 21 3/4     | 67 3/4   | 21 1/4   | 1 3/16       | 5/16   |      |

\* L = height of raised face of ring-joint flanges.

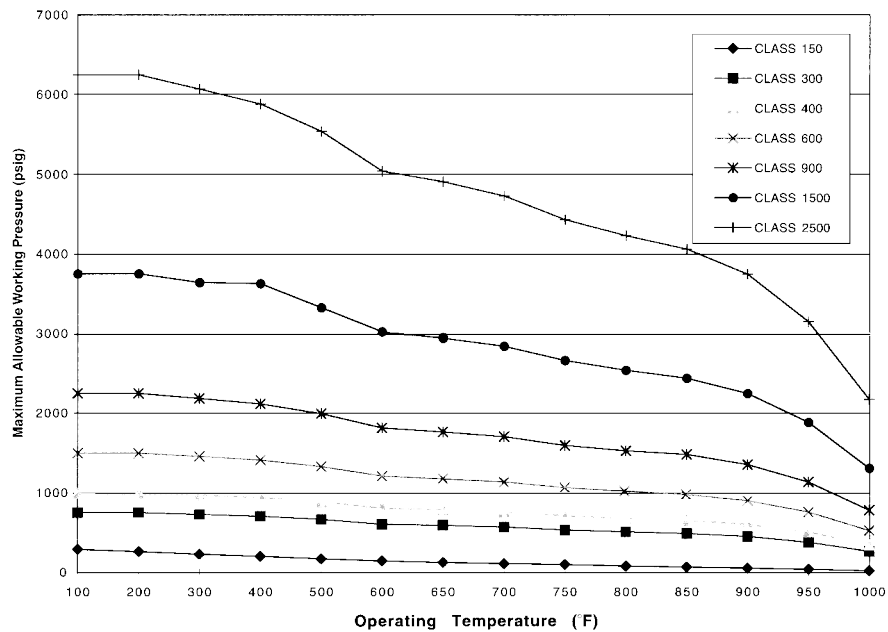
† D = approximate distance between flange faces when ring is compressed.

‡ Center-to-face dimensions shown for fittings with ring-joint flanges apply to straight sizes only. For reducing fittings and reducers, use dimensions shown for raised-face flanges of largest opening. Class 400 and higher classes, subtract the ¼-in raised face for each flange (do not subtract the ½-in raised face in Class 150 and 300); add height of ring-joint raised face (L) applying to each flange.

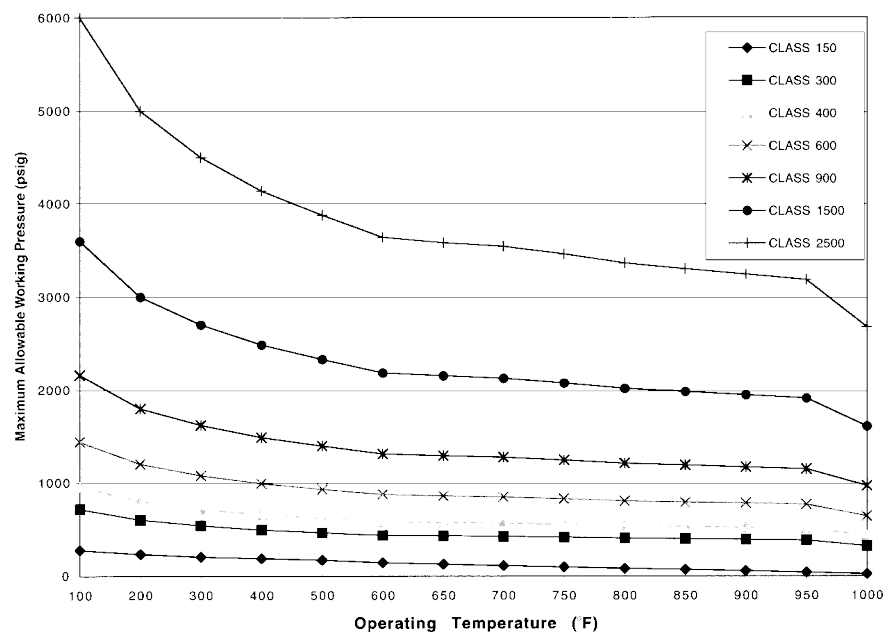
For calculating the “laying length,” of fittings with ring joints, add the approximate distance (D) between flange faces when ring is compressed to the center-to-face dimensions in these tables.



**FIGURE A2.1** Operating temperature versus allowable working pressure for ASME B16.5 flanges and flanged fittings—Group 1.1 materials. (From ASME B16.5, 1996)



**FIGURE A2.2** Operating temperature versus allowable working pressure for ASME B16.5 flanges and flanged fittings—Group 1.10 materials. (From ASME B16.5, 1996)



**FIGURE A2.3** Operating temperature versus allowable working pressure for ASME B16.5 flanges and flanged fittings—Group 2.1 materials. (From ASME B16.5, 1996)

chemical compositions, melting practices, and mechanical property requirements of ASTM A105, A182, or A350.

Threaded fittings are available in pressure Classes 2000, 3000, and 6000. Socket-welded fittings are available in pressure Classes 3000, 6000, and 9000. Limitations on fitting size and service conditions are as provided for by the code governing the installation. The maximum allowable pressure of the fitting is equal to that computed for straight seamless pipe of equivalent material, considering manufacturing tolerance, corrosion allowance, and mechanical strength allowance. Also, for socket-welding fittings, the pressure rating must be matched to the pipe wall thickness to ensure that the flat of the band can accommodate the size of the fillet weld required by the applicable code. The recommended fitting pressure class for the various pipe wall thicknesses is as follows:

| Pipe schedule and designation | Threaded class | Socket-welded class |
|-------------------------------|----------------|---------------------|
| 80/XS or less                 | 2000           | 3000                |
| 160                           | 3000           | 6000                |
| XXS                           | 6000           | 9000                |

Internal threads of threaded fittings are in accordance with ASME B1.20.1-Pipe Threads, General Purpose (Inch).