




SOUTHWEST GAS CORPORATION

ENGINEERING STAFF

MATERIAL SPECIFICATION

Prepared By: Engineering Staff 

Approved By: Jerome T. Schmitz 

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PIPE FITTINGS

Flanges, Steel

1. SCOPE

This specification covers weld neck, blind and threaded flanges. In nominal pipe sizes 1/2-inch to 36-inch and socket weld flanges in 3/4-inch to 3-inch, all with ANSI Class Ratings 150, 300, 400 and 600.

All pipe flanges covered by this specification must be tested in accordance with DS G-2 prior to installation.

2. APPLICABLE DOCUMENTS


- 2.1 ASTM International (ASTM) A-105, "Standard Specification for Carbon Steel Forgings, for Piping Applications."
- 2.2 ASTM International (ASTM) A-181, "Standard Specification for Carbon Steel Forgings, for General-Purpose Piping."
- 2.3 American National Standards Institute (ANSI) B-16.5, "Steel Pipe Flanges and Flanged Fittings – Class 150 through 2500."
- 2.4 American National Standards Institute (ANSI) B-16.9, "Factory-Made Wrought Steel Buttwelding Fittings."
- 2.5 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS) SP-44-2010, "Steel Pipe Line Flanges."
- 2.6 American National Standard Institute (ANSI) B-1.20.1, "Pipe Threads, General Purpose (INCH)."



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2. APPLICABLE DOCUMENTS (Cont'd)

- 2.7 Title 49, Code of Federal Regulations, part 192, "Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards" (49 CFR 192).

NOTE: Unless otherwise specified, the editions of the document incorporated in whole or in part by 49 CFR 192 are applicable. The above documents, and parts of documents (including annexes), not incorporated by 49 CFR 192 are incorporated by this Material Specification and will be the most recent edition. If a conflict exists between the applicable documents and/or this Material Specification, the requirements of 49 CFR 192 shall govern, and in the event of all other conflicts, the more stringent requirement shall govern.

3. TERMINOLOGY

3.1 General


- 3.1.1 "Southwest Gas," "Southwest" or "SWG" wherever used in this specification and other related documents will refer exclusively to Southwest Gas Corporation.
- 3.1.2 The terms "approved," "as approved," "satisfactory," "as directed," "or equal" or other similar terms wherever used in this specification and other related documents, will mean "as determined by Southwest Gas," unless specifically stated otherwise.
- 3.1.3 "Product Information Package" or "PIP" wherever used in this specification and other related documents will mean the required technical product information that a manufacturer must submit to SWG to determine if the product is suitable for use by SWG, unless specifically stated otherwise.



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4. MATERIALS AND MANUFACTURE

- 4.1 Flanges purchased to this specification will be manufactured, as a minimum, in accordance with ANSI B-16.5 and MSS SP-44. Materials shall be limited to ASTM A-105 and A-181.
- 4.2 All steel weld neck and socket weld flanges shall be manufactured from ASTM A-105 or ASTM A-181, Grade II material.
- 4.3 The threads in threaded flanges will conform to ANSI B-1.20.1.
- 4.4 Weld neck flange ends will be beveled for welding in accordance with ANSI B-16.9.
- 4.5 Flanges will be painted or treated with corrosion inhibiting agents to prevent rusting. These coatings will not interfere with the sealing surfaces.
- 4.6 Flanges will not be taper bored to obtain the specified wall thickness without prior approval from the requestor at Southwest Gas.

5. PERFORMANCE REQUIREMENTS

All fittings under this specification will be able to withstand a hydrostatic test at a pressure equal to at least the pressure shown below.


| CLASS | TEST PRESSURE CAPABILITY (psig) |
|--------------|--|
| 150 | 450 |
| 300 | 1125 |
| 400 | 1500 |
| 600 | 2225 |



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Flanges, Steel

6. DIMENSIONS AND TOLERANCES

- 6.1 The flange dimensions are shown in Appendix A.
- 6.2 All flanges manufactured to this specification will meet the dimension and tolerance requirements of ANSI B-16.5 or MSS SP-44.

7. INSPECTION


- 7.1 Successful review of the Product Information Package (PIP), as well as any future reference by SWG to the Seller's part number or internal code number in any future contract or purchase, will mean only that no conflict with the specification was found, and will not relieve the Seller from meeting all the requirements of this specification.
- 7.2 SWG retains the option to inspect the manufacture and testing of all materials, products and systems referenced in this specification that are sold to SWG.
- 7.3 Southwest will make appropriate inspections and tests of all materials, products or systems supplied to this specification. SWG will have the right, at its option, to reject any material which fails to conform to this specification. Any such rejection may take place at the manufacturer's facility; the supplier's warehouse or any subsequent delivery location, before or after Southwest assumes possession. Notice of the rejection will be made promptly to the supplier by SWG. The defective product will be replaced or returned for credit at the manufacturer's expense.
- 7.4 Any changes in the manufacturing of previously approved materials, products or systems described in this material specification for sale to SWG, must be approved by SWG's Engineering Staff. **Failure to obtain SWG's approval may be cause for rejection and disqualification as an approved supplier.**



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Flanges, Steel

8. CERTIFICATION

The manufacturer's or supplier's certification will be furnished to Southwest. This certification will state that samples representing each lot have been manufactured, tested and inspected in accordance with this specification and that all requirements have been met. When requested or specified in the purchase order or contract, a report of test results will be provided.

For components with material yield strength grades of 42,000 psi (X42) or greater and with nominal diameters of greater than 2 inches, testing documentation demonstrating the physical characteristics of the components which include, at a minimum, diameter, yield strength, ultimate tensile strength, wall thickness, seam type and chemical composition shall be provided to Southwest in accordance with 49 CFR 192.

Upon the request of Southwest, the certification of an independent third-party indicating conformance to the specification may be considered at Southwest's expense.

9. SAFETY DATA SHEETS

In accordance with law, the Seller will supply Safety Data Sheets for all applicable items supplied under this specification to the following:


- 1) The Receiving Location
- 2) Engineering Staff
- 3) Southwest Gas Corporation
Corporate Safety
Mail Station LVO-511
P.O. Box 98512
Las Vegas, NV 89193-8512



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Flanges, Steel

10. PRODUCT MARKING

All flanges sold to Southwest will be marked with the following as a minimum:

- Manufacturer's name or trademark
- Material designation
- Rating class
- B16
- Nominal Pipe Size

11. PACKAGING AND PACKAGE MARKING

All products covered in this specification will be packaged in a manner to prevent damage during transportation and storage.

12. STOCK CLASSIFICATION DESCRIPTION

FLANGE; STEEL; _____-INCH; _____ (WELD NECK, BLIND, THREADED, SOCKET WELD); ANSI ____ (150, 300, 400 OR 600) (RAISED OR FLAT FACE).



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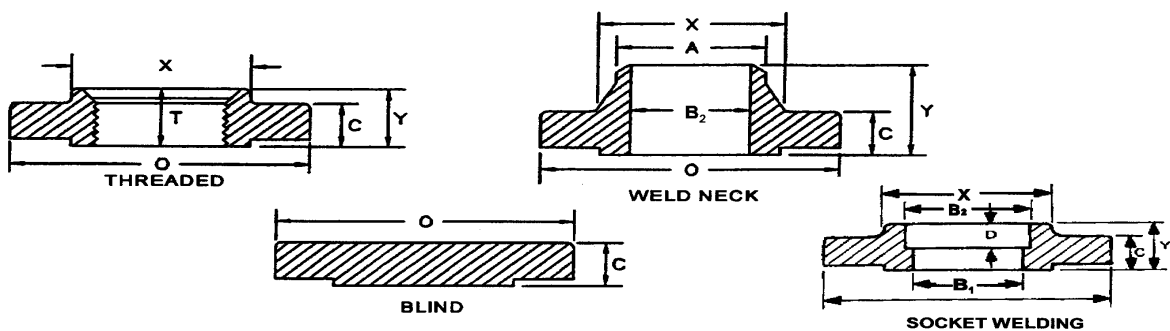
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PIPE FITTINGS

Flanges, Steel

APPENDIX A





| DIMENSIONS OF CLASS 150 FLANGES | | | | | | | | | | |
|---------------------------------|----------------------------|----------------------------|-----------------|--|---------------------------------|---------------|--------------------------------------|-----------------------|----------------|-----------------|
| Nominal Pipe Size | Outside Diameter of Flange | Thickness of Flange (min.) | Diameter of Hub | Hub Diameter Beginning of Chamfer Welding Neck | Length Through Hub | | Thread Length Threaded Flange (min.) | Bore | | Depth of Socket |
| | | | | | Threaded Slip-On Socket Welding | Welding* Neck | | Socket Welding (min.) | Welding Neck | |
| | O | C | X | A | Y | Y | T | B ₁ | B ₂ | D |
| 1/2 | 3.50 | 0.44 | 1.19 | 0.84 | 0.62 | 1.88 | 0.62 | 0.88 | 0.62 | 0.38 |
| 3/4 | 3.88 | 0.50 | 1.50 | 1.05 | 0.62 | 2.06 | 0.62 | 1.09 | 0.82 | 0.44 |
| 1 | 4.25 | 0.56 | 1.94 | 1.32 | 0.69 | 2.19 | 0.69 | 1.36 | 1.05 | 0.50 |
| 1 1/4 | 4.62 | 0.62 | 2.31 | 1.66 | 0.81 | 2.25 | 0.81 | 1.70 | 1.38 | 0.56 |
| 1 1/2 | 5.00 | 0.69 | 2.56 | 1.90 | 0.88 | 2.44 | 0.88 | 1.95 | 1.61 | 0.62 |
| 2 | 6.00 | 0.75 | 3.06 | 2.38 | 1.00 | 2.50 | 1.00 | 2.44 | 2.07 | 0.69 |
| 2 1/2 | 7.00 | 0.88 | 3.56 | 2.88 | 1.12 | 2.75 | 1.12 | 2.94 | 2.47 | 0.75 |
| 3 | 7.50 | 0.94 | 4.25 | 3.50 | 1.19 | 2.75 | 1.19 | 3.57 | 3.07 | 0.81 |
| 3 1/2 | 8.50 | 0.94 | 4.81 | 4.00 | 1.25 | 2.81 | 1.25 | 4.07 | 3.55 | — |
| 4 | 9.00 | 0.94 | 5.31 | 4.50 | 1.31 | 3.00 | 1.31 | 4.57 | 4.03 | — |
| 5 | 10.00 | 0.94 | 6.44 | 5.56 | 1.44 | 3.50 | 1.44 | 5.66 | 5.05 | — |
| 6 | 11.00 | 1.00 | 7.56 | 6.63 | 1.56 | 3.50 | 1.56 | 6.72 | 6.07 | — |
| 8 | 13.50 | 1.12 | 9.69 | 8.63 | 1.75 | 4.00 | 1.75 | 8.72 | 7.98 | — |
| 10 | 16.00 | 1.19 | 12.00 | 10.75 | 1.94 | 4.00 | 1.94 | 10.88 | 10.02 | — |
| 12 | 19.00 | 1.25 | 14.38 | 12.75 | 2.19 | 4.50 | 2.19 | 12.88 | 12.00 | — |
| 14 | 21.00 | 1.38 | 15.75 | 14.00 | 2.25 | 5.00 | 2.25 | 14.14 | To | — |
| 16 | 23.50 | 1.44 | 18.00 | 16.00 | 2.50 | 5.00 | 2.50 | 16.16 | Be | — |
| 18 | 25.00 | 1.56 | 19.88 | 18.00 | 2.69 | 5.50 | 2.69 | 18.18 | Specified | — |
| 20 | 27.50 | 1.69 | 22.00 | 20.00 | 2.88 | 5.69 | 2.88 | 20.20 | By | — |
| 24 | 32.00 | 1.88 | 26.12 | 24.00 | 3.25 | 6.00 | 3.25 | 24.25 | Purchaser | — |

* The 1/6" raised face is included with the Weld Neck Y dimension.



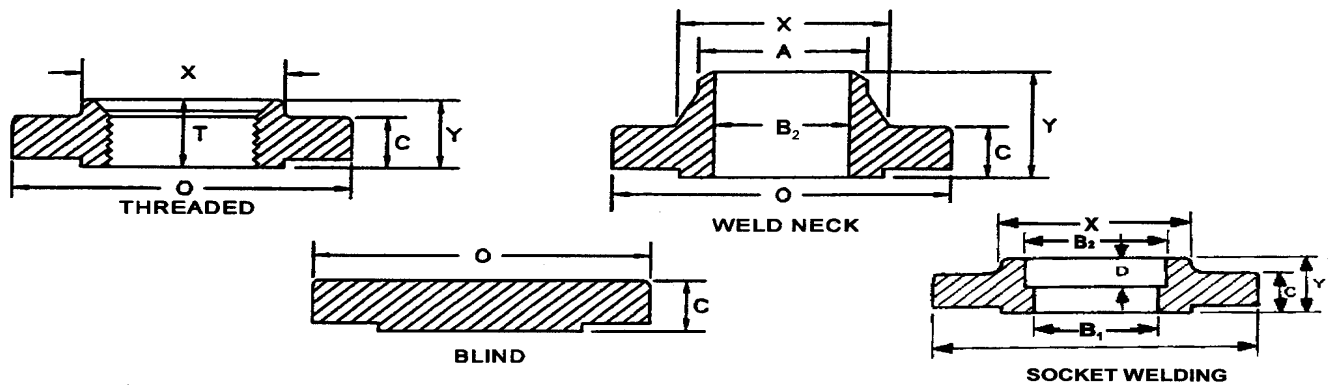
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PIPE FITTINGS
 Flanges, Steel

APPENDIX A
 (Cont'd)





| DIMENSIONS OF CLASS 150 FLANGES | | | | | | | | | | |
|---------------------------------|---------------------------------|---------------------------------|----------------------|---|--------------------------------------|--------------------|---|---|--------------------------------|----------------------|
| Nominal Pipe Size | Outside Diameter of Flange O | Thickness of Flange (min.) C | Diameter of Hub X | Hub Diameter Beginning of Chamfer Welding Neck A | Length Through Hub | | Thread Length Threaded Flange (min.) T | Bore | | Depth of Socket D |
| | | | | | Threaded Slip-On Socket Welding Y | Welding* Neck Y | | Socket Welding (min.) B ₁ | Welding Neck B ₂ | |
| 1/2 | 88.90 | 11.18 | 30.23 | 21.34 | 15.75 | 47.75 | 15.75 | 22.35 | 15.75 | 9.652 |
| 3/4 | 98.55 | 12.70 | 38.10 | 26.67 | 15.75 | 52.32 | 15.75 | 27.69 | 20.83 | 11.18 |
| 1 | 108.0 | 14.22 | 49.28 | 33.53 | 17.53 | 55.63 | 17.53 | 35.54 | 26.67 | 12.70 |
| 1 1/4 | 117.3 | 15.75 | 58.67 | 42.16 | 20.57 | 57.15 | 20.57 | 43.18 | 35.05 | 14.22 |
| 1 1/2 | 127.0 | 17.53 | 65.02 | 48.26 | 22.35 | 61.98 | 22.35 | 49.53 | 40.89 | 15.75 |
| 2 | 152.4 | 19.05 | 77.72 | 60.45 | 25.40 | 63.50 | 25.40 | 61.98 | 52.58 | 17.53 |
| 2 1/2 | 177.8 | 22.35 | 90.42 | 73.15 | 28.45 | 69.85 | 28.45 | 74.68 | 62.74 | 19.05 |
| 3 | 190.5 | 23.88 | 108.0 | 88.90 | 30.23 | 69.85 | 30.23 | 90.68 | 77.98 | 20.57 |
| 3 1/2 | 215.9 | 23.88 | 122.2 | 101.6 | 31.75 | 71.37 | 31.75 | 103.4 | 90.17 | — |
| 4 | 228.6 | 23.88 | 134.9 | 114.3 | 33.27 | 76.20 | 33.27 | 116.1 | 102.4 | — |
| 5 | 254.0 | 23.88 | 163.6 | 141.2 | 36.58 | 88.90 | 36.58 | 143.8 | 128.3 | — |
| 6 | 279.4 | 25.40 | 192.0 | 168.4 | 39.62 | 88.90 | 39.62 | 170.7 | 154.2 | — |
| 8 | 342.9 | 28.45 | 246.1 | 219.2 | 44.45 | 101.60 | 44.45 | 221.5 | 202.7 | — |
| 10 | 406.4 | 30.23 | 304.8 | 273.1 | 49.28 | 101.60 | 49.28 | 276.4 | 254.5 | — |
| 12 | 482.6 | 31.75 | 365.3 | 323.9 | 55.63 | 114.30 | 55.63 | 327.2 | 304.8 | — |
| 14 | 533.4 | 35.05 | 400.1 | 355.6 | 57.15 | 127.0 | 89.90 | 359.2 | To | — |
| 16 | 596.9 | 36.58 | 203.2 | 406.4 | 63.50 | 127.0 | 88.90 | 410.5 | Be | — |
| 18 | 635.0 | 39.62 | 505.0 | 457.2 | 68.33 | 139.7 | 101.6 | 461.8 | Specified | — |
| 20 | 685.8 | 42.93 | 558.8 | 508.0 | 73.15 | 144.5 | 101.6 | 513.1 | By | — |
| 24 | 812.8 | 47.75 | 663.4 | 609.6 | 82.55 | 152.4 | 114.3 | 615.9 | Purchaser | — |

* The 1/16" raised face is included with the Weld Neck Y dimension.



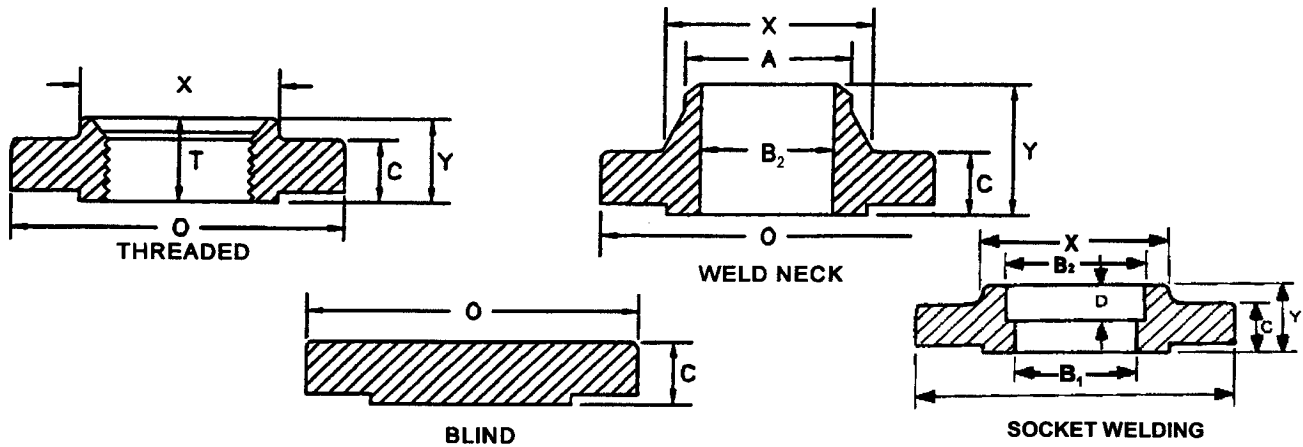
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PIPE FITTINGS
 Flanges, Steel

APPENDIX B





| DIMENSIONS OF CLASS 300 FLANGES | | | | | | | | | | |
|---------------------------------|----------------------------|----------------------------|-------------|--|---------------------------------|----------------|--------------------------------------|-----------------------|----------------|-----------------|
| Nominal Pipe Size | Outside Diameter of Flange | Thickness of Flange (min.) | Dia. of Hub | Hub Dia. Beginning of Chamfer Welding Neck | Length Through Hub | | Thread Length Threaded Flange (min.) | Bore | | Depth of Socket |
| | | | | | Threaded Slip-On Socket Welding | Welding * Neck | | Socket Welding (min.) | Welding Neck | |
| | O | C | X | A | Y | Y | T | B ₁ | B ₂ | D |
| 1/2 | 3.75 | 0.56 | 1.50 | 0.84 | 0.88 | 2.06 | 0.62 | 0.88 | 0.62 | 0.38 |
| 3/4 | 4.62 | 0.62 | 1.88 | 1.05 | 1.00 | 2.25 | 0.62 | 1.09 | 0.82 | 0.44 |
| 1 | 4.88 | 0.69 | 2.12 | 1.32 | 1.06 | 2.44 | 0.69 | 1.36 | 1.05 | 0.50 |
| 1 1/4 | 5.25 | 0.75 | 2.50 | 1.66 | 1.06 | 2.56 | 0.81 | 1.70 | 1.38 | 0.56 |
| 1 1/2 | 6.12 | 0.81 | 2.75 | 1.90 | 1.19 | 2.69 | 0.88 | 1.95 | 1.61 | 0.62 |
| 2 | 6.50 | 0.88 | 3.31 | 2.38 | 1.31 | 2.75 | 1.12 | 2.44 | 2.07 | 0.69 |
| 2 1/2 | 7.50 | 1.00 | 3.94 | 2.88 | 1.50 | 3.00 | 1.25 | 2.94 | 2.47 | 0.75 |
| 3 | 8.25 | 1.12 | 4.62 | 3.50 | 1.69 | 3.12 | 1.25 | 3.57 | 3.07 | 0.81 |
| 3 1/2 | 9.00 | 1.19 | 5.25 | 4.00 | 1.75 | 3.19 | 1.44 | 4.07 | 3.55 | — |
| 4 | 10.00 | 1.25 | 5.75 | 4.50 | 1.88 | 3.38 | 1.44 | 4.56 | 4.03 | — |
| 5 | 11.00 | 1.38 | 7.00 | 5.56 | 2.00 | 3.88 | 1.69 | 5.66 | 5.05 | — |
| 6 | 12.50 | 1.44 | 8.12 | 6.63 | 2.06 | 3.88 | 1.81 | 6.72 | 6.07 | — |
| 8 | 15.00 | 1.62 | 10.25 | 8.63 | 2.44 | 4.38 | 2.00 | 8.72 | 7.98 | — |
| 10 | 17.50 | 1.88 | 12.62 | 10.75 | 2.62 | 4.62 | 2.19 | 10.88 | 10.02 | — |
| 12 | 20.50 | 2.00 | 14.75 | 12.75 | 2.88 | 5.12 | 2.38 | 12.88 | 12.00 | — |
| 14 | 23.00 | 2.12 | 16.75 | 14.00 | 3.00 | 5.62 | 2.50 | 14.14 | To | — |
| 16 | 25.50 | 2.25 | 19.00 | 16.00 | 3.25 | 5.75 | 2.69 | 16.16 | Be | — |
| 18 | 28.00 | 2.38 | 21.00 | 18.00 | 3.50 | 6.25 | 2.75 | 18.18 | Specified | — |
| 20 | 30.50 | 2.50 | 23.12 | 20.00 | 3.75 | 6.38 | 2.88 | 20.20 | By | — |
| 24 | 36.00 | 2.75 | 27.62 | 24.00 | 4.19 | 6.62 | 3.25 | 24.25 | Purchaser | — |

* The 1/16" raised face is included with the Weld Neck Y dimension.



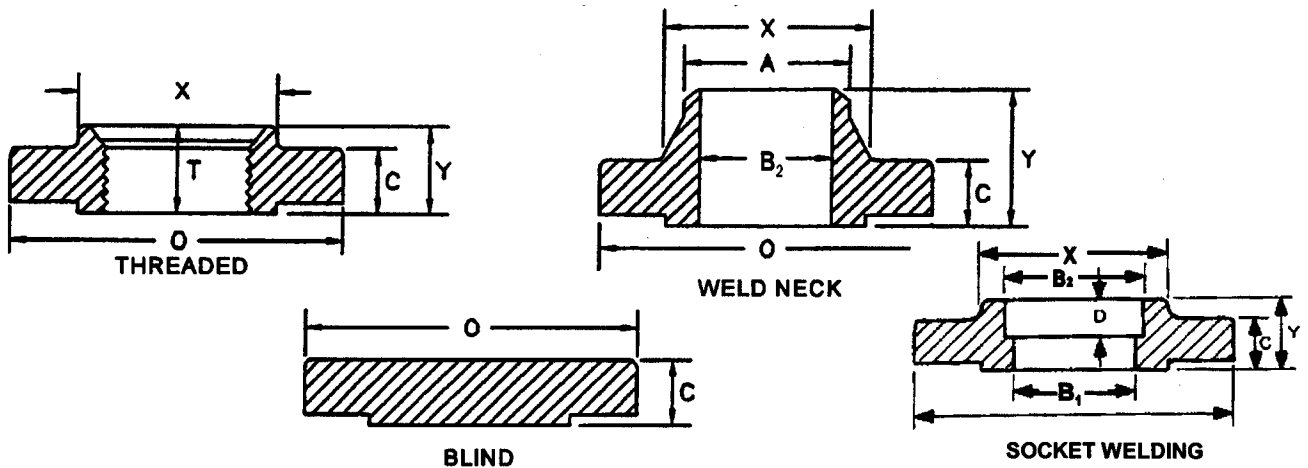
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APPENDIX B (Cont'd)





| Nominal Pipe Size | DIMENSIONS OF CLASS 300 FLANGES | | | | | | | | | |
|-------------------|---------------------------------|---------------------------------|------------------|--|--------------------------------------|--------------------|---|---|--------------------------------|----------------------|
| | Outside Diameter of Flange O | Thickness of Flange (min.) C | Dia. of Hub X | Hub Diameter Beginning of Chamfer Welding Neck A | Length Through Hub | | Thread Length Threaded Flange (min.) T | Bore | | Depth of Socket D |
| | | | | | Threaded Slip-On Socket Welding Y | Welding* Neck Y | | Socket Welding (min.) B ₁ | Welding Neck B ₂ | |
| 1/2 | 95.25 | 14.22 | 38.10 | 21.34 | 22.35 | 52.32 | 15.75 | 22.35 | 15.75 | 9.652 |
| 3/4 | 117.3 | 15.75 | 47.75 | 26.67 | 25.40 | 57.15 | 15.75 | 27.69 | 20.83 | 11.18 |
| 1 | 124.0 | 17.53 | 53.85 | 33.53 | 26.92 | 61.98 | 17.53 | 35.54 | 26.67 | 12.70 |
| 1 1/4 | 133.4 | 19.05 | 63.50 | 42.16 | 26.92 | 65.02 | 20.57 | 43.18 | 35.05 | 14.22 |
| 1 1/2 | 155.4 | 20.57 | 69.85 | 48.26 | 30.23 | 68.33 | 22.35 | 49.53 | 40.89 | 15.75 |
| 2 | 165.1 | 22.61 | 84.07 | 60.45 | 33.27 | 69.85 | 28.45 | 61.98 | 52.58 | 17.53 |
| 2 1/2 | 190.5 | 25.40 | 100.1 | 73.15 | 38.10 | 76.20 | 31.75 | 74.68 | 62.74 | 19.05 |
| 3 | 209.6 | 28.45 | 117.3 | 88.90 | 42.93 | 79.25 | 31.75 | 90.68 | 77.98 | 20.57 |
| 3 1/2 | 228.6 | 30.23 | 133.4 | 101.6 | 44.45 | 81.03 | 36.58 | 103.4 | 90.17 | — |
| 4 | 254.0 | 31.75 | 146.1 | 114.3 | 47.75 | 85.85 | 36.58 | 116.1 | 102.4 | — |
| 5 | 279.4 | 35.05 | 177.8 | 141.2 | 50.80 | 98.55 | 42.93 | 143.8 | 128.3 | — |
| 6 | 317.5 | 36.58 | 206.2 | 168.4 | 52.32 | 98.55 | 45.97 | 170.7 | 154.2 | — |
| 8 | 381.0 | 41.15 | 260.4 | 219.2 | 61.98 | 109.5 | 50.80 | 221.5 | 202.7 | — |
| 10 | 444.5 | 47.75 | 320.5 | 273.1 | 66.55 | 117.3 | 55.63 | 276.4 | 254.5 | — |
| 12 | 520.7 | 50.80 | 374.7 | 323.9 | 73.15 | 130.0 | 60.45 | 327.2 | 304.8 | — |
| 14 | 584.2 | 53.85 | 425.5 | 355.6 | 76.20 | 142.7 | 63.50 | 359.2 | To | — |
| 16 | 647.7 | 57.18 | 482.6 | 406.4 | 82.55 | 146.1 | 68.33 | 410.5 | Be | — |
| 18 | 711.2 | 60.45 | 533.4 | 457.2 | 88.90 | 158.8 | 69.85 | 461.8 | Specified | — |
| 20 | 774.7 | 63.50 | 587.2 | 508.0 | 95.25 | 162.1 | 73.15 | 513.1 | By | — |
| 24 | 914.4 | 69.85 | 701.5 | 609.6 | 106.43 | 168.1 | 82.55 | 615.9 | Purchaser | — |

* The 1/6" raised face is included with the Weld Neck Y dimension.



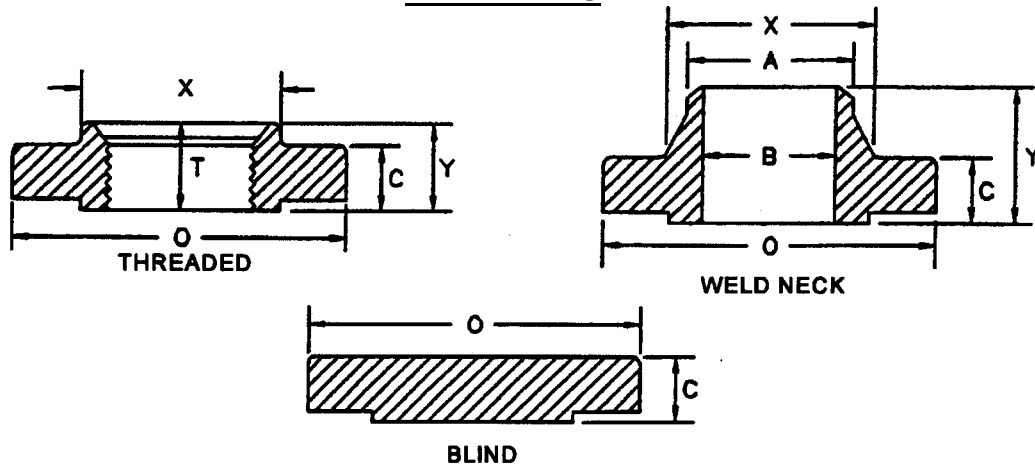
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PIPE FITTINGS
 Flanges, Steel

APPENDIX C



| DIMENSIONS OF CLASS 400 FLANGES | | | | | | | | |
|---------------------------------|---------------------------------|------------------------------------|----------------------|--|-----------------------|--------------------|--|------------------------------------|
| Nominal Pipe Size | Outside Diameter of Flange O | Thickness of Flange (minimum) C | Diameter of Hub X | Hub Diameter Beginning of Chamfer Weld Neck A | Length Through Hub | | Thread Length Threaded Flange (minimum) T | Bore Weld Neck Socket Welding B |
| | | | | | Threaded Welding Y | Welding* Neck Y | | |
| 1/2 | 3.75 | 0.56 | 1.50 | 0.84 | .88 | 2.06 | 0.62 | To Be Specified By Purchaser |
| 3/4 | 4.62 | 0.62 | 1.88 | 1.05 | 1.00 | 2.25 | 0.62 | |
| 1 | 4.88 | 0.69 | 2.12 | 1.32 | 1.06 | 2.44 | 0.69 | |
| 1 1/4 | 5.25 | 0.81 | 2.50 | 1.66 | 1.12 | 2.62 | 0.81 | |
| 1 1/2 | 6.12 | 0.88 | 2.75 | 1.90 | 1.25 | 2.75 | 0.88 | |
| 2 | 6.50 | 1.00 | 3.31 | 2.38 | 1.44 | 2.88 | 1.12 | |
| 2 1/2 | 7.50 | 1.12 | 3.94 | 2.88 | 1.62 | 3.12 | 1.25 | |
| 3 | 8.25 | 1.25 | 4.62 | 3.50 | 1.81 | 3.25 | 1.38 | |
| 3 1/2 | 9.00 | 1.38 | 5.25 | 4.00 | 1.94 | 3.38 | 1.56 | |
| 4 | 10.00 | 1.38 | 5.75 | 4.50 | 2.00 | 3.50 | 1.44 | |
| 5 | 11.00 | 1.50 | 7.00 | 5.56 | 2.12 | 4.00 | 1.69 | |
| 6 | 12.50 | 1.62 | 8.12 | 6.63 | 2.25 | 4.06 | 1.81 | |
| 8 | 15.00 | 1.88 | 10.25 | 8.63 | 2.69 | 4.62 | 2.00 | |
| 10 | 17.50 | 2.12 | 12.62 | 10.75 | 2.88 | 4.88 | 2.19 | |
| 12 | 20.50 | 2.25 | 14.75 | 12.75 | 3.12 | 5.38 | 2.38 | |
| 14 | 23.00 | 2.38 | 16.75 | 14.00 | 3.31 | 5.88 | 2.50 | |
| 16 | 25.50 | 2.50 | 19.00 | 16.00 | 3.69 | 6.00 | 2.69 | |
| 18 | 28.00 | 2.62 | 21.00 | 18.00 | 3.88 | 6.50 | 2.75 | |
| 20 | 30.50 | 2.75 | 23.12 | 20.00 | 4.00 | 6.62 | 2.88 | |
| 24 | 36.00 | 3.00 | 27.62 | 24.00 | 4.50 | 6.88 | 3.25 | |

* The 1/4" raised face is not included in the Weld Neck Y dimension.

APPENDIX C



SOUTHWEST GAS CORPORATION

ENGINEERING STAFF

MATERIAL SPECIFICATION

Prepared By: Engineering Staff

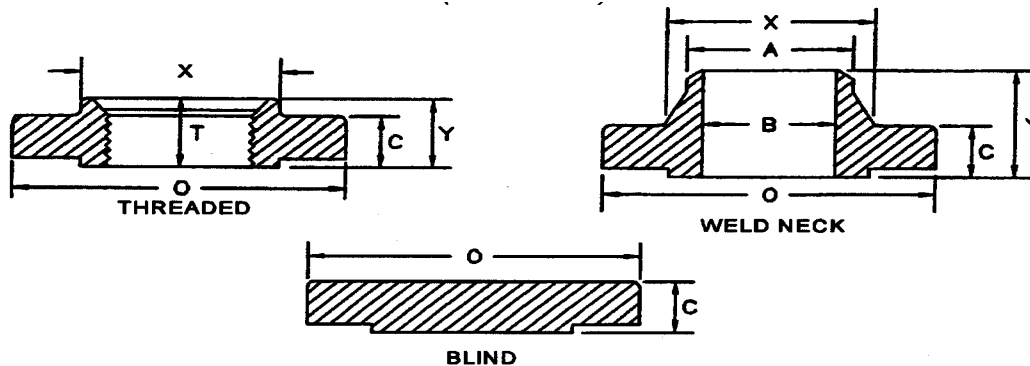
Approved By: Jerome T. Schmitz

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PIPE FITTINGS

Flanges, Steel

APPENDIX C (Cont'd)



| DIMENSIONS OF CLASS 400 FLANGES | | | | | | | | |
|---------------------------------|----------------------------|-------------------------------|-----------------|---|--------------------|---------------|---|-------------------------------|
| Nominal Pipe Size | Outside Diameter of Flange | Thickness of Flange (minimum) | Diameter of Hub | Hub Diameter Beginning of Chamfer Weld Neck | Length Through Hub | | Thread Length Threaded Flange (minimum) | Bore Weld Neck Socket Welding |
| | | | | | Threaded Welding | Welding* Neck | | |
| | O | C | X | A | Y | Y | T | B |
| ½ | 95.25 | 14.22 | 38.10 | 21.34 | 22.35 | 52.32 | 15.75 | To Be Specified By Purchaser |
| ¾ | 117.3 | 15.75 | 47.75 | 26.67 | 25.40 | 57.15 | 15.75 | |
| 1 | 124.0 | 17.53 | 53.85 | 33.53 | 26.92 | 61.98 | 17.53 | |
| 1 ¼ | 133.4 | 20.57 | 63.50 | | 28.45 | 66.55 | 20.57 | |
| 1 ½ | 155.4 | 22.35 | 69.85 | 48.26 | 31.75 | 69.85 | 22.35 | |
| 2 | 165.1 | 25.40 | 84.07 | 60.45 | 36.58 | 73.15 | 28.45 | |
| 2 ½ | 190.5 | 28.45 | 100.1 | 73.15 | 41.15 | 79.25 | 37.75 | |
| 3 | 209.6 | 31.75 | 117.3 | 88.90 | 45.97 | 82.55 | 31.75 | |
| 3 ½ | 228.6 | 35.05 | 133.4 | 101.16 | 49.28 | 85.85 | 36.58 | |
| 4 | 254.0 | 35.08 | 146.1 | 114.3 | 50.80 | 88.90 | 36.58 | |
| 5 | 279.4 | 38.10 | 177.8 | 141.2 | 53.85 | 101.6 | 42.93 | |
| 6 | 317.5 | 41.15 | 206.2 | 168.4 | 57.15 | 103.1 | 45.97 | |
| 8 | 381.0 | 47.75 | 260.4 | 219.2 | 68.33 | 117.3 | 50.80 | |
| 10 | 445.5 | 53.85 | 320.5 | 273.1 | 73.15 | 124.0 | 55.63 | |
| 12 | 520.7 | 57.15 | 374.7 | 323.9 | 79.25 | 136.7 | 60.45 | |
| 14 | 584.2 | 60.45 | 425.5 | 355.6 | 84.07 | 149.4 | 63.50 | |
| 16 | 647.7 | 63.50 | 482.6 | 406.4 | 93.73 | 152.4 | 68.33 | |
| 18 | 711.2 | 66.55 | 533.4 | 457.2 | 98.55 | 165.1 | 69.85 | |
| 20 | 774.7 | 69.85 | 587.2 | 508.0 | 101.6 | 168.1 | 73.15 | |
| 24 | 914.4 | 76.20 | 701.5 | 609.6 | 114.3 | 174.8 | 82.55 | |

* The ¼" raised face is not included in the Weld Neck Y dimension.



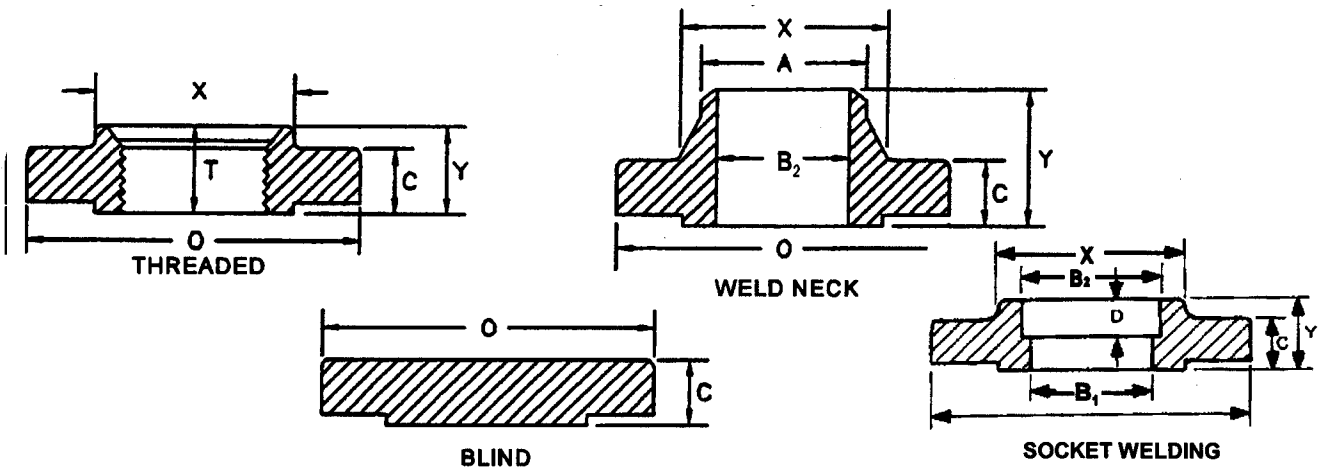
SOUTHWEST GAS CORPORATION
ENGINEERING STAFF
MATERIAL SPECIFICATION

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Prepared By: Engineering Staff
Approved By: Jerome T. Schmitz

PIPE FITTINGS
Flanges, Steel

APPENDIX D





| DIMENSIONS OF CLASS 600 FLANGES | | | | | | | | | | |
|---------------------------------|---------------------------------|---------------------------------|------------------|--|--------------------------------------|---------------------|---|---|--------------------------------|----------------------|
| Nominal Pipe Size | Outside Diameter of Flange O | Thickness of Flange (min.) C | Dia. of Hub X | Hub Diameter Beginning of Chamfer Welding Neck A | Length Through Hub | | Thread Length Threaded Flange (min.) T | Bore | | Depth of Socket D |
| | | | | | Threaded Slip-On Socket Welding Y | Welding * Neck Y | | Socket Welding (min.) B ₁ | Welding Neck B ₂ | |
| 1/2 | 3.75 | 0.56 | 1.50 | 0.84 | 0.88 | 2.06 | 0.62 | 0.88 | To Be Specified By Purchaser | 0.38 |
| 3/4 | 4.62 | 0.62 | 1.88 | 1.05 | 1.00 | 2.25 | 0.62 | 1.09 | | 0.44 |
| 1 | 4.88 | 0.69 | 2.12 | 1.32 | 1.06 | 2.44 | 0.69 | 1.36 | | 0.50 |
| 1 1/4 | 5.25 | 0.81 | 2.50 | 1.66 | 1.12 | 2.62 | 0.81 | 1.70 | | 0.56 |
| 1 1/2 | 6.12 | 0.88 | 2.75 | 1.90 | 1.25 | 2.75 | 0.88 | 1.95 | | 0.62 |
| 2 | 6.50 | 1.00 | 3.31 | 2.38 | 1.44 | 2.88 | 1.12 | 2.44 | | 0.69 |
| 2 1/2 | 7.50 | 1.12 | 3.94 | 2.88 | 1.62 | 3.12 | 1.25 | 2.94 | | 0.75 |
| 3 | 8.25 | 1.25 | 4.62 | 3.50 | 1.81 | 3.25 | 1.38 | 3.57 | | 0.81 |
| 3 1/2 | 9.00 | 1.38 | 5.25 | 4.00 | 1.94 | 3.38 | 1.56 | 4.07 | | — |
| 4 | 10.75 | 1.50 | 6.00 | 4.50 | 2.12 | 4.00 | 1.62 | 4.57 | | — |
| 5 | 13.00 | 1.75 | 7.44 | 5.56 | 2.38 | 4.50 | 1.88 | 5.66 | | — |
| 6 | 14.00 | 1.88 | 8.75 | 6.63 | 2.62 | 4.62 | 2.00 | 6.72 | | — |
| 8 | 16.50 | 2.19 | 10.75 | 8.63 | 3.00 | 5.25 | 2.25 | 8.72 | | — |
| 10 | 20.00 | 2.50 | 13.50 | 10.75 | 3.38 | 6.00 | 2.56 | 10.88 | | — |
| 12 | 22.00 | 2.62 | 15.75 | 12.75 | 3.62 | 6.12 | 2.75 | 12.88 | | — |
| 14 | 23.75 | 2.75 | 17.00 | 14.00 | 3.69 | 6.50 | 2.88 | 14.14 | — | |
| 16 | 27.00 | 3.00 | 19.50 | 16.00 | 4.19 | 7.00 | 3.06 | 16.16 | — | |
| 18 | 29.25 | 3.25 | 21.50 | 18.00 | 4.62 | 7.25 | 3.12 | 18.18 | — | |
| 20 | 32.00 | 3.50 | 24.00 | 20.00 | 5.00 | 7.50 | 2.25 | 20.20 | — | |
| 24 | 37.00 | 4.00 | 28.25 | 24.00 | 5.50 | 8.00 | 3.62 | 24.25 | — | |

* The 1/6" raised face is included with the Weld Neck Y dimension.



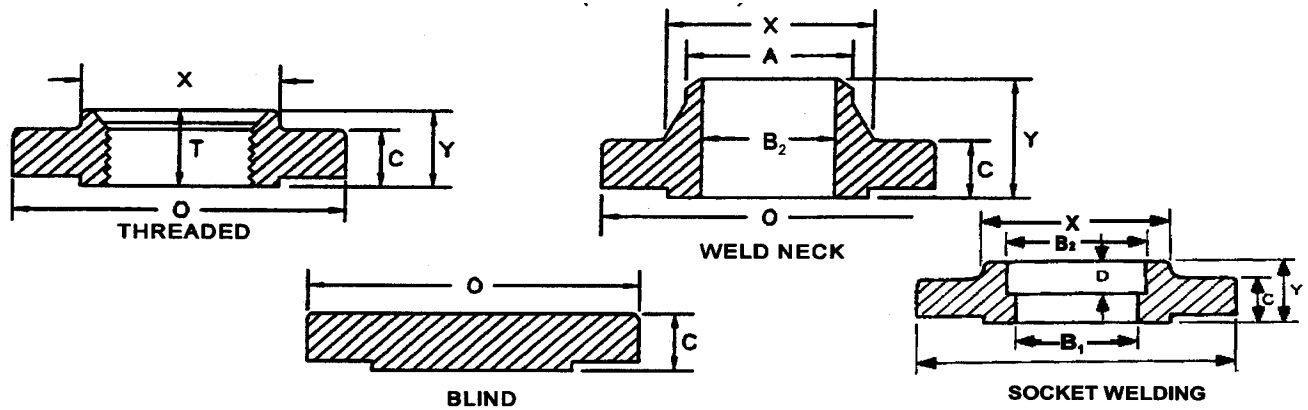
SOUTHWEST GAS CORPORATION
ENGINEERING STAFF
MATERIAL SPECIFICATION

Prepared By: Engineering Staff 
Approved By: Jerome T. Schmitz 

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PIPE FITTINGS
Flanges, Steel

APPENDIX D
(Cont'd)



| Nominal Pipe Size (inches) | DIMENSIONS OF CLASS 600 FLANGES | | | | | | | | | |
|----------------------------|---------------------------------|----------------------------|-------------|--|---------------------------------|---------------|--------------------------------------|-----------------------|------------------------------|-----------------|
| | Outside Diameter of Flange | Thickness of Flange (min.) | Dia. of Hub | Hub Length Through Hub | | | Thread Length Threaded Flange (min.) | Bore | | Depth of Socket |
| | | | | Hub Diameter Beginning of Chamfer Welding Neck | Threaded Slip-On Socket Welding | Welding* Neck | | Socket Welding (min.) | Welding Neck | |
| O | C | X | A | Y | Y | T | B ₁ | B ₂ | D | |
| ½ | 95.25 | 14.22 | 38.10 | 21.34 | 22.35 | 52.32 | 15.75 | 22.35 | To Be Specified By Purchaser | 9.652 |
| ¾ | 117.3 | 15.75 | 47.75 | 26.67 | 25.40 | 57.15 | 15.75 | 27.69 | | 11.18 |
| 1 | 124.0 | 17.53 | 53.85 | 33.53 | 26.92 | 61.98 | 17.53 | 35.54 | | 12.70 |
| 1 ¼ | 133.4 | 20.57 | 63.50 | 42.16 | 28.45 | 66.55 | 20.57 | 43.18 | | 14.22 |
| 1 ½ | 155.4 | 22.35 | 69.85 | 48.26 | 31.75 | 69.85 | 23.35 | 49.53 | | 15.75 |
| 2 | 165.1 | 25.40 | 84.07 | 60.45 | 36.58 | 73.15 | 28.45 | 61.98 | | 17.53 |
| 2 ½ | 190.5 | 28.45 | 100.1 | 73.15 | 41.15 | 79.25 | 31.75 | 74.68 | | 19.05 |
| 3 | 209.6 | 31.75 | 117.3 | 88.90 | 45.97 | 82.55 | 35.05 | 90.68 | | 20.57 |
| 3 ½ | 228.6 | 35.05 | 133.4 | 101.6 | 49.28 | 85.85 | 39.62 | 103.4 | | — |
| 4 | 273.1 | 38.10 | 152.4 | 114.3 | 53.85 | 101.6 | 41.15 | 116.1 | | — |
| 5 | 330.2 | 44.45 | 189.0 | 141.2 | 60.45 | 114.3 | 47.75 | 143.8 | | — |
| 6 | 355.6 | 47.75 | 222.3 | 168.4 | 66.55 | 117.3 | 50.80 | 170.7 | | — |
| 8 | 419.1 | 55.63 | 273.1 | 219.2 | 76.20 | 133.4 | 57.15 | 221.5 | | — |
| 10 | 508.0 | 63.50 | 342.9 | 273.1 | 85.85 | 152.4 | 65.02 | 276.4 | | — |
| 12 | 558.8 | 66.55 | 400.1 | 323.9 | 91.95 | 155.4 | 69.85 | 327.2 | | — |
| 14 | 603.3 | 69.85 | 431.8 | 355.6 | 93.73 | 165.1 | 73.15 | 359.2 | | — |
| 16 | 685.8 | 76.20 | 495.3 | 406.4 | 106.4 | 177.8 | 77.72 | 410.5 | | — |
| 18 | 743.0 | 82.55 | 546.1 | 457.2 | 117.3 | 184.2 | 79.25 | 461.8 | | — |
| 20 | 812.8 | 88.90 | 609.6 | 508.0 | 127.0 | 190.5 | 57.15 | 513.1 | | — |
| 24 | 939.8 | 101.6 | 717.6 | 609.6 | 139.7 | 203.2 | 91.95 | 615.9 | | — |

* The 1/6" raised face is included with the Weld Neck Y dimension.