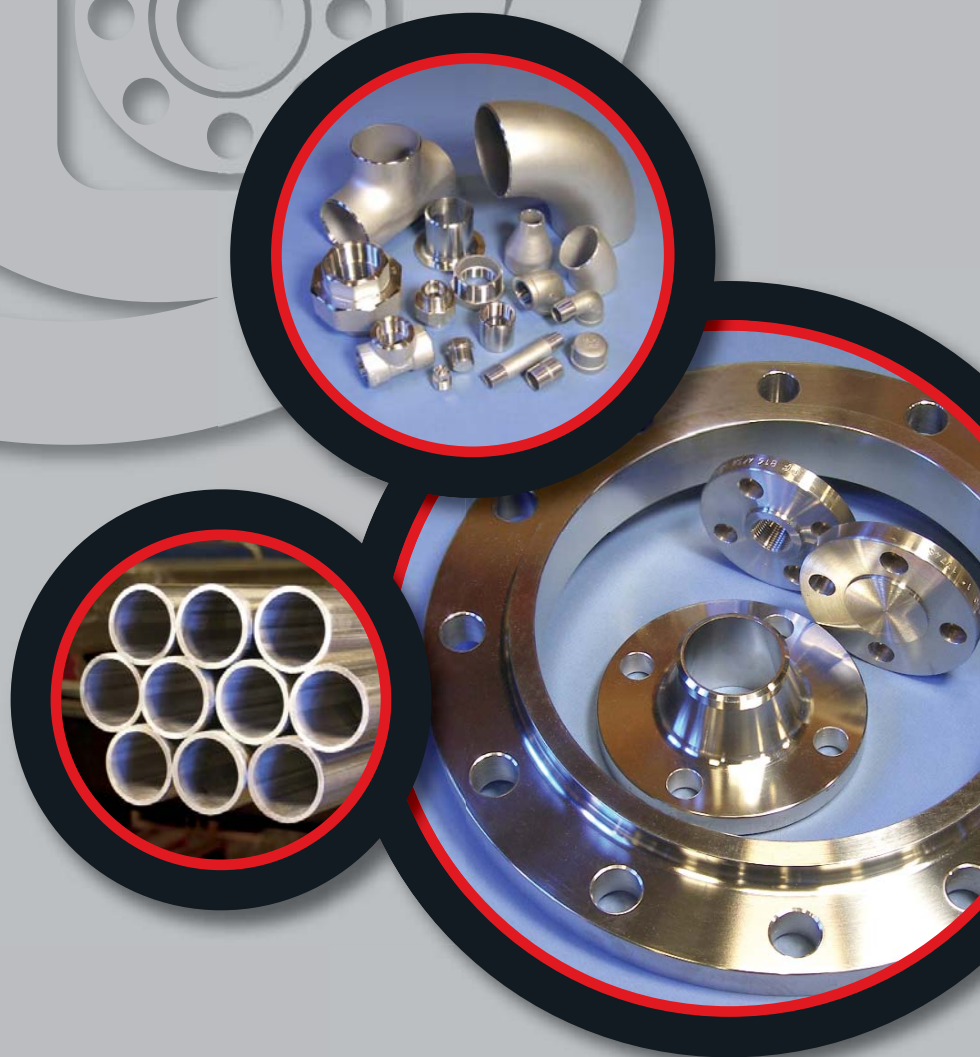


**STAINLESS STEEL**

**PIPE TUBING BAR FLANGES FITTINGS**

# Specialty Steels





STAINLESS STEEL

| WEIGHTS AND DIMENSIONS OF A.S.A PIPE SCHEDULES |                           |               |               |               |               |               |                |               |                |                   |                |                |                    |
|--|---------------------------|---------------|---------------|---------------|---------------|---------------|----------------|---------------|----------------|-------------------|----------------|----------------|--------------------|
| Pipe Size                                      | Outside Diameter (Inches) | 5S            | 5             | 10S           | 10            | 20            | 40S & Standard | 40            | 60             | 80S & Extra Heavy | 80             | 160            | Double Extra Heavy |
| 1/8  | .405                      |               | .035<br>.138  | .049<br>.186  | .049<br>.186  |               | .068<br>.244   | .068<br>.244  |                | .095<br>.314      | .095<br>.314   |                |                    |
| 1/4  | .540                      |               | .049<br>.257  | .065<br>.329  | .065<br>.329  |               | .088<br>.424   | .088<br>.424  |                | .119<br>.535      | .119<br>.535   |                |                    |
| 3/8  | .675                      |               | .049<br>.327  | .065<br>.423  | .065<br>.423  |               | .091<br>.567   | .091<br>.567  |                | .126<br>.738      | .126<br>.738   |                |                    |
| 1/2  | .840                      | .065<br>.538  | .065<br>.538  | .083<br>.671  | .083<br>.671  |               | .109<br>.851   | .109<br>.851  |                | .147<br>1.088     | .147<br>1.088  | .187<br>1.304  | .294<br>1.714      |
| 3/4  | 1.050                     | .065<br>.683  | .065<br>.683  | .083<br>.857  | .083<br>.857  |               | .113<br>1.131  | .113<br>1.131 |                | .154<br>1.474     | .154<br>1.474  | .218<br>1.937  | .308<br>2.441      |
| 1  | 1.315                     | .065<br>.867  | .065<br>.867  | .109<br>1.404 | .109<br>1.404 |               | .133<br>1.679  | .133<br>1.679 |                | .179<br>2.172     | .179<br>2.172  | .250<br>2.844  | .385<br>3.659      |
| 1-1/4  | 1.660                     | .065<br>1.107 | .065<br>1.107 | .109<br>1.806 | .109<br>1.806 |               | .140<br>2.273  | .140<br>2.273 |                | .191<br>2.997     | .191<br>2.997  | .250<br>3.765  | .382<br>5.214      |
| 1-1/2  | 1.900                     | .065<br>1.247 | .065<br>1.247 | .109<br>2.085 | .109<br>2.085 |               | .145<br>2.718  | .145<br>2.718 |                | .200<br>3.631     | .200<br>3.631  | .281<br>4.859  | .400<br>6.408      |
| 2  | 2.375                     | .065<br>1.604 | .065<br>1.604 | .109<br>2.638 | .109<br>2.638 |               | .154<br>3.653  | .154<br>3.653 |                | .218<br>5.022     | .218<br>5.022  | .343<br>7.444  | .436<br>9.029      |
| 2-1/2  | 2.875                     | .083<br>2.475 | .083<br>2.475 | .120<br>3.531 | .120<br>3.531 |               | .203<br>5.793  | .203<br>5.793 |                | .276<br>7.661     | .276<br>7.661  | .375<br>10.01  | .552<br>13.70      |
| 3  | 3.500                     | .083<br>3.029 | .083<br>3.029 | .120<br>4.332 | .120<br>4.332 |               | .216<br>7.576  | .216<br>7.576 |                | .300<br>10.25     | .300<br>10.25  | .437<br>14.32  | .600<br>18.85      |
| 3-1/2  | 4.000                     | .083<br>3.472 | .083<br>3.472 | .120<br>4.973 | .120<br>4.973 |               | .226<br>9.109  | .226<br>9.109 |                | .318<br>12.51     | .318<br>12.51  |                | .636<br>22.85      |
| 4  | 4.500                     | .083<br>3.915 | .083<br>3.915 | .120<br>5.613 | .120<br>5.613 |               | .237<br>10.79  | .237<br>10.79 | .281<br>12.66  | .337<br>14.98     | .337<br>14.98  | .531<br>22.51  | .674<br>27.54      |
| 4-1/2  | 5.000                     |               |               |               |               |               | .247<br>12.53  |               |                | .355<br>17.61     |                |                | .710<br>32.53      |
| 5  | 5.563                     | .109<br>6.349 | .109<br>6.349 | .134<br>7.770 | .134<br>7.770 |               | .258<br>14.62  | .258<br>14.62 |                | .375<br>20.78     | .375<br>20.78  | .625<br>32.96  | .750<br>38.55      |
| 6  | 6.625                     | .109<br>7.585 | .109<br>7.585 | .134<br>9.290 | .134<br>9.290 |               | .280<br>18.97  | .280<br>18.97 |                | .432<br>28.57     | .432<br>28.57  | .718<br>45.30  | .864<br>53.16      |
| 7  | 7.625                     |               |               |               |               |               | .301<br>23.57  |               |                | .500<br>38.05     |                |                | .875<br>63.08      |
| 8  | 8.625                     | .109<br>9.914 | .109<br>9.914 | .148<br>13.40 | .148<br>13.40 | .250<br>22.36 | .322<br>28.55  | .322<br>28.55 | .406<br>35.64  | .500<br>43.39     | .500<br>43.39  | .906<br>74.69  | .875<br>72.42      |
| 9  | 9.625                     |               |               |               |               |               | .342<br>33.90  |               |                | .500<br>48.72     |                |                |                    |
| 10   | 10.750                    | .134<br>15.19 | .134<br>15.19 | .165<br>18.70 | .165<br>18.70 | .250<br>28.04 | .365<br>40.48  | .365<br>40.48 | .500<br>54.74  | .500<br>54.74     | .593<br>64.33  | 1.125<br>115.7 |                    |
| 11   | 11.750                    |               |               |               |               |               | .375<br>45.55  |               |                | .500<br>60.07     |                |                |                    |
| 12   | 12.750                    | .156<br>21.07 | .165<br>22.18 | .180<br>24.20 | .180<br>24.20 | .250<br>33.38 | .375<br>49.56  | .406<br>53.53 | .562<br>73.16  | .500<br>65.42     | .687<br>88.51  | 1.312<br>160.3 |                    |
| 14   | 14.000                    | .156<br>23.07 |               | .188<br>27.73 | .250<br>36.71 | .312<br>45.68 | .375<br>54.57  | .437<br>63.37 | .593<br>84.91  | .500<br>72.09     | .750<br>106.1  | 1.406<br>189.1 |                    |
| 16   | 16.000                    | .165<br>27.90 |               | .188<br>31.75 | .250<br>42.05 | .312<br>52.36 | .375<br>62.58  | .500<br>82.77 | .656<br>107.5  | .500<br>82.77     | .843<br>136.5  | 1.593<br>245.1 |                    |
| 18   | 18.000                    | .165<br>31.43 |               | .188<br>35.76 | .250<br>47.39 | .312<br>59.03 | .375<br>70.59  | .562<br>104.8 | .750<br>138.20 | .500<br>93.45     | .937<br>170.8  | 1.781<br>308.5 |                    |
| 20   | 20.000                    | .188<br>39.78 |               | .218<br>46.05 | .250<br>52.73 | .375<br>78.60 | .375<br>78.60  | .593<br>122.9 | .812<br>166.4  | .500<br>104.1     | 1.031<br>208.9 | 1.968<br>379.0 |                    |
| 24   | 24.000                    | .218<br>55.37 |               | .250<br>63.41 | .250<br>63.41 | .375<br>94.62 | .375<br>94.62  | .687<br>171.2 | .968<br>238.1  | .500<br>125.5     | 1.218<br>296.4 | 2.343<br>541.9 |                    |

Shaded schedules indicate those commonly applied to stainless steel pipe

**PIPE FITTINGS FLANGES PRESSURE TUBE  
ORNAMENTAL TUBE BAR HOLLOW BAR  
ANGLES FLATS**

| TUBING WEIGHT PER FOOT |        |       |        |        |        |               |        |        |         |       |
|------------------------|--------|-------|--------|--------|--------|---------------|--------|--------|---------|-------|
| BWG                    |        | 25    | 22     | 20     | 18     | 16            | 14     | 13     | 12      | 11    |
| O.D.                   |        | .020" | .028"  | .035"  | .049"  | WALL<br>.065" | .083"  | .095"  | .109"   | .120" |
| 0.125                  | 1/8"   | .0224 | .0290  | .0336  | .0398  |               |        |        |         |       |
| 0.188                  | 3/16"  | .0358 | .0478  | .0570  | .0725  | .0850         |        |        |         |       |
| 0.250                  | 1/4"   | .0491 | .0664  | .0804  | .1052  | .1284         | .1480  |        |         |       |
| 0.313                  | 5/16"  | .0625 | .0851  | .1037  | .1379  | .1718         | .2034  |        |         |       |
| 0.375                  | 3/8"   | .0758 | .1038  | .1271  | .1706  | .2152         | .2588  | .2841  | .3097   | .3268 |
| 0.438                  | 7/16"  | .0892 | .1225  | .1504  | .2033  | .2586         | .3142  | .3475  | .3824   | .4069 |
| 0.500                  | 1/2"   | .1025 | .1411  | .1738  | .2360  | .3020         | .3696  | .4109  | .4552   | .4870 |
| 0.563                  | 9/16"  | .1159 | .1598  | .1972  | .2687  | .3454         | .4250  | .4743  | .5279   | .5671 |
| 0.625                  | 5/8"   | .1292 | .1785  | .2205  | .3014  | .3888         | .4804  | .5377  | .6007   | .6472 |
| 0.750                  | 3/4"   | .1559 | .2159  | .2673  | .3668  | .4755         | .5912  | .6646  | .7462   | .8074 |
| 0.875                  | 7/8"   | .1826 | .2533  | .3140  | .4323  | .5623         | .7021  | .7914  | .8917   | .9676 |
| 1.000                  | 1"     | .2907 | .3607  | .4977  | .6491  | .8129         | .9182  | 1.0372 | 1.1278  |       |
| 1.125                  | 1-1/8" | .3280 | .4074  | .5631  | .7358  | .9237         | 1.0450 | 1.1827 | 1.2880  |       |
| 1.250                  | 1-1/4" | .3654 | .4542  | .6285  | .8226  | 1.0345        | 1.1719 | 1.3283 | 1.4482  |       |
| 1.375                  | 1-3/8" | .4028 | .5009  | .6939  | .9094  | 1.1453        | 1.2987 | 1.4738 | 1.6084  |       |
| 1.500                  | 1-1/2" | .4402 | .5476  | .7593  | .9962  | 1.2561        | 1.4255 | 1.6193 | 1.7686  |       |
| 1.625                  | 1-5/8" | .4776 | .5943  | .8248  | 1.0830 | 1.3669        | 1.5523 | 1.7648 | 1.9288  |       |
| 1.750                  | 1-3/4" | .5149 | .6411  | .8902  | 1.1697 | 1.4777        | 1.6792 | 1.9103 | 2.0890  |       |
| 2.000                  | 2"     | .5897 | .7345  | 1.0210 | 1.3433 | 1.6993        | 1.9328 | 2.2014 | 2.4094  |       |
| 2.250                  | 2-1/4" | .6645 | .8280  | 1.1518 | 1.5168 | 1.9209        | 2.1865 | 2.4924 | 2.7298  |       |
| 2.500                  | 2-1/2" | .7392 | .9214  | 1.2826 | 1.6904 | 2.1425        | 2.4401 | 2.7834 | 3.0502  |       |
| 3.000                  | 3"     | .8887 | 1.1083 | 1.5443 | 2.0375 | 2.5857        | 2.9474 | 3.3655 | 3.6910  |       |
| 3.500                  | 3-1/2" |       |        |        | 2.4070 | 3.0570        | 3.4500 | 3.9840 | 4.3720  |       |
| 4.000                  | 4"     |       |        |        | 2.7570 | 3.5050        | 3.9620 | 4.5720 | 5.0190  |       |
| 5.000                  | 5"     |       |        |        | 3.4260 | 4.3590        | 4.9770 | 5.7720 | 6.2540  |       |
| 6.000                  | 6"     |       |        |        | 4.1200 | 5.2450        | 5.9910 | 6.9200 | 7.5400  |       |
| 8.000                  | 8"     |       |        |        | 5.5100 | 7.0200        | 8.0200 | 9.1900 | 10.1000 |       |

**GRADES OF STAINLESS STEEL**

| Grade | Benefits  | Typical Application   |
|-------|---|---|
| 303   | <ul style="list-style-type: none"> <li>Superior machining characteristics</li> <li>Non-magnetic in annealed condition</li> </ul>                            | <ul style="list-style-type: none"> <li>Automatic screw machine</li> <li>Bolts, Bushings, Nuts</li> <li>Shafts</li> </ul>  |
| 304   | <ul style="list-style-type: none"> <li>General purpose corrosion resistance</li> </ul>  | <ul style="list-style-type: none"> <li>Dairy/Food equipment</li> <li>Chemical equipment</li> <li>Water treatment</li> <li>Ornamental</li> <li>Structural</li> </ul>   |
| 304L  | <ul style="list-style-type: none"> <li>High corrosion resistance</li> <li>Easy fabrication and cleaning</li> <li>Resists intergranular corrosion</li> </ul> | <ul style="list-style-type: none"> <li>Extra-low carbon modification of 304 where intergranular carbide precipitation must be avoided</li> <li>Type 304 applications requiring extensive welding</li> </ul> |
| 316   | <ul style="list-style-type: none"> <li>Higher corrosion resistance than types 303 and 304, high creep strength</li> </ul>                                   | <ul style="list-style-type: none"> <li>Dairy/Food equipment</li> <li>Chemical equipment</li> <li>Water treatment</li> <li>Pulp and paper equipment</li> <li>Sea water exposure</li> </ul>                   |
| 316L  | <ul style="list-style-type: none"> <li>Superior resistance to intergranular corrosion</li> </ul>  | <ul style="list-style-type: none"> <li>Extra-low carbon modification of 316 where intergranular carbide precipitation must be avoided</li> <li>Type 316 applications requiring extensive welding</li> </ul> |

**CHEMICAL COMPOSITION (NOMINAL)  
Standard Stainless Steels**

|            | 304    | 304L   | 316    | 316L   |
|------------|--------|--------|--------|--------|
| Carbon-Max | 0.080  | 0.035  | 0.080  | 0.035  |
| Chromium   | 19.000 | 19.000 | 17.000 | 17.000 |
| Nickel     | 9.500  | 10.500 | 12.000 | 12.500 |
| Molybdenum |        |        | 2.500  | 2.500  |

**\* REPRESENTATIVE MECHANICAL PROPERTIES  
AT ROOM TEMPERATURE (ANNEALED)**

| AISI Type | Tensile Strength psi | Yield Strength (2% Offset) | Elongation Percent In 2 Inches |
|-----------|----------------------|----------------------------|--------------------------------|
| 304       | 84,000               | 42,000                     | 55                             |
| 304L      | 81,000               | 39,000                     | 55                             |
| 316       | 84,000               | 42,000                     | 55                             |
| 316L      | 81,000               | 39,000                     | 55                             |

ROCKWELL HARDNESS: B-75 to B-90

\* Refer to required ASTM specifications for minimum acceptance values.

**TOLERANCE PER ASTM:**

| ASTM Specification   | O.D."            | O.D."            | Wall                                   |
|--|------------------|------------------|--|
| <b>A-249</b><br>Welded & Cold Worked<br>Heat Exchanger Tube<br>Equivalent to<br>ASME SA-249<br>AM. STD. B36.33 | -1               | ±.004            | ±10% of<br>Normal<br>Wall<br>Thickness |
|  | 1 to 1-1/2       | ±.006            |  |
|  | +1-1/2 to -2     | ±.008            |  |
|  | 2 to -2-1/2      | ±.010            |  |
|  | 2-1/2 to -3      | ±.012            |  |
| 3 to 4   | ±.015            |                  |  |
| 4 to 5   | +0.015<br>-0.025 |                  |  |
| <b>A-269</b><br>Welded & Seamless<br>General Service<br>AM. STD. B36.37  | -1/2             | ±.005            | ±15%                                   |
|  | 1/2 to -1-1/2    | ±.005            | ±10%                                   |
|  | 1-1/2 to -3-1/2  | ±.010            | ±10%                                   |
|  | 3-1/2 to 5-1/5   | ±.015            | ±10%                                   |
|  | 5-1/2 to -8      | ±.030            | ±10%                                   |
| <b>A-312</b><br>Welded & Seamless Pipe<br>Equivalent to<br>ASME SA-312<br>AM. STD. B36.26                      | 1/8 to 1-1/2     | +0.015<br>-0.031 | 12-1/2%<br>MAX.                        |
|  | 2 to 4           | ±.031            | 12-1/2%<br>MAX.                        |
|  | 5 to 8           | +0.062<br>-0.031 | 12-1/2%<br>MAX.                        |
|  | 10 to 12         | +0.093<br>-0.031 | 12-1/2%<br>MAX.                        |



# Specialty Steels

Your **Reliable** Source for **Stainless Steel**

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