







### **Infra-Metals Buchanan**

916 Infra-Metals Way  
Buchanan, GA 30113  
Phone: 800-833-9175  
Fax: 404-577-1977

### **Infra-Metals Hallandale**

200 N.E. 7th St.  
Hallandale, FL 33009  
Phone: 800-432-1146  
Fax: 954-454-9515

### **Infra-Metals Marseilles**

1601 Broadway St.  
Marseilles, IL 61341  
Phone: 800-987-5283  
Fax: 815-795-5041

### **Infra-Metals New Boston**

1 Sturgills Way  
New Boston, OH 45662  
Phone: 877-741-8806  
Fax: 740-351-1770

### **Infra-Metals Newtown**

6 Penns Trail, Suite 201  
Newtown, PA 18940  
Phone: 800-899-3432  
Fax: 215-741-5973

### **Infra-Metals Petersburg**

1900 Bessemer Road  
Petersburg, VA 23805  
Phone: 800-435-0850  
Fax: 804-957-5800

### **Infra-Metals Tampa**

5208 24th Ave. South  
Tampa, FL 33619  
Phone: 800-693-1361  
Fax: 813-626-8032

### **Infra-Metals Wallingford**

55 Pent Highway  
Wallingford, CT 06492  
Phone: 800-243-4410  
Fax: 203-294-2993

### **Delta Steel Cedar Hill**

1548 Edgefield Way Road  
Cedar Hill, TX 75104  
Phone: 800-284-7321  
Fax: 972-293-7807

### **Delta Steel Fort Worth**

9217 South Freeway  
Fort Worth, TX 76140  
Phone: 800-772-2762  
Fax: 817-293-9458

### **Delta Steel Houston**

7355 Roundhouse Lane  
Houston, TX 77078  
Phone: 800-324-0220  
Fax: 713-635-2060

### **Delta Steel San Antonio**

1840 Ackerman Road  
San Antonio, TX 78219  
Phone: 800-292-5828  
Fax: 210-661-5205

### **Smith Pipe & Steel Phoenix**

735 N 19th Ave  
Phoenix, AZ 85009  
Phone: 602-257-9494  
Fax: 602-253-8770

### **Sugar Steel Chicago Heights**

2521 State St.  
Chicago Heights, IL 60411  
Phone: 708-757-9500  
Fax: 708-757-9900

### **Sugar Steel Evansville**

5401 Hwy. 41 North  
Evansville, IN 47711  
Phone: 812-428-5490  
Fax: 812-428-5494

### **Sugar Steel Perrysburg**

361 D St.  
Perrysburg, OH 43551  
Phone: 419-661-8500  
Fax: 419-661-8611



With an exceptionally wide range of products and services, The Infra Group is one of the largest structural steel service providers in the United States. We specifically tailor our centers to meet the needs of the regions they supply, and we maintain a steadfast commitment to providing high quality materials and service promptly and economically.

Our extensive inventory features products ranging from beams and tubes to sheets, channels and expanded metal, and our processing capabilities include just about everything from cutting and drilling to blasting and painting. Our locations provide a one-stop shop for all your structural carbon steel needs.

A leading distributor of structural steel and a member of Reliance, Inc., The Infra Group serves as a consolidated source for materials and processing and significantly streamlines our clients' procurement procedures. We can provide a wide variety of products with relatively short notice, which combined with our processing capabilities allows us to get our clients the correct material in a form that's immediately ready for the job.





# SPECIFICATIONS FOR STRUCTURAL STEEL SHAPES

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## **ASTM – A36 - Standard Specification for Carbon Structural Steel.**

This specification covers shapes of structural quality for use in riveted, bolted, or welded construction of bridges and buildings, and for general structural purposes.

## **ASTM – A572 - Standard Specification for High-Strength Low-Alloy Structural Steel.**

This specification covers five grades of high-strength low-alloy shapes intended for riveted, bolted, or welded construction of bridges, or for other construction applications.

## **ASTM – A588 - Standard Specification for High-Strength Low-Alloy Structural Steel.**

This specification covers shapes for welded, riveted, or bolted construction but intended primarily for use in welded bridges and buildings where savings in weight or added durability is important. The atmospheric corrosion resistance of this steel in most environments is substantially better than that of carbon steels with or without copper addition.

## **ASTM – A709 - Standard Specification for Carbon and High Strength Low-Alloy Shapes.**

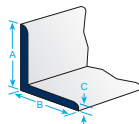
This specification covers shapes, and bars intended for use in bridges. Seven grades are available in four yield strengths.

## **ASTM – A992 - Standard Specification for Steel for Structural Shapes For Use in Building Framing.**

This specification covers rolled shapes for use in building framing or bridges, or for general structural purposes.

# Angles - Bar Size

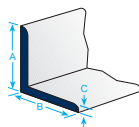
Standard Lengths 20' and 40'



| Size in Inches |   |       |   |      | Estimated Weight Lbs. |               |               |
|----------------|---|-------|---|------|-----------------------|---------------|---------------|
| A              |   | B     |   | C    | Per Foot              | 20 Ft. Length | 40 Ft. Length |
| 1/2            | x | 1/2   | x | 1/8  | 0.38                  | 7.6           |               |
| 5/8            | x | 5/8   | x | 1/8  | 0.48                  | 9.6           |               |
| 3/4            | x | 3/4   | x | 1/8  | 0.59                  | 11.8          |               |
| 7/8            | x | 7/8   | x | 1/8  | 0.7                   | 14            |               |
| 1              | x | 1     | x | 1/8  | 0.8                   | 16            | 32            |
|                |   |       |   | 3/16 | 1.16                  | 23.2          | 46.4          |
|                |   |       |   | 1/4  | 1.49                  | 29.8          | 59.6          |
| 1 1/4          | x | 1 1/4 | x | 1/8  | 1.01                  | 20.2          | 40.4          |
|                |   |       |   | 3/16 | 1.48                  | 29.6          | 59.2          |
|                |   |       |   | 1/4  | 1.92                  | 38.4          | 76.8          |
| 1 1/2          | x | 1 1/2 | x | 1/8  | 1.23                  | 24.6          | 49.2          |
|                |   |       |   | 3/16 | 1.8                   | 36            | 72            |
|                |   |       |   | 1/4  | 2.34                  | 46.8          | 93.6          |
| 1 3/4          | x | 1 3/4 | x | 1/8  | 1.44                  | 28.8          | 57.6          |
|                |   |       |   | 3/16 | 2.12                  | 42.4          | 84.8          |
|                |   |       |   | 1/4  | 2.77                  | 55.4          | 110.8         |
| 2              | x | 1 1/4 | x | 3/16 | 1.96                  | 39.2          | 78.4          |
|                |   |       |   | 1/4  | 2.55                  | 51            | 102           |
| 2              | x | 1 1/2 | x | 1/8  | 1.44                  | 28.8          | 57.6          |
|                |   |       |   | 3/16 | 2.12                  | 42.4          | 84.8          |
|                |   |       |   | 1/4  | 2.77                  | 55.4          | 110.8         |
| 2              | x | 2     | x | 1/8  | 1.65                  | 33            | 66            |
|                |   |       |   | 3/16 | 2.44                  | 48.8          | 97.6          |
|                |   |       |   | 1/4  | 3.19                  | 63.8          | 127.6         |
|                |   |       |   | 5/16 | 3.92                  | 78.4          | 156.8         |
|                |   |       |   | 3/8  | 4.7                   | 94            | 188           |
| 2 1/2          | x | 1 1/2 | x | 3/16 | 2.44                  | 48.8          | 97.6          |
|                |   |       |   | 1/4  | 3.19                  | 63.8          | 127.6         |
|                |   |       |   | 5/16 | 3.92                  | 78.4          | 156.8         |
| 2 1/2          | x | 2     | x | 3/16 | 2.75                  | 55            | 110           |
|                |   |       |   | 1/4  | 3.62                  | 72.4          | 144.8         |
|                |   |       |   | 5/16 | 4.5                   | 90            | 180           |
|                |   |       |   | 3/8  | 5.3                   | 106           | 212           |
| 2 1/2          | x | 2 1/2 | x | 3/16 | 3.07                  | 61.4          | 122.8         |
|                |   |       |   | 1/4  | 4.1                   | 82            | 164           |
|                |   |       |   | 5/16 | 5                     | 100           | 200           |
|                |   |       |   | 3/8  | 5.9                   | 118           | 236           |
|                |   |       |   | 1/2  | 7.7                   | 154           | 308           |

# L Angles - Structural Sizes

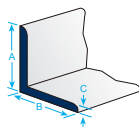
Standard Lengths 20' to 40'



| Size in Inches |   |       |   |      | Estimated Weight Lbs. |               |               |
|----------------|---|-------|---|------|-----------------------|---------------|---------------|
| A              |   | B     |   | C    | Per Foot              | 20 Ft. Length | 40 Ft. Length |
| 3              | x | 2     | x | 3/16 | 3.07                  | 61.4          | 122.8         |
|                |   |       |   | 1/4  | 4.1                   | 82            | 164           |
|                |   |       |   | 5/16 | 5                     | 100           | 200           |
|                |   |       |   | 3/8  | 5.9                   | 118           | 236           |
|                |   |       |   | 1/2  | 7.7                   | 154           | 308           |
| 3              | x | 2 1/2 | x | 3/16 | 3.39                  | 67.8          | 135.6         |
|                |   |       |   | 1/4  | 4.5                   | 90            | 180           |
|                |   |       |   | 5/16 | 5.6                   | 112           | 224           |
|                |   |       |   | 3/8  | 6.6                   | 132           | 264           |
|                |   |       |   | 1/2  | 8.5                   | 170           | 340           |
| 3              | x | 3     | x | 3/16 | 3.71                  | 74.2          | 148.4         |
|                |   |       |   | 1/4  | 4.9                   | 98            | 196           |
|                |   |       |   | 5/16 | 6.1                   | 122           | 244           |
|                |   |       |   | 3/8  | 7.2                   | 144           | 288           |
|                |   |       |   | 1/2  | 9.4                   | 188           | 376           |
| 3 1/2          | x | 2 1/2 | x | 1/4  | 4.9                   | 98            | 196           |
|                |   |       |   | 5/16 | 6.1                   | 122           | 244           |
|                |   |       |   | 3/8  | 7.2                   | 144           | 288           |
|                |   |       |   | 1/2  | 9.4                   | 188           | 376           |
| 3 1/2          | x | 3     | x | 1/4  | 5.4                   | 108           | 216           |
|                |   |       |   | 5/16 | 6.6                   | 132           | 264           |
|                |   |       |   | 3/8  | 7.9                   | 158           | 316           |
|                |   |       |   | 1/2  | 10.2                  | 204           | 408           |
| 3 1/2          | x | 3 1/2 | x | 1/4  | 5.8                   | 116           | 232           |
|                |   |       |   | 5/16 | 7.2                   | 144           | 288           |
|                |   |       |   | 3/8  | 8.5                   | 170           | 340           |
|                |   |       |   | 7/16 | 9.8                   | 196           | 392           |
|                |   |       |   | 1/2  | 11.1                  | 222           | 444           |
| 4              | x | 3     | x | 1/4  | 5.8                   | 116           | 232           |
|                |   |       |   | 5/16 | 7.2                   | 144           | 288           |
|                |   |       |   | 3/8  | 8.5                   | 170           | 340           |
|                |   |       |   | 1/2  | 11.1                  | 222           | 444           |
|                |   |       |   | 5/8  | 13.6                  | 272           | 544           |
| 4              | x | 3 1/2 | x | 1/4  | 6.2                   | 124           | 248           |
|                |   |       |   | 5/16 | 7.7                   | 154           | 308           |
|                |   |       |   | 3/8  | 9.1                   | 182           | 364           |
|                |   |       |   | 1/2  | 11.9                  | 238           | 476           |
| 4              | x | 4     | x | 1/4  | 6.6                   | 132           | 264           |
|                |   |       |   | 5/16 | 8.2                   | 164           | 328           |
|                |   |       |   | 3/8  | 9.8                   | 196           | 392           |
|                |   |       |   | 7/16 | 11.3                  | 226           | 452           |
|                |   |       |   | 1/2  | 12.8                  | 256           | 512           |
|                |   |       |   | 5/8  | 15.7                  | 314           | 628           |
|                |   |       |   | 3/4  | 18.5                  | 370           | 740           |
| 5              | x | 3     | x | 1/4  | 6.6                   | 132           | 264           |
|                |   |       |   | 5/16 | 8.2                   | 164           | 328           |
|                |   |       |   | 3/8  | 9.8                   | 196           | 392           |
|                |   |       |   | 1/2  | 12.8                  | 256           | 512           |

# L Angles - Structural Sizes

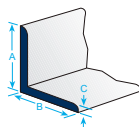
Standard Lengths up to 60'



| Size in Inches |   |       |   |      | Estimated Weight Lbs. |               |               |
|----------------|---|-------|---|------|-----------------------|---------------|---------------|
| A              |   | B     |   | C    | Per Foot              | 20 Ft. Length | 40 Ft. Length |
| 5              | x | 3 1/2 | x | 1/4  | 7.0                   | 140           | 280           |
|                |   |       |   | 5/16 | 8.7                   | 174           | 348           |
|                |   |       |   | 3/8  | 10.4                  | 208           | 416           |
|                |   |       |   | 1/2  | 13.6                  | 272           | 544           |
|                |   |       |   | 5/8  | 16.8                  | 336           | 672           |
|                |   |       |   | 3/4  | 19.8                  | 396           | 792           |
| 5              | x | 5     | x | 5/16 | 10.3                  | 206           | 412           |
|                |   |       |   | 3/8  | 12.3                  | 246           | 492           |
|                |   |       |   | 7/16 | 14.3                  | 286           | 572           |
|                |   |       |   | 1/2  | 16.2                  | 324           | 648           |
|                |   |       |   | 5/8  | 20                    | 400           | 800           |
|                |   |       |   | 3/4  | 23.6                  | 472           | 944           |
| 6              | x | 3 1/2 | x | 5/16 | 9.8                   | 196           | 392           |
|                |   |       |   | 3/8  | 11.7                  | 234           | 468           |
|                |   |       |   | 1/2  | 15.3                  | 306           | 612           |
| 6              | x | 4     | x | 5/16 | 10.3                  | 206           | 412           |
|                |   |       |   | 3/8  | 12.3                  | 246           | 492           |
|                |   |       |   | 7/16 | 14.3                  | 286           | 572           |
|                |   |       |   | 1/2  | 16.2                  | 324           | 648           |
|                |   |       |   | 5/8  | 20                    | 400           | 800           |
|                |   |       |   | 3/4  | 23.6                  | 472           | 944           |
| 6              | x | 6     | x | 5/16 | 12.4                  | 248           | 496           |
|                |   |       |   | 3/8  | 14.9                  | 298           | 596           |
|                |   |       |   | 7/16 | 17.2                  | 344           | 688           |
|                |   |       |   | 1/2  | 19.6                  | 392           | 784           |
|                |   |       |   | 5/8  | 24.2                  | 484           | 968           |
|                |   |       |   | 3/4  | 28.7                  | 574           | 1148          |
| 7              | x | 4     | x | 7/8  | 33.1                  | 662           | 1324          |
|                |   |       |   | 1    | 37.4                  | 748           | 1496          |
|                |   |       |   | 3/8  | 13.6                  | 272           | 544           |
|                |   |       |   | 7/16 | 15.8                  | 316           | 632           |
|                |   |       |   | 1/2  | 17.9                  | 358           | 716           |
|                |   |       |   | 5/8  | 22.1                  | 442           | 884           |
| 8              | x | 4     | x | 3/4  | 26.2                  | 524           | 1048          |
|                |   |       |   | 1/2  | 19.6                  | 392           | 784           |
|                |   |       |   | 9/16 | 21.9                  | 438           | 876           |
|                |   |       |   | 5/8  | 24.2                  | 484           | 968           |
|                |   |       |   | 3/4  | 28.7                  | 574           | 1148          |
|                |   |       |   | 7/8  | 33.1                  | 662           | 1324          |
| 8              | x | 6     | x | 1    | 37.4                  | 748           | 1496          |
|                |   |       |   | 1/2  | 23                    | 460           | 920           |
|                |   |       |   | 9/16 | 25.7                  | 514           | 1028          |
|                |   |       |   | 5/8  | 28.5                  | 570           | 1140          |
|                |   |       |   | 3/4  | 33.8                  | 676           | 1352          |
|                |   |       |   | 7/8  | 39.1                  | 782           | 1564          |
| 8              | x | 6     | x | 1    | 44.2                  | 884           | 1768          |

# L Angles - Structural Sizes

Standard Lengths up to 60'



| Size in Inches |   |   |   |       | Estimated Weight Lbs. |               |               |
|----------------|---|---|---|-------|-----------------------|---------------|---------------|
| A              |   | B |   | C     | Per Foot              | 20 Ft. Length | 40 Ft. Length |
| 8              | x | 8 | x | 1/2   | 26.4                  | 528           | 1056          |
|                |   |   |   | 9/16  | 29.6                  | 592           | 1184          |
|                |   |   |   | 5/8   | 32.7                  | 654           | 1308          |
|                |   |   |   | 3/4   | 38.9                  | 778           | 1556          |
|                |   |   |   | 7/8   | 45                    | 900           | 1800          |
|                |   |   |   | 1     | 51                    | 1020          | 2040          |
|                |   |   |   | 1 1/8 | 56.9                  | 1138          | 2276          |



# SPECIFICATIONS FOR STRUCTURAL STEEL SHAPES

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This specification covers shapes of structural quality for use in riveted, bolted, or welded construction of bridges and buildings, and for general structural purposes.

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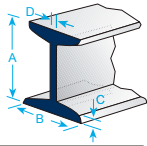
This specification covers shapes, and bars intended for use in bridges. Seven grades are available in four yield strengths.

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This specification covers rolled shapes for use in building framing or bridges, or for general structural purposes.

# Miscellaneous Beams

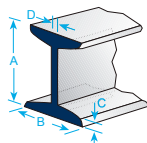
Standard Lengths 20' and 40'



| Section Number | <div><div>A</div><div>B</div><div>C</div><div>D</div></div> |                  |              |                  |               |
|----------------|-------------------------------------------------------------|------------------|--------------|------------------|---------------|
|                | Weight Per/Foot                                             | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.                                                         | in.              | in.          | in.              | in.           |
| M6             | 4.4                                                         | 6.00             | 1.844        | 0.171            | 0.114         |
| M8             | 6.5                                                         | 8.00             | 2.281        | 0.189            | 0.135         |
| M10            | 8                                                           | 9.95             | 2.690        | 0.182            | 0.141         |
|                | 9                                                           | 10.00            | 2.690        | 0.206            | 0.157         |
| M12            | 10                                                          | 11.97            | 3.250        | 0.180            | 0.149         |
|                | 10.8                                                        | 11.97            | 3.065        | 0.210            | 0.160         |
|                | 11.8                                                        | 12.00            | 3.065        | 0.225            | 0.177         |
| M12.5          | 11.6                                                        | 12.50            | 3.500        | 0.211            | 0.155         |
|                | 12.4                                                        | 12.53            | 3.750        | 0.228            | 0.155         |

# Standard "I" Beams

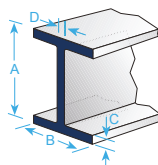
Standard Lengths 20'-60'



|                |                 | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
| Section Number | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>S3</b>      | 5.7             | 3.00             | 2.330        | 0.260            | 0.170         |
|                | 7.5             | 3.00             | 2.509        | 0.260            | 0.349         |
| <b>S4</b>      | 7.7             | 4.00             | 2.660        | 0.293            | 0.193         |
|                | 9.5             | 4.00             | 2.796        | 0.293            | 0.326         |
| <b>S5</b>      | 10              | 5.00             | 3.000        | 0.326            | 0.214         |
|                | 14.75           | 5.00             | 3.284        | 0.326            | 0.494         |
| <b>S6</b>      | 12.5            | 6.00             | 3.332        | 0.359            | 0.232         |
|                | 17.25           | 6.00             | 3.565        | 0.359            | 0.465         |
| <b>S7</b>      | 15.3            | 7.00             | 3.662        | 0.392            | 0.252         |
|                | 20              | 7.00             | 3.860        | 0.392            | 0.450         |
| <b>S8</b>      | 18.4            | 8.00             | 4.001        | 0.425            | 0.271         |
|                | 23              | 8.00             | 4.171        | 0.425            | 0.441         |
| <b>S10</b>     | 25.4            | 10.00            | 4.661        | 0.491            | 0.311         |
|                | 35              | 10.00            | 4.944        | 0.491            | 0.594         |
| <b>S12</b>     | 31.8            | 12.00            | 5.000        | 0.544            | 0.350         |
|                | 35              | 12.00            | 5.078        | 0.544            | 0.428         |
|                | 40.8            | 12.00            | 5.252        | 0.659            | 0.462         |
|                | 50              | 12.00            | 5.477        | 0.659            | 0.687         |
| <b>S15</b>     | 42.9            | 15.00            | 5.501        | 0.622            | 0.411         |
|                | 50              | 15.00            | 5.640        | 0.622            | 0.550         |
| <b>S18</b>     | 54.7            | 18.00            | 6.001        | 0.691            | 0.461         |
|                | 70              | 18.00            | 6.251        | 0.691            | 0.711         |
| <b>S20</b>     | 66              | 20.00            | 6.255        | 0.795            | 0.505         |
|                | 75              | 20.00            | 6.385        | 0.795            | 0.635         |
|                | 86              | 20.30            | 7.060        | 0.920            | 0.660         |
|                | 96              | 20.30            | 7.200        | 0.920            | 0.800         |
| <b>S24</b>     | 80              | 24.00            | 7.000        | 0.870            | 0.500         |
|                | 90              | 24.00            | 7.125        | 0.870            | 0.625         |
|                | 100             | 24.00            | 7.245        | 0.870            | 0.745         |
|                | 106             | 24.50            | 7.870        | 1.090            | 0.620         |
|                | 121             | 24.50            | 8.050        | 1.090            | 0.800         |

# Wide Flange Beams

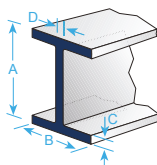
Standard Lengths 20'-70' in 5'0" increments



|                |                 | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
| Section Number | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W4</b>      | 13              | 4.16             | 4.060        | 0.345            | 0.280         |
| <b>W5</b>      | 16              | 5.01             | 5.000        | 0.300            | 0.240         |
|                | 19              | 5.15             | 5.030        | 0.430            | 0.270         |
| <b>W6</b>      | 8.5             | 5.83             | 3.940        | 0.194            | 0.170         |
|                | 9               | 5.90             | 3.940        | 0.215            | 0.170         |
|                | 12              | 6.03             | 4.000        | 0.280            | 0.230         |
|                | 16              | 6.28             | 4.030        | 0.405            | 0.260         |
| <b>W6</b>      | 15              | 5.99             | 5.990        | 0.260            | 0.230         |
|                | 20              | 6.20             | 6.020        | 0.365            | 0.260         |
|                | 25              | 6.38             | 6.080        | 0.455            | 0.320         |
| <b>W8</b>      | 10              | 7.89             | 3.940        | 0.205            | 0.170         |
|                | 13              | 7.99             | 4.000        | 0.255            | 0.230         |
|                | 15              | 8.11             | 4.015        | 0.315            | 0.245         |
| <b>W8</b>      | 18              | 8.14             | 5.250        | 0.330            | 0.230         |
|                | 21              | 8.28             | 5.270        | 0.400            | 0.250         |
| <b>W8</b>      | 24              | 7.93             | 6.490        | 0.400            | 0.245         |
|                | 28              | 8.06             | 6.535        | 0.465            | 0.285         |
| <b>W8</b>      | 31              | 8.00             | 7.995        | 0.435            | 0.285         |
|                | 35              | 8.12             | 8.020        | 0.495            | 0.310         |
|                | 40              | 8.25             | 8.070        | 0.560            | 0.360         |
|                | 48              | 8.50             | 8.110        | 0.685            | 0.400         |
|                | 58              | 8.75             | 8.220        | 0.810            | 0.510         |
|                | 67              | 9.00             | 8.280        | 0.935            | 0.570         |
| <b>W10</b>     | 12              | 9.87             | 3.960        | 0.210            | 0.190         |
|                | 15              | 9.99             | 4.000        | 0.270            | 0.230         |
|                | 17              | 10.11            | 4.010        | 0.330            | 0.240         |
|                | 19              | 10.24            | 4.020        | 0.395            | 0.250         |

# Wide Flange Beams

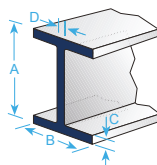
Standard Lengths 20'-70' in 5'0" increments



|                |                 | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
| Section Number | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W10</b>     | 22              | 10.17            | 5.750        | 0.360            | 0.240         |
|                | 26              | 10.33            | 5.770        | 0.440            | 0.260         |
|                | 30              | 10.47            | 5.810        | 0.510            | 0.300         |
| <b>W10</b>     | 33              | 9.73             | 7.960        | 0.435            | 0.290         |
|                | 39              | 9.92             | 7.985        | 0.530            | 0.315         |
|                | 45              | 10.10            | 8.020        | 0.620            | 0.350         |
| <b>W10</b>     | 49              | 9.98             | 10.000       | 0.560            | 0.340         |
|                | 54              | 10.09            | 10.030       | 0.615            | 0.370         |
|                | 60              | 10.22            | 10.080       | 0.680            | 0.420         |
|                | 68              | 10.40            | 10.130       | 0.770            | 0.470         |
|                | 77              | 10.60            | 10.190       | 0.870            | 0.530         |
|                | 88              | 10.84            | 10.265       | 0.990            | 0.605         |
|                | 100             | 11.10            | 10.340       | 1.120            | 0.680         |
|                | 112             | 11.36            | 10.415       | 1.250            | 0.755         |
| <b>W12</b>     | 14              | 11.91            | 3.970        | 0.225            | 0.022         |
|                | 16              | 11.99            | 3.990        | 0.265            | 0.220         |
|                | 19              | 12.16            | 4.005        | 0.350            | 0.235         |
|                | 22              | 12.31            | 4.030        | 0.425            | 0.260         |
| <b>W12</b>     | 26              | 12.22            | 6.490        | 0.380            | 0.230         |
|                | 30              | 12.34            | 6.520        | 0.440            | 0.260         |
|                | 35              | 12.50            | 6.560        | 0.520            | 0.300         |
| <b>W12</b>     | 40              | 11.94            | 8.005        | 0.515            | 0.295         |
|                | 45              | 12.06            | 8.045        | 0.575            | 0.335         |
|                | 50              | 12.19            | 8.080        | 0.640            | 0.370         |
| <b>W12</b>     | 53              | 12.06            | 9.995        | 0.757            | 0.345         |
|                | 58              | 12.19            | 10.010       | 0.640            | 0.360         |

# Wide Flange Beams

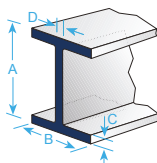
Standard Lengths 20'-70' in 5'0" increments



|                |                 | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
| Section Number | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W12</b>     | 65              | 12.12            | 12.000       | 0.605            | 0.390         |
|                | 72              | 12.25            | 12.040       | 0.670            | 0.430         |
|                | 79              | 12.38            | 12.080       | 0.735            | 0.470         |
|                | 87              | 12.53            | 12.125       | 0.810            | 0.515         |
|                | 96              | 12.71            | 12.160       | 0.900            | 0.550         |
|                | 106             | 12.89            | 12.220       | 0.990            | 0.610         |
|                | 120             | 13.12            | 12.320       | 1.105            | 0.710         |
|                | 136             | 13.41            | 12.400       | 1.250            | 0.790         |
|                | 152             | 13.71            | 12.480       | 1.400            | 0.870         |
|                | 170             | 14.03            | 12.570       | 1.560            | 0.960         |
|                | 190             | 14.38            | 12.670       | 1.735            | 1.060         |
|                | 210             | 14.71            | 12.790       | 1.900            | 1.180         |
|                | 230             | 15.05            | 12.895       | 2.070            | 1.285         |
|                | 252             | 15.41            | 13.005       | 2.250            | 1.395         |
|                | 279             | 15.85            | 13.140       | 2.470            | 1.530         |
|                | 305             | 16.32            | 13.235       | 2.705            | 1.625         |
|                | 336             | 16.82            | 13.385       | 2.955            | 1.775         |
| <b>W14</b>     | 22              | 13.74            | 5.000        | 0.335            | 0.230         |
|                | 26              | 13.91            | 5.025        | 0.420            | 0.255         |
| <b>W14</b>     | 30              | 13.84            | 6.730        | 0.385            | 0.270         |
|                | 34              | 13.98            | 6.785        | 0.455            | 0.285         |
|                | 38              | 14.10            | 6.770        | 0.515            | 0.310         |
| <b>W14</b>     | 43              | 13.66            | 7.995        | 0.530            | 0.305         |
|                | 48              | 13.79            | 8.030        | 0.595            | 0.340         |
|                | 53              | 13.92            | 8.060        | 0.660            | 0.370         |
|                | 61              | 13.89            | 9.995        | 0.645            | 0.375         |
|                | 68              | 14.04            | 10.035       | 0.720            | 0.415         |
|                | 74              | 14.17            | 10.070       | 0.785            | 0.450         |
|                | 82              | 14.31            | 10.130       | 0.855            | 0.510         |

# Wide Flange Beams

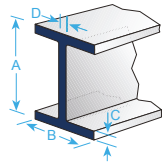
Standard Lengths 20'-70' in 5'0" increments



|                |                 | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
| Section Number | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W14</b>     | 90              | 14.02            | 14.520       | 0.710            | 0.440         |
|                | 99              | 14.16            | 14.565       | 0.780            | 0.485         |
|                | 109             | 14.32            | 14.605       | 0.860            | 0.525         |
|                | 120             | 14.48            | 14.670       | 0.940            | 0.590         |
|                | 132             | 14.66            | 14.725       | 1.030            | 0.645         |
| <b>W14</b>     | 145             | 14.78            | 15.500       | 1.090            | 0.680         |
|                | 159             | 14.98            | 15.565       | 1.190            | 0.745         |
|                | 176             | 15.22            | 15.650       | 1.310            | 0.830         |
|                | 193             | 15.48            | 15.710       | 1.440            | 0.890         |
|                | 211             | 15.72            | 15.800       | 1.560            | 0.980         |
|                | 233             | 16.04            | 15.890       | 1.720            | 1.070         |
|                | 257             | 16.38            | 15.995       | 1.890            | 1.175         |
|                | 283             | 16.74            | 16.110       | 2.070            | 1.290         |
|                | 311             | 17.12            | 16.230       | 2.260            | 1.410         |
|                | 342             | 17.54            | 16.360       | 2.470            | 1.540         |
|                | 370             | 17.92            | 16.475       | 2.660            | 1.655         |
|                | 398             | 18.29            | 16.590       | 2.845            | 1.770         |
|                | 426             | 18.67            | 16.695       | 3.035            | 1.875         |
|                | 455             | 19.02            | 16.835       | 3.210            | 2.015         |
|                | 500             | 19.60            | 17.010       | 3.500            | 2.190         |
|                | 550             | 20.24            | 17.200       | 3.820            | 2.380         |
|                | 605             | 20.92            | 17.415       | 4.160            | 2.595         |
|                | 665             | 21.64            | 17.650       | 4.520            | 2.830         |
|                | 730             | 22.42            | 17.890       | 4.910            | 3.070         |
| <b>W16</b>     | 26              | 15.69            | 5.500        | 0.345            | 0.250         |
|                | 31              | 15.88            | 5.525        | 0.440            | 0.275         |
|                | 36              | 15.86            | 6.985        | 0.430            | 0.295         |
|                | 40              | 16.01            | 6.995        | 0.505            | 0.305         |
|                | 45              | 16.13            | 7.035        | 0.565            | 0.345         |
|                | 50              | 16.26            | 7.070        | 0.630            | 0.380         |
|                | 57              | 16.43            | 7.120        | 0.715            | 0.430         |

## Wide Flange Beams

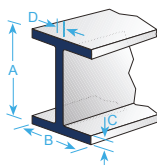
Standard Lengths 20'-70' in 5'0" increments



|                |                 | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
| Section Number | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W16</b>     | 67              | 16.33            | 10.235       | 0.665            | 0.395         |
|                | 77              | 16.52            | 10.295       | 0.760            | 0.455         |
|                | 89              | 16.75            | 10.365       | 0.875            | 0.525         |
|                | 100             | 16.97            | 10.425       | 0.985            | 0.585         |
| <b>W18</b>     | 35              | 17.70            | 6.000        | 0.425            | 0.300         |
|                | 40              | 17.90            | 6.015        | 0.525            | 0.315         |
|                | 46              | 18.06            | 6.060        | 0.605            | 0.360         |
| <b>W18</b>     | 41              | 17.70            | 7.450        | 0.530            | 0.320         |
|                | 45              | 17.86            | 7.480        | 0.500            | 0.340         |
|                | 50              | 17.99            | 7.495        | 0.570            | 0.355         |
|                | 55              | 18.11            | 7.530        | 0.630            | 0.390         |
|                | 60              | 18.24            | 7.555        | 0.695            | 0.415         |
|                | 65              | 18.35            | 7.590        | 0.750            | 0.450         |
|                | 71              | 18.47            | 7.635        | 0.810            | 0.495         |
| <b>W18</b>     | 76              | 18.21            | 11.035       | 0.680            | 0.425         |
|                | 86              | 18.39            | 11.090       | 0.770            | 0.480         |
|                | 97              | 18.59            | 11.145       | 0.870            | 0.535         |
|                | 106             | 18.73            | 11.200       | 0.940            | 0.590         |
|                | 119             | 18.97            | 11.265       | 1.060            | 0.655         |
|                | 130             | 19.25            | 11.160       | 1.200            | 0.670         |
|                | 143             | 19.49            | 11.220       | 1.320            | 0.730         |
|                | 158             | 19.72            | 11.300       | 1.440            | 0.810         |
|                | 175             | 20.04            | 11.375       | 1.590            | 0.890         |
|                | 192             | 20.35            | 11.455       | 1.750            | 0.960         |
|                | 211             | 20.67            | 11.555       | 1.910            | 1.060         |
|                | 234             | 21.06            | 11.650       | 2.110            | 1.160         |
|                | 258             | 21.46            | 11.770       | 2.300            | 1.280         |
|                | 283             | 21.85            | 11.890       | 2.500            | 1.400         |
|                | 311             | 22.32            | 12.005       | 2.740            | 1.520         |

# Wide Flange Beams

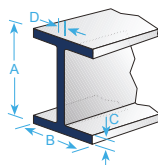
Standard Lengths 20'-70' in 5'0" increments



|                |                 | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
| Section Number | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W21</b>     | 44              | 20.66            | 6.500        | 0.450            | 0.350         |
|                | 50              | 20.83            | 6.530        | 0.535            | 0.380         |
|                | 57              | 21.06            | 6.555        | 0.650            | 0.405         |
| <b>W21</b>     | 48              | 20.62            | 8.140        | 0.430            | 0.035         |
|                | 55              | 20.80            | 8.220        | 0.522            | 0.375         |
|                | 62              | 20.99            | 8.240        | 0.615            | 0.400         |
|                | 68              | 21.13            | 8.270        | 0.685            | 0.430         |
|                | 73              | 21.24            | 8.295        | 0.740            | 0.455         |
|                | 83              | 21.43            | 8.355        | 0.835            | 0.515         |
|                | 93              | 21.62            | 8.420        | 0.930            | 0.580         |
| <b>W21</b>     | 101             | 21.36            | 12.290       | 0.800            | 0.500         |
|                | 111             | 21.51            | 12.340       | 0.875            | 0.550         |
|                | 122             | 21.68            | 12.390       | 0.960            | 0.600         |
|                | 132             | 21.83            | 12.440       | 1.035            | 0.650         |
|                | 147             | 22.06            | 12.510       | 1.150            | 0.720         |
|                | 166             | 22.48            | 12.420       | 1.360            | 0.750         |
|                | 182             | 22.72            | 12.500       | 1.480            | 0.830         |
|                | 201             | 23.03            | 12.560       | 1.630            | 0.910         |
|                | 223             | 23.35            | 12.680       | 1.790            | 1.000         |
|                | 248             | 23.74            | 12.775       | 1.990            | 1.110         |
|                | 275             | 24.13            | 12.890       | 2.190            | 1.220         |
| <b>W24</b>     | 55              | 23.57            | 7.005        | 0.505            | 0.395         |
|                | 62              | 23.74            | 7.040        | 0.590            | 0.430         |

# Wide Flange Beams

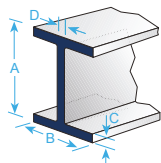
Standard Lengths 20'-70' in 5'0" increments



|                |                 | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
| Section Number | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W24</b>     | 56              | 23.48            | 8.900        | 0.460            | 0.355         |
|                | 61              | 23.56            | 8.930        | 0.500            | 0.380         |
|                | 68              | 23.73            | 8.965        | 0.585            | 0.415         |
|                | 76              | 23.92            | 8.990        | 0.680            | 0.440         |
|                | 84              | 24.10            | 9.200        | 0.770            | 0.470         |
|                | 94              | 24.31            | 9.065        | 0.875            | 0.515         |
|                | 103             | 24.53            | 9.000        | 0.980            | 0.550         |
| <b>W24</b>     | 104             | 24.06            | 12.750       | 0.750            | 0.500         |
|                | 117             | 24.26            | 12.800       | 0.850            | 0.550         |
|                | 131             | 24.48            | 12.855       | 0.960            | 0.605         |
|                | 146             | 24.74            | 12.900       | 1.090            | 0.650         |
|                | 162             | 25.00            | 12.995       | 1.220            | 0.705         |
|                | 176             | 25.24            | 12.890       | 1.340            | 0.750         |
|                | 192             | 25.47            | 12.950       | 1.460            | 0.810         |
|                | 207             | 25.71            | 13.010       | 1.570            | 0.870         |
|                | 229             | 26.02            | 13.110       | 1.730            | 0.960         |
|                | 250             | 26.34            | 13.185       | 1.890            | 1.040         |
|                | 279             | 26.73            | 13.305       | 2.090            | 1.160         |
|                | 306             | 27.13            | 13.405       | 2.280            | 1.260         |
|                | 335             | 27.52            | 13.520       | 2.480            | 1.380         |
|                | 370             | 27.99            | 13.660       | 2.720            | 1.520         |

# Wide Flange Beams

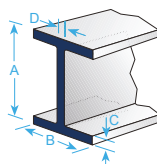
Standard Lengths 20'-70' in 5'0" increments



| Section Number | Weight Per/Foot | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
|                |                 | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W27</b>     | 84              | 26.71            | 9.960        | 0.640            | 0.460         |
|                | 94              | 26.92            | 9.990        | 0.745            | 0.490         |
|                | 102             | 27.09            | 10.015       | 0.830            | 0.515         |
|                | 114             | 27.29            | 10.070       | 0.930            | 0.570         |
|                | 129             | 27.63            | 10.010       | 1.100            | 0.610         |
| <b>W27</b>     | 146             | 27.38            | 13.965       | 0.975            | 0.605         |
|                | 161             | 27.59            | 14.020       | 1.080            | 0.660         |
|                | 178             | 27.81            | 14.085       | 1.190            | 0.725         |
|                | 194             | 28.11            | 14.035       | 1.340            | 0.750         |
|                | 217             | 28.43            | 14.115       | 1.500            | 0.830         |
|                | 235             | 28.66            | 14.190       | 1.610            | 0.910         |
|                | 258             | 28.98            | 14.270       | 1.770            | 0.980         |
|                | 281             | 29.29            | 14.350       | 1.930            | 1.060         |
|                | 307             | 29.61            | 14.445       | 2.090            | 1.160         |
|                | 336             | 30.00            | 14.545       | 2.280            | 1.260         |
|                | 368             | 30.39            | 14.665       | 2.480            | 1.380         |
| <b>W30</b>     | 90              | 29.53            | 10.400       | 0.610            | 0.470         |
|                | 99              | 29.65            | 10.450       | 0.670            | 0.520         |
|                | 108             | 29.83            | 10.475       | 0.760            | 0.545         |
|                | 116             | 30.01            | 10.495       | 0.850            | 0.565         |
|                | 124             | 30.17            | 10.515       | 0.930            | 0.585         |
|                | 132             | 30.31            | 10.545       | 1.000            | 0.615         |
|                | 148             | 30.67            | 10.480       | 1.180            | 0.650         |

# Wide Flange Beams

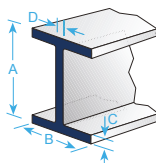
Standard Lengths 20'-70' in 5'0" increments



|                |                 | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
| Section Number | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W30</b>     | 173             | 30.44            | 14.985       | 1.065            | 0.655         |
|                | 191             | 30.68            | 15.040       | 1.185            | 0.710         |
|                | 211             | 30.94            | 15.105       | 1.315            | 0.775         |
|                | 235             | 31.30            | 15.055       | 1.500            | 0.830         |
|                | 261             | 31.61            | 15.155       | 1.650            | 0.930         |
|                | 292             | 32.01            | 15.255       | 1.850            | 1.020         |
|                | 326             | 32.40            | 15.370       | 2.050            | 1.140         |
|                | 357             | 32.80            | 15.470       | 2.240            | 1.240         |
|                | 391             | 33.19            | 15.590       | 2.440            | 1.360         |
| <b>W33</b>     | 118             | 32.86            | 11.480       | 0.740            | 0.550         |
|                | 130             | 33.09            | 11.510       | 0.855            | 0.580         |
|                | 141             | 33.30            | 11.535       | 0.960            | 0.605         |
|                | 152             | 33.49            | 11.565       | 1.055            | 0.635         |
|                | 169             | 33.82            | 11.500       | 1.220            | 0.670         |
| <b>W33</b>     | 201             | 33.68            | 15.745       | 1.150            | 0.715         |
|                | 221             | 33.93            | 15.805       | 1.275            | 0.775         |
|                | 241             | 34.18            | 15.860       | 1.400            | 0.830         |
|                | 263             | 34.53            | 15.805       | 1.570            | 0.870         |
|                | 291             | 34.84            | 15.905       | 1.730            | 0.960         |
|                | 318             | 35.16            | 15.985       | 1.890            | 1.040         |
|                | 354             | 35.55            | 16.100       | 2.090            | 1.160         |
|                | 387             | 35.95            | 16.200       | 2.280            | 1.260         |

# Wide Flange Beams

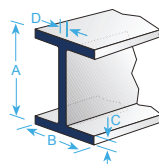
Standard Lengths 20'-70' in 5'0" increments



|                |                 | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
| Section Number | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W36</b>     | 135             | 35.55            | 11.900       | 0.790            | 0.600         |
|                | 150             | 35.85            | 11.975       | 0.940            | 0.625         |
|                | 160             | 36.01            | 12.000       | 1.020            | 0.650         |
|                | 170             | 36.17            | 12.030       | 1.100            | 0.680         |
|                | 182             | 36.33            | 12.075       | 1.180            | 0.725         |
|                | 194             | 36.49            | 12.115       | 1.260            | 0.765         |
|                | 210             | 36.69            | 12.180       | 1.360            | 0.830         |
|                | 232             | 37.12            | 12.120       | 1.570            | 0.960         |
|                | 256             | 37.43            | 12.215       | 1.730            | 0.870         |
| <b>W36</b>     | 231             | 36.49            | 16.470       | 1.260            | 0.760         |
|                | 247             | 36.67            | 16.510       | 1.350            | 0.800         |
|                | 262             | 36.85            | 16.550       | 1.440            | 0.840         |
|                | 282             | 37.11            | 16.595       | 1.570            | 0.885         |
|                | 302             | 37.33            | 16.655       | 1.680            | 0.945         |
|                | 330             | 37.67            | 16.630       | 1.850            | 1.020         |
|                | 361             | 37.99            | 16.730       | 2.010            | 1.120         |
|                | 395             | 38.41            | 16.830       | 2.200            | 1.220         |
|                | 441             | 38.85            | 16.965       | 2.440            | 1.360         |
|                | 487             | 39.33            | 17.086       | 2.681            | 1.500         |
|                | 529             | 39.80            | 17.205       | 2.909            | 1.610         |
|                | 652             | 41.06            | 17.559       | 3.539            | 1.968         |

# Wide Flange Beams

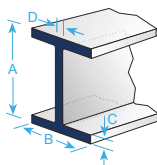
Standard Lengths 20'-70' in 5'0" increments



|                |                 | A                | B            | C                | D             |
|----------------|-----------------|------------------|--------------|------------------|---------------|
| Section Number | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W40</b>     | 149             | 38.20            | 11.810       | 0.830            | 0.630         |
|                | 167             | 38.59            | 11.810       | 1.025            | 0.650         |
|                | 183             | 38.98            | 11.810       | 1.220            | 0.650         |
|                | 211             | 39.37            | 11.811       | 1.413            | 0.752         |
|                | 235             | 39.68            | 11.890       | 1.575            | 0.831         |
|                | 264             | 40.00            | 11.929       | 1.728            | 0.961         |
|                | 278             | 40.16            | 11.968       | 1.811            | 1.024         |
|                | 294             | 40.39            | 12.008       | 1.929            | 1.059         |
|                | 327             | 40.79            | 12.126       | 2.130            | 1.181         |
|                | 331             | 40.79            | 12.165       | 2.126            | 1.220         |
|                | 392             | 41.57            | 12.362       | 2.520            | 1.417         |
| <b>W40</b>     | 199             | 38.67            | 15.750       | 1.065            | 0.650         |
|                | 215             | 38.98            | 15.750       | 1.220            | 0.650         |
|                | 249             | 39.38            | 15.750       | 1.420            | 0.750         |
|                | 277             | 39.69            | 15.830       | 1.575            | 0.830         |
|                | 297             | 39.84            | 15.825       | 1.650            | 0.930         |
|                | 324             | 40.16            | 15.905       | 1.810            | 1.000         |
|                | 362             | 40.55            | 16.020       | 2.010            | 1.120         |
|                | 372             | 40.63            | 16.060       | 2.050            | 1.160         |
|                | 397             | 40.95            | 16.120       | 2.200            | 1.220         |
|                | 431             | 41.26            | 16.220       | 2.363            | 1.339         |
|                | 503             | 42.05            | 16.417       | 2.756            | 1.535         |
|                | 593             | 42.99            | 16.693       | 3.228            | 1.791         |

# Wide Flange Beams

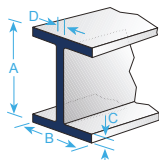
Standard Lengths 20'-70' in 5'0" increments



| Section Number |                 |                  |              |                  |               |
|----------------|-----------------|------------------|--------------|------------------|---------------|
|                |                 | A                | B            | C                | D             |
|                | Weight Per/Foot | Depth of Section | Flange Width | Flange Thickness | Web Thickness |
|                | lb.             | in.              | in.          | in.              | in.           |
| <b>W44</b>     | 230             | 42.91            | 15.750       | 1.220            | 0.710         |
|                | 262             | 43.31            | 15.750       | 1.420            | 0.790         |
|                | 290             | 43.62            | 15.830       | 1.580            | 0.870         |
|                | 335             | 44.02            | 15.950       | 1.770            | 1.020         |

## Standard "H" Pile Beams

Standard Lengths 20'-70' in 5'0" increments



| Section Number | A                      B                      C                      D |                     |                 |                     |                  |
|----------------|------------------------------------------------------------------------|---------------------|-----------------|---------------------|------------------|
|                | Weight<br>Per/Foot                                                     | Depth of<br>Section | Flange<br>Width | Flange<br>Thickness | Web<br>Thickness |
|                | lb.                                                                    | in.                 | in.             | in.                 | in.              |
| <b>HP 8</b>    | 36                                                                     | 8.02                | 8.155           | 0.445               | 0.445            |
| <b>HP 10</b>   | 42                                                                     | 9.7                 | 10.075          | 0.415               | 0.415            |
|                | 57                                                                     | 10.00               | 10.225          | 0.565               | 0.565            |
| <b>HP 12</b>   | 53                                                                     | 11.78               | 12.045          | 0.435               | 0.435            |
|                | 63                                                                     | 11.94               | 12.125          | 0.515               | 0.515            |
|                | 74                                                                     | 12.13               | 12.215          | 0.605               | 0.605            |
|                | 84                                                                     | 12.28               | 12.295          | 0.685               | 0.685            |
|                | 89                                                                     | 12.40               | 12.330          | 0.720               | 0.720            |
| <b>HP 14</b>   | 73                                                                     | 13.61               | 14.585          | 0.505               | 0.505            |
|                | 89                                                                     | 13.83               | 14.695          | 0.615               | 0.615            |
|                | 102                                                                    | 14.01               | 14.785          | 0.705               | 0.705            |
|                | 117                                                                    | 14.21               | 14.885          | 0.805               | 0.805            |
| <b>HP 16</b>   | 88                                                                     | 15.30               | 15.665          | 0.540               | 0.540            |
|                | 101                                                                    | 15.50               | 15.750          | 0.625               | 0.625            |
|                | 121                                                                    | 15.80               | 15.875          | 0.750               | 0.750            |
|                | 141                                                                    | 16.00               | 16.000          | 0.875               | 0.875            |
|                | 162                                                                    | 16.30               | 16.125          | 1.000               | 1.000            |
|                | 183                                                                    | 16.50               | 16.250          | 1.125               | 1.125            |
| <b>HP 18</b>   | 135                                                                    | 17.50               | 17.750          | 0.750               | 0.750            |
|                | 157                                                                    | 17.70               | 17.870          | 0.870               | 0.870            |
|                | 181                                                                    | 18.00               | 18.000          | 1.000               | 1.000            |
|                | 204                                                                    | 18.30               | 18.125          | 1.125               | 1.125            |

# SPECIFICATIONS FOR CARBON STEEL BARS

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## HOT ROLLED

### **MERCHANT BAR QUALITY**

A group of commodity steel shapes that consist of rounds, squares, flats, strips, angles and channels, which fabricators, steel service centers and manufacturers cut, bend and shape into products. Merchant products require more specialized processing than reinforcing bar.

### **M1020**

A low carbon, general purpose, merchant quality steel. Suitable for forming and welding.

### **M1044**

Medium carbon bars that are used where greater strength is required. Due to higher carbon content this grade is easily heat treatable but does not weld easily.

### **ASTM – A588**

This specification covers high strength low alloy bars and is primarily intended for use in bridges and buildings where strength and corrosion resistance is a factor.

### **ASTM – A615**

ASTM A615 rebar is most commonly used in low-stress and less-demanding applications and makes an economical choice in situations where a tremendous level of tensile strength is not necessarily needed. Its strength and performance characteristics are grade-dependent, and A614 rebar is available in a full range of standard sizes and grades 40, 60, 75 and 80.

# SPECIFICATIONS FOR CARBON STEEL BARS

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## COLD FINISHED

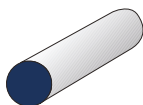
### LOW CARBON

**1018** - A low carbon steel with a medium manganese content. Has good hardening properties, fair machinability and is excellent for cold bending and forming operations. Readily brazed and welded. Suitable for shafting and for applications that do not require the greater strength of high carbon and alloy steels. Conforms to ASTM A-108 and AMS 5069. (Not applicable to bars under 2<sup>15/16"</sup> and sizes lighter than 29.34 lbs per foot.)

### GROUND & POLISHED SHAFTING

Extreme size accuracy, straightness and concentricity to minimize wear in high speed applications. **Turned**, ground & polished bars can be machined unsymmetrically, as in key-seating, with minimum distortion because cold drawing strains are not developed. **Drawn**, ground & polished bars combine the strength advantages of cold drawn stock with extra accuracy and lustrous finish. Conforms to ASTM A-108 and QQ-S-637.

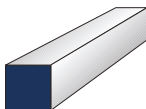
## Hot Rolled Rounds



Standard Length 20'

| Estimated Weight lbs. |          |            | Estimated Weight lbs. |          |            |
|-----------------------|----------|------------|-----------------------|----------|------------|
| Size in Inches        | Per Foot | 20 ft. Bar | Size in Inches        | Per Foot | 20 ft. Bar |
| 1/4                   | 0.167    | 3.34       | 1 1/2                 | 6.013    | 120.26     |
| 5/16                  | 0.261    | 5.22       | 1 5/8                 | 7.05     | 141.00     |
| 3/8                   | 0.376    | 7.52       | 1 3/4                 | 8.18     | 163.60     |
| 7/16                  | 0.511    | 10.22      | 1 7/8                 | 9.39     | 187.80     |
| 1/2                   | 0.668    | 13.36      | 2                     | 10.68    | 213.60     |
| 9/16                  | 0.845    | 16.9       | 2 1/8                 | 12.06    | 241.20     |
| 5/8                   | 1.043    | 20.86      | 2 1/4                 | 13.53    | 270.60     |
| 0.680                 | 1.26     | 25.2       | 2 3/8                 | 15.06    | 301.20     |
| 3/4                   | 1.502    | 30.04      | 2 1/2                 | 16.7     | 334.00     |
| 25/32                 | 1.63     | 32.6       | 2 5/8                 | 18.4     | 368.00     |
| 7/8                   | 2.045    | 40.9       | 2 3/4                 | 20.2     | 404.00     |
| 29/32                 | 2.19     | 43.8       | 2 7/8                 | 22.07    | 441.40     |
| 1                     | 2.67     | 53.4       | 3                     | 24.05    | 481.00     |
| 1 1/8                 | 3.38     | 67.58      | 3 1/2                 | 32.71    | 654.20     |
| 1.145                 | 3.5      | 70         | 4                     | 42.73    | 854.60     |
| 1 1/4                 | 4.17     | 83.46      | 5                     | 66.76    | 1335.20    |
| 1 3/8                 | 5.05     | 101        | 6                     | 96.13    | 1922.60    |

## Hot Rolled Squares

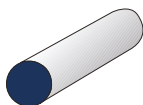


Standard Length 20'

| Estimated Weight lbs. |          |            | Estimated Weight lbs. |          |            |
|-----------------------|----------|------------|-----------------------|----------|------------|
| Size in Inches        | Per Foot | 20 ft. Bar | Size in Inches        | Per Foot | 20 ft. Bar |
| 3/8                   | 0.479    | 9.56       | 1 1/4                 | 5.32     | 106.30     |
| 1/2                   | 0.85     | 17         | 1 3/8                 | 6.44     | 128.60     |
| 5/8                   | 1.33     | 26.56      | 1 1/2                 | 7.66     | 153.00     |
| 3/4                   | 1.91     | 38.26      | 1 3/4                 | 10.42    | 208.20     |
| 7/8                   | 2.61     | 52.06      | 2                     | 13.62    | 272.00     |
| 1                     | 3.4      | 68         | 2 1/4                 | 17.23    | 344.20     |
| 1 1/8                 | 4.31     | 86.06      | 2 1/2                 | 21.28    | 425.00     |

\*Hot dipped galvanized sizes available from stock

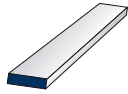
# Cold Finished Round Bar



| Size<br>(Inches) | Weight Per<br>Linear Ft. | Weight Per<br>20 ft. Piece |
|------------------|--------------------------|----------------------------|
| 3/16             | 0.094                    | 1.88                       |
| 1/4              | 0.167                    | 3.34                       |
| 5/16             | 0.261                    | 5.22                       |
| 3/8              | 0.376                    | 7.52                       |
| 7/16             | 0.511                    | 10.22                      |
| 1/2              | 0.668                    | 13.36                      |
| 9/16             | 0.845                    | 16.90                      |
| 5/8              | 1.043                    | 20.86                      |
| 11/16            | 1.262                    | 25.24                      |
| 3/4              | 1.500                    | 30.00                      |
| 13/16            | 1.763                    | 35.26                      |
| 7/8              | 2.044                    | 40.88                      |
| 15/16            | 2.347                    | 46.94                      |
| 1                | 2.670                    | 53.40                      |
| 1 1/16           | 3.015                    | 60.30                      |
| 1 1/8            | 3.380                    | 67.60                      |
| 1 3/16           | 3.766                    | 75.32                      |
| 1 1/4            | 4.172                    | 83.44                      |
| 1 5/16           | 4.600                    | 92.00                      |
| 1 3/8            | 5.049                    | 100.98                     |
| 1 7/16           | 5.518                    | 110.36                     |
| 1 1/2            | 6.008                    | 120.16                     |
| 1 9/16           | 6.519                    | 130.38                     |
| 1 5/8            | 7.051                    | 141.02                     |
| 1 11/16          | 7.604                    | 152.08                     |
| 1 3/4            | 8.178                    | 163.56                     |
| 1 13/16          | 8.773                    | 175.46                     |
| 1 7/8            | 9.388                    | 187.76                     |
| 1 15/16          | 10.024                   | 200.48                     |
| 2                | 10.681                   | 213.62                     |
| 2 1/8            | 12.058                   | 241.16                     |
| 2 3/16           | 12.778                   | 255.56                     |
| 2 1/4            | 13.519                   | 270.38                     |
| 2 5/16           | 14.280                   | 285.60                     |
| 2 3/8            | 15.060                   | 301.20                     |
| 2 7/16           | 15.870                   | 317.40                     |
| 2 1/2            | 16.690                   | 333.80                     |
| 2 5/8            | 18.400                   | 368.00                     |
| 2 11/16          | 19.290                   | 385.80                     |
| 2 3/4            | 20.190                   | 403.80                     |
| 2 7/8            | 22.070                   | 441.40                     |
| 2 15/16          | 23.042                   | 460.84                     |

# Hot Rolled Strip

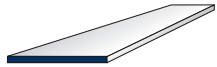
Standard Length 20'



| Estimated Weight lbs. |       |          |           | Estimated Weight lbs. |       |          |            |
|-----------------------|-------|----------|-----------|-----------------------|-------|----------|------------|
| Size in Inches        |       | Per Foot | 20 Ft Bar | Size in Inches        |       | Per Foot | 20 Ft. Bar |
| 1/8 x                 | 1/2   | 0.213    | 4.26      | 3/16 x                | 2 3/4 | 1.75     | 35.00      |
|                       | 5/8   | 0.266    | 5.32      |                       | 3     | 1.92     | 38.40      |
|                       | 3/4   | 0.319    | 6.38      |                       | 4     | 2.55     | 51.00      |
|                       | 1     | 0.425    | 8.50      |                       | 5     | 3.19     | 63.80      |
|                       | 1 1/8 | 0.478    | 9.56      |                       | 6     | 3.83     | 76.60      |
|                       | 1 1/4 | 0.531    | 10.62     |                       | 7     | 4.47     | 89.40      |
|                       | 1 1/2 | 0.638    | 12.76     |                       | 8     | 5.1      | 102.00     |
|                       | 1 3/4 | 0.744    | 14.88     |                       | 10    | 6.38     | 127.60     |
|                       | 2     | 0.850    | 17.00     |                       | 12    | 7.66     | 153.20     |
|                       | 2 1/2 | 1.060    | 21.20     |                       |       |          |            |
|                       | 3     | 1.280    | 25.60     | 1/4 x                 | 1/2   | 0.43     | 8.60       |
|                       | 4     | 1.700    | 34.00     |                       | 5/8   | 0.531    | 10.62      |
|                       | 5     | 2.130    | 42.60     |                       | 3/4   | 0.638    | 12.76      |
|                       | 6     | 2.550    | 51.00     |                       | 1     | 0.85     | 17.00      |
|                       | 7     | 2.980    | 59.60     |                       | 1 1/8 | 0.956    | 19.12      |
|                       | 8     | 3.400    | 68.00     |                       | 1 1/4 | 1.063    | 21.26      |
|                       | 10    | 4.250    | 85.00     |                       | 1 1/2 | 1.28     | 25.60      |
|                       | 12    | 5.100    | 102.00    |                       | 1 3/4 | 1.488    | 29.76      |
|                       |       |          |           |                       | 2     | 1.7      | 34.00      |
|                       |       |          |           |                       | 2 1/2 | 2.13     | 42.60      |
| 3/16 x                | 1/2   | 0.319    | 6.38      |                       | 2 3/4 | 2.34     | 46.80      |
|                       | 5/8   | 0.398    | 7.96      |                       | 3     | 2.55     | 51.00      |
|                       | 3/4   | 0.478    | 9.56      |                       | 4     | 3.4      | 68.00      |
|                       | 1     | 0.638    | 12.76     |                       | 5     | 4.25     | 85.00      |
|                       | 1 1/8 | 0.717    | 14.34     |                       | 6     | 5.1      | 102.00     |
|                       | 1 1/4 | 0.797    | 15.94     |                       | 7     | 5.95     | 119.00     |
|                       | 1 1/2 | 0.956    | 19.12     |                       | 8     | 6.8      | 136.00     |
|                       | 1 3/4 | 1.12     | 22.40     |                       | 10    | 8.5      | 170.00     |
|                       | 2     | 1.28     | 25.60     |                       | 12    | 10.2     | 204.00     |
|                       | 2 1/2 | 1.60     | 32.00     |                       |       |          |            |

# Hot Rolled Flat Bar

Standard Length 20'



| Estimated Weight lbs. |       |          |            | Estimated Weight lbs. |       |          |            |
|-----------------------|-------|----------|------------|-----------------------|-------|----------|------------|
| Size in Inches        |       | Per Foot | 20 Ft. Bar | Size in Inches        |       | Per Foot | 20 Ft. Bar |
| 1/4 x                 | 3/8   | 0.319    | 6.38       | 5/16 x                | 2 3/4 | 2.922    | 58.44      |
|                       | 1/2   | 0.430    | 8.60       |                       | 3     | 3.190    | 63.76      |
|                       | 5/8   | 0.531    | 10.62      |                       | 3 1/2 | 3.720    | 74.38      |
|                       | 3/4   | 0.638    | 12.76      |                       | 4     | 4.250    | 85.00      |
|                       | 7/8   | 0.744    | 14.88      |                       | 4 1/2 | 4.780    | 95.62      |
|                       | 1     | 0.850    | 17.00      |                       | 5     | 5.310    | 106.26     |
|                       | 1 1/8 | 0.956    | 19.12      |                       | 5 1/2 | 5.840    | 116.80     |
|                       | 1 1/4 | 1.063    | 21.26      |                       | 6     | 6.380    | 127.50     |
|                       | 1 3/8 | 1.170    | 23.40      |                       | 7     | 7.440    | 148.80     |
|                       | 1 1/2 | 1.280    | 25.50      |                       | 8     | 8.500    | 170.00     |
|                       | 1 5/8 | 1.381    | 27.62      |                       | 9     | 9.600    | 191.40     |
|                       | 1 3/4 | 1.488    | 29.76      |                       | 10    | 10.600   | 212.60     |
|                       | 2     | 1.700    | 34.00      |                       | 11    | 11.700   | 234.00     |
|                       | 2 1/4 | 1.913    | 38.26      |                       | 12    | 12.700   | 255.20     |
|                       | 2 1/2 | 2.130    | 42.50      | 3/8 x                 | 1/2   | 0.638    | 12.76      |
|                       | 2 3/4 | 2.340    | 46.76      |                       | 5/8   | 0.797    | 15.94      |
|                       | 3     | 2.550    | 51.00      |                       | 3/4   | 0.956    | 19.12      |
|                       | 3 1/4 | 2.763    | 55.26      |                       | 7/8   | 1.116    | 22.32      |
|                       | 3 1/2 | 2.980    | 59.50      |                       | 1     | 1.276    | 25.52      |
|                       | 3 3/4 | 3.188    | 63.76      |                       | 1 1/8 | 1.434    | 28.68      |
|                       | 4     | 3.400    | 68.00      |                       | 1 1/4 | 1.595    | 31.90      |
|                       | 4 1/2 | 3.830    | 76.50      |                       | 1 3/8 | 1.753    | 35.06      |
|                       | 5     | 4.250    | 85.00      |                       | 1 1/2 | 1.914    | 38.28      |
|                       | 5 1/2 | 4.680    | 93.50      |                       | 1 5/8 | 2.072    | 41.44      |
|                       | 6     | 5.100    | 102.00     |                       | 1 3/4 | 2.231    | 44.62      |
|                       | 7     | 5.950    | 119.00     |                       | 2     | 2.550    | 51.00      |
|                       | 8     | 6.800    | 136.00     |                       | 2 1/4 | 2.870    | 57.38      |
|                       | 9     | 7.660    | 153.20     |                       | 2 1/2 | 3.190    | 63.80      |
|                       | 10    | 8.500    | 170.20     |                       | 2 3/4 | 3.510    | 70.12      |
|                       | 11    | 9.360    | 187.20     |                       | 3     | 3.830    | 76.60      |
|                       | 12    | 10.200   | 204.20     |                       | 3 1/4 | 4.144    | 82.88      |
| 5/16 x                | 1/2   | 0.531    | 10.62      |                       | 3 1/2 | 4.460    | 89.26      |
|                       | 5/8   | 0.664    | 13.28      |                       | 4     | 5.100    | 102.00     |
|                       | 3/4   | 0.797    | 15.94      |                       | 4 1/2 | 5.742    | 114.84     |
|                       | 7/8   | 0.930    | 18.60      |                       | 5     | 6.380    | 127.60     |
|                       | 1     | 1.060    | 21.26      |                       | 5 1/2 | 7.013    | 140.26     |
|                       | 1 1/8 | 1.195    | 23.90      |                       | 6     | 7.650    | 153.00     |
|                       | 1 1/4 | 1.330    | 26.56      |                       | 7     | 8.930    | 178.60     |
|                       | 1 3/8 | 1.461    | 29.22      |                       | 8     | 10.200   | 204.00     |
|                       | 1 1/2 | 1.590    | 31.88      |                       | 9     | 11.484   | 229.68     |
|                       | 1 3/4 | 1.860    | 37.18      |                       | 10    | 12.760   | 255.20     |
|                       | 2     | 2.130    | 42.50      |                       | 11    | 14.040   | 280.80     |
|                       | 2 1/4 | 2.390    | 47.82      |                       | 12    | 15.310   | 306.20     |
|                       | 2 1/2 | 2.660    | 53.20      |                       |       |          |            |

# Hot Rolled Flat Bar

Standard Length 20'



| Estimated Weight lbs. |       |          |            | Estimated Weight lbs. |       |          |            |
|-----------------------|-------|----------|------------|-----------------------|-------|----------|------------|
| Size in Inches        |       | Per Foot | 20 Ft. Bar | Size in Inches        |       | Per Foot | 20 Ft. Bar |
| 1/2 x                 | 5/8   | 1.063    | 21.26      | 5/8 x                 | 9     | 19.100   | 383.00     |
|                       | 3/4   | 1.275    | 25.50      |                       | 10    | 21.270   | 425.40     |
|                       | 7/8   | 1.488    | 29.76      |                       | 11    | 23.400   | 468.00     |
|                       | 1     | 1.700    | 34.00      |                       | 12    | 25.520   | 510.40     |
| 1                     | 1/8   | 1.913    | 38.26      | 3/4 x                 | 7/8   | 2.231    | 44.62      |
| 1                     | 1/4   | 2.130    | 42.50      |                       | 1     | 2.550    | 51.00      |
| 1                     | 3/8   | 2.338    | 46.76      |                       | 1 1/8 | 2.870    | 57.38      |
| 1                     | 1/2   | 2.550    | 51.00      |                       | 1 1/4 | 3.190    | 63.76      |
| 1                     | 3/4   | 2.975    | 59.50      |                       | 1 1/2 | 3.830    | 76.60      |
| 2                     |       | 3.400    | 68.00      |                       | 1 3/4 | 4.463    | 89.26      |
| 2                     | 1/4   | 3.825    | 76.50      |                       | 2     | 5.100    | 102.00     |
| 2                     | 1/2   | 4.250    | 85.00      |                       | 2 1/4 | 5.740    | 114.80     |
| 2                     | 3/4   | 4.675    | 93.50      |                       | 2 1/2 | 6.380    | 127.50     |
| 3                     |       | 5.100    | 102.00     |                       | 2 3/4 | 7.013    | 140.26     |
| 3                     | 1/4   | 5.530    | 110.60     |                       | 3     | 7.650    | 153.00     |
| 3                     | 1/2   | 5.955    | 119.10     |                       | 3 1/4 | 8.288    | 165.76     |
| 4                     |       | 6.800    | 136.00     |                       | 3 1/2 | 8.932    | 178.64     |
| 4                     | 1/2   | 7.660    | 153.20     |                       | 4     | 10.200   | 204.00     |
| 5                     |       | 8.500    | 170.00     |                       | 4 1/2 | 11.480   | 229.50     |
| 5                     | 1/2   | 9.350    | 187.00     |                       | 5     | 12.750   | 255.00     |
| 6                     |       | 10.200   | 204.00     |                       | 5 1/2 | 14.030   | 280.50     |
| 7                     |       | 11.910   | 238.20     |                       | 6     | 15.300   | 306.00     |
| 8                     |       | 13.610   | 272.20     |                       | 7     | 17.870   | 357.40     |
| 9                     |       | 15.320   | 306.40     |                       | 8     | 20.420   | 408.40     |
| 10                    |       | 17.000   | 340.40     |                       | 9     | 22.970   | 459.40     |
| 11                    |       | 18.720   | 374.40     |                       | 10    | 25.520   | 510.40     |
| 12                    |       | 20.420   | 408.40     |                       | 11    | 28.080   | 561.60     |
| 5/8 x                 | 3/4   | 1.594    | 31.88      |                       | 12    | 30.630   | 612.60     |
|                       | 7/8   | 1.859    | 37.18      | 7/8 x                 | 1     | 2.980    | 59.50      |
| 1                     | 2.125 | 42.50    | 1 1/4      |                       | 3.720 | 74.50    |            |
| 1                     | 1/8   | 2.390    | 47.82      |                       | 1 1/2 | 4.470    | 89.26      |
| 1                     | 1/4   | 2.660    | 53.12      |                       | 1 3/4 | 5.210    | 104.12     |
| 1                     | 1/2   | 3.190    | 63.76      |                       | 2     | 5.950    | 119.00     |
| 1                     | 3/4   | 3.719    | 74.38      |                       | 2 1/4 | 6.700    | 133.88     |
| 2                     |       | 4.250    | 85.00      |                       | 2 1/2 | 7.450    | 148.76     |
| 2                     | 1/4   | 4.780    | 95.62      |                       | 2 3/4 | 8.190    | 163.62     |
| 2                     | 1/2   | 5.317    | 106.34     |                       | 3     | 8.925    | 178.50     |
| 2                     | 3/4   | 5.844    | 116.88     |                       | 3 1/2 | 10.420   | 208.26     |
| 3                     |       | 6.380    | 127.50     |                       | 4     | 11.900   | 238.00     |
| 3                     | 1/4   | 6.906    | 138.12     |                       | 4 1/2 | 13.390   | 267.76     |
| 3                     | 1/2   | 7.438    | 148.76     |                       | 5     | 14.880   | 297.50     |
| 4                     |       | 8.500    | 170.00     |                       | 6     | 17.850   | 357.00     |
| 4                     | 1/2   | 9.560    | 191.26     |                       | 7     | 20.830   | 416.50     |
| 5                     |       | 10.630   | 212.60     |                       | 8     | 23.800   | 476.00     |
| 5                     | 1/2   | 11.690   | 233.80     |                       | 9     | 26.800   | 536.00     |
| 6                     |       | 12.750   | 255.00     |                       | 10    | 29.790   | 595.66     |
| 7                     |       | 14.900   | 298.00     |                       | 11    | 32.800   | 655.22     |
| 8                     |       | 17.010   | 340.20     |                       | 12    | 35.740   | 714.80     |

# Hot Rolled Flat Bar

Standard Length 20'



| Estimated Weight lbs. |         |          |            | Estimated Weight lbs. |        |          |            |
|-----------------------|---------|----------|------------|-----------------------|--------|----------|------------|
| Size in Inches        |         | Per Foot | 20 Ft. Bar | Size in Inches        |        | Per Foot | 20 Ft. Bar |
| 1 x                   | 1 1/4   | 4.250    | 85.00      | 1 1/4 x               | 9      | 38.250   | 765.00     |
|                       | 1 1/2   | 5.100    | 102.00     |                       | 10     | 42.540   | 850.80     |
|                       | 1 3/4   | 5.950    | 119.00     |                       | 11     | 46.794   | 935.88     |
|                       | 2       | 6.800    | 136.00     |                       | 12     | 51.050   | 1021.00    |
|                       | 2 1/4   | 7.650    | 153.00     | 1 1/2 x               | 2      | 10.200   | 204.00     |
|                       | 2 1/2   | 8.500    | 170.00     |                       | 2 1/2  | 12.750   | 255.00     |
|                       | 2 3/4   | 9.350    | 187.00     |                       | 3      | 15.314   | 306.28     |
|                       | 3       | 10.200   | 204.00     |                       | 3 1/2  | 17.850   | 357.00     |
|                       | 3 1/4   | 11.900   | 238.00     |                       | 4      | 20.400   | 408.00     |
|                       | 4       | 13.600   | 272.00     |                       | 4 1/2  | 22.950   | 459.00     |
|                       | 4 1/2   | 15.310   | 306.20     |                       | 5      | 25.500   | 510.00     |
|                       | 5       | 17.000   | 340.00     |                       | 6      | 30.628   | 612.56     |
|                       | 5 1/2   | 18.700   | 374.00     |                       | 7      | 35.700   | 714.00     |
|                       | 6       | 20.420   | 408.40     |                       | 8      | 40.830   | 816.60     |
|                       | 7       | 23.800   | 476.00     |                       | 9      | 45.950   | 919.00     |
|                       | 8       | 27.200   | 544.00     |                       | 10     | 51.000   | 1021.16    |
|                       | 9       | 30.630   | 612.60     |                       | 11     | 56.152   | 1123.04    |
|                       | 10      | 34.020   | 680.40     |                       | 12     | 61.258   | 1225.16    |
|                       | 11      | 37.440   | 748.80     | 1 3/4 x               | 2      | 11.900   | 238.00     |
|                       | 12      | 40.830   | 816.60     |                       | 2 1/2  | 14.875   | 297.50     |
| 1 1/8 x               | 2       | 7.650    | 153.00     |                       | 3      | 17.850   | 357.00     |
|                       | 3       | 11.475   | 229.50     |                       | 3 1/2  | 20.825   | 416.50     |
|                       | 4       | 15.300   | 306.00     |                       | 4      | 23.822   | 476.44     |
|                       | 5       | 19.100   | 382.50     |                       | 4 1/2  | 26.775   | 535.50     |
|                       | 6       | 22.950   | 459.00     |                       | 5      | 29.800   | 595.00     |
|                       | 7       | 26.780   | 535.50     |                       | 6      | 35.700   | 714.00     |
|                       | 8       | 30.630   | 612.60     |                       | 7      | 41.700   | 833.00     |
|                       | 9       | 34.450   | 689.24     |                       | 8      | 47.600   | 952.00     |
|                       | 10      | 38.300   | 765.82     | 9                     | 53.600 | 1072.04  |            |
|                       | 11      | 42.110   | 842.40     | 10                    | 59.556 | 1191.12  |            |
|                       | 12      | 45.900   | 919.00     | 11                    | 65.500 | 1310.28  |            |
|                       | 1 1/4 x | 1 1/2    | 6.375      | 127.50                | 12     | 71.500   | 1429.40    |
| 1 3/4                 |         | 7.440    | 148.80     | 2 x                   | 2 1/2  | 17.000   | 340.00     |
| 2                     |         | 8.500    | 170.00     |                       | 3      | 20.420   | 408.40     |
| 2 1/4                 |         | 9.563    | 191.26     |                       | 3 1/2  | 23.800   | 476.00     |
| 2 1/2                 |         | 10.630   | 212.60     |                       | 4      | 27.225   | 544.50     |
| 2 3/4                 |         | 11.688   | 233.76     |                       | 4 1/2  | 30.600   | 612.00     |
| 3                     |         | 12.750   | 255.00     |                       | 5      | 34.000   | 680.00     |
| 3 1/2                 |         | 14.880   | 297.60     |                       | 6      | 40.830   | 816.60     |
| 4                     |         | 17.000   | 340.00     |                       | 7      | 47.600   | 952.00     |
| 4 1/2                 |         | 19.125   | 382.50     |                       | 8      | 54.450   | 1089.00    |
| 5                     |         | 21.250   | 425.00     |                       | 9      | 61.200   | 1225.20    |
| 5 1/2                 |         | 23.375   | 467.50     |                       | 10     | 68.100   | 1361.32    |
| 6                     |         | 25.500   | 510.00     |                       | 11     | 74.900   | 1497.46    |
| 7                     |         | 29.750   | 595.00     |                       | 12     | 81.700   | 1633.60    |
| 8                     |         | 34.000   | 680.00     |                       |        |          |            |

# Hot Rolled Flat Bar

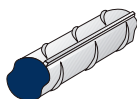
Standard Length 20'



| Estimated Weight lbs. |       |          |            | Estimated Weight lbs. |       |          |            |
|-----------------------|-------|----------|------------|-----------------------|-------|----------|------------|
| Size in Inches        |       | Per Foot | 20 Ft. Bar | Size in Inches        |       | Per Foot | 20 Ft. Bar |
| 2 1/2 x               | 3     | 25.500   | 510.00     | 3 x                   | 4     | 40.800   | 816.00     |
|                       | 3 1/2 | 29.750   | 595.00     |                       | 4 1/2 | 45.900   | 918.00     |
|                       | 4     | 34.032   | 680.64     |                       | 5     | 51.000   | 1020.00    |
|                       | 4 1/2 | 38.250   | 765.00     |                       | 6     | 61.200   | 1224.00    |
|                       | 5     | 42.500   | 850.00     |                       | 7     | 71.500   | 1428.00    |
|                       | 6     | 51.000   | 1020.00    |                       | 8     | 81.700   | 1632.00    |
|                       | 7     | 59.500   | 1190.00    |                       | 9     | 91.900   | 1837.80    |
|                       | 8     | 68.100   | 1360.00    |                       | 10    | 102.100  | 2042.00    |
|                       | 9     | 76.560   | 1531.50    |                       | 11    | 112.300  | 2246.20    |
|                       | 10    | 85.010   | 1701.66    |                       | 12    | 122.500  | 2450.40    |
|                       | 11    | 93.600   | 1871.82    |                       |       |          |            |
|                       | 12    | 102.100  | 2042.00    |                       |       |          |            |

# Reinforcing Bars

Standard Length 20'



| Bar Sizes |           | Weight          | Nominal Dimensions in Inches |                |
|-----------|-----------|-----------------|------------------------------|----------------|
| No.       | Inches    | Pounds Per Foot | Diameter Inches              | Area Sq Inches |
| #3        | 3/8 Rd.   | 0.376           | 0.375                        | 0.11           |
| #4        | 1/2 Rd.   | 0.668           | 0.500                        | 0.20           |
| #5        | 5/8 Rd.   | 1.043           | 0.625                        | 0.31           |
| #6        | 3/4 Rd.   | 1.502           | 0.750                        | 0.44           |
| #7        | 7/8 Rd.   | 2.044           | 0.785                        | 0.60           |
| #8        | 1 Rd.     | 2.670           | 1.000                        | 0.79           |
| #9        | 1 1/8 Rd. | 3.400           | 1.125                        | 1.00           |
| #10       | 1 1/4 Rd. | 4.303           | 1.250                        | 1.27           |
| #11       | 1 3/8 Rd. | 5.313           | 1.375                        | 1.56           |
| #14       | 1 5/8 Rd. | 7.650           | 1.693                        | 2.25           |
| #18       | 2 1/4 Rd. | 13.600          | 2.257                        | 4.00           |

The bar numbers are based on the number of 1/8 inches included in the nominal diameter of the bar.

A615 - Grade 40 & 60

# SPECIFICATIONS FOR STRUCTURAL STEEL SHAPES

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## **ASTM – A36 - Standard Specification for Carbon Structural Steel.**

This specification covers shapes of structural quality for use in riveted, bolted, or welded construction of bridges and buildings, and for general structural purposes.

## **ASTM – A572 - Standard Specification for High-Strength Low-Alloy Structural Steel.**

This specification covers five grades of high-strength low-alloy shapes intended for riveted, bolted, or welded construction of bridges, or for other construction applications.

## **ASTM – A588 - Standard Specification for High-Strength Low-Alloy Structural Steel.**

This specification covers shapes for welded, riveted, or bolted construction but intended primarily for use in welded bridges and buildings where savings in weight or added durability is important. The atmospheric corrosion resistance of this steel in most environments is substantially better than that of carbon steels with or without copper addition.

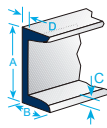
## **ASTM – A709 - Standard Specification for Carbon and High Strength Low-Alloy Shapes.**

This specification covers shapes, and bars intended for use in bridges. Seven grades are available in four yield strengths.

## **ASTM – A992 - Standard Specification for Steel for Structural Shapes For Use in Building Framing.**

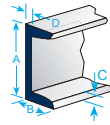
This specification covers rolled shapes for use in building framing or bridges, or for general structural purposes.

# Standard Channels

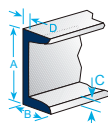


| A B C D        |         |                  |        |           |           |
|----------------|---------|------------------|--------|-----------|-----------|
| Section Number | Weigth  | Depth of Section | Flange |           | Web       |
|                | Per Ft. |                  | Width  | Thickness | Thickness |
|                | Pound   | Inch             | Inch   | Inch      | Inch      |
| 3              | 3.5     | 3                | 1.376  | 0.273     | 0.125     |
|                | 4.1     | 3                | 1.410  | 0.273     | 0.170     |
|                | 5       | 3                | 1.498  | 0.273     | 0.258     |
|                | 6       | 3                | 1.596  | 0.273     | 0.356     |
| 4              | 4.5     | 4                | 1.585  | 0.149     | 0.163     |
|                | 5.4     | 4                | 1.580  | 0.296     | 0.184     |
|                | 7.25    | 4                | 1.721  | 0.296     | 0.321     |
| 5              | 6.7     | 5                | 1.750  | 0.320     | 0.190     |
|                | 9       | 5                | 1.885  | 0.320     | 0.325     |
| 6              | 8.2     | 6                | 1.920  | 0.343     | 0.200     |
|                | 10.5    | 6                | 2.034  | 0.343     | 0.314     |
|                | 13      | 6                | 2.157  | 0.343     | 0.437     |
| 7              | 9.8     | 7                | 2.090  | 0.366     | 0.210     |
|                | 12.25   | 7                | 2.194  | 0.366     | 0.303     |
|                | 14.75   | 7                | 2.299  | 0.366     | 0.487     |
| 8              | 11.5    | 8                | 2.260  | 0.390     | 0.220     |
|                | 13.75   | 8                | 2.343  | 0.390     | 0.303     |
|                | 18.75   | 8                | 2.527  | 0.390     | 0.487     |
| 9              | 13.4    | 9                | 2.433  | 0.413     | 0.233     |
|                | 15      | 9                | 2.485  | 0.413     | 0.285     |
|                | 20      | 9                | 2.648  | 0.413     | 0.448     |
| 10             | 15.3    | 10               | 2.600  | 0.436     | 0.240     |
|                | 20      | 10               | 2.739  | 0.436     | 0.379     |
|                | 25      | 10               | 2.886  | 0.436     | 0.523     |
|                | 30      | 10               | 3.033  | 0.436     | 0.673     |
| 12             | 20.7    | 12               | 2.942  | 0.501     | 0.282     |
|                | 25      | 12               | 3.047  | 0.501     | 0.387     |
|                | 30      | 12               | 3.170  | 0.501     | 0.510     |
| 15             | 33.9    | 15               | 3.400  | 0.650     | 0.400     |
|                | 40      | 15               | 3.520  | 0.650     | 0.520     |
|                | 50      | 15               | 3.716  | 0.650     | 0.716     |

# MC Channels



|                | A              |                  | B      |           | C             | D |
|----------------|----------------|------------------|--------|-----------|---------------|---|
| Section Number | Weight Per Ft. | Depth of Section | Flange |           | Web Thickness |   |
|                |                |                  | Width  | Thickness |               |   |
|                | Pound          | Inch             | Inch   | Inch      | Inch          |   |
| 3              | 7.1            | 2.93             | 1.940  | 0.351     | 0.312         |   |
| 4              | 13.8           | 4                | 2.500  | 0.500     | 0.500         |   |
| 6              | 12             | 6                | 2.497  | 0.375     | 0.310         |   |
|                | 15.1           | 6                | 2.941  | 0.475     | 0.316         |   |
|                | 15.3           | 6                | 3.500  | 0.475     | 0.375         |   |
|                | 16.3           | 6                | 3.000  | 0.475     | 0.379         |   |
|                | 18             | 6                | 3.504  | 0.475     | 0.379         |   |
| 7              | 19.1           | 7                | 3.452  | 0.500     | 0.352         |   |
|                | 22.7           | 7                | 3.603  | 0.500     | 0.503         |   |
| 8              | 8.5            | 8                | 1.874  | 0.311     | 0.179         |   |
|                | 18.7           | 8                | 2.978  | 0.500     | 0.353         |   |
|                | 20             | 8                | 3.025  | 0.500     | 0.400         |   |
|                | 21.4           | 8                | 3.450  | 0.525     | 0.375         |   |
|                | 22.8           | 8                | 3.502  | 0.525     | 0.427         |   |
| 9              | 23.9           | 9                | 3.450  | 0.550     | 0.400         |   |
|                | 25.4           | 9                | 3.500  | 0.550     | 0.450         |   |
| 10             | 6.5            | 10               | 1.170  | 0.202     | 0.152         |   |
|                | 8.4            | 10               | 1.500  | 0.280     | 0.170         |   |
|                | 22             | 10               | 3.315  | 0.575     | 0.290         |   |
|                | 25             | 10               | 3.405  | 0.575     | 0.380         |   |
|                | 28.5           | 10               | 3.950  | 0.575     | 0.425         |   |
|                | 33.6           | 10               | 4.100  | 0.575     | 0.575         |   |
|                | 41.1           | 10               | 4.321  | 0.575     | 0.796         |   |
| 12             | 10.6           | 12               | 1.500  | 0.309     | 0.190         |   |
|                | 14.3           | 12               | 2.125  | 0.313     | 0.250         |   |
|                | 31             | 12               | 3.670  | 0.700     | 0.370         |   |
|                | 35             | 12               | 3.767  | 0.700     | 0.465         |   |
|                | 40             | 12               | 3.890  | 0.700     | 0.590         |   |
|                | 45             | 12               | 4.012  | 0.700     | 0.712         |   |
|                | 50             | 12               | 4.135  | 0.700     | 0.835         |   |
| 13             | 31.8           | 13               | 4.000  | 0.610     | 0.375         |   |
|                | 35             | 13               | 4.072  | 0.610     | 0.447         |   |
|                | 40             | 13               | 4.185  | 0.610     | 0.560         |   |
|                | 50             | 13               | 4.412  | 0.610     | 0.787         |   |
| 18             | 42.7           | 18               | 3.950  | 0.625     | 0.450         |   |
|                | 45.8           | 18               | 4.000  | 0.625     | 0.500         |   |
|                | 51.9           | 18               | 4.125  | 0.625     | 0.600         |   |
|                | 58             | 18               | 4.200  | 0.625     | 0.700         |   |



## Bar Channels

| A                      B                      C |              |               |                |                |
|-------------------------------------------------|--------------|---------------|----------------|----------------|
| Size in Inches                                  |              |               | Estimated lbs. |                |
| Section Depth                                   | Flange Width | Web Thickness | Per Ft.        | Per 20' Length |
| 1/2                                             | 1/4          | 1/8           | 0.28           | 5.60           |
| 3/4                                             | 5/16         | 1/8           | 0.50           | 10.00          |
| 3/4                                             | 3/8          | 1/8           | 0.56           | 11.20          |
| 7/8                                             | 3/8          | 1/8           | 0.65           | 13.00          |
| 7/8                                             | 7/16         | 1/8           | 0.69           | 13.80          |
| 1                                               | 3/8          | 1/8           | 0.68           | 13.60          |
| 1                                               | 1/2          | 1/8           | 0.84           | 16.80          |
| 1 1/8                                           | 9/16         | 1/8           | 1.16           | 23.20          |
| 1 1/4                                           | 1/2          | 1/8           | 1.01           | 20.20          |
| 1 1/2                                           | 1/2          | 1/8           | 1.12           | 22.40          |
| 1 1/2                                           | 3/4          | 1/8           | 1.17           | 23.40          |
| 2                                               | 1/2          | 1/8           | 1.43           | 28.60          |
| 2                                               | 1            | 1/8           | 1.78           | 35.60          |
| 1 1/2                                           | 9/16         | 3/16          | 1.44           | 28.80          |
| 1 3/4                                           | 1/2          | 3/16          | 1.55           | 31.00          |
| 2                                               | 9/16         | 3/16          | 1.86           | 37.20          |
| 2                                               | 1            | 3/16          | 2.32           | 46.40          |
| 2 1/2                                           | 5/8          | 3/16          | 2.27           | 45.40          |
| 2                                               | 5/8          | 1/4           | 2.28           | 45.60          |

# Expanded Metal



## Standard Expanded Metal

| Style Designation |        | Weight Per 100 Sq. Ft. | Diamond Size Inches |        | Overall Thickness Inches | Standard Sheet Size |          |
|-------------------|--------|------------------------|---------------------|--------|--------------------------|---------------------|----------|
|                   |        |                        |                     |        |                          | Width               | Length   |
| 1/4"              | No. 18 | 117                    | 0.26                | x 1    | 0.125                    | 4'                  | 8'       |
| 1/2"              | No. 20 | 43                     | 0.5                 | x 1.12 | 0.134                    | 4'                  | 8' & 10' |
| 1/2"              | No. 18 | 70                     | 0.5                 | x 1.2  | 0.161                    | 4' & 6'             | 8' & 10' |
| 1/2"              | No. 16 | 87                     | 0.5                 | x 1.2  | 0.159                    | 4' & 6'             | 8' & 10' |
| 1/2"              | No. 13 | 146                    | 0.5                 | x 1.2  | 0.199                    | 4' & 6' 6"          | 8'       |
| 3/4"              | No. 16 | 54                     | 0.923               | x 2    | 0.183                    | 4' & 6' 6"          | 8' & 10' |
| 3/4"              | No. 13 | 80                     | 0.88                | x 2    | 0.185                    | 4' & 6'             | 8' & 10' |
| 3/4"              | No. 10 | 119                    | 0.889               | x 2    | 0.277                    | 4'                  | 8'       |
| 3/4"              | No. 9  | 180                    | 0.857               | x 2    | 0.29                     | 4' & 6'             | 8' & 10' |
| 1"                | No. 16 | 47                     | 1.01                | x 2.4  | 0.196                    | 4'                  | 8'       |
| 1 1/2"            | No. 16 | 40                     | 1.35                | x 3    | 0.21                     | 4'                  | 8'       |
| 1 1/2"            | No. 13 | 60                     | 1.35                | x 3    | 0.213                    | 4' & 6'             | 8' & 10' |
| 1 1/2"            | No. 10 | 79                     | 1.33                | x 3    | 0.248                    | 4' & 6'             | 8' & 10' |
| 1 1/2"            | No. 9  | 119                    | 1.33                | x 3    | 0.289                    | 4' & 6'             | 8' & 10' |
| 1 1/2"            | No. 6  | 250                    | 1.33                | x 3    | 0.385                    | 6'                  | 12'      |

## Flattened Expanded Metal

| Style Designation |             | Weight Per 100 Sq. Ft. | Diamond Size Inches |        | Overall Thickness Inches | Standard Sheet Size |          |
|-------------------|-------------|------------------------|---------------------|--------|--------------------------|---------------------|----------|
|                   |             |                        |                     |        |                          | Width               | Length   |
| 1/4"              | No.20-22    | 87                     | 0.26                | x 1.03 | 0.031                    | 4'                  | 8'       |
| 1/4"              | No.18-20    | 113                    | 0.26                | x 1.03 | 0.042                    | 4'                  | 8'       |
| 1/2"              | No.20-22    | 41                     | 0.500               | x 1.25 | 0.032                    | 3' & 4'             | 8'       |
| 1/2"              | No.18-20    | 66                     | 0.500               | x 1.26 | 0.038                    | 3' & 4'             | 8' & 10' |
| 1/2"              | No.16-18    | 82                     | 0.500               | x 1.26 | 0.050                    | 3' & 4'             | 8' & 10' |
| 1/2"              | No.13-15    | 138                    | 0.500               | x 1.26 | 0.070                    | 3' & 4'             | 8'       |
| 3/4"              | No.16-18    | 51                     | 0.923               | x 2.10 | 0.048                    | 3' & 4'             | 8' & 10' |
| 3/4"              | No.14-16    | 68                     | 0.923               | x 2.10 | 0.063                    | 3' & 4'             | 8'       |
| 3/4"              | No.13-15    | 76                     | 0.923               | x 2.10 | 0.070                    | 3' & 4'             | 8' & 10' |
| 3/4"              | No. 9-11    | 171                    | 0.857               | x 2.10 | 0.110                    | 3' & 4'             | 8' & 10' |
| 1"                | No.16-18    | 46                     | 1.09                | x 2.56 | 0.048                    | 3' & 4'             | 8'       |
| 1 1/2"            | No.16(It)18 | 29                     | 1.33                | x 3.20 | 0.048                    | 3' & 4'             | 8'       |
| 1 1/2"            | No.14-16    | 53                     | 1.33                | x 3.20 | 0.063                    | 3' & 4'             | 8'       |
| 1 1/2"            | No.13-15    | 57                     | 1.33                | x 3.20 | 0.070                    | 3' & 4'             | 8' & 10' |
| 1 1/2"            | No. 9-11    | 113                    | 1.33                | x 3.20 | 0.106                    | 3' & 4'             | 8' & 10' |

# Grating & Flooring Products

## Expanded Metal Grating

| Style Designation<br>(wt. per sq. ft.) |     | Diamond Size<br>a x b Inches | Overall<br>Thickness<br>in In. | Standard Sheet Size |              |
|----------------------------------------|-----|------------------------------|--------------------------------|---------------------|--------------|
|                                        |     |                              |                                | Length<br>(SWD)     | Width (LWD)  |
| 3                                      | lb. | 1.33 x 5.33                  | 1/2                            | 4' & 6'             | 5', 8' & 10' |
| 3.14                                   | lb. | 2.00 x 6.0                   | 9/16                           | 4' & 6'             | 10'          |
| 4                                      | lb. | 1.333 x 5.333                | 5/8                            | 4', 5' & 6'         | 8'           |
| 4.27                                   | lb. | 1.412 x 4.0                  | 5/8                            | 4' & 6'             | 8'           |
| 5                                      | lb. | 1.333 x 5.333                | 5/8                            | 4'                  | 5', 8' & 10' |
| 6.25                                   | lb. | 1.412 x 5.33                 | 47/64                          | 4' & 6'             | 8'           |
| 7                                      | lb. | 1.333 x 5.333                | 3/4                            | 4'                  | 4'2" & 8'4"  |

## Carbon Steel Gratings

Standard or Serrated

Stock Widths 24" & 36", Lengths 20' & 24'

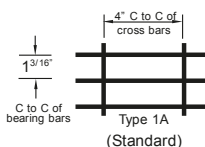
### Weight in Pounds per Sq. Ft.

| Bearing Bars | Cross Bars | Type 1A | Type 1B |
|--------------|------------|---------|---------|
| 3/4 x 1/8    | 1/4        | 3.99    | 4.63    |
| 3/4 x 3/16   | 1/4        | 5.67    | 6.31    |
| 1 x 1/8      | 1/4        | 5.15    | 5.79    |
| 1 x 3/16     | 1/4        | 7.35    | 7.99    |
| 1 1/4 x 1/8  | 1/4        | 6.20    | 6.84    |
| 1 1/4 x 3/16 | 1/4        | 9.03    | 9.67    |
| 1 1/2 x 1/8  | 1/4        | 7.35    | 7.99    |
| 1 1/2 x 3/16 | 5/16       | 10.94   | 11.80   |
| 1 3/4 x 3/16 | 5/16       | 12.62   | 13.48   |
| 2 x 3/16     | 5/16       | 14.30   | 15.16   |
| 2 1/4 x 3/16 | 5/16       | 15.87   | 16.74   |
| 2 1/2 x 3/16 | 5/16       | 17.55   | 18.42   |

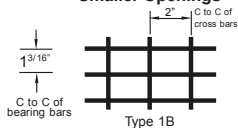
### Weight in Pounds per Sq. Ft.

| Bearing Bars | Cross Bars | Type 2A | Type 2B |
|--------------|------------|---------|---------|
| 3/4 x 1/8    | 1/4        | 4.95    | 5.59    |
| 3/4 x 3/16   | 1/4        | 7.11    | 7.75    |
| 1 x 1/8      | 1/4        | 6.44    | 7.08    |
| 1 x 3/16     | 1/4        | 9.27    | 9.91    |
| 1 1/4 x 1/8  | 1/4        | 7.79    | 8.43    |
| 1 1/4 x 3/16 | 1/4        | 11.43   | 12.07   |
| 1 1/2 x 1/8  | 1/4        | 9.27    | 9.91    |
| 1 1/2 x 3/16 | 5/16       | 13.82   | 14.68   |
| 1 3/4 x 3/16 | 5/16       | 15.98   | 16.84   |
| 2 x 3/16     | 5/16       | 18.14   | 19.00   |
| 2 1/4 x 3/16 | 5/16       | 20.16   | 21.03   |
| 2 1/2 x 3/16 | 5/16       | 22.23   | 23.19   |

### General Duty

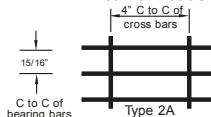


### Smaller Openings



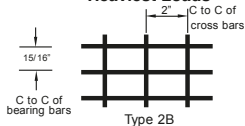
(Standard with Close Cross Bars)

### Heavier Loads



(Close Space)

### Heaviest Loads



# SPECIFICATIONS FOR CARBON STEEL PLATES

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## **ASTM – A36 - Standard Specification for Carbon Steel.**

This specification covers carbon steel plates for use in riveted, bolted, or welded construction of bridges and buildings, and for general structural purposes.

## **ASTM – A572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.**

This specification covers five grades of high-strength low-alloy structural steel plates intended for riveted or bolted construction of bridges, or for riveted, bolted or welded construction in other applications.

## **ASTM – A588 - Standard Specification for High-Strength Low-Alloy Structural Steel.**

This specification covers HSLA steel plates for welded, riveted or bolted construction but intended primarily for use in welded bridges and buildings where savings in weight and added durability are important. The atmospheric corrosion resistance of this steel is substantially better than that of carbon structural steels with or without copper added.

## **ASTM – A514 - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.**

This specification covers quenched and tempered alloy steel plates of structural quality intended primarily for use in welded bridge construction and other structures.

## **ASTM – A709 - Standard Specification for Carbon and High-Strength Low Alloy and Quenched-and-Tempered Alloy Structural Steel Plates for Bridges.**

This specification covers carbon HSLA plates intended for use in bridges. Seven grades are available in four yield strength levels.

# SPECIFICATIONS FOR CARBON STEEL PLATES

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## **ASTM – A285 - Standard Specification for Pressure Vessel Plates, Carbon Steel, Low and Intermediate Tensile Strength.**

This specification covers carbon steel plates of low and intermediate-tensile strength and is intended for fusion-welded pressure vessels. The plates are available in three grades having different strength levels.

## **ASTM – A515 - Standard Specification for Pressure Vessel Plates, Carbon Steel, for Intermediate and Higher-Temperature Service.**

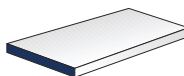
This specification covers carbon-silicon steel plates primarily for intermediate and higher-temperature service in welded boilers and other pressure vessels. The plates are available in three grades each having different strength levels.

## **ASTM – A516 - Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate and Lower-Temperature Service.**

This specification covers carbon steel plates intended primarily for service in welded pressure vessels where improved notch toughness is important. The plates are available in four grades each having different strength levels.

# PLATE

## Commercial & Specification Grades

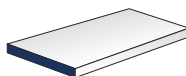


### Average Mechanical Properties

| Grade                                   | Tensile Strength psi                               | Minimum Yield psi | Elongation In 2" Min % | Misc. Properties                 |
|-----------------------------------------|----------------------------------------------------|-------------------|------------------------|----------------------------------|
| Low Carbon<br>3/4" & Under<br>3/4-1 1/2 |                                                    |                   |                        | .10-.20 Carbon<br>.15-.25 Carbon |
| Over 1 1/2"                             | <b>ORDERED TO CHEMISTRY NO PHYSICALS SPECIFIED</b> |                   |                        | .20-.33 Carbon                   |
| <b>SPEC. GRADE</b>                      |                                                    |                   |                        |                                  |
| ASTM A-36                               | 50,000 to 80,000                                   | 36,000            | 23                     | .25-.29 Carbon                   |
| ASTM T1-A                               | 105,000 to 135,000                                 | 90,000 to 100,000 | 17 to 18               | .229 to .293 Brinell             |
| AR360                                   | 166,000                                            | 160,000           | 15                     | 360 Brinell                      |
| AR400                                   | 190,000                                            | 184,000           | 15                     | 400 Brinell                      |
| ASTM A285 Grade C                       | 55,000 to 65,000                                   | 30,000            | 25                     | 0.28 Carbon                      |
| ASTM A515 Grade 70                      | 70,000 to 85,000                                   | 38,000            | 17                     | .31 to .35 Carbon                |
| ASTM A516 Grade 70                      | 70,000 to 85,000                                   | 38,000            | 17                     | .27 to .31 Carbon                |
| ASTM A572                               | 65,000                                             | 50,000            | 21                     | 0.23 Carbon                      |
| A588                                    | 70,000                                             | 50,000            | 19                     | 20 Carbon                        |

Stocked ABS Grade A

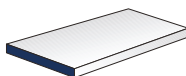
# ABS Plate



ABS is plate that is certified to meet the American Bureau of Shipping standards. ABS is produced for maritime applications such as hull and structural parts of ships, barges, offshore rigs or general marine equipment. Available grades include A, B, AH, D, DH & EH. DH and AH are normalized for improved notch toughness

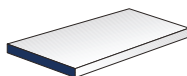
| Size (in.)   | Stock Sizes (in.) | Wt. Per Sq. Ft. | Wt. Per Sheet |
|--------------|-------------------|-----------------|---------------|
| <b>1/4</b>   | 96 x 240          | 10.21           | 1634.00       |
|              | 96 x 480          | .               | 3268.00       |
|              | 120 x 480         |                 | 4084.00       |
| <b>5/16</b>  | 96 x 480          | 12.76           | 4083.20       |
| <b>3/8</b>   | 96 x 240          | 15.32           | 2451.20       |
|              | 96 x 288          |                 | 2941.44       |
|              | 96 x 360          |                 | 3676.80       |
|              | 96 x 480          |                 | 4902.40       |
|              | 120 x 240         |                 | 3064.00       |
|              | 120 x 480         |                 | 6128.00       |
| <b>7/16</b>  | 96 x 480          | 17.87           | 5718.40       |
| <b>1/2</b>   | 96 x 240          | 20.42           | 3267.20       |
|              | 96 x 360          |                 | 4900.80       |
|              | 96 x 480          |                 | 6534.40       |
|              | 120 x 240         |                 | 4084.00       |
|              | 120 x 480         |                 | 8168.00       |
| <b>5/8</b>   | 96 x 240          | 25.53           | 4084.80       |
|              | 96 x 360          |                 | 6127.20       |
|              | 96 x 480          |                 | 8169.60       |
|              | 120 x 480         |                 | 10212.00      |
| <b>3/4</b>   | 96 x 240          | 30.63           | 4900.80       |
|              | 96 x 480          |                 | 9801.60       |
|              | 120 x 480         |                 | 12252.00      |
| <b>1</b>     | 96 x 240          | 40.84           | 6534.40       |
|              | 96 x 480          |                 | 13068.80      |
|              | 120 x 480         |                 | 16336.00      |
| <b>1 1/8</b> | 96 x 240          | 45.95           | 7352.00       |
| <b>1 1/4</b> | 96 x 240          | 51.05           | 8168.00       |
| <b>1 3/8</b> | 96 x 240          | 56.16           | 8985.60       |
| <b>1 1/2</b> | 96 x 240          | 61.27           | 9803.20       |
| <b>1 5/8</b> | 96 x 240          | 66.37           | 10619.20      |
| <b>1 3/4</b> | 96 x 240          | 71.47           | 11435.20      |
| <b>2</b>     | 96 x 240          | 81.68           | 13068.80      |
| <b>2 1/2</b> | 96 x 240          | 102.10          | 16336.00      |
| <b>2 3/4</b> | 96 x 240          | 112.31          | 17969.60      |
| <b>3</b>     | 96 x 240          | 122.52          | 19603.20      |

# Hot Rolled Plate



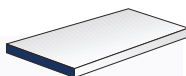
| Size (in.) | Stock Sizes (in.) | Wt. Per Sq. Ft. | Wt. Per Sheet |
|------------|-------------------|-----------------|---------------|
| 3/16       | 48 x 96           | 7.66            | 245.12        |
|            | 48 x 120          |                 | 306.40        |
|            | 48 x 144          |                 | 367.68        |
|            | 48 x 240          |                 | 612.80        |
|            | 60 x 120          |                 | 383.00        |
|            | 60 x 144          |                 | 459.60        |
|            | 60 x 240          |                 | 777.00        |
|            | 72 x 120          |                 | 459.60        |
|            | 72 x 240          |                 | 919.20        |
|            | 96 x 240          |                 | 1225.60       |
| 1/4        | 48 x 96           | 10.21           | 326.72        |
|            | 48 x 120          |                 | 408.40        |
|            | 48 x 144          |                 | 490.08        |
|            | 48 x 240          |                 | 816.80        |
|            | 60 x 120          |                 | 510.50        |
|            | 60 x 144          |                 | 612.60        |
|            | 60 x 240          |                 | 1021.00       |
|            | 72 x 120          |                 | 612.60        |
|            | 72 x 240          |                 | 1225.20       |
|            | 84 x 240          |                 | 1429.40       |
|            | 96 x 240          |                 | 1633.60       |
|            | 96 x 480          |                 | 3267.20       |
|            | 120 x 480         |                 | 4084.00       |
| 5/16       | 48 x 96           | 12.76           | 408.32        |
|            | 48 x 120          |                 | 510.40        |
|            | 48 x 144          |                 | 612.48        |
|            | 48 x 240          |                 | 1020.80       |
|            | 60 x 120          |                 | 638.00        |
|            | 60 x 144          |                 | 765.60        |
|            | 60 x 240          |                 | 1276.00       |
|            | 72 x 240          |                 | 1531.20       |
|            | 84 x 240          |                 | 1786.40       |
|            | 96 x 240          |                 | 2041.60       |
|            | 96 x 480          |                 | 4083.20       |
|            | 120 x 480         |                 | 5104.00       |
| 3/8        | 48 x 96           | 15.32           | 490.24        |
|            | 48 x 120          |                 | 612.80        |
|            | 48 x 144          |                 | 735.36        |
|            | 48 x 240          |                 | 1225.60       |
|            | 60 x 120          |                 | 766.00        |
|            | 72 x 120          |                 | 919.20        |
|            | 72 x 240          |                 | 1838.40       |

# Hot Rolled Plate



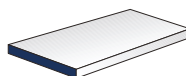
| Size (in.)  | Stock Sizes (in.) | Wt. Per Sq. Ft. | Wt. Per Sheet |
|-------------|-------------------|-----------------|---------------|
| 3/8 (con't) | 84 x 240          | 15.32           | 2144.80       |
|             | 96 x 240          |                 | 2451.20       |
|             | 96 x 360          |                 | 3676.80       |
|             | 96 x 480          |                 | 4902.40       |
|             | 120 x 240         |                 | 3064.00       |
|             | 120 x 480         |                 | 6128.00       |
| 1/2         | 48 x 96           | 20.42           | 653.44        |
|             | 48 x 120          |                 | 816.80        |
|             | 48 x 144          |                 | 980.16        |
|             | 60 x 120          |                 | 1021.00       |
|             | 72 x 120          |                 | 1225.20       |
|             | 72 x 240          |                 | 2450.40       |
|             | 84 x 240          |                 | 2858.80       |
|             | 96 x 240          |                 | 3267.20       |
|             | 96 x 360          |                 | 4900.80       |
|             | 96 x 480          |                 | 6534.40       |
| 5/8         | 48 x 96           | 25.53           | 816.96        |
|             | 48 x 120          |                 | 1021.20       |
|             | 48 x 240          |                 | 2042.40       |
|             | 60 x 120          |                 | 1276.50       |
|             | 72 x 120          |                 | 1531.80       |
|             | 72 x 240          |                 | 3063.60       |
|             | 84 x 240          |                 | 3574.20       |
|             | 96 x 240          |                 | 4084.80       |
|             | 96 x 480          |                 | 8169.60       |
| 3/4         | 48 x 96           | 30.63           | 980.16        |
|             | 48 x 120          |                 | 1225.20       |
|             | 60 x 120          |                 | 1531.50       |
|             | 72 x 240          |                 | 3675.60       |
|             | 84 x 240          |                 | 4288.20       |
|             | 96 x 240          |                 | 4900.80       |
|             | 96 x 480          |                 | 9801.60       |
| 7/8         | 48 x 96           | 35.74           | 1143.68       |
|             | 48 x 120          |                 | 1429.60       |
|             | 48 x 240          |                 | 2859.20       |
|             | 60 x 120          |                 | 1787.00       |
|             | 72 x 120          |                 | 2144.40       |
|             | 72 x 240          |                 | 4288.80       |
|             | 84 x 240          |                 | 5003.60       |
|             | 96 x 240          |                 | 5718.40       |
|             | 96 x 480          |                 | 11436.80      |

# Hot Rolled Plate



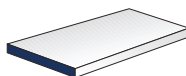
| Size (in.) | Stock Sizes (in.) | Wt. Per Sq. Ft. | Wt. Per Sheet |
|------------|-------------------|-----------------|---------------|
| 1          | 48 x 96           | 40.84           | 1306.88       |
|            | 48 x 120          |                 | 1633.60       |
|            | 48 x 240          |                 | 3267.20       |
|            | 60 x 96           |                 | 1633.60       |
|            | 60 x 120          |                 | 2042.00       |
|            | 60 x 240          |                 | 4084.00       |
|            | 72 x 120          |                 | 2450.40       |
|            | 72 x 240          |                 | 4900.80       |
|            | 72 x 480          |                 | 9801.60       |
|            | 96 x 120          |                 | 3267.20       |
|            | 96 x 240          |                 | 6534.40       |
|            | 96 x 480          |                 | 13068.80      |
|            | 120 x 240         |                 | 8168.00       |
|            | 120 x 480         |                 | 16336.00      |
| 1 1/8      | 96 x 240          | 45.95           | 7352.00       |
|            | 120 x 240         |                 | 9190.00       |
| 1 1/4      | 48 x 120          | 51.05           | 2042.00       |
|            | 48 x 240          |                 | 4084.00       |
|            | 60 x 120          |                 | 2552.50       |
|            | 72 x 240          |                 | 6126.00       |
|            | 96 x 240          |                 | 8168.00       |
| 1 1/2      | 48 x 96           | 61.26           | 1960.32       |
|            | 48 x 120          |                 | 2450.40       |
|            | 48 x 240          |                 | 4900.80       |
|            | 60 x 120          |                 | 3063.00       |
|            | 72 x 240          |                 | 7351.20       |
|            | 96 x 240          |                 | 9801.60       |
| 1 3/4      | 48 x 96           | 71.47           | 2287.04       |
|            | 48 x 120          |                 | 2858.80       |
|            | 96 x 240          |                 | 11435.20      |
| 2          | 48 x 96           | 81.68           | 2613.76       |
|            | 48 x 120          |                 | 3267.20       |
|            | 48 x 240          |                 | 6534.40       |
|            | 96 x 240          |                 | 13068.80      |
| 2 1/4      | 48 x 96           | 91.89           | 2940.48       |
|            | 48 x 240          |                 | 7351.20       |
|            | 96 x 240          |                 | 14702.40      |
| 2 1/2      | 48 x 96           | 102.10          | 3267.20       |
|            | 48 x 240          |                 | 8168.00       |
|            | 96 x 240          |                 | 16336.00      |
| 2 3/4      | 48 x 96           | 112.31          | 3593.92       |
|            | 96 x 240          |                 | 17969.60      |
| 3          | 96 x 144          | 122.52          | 11761.92      |
|            | 96 x 240          |                 | 19603.20      |

# Hot Rolled Plate



| Size (in.) | Stock Sizes (in.) | Wt. Per Sq. Ft. | Wt. Per Sheet |
|------------|-------------------|-----------------|---------------|
| 3 1/2      | 96 x 144          | 142.93          | 13721.28      |
|            | 96 x 240          |                 | 22868.80      |
| 4          | 96 x 144          | 163.36          | 15682.56      |
|            | 96 x 240          |                 | 26137.60      |
| 4 1/2      | 96 x 144          | 183.78          | 17642.88      |
|            | 96 x 240          |                 | 29404.80      |
| 5          | 48 x 96           | 204.20          | 6534.40       |
|            | 96 x 144          |                 | 19603.20      |
|            | 96 x 240          |                 | 32672.00      |
| 5 1/2      | 60 x 120          | 224.61          | 11230.50      |
|            | 60 x 240          |                 | 22461.00      |
|            | 60 x 480          |                 | 44922.00      |
| 6          | 60 x 240          | 245.03          | 24503.00      |
|            | 60 x 480          |                 | 49006.00      |
|            | 72 x 120          |                 | 14701.80      |
|            | 72 x 240          |                 | 29403.60      |
|            | 96 x 120          |                 | 19602.40      |
|            | 96 x 240          |                 | 39204.80      |
| 6 1/2      | 96 x 120          | 265.45          | 21236.00      |
|            | 96 x 240          |                 | 42472.00      |
| 7          | 60 x 120          | 285.87          | 14293.50      |
|            | 60 x 240          |                 | 28587.00      |
|            | 96 x 120          |                 | 22869.60      |
|            | 96 x 240          |                 | 45739.20      |
| 8          | 60 x 120          | 326.71          | 16335.50      |
|            | 60 x 240          |                 | 32671.00      |
| 10         | 84 x 120          | 408.38          | 28586.60      |

# Floor Plate



| Thickness | Stock Sizes (in.) | Wt. Per Sq. Ft. | Wt. Per Sheet |
|-----------|-------------------|-----------------|---------------|
| 1/8       | 48 x 96           | 6.16            | 197.12        |
|           | 48 x 120          |                 | 246.40        |
|           | 48 x 144          |                 | 295.68        |
|           | 48 x 240          |                 | 492.80        |
|           | 60 x 120          |                 | 308.00        |
|           | 60 x 240          |                 | 616.00        |
| 3/16      | 48 x 96           | 8.71            | 278.72        |
|           | 48 x 120          |                 | 348.84        |
|           | 48 x 240          |                 | 696.80        |
|           | 60 x 120          |                 | 435.50        |
|           | 60 x 240          |                 | 871.00        |
|           | 72 x 240          |                 | 1045.20       |
| 1/4       | 48 x 96           | 11.26           | 360.32        |
|           | 48 x 120          |                 | 450.40        |
|           | 48 x 240          |                 | 900.80        |
|           | 60 x 240          |                 | 1126.00       |
|           | 72 x 240          |                 | 1351.20       |
|           | 96 x 240          |                 | 1801.60       |
| 5/16      | 48 x 120          | 13.81           | 552.40        |
|           | 48 x 240          |                 | 1104.80       |
|           | 60 x 240          |                 | 1381.00       |
|           | 72 x 240          |                 | 1657.20       |
|           | 96 x 240          |                 | 2209.60       |
| 3/8       | 48 x 120          | 16.37           | 654.80        |
|           | 48 x 240          |                 | 1309.60       |
|           | 60 x 240          |                 | 1637.00       |
|           | 72 x 240          |                 | 1964.40       |
|           | 96 x 240          |                 | 2619.20       |
| 1/2       | 48 x 120          | 21.47           | 858.80        |
|           | 48 x 240          |                 | 1717.60       |
|           | 60 x 240          |                 | 2147.00       |
|           | 96 x 240          |                 | 3435.20       |
| 5/8       | 96 x 240          | 26.58           | 4252.80       |
| 3/4       | 96 x 240          | 31.68           | 5068.80       |
| 1         | 96 x 240          | 41.89           | 6702.40       |



# SHEET SELECTION GUIDE

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## **HOT ROLLED**

Commercial Quality Sheets produced from low carbon steel and intended for uses involving simple bending or moderate drawing and welding. A wide variety of applications from agriculture implements to automotive equipment, from blower and ventilating systems to hot air registers, from stub barrels and drums to bins and partitions.

## **HOT ROLLED PICKLED & OILED**

Pickled & Oiled Sheets should be used when the tight oxide scale present on Hot Rolled Sheets is objectionable. Pickled and Oiled Sheets with their superior smooth clean surface are recommended for stamping or ordinary drawing applications. After cleaning they can be painted or enameled.

## **COLD ROLLED**

Cold Rolled Commercial Quality Sheets are produced from low carbon steel and are intended for exposed or unexposed parts involving bending, moderate drawing or forming and welding. Sheets of this quality have a greater degree of ductility and are more consistent in performance because of higher standards in production, selection, and processing of the steel. The surface finish is a dull matte texture.

# Hot Rolled Steel Sheets

Commercial Quality - Low Carbon



| Gauge Number | Stock Sizes (In.) | Wt. Per Sq. Ft. | Wt. Per Sheet |
|--------------|-------------------|-----------------|---------------|
| 16 Ga.       | 48 x 96           | 2.5             | 80            |
|              | 48 x 120          |                 | 100           |
|              | 48 x 144          |                 | 120           |
|              | 60 x 96           |                 | 100           |
|              | 60 x 120          |                 | 125           |
|              | 60 x 144          |                 | 150           |
| 14 Ga.       | 48 x 96           | 3.125           | 100           |
|              | 48 x 120          |                 | 125           |
|              | 48 x 144          |                 | 150           |
|              | 60 x 96           |                 | 125           |
|              | 60 x 120          |                 | 156.3         |
|              | 60 x 144          |                 | 187.5         |
| 12 Ga.       | 48 x 96           | 4.375           | 140           |
|              | 48 x 120          |                 | 175           |
|              | 48 x 144          |                 | 210           |
|              | 60 x 96           |                 | 175           |
|              | 60 x 120          |                 | 218.8         |
|              | 60 x 144          |                 | 262.5         |
|              | 72 x 120          |                 | 262.5         |
|              | 72 x 144          |                 | 315           |
| 11 Ga.       | 48 x 96           | 5               | 160           |
|              | 48 x 120          |                 | 200           |
|              | 48 x 144          |                 | 240           |
|              | 60 x 96           |                 | 200           |
|              | 60 x 120          |                 | 250           |
|              | 60 x 144          |                 | 300           |
|              | 72 x 120          |                 | 300           |
|              | 72 x 144          |                 | 360           |
|              | 72 x 240          |                 | 600           |
| 10 Ga.       | 48 x 96           | 5.625           | 180           |
|              | 48 x 120          |                 | 225           |
|              | 48 x 144          |                 | 270           |
|              | 60 x 96           |                 | 225           |
|              | 60 x 120          |                 | 281.3         |
|              | 60 x 144          |                 | 337.5         |
|              | 72 x 120          |                 | 337.5         |
|              | 72 x 144          |                 | 405           |
|              | 72 x 240          |                 | 675           |

# Sheet Product

AISI Thickness Tolerance Range



|              | Thickness Inches |                  |             |                  |             |                     |
|--------------|------------------|------------------|-------------|------------------|-------------|---------------------|
| Gauge Number | H.R. & H.R.P.O.  |                  | C.R.        |                  | Galv.       |                     |
|              | Dec. Equiv.      | Tolerance Range  | Dec. Equiv. | Tolerance Range  | Dec. Equiv. | Tolerance Range     |
| 7            | 0.1793           | 0.1873<br>0.1713 | 0.1793      | 0.1883<br>0.1703 |             |                     |
| 8            | 0.1644           | 0.1724<br>0.1564 | 0.1644      | 0.1734<br>0.1554 |             |                     |
| 9            | 0.1495           | 0.1575<br>0.1415 | 0.1495      | 0.1585<br>0.1405 |             |                     |
| 10           | 0.1345           | 0.1425<br>0.1265 | 0.1345      | 0.1405<br>0.1285 | 0.1382      | 0.1472<br>1292.0000 |
| 11           | 0.1196           | 0.1276<br>0.1116 | 0.1196      | 0.1256<br>0.1136 | 0.1233      | 0.1323<br>0.1143    |
| 12           | 0.1046           | 0.1126<br>0.0966 | 0.1046      | 0.1106<br>0.0986 | 0.1084      | 0.1174<br>0.0994    |
| 13           | 0.0897           | 0.0967<br>0.0827 | 0.0897      | 0.0947<br>0.0847 | 0.0934      | 0.1014<br>0.0854    |
| 14           | 0.0747           | 0.0817<br>0.0677 | 0.0747      | 0.0797<br>0.0697 | 0.0785      | 0.0865<br>0.0705    |
| 15           | 0.0673           | 0.0733<br>0.0613 | 0.0673      | 0.0723<br>0.0623 | 0.0710      | 0.0770<br>0.0650    |
| 16           | 0.0598           | 0.0658<br>0.0538 | 0.0598      | 0.0648<br>0.0548 | 0.0635      | 0.0695<br>0.0575    |
| 17           | 0.0538           | 0.0598<br>0.0478 | 0.0538      | 0.0578<br>0.0498 | 0.0575      | 0.0625<br>0.0525    |
| 18           | 0.0478           | 0.0528<br>0.0428 | 0.0478      | 0.0518<br>0.0438 | 0.0516      | 0.0566<br>0.0466    |
| 19           | 0.0418           | 0.0458<br>0.0378 | 0.0456      | 0.0506<br>0.0406 |             |                     |
| 20           | 0.0359           | 0.0389<br>0.0329 | 0.04        | 0.0436<br>0.0356 |             |                     |
| 21           | 0.0329           | 0.0359<br>0.0299 | 0.037       | 0.0406<br>0.0326 |             |                     |
| 22           | 0.0299           | 0.0329<br>0.0269 | 0.034       | 0.0376<br>0.0296 |             |                     |
| 23           | 0.0269           | 0.0299<br>0.0239 | 0.031       | 0.0346<br>0.0266 |             |                     |
| 24           | 0.0239           | 0.0269<br>0.0209 | 0.028       | 0.0316<br>0.0236 |             |                     |
| 25           | 0.0209           | 0.0239<br>0.0179 | 0.025       | 0.0287<br>0.0207 |             |                     |
| 26           | 0.0179           | 0.0199<br>0.0159 | 0.022       | 0.0247<br>0.0187 |             |                     |
| 27           | 0.0164           | 0.0184<br>0.0144 | 0.02        | 0.0232<br>0.0172 |             |                     |
| 28           | 0.0149           | 0.0169<br>0.0129 | 0.019       | 0.0217<br>0.0157 |             |                     |
| 29           | 0.0135           | 0.0155<br>0.0115 | 0.017       | 0.0202<br>0.0142 |             |                     |
| 30           | 0.012            | 0.013<br>0.011   | 0.016       | 0.0187<br>0.0127 |             |                     |



# **SPECIFICATIONS FOR WELDED AND SEAMLESS STEEL PIPE**

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## **ASTM – A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.**

This specification covers cold-formed welded carbon steel round, square, rectangular, or special shape structural tubing for welded, riveted, or bolted construction of bridges and buildings, and for general structural purposes. Four grades are produced each having a different chemistry and tensile requirement.

Structural Tubing is relatively low in cost, has a high strength-to-weight ratio and is easily welded, formed, punched and drilled. Its hollow shape protects and conceals wires, pipes, moving parts and it can be left exposed.

Grades B and C, being the most common stock available, can be subjected to most of the usual fabricating operations. Ductility is good. Bends well, flattens, cuts, punches, flares, flanges and welds easily.

## **ASTM – A1085 - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS).**

This specification covers cold-formed welded carbon steel hollow structural sections (HSS) for welded or bolted construction that are used in, although not limited to, buildings, bridges, towers, cranes, sign supports and poles, off-shore production and drilling platforms, roll-over protective structures (ROPS), falling object protective structures (FOPS), and amusement rides. This HSS is produced in welded sizes with a periphery of not more than 88 in. (2235 mm)

# SPECIFICATIONS FOR WELDED AND SEAMLESS STEEL PIPE

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as well as a specified nominal wall thickness of at least 0.148 in (3.8 mm) and not more than 0.875 in. (22 mm). The standard addresses areas such as ordering information, the steel-making process, HSS manufacture, heat analysis, product analysis, tensile requirements, flattening test, permissible variations in dimensions, number of tests, retests, test methods, rejection, certification, product marking, packing and loading, and government procurement.

## **ASTM – A252 - Standard Specification for Welded and Seamless Steel Pipe Piles.**

This specification covers nominal wall cylindrical steel pipe piles in which the steel cylinder acts as a permanent load-carrying member or as a shell to form cast-in-place concrete piles. Ideally suited for application in buildings, retaining walls, and other structures needing solid, dependably, quality made steel piling pipe as its structure. Each welded pile shall be made by seamless, electric resistance welding, flash welding or fusion welding with longitudinal, helical-butt, or helical-lap seams. This specification also deals with material tensile requirements, minimum elongation values and common size and weights per unit length values. ASTM A252.

# SPECIFICATIONS FOR WELDED AND SEAMLESS STEEL PIPE

BLACK AND HOT DIPPED ZINC COATED  
(GALVANIZED)

## FOR ORDINARY USES

These specifications cover black and hot dipped galvanized welded and seamless steel pipe. Pipe ordered under these specifications is nominal (average) wall and is intended for ordinary uses in steam, water, gas, and air lines, but is not intended for close coiling or bending, or high-temperature service. No mechanical tests are specified on pipe made to these specifications, except hydrostatic tests which shall be made at the mills, as these specifications are intended to cover pipe purchased mainly from jobber's stocks.

Note - When tension, flattening, or bend tests are required, pipe should be ordered in accordance with the Specifications for Welded and Seamless Steel Pipe (ASTM Designation: A53). In the case of galvanized pipe so ordered, the base metal shall be made and tested in accordance with the Specifications A53 and the pipe shall be galvanized and the coating tested in accordance with these specifications A 120. When specified, results of the mechanical tests on the base material shall be reported to the purchaser.

Note - When galvanized pipe, as covered by these specifications, is bent or otherwise fabricated to a degree which causes the zinc coating to stretch or compress beyond the limit of elasticity, some flaking of the coating may occur.

| Specifications                                                       | Scope                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A-120</b><br>SIZES 1/8"-12" Std,<br>E.S. and XX                   | Covers BLACK and GALVANIZED WELDED SEAMLESS nominal (average) wall pipe for ordinary uses in steam, water, gas and air lines. Pipe to this specification not intended for close coiling, bending, or high-temperature service. Intended primarily to cover pipe purchased mainly from distributors' stocks.           |
| <b>A-53</b><br>SIZES 1/8"-24" Std,<br>E.S. and XXX                   | Covers BLACK and GALVANIZED WELDED SEAMLESS nominal wall pipe for coiling, bending, flanging and other special purposes and is suitable for welding. BUTTWELDED pipe is not intended for flanging (roll back operation to form flange using pipe wall.) Purpose for which pipe is intended should be stated on order. |
| <b>A-106</b><br>SIZES 1/8"-24" A.S.A.<br>Schedules 10 through<br>160 | Covers SEAMLESS nominal wall pipe (welded not permitted) for high-temperature service, suitable for bending, flanging, and similar forming operations. Sizes 1 1/2" and under may be either hot finished or cold drawn. Sizes 2" and larger shall be hot finished unless otherwise specified.                         |
| <b>API 5-L</b><br>SIZES 1/8"-24"                                     | Covers WELDED and SEAMLESS pipe suitable for use in conveying gas, water, and oil in both the oil and natural gas industries.                                                                                                                                                                                         |

# Pipe Size Chart

| Nominal<br>Pipe Size<br>Inches | Outside<br>Diameter<br>Inches | Standard<br>Pipe<br>Schedule | Inside<br>Diameter<br>Inches | Wall<br>Thickness<br>Inches | Weight per<br>ft. lbs.<br>Plain End |
|--------------------------------|-------------------------------|------------------------------|------------------------------|-----------------------------|-------------------------------------|
| 1/2                            | 0.840                         | 5                            | 0.710                        | 0.065                       | 0.538                               |
|                                |                               | 10                           | 0.674                        | 0.083                       | 0.671                               |
|                                |                               | 40 Std.                      | 0.622                        | 0.109                       | 0.851                               |
|                                |                               | 80 Ex Hvy                    | 0.546                        | 0.147                       | 1.088                               |
|                                |                               | 160                          | 0.466                        | 0.187                       | 1.304                               |
|                                |                               | XX Hvy                       | 0.252                        | 0.294                       | 1.714                               |
| 3/4                            | 1.050                         | 5                            | 0.920                        | 0.065                       | 0.684                               |
|                                |                               | 10                           | 0.844                        | 0.083                       | 0.857                               |
|                                |                               | 40 Std.                      | 0.824                        | 0.113                       | 1.130                               |
|                                |                               | 80 Ex Hvy                    | 0.742                        | 0.154                       | 1.474                               |
|                                |                               | 160                          | 0.614                        | 0.216                       | 1.937                               |
|                                |                               | XX Hvy                       | 0.434                        | 0.308                       | 2.441                               |
| 1                              | 1.315                         | 5                            | 1.185                        | 0.065                       | 0.868                               |
|                                |                               | 10                           | 1.097                        | 0.109                       | 1.404                               |
|                                |                               | 40 Std.                      | 1.049                        | 0.133                       | 1.679                               |
|                                |                               | 80 Ex Hvy                    | 0.957                        | 0.179                       | 2.172                               |
|                                |                               | 160                          | 0.815                        | 0.250                       | 2.844                               |
|                                |                               | XX Hvy                       | 0.599                        | 0.358                       | 3.659                               |
| 1 1/4                          | 1.660                         | 5                            | 1.530                        | 0.065                       | 1.107                               |
|                                |                               | 10                           | 1.442                        | 0.109                       | 1.806                               |
|                                |                               | 40 Std.                      | 1.380                        | 0.140                       | 2.273                               |
|                                |                               | 80 Ex Hvy                    | 1.278                        | 0.191                       | 2.997                               |
|                                |                               | 160                          | 1.160                        | 0.250                       | 3.765                               |
|                                |                               | XX Hvy                       | 0.896                        | 0.382                       | 5.214                               |
| 1 1/2                          | 1.900                         | 5                            | 1.770                        | 0.065                       | 1.274                               |
|                                |                               | 10                           | 1.682                        | 0.109                       | 2.085                               |
|                                |                               | 40 Std.                      | 1.610                        | 0.145                       | 2.718                               |
|                                |                               | 80 Ex Hvy                    | 1.500                        | 0.200                       | 3.630                               |
|                                |                               | 160                          | 1.338                        | 0.281                       | 4.859                               |
|                                |                               | XX Hvy                       | 1.100                        | 0.400                       | 6.408                               |
| 2                              | 2.375                         | 5                            | 2.245                        | 0.065                       | 1.604                               |
|                                |                               | 10                           | 2.157                        | 0.109                       | 2.638                               |
|                                |                               | 40 Std.                      | 2.067                        | 0.154                       | 3.653                               |
|                                |                               | 80 Ex Hvy                    | 1.939                        | 0.218                       | 5.022                               |
|                                |                               | 160                          | 1.689                        | 0.343                       | 7.444                               |
|                                |                               | XX Hvy                       | 1.503                        | 0.436                       | 9.029                               |
| 2 1/2                          | 2.875                         | 5                            | 2.709                        | 0.083                       | 2.475                               |
|                                |                               | 10                           | 2.635                        | 0.120                       | 3.531                               |
|                                |                               | 40 Std.                      | 2.469                        | 0.203                       | 5.793                               |
|                                |                               | 80 Ex Hvy                    | 2.323                        | 0.276                       | 7.661                               |
|                                |                               | 160                          | 2.125                        | 0.375                       | 10.010                              |
|                                |                               | XX Hvy                       | 1.771                        | 0.552                       | 13.700                              |
| 3                              | 3.500                         | 5                            | 3.334                        | 0.083                       | 3.029                               |
|                                |                               | 10                           | 3.260                        | 0.120                       | 4.332                               |
|                                |                               | 40 Std.                      | 3.068                        | 0.216                       | 7.596                               |
|                                |                               | 80 Ex Hvy                    | 2.900                        | 0.300                       | 10.250                              |
|                                |                               | 160                          | 2.624                        | 0.437                       | 14.320                              |
|                                |                               | XX Hvy                       | 2.300                        | 0.600                       | 18.580                              |
| 3 1/2                          | 4.000                         | 5                            | 3.834                        | 0.083                       | 3.472                               |
|                                |                               | 10                           | 3.760                        | 0.120                       | 4.973                               |
|                                |                               | 40 Std.                      | 3.548                        | 0.226                       | 9.109                               |
|                                |                               | 80 Ex Hvy                    | 3.364                        | 0.318                       | 12.510                              |
| 4                              | 4.500                         | 5                            | 4.334                        | 0.083                       | 3.915                               |
|                                |                               | 10                           | 4.260                        | 0.120                       | 5.613                               |
|                                |                               | 40 Std.                      | 4.026                        | 0.237                       | 10.790                              |
|                                |                               | 80 Ex Hvy                    | 3.826                        | 0.337                       | 14.980                              |
|                                |                               | 120                          | 3.626                        | 0.437                       | 19.010                              |
|                                |                               | 160                          | 3.438                        | 0.531                       | 22.510                              |
| 4 1/2                          | 5.00                          | XX Hvy                       | 3.152                        | 0.674                       | 27.540                              |
|                                |                               | Std.                         | 4.506                        | 0.247                       | 12.530                              |
|                                |                               | Ex Hvy                       | 4.290                        | 0.355                       | 17.610                              |
|                                |                               | XX Hvy                       | 3.580                        | 0.710                       | 17.610                              |

# Pipe Size Chart

| Nominal<br>Pipe Size<br>Inches | Outside<br>Diameter<br>Inches | Standard<br>Pipe<br>Schedule | Inside<br>Diameter<br>Inches | Wall<br>Thickness<br>Inches | Weight per<br>ft. lbs.<br>Plain End |
|--------------------------------|-------------------------------|------------------------------|------------------------------|-----------------------------|-------------------------------------|
| 5                              | 5.563                         | 5                            | 5.345                        | 0.109                       | 6.349                               |
|                                |                               | 10                           | 5.295                        | 0.134                       | 7.770                               |
|                                |                               | 40 Std.                      | 5.047                        | 0.258                       | 14.620                              |
|                                |                               | 80 Ex Hvy                    | 4.813                        | 0.375                       | 20.780                              |
|                                |                               | 120                          | 4.563                        | 0.500                       | 27.040                              |
|                                |                               | 160                          | 4.313                        | 0.625                       | 32.960                              |
|                                |                               | XX Hvy                       | 4.063                        | 0.750                       | 38.550                              |
| 6                              | 6.625                         | 5                            | 6.407                        | 0.109                       | 7.585                               |
|                                |                               | 10                           | 6.357                        | 0.134                       | 9.289                               |
|                                |                               | 40 Std.                      | 6.065                        | 0.280                       | 18.970                              |
|                                |                               | 80 Ex Hvy                    | 5.761                        | 0.432                       | 28.570                              |
|                                |                               | 120                          | 5.491                        | 0.562                       | 36.390                              |
|                                |                               | 160                          | 5.189                        | 0.719                       | 45.350                              |
|                                |                               | XX Hvy                       | 4.897                        | 0.864                       | 53.160                              |
| 7                              | 7.625                         | Std                          | 7.023                        | 0.301                       | 23.570                              |
|                                |                               | Ex Hvy                       | 6.625                        | 0.500                       | 38.050                              |
|                                |                               | XX Hvy                       | 5.875                        | 0.875                       | 63.080                              |
| 8                              | 8.625                         | 5                            | 8.407                        | 0.109                       | 9.914                               |
|                                |                               | 10                           | 8.329                        | 0.148                       | 13.400                              |
|                                |                               | 20                           | 8.125                        | 0.250                       | 22.360                              |
|                                |                               | 40 Std.                      | 7.981                        | 0.322                       | 28.550                              |
|                                |                               | 60                           | 7.813                        | 0.406                       | 35.640                              |
|                                |                               | 80 Ex Hvy                    | 7.625                        | 0.500                       | 43.390                              |
|                                |                               | 160                          | 6.813                        | 0.906                       | 74.690                              |
|                                |                               | XX Hvy                       | 6.875                        | 0.875                       | 72.420                              |
| 9                              | 9.625                         | Std                          | 8.941                        | 0.342                       | 33.900                              |
|                                |                               | Ex Hvy                       | 8.625                        | 0.500                       | 48.720                              |
| 10                             | 10.750                        | 5                            | 10.482                       | 0.134                       | 15.190                              |
|                                |                               | 10                           | 10.420                       | 0.165                       | 18.700                              |
|                                |                               | 30                           | 10.136                       | 0.307                       | 34.240                              |
|                                |                               | 40 Std.                      | 10.020                       | 0.365                       | 40.480                              |
|                                |                               | Ex Hvy                       | 9.750                        | 0.500                       | 54.740                              |
|                                |                               | 140                          | 8.750                        | 1.000                       | 104.130                             |
|                                |                               | 160                          | 8.500                        | 1.125                       | 115.640                             |
| 11                             | 11.750                        | Std                          | 11.000                       | 0.375                       | 45.550                              |
|                                |                               | Ex Hvy                       | 10.750                       | 0.500                       | 60.070                              |
| 12                             | 12.750                        | 5                            | 12.438                       | 0.156                       | 21.070                              |
|                                |                               | 20                           | 12.250                       | 0.250                       | 33.410                              |
|                                |                               | 30                           | 12.126                       | 0.312                       | 41.480                              |
|                                |                               | Std                          | 12.000                       | 0.375                       | 49.560                              |
|                                |                               | 40                           | 11.938                       | 0.406                       | 53.530                              |
|                                |                               | Ex Hvy                       | 11.750                       | 0.500                       | 65.420                              |
|                                |                               | *                            | 11.500                       | 0.625                       | 81.010                              |
|                                |                               | 80                           | 11.370                       | 0.690                       | 88.960                              |
|                                |                               | *                            | 11.250                       | 0.750                       | 96.210                              |
|                                |                               | *                            | 10.940                       | 0.905                       | 114.590                             |
|                                |                               | 160                          | 10.126                       | 1.312                       | 160.270                             |

\*Non-scheduled wall

# Pipe Size Chart

| Nominal<br>Pipe Size<br>Inches | Outside<br>Diameter<br>Inches | Standard<br>Pipe<br>Schedule | Inside<br>Diameter<br>Inches | Wall<br>Thickness<br>Inches | Weight per<br>ft. lbs.<br>Plain End |
|--------------------------------|-------------------------------|------------------------------|------------------------------|-----------------------------|-------------------------------------|
| 14                             | 14.000                        | 10                           | 13.500                       | 0.250                       | 36.710                              |
|                                |                               | 20                           | 13.376                       | 0.312                       | 45.680                              |
|                                |                               | 30 Std.                      | 13.250                       | 0.375                       | 54.570                              |
|                                |                               | 40                           | 13.124                       | 0.437                       | 63.370                              |
|                                |                               | Ex Hvy                       | 13.000                       | 0.500                       | 72.090                              |
|                                |                               | 60                           | 12.814                       | 0.593                       | 84.910                              |
|                                |                               | *                            | 12.250                       | 0.875                       | 122.770                             |
|                                |                               | 80                           | 12.500                       | 0.750                       | 106.230                             |
|                                |                               | 100                          | 12.126                       | 0.937                       | 130.700                             |
|                                |                               | 120                          | 12.000                       | 1.000                       | 139.970                             |
|                                |                               | 140                          | 11.500                       | 1.250                       | 170.200                             |
|                                |                               | 160                          | 11.188                       | 1.406                       | 189.100                             |
| 16                             | 16.000                        | 10                           | 15.500                       | 0.250                       | 42.050                              |
|                                |                               | 20                           | 15.376                       | 0.312                       | 52.360                              |
|                                |                               | 30 Std.                      | 15.250                       | 0.375                       | 62.580                              |
|                                |                               | 40 Ex Hvy                    | 15.000                       | 0.500                       | 82.770                              |
|                                |                               | 60                           | 14.688                       | 0.656                       | 107.500                             |
|                                |                               | *                            | 14.500                       | 0.750                       | 122.270                             |
|                                |                               | 80                           | 14.250                       | 0.875                       | 141.480                             |
|                                |                               | 100                          | 14.000                       | 1.000                       | 160.350                             |
|                                |                               | 120                          | 13.564                       | 1.218                       | 192.300                             |
|                                |                               | 140                          | 13.124                       | 1.437                       | 223.500                             |
|                                |                               | 160                          | 12.814                       | 1.593                       | 245.100                             |
| 18                             | 18.000                        | 10                           | 17.500                       | 0.250                       | 47.390                              |
|                                |                               | 20                           | 17.376                       | 0.312                       | 59.030                              |
|                                |                               | Std                          | 17.250                       | 0.375                       | 70.590                              |
|                                |                               | 30                           | 17.124                       | 0.437                       | 82.060                              |
|                                |                               | Ex Hvy                       | 17.000                       | 0.500                       | 93.450                              |
|                                |                               | 40                           | 16.876                       | 0.562                       | 104.800                             |
|                                |                               | 60                           | 16.500                       | 0.750                       | 138.300                             |
|                                |                               | *                            | 16.250                       | 0.875                       | 160.190                             |
|                                |                               | 80                           | 16.000                       | 1.000                       | 181.730                             |
|                                |                               | 100                          | 15.688                       | 1.156                       | 208.000                             |
|                                |                               | 120                          | 15.250                       | 1.375                       | 244.100                             |
|                                |                               | 140                          | 14.876                       | 1.562                       | 274.200                             |
|                                |                               | 160                          | 14.438                       | 1.781                       | 308.500                             |
| 20                             | 20.000                        | 10                           | 19.500                       | 0.250                       | 52.730                              |
|                                |                               | 20 Std.                      | 19.250                       | 0.375                       | 78.600                              |
|                                |                               | 30 Ex Hvy                    | 19.000                       | 0.500                       | 104.100                             |
|                                |                               | 40                           | 18.814                       | 0.593                       | 122.900                             |
|                                |                               | *                            | 18.500                       | 0.750                       | 154.340                             |
|                                |                               | 60                           | 18.376                       | 0.812                       | 166.400                             |
|                                |                               | *                            | 18.250                       | 0.875                       | 178.890                             |
|                                |                               | 80                           | 18.000                       | 1.000                       | 203.110                             |
|                                |                               | 100                          | 17.438                       | 1.281                       | 256.100                             |
|                                |                               | 120                          | 17.000                       | 1.500                       | 296.400                             |
|                                |                               | 140                          | 16.500                       | 1.750                       | 341.100                             |
|                                |                               | 160                          | 16.064                       | 1.968                       | 379.000                             |

\*Non-scheduled wall

# Pipe Size Chart

| Nominal<br>Pipe Size<br>Inches | Outside<br>Diameter<br>Inches | Standard<br>Pipe<br>Schedule | Inside<br>Diameter<br>Inches | Wall<br>Thickness<br>Inches | Weight per<br>ft. lbs.<br>Plain End |
|--------------------------------|-------------------------------|------------------------------|------------------------------|-----------------------------|-------------------------------------|
| 22                             | 22.000                        | 10                           | 21.500                       | 0.250                       | 58.070                              |
|                                |                               | 20 Std.                      | 21.250                       | 0.375                       | 86.610                              |
|                                |                               | 30 Ex Hvy                    | 21.000                       | 0.500                       | 114.800                             |
|                                |                               | 60                           | 20.250                       | 0.875                       | 197.400                             |
|                                |                               | 80                           | 19.750                       | 1.125                       | 250.800                             |
|                                |                               | 100                          | 19.250                       | 1.375                       | 302.900                             |
|                                |                               | 120                          | 18.750                       | 1.625                       | 353.600                             |
|                                |                               | 140                          | 18.250                       | 1.875                       | 403.000                             |
|                                |                               | 160                          | 17.750                       | 2.125                       | 451.100                             |
| 24                             | 24.000                        | 10                           | 23.500                       | 0.250                       | 63.410                              |
|                                |                               | 20 Std.                      | 23.250                       | 0.375                       | 94.710                              |
|                                |                               | 20 Ex Hvy                    | 23.000                       | 0.500                       | 125.500                             |
|                                |                               | 30                           | 23.000                       | 0.500                       | 125.610                             |
|                                |                               | 40                           | 22.750                       | 0.625                       | 156.180                             |
|                                |                               | *                            | 22.500                       | 0.750                       | 186.410                             |
|                                |                               | *                            | 22.250                       | 0.875                       | 216.310                             |
|                                |                               | 60                           | 22.000                       | 1.000                       | 245.870                             |
|                                |                               | 80                           | 21.564                       | 1.218                       | 296.400                             |
|                                |                               | 100                          | 20.938                       | 1.531                       | 367.400                             |
|                                |                               | 120                          | 20.376                       | 1.812                       | 429.400                             |
|                                |                               | 140                          | 19.876                       | 2.062                       | 483.100                             |
| 28                             | 28.00                         | E.H.                         | 27.000                       | 0.500                       | 146.990                             |
|                                |                               | *                            | 26.750                       | 0.625                       | 182.900                             |
|                                |                               | *                            | 26.500                       | 0.750                       | 218.480                             |
|                                |                               | *                            | 26.250                       | 0.875                       | 253.720                             |
|                                |                               | *                            | 26.000                       | 1.000                       | 288.630                             |

\*Non-scheduled wall

# Pipe Pile

| Nominal<br>O.D. in<br>inches | O.D. in<br>Inches | Nominal Wall<br>Thickness | Weight<br>#s/FT |
|------------------------------|-------------------|---------------------------|-----------------|
| 8 5/8                        | 8.625             | 0.250                     | 22.382          |
|                              |                   | 0.312                     | 27.786          |
|                              |                   | 0.375                     | 33.072          |
|                              |                   | 0.500                     | 43.428          |
|                              |                   | 0.625                     | 53.401          |
| 9 5/8                        | 9.625             | 0.250                     | 25.055          |
|                              |                   | 0.312                     | 31.139          |
|                              |                   | 0.375                     | 37.081          |
|                              |                   | 0.500                     | 48.773          |
|                              |                   | 0.625                     | 60.131          |
| 10 3/4                       | 10.750            | 0.250                     | 28.061          |
|                              |                   | 0.312                     | 34.890          |
|                              |                   | 0.365                     | 40.520          |
|                              |                   | 0.375                     | 41.591          |
|                              |                   | 0.500                     | 54.786          |
|                              |                   | 0.625                     | 67.648          |
|                              |                   | 0.690                     | 74.200          |
| 12                           | 12.000            | 0.250                     | 31.373          |
|                              |                   | 0.312                     | 39.068          |
|                              |                   | 0.375                     | 46.559          |
|                              |                   | 0.500                     | 61.411          |
|                              |                   | 0.625                     | 75.929          |
| 12 3/4                       | 12.750            | 0.250                     | 33.406          |
|                              |                   | 0.312                     | 41.575          |
|                              |                   | 0.375                     | 49.608          |
|                              |                   | 0.500                     | 65.476          |
|                              |                   | 0.625                     | 81.010          |
|                              |                   | 0.690                     | 88.960          |
|                              |                   | 0.750                     | 96.210          |
|                              |                   | 0.905                     | 114.590         |
| 14                           | 14.000            | 0.250                     | 36.747          |
|                              |                   | 0.312                     | 45.753          |
|                              |                   | 0.375                     | 54.619          |
|                              |                   | 0.500                     | 72.158          |
|                              |                   | 0.625                     | 89.362          |
|                              |                   | 0.750                     | 106.230         |
|                              |                   | 0.875                     | 122.770         |
|                              |                   | 1.000                     | 138.970         |
| 16                           | 16.000            | 0.250                     | 42.092          |
|                              |                   | 0.312                     | 52.439          |
|                              |                   | 0.375                     | 62.637          |
|                              |                   | 0.500                     | 82.848          |
|                              |                   | 0.625                     | 102.724         |
|                              |                   | 0.750                     | 122.270         |
|                              |                   | 0.875                     | 141.480         |
|                              |                   | 1.000                     | 160.350         |
| 18                           | 18.000            | 0.250                     | 47.437          |
|                              |                   | 0.312                     | 59.188          |
|                              |                   | 0.375                     | 70.654          |
|                              |                   | 0.500                     | 93.538          |
|                              |                   | 0.625                     | 116.087         |
|                              |                   | 0.750                     | 138.300         |
|                              |                   | 0.875                     | 160.180         |
|                              |                   | 1.000                     | 181.730         |

# Pipe Pile

| Nominal<br>O.D. in<br>inches | O.D. in<br>Inches | Nominal Wall<br>Thickness | Weight<br>#s/FT |
|------------------------------|-------------------|---------------------------|-----------------|
| 20                           | 20.000            | 0.250                     | 52.782          |
|                              |                   | 0.312                     | 65.810          |
|                              |                   | 0.375                     | 78.672          |
|                              |                   | 0.500                     | 104.228         |
|                              |                   | 0.625                     | 129.449         |
|                              |                   | 0.750                     | 154.340         |
|                              |                   | 0.875                     | 178.890         |
|                              |                   | 1.000                     | 203.110         |
| 24                           | 24.000            | 0.312                     | 79.010          |
|                              |                   | 0.375                     | 94.710          |
|                              |                   | 0.500                     | 125.610         |
|                              |                   | 0.625                     | 156.170         |
|                              |                   | 0.750                     | 186.410         |
|                              |                   | 0.875                     | 216.310         |
|                              |                   | 1.000                     | 245.870         |
| 28                           | 28.000            | 0.375                     | 110.740         |
|                              |                   | 0.500                     | 146.990         |
|                              |                   | 0.625                     | 182.900         |
|                              |                   | 0.750                     | 218.480         |
|                              |                   | 0.875                     | 253.720         |
|                              |                   | 1.000                     | 288.630         |



# **SPECIFICATIONS FOR CARBON STEEL STRUCTURAL TUBING**

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## **ASTM – A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.**

This specification covers cold-formed welded carbon steel round, square, rectangular, or special shape structural tubing for welded, riveted, or bolted construction of bridges and buildings, and for general structural purposes. Four grades are produced each having a different chemistry and tensile requirement.

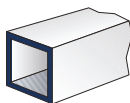
Structural Tubing is relatively low in cost, has a high strength-to-weight ratio and is easily welded, formed, punched and drilled. Its hollow shape protects and conceals wires, pipes, moving parts and it can be left exposed.

Grades B and C, being the most common stock available, can be subjected to most of the usual fabricating operations. Ductility is good. Bends well, flattens, cuts, punches, flares, flanges and welds easily.

## **ASTM – A1085 - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS).**

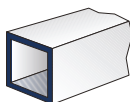
This specification covers cold-formed welded carbon steel hollow structural sections (HSS) for welded or bolted construction that are used in, although not limited to, buildings, bridges, towers, cranes, sign supports and poles, off-shore production and drilling platforms, roll-over protective structures (ROPS), falling object protective structures (FOPS), and amusement rides. This HSS is produced in welded sizes with a periphery of not more than 88 in. (2235 mm) as well as a specified nominal wall thickness of at least 0.148 in (3.8 mm) and not more than 0.875 in. (22 mm). The standard addresses areas such as ordering information, the steel-making process, HSS manufacture, heat analysis, product analysis, tensile requirements, flattening test, permissible variations in dimensions, number of tests, retests, test methods, rejection, certification, product marking, packing and loading, and government procurement.

# Square Tubing



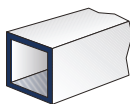
| Size in<br>Inches | Carbon Steel |         | Wt. Per Ft<br>in lbs. |
|-------------------|--------------|---------|-----------------------|
|                   | Average Wall |         |                       |
|                   | Gauge        | Decimal |                       |
| 1/2 x 1/2         | 16           | 0.065   | 0.385                 |
|                   | 14           | 0.083   | 0.470                 |
| 3/4 x 3/4         | 16           | 0.065   | 0.606                 |
|                   | 14           | 0.083   | 0.753                 |
|                   | 11           | 0.120   | 1.028                 |
|                   | 1/8          | 0.125   | 1.030                 |
| 1 x 1             | 16           | 0.065   | 0.827                 |
|                   | 14           | 0.083   | 1.035                 |
|                   | 1/8          | 0.125   | 1.436                 |
| 1 1/4 x 1 1/4     | 16           | 0.065   | 1.048                 |
|                   | 14           | 0.083   | 1.317                 |
|                   | 10           | 0.135   | 1.9667                |
|                   | 1/8          | 0.125   | 1.844                 |
|                   | 3/16         | 0.188   | 2.62                  |
|                   | 1/4          | 0.250   | 4.11                  |
| 1 1/2 x 1 1/2     | 16           | 0.065   | 1.269                 |
|                   | 14           | 0.083   | 1.60                  |
|                   | 1/8          | 0.125   | 2.252                 |
|                   | 3/16         | 0.188   | 3.04                  |
|                   | 1/4          | 0.250   | 4.11                  |
| 1 3/4 x 1 3/4     | 16           | 0.065   | 1.49                  |
|                   | 14           | 0.083   | 1.88                  |
|                   | 1/8          | 0.125   | 2.66                  |
|                   | 3/16         | 0.188   | 3.99                  |
| 2 x 2             | 16           | 0.065   | 1.7103                |
|                   | 14           | 0.083   | 2.163                 |
|                   | 1/8          | 0.125   | 3.067                 |
|                   | 3/16         | 0.188   | 4.32                  |
|                   | 1/4          | 0.250   | 5.41                  |
|                   | 5/16         | 0.313   | 6.32                  |
| 2 1/2 x 2 1/2     | 16           | 0.065   | 2.15                  |
|                   | 14           | 0.083   | 2.73                  |
|                   | 1/8          | 0.125   | 3.90                  |
|                   | 3/16         | 0.188   | 5.59                  |
|                   | 1/4          | 0.250   | 7.11                  |
|                   | 5/16         | 0.313   | 8.43                  |

# Square Tubing



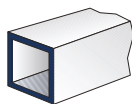
| Size in<br>Inches | Carbon Steel |         | Wt. Per Ft<br>in lbs. |
|-------------------|--------------|---------|-----------------------|
|                   | Average Wall |         |                       |
|                   | Gauge        | Decimal |                       |
| 3 x 3             | 16           | 0.065   | 2.59                  |
|                   | 14           | 0.083   | 3.26                  |
|                   | 1/8          | 0.125   | 4.75                  |
|                   | 3/16         | 0.188   | 6.87                  |
|                   | 1/4          | 0.250   | 8.81                  |
|                   | 5/16         | 0.313   | 10.58                 |
|                   | 3/8          | 0.375   | 12.17                 |
| 3 1/2 x 3 1/2     | 14           | 0.083   | 3.80                  |
|                   | 1/8          | 0.125   | 5.61                  |
|                   | 3/16         | 0.188   | 8.15                  |
|                   | 1/4          | 0.250   | 10.51                 |
|                   | 5/16         | 0.313   | 12.70                 |
|                   | 3/8          | 0.375   | 14.72                 |
| 4 x 4             | 1/8          | 0.125   | 6.46                  |
|                   | 3/16         | 0.188   | 9.42                  |
|                   | 1/4          | 0.250   | 12.21                 |
|                   | 5/16         | 0.313   | 14.83                 |
|                   | 3/8          | 0.375   | 17.27                 |
|                   | 1/2          | 0.500   | 21.63                 |
| 4 1/2 x 4 1/2     | 3/16         | 0.188   | 10.70                 |
|                   | 1/4          | 0.250   | 13.91                 |
|                   | 5/16         | 0.313   | 16.96                 |
|                   | 3/8          | 0.375   | 19.82                 |
|                   | 1/2          | 0.500   | 25.03                 |
| 5 x 5             | 3/16         | 0.188   | 11.97                 |
|                   | 1/4          | 0.250   | 15.62                 |
|                   | 5/16         | 0.313   | 19.08                 |
|                   | 3/8          | 0.375   | 22.37                 |
|                   | 1/2          | 0.500   | 28.43                 |
| 5 1/2 x 5 1/2     | 3/16         | 0.188   | 13.30                 |
|                   | 1/4          | 0.250   | 17.32                 |
|                   | 5/16         | 0.313   | 21.22                 |
|                   | 3/8          | 0.375   | 24.93                 |
|                   | 1/2          | 0.500   | 31.84                 |
| 6 x 6             | 3/16         | 0.188   | 14.53                 |
|                   | 1/4          | 0.250   | 19.02                 |
|                   | 5/16         | 0.313   | 23.34                 |
|                   | 3/8          | 0.375   | 27.48                 |
|                   | 1/2          | 0.500   | 35.24                 |
|                   | 5/8          | 0.625   | 42.30                 |

# Square Tubing

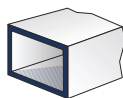


| Size in<br>Inches | Carbon Steel |         | Wt. Per Ft<br>in lbs. |
|-------------------|--------------|---------|-----------------------|
|                   | Average Wall |         |                       |
|                   | Gauge        | Decimal |                       |
| 7 x 7             | 3/16         | 0.188   | 17.08                 |
|                   | 1/4          | 0.250   | 22.42                 |
|                   | 5/16         | 0.313   | 27.59                 |
|                   | 3/8          | 0.375   | 32.58                 |
|                   | 1/2          | 0.500   | 42.05                 |
|                   | 5/8          | 0.625   | 50.81                 |
| 8 x 8             | 3/16         | 0.188   | 19.63                 |
|                   | 1/4          | 0.250   | 25.82                 |
|                   | 5/16         | 0.313   | 31.84                 |
|                   | 3/8          | 0.375   | 37.69                 |
|                   | 1/2          | 0.500   | 48.85                 |
|                   | 5/8          | 0.625   | 59.32                 |
| 9 x 9             | 1/4          | 0.250   | 29.23                 |
|                   | 5/16         | 0.313   | 36.12                 |
|                   | 3/8          | 0.375   | 42.79                 |
|                   | 1/2          | 0.500   | 55.66                 |
|                   | 5/8          | 0.625   | 67.82                 |
| 10 x 10           | 3/16         | 0.188   | 24.73                 |
|                   | 1/4          | 0.250   | 32.63                 |
|                   | 5/16         | 0.313   | 40.35                 |
|                   | 3/8          | 0.375   | 47.90                 |
|                   | 1/2          | 0.500   | 62.46                 |
|                   | 5/8          | 0.625   | 76.33                 |
|                   | 3/4          | 0.750   | 89.50                 |
| 12 x 12           | 3/16         | 0.188   | 29.84                 |
|                   | 1/4          | 0.250   | 39.43                 |
|                   | 5/16         | 0.313   | 48.86                 |
|                   | 3/8          | 0.375   | 58.10                 |
|                   | 1/2          | 0.500   | 76.07                 |
|                   | 5/8          | 0.625   | 93.34                 |
|                   | 3/4          | 0.750   | 109.91                |
| 14 x 14           | 5/16         | 0.313   | 57.36                 |
|                   | 3/8          | 0.375   | 68.31                 |
|                   | 1/2          | 0.500   | 89.68                 |
|                   | 5/8          | 0.625   | 110.36                |
|                   | 3/4          | 0.750   | 130.33                |
|                   | 7/8          | 0.875   | 149.61                |
|                   | 1            | 1.000   | 168.18                |

# Square Tubing

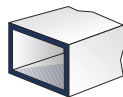


| Size in<br><br>Inches | Carbon Steel |         | Wt. Per Ft<br><br>in lbs. |
|-----------------------|--------------|---------|---------------------------|
|                       | Average Wall |         |                           |
|                       | Gauge        | Decimal |                           |
| 16 x 16               | 5/16         | 0.313   | 65.87                     |
|                       | 3/8          | 0.375   | 78.52                     |
|                       | 1/2          | 0.500   | 103.30                    |
|                       | 5/8          | 0.625   | 127.37                    |
|                       | 3/4          | 0.750   | 150.75                    |
|                       | 7/8          | 0.875   | 173.43                    |
|                       | 1            | 1.000   | 195.40                    |
| 18 x 18               | 3/8          | 0.375   | 88.73                     |
|                       | 1/2          | 0.500   | 116.91                    |
|                       | 5/8          | 0.625   | 144.39                    |
|                       | 3/4          | 0.750   | 171.16                    |
|                       | 7/8          | 0.875   | 197.24                    |
|                       | 1            | 1.000   | 222.63                    |
| 20 x 20               | 3/8          | 0.375   | 98.94                     |
|                       | 1/2          | 0.500   | 130.52                    |
|                       | 5/8          | 0.625   | 161.40                    |
|                       | 3/4          | 0.750   | 191.58                    |
|                       | 7/8          | 0.875   | 221.06                    |
|                       | 1            | 1.000   | 249.85                    |
| 22 x 22               | 1/2          | 0.500   | 144.13                    |
|                       | 5/8          | 0.625   | 178.41                    |
|                       | 3/4          | 0.750   | 212.00                    |
|                       | 7/8          | 0.875   | 244.88                    |
|                       | 1            | 1.000   | 277.07                    |



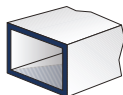
# Rectangular Tubing

| Size in<br>Inches | Carbon Steel |         | Wt. Per Ft<br>in lbs. |
|-------------------|--------------|---------|-----------------------|
|                   | Average Wall |         |                       |
|                   | Gauge        | Decimal |                       |
| 1 1/2 x 1         | 16           | 0.065   | 1.05                  |
|                   | 14           | 0.083   | 1.32                  |
|                   | 1/8          | 0.125   | 1.84                  |
| 2 x 1             | 16           | 0.065   | 1.27                  |
|                   | 14           | 0.083   | 1.60                  |
|                   | 1/8          | 0.125   | 2.25                  |
|                   | 3/16         | 0.188   | 3.40                  |
| 2 x 1 1/2         | 16           | 0.065   | 1.49                  |
|                   | 14           | 0.083   | 1.88                  |
|                   | 1/8          | 0.125   | 2.63                  |
|                   | 3/16         | 0.188   | 3.68                  |
| 2 1/2 x 1         | 16           | 0.065   | 1.49                  |
|                   | 14           | 0.083   | 1.88                  |
|                   | 1/8          | 0.125   | 2.66                  |
| 2 1/2 x 1 1/2     | 16           | 0.065   | 1.69                  |
|                   | 14           | 0.083   | 2.16                  |
|                   | 1/8          | 0.125   | 3.06                  |
|                   | 3/16         | 0.188   | 4.32                  |
|                   | 1/4          | 0.250   | 5.41                  |
| 3 x 1             | 16           | 0.065   | 1.71                  |
|                   | 14           | 0.083   | 2.16                  |
|                   | 1/8          | 0.125   | 3.06                  |
|                   | 3/16         | 0.188   | 4.31                  |
|                   | 1/4          | 0.250   | 5.41                  |
| 3 x 1 1/2         | 16           | 0.065   | 1.93                  |
|                   | 14           | 0.083   | 2.45                  |
|                   | 1/8          | 0.125   | 3.48                  |
|                   | 3/16         | 0.188   | 4.97                  |
|                   | 1/4          | 0.250   | 6.26                  |
| 3 x 2             | 16           | 0.065   | 2.15                  |
|                   | 14           | 0.083   | 2.73                  |
|                   | 1/8          | 0.125   | 3.90                  |
|                   | 3/16         | 0.188   | 5.59                  |
|                   | 1/4          | 0.250   | 7.11                  |
|                   | 5/16         | 0.313   | 8.45                  |
| 3 x 2 1/2         | 14           | 0.083   | 3.01                  |
|                   | 1/8          | 0.125   | 4.29                  |
|                   | 3/16         | 0.188   | 6.29                  |
|                   | 1/4          | 0.250   | 7.96                  |



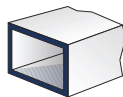
# Rectangular Tubing

| Size in<br>Inches | Carbon Steel |         | Wt. Per Ft<br>in lbs. |
|-------------------|--------------|---------|-----------------------|
|                   | Average Wall |         |                       |
|                   | Gauge        | Decimal |                       |
| 3 1/2 x 1 1/2     | 16           | 0.065   | 2.15                  |
|                   | 14           | 0.083   | 2.75                  |
|                   | 1/8          | 0.125   | 3.90                  |
|                   | 3/16         | 0.188   | 5.59                  |
|                   | 1/4          | 0.250   | 7.11                  |
| 3 1/2 x 2         | 14           | 0.083   | 3.01                  |
|                   | 1/8          | 0.125   | 4.29                  |
|                   | 3/16         | 0.188   | 6.29                  |
| 3 1/2 x 2 1/2     | 16           | 0.065   | 2.59                  |
|                   | 14           | 0.083   | 3.26                  |
|                   | 1/8          | 0.125   | 4.75                  |
|                   | 3/16         | 0.188   | 6.87                  |
|                   | 1/4          | 0.250   | 8.81                  |
|                   | 5/16         | 0.313   | 10.58                 |
| 4 x 2             | 16           | 0.065   | 2.59                  |
|                   | 14           | 0.083   | 3.29                  |
|                   | 1/8          | 0.125   | 4.75                  |
|                   | 3/16         | 0.188   | 6.87                  |
|                   | 1/4          | 0.250   | 8.81                  |
|                   | 5/16         | 0.313   | 10.58                 |
|                   | 3/8          | 0.375   | 12.17                 |
| 4 x 2 1/2         | 14           | 0.083   | 3.55                  |
|                   | 1/8          | 0.125   | 5.18                  |
|                   | 3/16         | 0.188   | 7.51                  |
|                   | 1/4          | 0.250   | 9.66                  |
| 4 x 3             | 14           | 0.083   | 3.80                  |
|                   | 1/8          | 0.125   | 5.61                  |
|                   | 3/16         | 0.188   | 8.15                  |
|                   | 1/4          | 0.250   | 10.51                 |
|                   | 5/16         | 0.313   | 12.70                 |
|                   | 3/8          | 0.375   | 14.71                 |
| 4 1/2 x 2         | 14           | 0.083   | 3.55                  |
|                   | 1/8          | 0.125   | 5.11                  |
|                   | 3/16         | 0.188   | 7.48                  |
|                   | 1/4          | 0.250   | 9.65                  |
| 5 x 2             | 14           | 0.083   | 3.80                  |
|                   | 1/8          | 0.125   | 5.61                  |
|                   | 3/16         | 0.188   | 8.15                  |
|                   | 1/4          | 0.250   | 10.51                 |
|                   | 5/16         | 0.313   | 12.70                 |
|                   | 3/8          | 0.375   | 14.71                 |



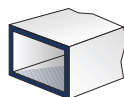
# Rectangular Tubing

| Size in<br>Inches | Carbon Steel |         | Wt. Per Ft<br>in lbs. |
|-------------------|--------------|---------|-----------------------|
|                   | Average Wall |         |                       |
|                   | Gauge        | Decimal |                       |
| 5 x 2 1/2         | 1/8          | 0.125   | 6.03                  |
|                   | 3/16         | 0.188   | 8.78                  |
|                   | 1/4          | 0.250   | 11.36                 |
| 5 x 3             | 1/8          | 1.250   | 6.46                  |
|                   | 3/16         | 1.880   | 9.42                  |
|                   | 1/4          | 0.250   | 12.21                 |
|                   | 5/16         | 0.313   | 14.83                 |
|                   | 3/8          | 0.357   | 17.27                 |
|                   | 1/2          | 0.500   | 21.63                 |
|                   | 5/8          | 0.625   | 25.26                 |
| 5 x 4             | 1/8          | 0.125   | 7.31                  |
|                   | 3/16         | 0.188   | 10.70                 |
|                   | 1/4          | 0.250   | 13.91                 |
|                   | 5/16         | 0.313   | 16.96                 |
|                   | 3/8          | 0.375   | 19.82                 |
|                   | 1/2          | 0.500   | 25.03                 |
| 6 x 2             | 1/8          | 0.125   | 6.46                  |
|                   | 3/16         | 0.188   | 9.42                  |
|                   | 1/4          | 0.250   | 12.21                 |
|                   | 5/16         | 0.313   | 14.83                 |
|                   | 3/8          | 0.375   | 17.27                 |
| 6 x 3             | 1/8          | 0.125   | 7.31                  |
|                   | 3/16         | 0.188   | 10.70                 |
|                   | 1/4          | 0.250   | 13.91                 |
|                   | 5/16         | 0.313   | 16.96                 |
|                   | 3/8          | 0.375   | 19.82                 |
|                   | 1/2          | 0.500   | 25.03                 |
| 6 x 4             | 1/8          | 0.125   | 8.16                  |
|                   | 3/16         | 0.188   | 11.97                 |
|                   | 1/4          | 0.250   | 15.62                 |
|                   | 5/16         | 0.313   | 19.08                 |
|                   | 3/8          | 0.375   | 22.37                 |
|                   | 1/2          | 0.500   | 28.43                 |
| 6 x 5             | 3/16         | 0.188   | 13.30                 |
|                   | 1/4          | 0.250   | 17.32                 |
|                   | 5/16         | 0.313   | 21.22                 |
|                   | 3/8          | 0.375   | 24.93                 |
|                   | 1/2          | 0.500   | 31.84                 |



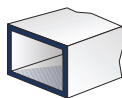
# Rectangular Tubing

| Size in<br>Inches | Carbon Steel |         | Wt. Per Ft<br>in lbs. |
|-------------------|--------------|---------|-----------------------|
|                   | Average Wall |         |                       |
|                   | Gauge        | Decimal |                       |
| 7 x 3             | 3/16         | 0.188   | 11.97                 |
|                   | 1/4          | 0.250   | 15.62                 |
|                   | 5/16         | 0.313   | 19.08                 |
|                   | 3/8          | 0.375   | 22.37                 |
|                   | 1/2          | 0.500   | 28.43                 |
| 7 x 4             | 3/16         | 0.188   | 13.30                 |
|                   | 1/4          | 0.250   | 17.32                 |
|                   | 5/16         | 0.313   | 21.22                 |
|                   | 3/8          | 0.375   | 24.93                 |
|                   | 1/2          | 0.500   | 31.84                 |
| 7 x 5             | 3/16         | 0.188   | 14.53                 |
|                   | 1/4          | 0.250   | 19.02                 |
|                   | 5/16         | 0.313   | 23.34                 |
|                   | 3/8          | 0.375   | 27.48                 |
|                   | 1/2          | 0.500   | 35.24                 |
|                   | 5/8          | 0.625   | 42.30                 |
| 8 x 2             | 3/16         | 0.188   | 11.97                 |
|                   | 1/4          | 0.250   | 15.62                 |
|                   | 5/16         | 0.313   | 19.08                 |
|                   | 3/8          | 0.375   | 22.37                 |
| 8 x 3             | 3/16         | 0.188   | 13.30                 |
|                   | 1/4          | 0.250   | 17.32                 |
|                   | 5/16         | 0.313   | 21.22                 |
|                   | 3/8          | 0.375   | 24.93                 |
|                   | 1/2          | 0.500   | 31.81                 |
| 8 x 4             | 3/16         | 0.188   | 14.53                 |
|                   | 1/4          | 0.250   | 19.02                 |
|                   | 5/16         | 0.313   | 23.34                 |
|                   | 3/8          | 0.375   | 27.48                 |
|                   | 1/2          | 0.500   | 35.24                 |
|                   | 5/8          | 0.625   | 42.26                 |
| 8 x 6             | 3/16         | 0.188   | 17.11                 |
|                   | 1/4          | 0.250   | 22.42                 |
|                   | 5/16         | 0.313   | 27.59                 |
|                   | 3/8          | 0.375   | 32.58                 |
|                   | 1/2          | 0.500   | 42.05                 |
|                   | 5/8          | 0.625   | 50.81                 |



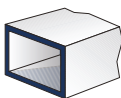
# Rectangular Tubing

| Size in<br>Inches | Carbon Steel |         | Wt. Per Ft<br>in lbs. |
|-------------------|--------------|---------|-----------------------|
|                   | Average Wall |         |                       |
|                   | Gauge        | Decimal |                       |
| 9 x 3             | 1/4          | 0.250   | 19.02                 |
|                   | 5/16         | 0.313   | 23.34                 |
|                   | 3/8          | 0.375   | 27.48                 |
|                   | 1/2          | 0.500   | 35.24                 |
| 9 x 5             | 5/16         | 0.313   | 27.59                 |
|                   | 3/8          | 0.375   | 32.58                 |
|                   | 1/4          | 0.250   | 22.42                 |
|                   | 1/2          | 0.500   | 42.05                 |
|                   | 5/8          | 0.625   | 50.81                 |
| 9 x 7             | 3/16         | 0.188   | 19.63                 |
|                   | 1/4          | 0.250   | 25.82                 |
|                   | 5/16         | 0.313   | 31.86                 |
|                   | 3/8          | 0.375   | 37.69                 |
|                   | 1/2          | 0.500   | 48.85                 |
|                   | 5/8          | 0.625   | 59.32                 |
| 10 x 2            | 3/16         | 0.188   | 14.55                 |
|                   | 1/4          | 0.250   | 19.02                 |
|                   | 5/16         | 0.313   | 23.34                 |
|                   | 3/8          | 0.375   | 27.48                 |
| 10 x 3            | 3/16         | 0.188   | 15.80                 |
|                   | 1/4          | 0.250   | 20.72                 |
|                   | 5/16         | 0.313   | 25.46                 |
|                   | 3/8          | 0.375   | 30.03                 |
| 10 x 4            | 3/16         | 0.188   | 17.08                 |
|                   | 1/4          | 0.250   | 22.42                 |
|                   | 5/16         | 0.313   | 27.59                 |
|                   | 3/8          | 0.375   | 32.58                 |
|                   | 1/2          | 0.500   | 42.05                 |
|                   | 5/8          | 0.625   | 50.76                 |
| 10 x 5            | 3/16         | 0.188   | 18.35                 |
|                   | 1/4          | 0.250   | 24.12                 |
|                   | 5/16         | 0.313   | 29.72                 |
|                   | 3/8          | 0.375   | 35.13                 |
|                   | 1/2          | 0.500   | 45.45                 |
| 10 x 6            | 3/16         | 0.188   | 19.66                 |
|                   | 1/4          | 0.250   | 25.82                 |
|                   | 5/16         | 0.313   | 31.84                 |
|                   | 3/8          | 0.375   | 37.69                 |
|                   | 1/2          | 0.500   | 48.85                 |
|                   | 5/8          | 0.625   | 59.32                 |
| 10 x 8            | 3/16         | 0.188   | 22.22                 |
|                   | 1/4          | 0.250   | 29.23                 |
|                   | 5/16         | 0.313   | 36.10                 |
|                   | 3/8          | 0.375   | 42.79                 |
|                   | 1/2          | 0.500   | 55.66                 |



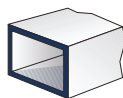
# Rectangular Tubing

| Size in<br>Inches | Carbon Steel |         | Wt. Per Ft<br>in lbs. |
|-------------------|--------------|---------|-----------------------|
|                   | Average Wall |         |                       |
|                   | Gauge        | Decimal |                       |
| 12 x 2            | 3/16         | 0.188   | 17.11                 |
|                   | 1/4          | 0.250   | 22.42                 |
|                   | 5/16         | 0.313   | 27.59                 |
|                   | 3/8          | 0.375   | 32.58                 |
| 12 x 3            | 3/16         | 0.188   | 18.40                 |
|                   | 1/4          | 0.250   | 24.10                 |
|                   | 5/16         | 0.313   | 29.70                 |
|                   | 3/8          | 0.375   | 35.13                 |
| 12 x 4            | 3/16         | 0.188   | 19.66                 |
|                   | 1/4          | 0.250   | 25.82                 |
|                   | 5/16         | 0.313   | 31.84                 |
|                   | 3/8          | 0.375   | 37.69                 |
|                   | 1/2          | 0.500   | 48.85                 |
|                   | 5/8          | 0.625   | 59.32                 |
| 12 x 6            | 3/16         | 0.188   | 22.22                 |
|                   | 1/4          | 0.250   | 29.23                 |
|                   | 5/16         | 0.313   | 36.10                 |
|                   | 3/8          | 0.375   | 42.79                 |
|                   | 1/2          | 0.500   | 55.66                 |
|                   | 5/8          | 0.625   | 67.82                 |
| 12 x 8            | 3/16         | 0.188   | 24.77                 |
|                   | 1/4          | 0.250   | 32.63                 |
|                   | 5/16         | 0.313   | 40.35                 |
|                   | 3/8          | 0.375   | 47.90                 |
|                   | 1/2          | 0.500   | 62.46                 |
|                   | 5/8          | 0.625   | 76.33                 |
| 12 x 10           | 1/4          | 0.250   | 36.03                 |
|                   | 5/16         | 0.313   | 44.70                 |
|                   | 3/8          | 0.375   | 53.00                 |
|                   | 1/2          | 0.500   | 69.27                 |
| 14 x 4            | 3/16         | 0.188   | 22.22                 |
|                   | 1/4          | 0.250   | 29.23                 |
|                   | 5/16         | 0.313   | 36.10                 |
|                   | 3/8          | 0.375   | 42.79                 |
|                   | 1/2          | 0.500   | 55.66                 |
|                   | 5/8          | 0.625   | 67.82                 |
| 14 x 6            | 3/16         | 0.188   | 24.77                 |
|                   | 1/4          | 0.250   | 32.63                 |
|                   | 5/16         | 0.313   | 40.35                 |
|                   | 3/8          | 0.375   | 47.90                 |
|                   | 1/2          | 0.500   | 62.46                 |
|                   | 5/8          | 0.625   | 76.33                 |



# Rectangular Tubing

| Size in<br>Inches | Carbon Steel |         | Wt. Per Ft<br>in lbs. |
|-------------------|--------------|---------|-----------------------|
|                   | Average Wall |         |                       |
|                   | Gauge        | Decimal |                       |
| 14 x 10           | 1/4          | 0.250   | 39.43                 |
|                   | 5/16         | 0.313   | 48.86                 |
|                   | 3/8          | 0.375   | 58.10                 |
|                   | 1/2          | 0.500   | 76.07                 |
|                   | 5/8          | 0.625   | 93.34                 |
|                   | 3/4          | 0.750   | 109.91                |
|                   | 7/8          | 0.875   | 125.79                |
| 16 x 4            | 1/4          | 0.250   | 32.63                 |
|                   | 5/16         | 0.313   | 40.35                 |
|                   | 3/8          | 0.375   | 47.90                 |
|                   | 1/2          | 0.500   | 62.46                 |
|                   | 5/8          | 0.625   | 76.33                 |
| 16 x 8            | 1/4          | 0.250   | 39.43                 |
|                   | 5/16         | 0.313   | 48.86                 |
|                   | 3/8          | 0.375   | 58.10                 |
|                   | 1/2          | 0.500   | 76.07                 |
|                   | 5/8          | 0.625   | 93.34                 |
|                   | 3/4          | 0.750   | 109.91                |
|                   | 7/8          | 0.875   | 125.79                |
| 16 x 12           | 5/16         | 0.313   | 57.36                 |
|                   | 3/8          | 0.375   | 68.31                 |
|                   | 1/2          | 0.500   | 89.68                 |
|                   | 5/8          | 0.625   | 110.36                |
|                   | 3/4          | 0.750   | 130.33                |
|                   | 7/8          | 0.875   | 149.61                |
|                   | 1            | 1.000   | 168.18                |
| 18 x 6            | 1/4          | 0.250   | 39.43                 |
|                   | 5/16         | 0.313   | 48.86                 |
|                   | 3/8          | 0.375   | 58.10                 |
|                   | 1/2          | 0.500   | 76.07                 |
|                   | 5/8          | 0.625   | 93.34                 |
|                   | 3/4          | 0.750   | 109.91                |
| 20 x 4            | 1/4          | 0.250   | 39.43                 |
|                   | 5/16         | 0.313   | 48.86                 |
|                   | 3/8          | 0.375   | 58.10                 |
|                   | 1/2          | 0.500   | 76.07                 |
| 20 x 8            | 5/16         | 0.313   | 57.36                 |
|                   | 3/8          | 0.375   | 68.31                 |
|                   | 1/2          | 0.500   | 89.68                 |
|                   | 5/8          | 0.625   | 110.36                |
|                   | 3/4          | 0.750   | 130.33                |
|                   | 7/8          | 0.875   | 149.61                |
|                   | 1            | 1.000   | 168.18                |



# Rectangular Tubing

| Size in<br>Inches | Carbon Steel |         | Wt. Per Ft<br>in lbs. |
|-------------------|--------------|---------|-----------------------|
|                   | Average Wall |         |                       |
|                   | Gauge        | Decimal |                       |
| 20 x 12           | 5/16         | 0.313   | 65.87                 |
|                   | 3/8          | 0.375   | 78.52                 |
|                   | 1/2          | 0.500   | 103.30                |
|                   | 5/8          | 0.625   | 127.38                |
|                   | 3/4          | 0.750   | 150.75                |
|                   | 7/8          | 0.875   | 173.43                |
|                   | 1            | 1.000   | 195.40                |
| 24 x 12           | 3/8          | 0.375   | 88.73                 |
|                   | 1/2          | 0.500   | 116.91                |
|                   | 5/8          | 0.625   | 144.39                |
|                   | 3/4          | 0.750   | 171.16                |
|                   | 7/8          | 0.875   | 197.24                |
|                   | 1            | 1.000   | 222.63                |
| 30 x 10           | 1/2          | 0.500   | 130.52                |
|                   | 5/8          | 0.625   | 161.40                |
|                   | 3/4          | 0.750   | 191.58                |
|                   | 7/8          | 0.875   | 221.06                |
|                   | 1            | 1.000   | 249.85                |
| 34 x 10           | 5/8          | 0.625   | 178.41                |
|                   | 3/4          | 0.750   | 212.00                |
|                   | 7/8          | 0.875   | 244.88                |
|                   | 1            | 1.000   | 277.07                |



# VALUE-ADDED SERVICES

Infra-Metals, with locations throughout the Eastern, Mid-Western, South-Western and Southern United States, is committed to meet the ever changing needs of our customers. Our first stage processing capabilities are structured to serve all facets of the steel industry, including structural, miscellaneous, bridge and marine fabrication as well as original equipment manufacturers.

Value-Added equipment and services are tailored to our customers' needs and requirements to help reduce overall costs through better planning, material utilization, "just in time delivery", and reduced handling.

| Process Capabilities: | Description                                                                                                                                                                                                                          |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Burning               | CNC Burning Machines with tables up to 16' wide and 85' long<br><br>Oxy fuel / plasma<br><br>Plasma Beveling .25"-2" Thick, Plasma Arc marking<br><br>CNC programming from DXF files, NC1 files, auto cad or in house CAD programmer |
| Drilling              | 5/16" diameter up to 3-1/4" diameter in up to 8" plate<br><br>Tap, Counter Sink, Counter Bore & Milling                                                                                                                              |
| Saws                  | Automated Saws with cross Transfer Conveyor systems for Structural cutting up to 40" Wide Flange Beam Sections<br><br>Miter Cutting up to 60 Degrees                                                                                 |
| Camber                | Cold Camber thru W40 X 397                                                                                                                                                                                                           |
| Press Brake           | 2200 ton press brake capable of bending up to 3/4" plate 60' long                                                                                                                                                                    |
| Blast & Paint         | Blast & Paint line capable of 1/4" thru 2" plate up to 12' wide by 40' long As well as channels angles and beams up to 17.75" high and 41" wide.                                                                                     |
| T Splitter            | Rotary Beam Splitter with capacity of 36" sections with straightening capabilities                                                                                                                                                   |
| Ironworker            | Ironworkers up to 165 ton capacity                                                                                                                                                                                                   |
| Angle Roll            | Roll angles up to 6" x 6" x 3/8"                                                                                                                                                                                                     |

In addition we subcontract additional processing including machining, galvanizing, sandblasting, painting, forming, shearing and rolling of plate and structural sections.

Infra-Metals Overview Video: <https://www.youtube.com/user/inframetals1>





# A.I.S.C.

## HOT-ROLLED STRUCTURAL STEEL

### SHAPE DESIGNATIONS

| New Designation                                                                                                                                                                                                                                                                       | Type of Shape                                                       | Old Designation                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| W 24 x 76<br>W 14 x 26                                                                                                                                                                                                                                                                | W shape                                                             | 24 WF 76<br>14 B 26                                                                                                                                                                                                                                                                   |
| S 24 x 100                                                                                                                                                                                                                                                                            | S shape                                                             | 24 I 100                                                                                                                                                                                                                                                                              |
| M 8 x 18.5<br>M 10 x 9<br>M 8 x 34.3                                                                                                                                                                                                                                                  | M shape                                                             | 8 M 18.5<br>10 JR 9.0<br>8 x 8 M 34.3                                                                                                                                                                                                                                                 |
| C 12 x 20.7                                                                                                                                                                                                                                                                           | American Std. Channel                                               | 12 C 20.7                                                                                                                                                                                                                                                                             |
| MC 12 x 45<br>MC 12 x 10.6                                                                                                                                                                                                                                                            | Miscellaneous Channel                                               | 12 x 4 C 45.0<br>12 JR C 10.6                                                                                                                                                                                                                                                         |
| HP 14 x 73                                                                                                                                                                                                                                                                            | HP shape                                                            | 14 BP 73                                                                                                                                                                                                                                                                              |
| L 6 x 6 x <sup>3</sup> / <sub>4</sub><br>L 6 x 4 x <sup>5</sup> / <sub>8</sub>                                                                                                                                                                                                        | Equal Leg Angle<br>Unequal Leg Angle                                | L 6 x 6 x <sup>3</sup> / <sub>4</sub><br>L 6 x 4 x <sup>5</sup> / <sub>8</sub>                                                                                                                                                                                                        |
| WT 12 x 38<br>WT 7 x 13                                                                                                                                                                                                                                                               | Structural Tee<br>Cut from W shape                                  | ST 12 WF 38<br>ST 7 B 13                                                                                                                                                                                                                                                              |
| ST 12 x 50                                                                                                                                                                                                                                                                            | Cut from S shape                                                    | ST 12 I 50                                                                                                                                                                                                                                                                            |
| MT 4 x 9.25<br>MT 5 x 4.5<br>MT 4 x 17.15                                                                                                                                                                                                                                             | Cut from M shape                                                    | ST 4 M 9.25<br>ST 5 JR 4.5<br>ST 4 M 17.15                                                                                                                                                                                                                                            |
| PL <sup>1</sup> / <sub>2</sub> x 18                                                                                                                                                                                                                                                   | Plate                                                               | PL 18 x <sup>1</sup> / <sub>2</sub>                                                                                                                                                                                                                                                   |
| Bar 1 <br>Bar 1 <sup>1</sup> / <sub>4</sub> <br>Bar 2 <sup>1</sup> / <sub>2</sub> x <sup>1</sup> / <sub>2</sub> | Square Bar<br>Round Bar<br>Flat Bar                                 | Bar 1 <br>Bar 1 <sup>1</sup> / <sub>4</sub> <br>Bar 2 <sup>1</sup> / <sub>2</sub> x <sup>1</sup> / <sub>2</sub> |
| Pipe 4 Std.<br>Pipe 4 X. Strong<br>Pipe 4 xx . Strong<br>TS 4 x 4 x .375                                                                                                                                                                                                              | Pipe<br><br>Structural Tubing:<br>Square<br>Rectangular<br>Circular | Pipe 4 Std.<br>Pipe 4 x-Strong<br>Pipe 4 xx-Strong<br><br>Tube 4 x 4 x .375<br>Tube 5 x 3 x .375<br>Tube 3 OD x .250                                                                                                                                                                  |

# Approximate Minimum Mechanical Properties of Some Steels

## Hot Rolled - Cold Drawn - Annealed - Quenched & Tempered at 1000° F.

The following table represents an average of results obtained from a large number of tests and is offered only as a guide. In accordance with standard procedure, the specimens used were 1 " diameter. Under no condition do we guarantee these statistics to be accurate.

The section size, finishing temperature and cooling rate during the rolling process influence the final mechanical properties of any steel in the As-Rolled condition. The amount of size reduction in cold drawing will affect the mechanical properties of Cold Drawn Bars. Turned and Polished as well as Turned, Ground & Polished Bars have approximately the same mechanical properties as the Hot Rolled Bars from which they were produced.

| Approximate mechanical properties                                    |                |                        |            |      |           |               |          |       |               |
|----------------------------------------------------------------------|----------------|------------------------|------------|------|-----------|---------------|----------|-------|---------------|
| (Tensile and Yield Expressed in Thousands of Pounds Per Square Inch) |                |                        |            |      |           |               |          |       |               |
| AISI Grade                                                           | Con-<br>dition | Machin-<br>ability     | Strength   |      | Ductility |               | Hardness |       |               |
|                                                                      |                | 1212<br>equals<br>100% | S.F.<br>M. | T.S. | Y.P.      | EL<br>2"<br>% | RA       | Brnl. | Rock-<br>well |
| 1018                                                                 | H.R.           | 52                     | 86         | 58   | 32        | 25            | 50       | 116   | 68B           |
| 1018                                                                 | C.D.           | 65                     | 107        | 64   | 54        | 15            | 40       | 126   | 72B           |
| M1020                                                                | H.R.           | 50                     | 83         | 55   | 30        | 25            | 50       | 110   | 66B           |
| 1035                                                                 | H.R.           | 65                     | 107        | 70   | 30        | 20            | 35       | 155   | 83B           |
| 1035                                                                 | C.D.           | 67                     | 111        | 90   | 75        | 10            | 40       | 170   | 87B           |
| 1035                                                                 | Q&T            |                        |            | 95   | 70        | 19            | 55       | 191   | 92B           |
| 1042                                                                 | H.R.           | 61                     | 101        | 80   | 50        | 15            | 35       | 175   | 88B           |
| 1042                                                                 | C.D.           | 63                     | 104        | 90   | 75        | 12            | 30       | 185   | 91B           |
| 1042                                                                 | Q&T            |                        |            | 105  | 80        | 15            | 40       | 215   | 96B           |
| M1044                                                                | H.R.           | 53                     | 87         | 82   | 49        | 15            | 30       | 170   | 87B           |
| 1045                                                                 | H.R.           | 56                     | 92         | 85   | 50        | 15            | 30       | 175   | 88B           |
| 1045                                                                 | C.D.           | 60                     | 99         | 90   | 80        | 10            | 30       | 195   | 93B           |
| 1045                                                                 | Q&T            |                        |            | 110  | 80        | 16            | 40       | 230   | 98B           |
| 1095                                                                 | H.R.A          | 45                     | 74         | 90   | 55        | 15            | 40       | 190   | 90B           |
| 1095                                                                 | Q&T            |                        |            | 170  | 120       | 10            | 30       | 360   | 39C           |
| 1117                                                                 | H.R.           | 85                     | 140        | 60   | 35        | 20            | 45       | 115   | 68B           |
| 1117                                                                 | C.D.           | 90                     | 149        | 75   | 60        | 15            | 40       | 143   | 79B           |
| 11L17                                                                | H.R.           | 92                     | 152        | 60   | 35        | 20            | 45       | 115   | 68B           |
| 11L17                                                                | C.D.           | 100                    | 165        | 75   | 60        | 15            | 40       | 143   | 79B           |
| 1137                                                                 | H.R.           | 70                     | 116        | 85   | 50        | 18            | 35       | 179   | 89B           |
| 1137                                                                 | C.D.           | 75                     | 121        | 100  | 85        | 10            | 30       | 197   | 93B           |
| 1137                                                                 | Q&T            |                        |            | 110  | 85        | 15            | 40       | 250   | 24C           |
| 1141                                                                 | H.R.           | 65                     | 107        | 90   | 60        | 15            | 25       | 180   | 89B           |
| 1141                                                                 | C.D.           | 70                     | 116        | 100  | 85        | 8             | 20       | 195   | 93B           |
| 1141                                                                 | Q&T            |                        |            | 120  | 100       | 10            | 35       | 270   | 28C           |
| 1144                                                                 | H.R.           | 75                     | 124        | 95   | 60        | 15            | 30       | 200   | 94B           |
| 1144                                                                 | C.D.           | 85                     | 110        | 100  | 90        | 7             | 20       | 210   | 96B           |
| 1144                                                                 | Q&T            |                        |            | 130  | 110       | 15            | 45       | 286   | 30C           |
| 1212                                                                 | C.D.           | 100                    | 165        | 80   | 70        | 10            | 40       | 170   | 87B           |
| 1213                                                                 | C.D.           | 150                    | 248        | 80   | 70        | 10            | 40       | 170   | 87B           |
| B1113                                                                | C.D.           | 150                    | 248        | 80   | 70        | 10            | 40       | 170   | 87B           |
| 12L14                                                                | C.D.           | 170                    | 281        | 60   | 55        | 12            | 40       | 150   | 81B           |
| (Type A Leaded)                                                      |                |                        |            |      |           |               |          |       |               |
| 12L14                                                                | C.D.           | 215                    | 355        | 60   | 55        | 12            | 40       | 150   | 81B           |
| Selenium Treated                                                     |                |                        |            |      |           |               |          |       |               |
| 1215                                                                 | C.D.           | 150                    | 248        | 80   | 70        | 10            | 40       | 170   | 87B           |
| Jalcase 100                                                          | C.D.           | 80                     | 132        | 120  | 100       | 10            | 25       | 248   | 24C           |
| Jalcase 100L                                                         | C.D.           | 98                     | 162        | 120  | 100       | 10            | 25       | 248   | 24C           |
| (Leaded)                                                             |                |                        |            |      |           |               |          |       |               |
| 4142                                                                 | H.R.A.         | 56                     | 92         | 85   | 55        | 20            | 45       | 170   | 87B           |
| 4142                                                                 | C.D.A.         | 65                     | 107        | 100  | 85        | 12            | 40       | 196   | 93B           |
| 4142                                                                 | Q & T          |                        |            | 150  | 130       | 15            | 45       | 300   | 32C           |
| 4147-50                                                              | H.R.A.         | 52                     | 86         | 90   | 65        | 20            | 50       | 185   | 92B           |
| 4147-50                                                              | Q&T            |                        |            | 170  | 145       | 15            | 50       | 350   | 37C           |
| 4340                                                                 | H.R.A.         | 45                     | 74         | 100  | 70        | 15            | 10       | 220   | 20C           |
| 4340                                                                 | Q & T          |                        |            | 175  | 155       | 12            | 18       | 370   | 38C           |
| 8620                                                                 | H.R.           | 60                     | 99         | 80   | 55        | 18            | 15       | 160   | 84B           |
| 8620                                                                 | Q&T300°        |                        |            | 130  | 92        | 25            | 55       | 218   | 24C           |
| 8620                                                                 | C.D.           | 63                     | 104        | 90   | 70        | 15            | 10       | 185   | 90B           |

# HARDNESS CONVERSION TABLE

## (Approximate Value)

| BRINELL                                     |                      | ROCKWELL |         |      |      | Tensile Strength |                     |
|---------------------------------------------|----------------------|----------|---------|------|------|------------------|---------------------|
| Diameter<br>3000 Kg.<br>Load<br>10 mm. Ball | Hard-<br>ness<br>No. | C        | B       | A    | 15-N | Shore            | 1000<br>Lb./Sq. In. |
| 2.25                                        | 745                  | 65.3     | —       | 84.1 | 92.3 | 91               | —                   |
| 2.30                                        | 712                  | —        | —       | —    | —    | —                | —                   |
| 2.35                                        | 682                  | 61.7     | —       | 82.2 | 91.0 | 84               | —                   |
| 2.40                                        | 653                  | 60.0     | —       | 81.2 | 90.2 | 81               | —                   |
| 2.45                                        | 627                  | 58.7     | —       | 80.5 | 89.6 | 79               | —                   |
| 2.50                                        | 601                  | 57.3     | —       | 79.8 | 89.0 | 77               | —                   |
| 2.55                                        | 578                  | 56.0     | —       | 79.1 | 88.4 | 75               | —                   |
| 2.60                                        | 555                  | 54.7     | —       | 78.4 | 87.8 | 73               | 298                 |
| 2.65                                        | 534                  | 53.5     | —       | 77.8 | 87.2 | 71               | 288                 |
| 2.70                                        | 514                  | 52.1     | —       | 76.9 | 86.5 | 70               | 274                 |
| 2.75                                        | 495                  | 51.0     | —       | 76.3 | 85.1 | 68               | 264                 |
| 2.80                                        | 477                  | 49.6     | —       | 75.6 | 85.3 | 66               | 252                 |
| 2.85                                        | 461                  | 48.5     | —       | 74.9 | 84.7 | 65               | 242                 |
| 2.90                                        | 444                  | 47.1     | —       | 74.2 | 84.0 | 63               | 230                 |
| 2.95                                        | 429                  | 45.7     | —       | 73.4 | 83.4 | 61               | 219                 |
| 3.00                                        | 415                  | 44.5     | —       | 72.8 | 82.8 | 59               | 212                 |
| 3.05                                        | 401                  | 43.1     | —       | 72.0 | 82.0 | 58               | 202                 |
| 3.10                                        | 388                  | 41.8     | —       | 71.4 | 81.4 | 56               | 193                 |
| 3.15                                        | 375                  | 40.4     | —       | 70.6 | 80.6 | 54               | 184                 |
| 3.20                                        | 363                  | 39.1     | —       | 70.0 | 80.0 | 52               | 177                 |
| 3.25                                        | 352                  | 37.9     | (110.0) | 69.3 | 79.3 | 51               | 170                 |
| 3.30                                        | 341                  | 36.6     | (109.0) | 68.7 | 78.6 | 50               | 163                 |
| 3.35                                        | 331                  | 35.5     | (108.5) | 68.1 | 78.0 | 48               | 158                 |
| 3.40                                        | 321                  | 34.3     | (108.0) | 67.5 | 77.3 | 47               | 152                 |
| 3.45                                        | 311                  | 33.1     | (107.5) | 66.9 | 76.7 | 46               | 147                 |
| 3.50                                        | 302                  | 32.1     | (107.0) | 66.3 | 76.1 | 45               | 143                 |
| 3.55                                        | 293                  | 30.9     | (106.0) | 65.7 | 75.5 | 43               | 139                 |
| 3.60                                        | 285                  | 29.9     | (105.5) | 65.3 | 75.0 | —                | 135                 |
| 3.65                                        | 277                  | 28.8     | (104.5) | 64.6 | 74.4 | 41               | 131                 |
| 3.70                                        | 269                  | 27.6     | (104.0) | 64.1 | 73.7 | 40               | 128                 |
| 3.75                                        | 262                  | 26.6     | (103.0) | 63.6 | 73.1 | 39               | 125                 |
| 3.80                                        | 255                  | 25.4     | (102.0) | 63.0 | 72.5 | 38               | 121                 |
| 3.85                                        | 248                  | 24.2     | (101.0) | 62.5 | 71.7 | 37               | 118                 |
| 3.90                                        | 241                  | 22.8     | 100.0   | 61.8 | 70.9 | 36               | 114                 |
| 3.95                                        | 235                  | 21.7     | 99.0    | 61.4 | 70.3 | 35               | 111                 |
| 4.00                                        | 229                  | 20.5     | 98.2    | 60.8 | 69.7 | 34               | 109                 |
| 4.05                                        | 223                  | (18.8)   | 97.3    | —    | —    | —                | 104                 |
| 4.10                                        | 217                  | (17.5)   | 96.4    | —    | —    | 33               | 103                 |
| 4.15                                        | 212                  | (16.0)   | 95.5    | —    | —    | —                | 100                 |
| 4.20                                        | 207                  | (15.2)   | 94.6    | —    | —    | 32               | 99                  |
| 4.25                                        | 201                  | (13.8)   | 93.8    | —    | —    | 31               | 97                  |
| 4.30                                        | 197                  | (12.7)   | 92.8    | —    | —    | 30               | 94                  |
| 4.35                                        | 192                  | (11.5)   | 91.9    | —    | —    | 29               | 92                  |
| 4.40                                        | 187                  | (10.0)   | 90.7    | —    | —    | —                | 90                  |
| 4.45                                        | 183                  | (9.0)    | 90.0    | —    | —    | 28               | 89                  |
| 4.50                                        | 179                  | (8.0)    | 89.0    | —    | —    | 27               | 88                  |
| 4.55                                        | 174                  | (6.4)    | 87.8    | —    | —    | —                | 86                  |
| 4.60                                        | 170                  | (5.4)    | 86.8    | —    | —    | 26               | 84                  |
| 4.65                                        | 167                  | (4.4)    | 86.0    | —    | —    | —                | 83                  |
| 4.70                                        | 163                  | (3.3)    | 85.0    | —    | —    | 25               | 82                  |
| 4.80                                        | 156                  | (0.9)    | 82.9    | —    | —    | —                | 80                  |
| 4.90                                        | 149                  | —        | 80.8    | —    | —    | 23               | —                   |
| 5.00                                        | 143                  | —        | 78.7    | —    | —    | 22               | —                   |
| 5.10                                        | 137                  | —        | 76.4    | —    | —    | 21               | —                   |
| 5.20                                        | 131                  | —        | 74.0    | —    | —    | —                | —                   |
| 5.30                                        | 126                  | —        | 72.0    | —    | —    | 20               | —                   |
| 5.40                                        | 121                  | —        | 69.8    | —    | —    | 19               | —                   |
| 5.50                                        | 116                  | —        | 67.6    | —    | —    | 18               | —                   |
| 5.60                                        | 111                  | —        | 65.7    | —    | —    | 15               | —                   |

Hardness values are from SAE-ASM-ASTM Committees on Hardness Conversions as printed in ASTM E 140, Table 3. Tensile Strength values are from Federal Test Methods Standard No. 151A-method 241.2 dated Jan. 10, 1961.

# METRIC

## MEASUREMENT AND CONVERSION

### LENGTH - Basic unit is meter (m)

| Metric Unit     | Meter | Inches | Feet  | Yards | Miles |
|-----------------|-------|--------|-------|-------|-------|
| Millimeter (mm) | .001  | —      | —     | —     | —     |
| Centimeter (cm) | .01   | .3937  | —     | —     | —     |
| Decimeter (dm)  | .1    | 3.937  | .3281 | .1094 | —     |
| Meter (m)       | 1     | 39.37  | 3.281 | 1.094 | —     |
| Decameter (dkm) | 10    | 393.7  | 32.81 | 10.94 | —     |
| Hectometer (hm) | 100   | 3937   | 328.1 | 109.4 | —     |
| Kilometer (km)  | 1000  | —      | 3281  | 1094  | .6214 |

#### To convert

In. to Millimeters-multiply by 25.4  
 Millimeters to In.-multiply by .03937  
 Feet to Meters-multiply by .3048  
 Meters to Feet-multiply by 3.281

Yards to Meters-multiply by .9144  
 Meters to Yards-multiply by 1.094  
 Miles to Kilometer-multiply by 1.609  
 Kilometers to Miles-multiply by .6214

### AREA - Basic unit is centare (ca) which is 1 square meter

| Metric Unit                  | Meter     | Square Inches | Square Feet | Square Yards | Miles |
|------------------------------|-----------|---------------|-------------|--------------|-------|
| Sq. Millimeter (sq. mm)      | .000001   | —             | —           | —            | —     |
| Sq. Centimeter (sq. cm)      | .0001     | .1550         | —           | —            | —     |
| Sq. Decimeter (sq. dm)       | .01       | 15.50         | .1076       | —            | —     |
| Centare/Sq. Meter (ca/sq. m) | 1         | 1550          | 10.76       | 1.196        | —     |
| Area (a)                     | 100       | —             | 1076        | 119.6        | —     |
| Hectare (he)                 | 10,000    | —             | —           | —            | 2.471 |
| Sq. Kilometer (sq. km)       | 1,000,000 | —             | —           | —            | 247.1 |

#### To convert

Sq. in. to Sq. cm-multiply by 6.452  
 Sq. cm to Sq. In.-multiply by .1550  
 Sq. Ft. to Sq. m.-multiply by .0929  
 Sq. m. to Sq. Ft.-multiply by 10.76  
 Sq. Yds. to Sq. m.-multiply by .8361  
 Sq. M. to SQ. Yds.-multiply by 1.196

Acres to Hectares-multiply by .4047  
 Hectares to Acres-multiply by 2.471  
 Acres to Sq. Km-multiply by .004047  
 Sq km. to Acres-multiply by 247.1  
 Sq. Mile to Sq. Km-multiply by 2.590  
 Sq km. to Sq. Miles-multiply by .3861

### VOLUME - Basic unit is stere(s) which is 1 cubic meter

| Metric Unit             | Steres     | Cubic Inch | Cubic Foot | Cubic Yards |
|-------------------------|------------|------------|------------|-------------|
| Cu Millimeter (cu mm)   | .000000001 | -          | -          | -           |
| Cu Centimeter (cu cm)   | .000001    | .06102     | -          | -           |
| Cu Decimeter (cu dm)    | .001       | 61.023     | -          | -           |
| Decistere (ds)          | .1         | 6102.3     | 3.531      | .1308       |
| Stere/Cu Meter (s/cu m) | 1          | 61023      | 35.31      | 1.308       |
| Decastere (dks)         | 10         | -          | 353.1      | 13.08       |

#### To convert

Cu. In. to Cu mm-multiply by 1639  
 Cu. mm to Cu. In.-multiply by .000061  
 Cu. In. to Cu cm-multiply by 16.39  
 Cu cm to Cu In.-multiply by .06102

Cu. Ft to Cu. m-multiply by .0283  
 Cu. m to Cu. Ft.-multiply by 35.31  
 Cu. Yds. to Cu. m-multiply by .7646  
 Cu. m to Cu. Yds.-multiply by 1.308

### WEIGHT - Basic unit is gram (g)

| Metric Unit     | Grams     | Grains | Ounce  | Pounds |
|-----------------|-----------|--------|--------|--------|
| Milligram (mg)  | .001      | .01543 | —      | —      |
| Centigram (cg)  | .01       | .1543  | —      | —      |
| Decigram (dg)   | .1        | 1.543  | —      | —      |
| Gram            | 1         | 15.43  | .03527 | —      |
| Decagram (dkg)  | 10        | 154.3  | .3527  | —      |
| Hectogram (hg)  | 100       | 1543   | 3.527  | .22046 |
| Kilogram (kg)   | 1000      | —      | 35.27  | 2.2046 |
| Quintal (q)     | 100,000   | —      | 3527   | 220.46 |
| Metric Ton (MT) | 1,000,000 | —      | —      | 2204.6 |

#### To convert

Grains to Centigrams-multiply by 6.48  
 Centigrams to Grains-multiply by .1543  
 Ounces to grams-multiply by 28.35  
 Tons (2000#) to Metric Tons-multiply by ~9078  
 Metric Tons to Tons (2000#)-multiply by 1.1023

Grams to Ounces-multiply by .03527  
 Pounds to Kilograms-multiply by .4536  
 Kilograms to Pounds-multiply by 2.2046

# English To Metric Conversion Table

| Inches<br>Dec. | mm      | Inches<br>Dec. | mm      | Inches<br>Frac. | Dec.     | mm      | Inches<br>Frac. | Dec.     | mm      |
|----------------|---------|----------------|---------|-----------------|----------|---------|-----------------|----------|---------|
| 0.01           | 0.2540  | 0.51           | 12.9540 | 1/61            | 0.015625 | 0.3969  | 33/64           | 0.515625 | 13.0969 |
| 0.02           | 0.5080  | 0.52           | 13.2080 |                 |          |         |                 |          |         |
| 0.03           | 0.7620  | 0.53           | 13.4620 | 1/32            | 0.031250 | 0.7938  | 17/32           | 0.531250 | 13.4938 |
| 0.04           | 1.0160  | 0.54           | 13.7160 | 3/64            | 0.046875 | 1.1906  | 35/64           | 0.546875 | 13.8906 |
| 0.05           | 1.2700  | 0.55           | 13.9700 |                 |          |         |                 |          |         |
| 0.06           | 1.5240  | 0.56           | 14.2240 | 1/16            | 0.062500 | 1.5875  | 9/16            | 0.562500 | 14.2875 |
| 0.07           | 1.7780  | 0.57           | 14.4780 | 5/64            | 0.078125 | 1.9844  | 37/64           | 0.578125 | 14.6841 |
| 0.08           | 2.0320  | 0.58           | 14.7320 |                 |          |         |                 |          |         |
| 0.09           | 2.2860  | 0.59           | 14.9860 | 3/32            | 0.093750 | 2.3812  | 19/32           | 0.593750 | 15.0812 |
| 0.10           | 2.5400  | 0.60           | 15.2400 |                 |          |         |                 |          |         |
| 0.11           | 2.7940  | 0.61           | 15.4940 | 7/64            | 0.109375 | 2.7781  | 39/64           | 0.609375 | 15.4781 |
| 0.12           | 3.0480  | 0.62           | 15.7480 | 1/8             | 0.125000 | 3.1750  | 5/8             | 0.625000 | 15.8750 |
| 0.13           | 3.3020  | 0.63           | 16.0020 |                 |          |         |                 |          |         |
| 0.14           | 3.5560  | 0.64           | 16.2560 | 9/64            | 0.140625 | 3.5719  | 41/64           | 0.640625 | 16.2719 |
| 0.15           | 3.8100  | 0.65           | 16.5100 | 5/32            | 0.156250 | 3.9688  | 21/32           | 0.656250 | 16.6688 |
| 0.16           | 4.0640  | 0.66           | 16.7640 |                 |          |         |                 |          |         |
| 0.17           | 4.3180  | 0.67           | 17.0180 | 11/64           | 0.171875 | 4.3656  | 43/64           | 0.671875 | 17.0656 |
| 0.18           | 4.5720  | 0.68           | 17.2720 | 3/16            | 0.187500 | 4.7625  | 11/16           | 0.687500 | 17.4625 |
| 0.19           | 4.8260  | 0.69           | 17.5260 |                 |          |         |                 |          |         |
| 0.20           | 5.0800  | 0.70           | 17.7800 | 13/64           | 0.203125 | 5.1594  | 45/64           | 0.703125 | 17.8594 |
| 0.21           | 5.3340  | 0.71           | 18.0340 |                 |          |         |                 |          |         |
| 0.22           | 5.5880  | 0.72           | 18.2880 | 7/32            | 0.218750 | 5.5562  | 23/32           | 0.718750 | 18.2562 |
| 0.23           | 5.8420  | 0.73           | 18.5420 | 15/64           | 0.234375 | 5.9531  | 47/64           | 0.734375 | 18.6531 |
| 0.24           | 6.0960  | 0.74           | 18.7960 |                 |          |         |                 |          |         |
| 0.25           | 6.3500  | 0.75           | 19.0500 | 1/4             | 0.250000 | 6.3500  | 3/4             | 0.750000 | 19.0500 |
| 0.26           | 6.6040  | 0.76           | 19.3040 | 17/64           | 0.265625 | 6.7469  | 49/64           | 0.765625 | 19.4469 |
| 0.27           | 6.8580  | 0.77           | 19.5580 |                 |          |         |                 |          |         |
| 0.28           | 7.1120  | 0.78           | 19.8120 | 9/32            | 0.281250 | 7.1438  | 25/32           | 0.781250 | 19.8437 |
| 0.29           | 7.3660  | 0.79           | 20.0660 | 19/64           | 0.296875 | 7.5406  | 51/64           | 0.796875 | 20.2406 |
| 0.30           | 7.6200  | 0.80           | 20.3200 |                 |          |         |                 |          |         |
| 0.31           | 7.8740  | 0.81           | 20.5740 | 5/16            | 0.312500 | 7.9375  | 13/16           | 0.812500 | 20.6375 |
| 0.32           | 7.8280  | 0.82           | 20.8280 |                 |          |         |                 |          |         |
| 0.33           | 8.3820  | 0.83           | 21.0820 | 21/64           | 0.328125 | 8.3344  | 53/64           | 0.828125 | 21.0344 |
| 0.34           | 8.6360  | 0.84           | 21.3360 | 11/32           | 0.343750 | 8.7312  | 27/32           | 0.843750 | 21.4312 |
| 0.35           | 8.8900  | 0.85           | 21.5900 |                 |          |         |                 |          |         |
| 0.36           | 9.1440  | 0.86           | 21.8440 | 23/64           | 0.359375 | 9.1281  | 55/64           | 0.859375 | 21.8281 |
| 0.37           | 9.3960  | 0.87           | 22.0980 | 3/8             | 0.375000 | 9.5250  | 7/8             | 0.875000 | 22.2250 |
| 0.38           | 9.6520  | 0.88           | 22.3520 |                 |          |         |                 |          |         |
| 0.39           | 9.9060  | 0.89           | 22.6060 | 25/64           | 0.390625 | 9.9219  | 57/64           | 0.890625 | 22.6219 |
| 0.40           | 10.1600 | 0.90           | 22.8600 |                 |          |         |                 |          |         |
| 0.41           | 10.4140 | 0.91           | 23.1140 | 13/32           | 0.406250 | 10.3188 | 29/32           | 0.906250 | 23.0188 |
| 0.42           | 10.6680 | 0.92           | 23.3680 | 27/64           | 0.421875 | 10.7156 | 59/64           | 0.921875 | 23.4156 |
| 0.43           | 10.9220 | 0.93           | 23.6220 |                 |          |         |                 |          |         |
| 0.44           | 11.1760 | 0.94           | 23.8760 | 7/16            | 0.430000 | 11.1125 | 15/16           | 0.937500 | 23.8125 |
| 0.45           | 11.4300 | 0.95           | 24.1300 | 29/64           | 0.453125 | 11.5094 | 61/64           | 0.953128 | 24.2094 |
| 0.46           | 11.6840 | 0.96           | 24.3840 |                 |          |         |                 |          |         |
| 0.47           | 11.9380 | 0.97           | 24.6380 | 15/32           | 0.468750 | 11.9062 | 31/32           | 0.968750 | 24.6062 |
| 0.48           | 12.1920 | 0.98           | 24.8920 |                 |          |         |                 |          |         |
| 0.49           | 12.4460 | 0.99           | 25.1460 | 31/64           | 0.484375 | 12.3031 | 63/64           | 0.984375 | 25.0031 |
| 0.50           | 12.7000 | 1.00           | 25.4000 | 1/2             | 0.500000 | 12.7000 | 1               | 1.000000 | 25.4000 |

For converting decimal-inches  
in "thousandths" , move decimal  
point in both columns to left.

# Metric to English Conversion Table

| mm   | Inches | mm   | Inches | mm   | Inches | mm | Inches  | mm  | Inches  |
|------|--------|------|--------|------|--------|----|---------|-----|---------|
| 0.01 | .00039 | 0.41 | .01614 | 0.81 | .03189 | 21 | .82677  | 61  | 2.40157 |
| 0.02 | .00079 | 0.42 | .01654 | 0.82 | .03228 | 22 | .86614  | 62  | 2.44094 |
| 0.03 | .00118 | 0.43 | .01693 | 0.83 | .03268 | 23 | .09551  | 63  | 2.48031 |
| 0.04 | .00157 | 0.44 | .01732 | 0.84 | .03307 | 24 | .94488  | 64  | 2.51968 |
| 0.05 | .00197 | 0.45 | .01772 | 0.85 | .03346 | 25 | .98425  | 65  | 2.55905 |
| 0.06 | .00236 | 0.46 | .01811 | 0.86 | .03386 | 26 | 1.02362 | 66  | 2.59842 |
| 0.07 | .00276 | 0.47 | .01850 | 0.87 | .03425 | 27 | 1.06299 | 67  | 2.63779 |
| 0.08 | .00315 | 0.48 | .01890 | 0.88 | .03465 | 28 | 1.10236 | 68  | 2.67716 |
| 0.09 | .00354 | 0.49 | .01929 | 0.89 | .03504 | 29 | 1.14173 | 69  | 2.71653 |
| 0.10 | .00394 | 0.50 | .01969 | 0.90 | .03543 | 30 | 1.18110 | 70  | 2.75590 |
| 0.11 | .00433 | 0.51 | .02008 | 0.91 | .03583 | 31 | 1.22047 | 71  | 2.79527 |
| 0.12 | .00472 | 0.52 | .02047 | 0.92 | .03622 | 32 | 1.25984 | 72  | 2.83464 |
| 0.13 | .00512 | 0.53 | .02087 | 0.93 | .03661 | 33 | 1.29921 | 73  | 2.87401 |
| 0.14 | .00551 | 0.54 | .02126 | 0.94 | .03701 | 34 | 1.33858 | 74  | 2.91338 |
| 0.15 | .00591 | 0.55 | .02165 | 0.95 | .03740 | 35 | 1.37795 | 75  | 2.95275 |
| 0.16 | .00630 | 0.56 | .02205 | 0.96 | .03780 | 36 | 1.41732 | 76  | 2.99212 |
| 0.17 | .00669 | 0.57 | .02244 | 0.97 | .03819 | 37 | 1.45669 | 77  | 3.03149 |
| 0.18 | .00709 | 0.58 | .02283 | 0.98 | .03858 | 38 | 1.49606 | 78  | 3.07086 |
| 0.19 | .00748 | 0.59 | .02323 | 0.99 | .03898 | 39 | 1.53543 | 79  | 3.11023 |
| 0.20 | .00787 | 0.60 | .02362 | 1.00 | .03937 | 40 | 1.57480 | 80  | 3.14960 |
| 0.21 | .00827 | 0.61 | .02402 | 1    | .03937 | 41 | 1.61417 | 81  | 3.18897 |
| 0.22 | .00866 | 0.62 | .02441 | 2    | .07874 | 42 | 1.65354 | 82  | 3.22834 |
| 0.23 | .00906 | 0.63 | .02480 | 3    | .11811 | 43 | 1.69291 | 83  | 3.26771 |
| 0.24 | .00945 | 0.64 | .02520 | 4    | .15748 | 44 | 1.73228 | 84  | 3.30708 |
| 0.25 | .00984 | 0.65 | .02559 | 5    | .19685 | 45 | 1.77165 | 85  | 3.34645 |
| 0.26 | .01024 | 0.66 | .02598 | 6    | .23622 | 46 | 1.81102 | 86  | 3.38582 |
| 0.27 | .01063 | 0.67 | .02638 | 7    | .27559 | 47 | 1.85039 | 87  | 3.42519 |
| 0.28 | .01102 | 0.68 | .02677 | 8    | .31496 | 48 | 1.88976 | 88  | 3.46456 |
| 0.29 | .01142 | 0.69 | .02717 | 9    | .35433 | 49 | 1.92913 | 89  | 3.50393 |
| 0.30 | .01181 | 0.70 | .02756 | 10   | .39370 | 50 | 1.96850 | 90  | 3.54330 |
| 0.31 | .01220 | 0.71 | .02795 | 11   | .43307 | 51 | 2.00787 | 91  | 3.58267 |
| 0.32 | .01260 | 0.72 | .02835 | 12   | .47244 | 52 | 2.04724 | 92  | 3.62204 |
| 0.33 | .01299 | 0.73 | .02874 | 13   | .51181 | 53 | 2.08661 | 93  | 3.66141 |
| 0.34 | .01339 | 0.74 | .02913 | 14   | .55118 | 54 | 2.12598 | 94  | 3.70078 |
| 0.35 | .01378 | 0.75 | .02953 | 15   | .59055 | 55 | 2.16535 | 95  | 3.74015 |
| 0.36 | .01417 | 0.76 | .02992 | 16   | .62992 | 56 | 2.20472 | 96  | 3.77952 |
| 0.37 | .01457 | 0.77 | .03032 | 17   | .66929 | 57 | 2.24409 | 97  | 3.81889 |
| 0.38 | .01496 | 0.78 | .03071 | 18   | .70866 | 58 | 2.28346 | 98  | 3.85826 |
| 0.39 | .01535 | 0.79 | .03110 | 19   | .74803 | 59 | 2.32283 | 99  | 3.89763 |
| 0.40 | .01575 | 0.80 | .03150 | 20   | .78740 | 60 | 2.36220 | 100 | 3.93700 |

For converting millimeters in "thousandths" move decimal point in both columns to left.

# Decimal Equivalents

|                  |                  |
|------------------|------------------|
| 1/64.....015625  | 33/64 ....515625 |
| 1/32 .....03125  | 17/32 .....53125 |
| 3/64.....046875  | 35/64 ....546875 |
| 1/16 .....0625   | 9/16 .....5625   |
| 5/64 ....078125  | 37/64 ....578125 |
| 3/32 .....09375  | 19/32 .....59375 |
| 7/64 ....109375  | 39/64 ....609375 |
| 1/8.....125      | 5/8.....625      |
| 9/64.....140625  | 41/64 ....640625 |
| 5/32 .....15625  | 21/32 .....65625 |
| 11/64.....171875 | 43/64 ....671875 |
| 3/16 .....1875   | 11/16 .....6875  |
| 13/64 ....203125 | 45/64....703125  |
| 7/32 .....21875  | 23/32 .....71875 |
| 15/64 ....234375 | 47/64....734375  |
| 1/4.....25       | 3/4.....75       |
| 17/64 ....265625 | 49/64 ....765625 |
| 9/32 .....28125  | 25/32 .....78125 |
| 19/64 ....296875 | 51/64 ....796875 |
| 5/16 .....3125   | 13/16 .....8125  |
| 21/64....328125  | 53/64 ....828125 |
| 11/32 .....34375 | 27/32 .....84375 |
| 23/64....359375  | 55/64....859375  |
| 3/8.....375      | 7/8.....875      |
| 25/64....390625  | 57/64 ....890625 |
| 13/32 .....40625 | 29/32 .....90625 |
| 27/64....421875  | 59/64....921875  |
| 7/16 .....4375   | 15/16 .....9375  |
| 29/64....453125  | 61/64 ....953125 |
| 15/32 .....46875 | 31/32 .....96875 |
| 31/64....484375  | 63/64 ....984375 |
| 1/2.....5        | 1.....1.         |

# CONVERTING INCHES INTO DECIMALS OF A FOOT

| Inches               | Decimal of a Ft. | Inches               | Decimal of a Ft. | Inches                | Decimal of a Ft. |
|----------------------|------------------|----------------------|------------------|-----------------------|------------------|
| <b>0"</b>            | 1/16 .005208     | <b>4"</b><br>.33333  | 1/16 .338542     | <b>8"</b><br>.66666   | 1/16 .671875     |
|                      | 1/8 .010416      |                      | 1/8 .343750      |                       | 1/8 .677083      |
|                      | 3/16 .015625     |                      | 3/16 .348958     |                       | 3/16 .682292     |
|                      | 1/4 .020833      |                      | 1/4 .354166      |                       | 1/4 .687500      |
|                      | 5/16 .026042     |                      | 5/16 .359375     |                       | 5/16 .692708     |
|                      | 3/8 .031250      |                      | 3/8 .364583      |                       | 3/8 .697916      |
|                      | 7/16 .036458     |                      | 7/16 .369792     |                       | 7/16 .703125     |
|                      | 1/2 .041666      |                      | 1/2 .375000      |                       | 1/2 .708333      |
|                      | 9/16 .046875     |                      | 9/16 .380208     |                       | 9/16 .713542     |
|                      | 5/8 .052083      |                      | 5/8 .385416      |                       | 5/8 .718750      |
|                      | 11/16 .057292    |                      | 11/16 .390625    |                       | 11/16 .723958    |
|                      | 3/4 .062500      |                      | 3/4 .395833      |                       | 3/4 .729166      |
|                      | 13/16 .067708    |                      | 13/16 .401042    |                       | 13/16 .734375    |
|                      | 7/8 .072916      |                      | 7/8 .406250      |                       | 7/8 .739583      |
|                      | 15/16 .078125    |                      | 15/16 .411458    |                       | 15/16 .744792    |
| <b>1"</b><br>.083333 | 1/16 .088542     | <b>5"</b><br>.416666 | 1/16 .421875     | <b>9"</b><br>.750     | 1/16 .755208     |
|                      | 1/8 .093750      |                      | 1/8 .427083      |                       | 1/8 .760416      |
|                      | 3/16 .098958     |                      | 3/16 .432292     |                       | 3/16 .765625     |
|                      | 1/4 .104166      |                      | 1/4 .437500      |                       | 1/4 .770833      |
|                      | 5/16 .109375     |                      | 5/16 .442708     |                       | 5/16 .776042     |
|                      | 3/8 .114583      |                      | 3/8 .447916      |                       | 3/8 .781250      |
|                      | 7/16 .119792     |                      | 7/16 .453125     |                       | 7/16 .786458     |
|                      | 1/2 .125000      |                      | 1/2 .458333      |                       | 1/2 .791666      |
|                      | 9/16 .130208     |                      | 9/16 .463542     |                       | 9/16 .796875     |
|                      | 5/8 .135416      |                      | 5/8 .468750      |                       | 5/8 .802083      |
|                      | 11/16 .140625    |                      | 11/16 .473958    |                       | 11/16 .807292    |
|                      | 3/4 .145833      |                      | 3/4 .479166      |                       | 3/4 .812500      |
|                      | 13/16 .151042    |                      | 13/16 .484375    |                       | 13/16 .817708    |
|                      | 7/8 .156250      |                      | 7/8 .489583      |                       | 7/8 .822916      |
|                      | 15/16 .161458    |                      | 15/16 .494792    |                       | 15/16 .828125    |
| <b>2"</b><br>.166666 | 1/16 .171875     | <b>6"</b><br>.50     | 1/16 .505208     | <b>10"</b><br>.833333 | 1/16 .838542     |
|                      | 1/8 .177083      |                      | 1/8 .510416      |                       | 1/8 .843750      |
|                      | 3/16 .182292     |                      | 3/16 .515625     |                       | 3/16 .848958     |
|                      | 1/4 .187500      |                      | 1/4 .520833      |                       | 1/4 .854166      |
|                      | 5/16 .192708     |                      | 5/16 .526042     |                       | 5/16 .859375     |
|                      | 3/8 .197916      |                      | 3/8 .531250      |                       | 3/8 .864583      |
|                      | 7/16 .203125     |                      | 7/16 .536458     |                       | 7/16 .869792     |
|                      | 1/2 .208333      |                      | 1/2 .541666      |                       | 1/2 .875000      |
|                      | 9/16 .213542     |                      | 9/16 .546875     |                       | 9/16 .880208     |
|                      | 5/8 .218750      |                      | 5/8 .552083      |                       | 5/8 .885416      |
|                      | 11/16 .223958    |                      | 11/16 .557292    |                       | 11/16 .890625    |
|                      | 3/4 .229166      |                      | 3/4 .562500      |                       | 3/4 .895833      |
|                      | 13/16 .234375    |                      | 13/16 .567708    |                       | 13/16 .901042    |
|                      | 7/8 .239583      |                      | 7/8 .572916      |                       | 7/8 .906250      |
|                      | 15/16 .244792    |                      | 15/16 .578125    |                       | 15/16 .911458    |
| <b>3"</b><br>.250    | 1/16 .255208     | <b>7"</b><br>.583333 | 1/16 .588542     | <b>11"</b><br>.916666 | 1/16 .921875     |
|                      | 1/8 .260416      |                      | 1/8 .593750      |                       | 1/8 .927083      |
|                      | 3/16 .265625     |                      | 3/16 .598958     |                       | 3/16 .932292     |
|                      | 1/4 .270833      |                      | 1/4 .604166      |                       | 1/4 .937500      |
|                      | 5/16 .276042     |                      | 5/16 .609375     |                       | 5/16 .942708     |
|                      | 3/8 .281250      |                      | 3/8 .614583      |                       | 3/8 .947916      |
|                      | 7/16 .286458     |                      | 7/16 .619792     |                       | 7/16 .953125     |
|                      | 1/2 .291666      |                      | 1/2 .625000      |                       | 1/2 .958333      |
|                      | 9/16 .296875     |                      | 9/16 .630208     |                       | 9/16 .963542     |
|                      | 5/8 .302083      |                      | 5/8 .635416      |                       | 5/8 .968750      |
|                      | 11/16 .307292    |                      | 11/16 .640625    |                       | 11/16 .973958    |
|                      | 3/4 .312500      |                      | 3/4 .645833      |                       | 3/4 .979166      |
|                      | 13/16 .317708    |                      | 13/16 .651042    |                       | 13/16 .984375    |
|                      | 7/8 .322916      |                      | 7/8 .656250      |                       | 7/8 .989593      |
|                      | 15/16 .328125    |                      | 15/16 .661458    |                       | 15/16 .994792    |

# USEFUL DATA

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**To find circumference** of a circle, multiply diameter by 3.1416.

**To find diameter** of a circle, multiply circumference by .31831.

**To find area** of a circle, multiply square of diameter by .7854.

**Area of a rectangle** = length multiplied by breadth. Doubling the diameter of a circle increases its area four times.

**To find area of a triangle**, multiply base by 1/2 perpendicular height.

**Area of ellipse** = product of both diameters times .7854.

**Area of parallelogram** = base times altitude.

**To find side of an inscribed square**, multiply diameter by 0.7071 or multiply circumference by 0.2251 or divide circumference by 4.4428.

**Side of inscribed cube** = radius of sphere times 1.1547.

**To find side of an equal square**, multiply diameter by .8862 Square. A side multiplied by 1.4142 equals diameter of its circumscribing circle.

A side multiplied by 4.443 equals **circumference of its circumscribing circle**.

A side multiplied by 1.128 equals **diameter of an equal circle**.

A side multiplied by 3.547 equals **circumference of an equal circle**.

**To find cubic inches in a ball**, multiply cube of diameter by .5236.

**To find cubic contents of a cone**, multiply area of base by 1/3 the altitude.

**Surface of frustrum of cone or pyramid** = sum of circumference of both ends times 1/2 slant height plus area of both ends.

**Contents of frustrum of cone or pyramid** = multiply area of two ends and get square root. Add the 2 areas and multiply 1/3 altitude.

**Doubling the diameter of a pipe** increases its capacity four times.

**A gallon of water** (U.S. standard) weighs 8-1/3 lbs. and contains 231 cubic inches.

**A cubic foot of water** contains 7-1/2 gallons, 1728 cubic inches, and weighs 62 1/2 lbs.

To find the **pressure in pounds per square inch of a column of water**, multiply the height of the column in feet by .434.

**To find capacity of tanks** any size, given dimensions of a cylinder in inches, to find its capacity in U.S. gallons: square the diameter, multiply by the length and by .0034.

# Weight Formulas

Steel weights are based on 2836 lbs. per cubic inch, aluminum on .0979 lbs. per cubic inch (f 100 alloy). Use conversion factors to convert steel weights to other metals.

| Lbs. Per Lineal Foot                                                                                  |                                                         | Conversion Factors          |                                  |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------------|----------------------------------|
|                                                                                                       |                                                         | Multiply<br>Steel Weight by | Density<br>Lbs./In. <sup>3</sup> |
| <b>ROUNDS</b><br>    | Steel:<br>2.6729 x D <sup>2</sup>                       | Aluminum                    |                                  |
|                                                                                                       | Aluminum:<br>.924 x D <sup>2</sup>                      | 1100                        | .3462 .098                       |
|                                                                                                       | D = Size, Inches                                        | 2011                        | .3604 .102                       |
|                                                                                                       |                                                         | 2014                        | .3568 .101                       |
|                                                                                                       |                                                         | 2017                        | .3568 .101                       |
|                                                                                                       |                                                         | 2024                        | .3533 .100                       |
|                                                                                                       |                                                         | 3003                        | .3498 .099                       |
|                                                                                                       |                                                         | 5005                        | .3462 .098                       |
|                                                                                                       |                                                         | 5052                        | .3427 .097                       |
|                                                                                                       |                                                         | 5056                        | .3356 .095                       |
| <b>SQUARES</b><br>   | Steel:<br>3.4032 x D <sup>2</sup>                       | 5083                        | .3392 .096                       |
|                                                                                                       | Aluminum:<br>1.18 x D <sup>2</sup>                      | 5086                        | .3392 .096                       |
|                                                                                                       | D = Size, Inches                                        | 6061                        | .3462 .098                       |
|                                                                                                       |                                                         | 6063                        | .3462 .098                       |
|                                                                                                       |                                                         | 7075                        | .3568 .101                       |
|                                                                                                       |                                                         | 7178                        | .3604 .102                       |
|                                                                                                       |                                                         | Stainless                   |                                  |
|                                                                                                       |                                                         | 300 Series                  | 1.010 .286                       |
|                                                                                                       |                                                         | 400 Series                  | 1.000 .283                       |
|                                                                                                       |                                                         | Nickel                      |                                  |
| <b>HEXAGONS</b><br>  | Steel:<br>2.9473 x D <sup>2</sup>                       | 200                         | 1.132 .321                       |
|                                                                                                       | Aluminum:<br>1.02 x D <sup>2</sup>                      | 201                         | 1.132 .321                       |
|                                                                                                       | D = Size, Inches                                        | 400                         | 1.125 .319                       |
|                                                                                                       |                                                         | 600                         | 1.072 .304                       |
|                                                                                                       |                                                         | 625                         | 1.075 .305                       |
|                                                                                                       |                                                         | 718                         | 1.047 .297                       |
|                                                                                                       |                                                         | X750                        | 1.051 .298                       |
|                                                                                                       |                                                         | 800                         | 1.012 .287                       |
|                                                                                                       |                                                         | 800H                        | 1.012 .287                       |
|                                                                                                       |                                                         | 825                         | 1.037 .294                       |
| <b>OCTAGONS</b><br> | Steel:<br>2.8193 x D <sup>2</sup>                       | 904L                        | 1.026 .291                       |
|                                                                                                       | Aluminum:<br>.974 x D <sup>2</sup>                      | Hastelloy®                  |                                  |
|                                                                                                       | D = Size, Inches                                        | C-276                       | 1.132 .321                       |
|                                                                                                       |                                                         | B-2                         | 1.174 .333                       |
|                                                                                                       |                                                         | C-4                         | 1.100 .312                       |
|                                                                                                       |                                                         | G-3                         | 1.058 .300                       |
|                                                                                                       |                                                         | Magnesium                   | .229 .065                        |
|                                                                                                       |                                                         | Beryllium                   | .236 .067                        |
|                                                                                                       |                                                         | Titanium                    | .575 .163                        |
|                                                                                                       |                                                         | Zirconium                   | .812 .230                        |
| <b>FLATS</b><br>   | Steel:<br>3.4032 x T x W                                | Cast Iron                   | .911 .258                        |
|                                                                                                       | Aluminum:<br>1.18 a x T x W                             | Zinc                        | .911 .258                        |
|                                                                                                       | T = Thickness, In.                                      | Brass                       | 1.084 .307                       |
|                                                                                                       | W = Width, Inches                                       | Columbium                   | 1.095 .310                       |
|                                                                                                       |                                                         | Copper                      | 1.144 .324                       |
|                                                                                                       |                                                         | Molybdenum                  | 1.303 .369                       |
|                                                                                                       |                                                         | Silver                      | 1.339 .379                       |
|                                                                                                       |                                                         | Lead                        | 1.448 .410                       |
|                                                                                                       |                                                         | Tantalum                    | 2.120 .600                       |
|                                                                                                       |                                                         | Tungsten                    | 2.462 .697                       |
| <b>TUBING</b><br>  | Steel:<br>10.68x(OD-W)xW                                | Gold                        | 2.466 .698                       |
|                                                                                                       | Aluminum:<br>3.70x(OD-W)xW                              |                             |                                  |
|                                                                                                       | OD = OD, Inches                                         |                             |                                  |
|                                                                                                       | W = Wall, Inches                                        |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
| <b>CIRCLES</b><br> | Steel:<br>.22274 x T x D <sup>2</sup>                   |                             |                                  |
|                                                                                                       | Aluminum:<br>.077 x T x D <sup>2</sup>                  |                             |                                  |
|                                                                                                       | D = Diameter, In.                                       |                             |                                  |
|                                                                                                       | T = Thickness, In.                                      |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
| <b>RINGS</b><br>   | Steel:<br>.22274xTx(OD <sup>2</sup> -ID <sup>2</sup> )  |                             |                                  |
|                                                                                                       | Aluminum:<br>.077xTx(OD <sup>2</sup> -ID <sup>2</sup> ) |                             |                                  |
|                                                                                                       | OD = OD, Inches                                         |                             |                                  |
|                                                                                                       | ID = ID, Inches                                         |                             |                                  |
|                                                                                                       | T = Thickness, In.                                      |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |
|                                                                                                       |                                                         |                             |                                  |

# Circumference and Area of Circles

| Dia. in<br>Inches | Circum. in<br>Ft. In. | Area<br>Sq. Ft. | Dia. in<br>Inches | Circum. in<br>Ft. In. | Area<br>Sq. Ft. |
|-------------------|-----------------------|-----------------|-------------------|-----------------------|-----------------|
| 1/16              | 13/16                 |                 | 6                 | 1 6 <sup>13/16</sup>  | .1964           |
| 1/8               | 25/64                 |                 | 6 <sup>1/8</sup>  | 1 7 <sup>3/16</sup>   | .2046           |
| 3/16              | 19/32                 |                 | 6 <sup>1/4</sup>  | 1 7 <sup>5/8</sup>    | .2131           |
| 1/4               | 25/32                 |                 | 6 <sup>3/8</sup>  | 1 8                   | .2217           |
| 5/16              | 63/64                 |                 | 6 <sup>1/2</sup>  | 1 8 <sup>3/8</sup>    | .2304           |
| 3/8               | 11/64                 |                 | 6 <sup>5/8</sup>  | 1 8 <sup>3/4</sup>    | .2394           |
| 7/16              | 1 <sup>3/8</sup>      |                 | 6 <sup>3/4</sup>  | 1 9 <sup>3/16</sup>   | .2485           |
|                   |                       |                 | 6 <sup>7/8</sup>  | 1 9 <sup>9/16</sup>   | .2578           |
| 1/2               | 1 <sup>37/64</sup>    |                 | 7                 | 1 9 <sup>15/16</sup>  | .2673           |
| 9/16              | 1 <sup>49/64</sup>    |                 | 7 <sup>1/8</sup>  | 1 10 <sup>3/8</sup>   | .2763           |
| 5/8               | 1 <sup>15/16</sup>    |                 | 7 <sup>1/4</sup>  | 1 10 <sup>3/4</sup>   | .2867           |
| 11/16             | 2 <sup>5/32</sup>     |                 | 7 <sup>3/8</sup>  | 1 11 <sup>1/8</sup>   | .2966           |
| 3/4               | 2 <sup>23/64</sup>    |                 | 7 <sup>1/2</sup>  | 1 11 <sup>1/2</sup>   | .3068           |
| 13/16             | 2 <sup>35/64</sup>    |                 | 7 <sup>5/8</sup>  | 1 11 <sup>15/16</sup> | .3164           |
| 7/8               | 2 <sup>3/4</sup>      |                 | 7 <sup>3/4</sup>  | 2 5/16                | .3275           |
| 15/16             | 2 <sup>15/16</sup>    |                 | 7 <sup>7/8</sup>  | 2 11/16               | .3382           |
| 1                 | 3 <sup>9/64</sup>     | .0055           | 8                 | 2 1 <sup>1/8</sup>    | .3491           |
| 1 <sup>1/8</sup>  | 3 <sup>1/2</sup>      | .0069           | 8 <sup>1/8</sup>  | 2 1 <sup>1/2</sup>    | .3601           |
| 1 <sup>1/4</sup>  | 3 <sup>7/8</sup>      | .0085           | 8 <sup>1/4</sup>  | 2 1 <sup>7/8</sup>    | .3712           |
| 1 <sup>3/8</sup>  | 4 <sup>5/16</sup>     | .0103           | 8 <sup>3/8</sup>  | 2 2 <sup>1/4</sup>    | .3826           |
| 1 <sup>1/2</sup>  | 4 <sup>11/16</sup>    | .0123           | 8 <sup>1/2</sup>  | 2 2 <sup>11/16</sup>  | .3941           |
| 1 <sup>5/8</sup>  | 5 <sup>1/16</sup>     | .0144           | 8 <sup>5/8</sup>  | 2 3 <sup>1/8</sup>    | .4057           |
| 1 <sup>3/4</sup>  | 5 <sup>7/16</sup>     | .0167           | 8 <sup>3/4</sup>  | 2 3 <sup>7/16</sup>   | .4176           |
| 1 <sup>7/8</sup>  | 5 <sup>7/8</sup>      | .0192           | 8 <sup>7/8</sup>  | 2 3 <sup>7/8</sup>    | .4296           |
| 2                 | 6 <sup>1/4</sup>      | .0218           | 9                 | 2 4 <sup>1/4</sup>    | .4418           |
| 2 <sup>1/8</sup>  | 6 <sup>5/8</sup>      | .0246           | 9 <sup>1/8</sup>  | 2 4 <sup>5/8</sup>    | .4541           |
| 2 <sup>1/4</sup>  | 7                     | .0276           | 9 <sup>1/4</sup>  | 2 5                   | .4667           |
| 2 <sup>3/8</sup>  | 7 <sup>7/16</sup>     | .0308           | 9 <sup>3/8</sup>  | 2 5 <sup>7/16</sup>   | .4794           |
| 2 <sup>1/2</sup>  | 7 <sup>13/16</sup>    | .0341           | 9 <sup>1/2</sup>  | 2 5 <sup>13/16</sup>  | .4922           |
| 2 <sup>5/8</sup>  | 8 <sup>3/16</sup>     | .0376           | 9 <sup>5/8</sup>  | 2 6 <sup>3/16</sup>   | .5053           |
| 2 <sup>3/4</sup>  | 8 <sup>5/8</sup>      | .0412           | 9 <sup>3/4</sup>  | 2 5/8                 | .5185           |
| 2 <sup>7/8</sup>  | 9                     | .0451           | 9 <sup>7/8</sup>  | 2 7                   | .5319           |
| 3                 | 9 <sup>3/8</sup>      | .0491           | 10                | 2 7 <sup>3/8</sup>    | .5454           |
| 3 <sup>1/8</sup>  | 9 <sup>13/16</sup>    | .0533           | 10 <sup>1/8</sup> | 2 7 <sup>3/4</sup>    | .5591           |
| 3 <sup>1/4</sup>  | 10 <sup>3/16</sup>    | .0576           | 10 <sup>1/4</sup> | 2 8 <sup>3/16</sup>   | .5730           |
| 3 <sup>3/8</sup>  | 10 <sup>9/16</sup>    | .0621           | 10 <sup>3/8</sup> | 2 8 <sup>9/16</sup>   | .5871           |
| 3 <sup>1/2</sup>  | 10 <sup>15/16</sup>   | .0668           | 10 <sup>1/2</sup> | 2 8 <sup>7/16</sup>   | .6013           |
| 3 <sup>5/8</sup>  | 11 <sup>3/8</sup>     | .0717           | 10 <sup>5/8</sup> | 2 9 <sup>3/8</sup>    | .6157           |
| 3 <sup>3/4</sup>  | 11 <sup>3/4</sup>     | .0767           | 10 <sup>3/4</sup> | 2 9 <sup>3/4</sup>    | .6303           |
| 3 <sup>7/8</sup>  | 1 1/8                 | .0819           | 10 <sup>7/8</sup> | 2 10 <sup>1/8</sup>   | .6450           |
| 4                 | 1 9/16                | .0873           | 11                | 2 10 <sup>1/2</sup>   | .6600           |
| 4 <sup>1/8</sup>  | 1 15/16               | .0928           | 11 <sup>1/8</sup> | 2 10 <sup>15/16</sup> | .6750           |
| 4 <sup>1/4</sup>  | 1 1 <sup>5/16</sup>   | .0985           | 11 <sup>1/4</sup> | 2 11 <sup>5/16</sup>  | .6902           |
| 4 <sup>3/8</sup>  | 1 1 <sup>11/16</sup>  | .1044           | 11 <sup>3/8</sup> | 2 11 <sup>11/16</sup> | .7057           |
| 4 <sup>1/2</sup>  | 1 2 <sup>1/8</sup>    | .1104           | 11 <sup>1/2</sup> | 3 1/8                 | .7213           |
| 4 <sup>5/8</sup>  | 1 2 <sup>1/2</sup>    | .1167           | 11 <sup>5/8</sup> | 3 1/2                 | .7371           |
| 4 <sup>3/4</sup>  | 1 2 <sup>7/8</sup>    | .1230           | 11 <sup>3/4</sup> | 3 7/8                 | .7530           |
| 4 <sup>7/8</sup>  | 1 3 <sup>5/16</sup>   | .1297           | 11 <sup>7/8</sup> | 3 1 <sup>1/4</sup>    | .7690           |
| 5                 | 1 3 <sup>11/16</sup>  | .1364           | 12                | 3 1 <sup>11/16</sup>  | .7854           |
| 5 <sup>1/8</sup>  | 1 4 <sup>7/16</sup>   | .1433           | 12 <sup>1/8</sup> | 3 2 <sup>1/16</sup>   | .8019           |
| 5 <sup>1/4</sup>  | 1 4 <sup>7/8</sup>    | .1503           | 12 <sup>1/4</sup> | 3 2 <sup>7/16</sup>   | .8185           |
| 5 <sup>3/8</sup>  | 1 5 <sup>1/4</sup>    | .1575           | 12 <sup>3/8</sup> | 3 2 <sup>7/8</sup>    | .8353           |
| 5 <sup>1/2</sup>  | 1 5 <sup>5/8</sup>    | .1650           | 12 <sup>1/2</sup> | 3 3 <sup>1/4</sup>    | .8523           |
| 5 <sup>5/8</sup>  | 1 6                   | .1726           | 12 <sup>5/8</sup> | 3 3 <sup>5/8</sup>    | .8694           |
| 5 <sup>3/4</sup>  | 1 6 <sup>7/16</sup>   | .1803           | 12 <sup>3/4</sup> | 3 4                   | .8867           |
| 5 <sup>7/8</sup>  | 1 6 <sup>7/8</sup>    | .1883           | 12 <sup>7/8</sup> | 3 4 <sup>7/16</sup>   | .9041           |

# Circumference and Area of Circles

| Dia. in Inches | Circum. in Ft. In. | Area Sq. Ft. | Dia. in Inches    | Circum. in Ft. In.    | Area Sq. Ft. |
|----------------|--------------------|--------------|-------------------|-----------------------|--------------|
| 1/16           | 13/16              |              | 6                 | 1 6 <sup>13/16</sup>  | .1964        |
| 1/8            | 25/64              |              | 6 <sup>1/8</sup>  | 1 7 <sup>3/16</sup>   | .2046        |
| 3/16           | 19/32              |              | 6 <sup>1/4</sup>  | 1 7 <sup>5/8</sup>    | .2131        |
| 1/4            | 25/32              |              | 6 <sup>3/8</sup>  | 1 8                   | .2217        |
| 5/16           | 63/64              |              | 6 <sup>1/2</sup>  | 1 8 <sup>3/8</sup>    | .2304        |
| 3/8            | 11/64              |              | 6 <sup>5/8</sup>  | 1 8 <sup>3/4</sup>    | .2394        |
| 7/16           | 1 3/8              |              | 6 <sup>3/4</sup>  | 1 9 <sup>3/16</sup>   | .2485        |
|                |                    |              | 6 <sup>7/8</sup>  | 1 9 <sup>9/16</sup>   | .2578        |
| 1/2            | 1 37/64            |              | 7                 | 1 9 <sup>15/16</sup>  | .2673        |
| 9/16           | 1 49/64            |              | 7 <sup>1/8</sup>  | 1 10 <sup>3/8</sup>   | .2763        |
| 5/8            | 1 15/16            |              | 7 <sup>1/4</sup>  | 1 10 <sup>3/4</sup>   | .2867        |
| 11/16          | 2 5/32             |              | 7 <sup>3/8</sup>  | 1 11 <sup>1/8</sup>   | .2966        |
| 3/4            | 2 23/64            |              | 7 <sup>1/2</sup>  | 1 11 <sup>1/2</sup>   | .3068        |
| 13/16          | 2 35/64            |              | 7 <sup>5/8</sup>  | 1 11 <sup>15/16</sup> | .3164        |
| 7/8            | 2 3/4              |              | 7 <sup>3/4</sup>  | 2 5/16                | .3275        |
| 15/16          | 2 15/16            |              | 7 <sup>7/8</sup>  | 2 11/16               | .3382        |
| 1              | 3 9/64             | .0055        | 8                 | 2 1 1/8               | .3491        |
| 1 1/8          | 3 1/2              | .0069        | 8 <sup>1/8</sup>  | 2 1 1/2               | .3601        |
| 1 1/4          | 3 7/8              | .0085        | 8 <sup>1/4</sup>  | 2 1 7/8               | .3712        |
| 1 3/8          | 4 5/16             | .0103        | 8 <sup>3/8</sup>  | 2 2 1/4               | .3826        |
| 1 1/2          | 4 11/16            | .0123        | 8 <sup>1/2</sup>  | 2 2 11/16             | .3941        |
| 1 5/8          | 5 1/16             | .0144        | 8 <sup>5/8</sup>  | 2 3 1/8               | .4057        |
| 1 3/4          | 5 7/16             | .0167        | 8 <sup>3/4</sup>  | 2 3 7/16              | .4176        |
| 1 7/8          | 5 7/8              | .0192        | 8 <sup>7/8</sup>  | 2 3 7/8               | .4296        |
| 2              | 6 1/4              | .0218        | 9                 | 2 4 1/4               | .4418        |
| 2 1/8          | 6 5/8              | .0246        | 9 <sup>1/8</sup>  | 2 4 5/8               | .4541        |
| 2 1/4          | 7                  | .0276        | 9 <sup>1/4</sup>  | 2 5                   | .4667        |
| 2 3/8          | 7 7/16             | .0308        | 9 <sup>3/8</sup>  | 2 5 7/16              | .4794        |
| 2 1/2          | 7 13/16            | .0341        | 9 <sup>1/2</sup>  | 2 5 13/16             | .4922        |
| 2 5/8          | 8 3/16             | .0376        | 9 <sup>5/8</sup>  | 2 6 3/16              | .5053        |
| 2 3/4          | 8 5/8              | .0412        | 9 <sup>3/4</sup>  | 2 5/8                 | .5185        |
| 2 7/8          | 9                  | .0451        | 9 <sup>7/8</sup>  | 2 7                   | .5319        |
| 3              | 9 3/8              | .0491        | 10                | 2 7 3/8               | .5454        |
| 3 1/8          | 9 13/16            | .0533        | 10 <sup>1/8</sup> | 2 7 3/4               | .5591        |
| 3 1/4          | 10 3/16            | .0576        | 10 <sup>1/4</sup> | 2 8 3/16              | .5730        |
| 3 3/8          | 10 9/16            | .0621        | 10 <sup>3/8</sup> | 2 8 9/16              | .5871        |
| 3 1/2          | 10 15/16           | .0668        | 10 <sup>1/2</sup> | 2 8 7/16              | .6013        |
| 3 5/8          | 11 3/8             | .0717        | 10 <sup>5/8</sup> | 2 9 3/8               | .6157        |
| 3 3/4          | 11 3/4             | .0767        | 10 <sup>3/4</sup> | 2 9 3/4               | .6303        |
| 3 7/8          | 1 1/8              | .0819        | 10 <sup>7/8</sup> | 2 10 1/8              | .6450        |
| 4              | 1 9/16             | .0873        | 11                | 2 10 1/2              | .6600        |
| 4 1/8          | 1 15/16            | .0928        | 11 <sup>1/8</sup> | 2 10 15/16            | .6750        |
| 4 1/4          | 1 1 5/16           | .0985        | 11 <sup>1/4</sup> | 2 11 5/16             | .6902        |
| 4 3/8          | 1 1 11/16          | .1044        | 11 <sup>3/8</sup> | 2 11 11/16            | .7057        |
| 4 1/2          | 1 2 1/8            | .1104        | 11 <sup>1/2</sup> | 3 1/8                 | .7213        |
| 4 5/8          | 1 2 1/2            | .1167        | 11 <sup>5/8</sup> | 3 1/2                 | .7371        |
| 4 3/4          | 1 2 7/8            | .1230        | 11 <sup>3/4</sup> | 3 7/8                 | .7530        |
| 4 7/8          | 1 3 5/16           | .1297        | 11 <sup>7/8</sup> | 3 1 1/4               | .7690        |
| 5              | 1 3 11/16          | .1364        | 12                | 3 1 11/16             | .7854        |
| 5 1/8          | 1 4 7/16           | .1433        | 12 <sup>1/8</sup> | 3 2 1/16              | .8019        |
| 5 1/4          | 1 4 7/8            | .1503        | 12 <sup>1/4</sup> | 3 2 7/16              | .8185        |
| 5 3/8          | 1 5 1/4            | .1575        | 12 <sup>3/8</sup> | 3 2 7/8               | .8353        |
| 5 1/2          | 1 5 5/8            | .1650        | 12 <sup>1/2</sup> | 3 3 1/4               | .8523        |
| 5 5/8          | 1 6                | .1726        | 12 <sup>5/8</sup> | 3 3 5/8               | .8694        |
| 5 3/4          | 1 6 7/16           | .1803        | 12 <sup>3/4</sup> | 3 4                   | .8867        |
| 5 7/8          | 1                  | .1883        | 12 <sup>7/8</sup> | 3 4 7/16              | .9041        |

# TANK VOLUME

## U.S. GALLONS IN ROUND TANKS For One Foot In Depth

| Dia. of Tank |       | No. U.S. Gals. | Cu. Ft. and Area in Sq. Ft. | Dia. of Tank |       | No. U.S. Gals. | Cu. Ft. and Area in Sq. Ft. |
|--------------|-------|----------------|-----------------------------|--------------|-------|----------------|-----------------------------|
| 1 ft.        | 0 in. | 5.87           | .785                        | 4 ft.        | 6 in. | 118.97         | 15.90                       |
| 1            | 1     | 6.89           | .922                        | 4            | 7     | 123.42         | 16.50                       |
| 1            | 2     | 8.00           | 1.069                       | 4            | 8     | 127.95         | 17.10                       |
| 1            | 3     | 9.18           | 1.227                       | 4            | 9     | 132.56         | 17.72                       |
| 1            | 4     | 10.44          | 1.396                       | 4            | 10    | 137.25         | 18.35                       |
| 1            | 5     | 11.79          | 1.576                       | 4            | 11    | 142.02         | 18.99                       |
| 1            | 6     | 13.22          | 1.767                       | 5            | 0     | 146.88         | 19.63                       |
| 1            | 7     | 14.73          | 1.969                       | 5            | 1     | 151.82         | 20.29                       |
| 1            | 8     | 16.32          | 2.182                       | 5            | 2     | 156.83         | 20.97                       |
| 1            | 9     | 17.99          | 2.405                       | 5            | 3     | 161.93         | 21.65                       |
| 1            | 10    | 19.75          | 2.640                       | 5            | 4     | 167.12         | 22.34                       |
| 1            | 11    | 21.58          | 2.885                       | 5            | 5     | 172.38         | 23.04                       |
| 2            | 0     | 23.50          | 3.142                       | 5            | 6     | 177.72         | 23.76                       |
| 2            | 1     | 25.50          | 3.409                       | 5            | 7     | 183.15         | 24.48                       |
| 2            | 2     | 27.58          | 3.687                       | 5            | 8     | 188.66         | 25.22                       |
| 2            | 3     | 29.74          | 3.976                       | 5            | 9     | 194.25         | 25.97                       |
| 2            | 4     | 31.99          | 4.276                       | 5            | 10    | 199.92         | 26.73                       |
| 2            | 5     | 34.31          | 4.587                       | 5            | 11    | 205.67         | 27.49                       |
| 2            | 6     | 36.72          | 4.909                       | 6            | 0     | 211.51         | 28.27                       |
| 2            | 7     | 39.21          | 5.241                       | 6            | 3     | 229.50         | 30.68                       |
| 2            | 8     | 41.78          | 5.585                       | 6            | 6     | 248.23         | 33.18                       |
| 2            | 9     | 44.43          | 5.940                       | 6            | 9     | 267.69         | 35.78                       |
| 2            | 10    | 47.16          | 6.305                       | 7            | 0     | 287.88         | 38.48                       |
| 2            | 11    | 49.98          | 6.681                       | 7            | 3     | 308.81         | 41.28                       |
| 3            | 0     | 52.88          | 7.069                       | 7            | 6     | 330.48         | 44.18                       |
| 3            | 1     | 55.86          | 7.467                       | 7            | 9     | 352.88         | 47.17                       |
| 3            | 2     | 58.92          | 7.876                       | 8            | 0     | 376.01         | 50.27                       |
| 3            | 3     | 62.06          | 8.296                       | 8            | 3     | 399.88         | 53.46                       |
| 3            | 4     | 65.28          | 8.727                       | 8            | 6     | 424.48         | 56.75                       |
| 3            | 5     | 68.58          | 9.168                       | 8            | 9     | 449.82         | 60.13                       |
| 3            | 6     | 71.97          | 9.621                       | 9            | 0     | 475.89         | 63.62                       |
| 3            | 7     | 75.44          | 10.085                      | 9            | 3     | 502.70         | 67.20                       |
| 3            | 8     | 78.99          | 10.559*                     | 9            | 6     | 530.24         | 70.88                       |
| 3            | 9     | 82.62          | 11.045                      | 9            | 9     | 558.51         | 74.66                       |
| 3            | 10    | 86.33          | 11.541                      | 10           | 0     | 587.52         | 78.54                       |
| 3            | 11    | 90.13          | 12.048                      | 10           | 3     | 617.26         | 82.52                       |
| 4            | 0     | 94.00          | 12.566                      | 10           | 6     | 647.74         | 86.59                       |
| 4            | 1     | 97.96          | 13.095                      | 10           | 9     | 678.95         | 90.76                       |
| 4            | 2     | 102.00         | 13.635                      | 11           | 0     | 710.90         | 95.03                       |
| 4            | 3     | 106.12         | 14.186                      | 11           | 3     | 743.58         | 99.40                       |
| 4            | 4     | 110.32         | 14.748                      | 11           | 6     | 776.99         | 103.87                      |
| 4            | 5     | 114.61         | 15.321                      | 11           | 9     | 811.14         | 108.43                      |

(continued)

### 31<sup>1</sup>/<sub>2</sub> Gallons equal 1 Barrel

To find the capacity of tanks greater than the largest given in the table, took in the table for a Tank of one-half of the given size and multiply its capacity by 4, or one of one-third its size and multiply its capacity by 9, etc.

# TANK VOLUME

## U.S. GALLONS IN ROUND TANKS For One Foot In Depth

| Dia. of Tank       | No. U.S. Gals. | Cu. Ft. and Area in Sq. Ft. | Dia. of Tank | No. U.S. Gals. | Cu. Ft. and Area in Sq. Ft. |
|--------------------|----------------|-----------------------------|--------------|----------------|-----------------------------|
| <i>(continued)</i> |                |                             |              |                |                             |
| 12 ft. 0 in.       | 846.03         | 113.10                      | 22 ft. 6 in. | 2974.30        | 397.61                      |
| 12 3               | 881.65         | 117.86                      | 22 9         | 3040.80        | 406.49                      |
| 12 6               | 918.00         | 122.72                      | 23 0         | 3108.00        | 415.48                      |
| 12 9               | 955.09         | 127.68                      | 23 3         | 3175.90        | 424.56                      |
| 13 0               | 201.06         | 132.73                      | 23 6         | 3244.60        | 433.74                      |
| 13 3               | 1031.50        | 137.89                      | 23 9         | 3314.00        | 443.01                      |
| 13 6               | 1070.80        | 143.14                      | 24 0         | 3384.10        | 452.39                      |
| 13 9               | 1110.80        | 148.49                      | 24 3         | 3455.00        | 461.86                      |
| 14 0               | 1151.50        | 153.94                      | 24 6         | 3526.60        | 471.44                      |
| 14 3               | 1193.00        | 159.48                      | 24 9         | 3598.90        | 481.11                      |
| 14 6               | 1235.30        | 165.13                      | 25 0         | 3672.00        | 490.87                      |
| 14 9               | 1278.20        | 170.87                      | 25 3         | 3745.80        | 500.74                      |
| 15 0               | 1321.90        | 176.71                      | 25 6         | 3820.30        | 510.71                      |
| 15 3               | 1366.40        | 182.65                      | 25 9         | 3895.60        | 520.77                      |
| 15 6               | 1411.50        | 188.69                      | 26 0         | 3971.60        | 530.93                      |
| 15 9               | 1457.40        | 194.83                      | 26 3         | 4048.40        | 541.19                      |
| 16 0               | 1504.10        | 201.06                      | 26 6         | 4125.90        | 551.55                      |
| 16 3               | 1551.40        | 207.39                      | 26 9         | 4204.10        | 562.00                      |
| 16 6               | 1599.50        | 213.82                      | 27 0         | 4283.00        | 572.56                      |
| 16 9               | 1648.40        | 220.35                      | 27 3         | 4362.70        | 583.21                      |
| 17 0               | 1697.90        | 226.98                      | 27 6         | 4443.10        | 593.96                      |
| 17 3               | 1748.20        | 233.71                      | 27 9         | 4524.30        | 604.81                      |
| 17 6               | 1799.30        | 240.53                      | 28 0         | 4606.20        | 615.75                      |
| 17 9               | 1851.10        | 247.45                      | 28 3         | 4688.80        | 626.80                      |
| 18 0               | 1903.60        | 254.47                      | 28 6         | 4772.10        | 637.94                      |
| 18 3               | 1956.80        | 261.59                      | 28 9         | 4856.20        | 649.18                      |
| 18 6               | 2010.80        | 268.80                      | 29 0         | 4941.00        | 660.52                      |
| 18 9               | 2065.50        | 276.12                      | 29 3         | 5026.60        | 671.96                      |
| 19 0               | 2120.90        | 283.53                      | 29 6         | 5112.90        | 683.49                      |
| 19 3               | 2177.10        | 291.04                      | 29 9         | 5199.90        | 695.13                      |
| 19 6               | 2234.00        | 298.65                      | 30 0         | 5287.70        | 706.86                      |
| 19 9               | 2291.70        | 306.35                      | 30 3         | 5376.20        | 718.69                      |
| 20 0               | 2350.10        | 314.16                      | 30 6         | 5465.40        | 730.62                      |
| 20 3               | 2409.20        | 322.06                      | 30 9         | 5555.40        | 742.64                      |
| 20 6               | 2469.10        | 330.06                      | 31 0         | 5646.10        | 754.77                      |
| 20 9               | 2529.60        | 338.16                      | 31 3         | 5737.50        | 766.99                      |
| 21 0               | 2591.00        | 346.36                      | 31 6         | 5829.70        | 779.31                      |
| 21 3               | 2653.00        | 354.66                      | 31 9         | 5922.60        | 791.73                      |
| 21 6               | 2715.80        | 363.05                      | 32 0         | 6016.20        | 804.25                      |
| 21 9               | 2779.30        | 371.54                      | 32 3         | 6110.60        | 816.86                      |
| 22 0               | 2843.60        | 380.13                      | 32 6         | 6205.70        | 829.58                      |
| 22 3               | 2908.60        | 388.82                      | 32 9         | 6301.50        | 842.39                      |

### 31<sup>1/2</sup> Gallons equal 1 Barrel

To find the capacity of tanks greater than the largest given in the table, took in the table for a Tank of one-half of the given size and multiply its capacity by 4, or one of one-third its size and multiply its capacity by 9, etc.