

# APPENDIX E MISCELLANEOUS DATA

Table E-1. Temperature Ranges for Processing Metals

| Process                            | Temperature Range |              |
|------------------------------------|-------------------|--------------|
|                                    | °F                | °C           |
| Joining temperature                |                   |              |
| Brazing (copper and copper alloys) | 1300 to 2150      | 704 to 1177  |
| Brazing (silver alloys)            | 1100 to 1650      | 593 to 899   |
| Forging                            | 1700 to 2150      | 927 to 1177  |
| Soft soldering                     | 300 to 700        | 149 to 371   |
| Welding (ferrous metals)           | 1800 to 2800      | 982 to 1538  |
| Welding (nonferrous metals)        | 600 to 3300       | 316 to 1816  |
| Hardening                          |                   |              |
| Carbon steel                       | 1350 to 1550      | 732 to 843   |
| Alloy steel                        | 1400 to 1850      | 760 to 1010  |
| High speed steel                   | 2150 to 2400      | 1177 to 1316 |
| Tempering                          |                   |              |
| Carbon steel                       | 300 to 1050       | 149 to 566   |
| Alloy steel                        | 300 to 1300       | 149 to 704   |
| High speed steel                   | 350 to 1100       | 177 to 593   |

Table E-2. Combustion Constants of Fuel Gases

| Name of Gas   | Heat Value <sub>3</sub><br>Btu per ft <sup>3</sup> | Flame Temperature<br>with Oxygen |      |
|---------------|--|----------------------------------|------|
|               |  | °F                               | °C   |
| Acetylene     | 1433 net   | 6300                             | 3482 |
| Butane        | 2999 net   | 5300                             | 2927 |
| City gas      | 300 to 800 net                                     | 4600                             | 2538 |
| Coke oven gas | 500 to 550 net                                     | 4600                             | 2538 |
| Ethane        | 1631 net   | 5100                             | 2816 |
| Ethylene      | 1530 net   | 5100                             | 2816 |
| Hydrogen      | 275.1 net  | 5400                             | 2982 |
| Methane       | 913.8 net  | 5000                             | 2760 |
| Natural gas   | 800 to 1200 net                                    | 4600                             | 2538 |
| MAPP gas      | 2406 net   | 5300                             | 2927 |

Table E-3. Melting Points of Metals and Alloys

| Metal or Alloy                                     | °F           | Melting point | °C           |
|--|--------------|---------------|--------------|
| Aluminum, cast (8 percent copper)                  | 1175         |               | 635          |
| Aluminum, pure                                     | 1220         |               | 660          |
| Aluminum (5 percent silicon)                       | 1118         |               | 603          |
| Brass, naval                                       | 1625         |               | 885          |
| Brass, yellow                                      | 1660         |               | 904          |
| Bronze, aluminum                                   | 1905         |               | 1041         |
| Bronze, manganese                                  | 1600         |               | 871          |
| Bronze, phosphor                                   | 1830 to 1922 |               | 999 to 1050  |
| Bronze, tobin                                      | 1625         |               | 885          |
| Chromium   | 2740         |               | 1504         |
| Copper   | 1981         |               | 1083         |
| Iron, cast   | 2300         |               | 1260         |
| Iron, malleable                                    | 2300         |               | 1260         |
| Iron, pure   | 2786         |               | 1530         |
| Iron, wrought                                      | 2750         |               | 1510         |
| Lead   | 620          |               | 327          |
| Manganese  | 2246         |               | 1230         |
| Magnesium  | 1200         |               | 649          |
| Molybdenum   | 4532         |               | 2500         |
| Monel metal  | 2480         |               | 1360         |
| Nickel   | 2646         |               | 1452         |
| Nickel silver (18 percent nickel)                  | 2030         |               | 1110         |
| Silver, pure                                       | 1762         |               | 961          |
| Silver solders (50 percent silver)                 | 1160 to 1275 |               | 627 to 691   |
| Solder (50-50)                                     | 420          |               | 216          |
| Stainless steel (18-8)                             | 2550         |               | 1399         |
| Stainless steel, low carbon (18-8)                 | 2640         |               | 1449         |
| Steel, high carbon (0.55-0.83)<br>percent carbon)  | 2500 to 2550 |               | 1371 to 1399 |
| Steel, low carbon (maximum 0.30<br>percent carbon) | 2600 to 2750 |               | 1427 to 1510 |
| Steel, medium carbon (0.30-0.55<br>percent carbon) | 2550 to 2600 |               | 1399 to 1427 |
| Steel, manganese                                   | 2450         |               | 1343         |
| Steel, cast  | 2600 to 2750 |               | 1427 to 1510 |
| Steel, nickel (3.5 percent nickel)                 | 2600         |               | 1427         |
| Tantalum   | 5160         |               | 2849         |
| Tin  | 420          |               | 216          |
| Titanium   | 3270         |               | 1799         |
| Tungsten   | 6152         |               | 3400         |
| Vanadium   | 3182         |               | 1750         |
| White metal  | 725          |               | 385          |
| Zinc   | 786          |               | 419          |

Table E-4. Temper Colors and Temperatures

| Temper Color           | Temperatures       |                    | Uses  |
|------------------------|--------------------|--------------------|---|
|                        | $^{\circ}\text{F}$ | $^{\circ}\text{C}$ |   |
| Faint straw            | 400                | 204                |   |
| Straw                  | 440                | 227                | Scrapers, hammer faces, lathe, shaper, and planer tools |
| Dark straw             | 460                | 238                | Milling cutters, taps, and dies                         |
| Very deep straw        | 480                | 249                | Punches, dies, knives, and reamers                      |
| Brown yellow           | 500                | 260                | Stone-cutting tools and twist drills                    |
| Bronze or brown purple | 520                | 271                | Drift pins  |
| Peacock or full purple | 540                | 282                | Augers, cold chisels for steel                          |
| Bluish purple          | 550                | 288                | Axes, cold chisels for iron, screwdrivers, and springs  |
| Blue                   | 570                | 299                | Saws for wood   |
| Full blue              | 590                | 310                |   |
| Very dark blue         | 600                | 316                |   |
| Light blue             | 640                | 338                |   |

Table E-5. Heat Colors with Approximate Temperature

| Color                       | Temperature        |                    |
|-----------------------------|--------------------|--------------------|
|                             | $^{\circ}\text{F}$ | $^{\circ}\text{C}$ |
| White                       | 2200               | 1204               |
| Light yellow                | 1975               | 1079               |
| Lemon                       | 1825               | 996                |
| Orange                      | 1725               | 941                |
| Salmon                      | 1650               | 899                |
| Bright red                  | 1550               | 843                |
| Bright cherry or dull red   | 1450               | 788                |
| Cherry or full red          | 1375               | 746                |
| Medium cherry               | 1250               | 677                |
| Dark cherry                 | 1175               | 635                |
| Blood red                   | 1050               | 566                |
| Faint red                   | 900                | 482                |
| Faint red (visible in dark) | 750                | 399                |

Table E-6. Stub Steel Wire Gauges

| Gauge No. | Dia   | Gauge No. | Dia   | Gauge No. | Dia   | Gauge No. | Dia   |
|-----------|-------|-----------|-------|-----------|-------|-----------|-------|
| 7/0       | ....  | 16        | 0.175 | 38        | 0.101 | 61        | 0.038 |
| 6/0       | ....  | 17        | 0.172 | 39        | 0.099 | 62        | 0.037 |
| 5/0       | ....  | 18        | 0.168 | 40        | 0.097 | 63        | 0.036 |
| 4/0       | ....  | 19        | 0.164 | 41        | 0.095 | 64        | 0.035 |
| 3/0       | ....  | 20        | 0.161 | 42        | 0.092 | 65        | 0.033 |
| 2/0       | ....  | 21        | 0.157 | 43        | 0.088 | 66        | 0.032 |
| 0         | ....  | 22        | 0.155 | 44        | 0.085 | 67        | 0.031 |
| 1         | 0.227 | 23        | 0.153 | 45        | 0.081 | 68        | 0.030 |
| 2         | 0.219 | 24        | 0.151 | 47        | 0.077 | 69        | 0.029 |
| 3         | 0.212 | 25        | 0.148 | 48        | 0.075 | 70        | 0.027 |
| 4         | 0.207 | 26        | 0.146 | 49        | 0.072 | 71        | 0.026 |
| 5         | 0.204 | 27        | 0.143 | 50        | 0.069 | 72        | 0.024 |
| 6         | 0.201 | 28        | 0.139 | 51        | 0.066 | 73        | 0.023 |
| 7         | 0.199 | 29        | 0.134 | 52        | 0.063 | —         | —     |
| 8         | 0.197 | 30        | 0.127 | 53        | 0.058 | 74        | 0.022 |
| 9         | 0.194 | 31        | 0.120 | 54        | 0.055 | 75        | 0.020 |
| 10        | 0.191 | 32        | 0.115 | 55        | 0.050 | 76        | 0.018 |
| 11        | 0.188 | 33        | 0.112 | 56        | 0.045 | 77        | 0.016 |
| 12        | 0.185 | 34        | 0.110 | 57        | 0.042 | 78        | 0.015 |
| 13        | 0.182 | 35        | 0.108 | 58        | 0.041 | 79        | 0.014 |
| 14        | 0.180 | 36        | 0.106 | 59        | 0.040 | 80        | 0.013 |
| 15        | 0.178 | 37        | 0.103 | 60        | 0.039 | —         | —     |

Table E-7. Standard Gauge Abbreviations

| Standard gauge                       | Abbreviation |
|--------------------------------------|--------------|
| American wire gauge                  | AWG          |
| Brown & Sharpe gauge                 | B&S          |
| .....                                | .....        |
| American steel wire gauge            | Stl WG       |
| National wire gauge                  | NATL         |
| Roebling wire gauge                  | ROEBL        |
| Washburn & Moen gauge                | W&M          |
| .....                                | .....        |
| Standard wire gauge                  | SWG          |
| English standard gauge               | SWG          |
| English legal standard gauge         | SWG          |
| Imperial wire gauge                  | IWG          |
| British Imperial wire gauge          | IWG          |
| British standard wire gauge          | SWG          |
| New British standard gauge           | NBS          |
| Olde English gauge                   | OEG          |
| London wire gauge                    | Lon WG       |
| .....                                | .....        |
| 1914 Birmingham gauge                | BWG          |
| .....                                | .....        |
| Birmingham wire gauge                | BWG          |
| Stub iron wire gauge (Peters Stubbs) | STUB IRON GA |
| Stub steel wire gauge                | STUB STL     |
| U.S. standard gauge                  | US STD       |
| .....                                | .....        |

## NOTE

Gauges grouped within broken lines (...) are identical.

Table E-8. Metal Gauge Comparisons

| Gauge No. | U.S. Standard<br>(obsolete)<br>Gauge | Manufacturer's<br>Standard | Muscle Wire | American<br>Wire<br>(AWG) | American<br>Steel<br>Wire<br>(STLWG) | Standard<br>Wire<br>(SWG) | Old<br>English<br>(OEG) | Birmingham<br>1914<br>(BG) | Birmingham<br>Wire<br>(BWG) |
|-----------|--------------------------------------|----------------------------|-------------|---------------------------|--------------------------------------|---------------------------|-------------------------|----------------------------|-----------------------------|
| 7/0       | 0.5000                               | .....                      | 0.003       | .....                     | 0.4900                               | 0.5000                    | .....                   | 0.6666                     | .....                       |
| 6/0       | 0.4687                               | .....                      | 0.004       | 0.5800                    | 0.4600                               | 0.4640                    | .....                   | 0.6250                     | .....                       |
| 5/0       | 0.4370                               | .....                      | 0.005       | 0.5165                    | 0.4300                               | 0.4320                    | .....                   | 0.5883                     | .....                       |
| 4/0       | 0.4063                               | .....                      | 0.006       | 0.4600                    | 0.3938                               | 0.4000                    | 0.4540                  | 0.5416                     | 0.454                       |
| 3/0       | 0.3750                               | .....                      | 0.007       | 0.4096                    | 0.3625                               | 0.3720                    | 0.4250                  | 0.5000                     | 0.425                       |
| 2/0       | 0.3437                               | .....                      | 0.008       | 0.3648                    | 0.3310                               | 0.3480                    | 0.3800                  | 0.4452                     | 0.380                       |
| 0         | 0.3125                               | .....                      | 0.009       | 0.3249                    | 0.3065                               | 0.3240                    | 0.3400                  | 0.3964                     | 0.340                       |
| 1         | 0.2813                               | .....                      | 0.010       | 0.2893                    | 0.2830                               | 0.3000                    | 0.3000                  | 0.3532                     | 0.300                       |
| 2         | 0.2656                               | .....                      | 0.011       | 0.2576                    | 0.2625                               | 0.2760                    | 0.2840                  | 0.3147                     | 0.284                       |
| 3         | 0.2500                               | 0.2391                     | 0.012       | 0.2294                    | 0.2437                               | 0.2520                    | 0.2590                  | 0.2804                     | 0.259                       |
| 4         | 0.2344                               | 0.2242                     | 0.013       | 0.2043                    | 0.2253                               | 0.2320                    | 0.2380                  | 0.2500                     | 0.238                       |
| 5         | 0.2188                               | 0.2092                     | 0.014       | 0.1819                    | 0.2070                               | 0.2120                    | 0.2200                  | 0.2225                     | 0.220                       |
| 6         | 0.2031                               | 0.1943                     | 0.016       | 0.1620                    | 0.1920                               | 0.1920                    | 0.2030                  | 0.1981                     | 0.203                       |
| 7         | 0.1875                               | 0.1793                     | 0.018       | 0.1443                    | 0.1770                               | 0.1760                    | 0.1800                  | 0.1764                     | 0.180                       |
| 8         | 0.1719                               | 0.1644                     | 0.020       | 0.1285                    | 0.1620                               | 0.1600                    | 0.1650                  | 0.1570                     | 0.165                       |
| 9         | 0.1563                               | 0.1495                     | 0.022       | 0.1144                    | 0.1483                               | 0.1440                    | 0.1480                  | 0.1398                     | 0.148                       |
| 10        | 0.1406                               | 0.1345                     | 0.024       | 0.1019                    | 0.1350                               | 0.1280                    | 0.1340                  | 0.1250                     | 0.134                       |
| 11        | 0.1250                               | 0.1196                     | 0.026       | 0.0907                    | 0.1205                               | 0.1160                    | 0.1200                  | 0.1113                     | 0.120                       |
| 12        | 0.1094                               | 0.1046                     | 0.029       | 0.0808                    | 0.1055                               | 0.1040                    | 0.1090                  | 0.0991                     | 0.109                       |
| 13        | 0.0937                               | 0.0897                     | 0.031       | 0.0720                    | 0.0915                               | 0.0920                    | 0.0950                  | 0.0882                     | 0.095                       |
| 14        | 0.0781                               | 0.0747                     | 0.033       | 0.0641                    | 0.0800                               | 0.0800                    | 0.0830                  | 0.0785                     | 0.083                       |
| 15        | 0.0703                               | 0.0673                     | 0.035       | 0.0571                    | 0.0720                               | 0.0720                    | 0.0720                  | 0.0699                     | 0.072                       |
| 16        | 0.0625                               | 0.0598                     | 0.037       | 0.0508                    | 0.0625                               | 0.0640                    | 0.0650                  | 0.0625                     | 0.065                       |
| 17        | 0.0563                               | 0.0538                     | 0.039       | 0.0453                    | 0.0540                               | 0.0560                    | 0.0580                  | 0.0556                     | 0.058                       |
| 18        | 0.0500                               | 0.0478                     | 0.041       | 0.0403                    | 0.0475                               | 0.0480                    | 0.0490                  | 0.0495                     | 0.049                       |
| 19        | 0.0438                               | 0.0418                     | 0.043       | 0.0359                    | 0.0410                               | 0.0400                    | 0.0400                  | 0.0440                     | 0.042                       |
| 20        | 0.0373                               | 0.0359                     | 0.045       | 0.0320                    | 0.0348                               | 0.0360                    | 0.0350                  | 0.0392                     | 0.035                       |
| 21        | 0.0344                               | 0.0329                     | 0.047       | 0.0284                    | 0.0318                               | 0.0320                    | 0.0315                  | 0.0349                     | 0.032                       |
| 22        | 0.0313                               | 0.0299                     | 0.049       | 0.0254                    | 0.0286                               | 0.0280                    | 0.0295                  | 0.0312                     | 0.028                       |
| 23        | 0.0281                               | 0.0269                     | 0.051       | 0.0226                    | 0.0258                               | 0.0240                    | 0.0270                  | 0.0278                     | 0.025                       |
| 24        | 0.0250                               | 0.0239                     | 0.055       | 0.0201                    | 0.0230                               | 0.0220                    | 0.0250                  | 0.0248                     | 0.022                       |

Table E-8. Metal Gauge Comparisons (cont)

| Gauge No. | U.S. Standard Gauge (obsolete) | Manufacturer's Standard | Muscle Wire | American Wire (AWG) | American Steel Wire (StIWG) | Standard Wire (SWG) | Old English (OEG) | 1914 Birmingham (BG) | Birmingham Wire (BWG) |
|-----------|--------------------------------|-------------------------|-------------|---------------------|-----------------------------|---------------------|-------------------|----------------------|-----------------------|
| 25        | 0.0219                         | 0.0209                  | 0.059       | 0.0179              | 0.0204                      | 0.0200              | 0.0230            | 0.0220               | 0.020                 |
| 26        | 0.0188                         | 0.0179                  | 0.063       | 0.0159              | 0.0181                      | 0.0180              | 0.0205            | 0.0196               | 0.018                 |
| 27        | 0.0172                         | 0.0164                  | 0.067       | 0.0142              | 0.0173                      | 0.0164              | 0.0187            | 0.0174               | 0.016                 |
| 28        | 0.0156                         | 0.0149                  | 0.071       | 0.0126              | 0.0162                      | 0.0148              | 0.0165            | 0.0156               | 0.014                 |
| 29        | 0.0141                         | 0.0135                  | 0.075       | 0.0113              | 0.0150                      | 0.0136              | 0.0155            | 0.0139               | 0.013                 |
| 30        | 0.0125                         | 0.0120                  | 0.080       | 0.0100              | 0.0140                      | 0.0124              | 0.0137            | 0.0123               | 0.012                 |
| 31        | 0.0109                         | 0.0105                  | 0.085       | 0.0089              | 0.0132                      | 0.0116              | 0.0122            | 0.0110               | 0.010                 |
| 32        | 0.0102                         | 0.0097                  | 0.090       | 0.0080              | 0.0128                      | 0.0108              | 0.0112            | 0.0098               | 0.009                 |
| 33        | 0.0094                         | 0.0090                  | 0.095       | 0.0071              | 0.0118                      | 0.0100              | 0.0102            | 0.0087               | 0.008                 |
| 34        | 0.0086                         | 0.0082                  | 0.100       | 0.0063              | 0.0104                      | 0.0092              | 0.0095            | 0.0077               | 0.007                 |
| 35        | 0.0078                         | 0.0075                  | 0.106       | 0.0056              | 0.0095                      | 0.0084              | 0.0090            | 0.0069               | 0.005                 |
| 36        | 0.0070                         | 0.0067                  | 0.112       | 0.0050              | 0.0090                      | 0.0076              | 0.0075            | 0.0061               | 0.004                 |
| 37        | 0.0066                         | 0.0064                  | 0.118       | 0.0045              | 0.0085                      | 0.0068              | 0.0065            | 0.0054               | .....                 |
| 38        | 0.0063                         | 0.0060                  | 0.124       | 0.0040              | 0.0080                      | 0.0060              | 0.0057            | 0.0048               | .....                 |
| 39        | .....                          | .....                   | 0.130       | 0.0035              | 0.0075                      | 0.0052              | 0.0050            | 0.0043               | .....                 |
| 40        | .....                          | .....                   | 0.138       | 0.0031              | 0.0070                      | 0.0048              | 0.0045            | 0.0039               | .....                 |
| 41        | .....                          | .....                   | .....       | 0.0028              | .....                       | 0.0044              | .....             | 0.0034               | .....                 |
| 42        | .....                          | .....                   | .....       | 0.0025              | .....                       | 0.0040              | .....             | 0.0031               | .....                 |
| 43        | .....                          | .....                   | .....       | 0.0022              | .....                       | 0.0036              | .....             | 0.0027               | .....                 |
| 44        | .....                          | .....                   | .....       | 0.0020              | .....                       | 0.0032              | .....             | 0.0024               | .....                 |
| 45        | .....                          | .....                   | .....       | 0.0018              | .....                       | 0.0028              | .....             | 0.0021               | .....                 |
| 46        | .....                          | .....                   | .....       | 0.0016              | .....                       | 0.0024              | .....             | 0.0019               | .....                 |
| 47        | .....                          | .....                   | .....       | 0.0014              | .....                       | 0.0020              | .....             | 0.0017               | .....                 |
| 48        | .....                          | .....                   | .....       | 0.0012              | .....                       | 0.0016              | .....             | 0.0015               | .....                 |
| 49        | .....                          | .....                   | .....       | 0.0010              | .....                       | 0.0012              | .....             | 0.0013               | .....                 |
| 50        | .....                          | .....                   | .....       | 0.00098             | .....                       | 0.0010              | .....             | 0.0012               | .....                 |

Table E-9. Sheet Metal Gauge

| Oz per sq foot | Sheet Copper |           | Sheet Zinc |           | Tin Plate |           | Stainless Steel |                         |             |
|----------------|--------------|-----------|------------|-----------|-----------|-----------|-----------------|-------------------------|-------------|
|                | Thickness    | Gauge No. | Thickness  | Gauge No. | Thickness | Gauge No. | Gauge No.       | Average Sheet Thickness |             |
|                |              |           |            |           |           |           |                 | 4 x 8 foot              | 6 x 12 foot |
| 96 oz          | 0.1296       | 28        | 1.000      | 6X        | 0.028     | 6         |                 | *                       | *           |
| 88 oz          | 0.1188       | 27        | 0.500      | 4X        | 0.022     | 7         |                 | 0.187                   | *           |
| 80 oz          | 0.1080       | 26        | 0.375      | 3X        | 0.019     | 8         |                 | 0.165                   | *           |
| 72 oz          | 0.0972       | 25        | 0.250      | 2X        | 0.017     | 9         |                 | *                       | *           |
| 64 oz          | 0.0864       | 24        | 0.125      | 1X        | 0.016     | 10        |                 | 0.135                   | 0.141       |
| 56 oz          | 0.0756       | 23        | 0.100      | 1C        | 0.013     | 11        |                 | 0.120                   | 0.125       |
| 52 oz          | 0.0702       | 22        | 0.090      |           |           | 12        |                 | 0.105                   | 0.109       |
| 48 oz          | 0.0648       | 21        | 0.080      |           |           | 13        |                 | 0.090                   | 0.094       |
| 44 oz          | 0.0594       | 20        | 0.070      |           |           | 14        |                 | 0.075                   | 0.078       |
| 40 oz          | 0.0540       | 19        | 0.060      |           |           | 15        |                 | *                       | *           |
| 36 oz          | 0.0486       | 18        | 0.055      |           |           | 16        |                 | 0.060                   | 0.063       |
| 32 oz          | 0.0432       | 17        | 0.050      |           |           | 17        |                 | *                       | *           |
| 28 oz          | 0.0378       | 16        | 0.045      |           |           | 18        |                 | 0.048                   | 0.050       |
| 26 oz          | 0.0351       | 15        | 0.040      |           |           | 19        |                 | 0.042                   | 0.044       |
| 24 oz          | 0.0324       | 14        | 0.036      |           |           | 20        |                 | 0.036                   | 0.038       |
| 20 oz          | 0.0270       | 13        | 0.032      |           |           | 21        |                 | *                       | *           |
| 18 oz          | 0.0243       | 12        | 0.028      |           |           | 22        |                 | 0.030                   | 0.031       |
| 16 oz          | 0.0216       | 11        | 0.024      |           |           | 23        |                 | *                       | *           |
| 14 oz          | 0.0189       | 10        | 0.020      |           |           | 24        |                 | 0.024                   | 0.025       |
| 13 oz          | 0.0175       | 9         | 0.018      |           |           | 25        |                 | *                       | *           |
| 12 oz          | 0.0162       | 8         | 0.016      |           |           | 26        |                 | 0.018                   | 0.019       |
| 10 oz          | 0.0135       | 7         | 0.014      |           |           | 27        |                 | *                       | *           |
| 9 oz           | 0.0121       | 6         | 0.012      |           |           | 28        |                 | 0.015                   | 0.016       |
| 8 oz           | 0.0108       | 5         | 0.010      |           |           |           |                 |                         |             |
| 7 oz           | 0.0094       | 4         | 0.008      |           |           |           |                 |                         |             |
| 6 oz           | 0.0081       | 3         | 0.006      |           |           |           |                 |                         |             |
| 5 oz           | 0.0067       |           |            |           |           |           |                 |                         |             |
| 4 oz           | 0.0054       |           |            |           |           |           |                 |                         |             |

\*Not normally manufactured in these gauges.



Table E-10. Elements and Related Chemical Symbols

| Chemical<br>Symbol | Element     | Chemical<br>Symbol | Element      |
|--------------------|-------------|--------------------|--------------|
| Ar                 | Argon       | Mo                 | Molybdenum   |
| Ac                 | Actinium    | Md                 | Mendelevium  |
| Ag                 | Silver      | N                  | Nitrogen     |
| Al                 | Aluminum    | Na                 | Sodium       |
| Am                 | Americium   | Nb                 | Niobium      |
| As                 | Arsenic     | Nd                 | Neodymium    |
| At                 | Astatine    | Ne                 | Neon         |
| Au                 | Gold        | Ni                 | Nickel       |
| B                  | Boron       | No                 | Nobelium     |
| Ba                 | Barium      | Np                 | Neptunium    |
| Be                 | Beryllium   | O                  | Oxygen       |
| Bi                 | Bismuth     | Os                 | Osmium       |
| Bk                 | Berkelium   | P                  | Phosphorus   |
| Br                 | Bromine     | Pa                 | Protactinium |
| C                  | Carbon      | Pb                 | Lead         |
| Ca                 | Calcium     | Pd                 | Palladium    |
| Cd                 | Cadmium     | Pm                 | Promethium   |
| Ce                 | Cerium      | Po                 | Polonium     |
| Cf                 | Californium | Pr                 | Praseodymium |
| Cl                 | Chlorine    | Pt                 | Platinum     |
| Cm                 | Curium      | Pu                 | Plutonium    |
| Co                 | Cobalt      | Ra                 | Radium       |
| Cr                 | Chromium    | Rb                 | Rubidium     |
| Cs                 | Cesium      | Re                 | Rhenium      |
| Cu                 | Copper      | Rh                 | Rhodium      |
| Dy                 | Dysprosium  | Rn                 | Radon        |
| Es                 | Einsteinium | Ru                 | Ruthenium    |
| Er                 | Erbium      | S                  | Sulfur       |
| Eu                 | Europium    | Sb                 | Antimony     |
| F                  | Fluorine    | Sc                 | Scandium     |
| Fe                 | Iron        | Se                 | Selenium     |
| Fm                 | Fermium     | Si                 | Silicon      |
| Fr                 | Francium    | Sm                 | Samarium     |
| Ga                 | Gallium     | Sn                 | Tin          |
| Gd                 | Gadolinium  | Sr                 | Strontium    |
| Ge                 | Germanium   | Ta                 | Tantalum     |
| H                  | Hydrogen    | Tb                 | Terbium      |
| He                 | Helium      | Tc                 | Technetium   |
| Hf                 | Hafnium     | Te                 | Tellurium    |
| Hg                 | Mercury     | Th                 | Thorium      |
| Ho                 | Holmium     | Ti                 | Titanium     |
| I                  | Iodine      | Tl                 | Thallium     |
| In                 | Indium      | Tm                 | Thulium      |
| Ir                 | Iridium     | U                  | Uranium      |
| K                  | Potassium   | V                  | Vanadium     |
| Kr                 | Krypton     | W                  | Tungsten     |
| La                 | Lanthanum   | Xe                 | Xenon        |
| Li                 | Lithium     | Y                  | Yttrium      |
| Lu                 | Lutetium    | Yb                 | Ytterbium    |
| Lr                 | Lawrencium  | Zn                 | Zinc         |
| Mg                 | Magnesium   | Zr                 | Zirconium    |
| Mn                 | Manganese   |                    |              |

Table E-11. Decimal Equivalents of Fractions of an Inch

| Inch Fraction | Decimal Equivalent | Inch Fraction | Decimal Equivalent |
|---------------|--------------------|---------------|--------------------|
| 1/64          | 0.015625           | 33/64         | 0.515625           |
| 1/32          | 0.031250           | 17/32         | 0.531250           |
| 3/64          | 0.046875           | 35/64         | 0.546875           |
| 1/16          | 0.062500           | 9/16          | 0.562500           |
| 5/64          | 0.078125           | 37/64         | 0.578125           |
| 3/32          | 0.093750           | 19/32         | 0.593750           |
| 7/64          | 0.109375           | 39/64         | 0.609375           |
| 1/8           | 0.125000           | 5/8           | 0.625000           |
| 9/64          | 0.140625           | 41/64         | 0.640625           |
| 5/32          | 0.156250           | 21/32         | 0.656250           |
| 11/64         | 0.171875           | 43/64         | 0.671875           |
| 3/16          | 0.187500           | 11/16         | 0.687500           |
| 13/64         | 0.203125           | 45/64         | 0.703125           |
| 7/32          | 0.218750           | 23/32         | 0.718750           |
| 15/64         | 0.234375           | 47/64         | 0.734375           |
| 1/4           | 0.250000           | 3/4           | 0.750000           |
| 17/64         | 0.265625           | 49/64         | 0.765625           |
| 9/32          | 0.281250           | 25/32         | 0.781250           |
| 19/64         | 0.296875           | 51/64         | 0.796875           |
| 5/16          | 0.312500           | 13/16         | 0.812500           |
| 21/64         | 0.328125           | 53/64         | 0.828125           |
| 11/32         | 0.343750           | 27/32         | 0.843750           |
| 23/64         | 0.359375           | 55/64         | 0.859375           |
| 3/8           | 0.375000           | 7/8           | 0.875000           |
| 25/64         | 0.390625           | 57/64         | 0.890625           |
| 13/32         | 0.406250           | 29/32         | 0.906250           |
| 27/64         | 0.421875           | 59/64         | 0.921875           |
| 7/16          | 0.437500           | 15/16         | 0.937500           |
| 29/64         | 0.453125           | 61/64         | 0.953125           |
| 15/32         | 0.468750           | 31/32         | 0.968750           |
| 31/64         | 0.484375           | 63/64         | 0.984375           |
| 1/2           | 0.500000           | 1             | 1.000000           |

Table E-12. Inches and Equivalents in Millimeter  
(1/64 Inch to 100 Inches)

| Inches | MM     | Inches | MM       | Inches | MM       |
|--------|--------|--------|----------|--------|----------|
| 1/64   | 0.397  | 7/8    | 22.225   | 48     | 1219.200 |
| 1/32   | 0.794  | 57/64  | 22.622   | 49     | 1244.600 |
| 3/64   | 1.191  | 29/32  | 23.019   | 50     | 1270.000 |
| 1/16   | 1.588  | 59/64  | 23.416   | 51     | 1295.400 |
| 5/64   | 1.984  | 15/16  | 23.813   | 52     | 1320.800 |
| 3/32   | 2.381  | 61/64  | 24.209   | 53     | 1346.200 |
| 7/64   | 2.778  | 31/32  | 24.606   | 54     | 1371.600 |
| 1/8    | 3.175  | 63/64  | 25.003   | 55     | 1397.000 |
| 9/64   | 3.572  | 1      | 25.400   | 56     | 1422.400 |
| 5/32   | 3.969  | 2      | 50.800   | 57     | 1447.800 |
| 11/64  | 4.366  | 3      | 76.200   | 58     | 1473.200 |
| 3/16   | 4.763  | 4      | 101.600  | 59     | 1498.600 |
| 13/64  | 5.159  | 5      | 127.000  | 60     | 1524.000 |
| 7/32   | 5.556  | 6      | 152.400  | 61     | 1549.400 |
| 15/64  | 5.953  | 7      | 177.800  | 62     | 1574.800 |
| 1/4    | 6.350  | 8      | 203.200  | 63     | 1600.200 |
| 17/64  | 6.747  | 9      | 228.600  | 64     | 1625.600 |
| 9/32   | 7.144  | 10     | 254.000  | 65     | 1651.000 |
| 19/64  | 7.541  | 11     | 279.400  | 66     | 1676.400 |
| 5/16   | 7.938  | 12     | 304.800  | 67     | 1701.800 |
| 21/64  | 8.334  | 13     | 330.200  | 68     | 1727.200 |
| 11/32  | 8.731  | 14     | 355.600  | 69     | 1752.600 |
| 23/64  | 9.128  | 15     | 381.000  | 70     | 1778.000 |
| 3/8    | 9.525  | 16     | 406.400  | 71     | 1803.400 |
| 25/64  | 9.922  | 17     | 431.800  | 72     | 1828.800 |
| 13/32  | 10.319 | 18     | 457.200  | 73     | 1854.200 |
| 27/64  | 10.716 | 19     | 482.600  | 74     | 1879.600 |
| 7/16   | 11.113 | 20     | 508.000  | 75     | 1905.000 |
| 29/64  | 11.509 | 21     | 533.400  | 76     | 1930.400 |
| 15/32  | 11.906 | 22     | 558.800  | 77     | 1955.800 |
| 31/64  | 12.303 | 23     | 584.200  | 78     | 1981.200 |
| 1/2    | 12.700 | 24     | 609.600  | 79     | 2006.600 |
| 33/64  | 13.097 | 25     | 635.000  | 80     | 2032.000 |
| 17/32  | 13.494 | 26     | 660.400  | 81     | 2057.400 |
| 35/64  | 13.891 | 27     | 685.800  | 82     | 2082.800 |
| 9/16   | 14.288 | 28     | 711.200  | 83     | 2108.200 |
| 37/64  | 14.684 | 29     | 736.600  | 84     | 2133.600 |
| 19/32  | 15.081 | 30     | 762.000  | 85     | 2159.000 |
| 39/64  | 15.478 | 31     | 787.400  | 86     | 2184.400 |
| 5/8    | 15.875 | 32     | 812.800  | 87     | 2209.800 |
| 41/64  | 16.272 | 33     | 838.200  | 88     | 2235.200 |
| 21/32  | 16.669 | 34     | 863.600  | 89     | 2260.600 |
| 43/64  | 17.066 | 35     | 889.000  | 90     | 2286.000 |
| 11/16  | 17.463 | 36     | 914.400  | 91     | 2311.400 |
| 45/64  | 17.859 | 37     | 939.800  | 92     | 2336.800 |
| 23/32  | 18.256 | 38     | 965.200  | 93     | 2362.200 |
| 47/64  | 18.653 | 39     | 990.600  | 94     | 2387.600 |
| 3/4    | 19.050 | 40     | 1016.000 | 95     | 2413.000 |
| 49/64  | 19.447 | 41     | 1041.400 | 96     | 2438.400 |
| 25/32  | 19.844 | 42     | 1066.800 | 97     | 2463.800 |
| 51/64  | 20.241 | 43     | 1092.200 | 98     | 2489.200 |
| 13/16  | 20.638 | 44     | 1117.600 | 99     | 2514.600 |
| 53/64  | 21.034 | 45     | 1143.000 | 100    | 2540.000 |
| 27/32  | 21.431 | 46     | 1168.400 |        |          |
| 55/64  | 21.828 | 47     | 1193.800 |        |          |