# 14. TABLES AND FIGURES

## TABLE 14.1. Copper Tube: Types, Standards, Applications, Tempers, Lengths

| *Tube type* | *Color code* | *Standard* | *Application* [1] | *Commercially available lengths* [2] | | |
|---|---|---|---|---|---|---|
| | | | | *Nominal or standard sizes* | *Drawn* | *Annealed* |
| Type K | Green | ASTM B 88 [3] | - Domestic water service and distribution - Fire protection - Solar - Fuel/fuel oil - HVAC - Snow melting - Compressed air - Natural gas - Liquified petroleum (LP) gas - Vacuum | Straight lengths: | | |
| | | | | ¼ inch to 8 inch | 20 ft. | 20 ft. |
| | | | | 10 inch | 18 ft. | 18 ft. |
| | | | | 12 inch | 12 ft. | 12 ft. |
| | | | | Coils: | | |
| | | | | ¼ inch to 1 inch | - | 60 ft. |
| | | | | | - | 100 ft. |
| | | | | 1¼ inch and 1½ inch | - | 60 ft. |
| | | | | 2 inch | - | 40 ft. |
| | | | | | - | 45 ft. |
| Type L | Blue | ASTM B 88 | - Domestic water service and distribution - Fire protection - Solar - Fuel/fuel oil - Natural gas - Liquified petroleum (LP) gas - HVAC - Snow melting - Compressed air - Vacuum | Straight lengths: | | |
| | | | | ¼ inch to 10 inch | 20 ft. | 20 ft. |
| | | | | 12 inch | 18 ft. | 18 ft. |
| | | | | Coils: | | |
| | | | | ¼ to 1 inch | - | 60 ft. |
| | | | | | - | 100 ft. |
| | | | | 1¼ inch to 1½ inch | - | 60 ft. |
| | | | | 2 inch | - | 40 ft. |
| | | | | | - | 45 ft. |
| Type M | Red | ASTM B 88 | - Domestic water service and distribution - Fire protection - Solar - Fuel/fuel oil - HVAC - Snow melting - Vacuum | Straight lengths: | | |
| | | | | ¼ inch to 12 inch | 20 ft. | N/A |
| DWV | Yellow | ASTM B 306 | - Drain, waste, vent - HVAC - Solar | Straight lengths: | | |
| | | | | 1¼ inch to 8 inch | 20 ft. | N/A |
| ACR | Blue | ASTM B 280 | - Air conditioning - Refrigeration - Natural gas - Liquefied petroleum (LP) gas - Compressed air | Straight lengths: | | |
| | | | | ¼ inch to 4⅛ inch | 20 ft. | [4] |
| | | | | Coils: | | |
| | | | | ⅛ inch to 1⅝ inch | - | 50 ft. |
| OXY, MED OXY/ MED OXY/ACR ACR/MED | (K) Green (L) Blue | ASTM B 819 | - Medical gas - Compressed medical air - Vacuum | Straight lengths: | | |
| | | | | ¼ inch to 8 inch | 20 ft. | N/A |

1. There are many other copper and copper alloy tubes and pipes available for specialized applications. For information on these products, contact the Copper Development Association Inc.
2. Individual manufacturers may have commercially available lengths in addition to those shown in this table.
3. Tube made to other ASTM standards is also intended for plumbing applications, although ASTM B88 is by far the most widely used. ASTM Standard Classification B 698 lists six plumbing tube standards including B 88.
4. Available as special order only.

# TABLE 14.2a. Dimensions and Physical Characteristics of Copper Tube: Type K

| Nominal or standard size, inches | Nominal dimensions, inches | | | Calculated values (based on nominal dimensions) | | | | |
|---|---|---|---|---|---|---|---|---|
| | Outside diameter | Inside diameter | Wall thickness | Cross sectional area of bore, sq. inches | Weight of tube only, pounds per linear ft. | Weight of tube & water, pounds per linear ft. | Volume of tube, per linear ft. | |
| | | | | | | | Cu ft. | Gal. |
| ¼ | .375 | .305 | .035 | .073 | .145 | .177 | .00051 | .00379 |
| ⅜ | .500 | .402 | .049 | .127 | .269 | .324 | .00088 | .00660 |
| ½ | .625 | .527 | .049 | .218 | .344 | .438 | .00151 | .0113 |
| ⅝ | .750 | .652 | .049 | .334 | .418 | .562 | .00232 | .0174 |
| ¾ | .875 | .745 | .065 | .436 | .641 | .829 | .00303 | .0227 |
| 1 | 1.125 | .995 | .065 | .778 | .839 | 1.18 | .00540 | .0404 |
| 1¼ | 1.375 | 1.245 | .065 | 1.22 | 1.04 | 1.57 | .00847 | .0634 |
| 1½ | 1.625 | 1.481 | .072 | 1.72 | 1.36 | 2.10 | .0119 | .0894 |
| 2 | 2.125 | 1.959 | .083 | 3.01 | 2.06 | 3.36 | .0209 | .156 |
| 2½ | 2.625 | 2.435 | .095 | 4.66 | 2.93 | 4.94 | .0324 | .242 |
| 3 | 3.125 | 2.907 | .109 | 6.64 | 4.00 | 6.87 | .0461 | .345 |
| 3½ | 3.625 | 3.385 | .120 | 9.00 | 5.12 | 9.01 | .0625 | .468 |
| 4 | 4.125 | 3.857 | .134 | 11.7 | 6.51 | 11.6 | .0813 | .608 |
| 5 | 5.125 | 4.805 | .160 | 18.1 | 9.67 | 17.5 | .126 | .940 |
| 6 | 6.125 | 5.741 | .192 | 25.9 | 13.9 | 25.1 | .180 | 1.35 |
| 8 | 8.125 | 7.583 | .271 | 45.2 | 25.9 | 45.4 | .314 | 2.35 |
| 10 | 10.125 | 9.449 | .338 | 70.1 | 40.3 | 70.6 | .487 | 3.64 |
| 12 | 12.125 | 11.315 | .405 | 101 | 57.8 | 101 | .701 | 5.25 |

# TABLE 14.2b. Dimensions and Physical Characteristics of Copper Tube: Type L

| Nominal or standard size, inches | Nominal dimensions, inches | | | Calculated values (based on nominal dimensions) | | | | |
|---|---|---|---|---|---|---|---|---|
| | Outside diameter | Inside diameter | Wall thickness | Cross sectional area of bore, sq. inches | Weight of tube only, pounds per linear ft. | Weight of tube & water, pounds per linear ft. | Volume of tube, per linear ft. | |
| | | | | | | | Cu ft. | Gal. |
| ¼ | .375 | .315 | .030 | .078 | .126 | .160 | .00054 | .00405 |
| ⅜ | .500 | .430 | .035 | .145 | .198 | .261 | .00101 | .00753 |
| ½ | .625 | .545 | .040 | .233 | .285 | .386 | .00162 | .0121 |
| ⅝ | .750 | .666 | .042 | .348 | .362 | .506 | .00232 | .0174 |
| ¾ | .875 | .785 | .045 | .484 | .455 | .664 | .00336 | .0251 |
| 1 | 1.125 | 1.025 | .050 | .825 | .655 | 1.01 | .00573 | .0429 |
| 1¼ | 1.375 | 1.265 | .055 | 1.26 | .884 | 1.43 | .00875 | .0655 |
| 1½ | 1.625 | 1.505 | .060 | 1.78 | 1.14 | 1.91 | .0124 | .0925 |
| 2 | 2.125 | 1.985 | .070 | 3.09 | 1.75 | 3.09 | .0215 | .161 |
| 2½ | 2.625 | 2.465 | .080 | 4.77 | 2.48 | 4.54 | .0331 | .248 |
| 3 | 3.125 | 2.945 | .090 | 6.81 | 3.33 | 6.27 | .0473 | .354 |
| 3½ | 3.625 | 3.425 | .100 | 9.21 | 4.29 | 8.27 | .0640 | .478 |
| 4 | 4.125 | 3.905 | .110 | 12.0 | 5.38 | 10.1 | .0764 | .571 |
| 5 | 5.125 | 4.875 | .125 | 18.7 | 7.61 | 15.7 | .130 | .971 |
| 6 | 6.125 | 5.845 | .140 | 26.8 | 10.2 | 21.8 | .186 | 1.39 |
| 8 | 8.125 | 7.725 | .200 | 46.9 | 19.3 | 39.6 | .326 | 2.44 |
| 10 | 10.125 | 9.625 | .250 | 72.8 | 30.1 | 61.6 | .506 | 3.78 |
| 12 | 12.125 | 11.565 | .280 | 105 | 40.4 | 85.8 | .729 | 5.45 |

# TABLE 14.2c. Dimensions and Physical Characteristics of Copper Tube: Type M

| Nominal or standard size, inches | Nominal dimensions, inches | | | Calculated values (based on nominal dimensions) | | | | |
|---|---|---|---|---|---|---|---|---|
| | Outside diameter | Inside diameter | Wall thickness | Cross sectional area of bore, sq. inches | Weight of tube only, pounds per linear ft. | Weight of tube & water, pounds per linear ft. | Volume of tube, per linear ft. | |
| | | | | | | | Cu ft. | Gal. |
| ⅜ | .500 | .450 | .025 | .159 | .145 | .214 | .00110 | .00826 |
| ½ | .625 | .569 | .028 | .254 | .204 | .314 | .00176 | .0132 |
| ¾ | .875 | .811 | .032 | .517 | .328 | .551 | .00359 | .0269 |
| 1 | 1.125 | 1.055 | .035 | .874 | .465 | .843 | .00607 | .0454 |
| 1¼ | 1.375 | 1.291 | .042 | 1.31 | .682 | 1.25 | .00910 | .0681 |
| 1½ | 1.625 | 1.527 | .049 | 1.83 | .940 | 1.73 | .0127 | .0951 |
| 2 | 2.125 | 2.009 | .058 | 3.17 | 1.46 | 2.83 | .0220 | .165 |
| 2½ | 2.625 | 2.495 | .065 | 4.89 | 2.03 | 4.14 | .0340 | .254 |
| 3 | 3.125 | 2.981 | .072 | 6.98 | 2.68 | 5.70 | .0485 | .363 |
| 3½ | 3.625 | 3.459 | .083 | 9.40 | 3.58 | 7.64 | .0653 | .488 |
| 4 | 4.125 | 3.935 | .095 | 12.2 | 4.66 | 9.83 | .0847 | .634 |
| 5 | 5.125 | 4.907 | .109 | 18.9 | 6.66 | 14.8 | .131 | .982 |
| 6 | 6.125 | 5.881 | .122 | 27.2 | 8.92 | 20.7 | .189 | 1.41 |
| 8 | 8.125 | 7.785 | .170 | 47.6 | 16.5 | 37.1 | .331 | 2.47 |
| 10 | 10.125 | 9.701 | .212 | 73.9 | 25.6 | 57.5 | .513 | 3.84 |
| 12 | 12.125 | 11.617 | .254 | 106 | 36.7 | 82.5 | .736 | 5.51 |

# TABLE 14.2d. Dimensions and Physical Characteristics of Copper Tube: DWV (Drain, Waste and Vent)

| Nominal or standard size, inches | Nominal dimensions, inches | | | Calculated values (based on nominal dimensions) | | | | |
|---|---|---|---|---|---|---|---|---|
| | Outside diameter | Inside diameter | Wall thickness | Cross sectional area of bore, sq. inches | Weight of tube only, pounds per linear ft. | Weight of tube & water, pounds per linear ft. | Volume of tube, per linear ft. | |
| | | | | | | | Cu ft. | Gal. |
| 1¼ | 1.375 | 1.295 | .040 | 1.32 | .650 | 1.22 | .00917 | .0686 |
| 1½ | 1.625 | 1.541 | .042 | 1.87 | .809 | 1.62 | .0130 | .0971 |
| 2 | 2.125 | 2.041 | .042 | 3.27 | 1.07 | 2.48 | .0227 | .170 |
| 3 | 3.125 | 3.030 | .045 | 7.21 | 1.69 | 4.81 | .0501 | .375 |
| 4 | 4.125 | 4.009 | .058 | 11.6 | 2.87 | 7.88 | .0806 | .603 |
| 5 | 5.125 | 4.981 | .072 | 19.5 | 4.43 | 12.9 | .135 | 1.01 |
| 6 | 6.125 | 5.959 | .083 | 27.9 | 6.10 | 18.2 | .194 | 1.45 |
| 8 | 8.125 | 7.907 | .109 | 49.1 | 10.6 | 31.8 | .341 | 2.55 |

# TABLE 14.2e. Dimensions and Physical Characteristics of Copper Tube: ACR (Air-Conditioning and Refrigeration Field Service)

| Nominal or Standard Size, inches | | Nominal dimensions, inches | | | Calculated values (based on nominal dimensions) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Outside diameter | Inside diameter | Wall thickness | Cross sectional area of bore, sq. inches | External surface, sq. ft. per linear ft. | Internal surface, sq. ft. per linear ft. | Weight of tube only, pounds per linear ft. | Volume of tube, cu. ft. per linear ft. |
| 1/8 | A | .125 | .065 | .030 | .00332 | .0327 | .0170 | .0347 | .00002 |
| 3/16 | A | .187 | .128 | .030 | .0129 | .0492 | .0335 | .0575 | .00009 |
| 1/4 | A | .250 | .190 | .030 | .0284 | .0655 | .0497 | .0804 | .00020 |
| | D | .250 | .200 | .025 | .0314 | .0655 | .0524 | .0680 | .00022 |
| 5/16 | A | .312 | .248 | .032 | .0483 | .0817 | .0649 | .109 | .00034 |
| 3/8 | A | .375 | .311 | .032 | .076 | .0982 | .0814 | .134 | .00053 |
| | D | .375 | .315 | .030 | .078 | .0982 | .0821 | .126 | .00054 |
| 1/2 | A | .500 | .436 | .032 | .149 | .131 | .114 | .182 | .00103 |
| | D | .500 | .430 | .035 | .145 | .131 | .113 | .198 | .00101 |
| 5/8 | A | .625 | .555 | .035 | .242 | .164 | .145 | .251 | .00168 |
| | D | .625 | .545 | .040 | .233 | .164 | .143 | .285 | .00162 |
| 3/4 | A | .750 | .680 | .035 | .363 | .196 | .178 | .305 | .00252 |
| | D | .750 | .666 | .042 | .348 | .196 | .174 | .362 | .00242 |
| 7/8 | A | .875 | .785 | .045 | .484 | .229 | .206 | .455 | .00336 |
| | D | .875 | .785 | .045 | .484 | .229 | .206 | .455 | .00336 |
| 1 1/8 | A | 1.125 | 1.025 | .050 | .825 | .294 | .268 | .655 | .00573 |
| | D | 1.125 | 1.025 | .050 | .825 | .294 | .268 | .655 | .00573 |
| 1 3/8 | A | 1.375 | 1.265 | .055 | 1.26 | .360 | .331 | .884 | .00875 |
| | D | 1.375 | 1.265 | .055 | 1.26 | .360 | .331 | .884 | .00875 |
| 1 5/8 | A | 1.625 | 1.505 | .060 | 1.78 | .425 | .394 | 1.14 | .0124 |
| | D | 1.625 | 1.505 | .060 | 1.78 | .425 | .394 | 1.14 | .0124 |
| 2 1/8 | D | 2.125 | 1.985 | .070 | 3.09 | .556 | .520 | 1.75 | .0215 |
| 2 5/8 | D | 2.625 | 2.465 | .080 | 4.77 | .687 | .645 | 2.48 | .0331 |
| 3 1/8 | D | 3.125 | 2.945 | .090 | 6.81 | .818 | .771 | 3.33 | .0473 |
| 3 5/8 | D | 3.625 | 3.425 | .100 | 9.21 | .949 | .897 | 4.29 | .0640 |
| 4 1/8 | D | 4.125 | 3.905 | .110 | 12.0 | 1.08 | 1.02 | 5.38 | .0833 |

A = Annealed Temper, D = Drawn Temper

# TABLE 14.2f. Dimensons and Physical Characteristics of Copper Tube: Medical Gas, K and L

| Nominal or standard size, inches | | Nominal dimensions, inches | | | Calculated values (based on nominal dimensions) | | | |
|---|---|---|---|---|---|---|---|---|
| | | Outside diameter | Inside diameter | Wall thickness | Cross sectional area of bore, sq. inches | Internal surface, sq. ft. per linear ft. | Weight of tube only, pounds per linear ft. | Volume of tube, cu. ft. per linear ft. |
| ¼ | K | .375 | .305 | .035 | .073 | .0789 | .145 | .00051 |
| | L | .375 | .315 | .030 | .078 | .0825 | .126 | .00054 |
| ⅜ | K | .500 | .402 | .049 | .127 | .105 | .269 | .00088 |
| | L | .500 | .430 | .035 | .145 | .113 | .198 | .00101 |
| ½ | K | .625 | .527 | .049 | .218 | .130 | .344 | .00151 |
| | L | .625 | .545 | .040 | .233 | .143 | .285 | .00162 |
| ⅝ | K | .750 | .652 | .049 | .334 | .171 | .418 | .00232 |
| | L | .750 | .666 | .042 | .348 | .174 | .362 | .00242 |
| ¾ | K | .875 | .745 | .065 | .436 | .195 | .641 | .00303 |
| | L | .875 | .785 | .045 | .484 | .206 | .455 | .00336 |
| 1 | K | 1.125 | .995 | .065 | .778 | .261 | .839 | .00540 |
| | L | 1.125 | 1.025 | .050 | .825 | .268 | .655 | .00573 |
| 1¼ | K | 1.375 | 1.245 | .065 | 1.222 | .326 | 1.04 | .00845 |
| | L | 1.375 | 1.265 | .055 | 1.26 | .331 | .884 | .00873 |
| 1½ | K | 1.625 | 1.481 | .072 | 1.72 | .388 | 1.36 | .0120 |
| | L | 1.625 | 1.505 | .060 | 1.78 | .394 | 1.14 | .0124 |
| 2 | K | 2.125 | 1.959 | .083 | 3.01 | .522 | 2.06 | .0209 |
| | L | 2.125 | 1.985 | .070 | 3.09 | .520 | 1.75 | .0215 |
| 2½ | K | 2.625 | 2.435 | .095 | 4.66 | .638 | 2.93 | .0323 |
| | L | 2.625 | 2.465 | .080 | 4.77 | .645 | 2.48 | .0331 |
| 3 | K | 3.125 | 2.907 | .109 | 6.64 | .761 | 4.00 | .0461 |
| | L | 3.125 | 2.945 | .090 | 6.81 | .761 | 3.33 | .0473 |
| 3½ | K | 3.625 | 3.385 | .120 | 9.00 | .886 | 5.12 | .0625 |
| | L | 3.625 | 3.425 | .100 | 9.21 | .897 | 4.29 | .0640 |
| 4 | K | 4.125 | 3.857 | .134 | 11.7 | 1.01 | 6.51 | .0811 |
| | L | 4.125 | 3.905 | .110 | 12.0 | 1.02 | 5.38 | .0832 |
| 5 | K | 5.125 | 4.805 | .160 | 18.1 | 1.26 | 9.67 | .126 |
| | L | 5.125 | 4.875 | .125 | 18.7 | 1.28 | 7.61 | .130 |
| 6 | K | 6.125 | 5.741 | .192 | 25.9 | 1.50 | 13.9 | .180 |
| | L | 6.125 | 5.854 | .140 | 26.8 | 1.53 | 10.2 | .186 |
| 8 | K | 8.125 | 7.583 | .271 | 45.2 | 1.99 | 25.9 | .314 |
| | L | 8.125 | 7.725 | .200 | 46.9 | 2.02 | 19.3 | .325 |