



COLD ROLLED ELECTRIC RESISTANCE WELDED (CREW) ROUND TUBING - ASTM A513 TYPE 2
Diameter Tolerances (inches)

NOTE: Measurements for diameter are to be taken at least 2 in. from the ends of the tubes (a)

Outside Diameter Range, in. (a)	Wall Thickness		Flash-in Tubing (b)	Flash Controlled to 0.010 In. max Tubing (c)	Flash Controlled (d) to 0.005 In. max Tubing	
	Bwg (a)	In. (e)	Outside Diameter Plus and Minus	Outside Diameter Plus and Minus	Outside Diameter Plus and Minus	Inside Diameter Plus and Minus
			Tolerances, in. (f,g)			
3/8 to 5/8, incl.	24 to 16	0.022 to 0.065	0.003	—	—	—
Over 5/8 to 1-1/8, incl.	24 to 19	0.022 to 0.042	0.0035	0.0035	0.0035	0.013
Over 5/8 to 1-1/8, incl.	18	0.049	0.0035	0.0035	0.0035	0.015
Over 5/8 to 1-1/8, incl.	16 to 14	0.065 to 0.083	0.0035	0.0035	0.0035	0.019
Over 3/4 to 1-1/8, incl.	13	0.095	0.0035	0.0035	0.0035	0.019
Over 7/8 to 1-1/8, incl.	12 to 11	0.109 to 0.120	0.0035	0.0035	0.0035	0.021
Over 1-1/8 to 2, incl.	22 to 18	0.028 to 0.049	0.005	0.005	0.005	0.015
Over 1-1/8 to 2, incl.	16 to 13	0.065 to 0.095	0.005	0.005	0.005	0.019
Over 1-1/8 to 2, incl.	12 to 10	0.109 to 0.134	0.005	0.005	0.005	0.022
Over 2 to 2-1/2, incl.	20 to 18	0.035 to 0.049	0.006	0.006	0.006	0.016
Over 2 to 2-1/2, incl.	16 to 13	0.065 to 0.095	0.006	0.006	0.006	0.02
Over 2 to 2-1/2, incl.	12 to 10	0.109 to 0.134	0.006	0.006	0.006	0.023
Over 2-1/2 to 3, incl.	20 to 18	0.035 to 0.049	0.008	0.008	0.008	0.018
Over 2-1/2 to 3, incl.	16 to 13	0.065 to 0.095	0.008	0.008	0.008	0.022
Over 2-1/2 to 3, incl.	12 to 10	0.109 to 0.134	0.008	0.008	0.008	0.025
Over 3 to 3-1/2, incl.	20 to 18	0.035 to 0.049	0.009	0.009	0.009	0.019
Over 3 to 3-1/2, incl.	16 to 13	0.065 to 0.095	0.009	0.009	0.009	0.023
Over 3 to 3-1/2, incl.	12 to 10	0.109 to 0.134	0.009	0.009	0.009	0.026
Over 3-1/2 to 4, incl.	20 to 18	0.035 to 0.049	0.010	0.010	0.010	0.020
Over 3-1/2 to 4, incl.	16 to 13	0.065 to 0.095	0.010	0.010	0.010	0.024
Over 3-1/2 to 4, incl.	12 to 10	0.109 to 0.134	0.010	0.010	0.010	0.027
Over 4 to 6, incl.	16 to 13	0.065 to 0.095	0.020	0.020	0.020	0.034
Over 4 to 6, incl.	12 to 10	0.109 to 0.134	0.020	0.020	0.020	0.037
Over 6 to 8, incl.	14 to 13	0.083 to 0.095	0.025	0.025	0.025	0.039
Over 6 to 8, incl.	12 to 10	0.109 to 0.134	0.025	0.025	0.025	0.042

(a) 1 in. – 25.4 mm.

(b) Flash-In tubing is produced to outside diameter tolerances and wall thickness tolerances only, and the height of the inside welding flash does not exceed the wall thickness of 3/32 in. whichever is less.

(c) Flash controlled to 0.010 in. maximum tubing consists of tubing over 5/8 in. outside diameter which is commonly produced to outside diameter tolerances and wall thickness tolerances only, in which the height of the remaining inside welding flash is controlled not exceed 0.010 in.

(d) Flash controlled to 0.005 in. maximum tubing is produced to outside diameter tolerances and wall thickness tolerances, inside diameter tolerances and wall thickness tolerances, or outside diameter tolerances and inside diameter tolerances, in which the height of the remaining inside welding flash is controlled not to exceed 0.005 in. Any remaining flash is considered to be part of the applicable inside diameter tolerances.

(e) Birmingham Wire Gage.

(f) The ovality shall be within the above tolerances except when the wall thickness is less than 3% of the outside diameter, in such cases see 8.6.1.

(g) Where the ellipsis (...) appears in this table, the tolerance is not addressed.

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Wall Thickness Tolerances (inches)

Wall Thickness		Outside Diameter, in. (a)											
in. (a)	Bwg (b)	3/8 to 7/8, incl.	Over 7/8 to 1-7/8, incl.	Over 1-7/8 to 3-3/4, incl.	Over 3-3/4 to 5, incl.	Over 5 to 6, incl.	Over 6 to 8, incl.	Wall Thickness Tolerances, in. (a, c) Plus and Minus					
		Plus	Minus	Plus	Minus	Plus	Minus	Plus	Minus	Plus	Minus	Plus	Minus
0.022	24	0.001	0.005	0.001	0.005								
0.028	22	0.001	0.005	0.001	0.005	—	—	—	—	—	—	—	—
0.035	20	0.002	0.005	0.001	0.005	0.001	0.005	—	—	—	—	—	—
0.049	18	0.003	0.006	0.002	0.006	0.002	0.006	—	—	—	—	—	—
0.065	16	0.005	0.007	0.004	0.007	0.004	0.007	0.004	0.007	0.004	0.007	—	—
0.083	14	0.006	0.007	0.005	0.007	0.004	0.007	0.004	0.007	0.004	0.008	0.004	0.008
0.095	13	0.006	0.007	0.005	0.007	0.004	0.007	0.004	0.007	0.004	0.008	0.004	0.008
0.109	12	—	—	0.006	0.008	0.005	0.008	0.005	0.008	0.005	0.009	0.005	0.009
0.120	11	—	—	0.007	0.008	0.006	0.008	0.005	0.008	0.005	0.009	0.005	0.009
0.134	10	—	—	0.007	0.008	0.006	0.008	0.005	0.008	0.005	0.009	0.005	0.009

- (a) 1 inch = 25.4 mm.
- (b) Birmingham Wire Gauge.
- (c) Where the ellipsis appears in this table, the tolerance is not addressed

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ELECTRIC RESISTANCE WELDED TUBING (ERW) FOR SQUARE AND RECTANGULAR TUBING - ASTM A513

Tolerances: Outside Dimensions (inches)

Largest Nominal Outside Dimension, in.	Wall Thickness, in.	Outside Tolerance at All Sides at Corners, in. Plus and Minus
3/16 to 5/8, incl.	0.020 to 0.083 incl.	0.004
Over 5/8 to 1-1/8, incl.	0.025 to 0.156 incl.	0.005
Over 1-1/8 to 1-1/2, incl.	0.025 to 0.192 incl.	0.006
Over 1-1/2 to 2, incl.	0.032 to 0.192 incl.	0.008
Over 2 to 3, incl.	0.035 to 0.259 incl.	0.010
Over 3 to 4, incl.	0.049 to 0.259 incl.	0.020
Over 4 to 6, incl.	0.065 to 0.259 incl.	0.020
Over 6 to 8, incl.	0.185 to 0.259 incl.	0.025

NOTE: Measurements should be taken at 2 inches from either end of tube.

ELECTRIC RESISTANCE WELDED TUBING (ERW) FOR SQUARE AND RECTANGULAR TUBING - ASTM A513

Wall Tolerances

Wall thickness tolerance on square and rectangular tubing is normally plus or minus 10 percent of the nominal wall. This tolerance exceeds the round tubing wall tolerance since stresses involved in forming round tubing into required square or rectangular sections cause wall deformation.

ELECTRIC RESISTANCE WELDED TUBING (ERW) FOR SQUARE AND RECTANGULAR TUBING - ASTM A513

Squareness

Permissible variations for Squareness to be determined by the following equation:

$$\pm b = c \times 0.006 \text{ in.}$$

where:

b = tolerance for out-of-square , and
 c = largest external dimension across flats

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ELECTRIC RESISTANCE WELDED TUBING (ERW) FOR SQUARE AND RECTANGULAR TUBING - ASTM A513

Twist Tolerances for Square and Rectangular Tubing

Twist tolerances are shown in the table below. The twist in square and rectangular tubing may be measured by holding one end of the tubing on a surface plate and noting the height of either corner of the opposite end of the same side above the surface plate. Twist may also be measured by the use of a beveled protractor equipped with a level, and noting the angular deviation on opposite ends, or at any point throughout the length.

Largest Dimension, in. (a)	Twist Tolerance in., 3 ft (b), in. (a)
1/2 and under	0.032
Over 1/2 to 1-1/2, incl.	0.050
Over 1-1/2 to 2-1/2, incl.	0.062
Over 2-1/2 to 4, incl.	0.075
Over 4 to 6, incl.	0.087
Over 6 to 8, incl.	0.100

(a) 1 in. = 25 mm.

(b) 1 ft. = 0.3 m.

ELECTRIC RESISTANCE WELDED TUBING (ERW) FOR SQUARE AND RECTANGULAR TUBING - ASTM A513

Straightness

Commercial tolerance for straightness is 1/16 inch in three feet.

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