

STRUCTURAL TUBING

ASTM-A-500 Square and Rectangular Steel Tubing

Mechanical Properties

Shaped Structural Tubing

| | Grade A | Grade B | Grade C |
|-------------------------------------|-----------------|-----------------|-----------------|
| Tensile Strength, min. psi (M Pa) | 45000 (310) | 58000 (400) | 62000 (427) |
| Yield Strength, min. psi (M Pa) | 39000 (269) | 46000 (317) | 50000 (345) |
| Elongation in 2 in. (50.8mm), min % | 25 ^a | 23 ^b | 21 ^c |

^a Applies to specified wall thickness 0.120 in. (3.05mm) and over. For wall thicknesses under 0.120 in., the minimum elongation shall be calculated by the formula: percent elongation in 2 in. = 56t + 17.5.

^b Applies to specified wall thickness 0.130 in. (4.57mm) and over. For wall thicknesses under 0.130 in., the minimum elongation shall be calculated by the formula: percent elongation in 2 in. = 61t + 12.

^c Applies to specified wall thickness 0.120 in. (3.05mm) and over. For lighter wall thicknesses, elongation shall be by agreement with the manufacturer.

Chemical Composition

| Element | Composition, % | | | |
|---|----------------|------------------|---------------|------------------|
| | Grades A and B | | Grade C | |
| | Heat Analysis | Product Analysis | Heat Analysis | Product Analysis |
| Carbon, max | 0.26 | 0.30 | 0.23 | 0.27 |
| Manganese, max | | | 1.35 | 1.40 |
| Phosphorous, max | 0.04 | 0.05 | 0.04 | 0.05 |
| Sulfur, max | 0.05 | 0.063 | 0.05 | 0.063 |
| Copper, when copper steel is specified, min | 0.20 | 0.18 | 0.20 | 0.18 |

Tolerances—Outside Dimensions

| Largest Nominal Outside Dimensions, Inches | Outside Tolerance at all Sides at Corners, Inch |
|--|---|
| Up to 2 1/2" | ± .020 |
| Over 2 1/2" to 3 1/2" inc. | ± .025 |
| Over 3 1/2" to 5" inc. | ± .025 |
| Over 5" | ± 1% |

Tolerances—Wall Thickness

The tolerance for wall thickness exclusive of the weld area shall be plus and minus 10 percent of the nominal wall thickness specified. The wall thickness is to be measured at the center of the flat.

Squareness of Sides

For square or rectangular structural tubing, adjacent sides may deviate from 90 degrees by a tolerance of plus or minus 2 degrees maximum.

Straightness

The permissible variation for straightness of square and rectangular structural tubing shall be 1/8 in. times the number of feet of total length divided by 5.

Corner Radii

For square or rectangular structural tubing the radius of any outside corner of the section shall not exceed three times the specified wall thickness.

Twists

Twist Tolerances for Square and Rectangular Structural Tubing

| Specified Dimension of Longer Side, in. (mm) | Maximum Twist in the First 3 ft. (1m) and in Each additional 3 ft. | |
|--|--|-------|
| | in. | mm |
| | 1 1/2 (38.1) and under | 0.050 |
| Over 1 1/2 to 2 1/2 (38.1 to 63.5), incl | 0.062 | 1.72 |
| Over 2 1/2 to 4 (63.5 to 101.6), incl | 0.075 | 2.09 |
| Over 4 to 6 (101.6 to 152.4), incl | 0.087 | 2.42 |
| Over 6 to 8 (152.4 to 203.2), incl | 0.100 | 2.78 |
| Over 8 (203) | 0.112 | 3.11 |

Lengths and Allowable Variation

| | 22 ft. and Under | | Over 22 ft. to 44 ft., Inc. | |
|---|------------------|-------|-----------------------------|-------|
| | Over | Under | Over | Under |
| Length tolerance for specified mill length, in. | 1/2 | 1/4 | 3/4 | 1/4 |