



‡Length of a Structural bolt is measured from the underhead bearing surface to the extreme end of the bolt.

| STRUCTURAL BOLTS, A325 & A490 | | | | | | | | | | | | | | | ASME 18.2.6-1996 | |
|--|--------|---------------|-------|--------------------|-------|-------|----------------------|-------|-------------|-------|-------|------------------|-------|----------------|--------------------------|--|
| Nominal Size or Basic Product Diameter | | E | | F | | | G | | H | | | R | | L _T | Y | |
| | | Body Diameter | | Width Across Flats | | | Width Across Corners | | Head Height | | | Radius of Fillet | | Thread Length | Transition Thread Length | |
| | | Max | Min | Basic | Max | Min | Max | Min | Basic | Max | Min | Max | Min | Ref | Max, Ref | |
| 1/2 | 0.5000 | 0.515 | 0.482 | 7/8 | 0.875 | 0.850 | 1.010 | 0.969 | 5/16 | 0.323 | 0.302 | 0.031 | 0.009 | 1.00 | 0.19 | |
| 5/8 | 0.6250 | 0.642 | 0.605 | 1-1/16 | 1.062 | 1.031 | 1.227 | 1.175 | 25/64 | 0.403 | 0.378 | 0.062 | 0.021 | 1.25 | 0.22 | |
| 3/4 | 0.7500 | 0.768 | 0.729 | 1-1/4 | 1.250 | 1.212 | 1.443 | 1.383 | 15/32 | 0.483 | 0.455 | 0.062 | 0.021 | 1.38 | 0.25 | |
| 7/8 | 0.8750 | 0.895 | 0.852 | 1-7/16 | 1.438 | 1.394 | 1.660 | 1.589 | 35/64 | 0.563 | 0.531 | 0.062 | 0.031 | 1.50 | 0.28 | |
| 1 | 1.0000 | 1.022 | 0.976 | 1-5/8 | 1.625 | 1.575 | 1.876 | 1.796 | 39/64 | 0.627 | 0.591 | 0.093 | 0.062 | 1.75 | 0.31 | |
| 1 1/8 | 1.1250 | 1.149 | 1.098 | 1-13/16 | 1.812 | 1.756 | 2.093 | 2.002 | 11/16 | 0.718 | 0.658 | 0.093 | 0.062 | 2.00 | 0.34 | |
| 1 1/4 | 1.2500 | 1.277 | 1.223 | 2 | 2.000 | 1.938 | 2.309 | 2.209 | 25/32 | 0.813 | 0.749 | 0.093 | 0.062 | 2.00 | 0.38 | |
| 1 3/8 | 1.3750 | 1.404 | 1.345 | 2-3/16 | 2.188 | 2.119 | 2.526 | 2.416 | 27/32 | 0.878 | 0.810 | 0.093 | 0.062 | 2.25 | 0.44 | |
| 1 1/2 | 1.5000 | 1.531 | 1.470 | 2-3/8 | 2.375 | 2.300 | 2.742 | 2.622 | 15/16 | 0.974 | 0.902 | 0.093 | 0.062 | 2.25 | 0.44 | |

| Tolerance on Length | Nominal Screw Size | Nominal Screw Length | |
|---------------------|--------------------|----------------------|------------|
| | | Through 6 in. | Over 6 in. |
| | 1/2 | -0.12 | -0.19 |
| | 5/8 | -0.12 | -0.25 |
| | 3/4 through 1 | -0.19 | -0.25 |
| 1 1/8 through 1 1/2 | -0.25 | -0.25 | |



ASTM A325 BOLTS, Type 1

| | |
|---------------------------------|---|
| Description | A heavy hex bolt made of medium carbon steel. The bearing surface shall be flat and washer faced, and the point is chamfered. |
| Applications/ Advantages | Commonly used in structural steel joints in heavy construction. |
| Material | Type 1 bolts shall be made from a carbon steel which conforms to the following chemical composition requirements-- <i>Carbon: 0.25-0.58%; Manganese: 0.57% minimum; Phosphorus: 0.048% maximum; Sulfur: 0.058% maximum</i> |
| Heat Treatment | Type 1 bolts shall be heat treated by quenching in a liquid medium from above the austenitizing temperature and then tempering by reheating to a temperature of at least 800°F. |
| Hardness | 1/2" through 1" diameter, inclusive: Rockwell C24 - 35 1-1/8" through 1-1/2" diameter, inclusive: Rockwell C19 - 31 |
| Proof Load | 1/2" through 1" diameter, inclusive: 85,000 psi. 1-1/8" through 1-1/2" diameter, inclusive: 74,000 psi. |
| Yield Strength | 1/2" through 1" diameter, inclusive: 92,000 psi. minimum 1-1/8" through 1-1/2" diameter, inclusive: 81,000 psi. minimum |
| Tensile Strength | 1/2" through 1" diameter, inclusive: 120,000 psi. minimum 1-1/8" through 1-1/2" diameter, inclusive: 105,000 psi. minimum |
| Plating | See Appendix-A for plating information. |



Type 1

ASTM A490 BOLTS, Types 1 & 3

Type 3

| | |
|---------------------------------|--|
| Description | A heavy hex bolt made of alloy steel. The bearing surface shall be flat and washer-faced, and the point is chamfered. |
| Applications/ Advantages | Used in structural steel joints in heavy construction when greater yield and tensile strengths than those of an A325 bolt are required. A Type 3 bolt is approximately twice as resistant to corrosion as a Type 1 bolt. |
| Material | Type 1 bolts shall be made from an alloy steel which conforms to the following chemical composition requirements-- <i>Carbon: 0.28-0.50% (for 1-1/2" diameter: 0.33-0.55%); Phosphorus: 0.045% maximum; Sulfur: 0.045% maximum.</i> Type 3 bolts shall be made from a corrosion resistant steel which conforms to the following chemical composition requirements-- <i>Carbon: 0.19-0.55%; Manganese: 0.37% minimum; Phosphorus: 0.045% maximum; Sulfur: 0.055% maximum; Copper: 0.63% maximum; Chromium: 0.42% minimum; Nickel: 0.17% minimum; Molybdenum: 0.14% minimum.</i> |
| Heat Treatment | Type 1 bolts shall be heat treated by quenching in oil from above the transformation temperature. Type 3 bolts shall be quenched in a suitable liquid from above the transformation temperature. Type 1 and Type 3 bolts shall be tempered by reheating to a temperature of at least 800°F. |
| Hardness | Rockwell C33 - 38 |
| Proof Load | 120,000 psi. |
| Yield Strength | 130,000 psi. minimum |
| Tensile Strength | 150,000 - 170,000 psi. |
| Plating | See Appendix-A for plating information. |

**Product standards require the manufacturer's head marking to appear on the top of all cap screws 1/4" diameter and larger. "X" represents one location such a marking may appear.