



STRUCTURAL BOLTS

NUCOR FASTENER

TECHNICAL DATA SHEET

Nucor Fastener is a leading manufacturer of Structural Bolts in diameters ranging from 1/2" to 1-1/4" and metric equivalents. We use only domestically melted and rolled material and produce the bolts in St. Joe, Indiana, U.S.A. Nucor Structural Bolts are formed on precision high speed cold formers, utilizing in-process quality systems to ensure you receive the highest quality structural bolts available. Chemical and physical certifications are provided with every shipment. Nucor Fastener is TS16949 and ISO9001 Registered. Testing is performed in our well equipped, A2LA accredited laboratory. Traceability is strictly enforced enabling us to track the lot number on the container through processing and testing all the way back to the original heat of steel. Nucor Structural Bolts contain over 99% recycled content, helping you qualify for "Green Building" or LEED® program projects. Additional information on Heavy Hex Nuts, Hot Dip Galvanizing, Mechanical Galvanizing, and our Tru-Tension® products can be found in separate Technical Data Sheets. The following is a summary of the Structural Bolts that we offer:



STRUCTURAL BOLTS



A325



A325T



A325-3



A490



A490-3



A325M



A325 Structural Bolts

ASTM A325 Bolts are typically supplied as plain or galvanized (Mechanical or Hot Dipped). We offer A325 Bolts in Type I and Type III (weathering steel) materials and also in the A325T (thread-to-head) configuration for lengths up to four times the diameter. All Nucor Fastener A325 bolts are quench & temper heat-treated to exceed the minimum tensile strength required. Type III Bolts are made from medium carbon alloy steel with copper, nickel, and chromium additions for weathering purposes. Please see our Technical Data Sheet on Type III Structural Fasteners if you would like further information. Dimensions are as specified for Heavy Hex Structural Bolts in ASME(ANSI) B18.2.6 and threads are UNC (Unified Coarse) per ASME(ANSI) B1.1.

A490 Structural Bolts

ASTM A490 Bolts are supplied in a plain (black) finish for Type I or Type III (weathering steel) materials and are also now permitted to be supplied for Type I with a Protective Coating per ASTM F1136, Grade 3. These bolts are heat-treated to a tensile strength between 150 and 173 ksi. Medium carbon alloy steel is used to manufacture these bolts. Dimensions are as specified for Heavy Hex Structural Bolts per ASME (ANSI) B18.2.6 and threads are UNC (Unified Coarse) per ASME (ANSI) B1.1.

A325M & A490M Metric Structural Bolts

ASTM A325M Bolts can be ordered in a plain or galvanized (Mechanical or Hot Dip) finish. ASTM A490M Bolts can be ordered in a plain finish. The ASTM A325M Bolt has equivalent properties to an ASTM F568 Property Class 8.8 Bolt and the ASTM A490M Bolt has equivalent properties to an ASTM F568 Property Class 10.9 Bolt. These properties are also essentially identical to Property Classes 8.8 or 10.9 in ISO 898/1. Surface discontinuity limits are specified in ASTM F788/F788M. The ASTM A325M and A490M Bolts are produced to the dimensions for Heavy Hex Structural Bolts as specified in ANSI B18.2.3.7M. The threads are rolled, as specified in ANSI B1.13M, to a metric coarse thread.

Applications

Structural Bolts are designed to be used with nuts for the connection of structural members. The head of a Heavy Hex Structural Bolt is specified to be the same size as a Heavy Hex Nut of the same nominal diameter, allowing a single size wrench or socket to be used on either the bolt head or nut. Structural Bolts have a shorter thread length according to the standard, so the threads can be eliminated from the shear planes of the connection. There are three primary joint types in use today for Structural Bolts; Slip Critical Joints; Pre-Tensioned Joints; and Snug Tightened Joints. The AISC (American Institute of Steel Construction) references the RCSC (Research Council on Structural Connections) "Specification of Structural Joints Using ASTM A325 or A490 Bolts", to describe correct installation and tightening methods for joints using Structural Bolts. In many cases (e.g., bearing connections, and bolts not in slip critical connections or subject to tension loads), bolts can be used in the snug tight condition. "Snug tight" is defined as the tightness that exists when all plies of a joint are in firm contact. "Snug tight" can normally be attained with a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench. If full pretensioning is required, such as in slip critical connections, then a clamp load equal to 70% of the minimum tensile strength is required. Slip critical connections, formerly known as friction type connections, rely on the friction between the steel plies being clamped together and the high clamp load of the Structural Bolt/Nut to prevent any movement (or slip) of the joint. To accomplish this high level of friction, the Structural Bolts must be fully tensioned to the following minimum clamp loads:

NOMINAL BOLT SIZE (INCHES)	MINIMUM TENSION IN KIPS 1 KIP = 1,000 POUNDS	
	A325 BOLTS	A490 BOLTS
1/2	12	15
5/8	19	24
3/4	28	35
7/8	39	49
1	51	64
1-1/8	56	80
1-1/4	71	102

The RCSC and AISC allow four methods to fully tension bolts for Slip Critical connections without further approval by the Engineer of Record. They include; "Turn-of-Nut" Pretensioning (where after snug tight, the nut is turned through a certain number of degrees to elongate the bolt); "Twist-Off -Type" Tension-Control Bolt Pretensioning (such as our Tru-Tension® line of products); Direct-Tension-Indicator Pretensioning (DTI Washers); and Calibrated Wench Pretensioning (Torque Wrench). Nucor Fastener recommends the "Turn-of-Nut", "Twist-Off -Type" and "DTI Washer" methods with the "Calibrated Torque Wrench" method to be considered as the least favorable of the four tightening options allowed. The calibrated torque wrench method has been recognized (since 1954) to have the potential for tremendous variation (+/-40%), when using Torque as the installation method. "Standard" torque/tension relationships from tables or formulas are no longer recognized as an appropriate means to control pretension. Calibrated wrench tightening may be used provided that the installation procedures follow RCSC guidelines for daily calibrations of each bolt diameter, length, grade, surface condition, nut, washer and lot combination used in a load indicating tension calibration device, such as a Skidmore-Wilhelm, prior to installation in the joint.

Nucor Black Kegs are really "Green"! With an Average Recycled Content of 99%, Nucor Fastener products qualify for "Green Building" applications or LEED® rated projects. Just as you would expect from Nucor, the largest recycler in North America. It's our Nature! Nucor Fastener has the equipment, quality, systems, expertise, sources, people & distributor network to meet your Structural Fastener needs!

TODAY, THAT LITTLE "n" MEANS BIG THINGS!