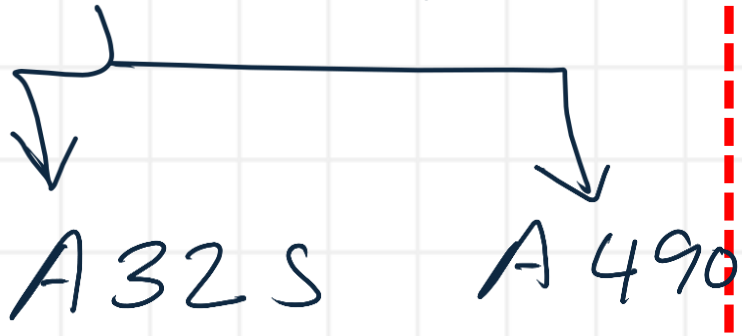
① Bolt Types (Low Carbon steel)
(High tensile bolts)

② structural bolt dimension.



③ Chapter J in Aisc.

④ High strength bolt groups.

⑤ SNUG Type bolt.

Low Carbon Steel

Generally used in secondary structures, such as handrails, light stairs, service plat forms, and other similar structures that are not subject to cyclical loads. Unfinished bolts have a lower load carrying capacity than high-strength bolts; therefore ,their use should be limited to secondary structures that typically have lighter loads.

Where to Use ?

There are two basic ASTM high strength bolt specifications and one non-high strength ASTM bolt specification that we will be using. The high strength bolts are ASTM A325 and ASTM A490. The non-high strength bolt is ASTM A307.

The second type, *high-strength bolts*, is made from medium carbon, heat-treated, or alloy steel and has tensile strengths much greater than those of ordinary bolts. High-strength bolts shall conform to the "Specifications for Structural Joints Using ASTM A325 or A490 Bolts," AISCS J3 (and to the Specification starting on p. 5-263).

High strength - ASTM A 325 & ASTM A 490

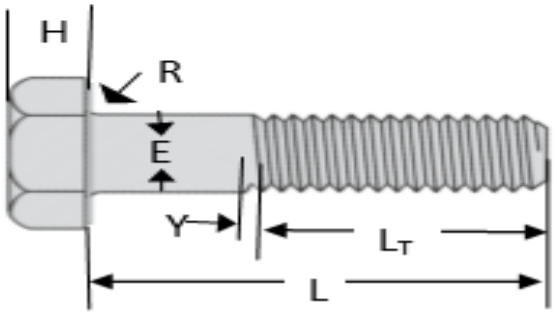
High-strength bolts are the most common type of bolt used in steel structures and have more than twice as much tensile strength than unfinished bolts. High-strength bolts conform to either ASTM A325 or ASTM A490 and can be used in bearing, as well as slip-critical, connections (connections where slip does not occur

The second type, *high-strength bolts*, is made from medium carbon, heat-treated, or alloy steel and has tensile strengths much greater than those of ordinary bolts. High-strength bolts shall conform to the "Specifications for Structural Joints Using ASTM A325 or A490 Bolts," AISCS J3 (and to the Specification starting on p. 5-263).

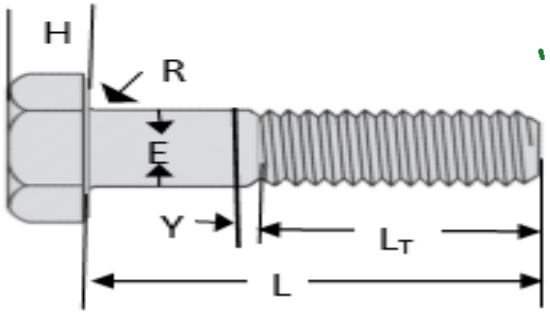
These bolts are very commonly used in steel construction where large loads are being transferred. They have a higher strength that ASTM A325 bolts so fewer may be required if connection strength is limited by bolt strength. These bolts tend to be the most expensive of the available bolts.

- ASME B18.2.6 - Structural Bolt Dimensions

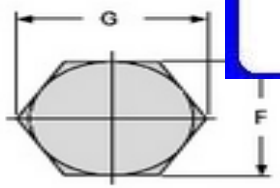
Body Diameter (E)	Bolt Length (L)
Head Height (H)	Radius of Fillet (R)
Thread Length (L_T)	Transition Thread Length (Y)
Width Across Flats (F)	Width Across Corners (G)

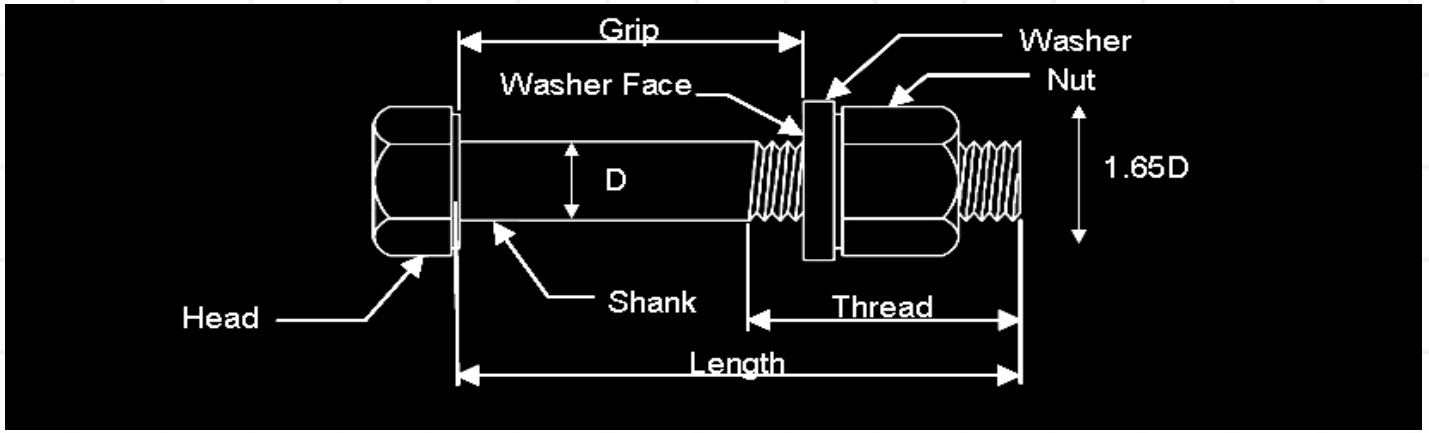


Cut Thread



Rolled Thread





CHAPTER J
DESIGN OF CONNECTIONS

This chapter addresses connecting elements, connectors and the affected elements of connected members not subject to fatigue loads.

The chapter is organized as follows:

← bolted Connection

J1. General Provisions
J2. Welds
J3. Bolts and Threaded Parts
J4. Affected Elements of Members and Connecting Elements
J5. Fillers
J6. Splices
J7. Bearing Strength
J8. Column Bases and Bearing on Concrete
J9. Anchor Rods and Embedments
J10. Flanges and Webs with Concentrated Forces

User Note: For cases not included in this chapter, the following sections apply:

- Chapter K Additional Requirements for HSS and Box-Section Connections
- Appendix 3 Fatigue

J3 AISC-360-16

J3. BOLTS AND THREADED PARTS

ASTM A307 bolts are permitted except where pretensioning is specified.

1. High-Strength Bolts

16-1-126

Use of high-strength bolts shall conform to the provisions of the *Specification for Structural Joints Using High-Strength Bolts*, hereafter referred to as the RCSC *Specification*, as approved by the Research Council on Structural Connections, except as otherwise provided in this Specification. High-strength bolts in this Specification are grouped according to material strength as follows:

Group A—ASTM F3125/F3125M Grades A325, A325M, F1852 and ASTM A354 Grade BC

Group B—ASTM F3125/F3125M Grades A490, A490M, F2280 and ASTM A354 Grade BD

Group C—ASTM F3043 and F3111

Three are three Groups

Use of Group C high-strength bolt/nut/washer assemblies shall conform to the applicable provisions of their ASTM standard. ASTM F3043 and F3111 Grade 1 assemblies may be installed only to the snug-tight condition. ASTM F3043 and F3111 Grade 2 assemblies may be used in snug-tight, pretensioned and slip-critical connections, using procedures provided in the applicable ASTM standard.

SNUG Tight

A spud wrench used by ironworkers for erecting structural steel and tightening bolts. One end of the wrench is sized for the hexagonal ends of bolts and nuts, while the other end is tapered to a rounded point and is used to align bolt holes between different connection

A *snug-tight* condition occurs when the bolts are in direct bearing and the plies of a connection are in firm contact. This can be accomplished by the full effort of a worker using a spud wrench, which is an open-ended wrench approximately 16 in. long. The opposite end of the wrench is tapered to a point, which an ironworker uses to align the holes of the connecting parts. A snug-tight joint can be specified for most simple shear connections, as well as tension-only connections. Snug-tight joints are not permitted for connections supporting nonstatic loads, nor are they permitted with A490 bolts loaded in tension.

When assembled, all joint surfaces, including those adjacent to the washers, shall be free of scale, except tight mill scale.

(a) Bolts are permitted to be installed to the snug-tight condition when used in:

Built up members

(1) Bearing-type connections, except as stipulated in Section E6

(2) Tension or combined shear and tension applications, for Group A bolts only, where loosening or fatigue due to vibration or load fluctuations are not design considerations