



# ASTM A325

Scope - This specification covers high strength heavy hex structural bolts from 1/2" through 1-1/2" diameter. These bolts are intended for use in structural connections and therefore have shorter thread lengths than standard hex bolts. This specification is applicable to heavy hex structural bolts only.

Grades	TYPE 1	Medium carbon, carbon boron, or medium carbon alloy steel
	TYPE 3	Weathering steel

Mechanical Properties	Markings		Size	Tensile, ksi	Yield, ksi	Elong. %	RA %	Hardness
	Type 1 A325	Type 3 A325	1/2 - 1	120 min	92 min	14 min	35 min	C25-C34
			1 1/8 to 1 1/2	105 min	81 min	14 min	35 min	C19-C30

Chemical Properties	Type 1 Bolts						
	Element	Carbon Steel	Carbon Boron Steel	Alloy Steel	Alloy Boron Steel		
	Carbon	0.30 - 0.52	0.30 - 0.52	0.30 - 0.52	0.30 - 0.52		
	Manganese	0.60 min	0.60 min	0.60 min	0.60 min		
	Phosphorus	0.040 max	0.040 max	0.035 max	0.035 max		
	Sulfur	0.050 max	0.050 max	0.040 max	0.040 max		
	Silicon	0.15 - 0.30	0.10 - 0.30	0.15 - 0.35	0.15 - 0.35		
	Boron		0.0005 - 0.003		0.0005 - 0.003		
	Type 3 Bolts						
	Element	A	B	C	D	E	F
	Carbon	0.33-0.40	0.38-0.48	0.15-0.25	0.15-0.25	0.20-0.25	0.20-0.25
	Manganese	0.90-1.20	0.70-0.90	0.80-1.35	0.40-1.20	0.60-1.00	0.90-1.20
	Phosphorus	0.035 max	0.06-0.12	0.035 max	0.035 max	0.035 max	0.035 max
	Sulfur	0.04 max	0.04 max	0.04 max	0.04 max	0.04 max	0.04 max
	Silicon	0.15-0.35	0.30-0.50	0.15-0.35	0.25-0.50	0.15-0.35	0.15-0.35
Copper	0.25-0.45	0.20-0.40	0.20-0.50	0.30-0.50	0.30-0.60	0.20-0.40	
Nickel	0.25-0.45	0.50-0.80	0.25-0.50	0.50-0.80	0.30-0.60	0.20-0.40	
Chromium	0.45-0.65	0.50-0.75	0.30-0.50	0.50-1.00	0.60-0.90	0.45-0.65	
Vanadium			0.20 min				
Molybdenum		0.06 max		0.10 max			
Titanium				0.05 max			

Recommended Mating Materials	Nuts		Washers		
	Type 1		Type 3	Type 1	Type 3
	Plain	Galvanized	Plain		
A563 C, C3, D, DH, DH3; A194 2H	A563DH; A194 2H	A563 C3, DH3; A194 2H	F436-1	F436-3	