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ASTM F3125 New, unified structural bolt specification replacing A325, A325M, A490, A490M, F1852, and F2280

Note: In 2016, specifications A325 and A490 were officially withdrawn by ASTM and replaced by ASTM F3125. A325 and A490 heavy hex structural bolts are now grades under the new F3125 specification. Summaries of the now obsolete A325 and A490 specifications remain on our site for reference purposes only.

This specification covers the chemical, physical and mechanical requirements for structural bolts manufactured from steel and alloy steel, in two strength grades, two styles and two types. This specification is a consolidation of and replacement for six ASTM standards ranging from 1/2" through 1-1/2" diameter: A325, A325M, A490, A490M, F1852 and F2280. The main difference between this standard and the older, existing standards is that A325s from 1-1/8" to 1-1/2" now have the same mechanical requirements as A325s 1" and under. Previously the larger bolts had slightly lower requirements.

F3125 Bolt Types

Grade	Min Strength, Tensile	Type	Style
A325	120ksi min	1 or 3	Heavy Hex Head
A325M	830MPa min	1 or 3	Heavy Hex Head
F1852	120ksi min	1 or 3	Twist-Off/TC
A490	150-173ksi	1 or 3	Heavy Hex Head
A490M	1040MPa	1 or 3	Heavy Hex Head
F2280	150ksi	1 or 3	Twist-Off/TC

Type 1 – 120ksi - carbon, carbon boron, alloy, or alloy boron steel

Type 1 – 150ksi – alloy or alloy boron steel

Type 3 – weathering Steel

Chemical Requirements – Type 1

Heat Analysis	120ksi, %	150ksi, %
Carbon	0.30 – 0.52	0.30 – 0.48*
Manganese	0.60 min	0.60 min
Phosphorus	0.035 max	0.035 max
Sulfur	0.040 max	0.040 max
Silicon	0.15 – 0.30	-
Boron	0.003 max	0.003 max
Copper	-	-
Nickel	-	-
Chromium	-	-
Molybdenum	-	-

*Carbon 0.35-0.53% for 1-1/2" A490/150ksi bolts

Chemical Requirements – Type 3

Heat Analysis	120ksi, % Comp A	120ksi, % Comp B	120ksi, % Index	150ksi, % Index
Carbon	0.33 – 0.40	0.38 – 0.48	0.30 – 0.52	0.30 – 0.53

Manganese	0.90 – 1.20	0.70 – 0.90	0.60 min	0.60 min
Phosphorus	0.035 max	0.035 max	0.035 max	0.035 max
Sulfur	0.040 max	0.040 max	0.040 max	0.040 max
Silicon	0.15 – 0.30	0.30 – 0.50		
Copper	0.25 – 0.45	0.20 – 0.40	0.20 – 0.60	0.20 – 0.60
Nickel	0.25 – 0.45	0.50 – 0.80	0.20 min*	0.20 min*
Chromium	0.45 – 0.65	0.50 – 0.80	0.20 min*	0.20 min*
Molybdenum		0.06 max	0.10 min*	0.10 min*
*Either Nickel or Molybdenum must be present in the amount specified *Corrosion Index based on ASTM Guide G101				

F3125 Mechanical Properties

Grade	Tensile, ksi	Yield, ksi min	Elongation, % min	RA, % min
120ksi (A325/F1852)	120 min	92	14	35
150ksi (A490/F2280)	150-173	130	14	40

F3125 Marking Requirements & Matching Components

	120ksi, Type 1	120ksi, Type 3	150ksi, Type 1	150ksi, Type 3
Marking	A325	A325	A490	A490
Nut, Plain	A563 DH	A563 DH3	A563 DH	A563 DH3
Nut, Coated	A563 DH	A563 DH3	A563 DH	A563 DH3
Washer	F436-1	F436-3	F436-1	F436-3

A194 2H nuts are an acceptable substitute for A563 DH nuts

Suitable plain finish nut alternatives can be found in the full F3125 text

Supplementary requirements S1 and S2 have special marking requirements.

F3125 Permitted Coatings

Bolt	F2329 Hot Dip Galvanizing	B695 Mechanical Galvanizing	F1136 Zinc/Aluminum (Geomet)	F2833 Zinc/Aluminum
A325	Approved	Class 55	Grade 3	Grade 1
F1852	Not Approved	Class 55	Not Approved	Not Approved
A490	Not Approved	Not Approved	Grade 3	Grade 1
F2280	Not Approved	Not Approved	Not Approved	Not Approved

*Other coatings may be used on 120ksi/A325 fasteners upon agreement between purchaser and user. Coatings on 150ksi/A490 fasteners must be qualified by ASTM committee F16.

F3125 Nut Overlap Allowances

Size	F2329 and B695, in	F1136 and F2833, in
½-13	0.018	0.009
5/8-11	0.020	0.010
¾-10	0.020	0.010
7/8-9	0.022	0.011
1-8	0.024	0.012
1-1/8-7	0.024	0.012
1-1/4-7	0.024	0.012
1-3/8-6	0.027	0.014
1-1/2-6	0.027	0.014

Hot dip galvanized nuts are tapped after coating. Other coatings are applied after nut tapping

Nuts overtapped for use with 150ksi/A490 bolts shall be proof load tested to 175ksi minimum after overtapping

F3125 Supplemental Requirements

S1	A325/120ksi bolts up to 4x the diameter threaded full length. Mark A325T
S2	Alternate head geometry or thread length. Mark A325S or A490S
S3	Lubricants
S4	Rotational Capacity Testing



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