

The American Society for Testing and Materials is an international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems, and services.

ASTM F1554 Anchor bolts designed to anchor structural supports to concrete foundations.

The ASTM F1554 specification was introduced in 1994 and covers anchor bolts designed to anchor structural supports to concrete foundations. F1554 anchor bolts can take the form of either headed bolts, straight rods, or bent anchor bolts. The three grades 36, 55, and 105 designate the minimum yield strength (ksi) of the anchor bolt. The bolts can be either cut or roll threaded and a weldable grade 55 can be substituted for grade 36 at the supplier's option. Color coding on the end – 36 blue, 55 yellow, and 105 red – helps facilitate easy identification in the field. Permanent manufacturer and grade marking is allowed under the S2 supplementary requirements.

Applications for F1554 anchor bolts include columns in structural steel framed buildings, traffic signal and street lighting poles, and overhead highway sign structures to name just a few.

#### F1554 Grades

F1554 Grade 36	Low carbon, 36 ksi yield steel anchor bolts
F1554 Grade 55	High strength, low alloy, 55 ksi yield steel anchor bolts
F1554 Grade 105	Alloy, heat treated, high strength 105 ksi yield steel anchor bolts

#### Supplementary Testing

Supplementary requirements shall apply only when specified in the purchase order or contract.

S1: Weldable version of the Grade 55 specification. Through chemical composition restrictions and by a carbon equivalency formula, S1 provides assurance of welding ability. When S1 is not specified, the Grade 55 material may or may not be weldable.

S2: Permanent manufacturer's identification on the end of the anchor bolt that projects from the concrete, in lieu of color coding.

S3: Permanent grade identification on the end of the anchor bolt that projects from the concrete, in lieu of color coding.

S4: Charpy Impact requirements at +40°F (+5°C) for grades 55 and 105. The minimum Charpy V-notch energy requirement is an average of 15ft-lbs for three specimens, with no one specimen falling below 12ft-lbs. Charpy Impact requirements at -20°F (-29°C) for grade 105. The minimum Charpy V-notch energy requirement is an average of 15ft-lbs for three specimens, with no one specimen falling below 12ft-lbs.

#### F1554 Mechanical Properties

Grade	Marking	Size inches	Tensile, ksi	Yield, ksi min	Yield, MPa min	Elong. % min	RA % min
36		1/2 - 4	58 - 80	36	248	23	40
55		1/2 - 2	75-95	55	380	21	30
		2 1/4 - 2 1/2	75-95	55	380	21	30
		2 3/4 - 3	75-95	55	380	21	30
		3 1/4 - 4	75-95	55	380	21	30

105		1/2 - 3	125 - 150	105	724	15	45
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Stamping of F1554 bolts with manufacturer's identification is a supplemental requirement (S2)

Color coding is required unless the grade is stamped in accordance with supplemental requirement (S3).

When Grade 36 is specified, a weldable Grade 55 may be furnished at the supplier's option

#### F1554 Chemical Properties

Element	Grade 36			Grades 55 and 105
	Sizes up to 3/4	4 Sizes over 3/4 to 1-1/2	Sizes over 1-1/2 to 4	
Carbon (max)	0.26%	0.27%	0.28%	
Manganese	*	0.60 - 0.90%	0.60 - 0.90%	
Phosphorus, max	0.04%	0.04%	0.04%	0.040%
Sulfur, max	0.05%	0.05%	0.05%	0.050%
Copper, min (when specified)	0.20%	0.20%	0.20%	0.20%

\* Optional with the manufacturer but shall be compatible with weldable steel

#### F1554 Recommended Hardware

Grade	Identification	Size Inches	Recommended A563 Nut				Washer
			Plain Finish		Hot-Dip or Mechanical Zinc Coated		
			Grade	Style	Grade	Style	
36		1/2 - 1 1/2	A	Hex	A	Hex	F436
		1 5/8 - 4	A	Heavy Hex	A	Heavy Hex	
55		1/2 - 1 1/2	A	Hex	A	Heavy Hex	F436
		1 5/8 - 4	A	Heavy Hex	A	Heavy Hex	
105		1/2 - 1 1/2	D1	Heavy Hex	DH2	Heavy Hex	F436
		1 5/8 - 3	DH2	Heavy Hex	DH2	Heavy Hex	

1 A563 grade D nuts are rarely available. A563 grade DH or A194 grade 2H should be substituted.

2 The availability of A563 grade DH nuts in nominal sizes 1" and larger is very limited and generally available only on special orders of 50,000 or more. For smaller quantities, ASTM A194 grade 2H should be considered.