

# ASTM F1554 Anchor Rods...

## Get Hooked!

By Charles J. Carter, S.E., P.E.

Anchor rods (or anchor bolts, for those who just can't switch to new lingo) are an area of focus for many of the questions AISC receives through its Steel Solutions Center. The "new"

ASTM F1554 anchor-rod specification accounts for a large number of these questions. Of course, "new" is a relative term — the ASTM F1554 specification was introduced back in 1999. It marked the first time that hooked, headed, and threaded and nutted rods in multiple grades were fully addressed in one specification.

While it is penetrating the market from coast to coast, ASTM F1554 still faces "specification inertia," and many do not know what it has to offer. Hopefully, this article will help change that.

Following are some highlights of ASTM F1554:

- ASTM F1554 covers hooked, headed, and threaded and nutted anchor rods in three strength grades: 36, 55 and 105. ASTM F1554 grades 36, 55 and 105 are essentially the anchor-rod equivalents of the generic rod specifications ASTM A36, ASTM A572 grade 55 and A193 grade B7, respectively.

- Grade 36 is most commonly specified. It has 58 ksi tensile strength, a size range up to 4-inch diameter and is weldable.

- Grade 55 has 75 ksi tensile strength and a size range up to 4-inch diameter. Weldability supplement S1 and the carbon equivalent formula in ASTM F1554 Section S1.5.2.1 can be specified to allow welded field correction as a potential solution should the anchor rods be placed incorrectly in the field.

- Grade 105 has 125 ksi tensile strength and a size range up to 3-inch diameter.

- Appropriate ASTM A563 nuts for the various grades are given in ASTM F1554 Section 6.6.1 (see Table 1).



- Washers provided with ASTM F1554 anchor rods are ASTM F436 Type 1, unless the purchaser specifies an alternative requirement (such as may be required for force transfer in applications transferring uplift or moment).

- All three grades of ASTM F1554 anchor rods are suitable for galvanizing either by hot-dip process (ASTM A153 Class C) or mechanical process (ASTM B695 Class 50). Note that the same process must be used for both rod and nut to ensure proper matching of threads between the two products. Washers can be galvanized by either process and need not be of the same process as the rod and nut.

- Threads can be made by rolling or cutting. Rolled and cut threads have identical strength, but the elongations of rods with rolled and cut threads will differ. From ASTM F1554 Table 5, a 1-inch-diameter rod with cut threads has a minimum body diameter of 0.9755-inches. A 1-inch-diameter rod with rolled threads has a minimum body diameter of 0.9067-inches. Since the actual threads are the same, both have an identical stress area of 0.606 in.<sup>2</sup> — and therefore identical strength — but the rolled-thread rod has about 14 percent less resistance to elongation. With this in mind, the best design practice is to use the body diameter for rolled threads in design calculations for serviceability (as this will permit the purchase of either rolled or cut threads). The foregoing discussion is true of all rods, not just ASTM F1554 rods.

ASTM F1554 Rod Grade and Size, in.		Recommended ASTM A563 Nut			
		Plain		Galvanized	
Grade	Size, in	Grade	Style	Grade	Style
36	¼ to 1½	A	Hex	A	Hex
	Over 1½ to 4	A	Heavy Hex	A	Heavy Hex
55	¼ to 1½	A	Hex	A	Heavy Hex
	Over 1½ to 4	A	Heavy Hex	A	Heavy Hex
105	¼ to 1½	D	Hex	DH	Heavy Hex
	Over 1½ to 3	DH	Heavy Hex	DH	Heavy Hex

Table 1

•Grades are identified by color – 36 is blue, 55 is yellow, and 105 is red.

The benefits of ASTM F1554 are clear: there is no other specification that brings all requirements for anchor rods together into one place—mechanical, chemical, threading, manufacturing, and dimensional. Compared to older “material-only” specifications like ASTM A449, ASTM F1554 eliminates confusion about what product is required.

*“...no other specification that brings all requirements for anchor rods together into one place...”*

ASTM F1554 is here to stay, and it's catching on. In an informal poll conducted by Bill Liddy of AISC's Steel Solutions Center, 15 fabricators representing all geographic regions of the United States were asked how often they see ASTM F1554 specified. The results divide at the Rocky Mountains. East of the Rockies, the respondents indicated that the demand for ASTM F1554 was on the rise—but West of the Rockies, ASTM A449 still is common. Folks out West should keep in mind that ASTM A449 material can be obtained as ASTM F1554 grade 105—and additionally, you get all the specification requirements that make the material into an anchor rod.

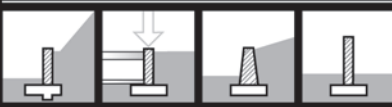
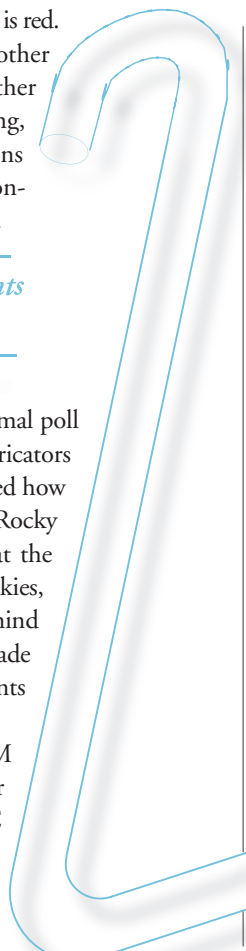
Don't let industry growing pains deter you—specify ASTM F1554, and encourage your fabricator to order your anchor rod materials early. ASTM F1554 is included in the AISC publication Selected ASTM Standards for Structural Steel Fabrication, which is available at [www.aisc.org/bookstore](http://www.aisc.org/bookstore). Alternatively, an individual copy of ASTM F1554 can be purchased from ASTM at [www.astm.org](http://www.astm.org). ■

*Charles J. Carter, S.E., P.E. is Chief Structural Engineer at the American Institute of Steel Construction in Chicago.*

## Can I keep specifying ASTM A325 or A490 anchor rods?

Only if you personally have met Sasquatch and the Easter Bunny! ASTM A325 and A490 are specifications that cover headed bolts only, with limited threaded length, generally available only up to 8 inches in length, and governed by provision for steel-to-steel structural joints only. You may think you've always specified your anchorage devices as ASTM A325 or A490 and it's never been a problem. But the reality is that your fabricator has been awfully nice to not embarrass you by pointing out that you've specified a product that does not exist in the length you likely specified—or as a hooked or longer-threaded rod.

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