

Washers for Anchor Rods

There is a table in ASTM F1554 Section 6.6.1 with the minimum requirements for nut specifications and grades. These vary by rod grade, diameter and galvanization requirements. You are correct that ASTM F844 washers should only be used for compression with reduced hole diameters. The part of [Steel Construction Manual](#) Chapter 14 that covers washer requirements for axial tension (page 14-10) confirms that the thicknesses given in Table 14-2 are minimums and that the “thickness must be suitable for the forces to be transferred.”

Continuity Plate Welds

The welds to the continuity plates are demand critical per the AISC [Specification for Structural Steel Buildings](#). However, if the ESW process were to be used for demand critical welds, the Commentary to Section W6.1 in AISC 341 states, “For processes such as ESW and EGW, the heat input level is considerably higher than that of the other four processes, and there has not been general testing proving the acceptability of these processes for demand critical welds.” However, these processes may have had limited connection qualification tests performed for certain applications, and their use in such applications may be approved by the engineer.”

Section 2.6 of AISC [Specification for Structural Steel Buildings](#) 21 also has a good discussion of ESW. You can find this as a free download for AISC members at [http://www.aisc.org/Products/Specifications/Specification-for-Structural-Steel-Buildings-2010-8th-Edition/2010-Spec-8th-Edition-Download.aspx](#). Non-members may purchase it there as well.

Also, for the sake of completeness, even though these welds are not demand critical, they still must satisfy the requirements of Sections 7.3 and 7.3a of the [Specification for Structural Steel Buildings](#).

Structural Steel Utilization

We do track structural steel utilization by building type through measuring the percentage of construction starts in a given year by project type and the structural steel market share in each category. We only track structural steel usage (hot rolled shapes and hollow structural sections). These numbers do not include other types of steel used in construction such as reinforcing bar, plate used to create girders, piping, cold formed steel used for studs and framing and such—these are [non-structural sections](#).

We break out the use of structural sections into three major categories: buildings; industrial construction not under roof (structures like petroleum refineries, power plants, industrial process plants); and non-structural uses (OEM use of structural sections for trailers, ship building, etc.).

The 2009 data are rather skewed as a result of the recession. In a more typical year we would have seen building construction represent closer to 60% of the structural steel market rather than the current 44%.

The breakdown for 2009 is:

Buildings		1,892,000
Retail	11%	250,384
Warehouse	4%	75,691
Offices	17%	363,646
Parking/Auto	10%	63,076
Manufacturing	1%	15,906
Schools	19%	474,166
Health Care	6%	131,636
Government Services	5%	94,614
Religious	3%	46,895
Amusement	4%	

steel interchange

