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# ASK THE EXPERT

## Welding High Strength Anchor Bolts

**Question:** Can welding be performed on high strength anchor bolts and fasteners?

**Answer:** The short answer is that in most cases, welding is not allowed on high strength bolts. In the fastener industry, the term "high strength" typically refers to any medium carbon or alloy material which undergoes a heat treating process to develop the strength properties necessary to meet the requirements of a given specification. These ASTM specifications include **A449, A325, A193 grade B7, F1554 grade 105, A354 grades BC and BD**, and **A490** among others. When heat is reapplied to a bolt that has been heat treated, it is probable that the physical properties (strength) of the bolt may be altered. When heat is applied in an uncontrolled environment, it is impossible to determine what effect this application of heat has had on the fastener. Therefore, welding to high strength bolts is not recommended.



Two references occur to back up this statement. On page 4-4 of the Ninth Edition of the AISC Manual (American Institute of Steel Construction), the following statement occurs:

"Anchor bolt material that is quenched and tempered (heat treated) should not be welded or heated."

The other reference prohibiting the heating of high strength bolts (which would occur during welding) can be found in the **ASTM F1554** specification. Section 6.4.3 of the **ASTM F1554** specification states:

"Hot bending performed on heat-treated bar stock shall not have the temperature come within 100°F (56°C) of the tempering (stress relieve) temperature of the heat-treat process at any location during hot bending and shall be allowed to air cool after bending."

Although this statement refers to hot bending, it implies that any process (including welding) that applies heat approaching or exceeding the tempering temperature to a high strength bolt may potentially alter the mechanical properties of the fastener and should therefore be avoided.

The issue of reheating high strength bolts when welding can be avoided by performing the welding

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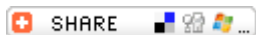
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be welded in the field or by another company once the bolts have been tested and certified to meet a particular ASTM specification.



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