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steel interchange

Weld Designation

What do the "U" and "a" indicate in the prequalified weld type B-U4a?

The U indicates that the weld can be used with material of unlimited thickness, as opposed to an L, which would indicate that the weld is only appropriate within a range of thicknesses. AWS D1.1 states: "The lower case letters—e.g., a, b, c, etc.—are used to differentiate between joints that would otherwise have the same joint designation." In this case there are two prequalified butt welds (B) using a single-bevel groove (4) with no limitation on thickness (U) listed in AWS D1.1. One of the listed welds uses backing (a) and the other does not (b). The "a" in your designation, "B-U4a", indicates that backing is used.

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Mixed Hole Sizes in Slip-Critical Connections

We have designed slip-critical connections with standard holes. When the structure was erected, a few of the bolts could not be installed due to mislocated holes. Can we make the mislocated holes oversized and leave the others as standard holes? Does the strength of the connection need to be reduced due to the oversized holes?

There is nothing in the RCSC or AISC that discusses the mixing of standard and oversized holes in a slip-critical connection, so you will have to rely on your own judgment. I will provide some comments that might assist you in this process.

It is not uncommon to see slip-critical connections with oversized holes that contain a couple of standard holes to help maintain the intended geometry during erection, so the mixing of hole types is relatively common. In such cases, the entire group is designed using oversized holes, while also incorporating a couple of standard holes; this leads to a more conservative design strength. Your situation is also not uncommon, since things do not always fit the way we would like in the field. Some engineers would tend to design the entire group using the values for oversized holes, although this is likely not necessary. Though the strength provided in the is less for connections with oversized holes, there is no loss of pretension or slip resistance due to the oversized holes. The lower nominal load is due to a higher factor of safety (reliability) to account for the consequences of slip. This is discussed in the Commentary to Section J3.8.

Since most of the holes in your connection are standard

made for each lot of DTIs being used for verification testing, termed the "verification lot"…This technique cannot be used for the turn-of-nut method because the deformation of the DTI consumes a portion of the turns provided. For turn-of-nut pre-installation verification of bolts too short to fit into a hydraulic calibration device, installing the fastener assembly

Square-Cut Sloping Beams

There are large wide-flange beams that slope with the roof pitch of ¼ in. per foot. In some instances they connect to girders and in other instances they connect to HSS columns. Can the beams be cut square leaving a varying distance from the end of the beam to the face of the support?

Especially for heavy shapes, cutting the member square is easier than making a bevel cut. The decision on whether to bevel-cut the beam or to bevel the connection material is usually based on economics. As the bevel increases, the eccentricity on the connection increases, potentially adding to the connection cost and overriding any benefit of square-cutting the beam. In your case, the bevel adds only about ¾ in. to the usual setback; therefore, standard shear end connections likely can be used for the strength calculations. In this case, square-cutting the beam will be preferred by most fabricators, and this is acceptable from an engineering standpoint.

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