

Eccentricity on Columns

Are there any formal recommendations concerning the inclusion of eccentric moment in a steel column due to the physical distance between the beam end and column centerline?

The decision to account for the eccentricity or neglect it is one that you have to make based on your engineering judgment. Ioannides (“Minimum Eccentricity for Simple Columns,” *ASCE Structures Congress Proceedings*, Volume 1, 1995) suggests that even for a column that is loaded on one side only, the restraint a connection provides to the column will help mitigate the eccentric effects in normal framing configurations.

There are some common parallels in design where we neglect eccentricity. The AISC *Steel Construction Manual* states that for standard or short-slotted holes, eccentricity on the beam side of double angle connections may be neglected for gages (distance from the face of the support to the centerline of a single vertical bolt row, shown as dimension *a* in Figure 10-4[a] in the *Manual*) not exceeding 3 in. While you are permitted to neglect this eccentricity, there will still be a resulting moment that will exist somewhere in the system. Some of the moment will go to the column and some to the beam, based on the stiffness of the elements. The reasons we neglect the eccentricity are largely historical: The basics of bolted joint design evolved before analysis capabilities had progressed sufficiently to account for it. However, there are some technical justifications. First, any assumption about where the moment will exist will be wrong, since the system will distribute the moment throughout the system based on stiffness. The usual eccentricity is relatively small, and its effects become arguably negligible when distributed within the system—even if the effects might be significant when assumed to be concentrated at an individual element. There also are other influences like the fact that the bolt strengths provided in the AISC *Specification* (available for free at www.aisc.org/2010spec) have been reduced to account for uneven loadings that occur in primarily end-loaded connections. These reductions also help to account for some eccentricity without explicit consideration of the moment by the designer.

A final thought: Check the settings in your software to see if your columns are already being designed for eccentricity automatically. Some software programs account for an assumed amount of connection eccentricity as a default when sizing the columns.

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Minimum Weld Sizes

We have a project where a 1-in.-thick A36 steel plate is welded to a 10-in. diameter column. What are the minimum weld sizes required?

Minimum Loads for Splices

We designed a beam to support a floor. The contractor has asked to put a bolted splice in the beam to simplify erection. We provided a shear and moment from the design loads at the splice. Since the loads at this location are small, the splice they have designed seems too light. Is there a minimum splice required, such as to design the moment splice to 75% beam capacity, regardless of the actual loads?

No, there are no minimum criteria in AISC standards for beam splices. Generally, the AISC *Specification* provides requirements relative to design and detailing based on the