BOLT HOLE SIZES

Maximum hole sizes for bolts are specified in the 1999 LRFD Specification Table J3.3. What if an actual hole dimension is between two of the values?

Question sent to AISC's Steel Solutions Center

AISC LRFD Specification Table J3.3 is based upon Table 3.1 in the 2000 RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts and contains the maximum dimensions of standard, oversized, short-slotted, and long-slotted holes. If an actual dimension exceeds the tabulated maximum by more than the $^{1}/_{32}$-inch tolerance given in the RCSC Specification, it must be treated as the next larger hole size.

For example, a $^{13}/_{16}$-in. by $1^{1}/_{4}$

TEES UNDER FLEXURE (STEM IN COMPRESSION)

from October 2002

How does one design a structural WT member under flexure when the stem is in compression? Chapter F of the 1989 ASD Specification does not appear to address this particular case.

When using LRFD, the current manual is straight forward for the design of tees. Both the equation for yielding strength and the equation for critical buckling strength of tees is shown in Chapter F of the AISC Specification

An article written by William A. Milek in the 3rd quarter 1965 AISC Engineering Journal, under the title "One Engineer's Opinion," addresses this question. In this article, Milek uses an approximation of the results obtained by an exact solution for lateral buckling critical stress for members symmetrical about the y-y axis but unsymmetrical about the x-x axis to determine the allowable bending stress for tee sections, σ_{cr}. Of course, the allowable stress is limited by $0.6F_y$.

It is also acceptable to use the equations of Section F1.3, excluding the equation (F1-8), to get a poor approximation of the allowable stress. Equation (F1-8) should not be used because it can be unconservative since there isn't a compression flange.

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Section 9.12 of Salmon and Johnson's *Steel Structures Design and Behavior*, 4th edition, states that a tee whose stem is on the compression side of the neutral axis is similar to an I-shaped section bent in its weak direction. If the stem of the tee satisfies λ_p for an unstiffened flange $[0.38(E/F_y)^{0.5}]$ then it is acceptable to use the maximum moment strength M_n as high as M_p as long as the extreme fiber in tension does not exceed F_y. Note that $F_yZ < 1.5M_y$. From a practical point of view, rolled structural tee webs will never satisfy this limit and web local buckling will control. For inelastic buckling, Q_s should be calculated per Appendix B of the LRFD Specification and M_r found as $Q_sF_yS_{xc}$. L_r can then be found and the problem solved as a normal beam problem. For elastic buckling, LRFD Equation F1-15 is still valid for stems in compression as long as B is taken as negative.

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NEW QUESTIONS

BOLTED HANGER-TYPE CONNECTIONS

The AISC 9th Edition (ASD) illustrates procedures for bolted hanger-type connections with a single line of resistance to prying action on each side of the hanging member. If each line of resistance consists of a bolt group, what design and analysis methods should be used?

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PREVIOUS QUESTIONS

SQUARE TUBULAR SECTION ARCHES

(June 2002)

What reference material is available for the design of s