

The Use of Jumbo Shapes in Non-column Applications

The AISC *Manual of Steel Construction*, 8th Edition, contains a note on the bottom of p. 1-6 indicating that Group 4 and 5 shapes, commonly referred to as jumbo shapes, are generally contemplated as compression members. These heavy shapes have been known to exhibit segregation in the mid-thickness region of the flanges and the web, especially near the intersection of the flange and the web. Because these areas may have low toughness, cracking might occur as a result of thermal cutting or welding.

In recent years, the use of jumbo shapes in non-column applications has been increasing. Cracking has been reported at welded splices in tension members of trusses. One producer has decided to decline to quote on *W*-shapes having flange thicknesses over 1-½ in. for use as non-column members *unless* killed steel is specified. Furthermore, this producer strongly recommends bolted splices and connections be employed whenever these *W*-shapes are used as non-column members, even when they are produced to a killed-steel practice.*

AISC has requested investigators of these problems to prepare technical papers on their studies. In the interim, the following new note has been drafted for inclusion in the next

printing of the *Manual of Steel Construction* in light of the recent experiences.

Amended Note for Table 2, p. 1-6 of AISC *Manual of Steel Construction*, 8th Edition:

Group 4 and 5 shapes are generally contemplated for application as columns or compression components. When used in other applications (e.g. trusses) and when thermal cutting or welding is required, the material specification and fabrication procedures should be carefully reviewed to minimize the possibility of cracking. Low toughness properties at the web mid-thickness and at the web-flange intersection may increase the possibility of cracking, especially at regions of stress concentration. The use of killed steel and special metallurgical requirements may be helpful to improve properties. The effects of tensile stresses resulting from welding and handling during fabrication and erection, as well as from design loads, should be considered. When connections are used in tension, bolting should be considered as an alternative to welding.

* For a brief explanation of terms describing steel making practices, see *Engineering for Steel Construction*, AISC Publication MO14, 1984, pp. 2-1 to 2-3.