

Material Substitutions

Just because something is not on the list of approved materials does not mean it is prohibited, ~~It is an AISC 1909 Specification~~ (the ~~It is an AISC 1909 Specification~~ Specification)

material. The exact method of evaluation inevitably depends upon the individual project requirements: what is appropriate for a particular purpose in one project may be less so or wholly inappropriate for another project.

To take an extreme example, consider a 5-lb wedge of A992 steel and a 5-lb wedge of tungsten. Both could be used to make doorstops, but the tungsten wedge will cost about 10 times as much as the steel wedge. Conversely, when design-

is acceptable.

It is a practical matter that only the usual materials and common alternatives are listed in the AISC *Specification*. With well over 6,000 enumerated steel material standards alone, it is effectively impossible to consider fully every possible steel material. There simply aren't enough committees, or enough time in a code cycle, to develop official recommendations (to say nothing of the difficulty in keeping track of the individual development paths for each of those 6,000-plus standards). By the time anything got decided, the decision would likely be obsolete. Because the relevant committees have not considered other materials, their evaluation and acceptability is a matter for the engineer who specifies them (see the Commentary to the AISC *Specification*, Section A3.1a).

Making an Evaluation

There are no simple tables of equivalence that will indicate if one material is "equal" to another because there is

is demanded in high-seismic applications. Strain hardening characteristics also reside in the background, and have become somewhat explicit in high-seismic design provisions.

While it is nominally similar for grades of carbon steel, the coefficient of thermal expansion can be markedly different for other types of steel materials considered for structural use.

Another consideration: is the material such that fabrication is different? Drills might require special bits or different speed/feed parameters, shears may have to be down-rated, blade clearances may have to be tweaked, hold-downs reinforced, and so on. These concerns are generally the responsibility of the fabricator, but it will be wise in the selection of alternative materials to discuss them with the fabricator to know what, if anything, might be different.

Chemical Properties

Corrosion. When corrosion effects are a consideration, it is important to know if the usual solutions will work for

sidered. The common materials used are covered and their use on a project is fairly routine. The use of other materials, however, departs from that routine and the Engineer