

Question from September 1999:

ASCE 7-95 section 2.4.3, part (b) states that the effect of two or more transient loads may be reduced provided that the allowable stress is not also increased. AISC's ASD Manual, 9th Ed., section A5.2 allows a 1/3 stress increase provided that the loads are not "calculated on the basis of reduction factors applied to design loads in combinations," and gives ANSI A58.1, which was updated as ASCE 7, as an example. My questions are:

- a) Is it acceptable to use the load combinations specified in ASCE 7, but not to reduce them and use a 1/3 stress increase when designing steel members?**
- b) may the 1/3 stress increase be used when designing for a Dead + Wind combination?**

David MacGregor

In my opinion, the answers to your questions regarding ASCE-7 and the 1/3 stress increase are:

- a) Yes
- b) Yes

Having said that though, I feel the need to qualify my answer and also tell you that not every member of the AISC Specification Committee agrees with me on this.

At first glance, ASCE-7 seems to prohibit a 1/3 increase in stress if the loads have already been reduced because of loads acting in combination. In fact, the wording is: (b) the allowable stress shall not be increased to account for these combinations (underlining mine).

But what if the 1/3 stress increase is *not* to account for loads in combination? Then is it permitted? It has long been my position that the

stress increase (which has been allowed for at least 100 years) was *never* to account for simultaneous action of two or more loads, but to ameliorate the effects of wind which was always applied as a static force.

On the other side, one can argue that modern wind forces are developed taking into account the gusty and localized nature of wind, so there is no need for a correction factor. I can understand this logic, too. However, most damage in wind storms is to glass, certain wall, roof and wall panels, and the forces on these small-tributary area items have been dramatically increased over the last two decades, reflecting the real behavior of wind.

You might refer to my article "The Mysterious 1/3 Stress Increase," in the 2nd Quarter 1977 AISC *Engineering Journal*.

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Another response:

Standard Building Code 1997 section 1609.1.1 "Stress increases" state that "Allowable stresses specified in the appropriate material standard for allowable stress design are permitted to be increased in accordance with the material design standard when stresses are produced by wind or seismic loading, acting alone or in combination with other loads."

load with the same deflection as a W16x26: slip between shear planes.

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Comment on a previous response:

In the July issue of Modern Steel Construction, Mr. Timothy M. Young answered an April question from Emha Antariksa regarding “laterally unsupported length of the compression flange.” Mr. Young begins his answer writing, “Lateral bracing must prevent both twisting and lateral deflection...” However, the AISC *Specification for Structural Steel Buildings, Allowable Stress Design and Plastic Design*, 1989, defines the unbraced length as “distance between cross sections braced against twist or lateral displacement...,” which implies that braces must prevent twist *or* lateral displacement, but not both.

Dr. Joseph Yura's notes from a “Summary of Bracing Recommendations” presented to SEAoT in May 1993 say on page G, “bracing is effective if it resists twist of the cross section and/or lateral movement of the compression flange.” So it appears that one or the other is needed, but not both.

Charles Baker
via email

New Questions

Is there an AISC (or equivalent) steel design code for temporary structures which is less conservative than ASD or LRFD?

Mark A. Walters
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Does anyone have any information on the