Steel Interchange

Steel Interchange is an open forum for *Modern Steel Construction* readers to exchange useful and practical professional ideas and information on all phases of steel building and bridge construction. Opinions and suggestions are welcome on any subject covered in this magazine.

The opinions expressed in *Steel Interchange* do not necessarily represent an official position of the American Institute of Steel Construction, Inc. and have not been reviewed. It is recognized that the design of structures is within the scope and expertise of a competent licensed structural engineer, architect or other licensed professional for the application of principles to a particular structure.

If you have a question or problem that your fellow readers might help you to solve, please forward it to us. At the same time, feel free to respond to any of the questions that you have read here. Contact *Steel Interchange* at:

Steel Interchange
Attn: Keith A. Grubb, Technical Editor
One East Wacker Dr., Suite 3100
Chicago, IL 60601-2001
fax: 312/670-5403
email: grubb@aiscmail.com

Comment on the November 1999 Steel Interchange:

The response by Mike Ginsburg is essentially correct, but has one significant error. The first printing of the 1997 UBC incorrectly read "... for all combinations, including W (wind load) or E (seismic load)." Later printings of the 1997 UBC correctly read "... for all combinations including W (wind load) or E (seismic load)." Note that the comma was removed in the later printing. This significant change has not yet appeared in the ICBO errata, but I understand it soon will.

Rick Drake, S.E.
Fluor Daniel, Inc.
Aliso Viejo, CA

Question from November 1999:

Does anyone have any information on the availability of angles, channels, and other rolled materials in 50 ksi material, rather than A36? Is the industry trending towards 50 ksi material in those shapes as well as wide flanges?

The steel industry is definitely in the midst of a trend towards 50 ksi steel for all structural materials, not just W-shapes.

From my perspective, we are getting more requests for 50 ksi steels in hot-rolled products other than W-shapes, but there has not been a groundswell movement to 50 ksi yet. Nucor Texas is now rolling all of our structural sizes in material that meets both the ASTM A36 specification and a 50 ksi specification that varies depending on the shape.

Our fabricator customers are requesting more and more 50 ksi material, so we tend to "dual certify" all of our material. Most of the angle and channel (Groups 1 & 2) that we produce are produced to an ASTM A36/A529 Grade 50 dual specification due to the costs of producing and stocking two different materials. Heavier channels are produced to ASTM A36/A572 Grade 50, and the Group 3 angles to ASTM A36/A572.

The group numbers refer to Table A of ASTM A6/A6M. The table, titled "Shape Size Groupings for Tensile Property Classification," more or less outlines the various sizes by section group. The grade specifications then outline what section group to refer to for each specification. For example, ASTM A529 states that it is available in: Plates to 1" thick to 12" wide; Bars to 2-1/2"; Shapes–Group 1 & 2.

Jim Sheble
Nucor Steel
Jewett, TX

Another response:

In regard to the question about the availability of angles, channels, etc. in 50 ksi material, I cannot speak about industry trends but for a number of years my company has been buying the following steel channels ordered to ASTM A572 Grade 50 for use as columns and beams in steel storage rack systems:

C3 x 3.5, C3 x 4.1
C4 x 4.5, C4 x 5.4
C5 x 6.1, C5 x 6.7

We tend purchase from mills such as Nucor, SMI and Austeel. On occasion we special order the following channels in Grade 50:

C6 x 8.2, C7 x 9.8, C8 x 11.5

The bar-size angles we use are A36.

Michael D. Dushenko, P.E.
Frazier Industrial Company
Waterloo, NY

Question from November 1999:

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

Mark A. Walters
Westinghouse Electric Company
Monroeville, PA

Any structure that falls under the jurisdiction of a local building code must be designed to the minimum requirements of that code as a legal matter. If the local

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building official has the authority to waive certain load cases (e.g. snow for a structure to be used for one summer only) that might be negotiated.

As a personal observation, I have seen "temporary" buildings on large industrial facilities still in use 20 years later.

For temporary structures outside the jurisdiction of the legal codes (such as construction shoring, formwork, rigging, etc.) engineers use their professional judgment regarding load combinations, allowables, or limit states.

However, if life safety or large economic questions exist, one's liability exposure in case of a failure would be more difficult to defend if one used "homemade" standards. Remember the ancient proverb: "To guess is cheap. To guess wrong is expensive."

Thomas A. Amundsen, P.E., S.E.
Sargent and Lundy
Chicago, IL

Question from December 1999:

Are there any AISC guidelines for flame-cut holes used for bolted connections?

Flame-cutting of bolt holes is permitted (at least, it is not specifically prohibited), but subject to the approval of the engineer of record. In general, flame-cutting has been used for large-diameter holes that can't be drilled or punched, like in base plates, and field modifications. Today's equipment (mechanically guided flame cutters and plasma punches) make flame cutting very feasible and accurate.

I think flame-cut holes that are reamed are essentially equivalent to a drilled hole; untreated flame-cut holes (i.e., flame-cut and left alone) are about equivalent to a punched hole, although there is a martensitic layer at the untreated edge. This differs from the punched hole, which has a different but similarly damaged rim of material.

This issue is covered further in AISC's *A Guide to Engineering and Quality Criteria for Steel Structures: Common Questions Answered.* If you are interested in getting a copy, it is AISC publication number S323 and you can order it through our website www.aisc.org or by calling 800/644-2400.

Charles J. Carter, P.E.
American Institute of Steel Construction
Chicago, IL

I am required to do lab testing of steel moment connections used in Special Moment Resisting Frames. Who does this type of testing, what does it cost, and what are the standards? I understand that it is possible to use previously tested joints, but this joint is a built-up retrofit of an existing structure. I am pretty sure it is not standard.

The basic standards for testing are available in the AISC *Seismic Provisions* (1997) Appendix S. You should also look at SAC documents like FEMA 267 and 267B. The actual testing has usually been performed by universities, such as University of Texas–Austin, University of California–San Diego, University of California–Berkeley, Georgia Tech, University of Michigan, University of Illinois, etc. Private labs have also done some testing.

Charles J. Carter, P.E.
American Institute of Steel Construction
Chicago, IL

General interest question:

We have a new inspector who claims that AISC does not allow paint where field welds are to be used. I have always been taught that you can weld directly over a paint system that is capable of being welded over. Can you point me to where AISC discusses this idea?

Section M3.5 of the *LRFD Specification for Structural Steel Buildings* addresses this point. It states:

Unless otherwise specified in the design documents, surfaces within two inches of any field weld location shall be free of materials that would prevent proper welding or produce objectionable fumes during welding.

The commentary on this section notes that the specification allows for welding through surface materials, including appropriate shop coatings, that neither adversely affect weld quality nor create objectionable fumes.

Keith A. Grubb, P.E.
American Institute of Steel Construction
Chicago, IL

New Question

What technical guidelines are available for consideration of temperature differentials during erection? We are designing a casino with several intermediate expansion joints (structural steel framing for casino level) spaced at approximately 500'.

Jan Vacca