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Not-Quite-Oversized Holes

According to Section J3.8 of the 2010 AISC *Specification*, different resistance factors are given for standard holes and oversized holes. If the hole size provided is larger than that specified for a standard hole, but smaller than that specified for an oversized hole, is it permitted to use linear interpolation to calculate the strength?

The Commentary to the RCSC *Specification* (a free download at www.boltcouncil.org) states, "The footnotes in Table 3.1 provide for slight variations in the dimensions of bolt holes from the nominal dimensions. When the dimensions of bolt holes are such that they exceed these permitted variations, the bolt hole must be treated as the next larger type." Thus, RCSC does not allow interpolation.

Larry S. Muir, P.E.

ASTM 1085

Does the introduction of ASTM A1085 HSS mean that ASTM A500 HSS is no longer available on the market?

No. We are in a transition period in which the structural marketplace will decide if ASTM A1085 will supersede ASTM A500 as the usual material for design and construction. In the meantime, ASTM A500 remains the usual material and HSS manufacturers do not plan to stop producing it. We are watching the transition and will advise with information in *MSC* as we see things change.

Larry S. Muir, P.E.

Perform and Observe versus Periodic and Continuous

How do the terms "periodic" and "continuous" used in the IBC relate to the terms "perform" and "observe" used in the AISC *Specification*?

The Commentary to Chapter N in the 2010 AISC *Specification* (a free download from www.aisc.org/2010spec) provides some insight:

"The terms perform and observe are not to be confused with periodic and continuous used in the 2009 IBC. Both sets of terms establish two levels of inspection. The IBC terms specify whether the inspector is present at all times or not during the course of the work. Chapter N establishes inspection levels for specific tasks within each major inspection area. Perform indicates each item is to be inspected and observe indicates samples of the work are to be inspected. It is likely that the number of inspection tasks will determine whether an inspector has to be present full-time, but it is not in accordance with Chapter N to let the time an inspector is on-site determine how many inspection tasks are done."

Perform means the task is done each piece, every time—a more rigorous condition than most interpretations of the term continuous. Observe means the task is done with a sampling plan appropriate to what is being inspected; it's similar to periodic, but better defined.

Larry S. Muir, P.E.

Stability Bracing

A W14 beam is connected to a 60-in.-deep plate girder with the same top of steel elevation. Relative to Appendix 6 of the AISC *Specification*:

1. Should the W14 be treated as lateral bracing or torsional bracing for the plate girder?
2. Does the required brace strength have to be added to the other design loads for the design of the W14 beam?
3. Should the W14 be designed for tension or compression?

Assuming the top flange of the plate girder is in compression, either lateral or torsional bracing can be used. However, lateral bracing is probably more efficient. You only need to satisfy either the lateral brace requirements or the torsional brace requirements, not both. In other words, the least stringent requirement will govern. If the bottom flange is in compression, only the torsional bracing provisions apply. In this case, web distortion should be accounted for in the brace stiffness and strength calculations as shown in equation A-6-13.

If the moment on the plate girder is present in the same load case as another applied load in the brace, the load is additive for the design of the brace.

Because we generally don't know in which direction the member will buckle, the brace load should be considered in the worst-case direction (tension or compression for lateral braces).

Bo Dowsell, P.E., Ph.D.

Turn-of-Nut and Tension Control

Due to restricted access we cannot get the wrench on tension control (TC) bolts. Can "turn of the nut" tensioning be used with TC bolts?

Yes. Any of the pretension methods described in Section 8.2 of the RCSC *Specification* (a free download at www.boltcouncil.org) can be used. However, TC bolts often have button (rounded) heads, which do not allow the use of a wrench to either hold the head motionless, as is required of the unturned element, or to turn the head while the nut is held in place. If the bolt has a hex head, then turn-of-nut tensioning can be used.

Larry S. Muir, P.E.

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Demolition and the Code of Standard Practice

We have received a contract that requires the fabricator to perform demolition. Is this a violation of Section 1.7.1 of the AISC Code of Standard Practice?

The AISC *Code of Standard Practice* (available for free at www.aisc.org/code), in Section 1.7.1, does not prohibit the fabricator or erector from performing demolition work, but rather clarifies that demolition or shoring of an existing structure cannot be construed as being within their scope of the work unless it is contractually agreed to. You said that your contract assigns the demolition work to you, and so this is a case where the default provision in the *Code* is superceded by a specific instruction to the contrary in the contract. Section 1.1 in the AISC *Code* allows for this.

Coordination of any construction project is usually the responsibility of the general contractor (GC), and demolition and shoring would usually fall into that category. Were I bidding a job for which demolition is shown in your work, I would exclude that work in my bid. It would then be up to the GC to assign it to someone else.

Keith Landwehr

Slotted HSS Connections

What is the proper way to slot an HSS used as a brace member and welded to a gusset plate?

A few years ago, I asked several fabricators how they cut these slots and found a variety of answers, including:

- ▶ Drill a hole and cut between the hole and the end of the brace to form a slot.
- ▶ Cut the entire slot with CNC-guided torches.
- ▶ Use a hand-held torch to cut the entire slot manually and grind as required.

Each of these methods is acceptable. The User Note in the 2010 AISC *Specification* (a free download at www.aisc.org/2010spec), in Section M2.2, states: "Slots in HSS for gussets may be made with semicircular ends or with curved corners. Square ends are acceptable provided the edge of the gusset is welded to the HSS."

Due to erection tolerance and clearance requirements, welding the gusset along the edge at the end of the slot is not practical for typical field-welded braces. Therefore, for all practical purposes, slots with square ends should be used only for shop welded gusset plates.

Bo Dowswell, P.E., Ph.D.

Compression Chord Bracing

I have a truss where I can effectively brace the tension chord but cannot brace the compression chord. Can the web members of a truss be considered to brace the compression chord out-of-plane?

In a vertical truss incorporated into a window wall system at the Virginia Beach Convention Center, the truss compression chord was "braced" by the truss web members. The connection of the tension chord to the window mullions was detailed to provide rotational restraint of the tension chord, the web members and the compression chord, thereby eliminating the need for out-of-plane bracing at the compression chord. The analysis and detailing of all of the truss components was quite rigorous in order to ensure proper load transfer and connection stiffness. A more detailed description of this particular case can be found in the following reference:

W. F. Baker and B.S. Young, "Stability Design of the Bow String Trusses of the Virginia Beach Convention Center," *Proceedings*, ASCE 2012 Structures Congress.

So in theory, with proper detailing and member rotational restraint, it is possible to design a system where the web members could be relied on as brace points. That said, you would need to evaluate your design and member detailing and use your own engineering judgment to assess whether you could apply these principles to your project. The project described in the article is obviously unusual. In most instances it would likely be less expensive to simply add additional bracing.

Susan Burmeister, P.E.

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Larry Muir is director of technical assistance at AISC. Bo Dowswell, Keith Landwehr and Susan Burmeister are consultants to AISC.

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If you have a question or problem that your fellow readers might help you 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 via AISC's Steel Solutions Center:

1 E Wacker Dr., Ste. 700, Chicago, IL 60601
tel: 866.ASK.AISC • fax: 312.803.4709
solutions@aisc.org



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