**IF YOU'VE EVER ASKED YOURSELF "WHY?"** about something related to structural steel design or construction, *Modern Steel Construction*'s monthly Steel Interchange column is for you!

## Bolt Installation method

**When you are using snug-tightened bolts, is the proper installation method the "turn-of-the-nut" method?**

*Question sent to AISC's Steel Solutions Center*

No. The turn-of-nut bolt installation method as well as three other methods described in the RCSC *Specification for Structural Joints Using ASTM A325 or A490 Bolts* applies to pretensioned installations; not snug-tight installations. Section 8.1 of the RCSC *Specification* defines the procedure for installation of snug-tightened joints which does not require a stipulated pretension force. You can download a free copy of the RCSC *Specification* at **www.boltcouncil.org**.

*Kurt Gustafson, S.E., P.E.*
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## Wireless Interference

**During the design phase of a project our office is doing, we were asked by the client representative if choosing steel as the construction material (in lieu of concrete) will cause any potential wireless interference (the project is a hospital). The other concern was possible audible vibration (due to human activities and mechanical systems).**

*Question sent to AISC's Steel Solutions Center*

AISC is not aware of any issues concerning wireless interference due to structural steel framing, as the construction material itself does not interfere or produce spurious radio emissions. In the end, there will be little difference between steel and concrete framing in this regard because construction with either material involves the use of significant amounts of the other.

All wireless devices use ultra-high frequencies (UHF) or higher, which have the distinct ability to "bounce" off objects. The same effect is noted in cellular phones. Hence even confined areas, such as within concrete cores in elevator shafts, may allow communications so long as a sufficient opening is available for UHF radio signals to bounce out. Once an elevator door shuts, however, the signal may be completely confined and communications hampered or lost. However, this phenomenon occurs in buildings with both concrete and steel framing.

If you were referring to signal attenuation, note that both concrete and steel frames will result in minimal blockage of radio waves, as building frames are not designed to be fully confined like elevators. Structural steel members usually have a smaller footprint than concrete members, which actually further reduces the little attenuation that may occur.

Regarding your audible vibration question, vibration can be felt, but not heard. AISC Design Guide 11 (**www.aisc.org/epubs**) and available software (Floorvibe, for example) can be used to design to eliminate perceptible vibrations.

*Sergio Zoruba, Ph.D., P.E.*
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## Non-Building Structure

**I have an elevated walkway (20 ft high) that is foundation-supported. I understand the building code considers this a non-building structure. IBC 2003 refers you to ASCE 7 section 9.14.7, which gives you a different Table (9.14.5.1.1) for *R* values. I am using braced frames as the lateral system. For concentric braced frames ASCE refers you back to the typical Table 9.5.2.2. Do I now select special/ordinary/etc. braced frames and comply with all respective detailing, thus treating the walkway just like a building?**

*Question sent to AISC's Steel Solutions Center*

We cannot speak as to the intent of documents developed by other organizations such as ICC and ASCE. However, the paper trail scenario you describe for the 2003 IBC and referenced ASCE 7-02 versions of those document appears correct. Under that scenario, the engineer would then select the system that they would want to use, and must comply with the stated requirements associated with that system. One thing that you did not mention is the Seismic Design Category (SDC) for the structure. Note that for building structures, if the structure falls in SDC A, B, or C, Table 9.5.2.2 of ASCE 7-02 permits the use of "Structural Steel Systems Not Specifically Detailed for Seismic Resistance" if $R = 3$ is used.

IBC 2006 and ASCE 7-05 include updated provisions pertaining to non-building structures. Chapter 15 of ASCE 7-05 covers seismic design requirements for non-building structures, and includes Table 15.4-1 (Seismic Coefficients for Non-Building Structures Similar to Buildings) and Table 15.4-2 (Seismic Coefficients for Non-Building Structures Not Similar to Buildings). You may want to look at these new documents if you are not tied to the older documents by contract or building code.

*Kurt Gustafson, S.E., P.E.*
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## No W8 Columns?

**I was just looking up some preliminary column sizes in the 13th Edition of the AISC *Manual* and the W tables have been truncated at W8×31. I could have sworn there were smaller sizes, so I looked at the 2nd Edition *LRFD Manual*; it includes W8×24 and also lists W6s, W5s, and W4s. Have these shapes largely been supplanted by HSS sections and therefore deemed not worthy of book space? Why the change?**

*Question sent to AISC's Steel Solutions Center*

There is no prohibition for the use of W6, W5, and W4 columns, and one can calculate strength for them easily with the specification equations. But the committee responsible for the *Manual* left them out of the tabulated information on purpose to encourage careful consideration before using such small W-shape columns. It is very difficult to make connections to small W-shape columns work. Any economy gained by weight savings is quickly lost on connections in the majority of cases.

In the *LRFD Manual*, third edition, we left out W8s entirely for the same reason. A question similar to this one led to the reprieve on W8s this time around.

*Charlie Carter, S.E., P.E.*
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## Shear Tabs on HSS

**Equation K1-10 (2005 Spec) appears to be the only check required on the HSS wall for shear tabs on rectangular HSS shapes. Can you confirm that bending of the HSS wall does not need to be considered?**

**Also, for pipes or round HSS, what are the limit states for checking the HSS for a shear tab connection? For smaller pipes, it seems that arching will help, but as the diameter increases, and the surface becomes flatter, the shape more closely resembles a flat surface, like a rectangular HSS.**

*Question sent to AISC's Steel Solutions Center*

Please refer to the top of page 10-158 in the AISC *Manual*, thirteenth edition, which addresses all of your concerns. It states:

"As long as the HSS wall is not classified as a slender element, the local distortion caused by the single-plate connection will be insignificant in reducing the column strength of the HSS. Therefore, single-plate connections may be used with HSS when $b/t \leq 1.40\sqrt{E/F_y}$ or 35.1 for $F_y$ = 46 ksi. Single-plate shear connections may also be used with round HSS as long as they are non-slender under axial load ($D/t \leq 0.11E/F_y$ or 76.0 for $F_y$ = 42 ksi)."

*Sergio Zoruba, Ph.D., P.E.*
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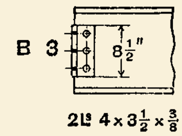
## AISC Series B-3 Connection

**I am reviewing a set of existing drawings dated 1953 to investigate proposed structural framing modifications. The drawings reference a B-3 connection. Is there a detail available of this connection?**

*Question sent to AISC's Steel Solutions Center*

The B3 designation was an AISC "label" used at the time to indicate a specific type of standardized framing angle connection. The "B" Series was for single rows of ¾-in.-diameter rivets in 13/16-in.-diameter holes in both the web and each outstanding leg of the framing angles. The "3" indicated that there were three rivets in the row. These connection types were found in the older steel manuals such as that shown in the fifth edition below:

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## Tube Slot Tolerance

**What is the recommended width tolerance of a slot in a tube structure that is to receive a plate? 1/8 in. larger? 1/16 in. larger?**

*Question sent to AISC's Steel Solutions Center*

This is a welding issue covered by AWS D1.1; rather than by the AISC *Specification*. Section 5.22 of AWS D1.1 covers tolerance of joint dimensions; with 5.22.1 covering fillet weld assemblies.

Remember, the gusset is attached to the HSS with a fillet weld. If the gap on either side exceeds 1/16 in., the leg of the fillet weld shall be increased by the amount of the root opening. The idea is to compensate for the loss of strength due to gaps larger than 1/16 in. when making fillet welds in slots.

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## Edge Distance for Base Plate Hole

**Is the minimum bolt edge distance on a steel base plate 2*d* (where *d* is the bolt diameter)? Is this typical? What about the relationship with the base plate thickness?**

*Question sent to AISC's Steel Solutions Center*

No, the minimum edge distances stipulated for bolt holes in steel-to-steel connections does not apply to holes in base plates for anchor rods. For further discussion on the subject please refer to FAQ 7.1.7 at www.aisc.org/faq.

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Steel Interchange is a 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 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:

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