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!

New ASD/LRFD Combined AISC Code

How will the new combined code handle the different loadings requirements for the two design methods? Surely the loading requirements for the LRFD method will not change.

Question sent to AISC's Steel Solutions Center

The load derivations will not change for either the LRFD or ASD method. As is the present procedure, loads to be used on a project are stipulated in the applicable building code, which usually uses those in ASCE 7. In the absence of an applicable building code, the AISC *Specification* is based on the load combinations in ASCE 7. The corresponding design capacity side of the equation is covered by the AISC *Specification*.

The new "unified specification" will be based on member capacity determined with the same equations whether the LRFD or ASD load combinations are selected. The limiting member strength is multiplied by ϕ in LRFD or divided by Ω in ASD to arrive at the design member capacity. The ϕ and Ω factors are stipulated in the AISC *Specification* for the various limit states under consideration.

When you begin to use the new *Specification*, you will be able to work in the system with which you feel more comfortable. However, I believe that when you see the two methods presented side by side in the AISC *Manual* and its companion design examples, you will see how similar the approaches are in principle.

Kurt Gustafson, S.E., P.E.
American Institute of Steel Construction

Welder Qualifications

We are involved in the design of a roof framing system comprised of a two-way grid of trusses. The trusses have round HSS web members and round HSS bottom chords. There are other portions of the project that involve standard wide flange framing. In our specifications, is it sufficient to require that welders be certified per AWS D1.1? Is there any additional certification required for tubular members? We have a lot of critical welds connecting round HSS to other round HSS as a part of the roof truss framing, but I do not know if that alone requires additional certification.

Question sent to AISC's Steel Solutions Center

Since this is a roof framing system, you are correct in referencing AWS D1.1 *Structural Welding Code—Steel*, which applies to buildings. Note that bridge work is different, generally conforming to AWS D1.5. However, also note that there are different types of qualification classifications within AWS D1.1. Part C, Section 4 of AWS D1.1-2004 covers performance qualification. Tables within this section of AWS D1.1 identify requirements for tube welding.

Kurt Gustafson, S.E., P.E.
American Institute of Steel Construction

Erection Plan

We have been asked to supply an AISC erection plan on a U.S. Army Corps of Engineers project that requires a Certified Fabricator, but not a Certified Erector. Is there such a thing as an AISC Erection Plan?

Question sent to AISC's Steel Solutions Center

The AISC Certified Erector is required to prepare a "Project Specific Erection Plan." The Corps of Engineers may also require this same erection plan for the specific project that you have. These plans are often prepared by the erector's engineer, including what cranes will be used to pick up what pieces, where to start, how to plumb the building, when the bolts have to be tightened before you can add more steel to the structure, etc. Just a written plan for how you do your work. If the job is complicated, perhaps a structural engineer who understands steel erection should be employed to prepare the plan.

Bill Liddy
American Institute of Steel Construction

IMF/Pre-qualified Moment Connections

Pre-qualified moment connections in FEMA are for special and ordinary moment frames, not for intermediate moment frames. Must we use the pre-qualified FEMA special moment frame connection for an intermediate moment frame defined in AISC? Or can we use the FEMA pre-qualified moment connection of ordinary moment frame for intermediate moment frame defined in AISC?

Question sent to AISC's Steel Solutions Center

1. At the end of the year, we will be releasing a seismic manual and a prequalified connections standard, based upon a peer review of FEMA 350. For now, we suggest that you refer to FEMA 350 for prequalified moment connection information.

   Since FEMA 350 was released before the 2002 *Seismic Provisions*, it is important to realize that all mention of SMF, IMF, and OMF in FEMA 350 pertains specifically to those seismic load resisting systems found in the 1997 *Seismic Provisions*. The 1997 IMF (FEMA IMF) was eliminated in the 2002 *Seismic Provisions*. The 1997 OMF (FEMA OMF) was then split as follows. The tested configuration became the 2002 IMF and the prescriptive detail became the 2002 OMF. Thus, the FEMA 350 OMF details are useful in 2002 IMF design.

   If you are designing a 1997 IMF, you will need to select a SMF prequalified connection from FEMA 350, as there are no formal IMF prequalified connections in FEMA 350. It likely would be more expensive to qualify (i.e. test) a connection to determine if it will satisfy the IMF inelastic interstory drift requirements than to simply use a FEMA 350 SMF prequalified moment connection that has already been tested.

2. One cannot use a FEMA OMF prequalified connection for the 1997 IMF. This is because IMFs are required to undergo an inelastic inter-story drift angle that is larger than that required for OMF. One can use FEMA 350 SMF prequalified connections for 1997 IMF. Note that only the welded un-reinforced flange, bolted web (WUF-B) moment connection does not have a corresponding detail qualified for use in SMF.

As noted in part one of this answer, the WUF-B can be used with the 2002 IMF. In fact, it is easier to remember than any FEMA 350 prequalified moment connection can be used with the 2002 IMF.

Sergio Zoruba, Ph.D.
American Institute of Steel Construction

Welded Moment Connections

I am looking for the bevel angle, size, and length of weld, etc. for a moment connection.

Question sent to AISC's Steel Solutions Center

The type of weld and weld lengths required are part of the design process for the structure. This determination should be made based on the specific conditions, loads, and details of the project. The bevel angle of a weld is a function of the type of weld and weld process used. Pre-qualified welded joint details are shown in the Table 8-3 of the AISC *LRFD Manual of Steel Construction*, 3rd edition. This *Manual* is available for purchase from the AISC bookstore at the following link, www.aisc.org/lrfd.html.

Kurt Gustafson, S.E., P.E.
American Institute of Steel Construction

Continuous Versus Intermittent Weld

Can you guide me as to how to decide or choose between using continuous or intermittent fillet welds?

1. **For a crane girder beam (I beam with channel on top) whether intermittent welding can be permitted.**
2. **For built up columns and beams whether intermittent welding can be considered and if so under what situations.**

Question sent to AISC's Steel Solutions Center

The decision as to when to use continuous versus intermittent fillet welds is largely dependent on the specific application, including the stress transfer requirements and the type of connection being made. Intermittent fillet welds are permitted to transfer calculated stress across joint or faying surfaces when the strength required is less than that developed by a continuous fillet weld of the smallest permitted size, and to join components of built-up members. For your first example of a built-up crane girder, you may want to consider the loading conditions involved, as intermittent fillet welds are typically avoided for crane girders because of the poor performance under fatigue situations.

Kurt Gustafson, S.E., P.E.
American Institute of Steel Construction

Bolted End Plate Moment Connections

Page 4-116 of the 9th edition *ASD Manual* indicates that an end plate moment connection can only be used for static loading. However, I have just purchased *Design Guide 16*, and I cannot find anything that would indicate that this connection must only be used for a static loading condition. Can this connection be utilized for seismic and wind moments?

Question sent to AISC's Steel Solutions Center

For high-seismic applications ($R > 3$), one must use a prequalified end-plate moment connection or qualify the connection to be used. Refer to AISC *Design Guide 4*, 2nd edition, for examples of prequalified connections. They can also be used for wind.

For wind and low-seismic applications ($R = 3$), one can use these same connections, those provided in AISC *Design Guide 16*, or other similarly acceptable details.

The information in the 1st edition of *Design Guide 4* and the 9th edition *ASD Manual* is now outdated. Refer to the article "SteelWise: AISC Design Guides" in the February 2005 issue of *Modern Steel Construction* (visit www.modernsteel.com and browse back issues). To order design guides, visit www.aisc.org/bookstore. AISC members can download any available design guide free-of-charge from www.aisc.org/epubs.

Sergio Zoruba, Ph.D.
American Institute of Steel Construction

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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* via AISC's Steel Solutions Center:

Steel SolutionsCenter
Your connection to ideas + answers

One East Wacker Dr., Suite 3100
Chicago, IL 60601
tel: 866.ASK.AISC
fax: 312.670.9032
solutions@aisc.org