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steel interchange

Certification and Design-Build

We are an AISC Certified fabricator and have procedures in place to document the *owner's designated representatives for design and construction* approval of shop drawings. On a design-build project, where we have a contract to design, fabricate and erect the structure, do we have to get the owner's approval in writing of any design changes that take place throughout the design/detail process? Do we need to obtain a written waiver of approval from the owner to comply with the certification standard? Who is the designated representative?

Relative to AISC Certification, the answer to both questions is no.

The terms *owner's designated representatives* for both *design* and *construction* are defined in the AISC *Code of Standard Practice*. The contract should clearly define who is acting as the owner's designated representatives for design and construction. If you (your company or its subs) are acting as the general contractor and the engineer, then you are the owner's designated representatives for design and construction. Identifying/assigning these responsibilities would fall under section 6 of the certification standard. In order for you to take on and execute the contract the role of designated representative must be assigned internally. Once they are assigned, one approach would be to simply treat the assigned individuals as the designated representatives relative to the certification standard and the *Code of Standard Practice*.

The owner's designated representative for *construction* is usually the general contractor, the construction manager or similar authority at the job site. The person in charge of this phase of the project should review the shop drawings for erectability, economy, etc. and should approve the drawings for fabrication/construction, acting as the owner's representative relative to the construction.

The owner's designated representative for *design* is usually the structural engineer of record. The person in charge of this phase of the project should review the shop drawings for conformance with the design intent and should approve the drawings for fabrication/construction, acting as the owner's representative relative to the design.

In a design-build contract all of these approvals may be internal to your organization. Though theoretically you could waive these approvals, I personally would not see the value in doing so. The engineer of record, regardless of who employs her or him, has a responsibility (beyond the *Code of Standard Practice* or AISC Certification) to ensure the design intent has been met. As stated in the June 2000 article "Design/Build and the Structural Engineer" (**www.modernsteel.com**):

> "The architect/engineer is still the professional who puts his/her name and reputation on the line when he/she signs and seals the drawings; his/her approval must be the final word relating to the materials, design, and specifications that define the project."

It is important to realize that the certification standard addresses the fabrication and only the fabrication. AISC does not provide certification for general contractors or engineers. If I understand the arrangement properly your company (or its subs) is acting as the fabricator, the engineer (representative for design), and the general contractor (representative for construction). The relationships among these three parties are laid out in the contract and addressed in the certification standard and the *Code of Standard Practice*. Neither the certification standard nor the *Code of Standard Practice* addresses the relationships between the owner and the owner's designated representatives. Relative to your role as structural engineer you might explore the information provided by the Council of American Structural Engineers (**www.acec.org/case**). Relative to your role as general contractor you might explore the information provided by the Associated General Contractors of America (**www.agc.org**). Both organizations provide information related to contracts and liability.

Both the certification standard and the *Code of Standard Practice* are robust enough that they can accommodate design-build projects to some extent, but neither document addresses this relationship directly.

Larry S. Muir, P.E.

Locating Bolts near Welds

How close can bolt holes be to the heat-affected zone (HAZ) for welded parts?

There is no limit, as neither AWS nor the AISC *Specification* place restrictions on the proximity of holes relative to CJP groove welds. In fact, I have seen instances where holes have had to be drilled through CJP groove welds. The primary concern in those cases is damage to the drill bit from the weld metal.

Carlo Lini

Applicability of Floor Flatness and Floor Levelness to Composite Slab

Can floor flatness and floor levelness criteria be applied to composite floor slabs?

FF (floor flatness) and FL (floor levelness) numbers are a means to evaluate the finishing methods of the concrete surface for a floor slab. They provide a means to evaluate the con-

tractor's construction process, not the design of the structure. Since this is technically a concrete material requirement and not a steel one, you will find information in ACI documents, such as ACI 302.1, ACI 117 and ASTM E 1155. That said, here's my interpretation of how these requirements apply to composite slab construction:

The FF number is used to assess the local "bumpiness" of a slab and is measured in 1-ft intervals. It is used as a determination of how smooth the finished concrete surface is. This method for evaluating the concrete finish could be applied to composite slabs, and in my experience some engineers specify it while others do not.

The FL numbers are used to assess how flat, or level, the floor slab is over a 10-ft interval. Since the acceptance criteria associated with this type of measurement is not calibrated to account for any floor deflection, this method for evaluating the concrete finish is only valid for use with shored construction and the testing must be completed before the shores are removed (re-shoring does not count). Since the majority of composite slabs constructed in the U.S. today use un-shored construction methods, this testing criteria does not apply to most composite slabs.

Since both FF and FL numbers are localized concrete finishing metrics, the number of floors in the building (low-rise vs. mid-rise vs. high-rise) should not be relevant to the applicability of the procedure.

Susan Burmeister, P.E.

Tension-Only Bracing in Ordinary Braced Frames

Section 14.2 of the 2005 AISC *Seismic Provisions* contained a user note that explicitly allowed the use of tension-only bracing and excluded the members from the seismically compact requirements in Section 8.2b. The current section on bracing members, F1.5, requires that all bracing members comply with the moderately ductile requirements of D1.1. Section D1.1 does not have a category for solid bars. Further there is no mention of tension-only bracing or rod bracing in the section F1.5. However, the *Seismic Design Manual*, Example 5.2.5, presents an OCBF with tension-only angle bracing and states that rod bracing is not required to meet the limiting *l/r* ratios.

Can you please confirm whether rod bracing is still allowed in OCBF? Also, the *Seismic Provisions* do not place limits on the effective slenderness ratio of tension-only bracing members, so why are there limits shown in the example problem?

There has been no change in intent relative to the use of tension-only bracing in OCBFs.

A round bar (rod) will either meet the requirements of Table D1.1 or the requirements of Table D1.1 are not applicable to a round bar, depending on how you approach the problem. Table D1.1 is based on local buckling. Local buckling is defined in the *Specification* as "limit state of buckling of a compression element within a cross section." There are no separate elements within a solid round section, so local buckling and global buckling are one and the same. Therefore, a solid round can be considered moderately ductile and is permitted.

The AISC *Specification* and *Seismic Provisions* provide requirements. The *Manual* provides guidance. Since the limits on effective slenderness ratio do not appear in the Provisions, they are not requirements. However, providing bracing within the limits is consistent with both the *Specification* and *Seismic Provisions*.

The example repurposes the *Specification* Section E2 user note, essentially re-crafting it to say, "For members designed on the basis of compression to resist only tension, the effective slenderness ratio *KL/r* preferably should exceed 200." Adhering to this recommendation will limit the compressive force that might otherwise unintentionally be delivered to the structure. It should be noted that, as stated in the Commentary to the *Specification*, the 200 limit "was based on professional judgment and practical construction economics, ease of handling, and care required to minimize inadvertent damage during fabrication, transport and erection." I am not aware of any standard that states that a member with a slenderness ratio exceeding 200 will be incapable of delivering significant compression force, but it seems like a reasonable limit.

Excluding rod bracing from the upper limit is simply giving deference to the user note. Again, the intent of the limit is further explained in the *Specification* commentary and is based on construction considerations. It is also intended to reduced "slapping" or vibration in service. Excluding the consideration of the 0.85 factor for rod bracing is also simply guidance and is a matter of engineering judgment. For rod bracing in practice, instead of explicit consideration, I would think "okay by inspection" would suffice.

Larry S. Muir, P.E.

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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:

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