

If you've ever asked yourself "Why?" about something related to structural steel design or construction, *Modern Steel's* monthly Steel Interchange is for you! Send your questions or comments to [solutions@aisc.org](mailto:solutions@aisc.org).

## steel interchange

This month's Steel Interchange questions and answers were provided by Chad Larson, president of LeJeune Bolt Company, and are based on a recent AISC webinar that highlighted changes introduced in the 2020 version of the RCSC Specification for Structural Joints Using High-Strength Bolts. (See "Bolting Ahead" on page 44 for more on the updated specification.) Both the RCSC Specification and the AISC Specification for Structural Steel Buildings (ANSI/AISC 360) are available at [aisc.org/specifications](http://aisc.org/specifications).

### Changes

**Are the effects of changes from the 2014 to 2020 RCSC Specification captured in the latest AISC Specification?**

No, the 2016 AISC Specification adopts requirements from the 2014 RCSC Specification. Section J3.1 of the AISC Specification states: "Use of high-strength bolts shall conform to the provisions of the Specification for Structural Joints Using High-Strength Bolts, hereafter referred to as the RCSC Specification, as approved by the Research Council on Structural Connections, except as otherwise provided in this Specification." Section A2 of the AISC Specification provides a list of specifications, codes, and standards referenced in the Specification and lists the 2014 RCSC Specification.

On occasion, the AISC Specification takes exception to requirements in the RCSC Specification as noted in Section J3.1. For example, a common exception in the 2016 AISC Specification is a difference in minimum bolt pretension values shown in Tables J3.1 of the AISC Specification and Table 8.1 in the 2014 RCSC Specification. As required per Section J3.1, the values in Table J3.1 would govern (unless noted otherwise in the contract documents). The Commentary to Section J3.1 of the Specification has a complete listing of the exceptions the AISC Specification takes to the RCSC requirements.

Use of the 2020 RCSC Specification with the 2016 AISC Specification falls outside the 2016 AISC Specification scope. It would have to be done with considerable judgment from the engineer of record (EOR) and with approval from the authority having jurisdiction.

Section A1 of the AISC Specification states: "Where conditions are not covered by this Specification, designs are permitted to be based on tests or analysis, subject to the approval of the authority having jurisdiction. Alternative methods of analysis and design are permitted, provided such alternative methods or criteria are acceptable to the authority having jurisdiction."

There is some overlap between the RCSC and AISC committee rosters, allowing coordination between the two standards to occur during the development process. Currently, revisions that were made to the RCSC Specification are being considered by the various AISC technical committees as work continues on the development of the 2022 AISC standards.

### Thermal Breaks

**How does one show bolt bending is okay and isn't a concern across thermal breaks or shims?**

For the most current information, I would suggest an inquiry with the individual thermal break manufacturers and a review of any available research. The minimum stiffness of the break material would likely come into play. Commentary to Section 1.1 of the 2020 RCSC Specification has been added to provide additional guidance. It includes the following aspects of a thermal break joint for the EOR to consider:

- The stiffness and strength of the inserted layers and their influence on the intended performance of the joint
- The maximum bolt tension that the layers in the grip can withstand without losing integrity or performance
- The installation instructions to prevent overtightening of bolts
- The effects of the thickness of the added plies on the stiffness and strength of the bolting assembly and of the connection as a whole
- The resistance to exposure of the added plies, when applicable
- The type of forces that the joint is intended to transfer (e.g., shear, shear, and tension, compression, tension without fatigue)
- The long-term behavior of the inserted layers
- The electro-chemical interactions of the inserted layers with coatings on steel, if applicable

### Type 1 Fasteners with Weathering Steel Girders

**Typically, Type 3 fasteners are used with weathering steel girders. Do you have any thoughts on using Type 1 fasteners on weathering steel girders?**

Use Type 3 fasteners for the best long-term performance when using corrosion-resistant materials. Weathering steels can add significant service life to structures in corrosion resistance, and using Type 1 fasteners puts additional reliance on the coating system and maintenance. It would be advisable for the small cost premium (and perhaps required by code) to use similar weathering materials. While it does not explicitly answer your question, Section 4 of the AASHTO/NSBA Collaboration G12.1 document offers some guidance and further information on bolts, providing a broader picture of what is available and typical for bridge applications (you can download it at [aisc.org/gdocs](http://aisc.org/gdocs)). You should also consult AASHTO and state specifications as appropriate.