

# steel quiz

This month's Steel Quiz is based on the stability bracing requirements in Appendix 6 of the AISC *Specification*.

- 1 True or False: A brace member in a braced frame designed using Chapter C in the AISC *Specification* also needs to be checked for stiffness and strength per Appendix 6 of the AISC *Specification*.
- 2 The following framing system in an industrial facility (see Figure 1) has been designed using Chapter C; there is floor grating but it is assumed to not provide bracing. Does Beam A need to be designed to brace Beam B according to the requirements in Appendix Section 6.3 if an unbraced length of  $L_b$  is used to design Beam B?

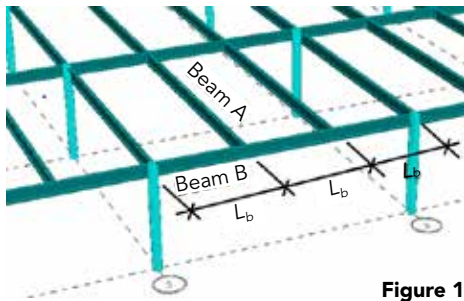


Figure 1

- 3 What is the correct unbraced length value for the beam shown in Figure 2:  $L_{b1}$  or  $L_{b2}$ ? Braces are located at the ends and at mid-span.

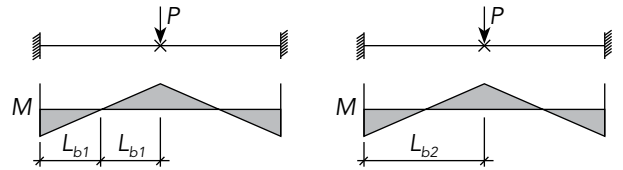


Figure 2

- 4 Could the beam-to-girder connection detail shown in Figure 3 be used to brace the girder for lateral-torsional buckling when the top flange of the girder is in compression?

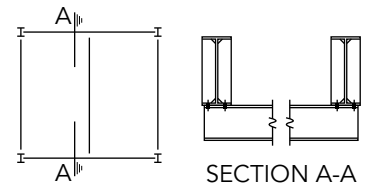


Figure 3

TURN PAGE FOR ANSWERS

- 1 False. The User Note at the beginning of Appendix 6 in the AISC *Specification* states: "The stability requirements for braced-frame systems are provided in Chapter C. The provisions in this appendix apply to bracing that is provided to stabilize individual columns, beams and beam-columns." Section C3 of the AISC *Specification* also comments on this distinction. An example of when Appendix 6 is used is when a braced point is added to the design model without actually modeling the bracing member.
- 2 Yes. Since Beam B was designed with an unbraced length  $L_b$  based on Beam A bracing Beam B, Beam A needs to be sized for the appropriate strength and stiffness per Section 6.3 in the AISC *Specification*. Section 6.1 states, "Beams with intermediate braced points designed to meet the requirements in Section 6.3 are permitted to be designed based on the unbraced length,  $L_b$ , between the braced points." Give yourself bonus points if you also realized that the bracing reaction in Beam A must be delivered to a lateral load-resisting element somewhere else in the system.
- 3 The correct unbraced length is equal to  $L_{b2}$ . Section 6.3 in the AISC *Specification* states: "In members subject to double curvature bending, the inflection point shall not be considered a braced point unless bracing is provided at that location."
- 4 Yes. This brace could be designed as a torsional brace. Section 6.3.2 states: "It is permitted to attach torsional bracing at any cross-sectional location, and it need not be attached near the compression flange. Note that beam bracing (lateral, torsional or both), as stated in Section 6.3, needs to "prevent relative displacement of the top and bottom flanges (i.e., to prevent twist)." This detail, if properly designed, could prevent twist.



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Anyone is welcome to submit questions and answers for Steel Quiz. If you are interested in submitting one question or an entire quiz, contact AISC's Steel Solutions Center at 866.ASK.AISC or at [solutions@aisc.org](mailto:solutions@aisc.org).