

steel quiz

The answers to this month's steel quiz can be found in AISC's *Facts for Steel Buildings #3— Earthquakes and Seismic Design*, AISC 341 and AISC 358.

- 1 True/False: A response history analysis is also referred to as a time history analysis.
- 2 Which of the following are important aspects of seismic design?
 - a) Redundancy
 - b) Having a defined yield mechanism
 - c) Regularity
 - d) All of the above
- 3 True/False: Soil characteristics do not affect the intensity of shaking that is experienced at a building site.
- 4 Which of the following are new to AISC 341-10 *Seismic Provisions for Structural Steel Buildings*?
 - a) Chapter N *Quality Control and Quality Assurance*
 - b) Provisions for the design of cantilevered column systems
 - c) Provisions for the design of the WUF-W connection
 - d) All of the above
- 5 True/False: Collectors and chords are never subject to the requirements of AISC 341.
- 6 What are the three standards that contain the basic seismic design and detailing requirements for structural steel buildings and are adopted by reference in the 2012 *International Building Code*?
- 7 True/False: Knee-braced frames are allowed to be used as an ordinary moment frame.
- 8 Which of the following are prequalified connections in AISC 358-10?
 - a) Bolted flange plate (BFP)
 - b) Reduced beam section (RBS)
 - c) Welded unreinforced flange – bolted web (WUF-B)
 - d) Answers A and B
- 9 True/False: The main benefit of the strong-column weak-beam concept is that it forces flexural yielding in beams in multiple levels of the frame.
- 10 True/False: HSS can be used for beams and columns in ordinary moment frames.

TURN PAGE FOR ANSWERS

- 1 True. A response history analysis, which is sometimes called time history analysis, is a method of calculating the response of a structure to a specific earthquake ground motion through numerical integration of the equation of motion.
 - 2 d) A number of strategies are important to the design of structures that will behave adequately in strong earthquakes. These include provision of continuity, adequate stiffness and strength, regularity, redundancy and a defined yield mechanism.
 - 3 False. In general, soft compressible soils tend to amplify shaking with long-period (0.5 seconds or higher) content and to attenuate motion with short-period content. Conversely, firm, relatively incompressible soils tend to attenuate long-period motion. The IBC and SEI/ASCE 7 adopted the concept of Site Class as a means of categorizing the tendency of a site to amplify or attenuate motion in different period ranges in a relatively simple manner.
 - 4 b) Sections E5 and E6 contain the requirements for the design of Ordinary and Special Cantilevered Column Systems, respectively. If you answered a) or c), at least you knew that these were new even if they are in other documents. Chapter N is a new section in AISC 360 and the WUF-W connection is a new prequalified moment connection in AISC 358.
 - 5 False. Collectors and chords are considered to be part of the seismic force resisting system (SFRS). When the SFRS is required to be designed and detailed in accordance with AISC 341, collectors and chords are included.
 - 6 They are:
 - ASCE/SEI 7-10 *Minimum Design Loads for Buildings and Other Structures*
 - ANSI/AISC 360-10 *Specification for Structural Steel Buildings*
 - ANSI/AISC 341-10 *Seismic Provisions for Structural Steel Buildings*
- These documents refer to other standards as well, such as AWS D1.1-10 *Structural Welding Code, Steel* and AWS D1.8-09 *Seismic Supplement to Structural Welding Code*. AISC 358, *Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications* is a non-mandatory standard that can be used to satisfy some of the design requirements for SMF and IMF contained in AISC 341.
- 7 True. The Commentary to AISC 341-10 Section E1.2 provides guidance for the use of OMF knee-braced frame systems and OMF truss systems.
 - 8 d) In addition to the BFP and RBS, AISC 358 also includes the following prequalified connections: extended end-plate; welded unreinforced flange-welded web; Kaiser bolted bracket; and ConXtech ConXL.
 - 9 True. The strong column-weak beam condition encourages distributed yielding in the frame and discourages the formation of a story mechanism. This enables the frame to dissipate the maximum amount of earthquake energy during inelastic cycling and also results in the higher overstrength and redundancy.
 - 10 True. OMF connections do not require qualification and there are no limits placed on the cross-sectional geometry of members used in OMF.



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.