

- 1 ASTM A6/A6M covers the metric series of structural shapes that is in use in the United States. Because it is a soft metric conversion, the metric series is physically identical to the inch-pound-unit shape series. The dimensions are given in millimeters, with the mass expressed in kilograms; note that the mass must be multiplied by acceleration of gravity 9.81 m/s^2 to obtain kilonewtons (KN). Please see FAQ 1.3.3 for more on this topic at www.aisc.org/faq.
- 2 Yes. The 2005 AISC *Specification* Section M2.1 and a discussion in the 13th edition AISC Manual (part 2), provide a sound basis for the use of controlled heat to straighten, curve, camber, and form structural steel. Moreover, Section 5.26.2 of the 2006 AWS D1.1 permits heat-straightening of members that are distorted by welding and stipulates rules for this procedure.
- 3 Yes, although the gap size is limited. As per the 2005 AISC *Specification* section M4.4, "Lack of contact bearing not exceeding a gap of $\frac{1}{16}$ in. regardless of the type of splice used, is permitted." If the gap exceeds $\frac{1}{16}$ in., but is less than $\frac{1}{4}$ in., and an engineering investigation shows that the actual area in contact (within $\frac{1}{16}$ in.) is adequate to transfer the load, the gap is acceptable.
- 4 Some examples of when notch toughness may be specified by the engineer include applications with dynamic or impact loading, fatigue loading, low service temperature, and some welded joints in heavy shapes/plates and CJP groove welds in high-seismic applications. See FAQ 4.4.1 for an explanation of why toughness is required in general.
- 5 No. However identical these materials are in terms of mechanical properties, they differ in that ASTM A325 and A490 specify thread length and head size, whereas SAE J429 does not. Moreover, quality assurance and inspection requirements for ASTM A325 and A490 bolts are more stringent.
- 6 Plug and slot welds are permitted for the transfer of shear force only. As such, they are sometimes used to transmit shear in lap joints, to join components of built-up members, or to prevent buckling of lapped parts. Their design and usage is covered in Section J2.3 of the 2005 AISC *Specification*.
- 7 Yes. AISC Design Guide 19 provides detailed information on rated assemblies and many other aspects of the fire protection for steel buildings.
- 8 An intumescent coating is one that chars, foams, and expands when heated. This way it is able to provide insulation for the steel from high temperature in a fire. Please see FAQ 11.1.6 and AISC Design Guide 19 for more details on this.
- 9 The rapid expansion of hot gases resulting from the detonation of an explosive charge gives rise to a compression wave called a shock wave, which propagates through the air. The time required for compression of the undisturbed air just ahead of the wave to full pressure just behind the wave is essentially zero. See FAQ 12.1.2 for more on peak pressures and its phases.
- 10 Progressive collapse is the propagation, by chain-reaction, of a local structural failure into the failure of a substantial portion of the building, disproportionate in magnitude to the original failure.

LOOKING FOR A CHALLENGE?

Modern Steel Construction's monthly Steel Quiz tests your knowledge of steel design and construction. Most answers can be found in the 2005 *Specification for Structural Steel Buildings*, available as a free download from AISC's web site, www.aisc.org/2005spec. Where appropriate, other industry standards are also referenced.

This month's Steel Quiz was developed by AISC's Steel Solutions Center. Sharpen your pencils and go!

- 1 When a project is subject to a metric design requirement, what shapes are available?
- 2 Is it permissible to use controlled heat to straighten, curve, or camber structural steel shapes?
- 3 When forces are to be transferred by contact bearing, is a gap allowed between the contact surfaces?
- 4 When should notch toughness properties be specified by the engineer?
- 5 Is it acceptable to substitute SAE J429 grades 5 and 8 bolts for ASTM A325 and A490 bolts, respectively?
- 6 When are plug and slot welds used?
- 7 Does AISC provide information on rated assemblies for fire protection?
- 8 How do intumescent painting systems work?
- 9 In blast design, what is a shock wave?
- 10 What is progressive collapse?

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.



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