steelwise
14 SECRETS OF THE 14TH EDITION

An inside look at some of the more useful, yet less well-known, resources in the new AISC 14th Edition Steel Construction Manual.

THE AISC STEEL CONSTRUCTION MANUAL has provided design aids, convenient design tables, and other useful tools for the designer since 1928. With close to 2,000 pages of detailed information in the latest edition, one could (and most do) spend a lifetime mastering the intricacies of its contents. In this article we’ll help unlock for you a few of the Manual’s “hidden secrets.” Some of these items are new, and some existed previously, but we hope this article will give you new insights into a few features of this powerful handbook.

1. The Secret of Form

Over time, new shapes are incorporated into the relevant ASTM standards, like ASTM A6 and A500. Thereafter, these changes are reflected in the AISC Manual. Changes to the new shapes list in the 14th Edition include:

➤ HP 18 and HP 16 shapes have been added, to respond to needs for deeper and stronger foundation systems.

➤ A stair stringer channel section, the MC12x14.3, has been added; it provides a wider flange (enough to receive a handrail pipe size and still make the fillet weld) and a thicker web.

2. The Secret of Size

Plates and bars, as discussed on page 1-8, should be specified in the preferred increments to facilitate the ordering process. For structural plate used in connections, the preferred practice is to specify thickness in 1/16-in. increments, and thickness and diameter in 1/8-in. increments. For bars, the preferred practice is to specify width in 1/4-in. increments.

3. The Second-Order Secret

Part 2 contains a section on “Simplified Determination of Required Strength,” beginning on page 2-16. This section provides a simplified alternative approach for stability analysis that can help you to apply the second-order analysis requirements of the Specification with ease. That said, application of the other methods provided in the AISC Specification is fairly straightforward as well.

For additional insight on this subject, you can turn to the Engineering Journal article “A Comparison of Frame Stability Analysis Methods in ANSI/AISC 360-05” (Third Quarter, 2008). All EJ articles are available online at www.aisc.org/ej as free downloads for AISC members, and for a nominal fee for others.

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The applicability of Tables 8-10 and 8-11 has been clarified in the 14th Edition Manual.

### 7. The Secretly Eccentric Weld Group

In Part 8, weld groups are concentrically loaded. The weld group coefficients are now based on the greater of the applicable provisions of Section J2.4 in the Specification. This new wrinkles the economy of welded joints.

### 8. Prying into Secrets

Previously introduced with the 13th Edition Manual, pry action calculations are now based on $F_r$ rather than $F_e$ to better match the performance of connections in actual tests. The 14th Edition Manual continues this practice and includes a more extensive discussion in Part 9.

### Table 8-10a (continued) Coefficients, C, for Eccentrically Loaded Weld Groups

<table>
<thead>
<tr>
<th>Angle (°)</th>
<th>LRFD</th>
<th>ASD</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.5</td>
<td>1.0</td>
<td>0.77</td>
</tr>
<tr>
<td>30</td>
<td>0.98</td>
<td>0.81</td>
</tr>
<tr>
<td>45</td>
<td>0.93</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Note: Shaded values indicate the value based on the greatest available strength permitted by AISC Specification Sections 22.4, 22.4(a), and 22.4(b).
11. Bear-ly Secret

Table 14-2 of the Manual has historically contained recommended maximum sizes for anchor-rod holes in base plates; however, you may not have noticed that this table has stealthily added compatible sizes of washers that can be used with those anchor rod and hole sizes. This is a secret no more.

12. Safety (Shouldn't be a) Secret

Part 2 of the Manual provides some general design information and covers a wide spectrum of topics related to the steel construction industry. It includes a concise summary, beginning on page 2-6, that will help you understand the basic aspects of OSHA requirements as they apply to steel construction. The full text of OSHA requirements is available in the Federal Register (see 29 CFR 1926 Subpart R at www.osha.gov).

13. Secret Similarities

It has been said that the more things change, the more they stay the same. When writing the 2010 Specification, the AISC Committee on Specifications started with the intent of minimizing the impact that Specification changes would have on the engineering profession and steel industry. Therefore, Specification provisions that form the basis of the new Manual are largely the same as they were in 2005. The 14th Edition Manual follows suit—its format is very similar to that of the 13th Edition Manual, with ASD and LRFD presented side-by-side and with sections presented in the same order. User-friendly features of the previous edition, such as footnoting in shape designations to help correlate shapes to the applicable limit states, have been carried through to this edition. For current users of the 13th Edition, these similarities should help ease the transition to the 14th Edition Manual, and should help increase the economy of designs while maintaining design-office efficiency.

14. Secret Savings

OK, this one is no secret. AISC members can get the 14th Edition Manual for $175. That’s the same price as the 13th Edition and half off the non-member price. In addition, the 14th Edition is the first Manual to be made available in a digital edition. As with the print version, AISC members pay just half the non-member price. Buy the digital edition and print edition together and save even more. Visit www.aisc.org/manuals for details and to order.

9. Secretly Bent Out of Shape

Seemingly hiding in Part 10 of the 14th Edition Manual is a table providing the minimum inside radius for cold bending of plate. Find Table 10-13 on page 10-172 in the 14th Edition Manual, and it won’t be able to hide from you ever again. Background information on this topic can be found in the article “Development of Fabrication Guidelines for Cold Bending of Plates” (Engineering Journal, First Quarter, 2006).

### Table 10-13

<table>
<thead>
<tr>
<th>ASTM Designation</th>
<th>Thickness, t, in.</th>
<th>Up to 1/2</th>
<th>Over 1/2 to 1</th>
<th>Over 1 to 2</th>
<th>Over 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A36, A572-42</td>
<td>1/8 t</td>
<td>1/8 t</td>
<td>1/8 t</td>
<td>2 t</td>
<td>2 1/2 t</td>
</tr>
<tr>
<td>A242, A297-50, A529-55, A572-50, A588, A992</td>
<td>1/8 t</td>
<td>1/8 t</td>
<td>2 t</td>
<td>3 t</td>
<td></td>
</tr>
<tr>
<td>A572-55, A582</td>
<td>1/8 t</td>
<td>1/8 t</td>
<td>2 1/2 t</td>
<td>3 t</td>
<td>3 1/2 t</td>
</tr>
<tr>
<td>A572-60, A572-65</td>
<td>1/8 t</td>
<td>1/8 t</td>
<td>2 1/2 t</td>
<td>3 t</td>
<td>3 1/2 t</td>
</tr>
<tr>
<td>A514</td>
<td>1/8 t</td>
<td>2 1/2 t</td>
<td>4 1/2 t</td>
<td>5 t</td>
<td>5 1/2 t</td>
</tr>
</tbody>
</table>

1 Values are for bend lines perpendicular to direction of final rolling. If bend lines are parallel to final rolling direction, multiply values by 1.5.
2 The grade designation follows the dash; where no grade is shown, all grades and/or classes are included.

The minimum bending radius guidelines for plates of various thickness ranges are provided in Table 10-13 of the 14th Edition Manual.

10. Secret Joy-Rides (on the Fillet)

Part 10 discusses “riding the fillet”—a secret that is nothing new to connection detailers, but is perhaps unknown to some others. Page 10-7 provides a discussion of fillet encroachment and includes an illustration of typical dimensions in Figure 10-3. And while we are on the subject of connection design, you may want to note the entering and tightening clearances required for bolted connections, found in Tables 7-15 and Table 7-16, and welding clearance discussions on page 8-15. All of these items will help you check that your connection details are consistently constructable.

#### Design Examples

Did you know that the AISC Design Examples are now available in electronic format as a free download at www.aisc.org/epubs? The scope of this free resource has expanded, with design examples illustrating the application of each major provision of the 2010 AISC Specification and the use of each table in the 14th Edition AISC Steel Construction Manual.