CISC HANDBOOK OF STEEL CONSTRUCTION

11th Edition, 3rd Revised Printing 2017

REVISIONS LIST NO. 2 - 4 OCTOBER 2017

The following revisions and updates have been incorporated into the 3rd Revised Printing of the 11th Edition of the CISC Handbook of Steel Construction. Minor editorial revisions are not shown.

The list of revisions given below is in some cases descriptive rather than comprehensive. A number of tables and pages were substantially updated due to the publication of S16-14 Update No. 1 by CSA Group in December 2016. These pages (indicated in **bold type** in the leftmost column below) will be reproduced in full in a publication entitled *Handbook Updates with Revised Tables – 2017*.

Page	Revisions
1-i	*Replace the first paragraph with the following:* This Standard is reprinted with the permission of CSA Group and contains all errata and revisions approved at time of printing. The reprint includes CSA S16-14 "Design of Steel Structures" (June 2014), Errata – October 2015 and Update No. 1 – December 2016.
1-iii to 1-224	*CSA S16-14 "Design of Steel Structures" was significantly revised and expanded in the 3rd printing of the 11th edition Handbook due to the publication of S16-14 Update No. 1 by CSA Group in December 2016. Notably, a new Annex N on "Design and Construction of Steel Storage Racks" has been added. See page 1-iv for information on obtaining this update from CSA Group.*
2-25	*In Clause 11, replace the paragraph under the heading "Elements in Compression Due to Bending and Axial Load" with the following text:* **Elements in Compression Due to Bending and Axial Load** (a) Major-axis bending and axial compression In Figure 2-9, the requirements for webs in compression ranging from compression due to pure bending to that due to pure compression are plotted. Because all of the web is in compression for columns and only one-half for beams, the depth-to-thickness limits vary as a function of the amount of axial load. The results presented here reflect the research results of Dawe and Kulak (1986). (b) I-sections in minor-axis bending and axial compression Since the applied stresses in Class 3 I-sections remain linear-elastic, the web experiences little compressive stress due to bending. Hence, the h/w limits for Class 3 sections in combined major-axis bending and axial compression also apply to Class 3 sections in combined minor-axis bending and axial compression. For Class 1 and Class 2 I-sections, h/w limits that are more stringent than those for major-axis bending and axial compression have been adopted in recognition of the full web in uniform compression.

(c) I-sections in biaxial bending and axial compression

When minor-axis bending stresses dominate in Class 1 and Class 2 I-sections in biaxial bending and axial compression, more stringent h/w limits than those for major-axis bending and axial compression also apply.

2-31 *In Clause 13.2, replace the paragraph starting with "Clause 13.2(b) applies to pin connections ..." with the following:*

Clause 13.2(b) applies to pin connections, except that more specific requirements apply to eyebars. The equation in (i) provides the gross-section yielding resistance; the equation in (ii) gives the net-section fracture resistance, and the equation in (iii) covers shear rupture or end tear-out.

2-58 *In Clause 13.13.1, first paragraph, insert the following sentence immediately before "When atmospheric corrosion-resistant steel grades ...":*

W59 permits the use of electrodes that are one designation higher than matching (i.e. over-matched), provided certain specific conditions are met and the value of X_u used in the calculation of the weld resistance does not exceed X_u of the matching electrode. When atmospheric corrosion-resistant steel grades are used in the uncoated condition, additional requirements for compatible corrosion resistance or colour are also required for matching electrodes.

In Clause 13.13.2, first paragraph, replace the last two sentences, "According to Clause 13.13.2.2 ... higher than matching is used." with the following text:

Even if over-matched electrodes (see Commentary to Clause 13.13.1) are used, the base metal check is not required for the design of fillet welds, provided the resistance is calculated using the tensile strength of the matching electrode, X_u.

2-105 *In Clause 22.3.5, replace the last paragraph with the following:*

For the use of pretensioned large-diameter A490, A490M and F2280 bolts in oversize or slotted holes, specific requirements for the use of hardened washers apply. See Clause 23.4.2(d).

2-106 *In Clause 23.4, first paragraph, delete the sentence "An alternative to the use ... Clause 22.3.5.2(d)." and insert a new paragraph immediately after:*

The use of an 8-mm hardened washer for large-diameter A490 bolts in accordance with Clause 23.4.2(d) aims to distribute the high clamping forces of these bolts. Alternatively, the hole may be covered with a 10-mm mild steel plate washer with a standard hardened washer under the head or the nut. The contract documents should specify any specific requirements.

2-116 *In Clause 27.1.6, first paragraph, add the following sentence immediately after "The requirements for bolted connections ... is avoided.":*

For joints designed as bearing-type and in which bolts are pretensioned, this friction exists if (i) Class A surfaces or better are provided, or (ii) the slip resistance equivalent to (i) is provided by increasing the number of bolts, bolt size, bolt strength, or any combination thereof.

2-118 *In Clause 27.2.1.1, third paragraph, replace the sentence "Column plastic hinging ... excessive localized damage." with the following:*

However, column plastic hinging is permitted at the top of a column stack (usually under a roof beam), as this behaviour is not expected to result in excessive localized damage.

2-156 *Replace Clause 30 with the following:*

30. INSPECTION

This clause outlines quality assurance practices with the objective of ensuring that all shop work and field erection work are in essential compliance with this Standard, in order to provide a structure that is fit for purpose with the requisite strength and stiffness.

30.5 Welding Inspection

30.5.1.1 General

CSA W59 requires the welding company (fabricator or erector) to visually inspect all welds as part of its quality control process. This internal inspection may be performed by the company's own personnel in accordance with its quality control process and may use either competent persons and/or inspection technologies built into the process. Formal welding inspector certification such as CSA W178.2 is not required for the welding company.

Non-destructive examination (NDE), other than the standard visual inspection (by the fabricator or erector) specified by CSA W59, is deemed to be a special and extra requirement and therefore must be specified in the project specifications. The type, location, extent and personnel qualifications of the NDE, as well as the party responsible (owner or other) for performing these inspections, must also be specified in the project specifications.

The CISC "Accredited Steel Inspector – Buildings" accreditation provides objective evidence that an inspector has a minimum competency in steel fabrication and erection inspection. This CISC accreditation is considered to be a complementary competency record, to be paired with CSA W178.2 (welding) if needed.

30.5.2 Competency of Inspection Personnel

This clause refers to the requirements of all third-party NDE personnel (including visual inspection) and company-employed NDE personnel other than visual.

3-47 *Replace the paragraph under the heading "Other Weld Configurations" with the following:*

For situations not covered by the tables of *Eccentric Loads on Weld Groups*, interpolating between weld configurations in the tables which "bracket" the situation being evaluated will often be sufficient to confirm adequacy.

3-62 *In the next-to-last paragraph, 3rd sentence, delete the following text in parentheses:*

(see *Eccentric Loads on Weld Groups* and Table 3-28)

4-14 *Add the following definitions:*

$\phi S_x F_y$, $\phi Z_x F_y$ = Factored moment resistance for bending about the X-X axis, for Class 3 sections, and for Class 1 and Class 2 sections, respectively, in accordance with S16-14 Clause 13.5, kN·m. In the tables below, if either $\phi S_x F_y$ or $\phi Z_x F_y$ is not applicable, it is left blank.

$\phi S_y F_y$, $\phi Z_y F_y$ = Factored moment resistance for bending about the Y-Y axis, for Class 3 sections, and for Class 1 and Class 2 sections, respectively, in accordance with S16-14 Clause 13.5, kN·m. In the tables below, if either $\phi S_y F_y$ or $\phi Z_y F_y$ is not applicable, it is left blank.

4-15 *Replace the entire section under the heading "Bending Resistances" with the following:*

For W-shape members, tabulated bending resistances about the X-X axis cannot be used for lateral-torsional buckling when the laterally unsupported length exceeds L_u.

The section Class is based on combined uniaxial bending and axial compression. *For members subject to bi-axial bending, bending resistances should be checked for compliance with S16-14 Table 2.*

For members in combined compression and bending, when the section Class with respect to the web slenderness (*h/w* ratio) is sensitive to the magnitude of axial compression, the factored bending resistances tabulated have been calculated with these assumptions:

- W-shape members for which bending resistances about either axis are functions of C_f are identified by the symbol (^) in the lower portion of the tables. Values of C_f at which the section Class changes from 2 to 3 are underlined, and the bending axes affected by the change are indicated by superscripts (^{x}) and (^{y}). Values of C_f at which the section Class changes from 3 to 4 are shown in boldface, but no superscript is shown since both bending axes are affected simultaneously. Bending resistances, $\phi S_{xe} F_y$ and $\phi S_{ye} F_y$ are not provided.
- Class 4 sections in pure compression are identified by the symbol (‡) next to the mass in kg/m. When flange slenderness (b_{el}/t ratio) renders the section a Class 4 section in pure compression, it is also a Class 4 section in combined bending and compression. In particular, the W150x22 section is also a Class 4 in bending about the X-X axis, and the value of $\phi S_x F_y$ was taken equal to $\phi S_{xe} F_y$ and preceded by the symbol (‡).
- For rectangular HSS identified as Class 4 in axial compression, the M_{rx} values tabulated are only valid for C_f values below the C_r value shown in bold face. Otherwise, the user must calculate M_{rx} as a Class 4 section.

4-17 to 4-27 *The tables of Factored Axial Compressive Resistances for W-shape columns on these pages were revised due to CSA Update No. 1. Tabulated values of C_f at which the Class in bending of a W-shape member changes from 2 to 3, or from 3 to 4, are highlighted, and the bending axes (X and/or Y) affected by the change are indicated.*

In the lower portion of the tables, the row corresponding to M_{rx} was replaced with two rows for $\phi S_x F_y$ and $\phi Z_x F_y$. Similarly, the row corresponding to M_{ry} was replaced with two rows for $\phi S_y F_y$ and $\phi Z_y F_y$. Members for which bending resistances about either axis are functions of C_f are identified, and moment resistances corresponding to the respective classes of section are tabulated in the appropriate rows.

Since the W150x22 section is a Class 4 in axial compression due to the flange, the value of $\phi S_x F_y$ is taken equal to $\phi S_{xe} F_y$, and $\phi S_y F_y$ is taken equal to $\phi S_{ye} F_y$.

See the revisions above (pages 4-14 and 4-15) for further information. The tables on these pages will be reproduced in full in a publication entitled "Handbook Updates with Revised Tables – 2017".

4-102 *Table 4-6, "Width-to-Thickness Ratios – Elements in Flexural Compression" was updated to reflect changes to S16-14 Table 2 in CSA Update No. 1. Two rows were added in Table 4-6 for the following cases:*

- *Web of I-section subjected to compression due to combined member axial compression and bending about the minor axis*

- *Web of I-section subjected to compression due to combined member axial compression and bending about both principal axes*

This table will be reproduced in full in a publication entitled "Handbook Updates with Revised Tables – 2017".

4-154 *Near the bottom of the page, replace the equation:*

$$t_p = \sqrt{\frac{2 \times 1\,550 \times 10^3 \times 93.3^3}{380 \times 380 \times 0.9 \times 300}} = 26.3 \text{ mm}$$

with the following:

$$t_p = \sqrt{\frac{2 \times 1\,550 \times 10^3 \times 93.3^2}{380 \times 380 \times 0.9 \times 300}} = 26.3 \text{ mm}$$

5-76 *In the second paragraph, replace the text:*

Tables 5-5, 5-6 and 5-7 provide values ...

with the following:

Tables 5-5 and 5-6 provide values ...

5-131 *Under the heading "6. Simple Beam — Uniform Loads Partially Distributed at Each End", replace the equation:*

V_x (when $x > (a + b)$) .... = $R_2 - w_2 (l - x)$

with the following:

V_x (when $x > (a + b)$) .... = $w_2 (l - x) - R_2$

8-1 to 8-14 *The number of pages in CSA S16-14 has increased substantially following the publication of Update No. 1 by CSA Group, resulting in a different page numbering in Part 1. The General Index in Part 8 will be reproduced in full in a publication entitled "Handbook Updates with Revised Tables – 2017".*