

ICC-ES Evaluation Report

ESR-1538

Reissued September 2023

Revised June 2024

Subject to renewal September 2025

This report also contains:

- CBC Supplement

- FBC Supplement


- SBC Supplement

See [ESR-1538-AU](#) for Australian Codes

See [ESR-1538-NZ](#) for New Zealand Codes

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|--|--|---|---|
| <p>DIVISION: 05 00 00 - METALS</p> <p>Section: 05 40 00—Cold-Formed Metal Framing</p> <p>Section: 05 41 00—Structural Metal Stud Framing</p> <p>Section: 05 42 00—Cold-Formed Metal Joist Framing</p> <p>DIVISION: 09 00 00 - FINISHES</p> <p>Section: 09 22 16.13—Non-Structural Metal Stud Framing</p> | <p>REPORT HOLDER:</p> <p>SCOTTSDALE CONSTRUCTION SYSTEMS</p> <p>DVELE OMEGA CORPORATION</p> | <p>EVALUATION SUBJECT:</p> <p>COLD-FORMED STEEL FRAMING MEMBERS</p> |  |
|--|--|---|---|

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015 and 2012 [International Building Code® \(IBC\)](#)
- 2021, 2018, 2015 and 2012 [International Residential Code \(IRC\)](#)
- 2013 *Abu Dhabi International Building Code (ADIBC)* †

†The ADIBC is based on the 2009 IBC as referenced under the ADIBC.

Property evaluated:

- Structural

2.0 USES

The Cold-Formed Steel Framing Members are used for framing of nonload-bearing interior walls and curtain walls, and load-bearing walls, floors, and roofs.

3.0 DESCRIPTION

3.1 General:

Member designations are provided in [Table 2](#). Gross, torsional and effective properties are provided in [Tables 3](#) and [4](#). See [Figure 1](#). Punch-outs are noncircular holes with a diameter of 1.125 inches by 4 inches

(28.6 mm by 102 mm) spaced 24 inches (610 mm) on center. The punch-outs are a minimum of 10 inches (254 mm) clear from the ends of the studs.

3.2 Material:

The framing members are cold-rolled from steel coils complying with the specification listed in [Table 1](#).

4.0 DESIGN AND INSTALLATION

4.1 Design:

The values in [Tables 5](#) and [6](#) have been determined in accordance with the North American Specification for Design of Cold-formed Steel Structural Members (AISI S100) based on lateral force resistance design (LRFD) method.

4.2 Installation:

The framing members must be installed in accordance with the applicable code, the approved plans and this report. If there is a conflict between the plans submitted for approval and this report, this report governs. The approved plans must be available at the jobsite at all times during the installation.

5.0 CONDITIONS OF USE:

The Cold-Formed Steel Framing members described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The cold-formed steel framing members must be installed in accordance with the applicable code, the approved plans and this report.
- 5.2 Minimum uncoated base-metal thickness of the framing members as delivered to the jobsite must be at least 95 percent of the design base-metal thickness.
- 5.3 Complete plans and calculations verifying compliance with this report must be submitted to the code official for each project at the time of permit application. The calculations and drawings must be prepared and sealed by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.4 The framing members are manufactured under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the [ICC-ES Acceptance Criteria for Cold-formed Steel Framing Members \(AC46\)](#), dated October 2019 (editorially revised December 2020).

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-1538) along with the name, registered trademark, or registered logo of the report holder or listee must be included in the product label.
- 7.2 In addition, each member must have a legible label, stamp or embossment, at a maximum of 96 inches (2440 mm) on center; member designation; minimum base-metal thickness (uncoated) in decimal thickness or mils; in addition to the following:
 - All members with a G40 coating and members complying with the non-loading bearing specifications in [Table 1](#) must also have the designation “NS”.
 - Load-bearing members must also have the minimum yield strength, and the protective coating designation (minimum G60).
- 7.3 The report holder’s contact information is the following:

SCOTTSDALE CONSTRUCTION SYSTEMS
POST OFFICE BOX 520981
SALT LAKE CITY, UTAH 84152, USA
1 (888) 406-2080

UNIT 4/5 HENRY STREET
LOGANHOLME, QUEENSLAND 4129
AUSTRALIA

17 CADBURY ROAD, ONEKAWA
 NAPIER 4110,
 NEW ZEALAND
 +64 21 512895

www.scottsdalesteelframes.com
sales@scottsdalesteelframes.com

7.4 The additional listees contact information are the following:

DVELE OMEGA CORPORATION
 5580 LA JOLLA BOULEVARD SUITE 7
 LA JOLLA, CA 92037 (909) 796-2561
www.dvele.com
info@dvele.com

DEFINITIONS OF SYMBOLS

Gross Properties

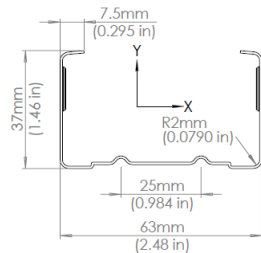
- I_x - moment of inertia of the cross section about the x-axis
- S_x - section modulus about the x-axis
- R_x - radius of gyration of cross section about the x-axis
- I_y - moment of inertia of the cross section about the y-axis
- R_y - radius of gyration of cross section about the y-axis

Effective Properties

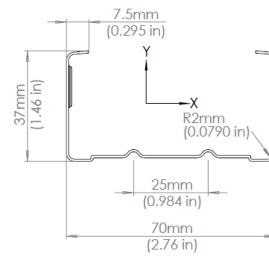
- A_e - Effective area for compression based on local buckling at stress = F_y
- I_{xe} - moment of inertia of the cross section about the x-axis
- S_{xe} - section modulus about the x-axis
- ϕM_{nxo} - Flexural strength (factored resistance) about the X-X axis
- M_{ad} - Flexural strength (factored resistance) for distortional buckling about the X-X axis
- ϕV_{nv} - Shear strength (factored resistance) with no web hole
- ϕV_{nvNet} - Shear strength (factored resistance) with web hole

Torsional and Other Properties

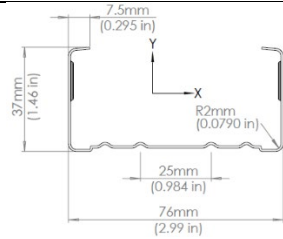
- J - St. Venant torsion constant.
- C_w - Warping constant
- X_o - Distance from shear center to neutral axis in the x-direction
- m - Distance from shear center to mid-plane of web
- R_o - Polar radius of gyration of cross section about the shear center
- β - Torsional flexural constant. $1-(X_o/R_o)^2$
- K_ϕ - Rotational stiffness.



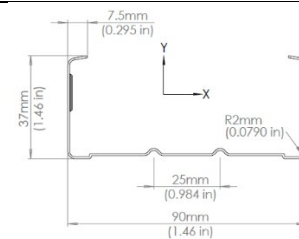
63C37



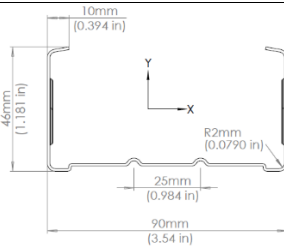
70C37



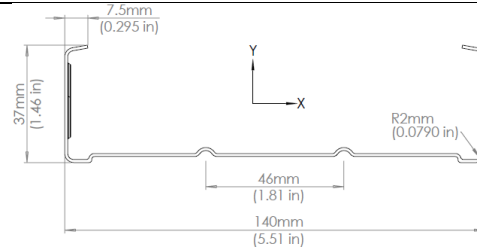
76C37



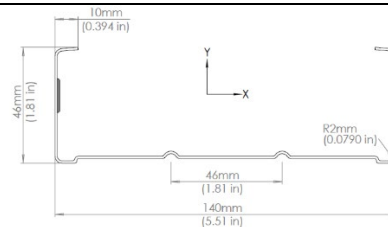
90C37



90C46



140C37



140C46

FIGURE 1 – COLD FORMED STEEL FRAMING MEMBER SECTIONS

TABLE 1—STEEL SPECIFICATIONS^{1,2}

| Specification | Grades of Steel for: | | |
|---------------|----------------------------|---|-------------------------------|
| | F _y = 33 ksi | F _y = 50 ksi | F _y = 70 ksi |
| ASTM A653 | SS Grade 33 | SS Grade 50 Class 1, 2 or 4 HSLAS Grade 50 | SS Grade 70 HSLAS Grade 70 |
| ASTM A1003 | ST33H NS33 ¹ | ST50H NS50 ¹ | NS70 ¹ |
| ASTM A1039 | --- | SS Grade 50 | --- |
| ASTM A1063 | SS Grade 33 | SS Grade 50 HSLAS Grade 50 Class 1 or 2 | --- |

¹The steel has either a minimum metallic coating designation of G40 or G60 coating.

²The NS grades of steels and G40 coatings are limited to nonstructural applications as defined by AISI S220.

TABLE 2—MEMBER DESIGNATION

| Member Designation | Gauge | Mils | Thickness (inches) | Web (inches) | Flange (inches) |
|--------------------|-------|------|--------------------|--------------|-----------------|
| 63C37-056 | 24 | 20 | 0.0219 | 2.48 | 1.46 |
| 63C37-072 | 22 | 27 | 0.0283 | 2.48 | 1.46 |
| 63C37-088 | 20 | 33 | 0.0346 | 2.48 | 1.46 |
| 70C37-056 | 24 | 20 | 0.0219 | 2.76 | 1.46 |
| 70C37-072 | 22 | 27 | 0.0283 | 2.76 | 1.46 |
| 70C37-088 | 20 | 33 | 0.0346 | 2.76 | 1.46 |
| 76C37-056 | 24 | 20 | 0.0219 | 2.99 | 1.46 |
| 76C37-072 | 22 | 27 | 0.0283 | 2.99 | 1.46 |
| 76C37-088 | 20 | 33 | 0.0346 | 2.99 | 1.46 |
| 90C37-072 | 22 | 27 | 0.0283 | 3.54 | 1.46 |
| 90C37-088 | 20 | 33 | 0.0346 | 3.54 | 1.46 |
| 90C37-114 | 18 | 43 | 0.0451 | 3.54 | 1.46 |
| 90C46-072 | 22 | 27 | 0.0283 | 3.54 | 1.81 |
| 90C46-088 | 20 | 33 | 0.0346 | 3.54 | 1.81 |
| 90C46-114 | 18 | 43 | 0.0451 | 3.54 | 1.81 |
| 140C37-072 | 22 | 27 | 0.0283 | 5.51 | 1.46 |
| 140C37-088 | 20 | 33 | 0.0346 | 5.51 | 1.46 |
| 140C37-114 | 18 | 43 | 0.0451 | 5.51 | 1.46 |
| 140C46-072 | 22 | 27 | 0.0283 | 5.51 | 1.81 |
| 140C46-088 | 20 | 33 | 0.0346 | 5.51 | 1.81 |
| 140C46-114 | 18 | 43 | 0.0451 | 5.51 | 1.81 |

TABLE 3—GROSS AND TORSIONAL SECTION PROPERTIES¹

| Member Designation | Design Thickness (in) | Gross Properties | | | | | | | Torsional Properties | | | | | |
|--------------------|-----------------------|-------------------------|----------------|------------------------------------|------------------------------------|---------------------|------------------------------------|---------------------|---------------------------|-----------------------------------|---------------------|--------|---------------------|--------|
| | | Area (in ²) | Weight (lb/ft) | I _{xx} (in ⁴) | S _{xx} (in ³) | R _x (in) | I _{yy} (in ⁴) | R _y (in) | Jx1000 (in ⁴) | C _w (in ⁶) | X _o (in) | m (in) | R _o (in) | β |
| 63C37-056 | 0.0219 | 0.1269 | 0.4317 | 0.1319 | 0.1063 | 1.0194 | 0.0360 | 0.5328 | 0.0203 | 0.0453 | -1.1532 | 0.6625 | 1.6288 | 0.4987 |
| 63C37-072 | 0.0283 | 0.1630 | 0.5546 | 0.1686 | 0.1359 | 1.0170 | 0.0458 | 0.5300 | 0.0436 | 0.0571 | -1.1478 | 0.6571 | 1.6225 | 0.4996 |
| 63C37-088 | 0.0346 | 0.1980 | 0.6739 | 0.2038 | 0.1644 | 1.0145 | 0.0551 | 0.5273 | 0.0792 | 0.0680 | -1.1423 | 0.6516 | 1.6162 | 0.5004 |
| 70C37-056 | 0.0219 | 0.1329 | 0.4523 | 0.1672 | 0.1213 | 1.1217 | 0.0373 | 0.5301 | 0.0212 | 0.0566 | -1.1164 | 0.6474 | 1.6689 | 0.5526 |
| 70C37-072 | 0.0283 | 0.1708 | 0.5812 | 0.2139 | 0.1552 | 1.1191 | 0.0475 | 0.5272 | 0.0456 | 0.0714 | -1.1108 | 0.6419 | 1.6626 | 0.5536 |
| 70C37-088 | 0.0346 | 0.2076 | 0.7064 | 0.2588 | 0.1878 | 1.1166 | 0.0571 | 0.5245 | 0.0830 | 0.0851 | -1.1051 | 0.6362 | 1.6563 | 0.5548 |
| 76C37-056 | 0.0219 | 0.1381 | 0.4699 | 0.2015 | 0.1347 | 1.2080 | 0.0384 | 0.5273 | 0.0221 | 0.0675 | -1.0868 | 0.6350 | 1.7083 | 0.5953 |
| 76C37-072 | 0.0283 | 0.1775 | 0.6040 | 0.2579 | 0.1724 | 1.2054 | 0.0488 | 0.5244 | 0.0474 | 0.0852 | -1.0811 | 0.6293 | 1.7020 | 0.5965 |
| 76C37-088 | 0.0346 | 0.2158 | 0.7342 | 0.3122 | 0.2087 | 1.2028 | 0.0587 | 0.5216 | 0.0862 | 0.1017 | -1.0754 | 0.6236 | 1.6957 | 0.5978 |
| 90C37-056 | 0.0219 | 0.1501 | 0.5109 | 0.2966 | 0.1674 | 1.4055 | 0.0405 | 0.5196 | 0.0240 | 0.0977 | -1.0242 | 0.6078 | 1.8150 | 0.6816 |
| 90C37-072 | 0.0283 | 0.1931 | 0.6571 | 0.3799 | 0.2145 | 1.4027 | 0.0516 | 0.5167 | 0.0516 | 0.1234 | -1.0183 | 0.6019 | 1.8088 | 0.6830 |
| 90C37-088 | 0.0346 | 0.2349 | 0.7992 | 0.4603 | 0.2598 | 1.4000 | 0.0620 | 0.5139 | 0.0939 | 0.1475 | -1.0124 | 0.5959 | 1.8025 | 0.6845 |
| 90C37-114 | 0.0451 | 0.3027 | 1.0301 | 0.5895 | 0.3327 | 1.3954 | 0.0785 | 0.5092 | 0.2048 | 0.1846 | -1.0024 | 0.5858 | 1.7920 | 0.6871 |
| 90C46-072 | 0.0283 | 0.2187 | 0.7443 | 0.4533 | 0.2559 | 1.4395 | 0.0969 | 0.6656 | 0.0585 | 0.2456 | -1.4020 | 0.8179 | 2.1168 | 0.5613 |
| 90C46-088 | 0.0346 | 0.2662 | 0.9059 | 0.5498 | 0.3103 | 1.4370 | 0.1170 | 0.6629 | 0.1064 | 0.2946 | -1.3961 | 0.8119 | 2.1103 | 0.5623 |
| 90C46-114 | 0.0451 | 0.3435 | 1.1689 | 0.7052 | 0.3981 | 1.4328 | 0.1489 | 0.6583 | 0.2324 | 0.3712 | -1.3861 | 0.8018 | 2.0994 | 0.5641 |
| 140C37-072 | 0.0283 | 0.2488 | 0.8467 | 1.0714 | 0.3888 | 2.0750 | 0.0586 | 0.4851 | 0.0665 | 0.3335 | -0.8473 | 0.5210 | 2.2933 | 0.8635 |
| 140C37-088 | 0.0346 | 0.3030 | 1.0311 | 1.3006 | 0.4719 | 2.0717 | 0.0704 | 0.4821 | 0.1211 | 0.3996 | -0.8414 | 0.5147 | 2.2875 | 0.8647 |
| 140C37-114 | 0.0451 | 0.3914 | 1.3319 | 1.6710 | 0.6063 | 2.0662 | 0.0891 | 0.4772 | 0.2648 | 0.5025 | -0.8315 | 0.5042 | 2.2778 | 0.8667 |
| 140C46-072 | 0.0283 | 0.2745 | 0.9340 | 1.2547 | 0.4553 | 2.1380 | 0.1113 | 0.6369 | 0.0734 | 0.6436 | -1.1907 | 0.7224 | 2.5288 | 0.7783 |
| 140C46-088 | 0.0346 | 0.3344 | 1.1379 | 1.5243 | 0.5531 | 2.1351 | 0.1344 | 0.6340 | 0.1337 | 0.7739 | -1.1847 | 0.7160 | 2.5227 | 0.7795 |
| 140C46-114 | 0.0451 | 0.4322 | 1.4707 | 1.9611 | 0.7116 | 2.1301 | 0.1711 | 0.6292 | 0.2924 | 0.9790 | -1.1745 | 0.7054 | 2.5125 | 0.7815 |

For SI: 1 inch = 25.4 mm; 1 k = 1000 lb = 4.448 kN.

¹Gross and torsional properties are based on the full-unreduced cross section away from the punch-outs.

TABLE 4—EFFECTIVE SECTION PROPERTIES^{1, 5}

| Member Designation | Design Thickness (in) | Fy (ksi) | Effective Properties ² | | | | | | |
|--------------------|-----------------------|----------|-----------------------------------|------------------------------|--------------------|-------------------|-------------------------------|------------------|---------------------|
| | | | Ae | I _{xe} ³ | S _{xe} | ΦM _{nxo} | ΦM _{nd} ⁴ | ΦV _{ny} | ΦV _{nyNet} |
| | | | (in ²) | (in ⁴) | (in ³) | (k-in) | (k-in) | (lb) | (lb) |
| 63C37-056 | 0.0219 | 33 | 0.068 | 0.1089 | 0.0766 | 2.275 | 2.224 | 697 | 304 |
| 63C37-056 | 0.0219 | 50 | 0.059 | 0.1002 | 0.0668 | 3.007 | 2.860 | 1056 | 304 |
| 63C37-056 | 0.0219 | 70 | 0.052 | 0.0932 | 0.0596 | 3.757 | 3.481 | 1479 | 304 |
| 63C37-072 | 0.0283 | 33 | 0.098 | 0.1467 | 0.1073 | 3.187 | 3.129 | 915 | 389 |
| 63C37-072 | 0.0283 | 50 | 0.085 | 0.1363 | 0.0947 | 4.262 | 4.053 | 1386 | 479 |
| 63C37-072 | 0.0283 | 70 | 0.075 | 0.1276 | 0.0851 | 5.360 | 4.956 | 1941 | 506 |
| 63C37-088 | 0.0346 | 33 | 0.131 | 0.1856 | 0.1408 | 4.183 | 4.066 | 1135 | 443 |
| 63C37-088 | 0.0346 | 50 | 0.114 | 0.1728 | 0.1243 | 5.591 | 5.304 | 1719 | 579 |
| 63C37-088 | 0.0346 | 70 | 0.101 | 0.1628 | 0.1124 | 7.082 | 6.514 | 2407 | 685 |
| 70C37-056 | 0.0219 | 33 | 0.069 | 0.1377 | 0.0865 | 2.570 | 2.491 | 811 | 336 |
| 70C37-056 | 0.0219 | 50 | 0.059 | 0.1264 | 0.0754 | 3.391 | 3.199 | 1228 | 336 |
| 70C37-056 | 0.0219 | 70 | 0.052 | 0.1173 | 0.0672 | 4.232 | 3.891 | 1720 | 336 |
| 70C37-072 | 0.0283 | 33 | 0.099 | 0.1860 | 0.1217 | 3.616 | 3.514 | 1062 | 483 |
| 70C37-072 | 0.0283 | 50 | 0.086 | 0.1725 | 0.1072 | 4.825 | 4.455 | 1609 | 560 |
| 70C37-072 | 0.0283 | 70 | 0.076 | 0.1613 | 0.0962 | 6.058 | 5.553 | 2252 | 560 |
| 70C37-088 | 0.0346 | 33 | 0.133 | 0.2359 | 0.1603 | 4.761 | 4.577 | 1314 | 585 |
| 70C37-088 | 0.0346 | 50 | 0.115 | 0.2193 | 0.1412 | 6.352 | 5.962 | 1991 | 721 |
| 70C37-088 | 0.0346 | 70 | 0.102 | 0.2063 | 0.1275 | 8.032 | 7.314 | 2788 | 834 |
| 76C37-056 | 0.0219 | 33 | 0.069 | 0.1652 | 0.0951 | 2.823 | 2.722 | 908 | 358 |
| 76C37-056 | 0.0219 | 50 | 0.059 | 0.1514 | 0.0827 | 3.720 | 3.492 | 1376 | 358 |
| 76C37-056 | 0.0219 | 70 | 0.052 | 0.1404 | 0.0736 | 4.639 | 4.244 | 1926 | 358 |
| 76C37-072 | 0.0283 | 33 | 0.099 | 0.2238 | 0.1342 | 3.984 | 3.848 | 1188 | 563 |
| 76C37-072 | 0.0283 | 50 | 0.086 | 0.2072 | 0.1180 | 5.308 | 4.971 | 1799 | 598 |
| 76C37-072 | 0.0283 | 70 | 0.076 | 0.1934 | 0.1057 | 6.657 | 6.069 | 2519 | 598 |
| 76C37-088 | 0.0346 | 33 | 0.135 | 0.2843 | 0.1771 | 5.259 | 5.022 | 1468 | 684 |
| 76C37-088 | 0.0346 | 50 | 0.116 | 0.2640 | 0.1557 | 7.007 | 6.532 | 2225 | 842 |
| 76C37-088 | 0.0346 | 70 | 0.103 | 0.2480 | 0.1404 | 8.847 | 8.008 | 3114 | 891 |
| 90C37-056 | 0.0219 | 70 | 0.052 | 0.2083 | 0.0927 | 5.837 | 5.074 | 2408 | 398 |
| 90C37-072 | 0.0283 | 33 | 0.101 | 0.3404 | 0.1786 | 5.306 | 4.638 | 1481 | 665 |
| 90C37-072 | 0.0283 | 50 | 0.087 | 0.3198 | 0.1609 | 7.242 | 5.977 | 2244 | 665 |
| 90C37-072 | 0.0283 | 70 | 0.077 | 0.2880 | 0.1337 | 8.421 | 7.285 | 3142 | 665 |
| 90C37-088 | 0.0346 | 33 | 0.137 | 0.4264 | 0.2287 | 6.793 | 6.078 | 1827 | 914 |
| 90C37-088 | 0.0346 | 50 | 0.117 | 0.4035 | 0.2089 | 9.400 | 7.884 | 2769 | 993 |
| 90C37-088 | 0.0346 | 70 | 0.104 | 0.3855 | 0.1939 | 12.217 | 9.648 | 3876 | 993 |
| 90C37-114 | 0.0451 | 33 | 0.204 | 0.5698 | 0.3150 | 9.354 | 8.594 | 2411 | 1177 |
| 90C37-114 | 0.0451 | 50 | 0.177 | 0.5428 | 0.2900 | 13.050 | 11.267 | 3653 | 1449 |
| 90C37-114 | 0.0451 | 70 | 0.156 | 0.5175 | 0.2682 | 16.895 | 13.877 | 5115 | 1674 |
| 90C46-072 | 0.0283 | 33 | 0.117 | 0.3991 | 0.2064 | 6.131 | 5.508 | 1481 | 665 |

| Member Designation | Design Thickness (in) | Fy (ksi) | Effective Properties ² | | | | | | |
|--------------------|-----------------------|----------|-----------------------------------|------------------------------|--------------------|-------------------|-------------------------------|------------------|---------------------|
| | | | Ae | I _{xe} ³ | S _{xe} | ϕM _{nxo} | ϕM _{nd} ⁴ | ϕV _{ny} | ϕV _{nyNet} |
| | | | (in ²) | (in ⁴) | (in ³) | (k-in) | (k-in) | (lb) | (lb) |
| 90C46-072 | 0.0283 | 50 | 0.099 | 0.3683 | 0.1802 | 8.109 | 7.096 | 2244 | 665 |
| 90C46-072 | 0.0283 | 70 | 0.087 | 0.3327 | 0.1515 | 9.544 | 8.647 | 3142 | 665 |
| 90C46-088 | 0.0346 | 33 | 0.154 | 0.4951 | 0.2597 | 7.712 | 7.211 | 1827 | 914 |
| 90C46-088 | 0.0346 | 50 | 0.133 | 0.4671 | 0.2361 | 10.624 | 9.348 | 2769 | 993 |
| 90C46-088 | 0.0346 | 70 | 0.117 | 0.4364 | 0.2108 | 13.279 | 11.435 | 3876 | 993 |
| 90C46-114 | 0.0451 | 33 | 0.228 | 0.6644 | 0.3593 | 10.672 | 10.181 | 2411 | 1177 |
| 90C46-114 | 0.0451 | 50 | 0.195 | 0.6230 | 0.3226 | 14.517 | 13.332 | 3653 | 1449 |
| 90C46-114 | 0.0451 | 70 | 0.173 | 0.5948 | 0.2994 | 18.859 | 16.409 | 5115 | 1674 |
| 140C37-072 | 0.0283 | 33 | 0.127 | 0.9534 | 0.3212 | 8.480 | 10.036 | 2530 | 1804 |
| 140C37-072 | 0.0283 | 50 | 0.109 | 0.8831 | 0.2845 | 11.378 | 11.695 | 3806 | 2707 |
| 140C37-072 | 0.0283 | 70 | 0.096 | 0.8261 | 0.2569 | 14.383 | 14.404 | 4554 | 3208 |
| 140C37-088 | 0.0346 | 33 | 0.172 | 1.2205 | 0.4259 | 11.243 | 13.041 | 3110 | 2195 |
| 140C37-088 | 0.0346 | 50 | 0.146 | 1.1341 | 0.3779 | 15.115 | 15.346 | 4712 | 3325 |
| 140C37-088 | 0.0346 | 70 | 0.129 | 1.0659 | 0.3427 | 19.190 | 19.013 | 6596 | 4655 |
| 140C37-114 | 0.0451 | 33 | 0.257 | 1.6273 | 0.5810 | 15.338 | 15.961 | 4079 | 2843 |
| 140C37-114 | 0.0451 | 50 | 0.220 | 1.5614 | 0.5436 | 21.744 | 21.728 | 6181 | 4307 |
| 140C37-114 | 0.0451 | 70 | 0.193 | 1.4776 | 0.4973 | 27.849 | 27.181 | 8653 | 6030 |
| 140C46-072 | 0.0283 | 33 | 0.147 | 1.0998 | 0.3662 | 9.669 | 10.264 | 2530 | 1804 |
| 140C46-072 | 0.0283 | 50 | 0.125 | 1.0127 | 0.3213 | 12.854 | 13.430 | 3806 | 2707 |
| 140C46-072 | 0.0283 | 70 | 0.109 | 0.9413 | 0.2875 | 16.100 | 16.521 | 4554 | 3208 |
| 140C46-088 | 0.0346 | 33 | 0.194 | 1.3922 | 0.4766 | 12.581 | 15.009 | 3110 | 2195 |
| 140C46-088 | 0.0346 | 50 | 0.165 | 1.2920 | 0.4222 | 16.887 | 17.612 | 4712 | 3325 |
| 140C46-088 | 0.0346 | 70 | 0.145 | 1.2084 | 0.3803 | 21.296 | 21.782 | 6596 | 4655 |
| 140C46-114 | 0.0451 | 33 | 0.288 | 1.8620 | 0.6528 | 17.234 | 18.596 | 4079 | 2843 |
| 140C46-114 | 0.0451 | 50 | 0.244 | 1.7637 | 0.5984 | 23.937 | 24.914 | 6181 | 4307 |
| 140C46-114 | 0.0451 | 70 | 0.215 | 1.6709 | 0.5487 | 30.726 | 31.084 | 8653 | 6030 |

For SI: 1 inch = 25.4 mm; 1 k = 1000 lb = 4.448 kN.

¹See Page 2 for definition of symbols.

²The effective properties are based on the reduced cross section at the web punch-out.

³Use I_{xe} deflection calculations.

⁴Distortional buckling moment (ϕM_{nd}) is calculated without the beneficial effect of sheathing to rotational stiffness. K_ϕ = 0.

⁵Available ASD strengths may be determined by dividing the tabulated LRFD values by 1.5.

TABLE 5—LRFD WEB CRIPPLING STRENGTHS FOR SINGLE MEMBERS– One Flange - Fastened to Support ^{1,2,3} (lbs)

| Member Designation | Design Thickness (in) | Fy (ksi) | Condition 1 (End 1 Flange) Fastened to Support | | | | | Condition 2 (Interior 1 Flange) Fastened to Support | | | | |
|--------------------|-----------------------|----------|---|-----|-----|-----|------|--|------|------|------|------|
| | | | Bearing Length (in) | | | | | Bearing Length (in) | | | | |
| | | | 1 | 1.5 | 3.5 | 4 | 6 | 1 | 1.5 | 3.5 | 4 | 6 |
| 63C37-056 | 0.0219 | 33 | 106 | 123 | 171 | 180 | - | 182 | 202 | 260 | 271 | - |
| 63C37-056 | 0.0219 | 50 | 160 | 186 | 259 | 273 | - | 276 | 307 | 394 | 411 | - |
| 63C37-056 | 0.0219 | 70 | 225 | 260 | 362 | 382 | - | 387 | 429 | 551 | 575 | - |
| 63C37-072 | 0.0283 | 33 | 174 | 201 | 277 | 292 | - | 318 | 350 | 444 | 462 | - |
| 63C37-072 | 0.0283 | 50 | 264 | 304 | 419 | 442 | - | 482 | 531 | 672 | 701 | - |
| 63C37-072 | 0.0283 | 70 | 370 | 426 | 587 | 619 | - | 674 | 743 | 941 | 981 | - |
| 63C37-088 | 0.0346 | 33 | 256 | 294 | 402 | 423 | - | 486 | 533 | 668 | 695 | - |
| 63C37-088 | 0.0346 | 50 | 388 | 445 | 609 | 641 | - | 737 | 808 | 1012 | 1053 | - |
| 63C37-088 | 0.0346 | 70 | 543 | 623 | 852 | 898 | - | 1032 | 1131 | 1417 | 1475 | - |
| 70C37-056 | 0.0219 | 33 | 104 | 121 | 168 | 178 | - | 181 | 201 | 258 | 269 | - |
| 70C37-056 | 0.0219 | 50 | 158 | 183 | 255 | 269 | - | 275 | 305 | 391 | 408 | - |
| 70C37-056 | 0.0219 | 70 | 221 | 256 | 357 | 377 | - | 384 | 426 | 547 | 571 | - |
| 70C37-072 | 0.0283 | 33 | 172 | 198 | 273 | 288 | - | 316 | 348 | 441 | 460 | - |
| 70C37-072 | 0.0283 | 50 | 261 | 300 | 414 | 437 | - | 479 | 528 | 668 | 696 | - |
| 70C37-072 | 0.0283 | 70 | 365 | 420 | 579 | 611 | - | 671 | 739 | 936 | 975 | - |
| 70C37-088 | 0.0346 | 33 | 253 | 290 | 397 | 418 | - | 484 | 530 | 665 | 692 | - |
| 70C37-088 | 0.0346 | 50 | 383 | 440 | 602 | 634 | - | 733 | 804 | 1007 | 1048 | - |
| 70C37-088 | 0.0346 | 70 | 537 | 616 | 842 | 887 | - | 1026 | 1125 | 1410 | 1467 | - |
| 76C37-056 | 0.0219 | 33 | 103 | 119 | 166 | 175 | - | 180 | 200 | 257 | 268 | - |
| 76C37-056 | 0.0219 | 50 | 156 | 181 | 252 | 266 | - | 273 | 303 | 389 | 406 | - |
| 76C37-056 | 0.0219 | 70 | 218 | 253 | 352 | 372 | - | 382 | 424 | 544 | 568 | - |
| 76C37-072 | 0.0283 | 33 | 170 | 196 | 270 | 285 | - | 315 | 347 | 439 | 458 | - |
| 76C37-072 | 0.0283 | 50 | 258 | 297 | 409 | 432 | - | 477 | 525 | 665 | 693 | - |
| 76C37-072 | 0.0283 | 70 | 361 | 416 | 573 | 605 | - | 667 | 735 | 931 | 970 | - |
| 76C37-088 | 0.0346 | 33 | 251 | 288 | 393 | 414 | - | 482 | 528 | 662 | 689 | - |
| 76C37-088 | 0.0346 | 50 | 380 | 436 | 596 | 628 | - | 730 | 800 | 1003 | 1043 | - |
| 76C37-088 | 0.0346 | 70 | 532 | 610 | 834 | 879 | - | 1022 | 1120 | 1404 | 1461 | - |
| 90C37-056 | 0.0219 | 70 | 212 | 246 | 342 | 362 | - | 378 | 419 | 538 | 561 | - |
| 90C37-072 | 0.0283 | 33 | 166 | 191 | 264 | 278 | - | 311 | 343 | 434 | 453 | - |
| 90C37-072 | 0.0283 | 50 | 252 | 290 | 400 | 422 | - | 472 | 520 | 658 | 686 | - |
| 90C37-072 | 0.0283 | 70 | 352 | 406 | 560 | 590 | - | 660 | 728 | 922 | 960 | - |
| 90C37-088 | 0.0346 | 33 | 246 | 282 | 385 | 406 | 478 | 477 | 523 | 656 | 682 | 774 |
| 90C37-088 | 0.0346 | 50 | 372 | 427 | 584 | 615 | 724 | 723 | 793 | 993 | 1034 | 1173 |
| 90C37-088 | 0.0346 | 70 | 521 | 597 | 817 | 861 | 1014 | 1012 | 1110 | 1391 | 1447 | 1642 |
| 90C37-114 | 0.0451 | 33 | 106 | 123 | 171 | 180 | 214 | 830 | 904 | 1117 | 1159 | 1307 |
| 90C37-114 | 0.0451 | 50 | 160 | 186 | 259 | 273 | 324 | 1257 | 1369 | 1692 | 1756 | 1981 |
| 90C37-114 | 0.0451 | 70 | 225 | 260 | 362 | 382 | 453 | 1760 | 1917 | 2368 | 2459 | 2773 |
| 90C46-072 | 0.0283 | 33 | 174 | 201 | 277 | 292 | - | 311 | 343 | 434 | 453 | - |
| 90C46-072 | 0.0283 | 50 | 264 | 304 | 419 | 442 | - | 472 | 520 | 658 | 686 | - |
| 90C46-072 | 0.0283 | 70 | 370 | 426 | 587 | 619 | - | 660 | 728 | 922 | 960 | - |
| 90C46-088 | 0.0346 | 33 | 256 | 294 | 402 | 423 | 498 | 477 | 523 | 656 | 682 | 774 |
| 90C46-088 | 0.0346 | 50 | 388 | 445 | 609 | 641 | 755 | 723 | 793 | 993 | 1034 | 1173 |
| 90C46-088 | 0.0346 | 70 | 543 | 623 | 852 | 898 | 1057 | 1012 | 1110 | 1391 | 1447 | 1642 |

| Member Designation | Design Thickness (in) | Fy (ksi) | Condition 1 (End 1 Flange) Fastened to Support | | | | | Condition 2 (Interior 1 Flange) Fastened to Support | | | | |
|--------------------|-----------------------|----------|---|-----|------|------|------|--|------|------|------|------|
| | | | Bearing Length (in) | | | | | Bearing Length (in) | | | | |
| | | | 1 | 1.5 | 3.5 | 4 | 6 | 1 | 1.5 | 3.5 | 4 | 6 |
| 90C46-114 | 0.0451 | 33 | 408 | 465 | 630 | 662 | 777 | 830 | 904 | 1117 | 1159 | 1307 |
| 90C46-114 | 0.0451 | 50 | 619 | 705 | 954 | 1004 | 1177 | 1257 | 1369 | 1692 | 1756 | 1981 |
| 90C46-114 | 0.0451 | 70 | 866 | 987 | 1336 | 1405 | 1648 | 1760 | 1917 | 2368 | 2459 | 2773 |
| 140C37-072 | 0.0283 | 33 | 166 | 191 | 264 | 278 | - | 301 | 332 | 421 | 438 | - |
| 140C37-072 | 0.0283 | 50 | 252 | 290 | 400 | 422 | - | 457 | 503 | 637 | 664 | - |
| 140C37-072 | 0.0283 | 70 | 352 | 406 | 560 | 590 | - | 639 | 705 | 892 | 930 | - |
| 140C37-088 | 0.0346 | 33 | 246 | 282 | 385 | 406 | 478 | 464 | 508 | 637 | 663 | 752 |
| 140C37-088 | 0.0346 | 50 | 372 | 427 | 584 | 615 | 724 | 702 | 770 | 965 | 1004 | 1140 |
| 140C37-088 | 0.0346 | 70 | 521 | 597 | 817 | 861 | 1014 | 983 | 1078 | 1351 | 1406 | 1596 |
| 140C37-114 | 0.0451 | 33 | 408 | 465 | 630 | 662 | 777 | 809 | 881 | 1089 | 1130 | 1275 |
| 140C37-114 | 0.0451 | 50 | 619 | 705 | 954 | 1004 | 1177 | 1226 | 1335 | 1650 | 1713 | 1932 |
| 140C37-114 | 0.0451 | 70 | 866 | 987 | 1336 | 1405 | 1648 | 1716 | 1869 | 2310 | 2398 | 2705 |
| 140C46-072 | 0.0283 | 33 | 154 | 178 | 245 | 258 | - | 301 | 332 | 421 | 438 | - |
| 140C46-072 | 0.0283 | 50 | 234 | 269 | 371 | 391 | - | 457 | 503 | 637 | 664 | - |
| 140C46-072 | 0.0283 | 70 | 327 | 377 | 519 | 548 | - | 639 | 705 | 892 | 930 | - |
| 140C46-088 | 0.0346 | 33 | 230 | 264 | 361 | 380 | 447 | 464 | 508 | 637 | 663 | 752 |
| 140C46-088 | 0.0346 | 50 | 348 | 399 | 546 | 576 | 678 | 702 | 770 | 965 | 1004 | 1140 |
| 140C46-088 | 0.0346 | 70 | 488 | 559 | 765 | 806 | 949 | 983 | 1078 | 1351 | 1406 | 1596 |
| 140C46-114 | 0.0451 | 33 | 386 | 440 | 595 | 626 | 734 | 809 | 881 | 1089 | 1130 | 1275 |
| 140C46-114 | 0.0451 | 50 | 585 | 667 | 902 | 949 | 1113 | 1226 | 1335 | 1650 | 1713 | 1932 |
| 140C46-114 | 0.0451 | 70 | 819 | 934 | 1263 | 1329 | 1558 | 1716 | 1869 | 2310 | 2398 | 2705 |

SI: 1 inch = 25.4 mm; 1 k = 1000 lb = 4.448 kN.

¹Tabulated values are for unpunched webs and punched webs where the clear distance between the edge of bearing is such that the web crippling reduction factor, R_c , per AISI S100 Section C3.4.2 = 1.0. For webs with punchouts closer to the edge of bearing a web crippling reduction factor must be applied per AISI S100, Section C3.4.2.

²See notes at end of [Table 6](#) for definitions of 1 and 2 flange loading.

³Design web crippling strengths for back-to-back members may be taken as twice the capacity of single members.

TABLE 6 —LRFD WEB CRIPPLING STRENGTHS FOR SINGLE MEMBERS – Two Flange - Fastened to Support ^{1,2,3} (lbs)

| Member Designation | Design Thickness (in) | Fy (ksi) | Condition 3 (End 2 Flange) Fastened to Support | | | | | Condition 4 (Interior 2 Flange) Fastened to Support | | | | |
|--------------------|-----------------------|----------|---|-----|-----|------|------|--|------|------|------|------|
| | | | Bearing Length (in) | | | | | Bearing Length (in) | | | | |
| | | | 1 | 1.5 | 3.5 | 4 | 6 | 1 | 1.5 | 3.5 | 4 | 6 |
| 63C37-056 | 0.0219 | 33 | 79 | 87 | 110 | 115 | - | 230 | 248 | 300 | 310 | - |
| 63C37-056 | 0.0219 | 50 | 120 | 132 | 167 | 174 | - | 348 | 375 | 454 | 470 | - |
| 63C37-056 | 0.0219 | 70 | 168 | 185 | 233 | 243 | - | 487 | 526 | 636 | 658 | - |
| 63C37-072 | 0.0283 | 33 | 143 | 156 | 194 | 202 | - | 399 | 428 | 511 | 528 | - |
| 63C37-072 | 0.0283 | 50 | 216 | 236 | 295 | 306 | - | 605 | 649 | 774 | 800 | - |
| 63C37-072 | 0.0283 | 70 | 303 | 331 | 412 | 429 | - | 847 | 908 | 1084 | 1120 | - |
| 63C37-088 | 0.0346 | 33 | 223 | 243 | 299 | 311 | - | 612 | 653 | 772 | 795 | - |
| 63C37-088 | 0.0346 | 50 | 338 | 368 | 454 | 471 | - | 927 | 989 | 1169 | 1205 | - |
| 63C37-088 | 0.0346 | 70 | 473 | 515 | 635 | 659 | - | 1297 | 1385 | 1637 | 1687 | - |
| 70C37-056 | 0.0219 | 33 | 75 | 82 | 104 | 108 | - | 223 | 241 | 292 | 302 | - |
| 70C37-056 | 0.0219 | 50 | 113 | 124 | 157 | 164 | - | 339 | 365 | 442 | 457 | - |
| 70C37-056 | 0.0219 | 70 | 158 | 174 | 220 | 229 | - | 474 | 511 | 619 | 640 | - |
| 70C37-072 | 0.0283 | 33 | 136 | 149 | 186 | 193 | - | 390 | 418 | 500 | 516 | - |
| 70C37-072 | 0.0283 | 50 | 207 | 226 | 282 | 293 | - | 591 | 634 | 757 | 782 | - |
| 70C37-072 | 0.0283 | 70 | 289 | 316 | 394 | 410 | - | 827 | 887 | 1060 | 1094 | - |
| 70C37-088 | 0.0346 | 33 | 215 | 234 | 288 | 299 | - | 599 | 640 | 756 | 780 | - |
| 70C37-088 | 0.0346 | 50 | 325 | 354 | 437 | 453 | - | 908 | 970 | 1146 | 1181 | - |
| 70C37-088 | 0.0346 | 70 | 456 | 496 | 611 | 634 | - | 1271 | 1357 | 1604 | 1654 | - |
| 76C37-056 | 0.0219 | 33 | 71 | 78 | 99 | 103 | - | 218 | 236 | 285 | 295 | - |
| 76C37-056 | 0.0219 | 50 | 108 | 118 | 150 | 156 | - | 331 | 357 | 432 | 447 | - |
| 76C37-056 | 0.0219 | 70 | 151 | 166 | 209 | 218 | - | 463 | 500 | 605 | 626 | - |
| 76C37-072 | 0.0283 | 33 | 131 | 143 | 179 | 186 | - | 383 | 410 | 490 | 506 | - |
| 76C37-072 | 0.0283 | 50 | 199 | 217 | 271 | 282 | - | 580 | 622 | 743 | 767 | - |
| 76C37-072 | 0.0283 | 70 | 278 | 304 | 379 | 394 | - | 812 | 871 | 1040 | 1073 | - |
| 76C37-088 | 0.0346 | 33 | 208 | 226 | 279 | 290 | - | 590 | 629 | 744 | 767 | - |
| 76C37-088 | 0.0346 | 50 | 315 | 343 | 423 | 439 | - | 893 | 954 | 1127 | 1162 | - |
| 76C37-088 | 0.0346 | 70 | 441 | 480 | 592 | 614 | - | 1251 | 1335 | 1578 | 1627 | - |
| 90C37-056 | 0.0219 | 70 | 134 | 147 | 186 | 194 | - | 440 | 474 | 574 | 594 | - |
| 90C37-072 | 0.0283 | 33 | 120 | 131 | 163 | 170 | - | 367 | 393 | 470 | 485 | - |
| 90C37-072 | 0.0283 | 50 | 182 | 199 | 248 | 257 | - | 556 | 596 | 711 | 735 | - |
| 90C37-072 | 0.0283 | 70 | 254 | 278 | 347 | 360 | - | 778 | 834 | 996 | 1028 | - |
| 90C37-088 | 0.0346 | 33 | 193 | 210 | 259 | 269 | 303 | 568 | 606 | 717 | 739 | 816 |
| 90C37-088 | 0.0346 | 50 | 293 | 318 | 393 | 407 | 459 | 861 | 919 | 1086 | 1119 | 1236 |
| 90C37-088 | 0.0346 | 70 | 410 | 446 | 550 | 570 | 642 | 1205 | 1286 | 1520 | 1567 | 1730 |
| 90C37-114 | 0.0451 | 33 | 353 | 382 | 464 | 481 | 538 | 1002 | 1064 | 1241 | 1276 | 1400 |
| 90C37-114 | 0.0451 | 50 | 535 | 579 | 703 | 728 | 815 | 1518 | 1612 | 1880 | 1934 | 2120 |
| 90C37-114 | 0.0451 | 70 | 749 | 810 | 985 | 1020 | 1141 | 2126 | 2256 | 2632 | 2707 | 2969 |
| 90C46-072 | 0.0283 | 33 | 120 | 131 | 163 | 170 | - | 367 | 393 | 470 | 485 | - |
| 90C46-072 | 0.0283 | 50 | 182 | 199 | 248 | 257 | - | 556 | 596 | 711 | 735 | - |
| 90C46-072 | 0.0283 | 70 | 254 | 278 | 347 | 360 | - | 778 | 834 | 996 | 1028 | - |
| 90C46-088 | 0.0346 | 33 | 193 | 210 | 259 | 269 | 303 | 568 | 606 | 717 | 739 | 816 |
| 90C46-088 | 0.0346 | 50 | 293 | 318 | 393 | 407 | 459 | 861 | 919 | 1086 | 1119 | 1236 |
| 90C46-088 | 0.0346 | 70 | 410 | 446 | 550 | 570 | 642 | 1205 | 1286 | 1520 | 1567 | 1730 |

| Member Designation | Design Thickness (in) | Fy (ksi) | Condition 3 (End 2 Flange) Fastened to Support | | | | | Condition 4 (Interior 2 Flange) Fastened to Support | | | | |
|--------------------|-----------------------|----------|---|-----|-----|------|------|--|------|------|------|------|
| | | | Bearing Length (in) | | | | | Bearing Length (in) | | | | |
| | | | 1 | 1.5 | 3.5 | 4 | 6 | 1 | 1.5 | 3.5 | 4 | 6 |
| 90C46-114 | 0.0451 | 33 | 353 | 382 | 464 | 481 | 538 | 1002 | 1064 | 1241 | 1276 | 1400 |
| 90C46-114 | 0.0451 | 50 | 535 | 579 | 703 | 728 | 815 | 1518 | 1612 | 1880 | 1934 | 2120 |
| 90C46-114 | 0.0451 | 70 | 749 | 810 | 985 | 1020 | 1141 | 2126 | 2256 | 2632 | 2707 | 2969 |
| 140C37-072 | 0.0283 | 33 | 86 | 94 | 117 | 122 | - | 318 | 341 | 407 | 421 | - |
| 140C37-072 | 0.0283 | 50 | 130 | 142 | 177 | 184 | - | 482 | 517 | 617 | 637 | - |
| 140C37-072 | 0.0283 | 70 | 182 | 199 | 248 | 258 | - | 675 | 724 | 864 | 892 | - |
| 140C37-088 | 0.0346 | 33 | 148 | 161 | 199 | 206 | 232 | 503 | 537 | 635 | 654 | 722 |
| 140C37-088 | 0.0346 | 50 | 225 | 244 | 301 | 313 | 352 | 762 | 814 | 962 | 992 | 1095 |
| 140C37-088 | 0.0346 | 70 | 314 | 342 | 422 | 438 | 493 | 1067 | 1139 | 1347 | 1388 | 1532 |
| 140C37-114 | 0.0451 | 33 | 288 | 312 | 379 | 392 | 439 | 907 | 963 | 1123 | 1155 | 1266 |
| 140C37-114 | 0.0451 | 50 | 437 | 472 | 574 | 595 | 665 | 1374 | 1458 | 1701 | 1750 | 1919 |
| 140C37-114 | 0.0451 | 70 | 612 | 661 | 804 | 832 | 932 | 1923 | 2042 | 2382 | 2450 | 2686 |
| 140C46-072 | 0.0283 | 33 | 86 | 94 | 117 | 122 | - | 318 | 341 | 407 | 421 | - |
| 140C46-072 | 0.0283 | 50 | 130 | 142 | 177 | 184 | - | 482 | 517 | 617 | 637 | - |
| 140C46-072 | 0.0283 | 70 | 182 | 199 | 248 | 258 | - | 675 | 724 | 864 | 892 | - |
| 140C46-088 | 0.0346 | 33 | 148 | 161 | 199 | 206 | 232 | 503 | 537 | 635 | 654 | 722 |
| 140C46-088 | 0.0346 | 50 | 225 | 244 | 301 | 313 | 352 | 762 | 814 | 962 | 992 | 1095 |
| 140C46-088 | 0.0346 | 70 | 314 | 342 | 422 | 438 | 493 | 1067 | 1139 | 1347 | 1388 | 1532 |
| 140C46-114 | 0.0451 | 33 | 288 | 312 | 379 | 392 | 439 | 907 | 963 | 1123 | 1155 | 1266 |
| 140C46-114 | 0.0451 | 50 | 437 | 472 | 574 | 595 | 665 | 1374 | 1458 | 1701 | 1750 | 1919 |
| 140C46-114 | 0.0451 | 70 | 612 | 661 | 804 | 832 | 932 | 1923 | 2042 | 2382 | 2450 | 2686 |

SI: 1 inch = 25.4 mm; 1 k = 1000 lb = 4.448 kN.

¹Tabulated values are for unpunched webs and punched webs where the clear distance between the edge of bearing is such that the web crippling reduction factor, R_c, per AISI S100 Section C3.4.2 = 1.0. For webs with punchouts closer to the edge of bearing a web crippling reduction factor must be applied per AISI S100, Section C3.4.2.

²See notes at end of Table 6 for definitions of 1 and 2 flange loading.

³Design web crippling strengths for back-to-back members may be taken as twice the capacity of single members.

Web Crippling Notes (For use with Tables 5-6):

As defined by AISI S100:

- One-flange loading or reaction is defined as the condition where the clear distance between the bearing edges of adjacent opposite concentrated loads or reactions is equal to or greater than 1.5h.
- Two-flange loading or reaction is defined as the condition where the clear distance between the bearing edges of adjacent opposite concentrated loads or reaction is less than 1.5h.
- End loading or reaction is defined as the condition where the distance from the edge of the bearing to the end of the member is equal to or less than 1.5h.
- Interior loading or reaction is defined as the condition where the distance from the edge of the bearing to the end of the member is greater than 1.5h, except as other noted in AISI S100 Chapter C.

DIVISION: 05 00 00—METALS

Section: 05 40 00—Cold-Formed Metal Framing

Section: 05 41 00—Structural Metal Stud Framing

Section: 05 42 00—Cold-Formed Metal Joist Framing

Section: 05 44 00—Cold-Formed Metal Trusses

REPORT HOLDER:

SCOTTSDALE CONSTRUCTION SYSTEMS

EVALUATION SUBJECT:

COLD-FORMED STEEL FRAMING MEMBERS

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that Cold-Formed Steel Framing Members, described in ICC-ES evaluation report ESR-1538, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2022 California Building Code (CBC)

For evaluation of applicable Chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2022 California Residential Code (CRC)

2.0 CONCLUSIONS**2.1 CBC:**

The Cold-Formed Steel Framing Members, described in Sections 2.0 through 7.0 of the evaluation report ESR-1538, comply with CBC Chapter 22, provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 16, 17 and 22, as applicable.

2.1.1 OSHPD: The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

2.1.2 DSA: The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

2.2 CRC:

The Cold-Formed Steel Framing Members, described in Sections 2.0 through 7.0 of the evaluation report ESR-1538, provided the design and installation are in accordance with the 2021 *International Residential Code*® (IRC) provisions, as applicable, noted in the evaluation report.

This supplement expires concurrently with the evaluation report, reissued September 2023 and revised June 2024.

DIVISION: 05 00 000—METALS

Section: 05 40 00—Cold-Formed Metal Framing

Section: 05 41 00—Structural Metal Stud Framing

Section: 05 42 00—Cold-Formed Metal Joist Framing

Section: 05 44 00—Cold-Formed Metal Trusses

REPORT HOLDER:

SCOTTSDALE CONSTRUCTION SYSTEMS

EVALUATION SUBJECT:

COLD-FORMED STEEL FRAMING MEMBERS

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that the Cold-Formed Steel Framing Members, described in ICC-ES evaluation report ESR-1538, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2023 *Florida Building Code—Building*
- 2023 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The Cold-Formed Steel Framing Members, described in Sections 2.0 through 7.0 of the ICC-ES evaluation report ESR-1538, comply with the *Florida Building Code—Building* and the *Florida Building Code—Residential*. The design requirements must be determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-1538 for the 2021 *International Building Code*® meet the requirements of the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable.

1. Use of the Cold-Formed Steel Framing Members has also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential* with the following limitation: Cold-formed steel framing members are limited to 20 ga and thicker unless protection of metal is provided in accordance with the *Florida Building Code—Building* Section 2222.6.

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official, when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, reissued September 2023 and revised June 2024.

DIVISION: 05 00 00—METALS

Section: 05 40 00—Cold-Formed Metal Framing

Section: 05 41 00—Structural Metal Stud Framing

Section: 05 42 00—Cold-Formed Metal Joist Framing

Section: 05 44 00—Cold-Formed Metal Trusses

DIVISION: 09 00 00—FINISHES

Section: 09 22 16.13—Non-Structural Metal Stud Framing

REPORT HOLDER:**SCOTTSDALE CONSTRUCTION SYSTEMS****EVALUATION SUBJECT:****COLD-FORMED STEEL FRAMING MEMBERS****1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to provide evidence of suitability that the Cold-Formed Steel Framing members, described in ICC-ES evaluation report ESR-1538, have also been evaluated for compliance with the code noted below.

Applicable code edition:

- 2018 *Saudi Building Code-General* – SBC 201-CR

2.0 CONCLUSIONS

The Cold-Formed Steel Framing Members, described in Sections 2.0 through 7.0 of the evaluation report ESR-1538, complies with the 2018 SBC 201-CR provisions.

3.0 CONDITIONS OF USE.

The Cold-Formed-Steel Framing Members, described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report ESR-1538.
- The design, installation, conditions of use and identification of the anchors are in accordance with the evaluation report [ESR-1538](#).
- Tables 2 through 8 of ESR-1538 are replaced with Tables 2 through 8 (SBC) of this supplement.

This supplement expires concurrently with the evaluation report, reissued September 2023 and revised June 2024.

TABLE 2 (SBC) —MEMBER DESIGNATION

| Member Designation | Thickness (mm) | Web (mm) | Flange (mm) |
|--------------------|----------------|----------|-------------|
| 63C37-056 | 0.56 | 63 | 37 |
| 63C37-072 | 0.72 | 63 | 37 |
| 63C37-088 | 0.88 | 63 | 37 |
| 70C37-056 | 0.56 | 70 | 37 |
| 70C37-072 | 0.72 | 70 | 37 |
| 70C37-088 | 0.88 | 70 | 37 |
| 76C37-056 | 0.56 | 76 | 37 |
| 76C37-072 | 0.72 | 76 | 37 |
| 76C37-088 | 0.88 | 76 | 37 |
| 90C37-072 | 0.72 | 90 | 37 |
| 90C37-088 | 0.88 | 90 | 37 |
| 90C37-114 | 1.14 | 90 | 37 |
| 90C46-072 | 0.72 | 90 | 46 |
| 90C46-088 | 0.88 | 90 | 46 |
| 90C46-114 | 1.14 | 90 | 46 |
| 140C37-072 | 0.72 | 140 | 37 |
| 140C37-088 | 0.88 | 140 | 37 |
| 140C37-114 | 1.14 | 140 | 37 |
| 140C46-072 | 0.72 | 140 | 46 |
| 140C46-088 | 0.88 | 140 | 46 |
| 140C46-114 | 1.14 | 140 | 46 |

For Imperial Units: 1 m = 39.4 in

TABLE 3 (SBC)—GROSS AND TORSIONAL SECTION PROPERTIES¹

| Member Designation | Design Thickness (mm) | Gross Properties | | | | | | | Torsional Properties | | | | | |
|--------------------|-----------------------|-------------------------|---------------|------------------------------------|------------------------------------|---------------------|------------------------------------|---------------------|----------------------|-----------------------------------|---------------------|--------|---------------------|-------|
| | | Area (mm ²) | Weight (kg/m) | I _{xx} (mm ⁴) | S _{xx} (mm ³) | R _x (mm) | I _{yy} (mm ⁴) | R _y (mm) | J (mm ⁴) | C _w (mm ⁶) | X _o (mm) | m (mm) | R _o (mm) | β |
| 63C37-056 | 0.56 | 81.9 | 0.64 | 54882 | 1742 | 25.9 | 14992 | 13.5 | 8.4 | 12158358 | -29.3 | 16.8 | 41.4 | 12.67 |
| 63C37-072 | 0.72 | 105.2 | 0.83 | 70168 | 2228 | 25.8 | 19059 | 13.5 | 18.1 | 15322151 | -29.2 | 16.7 | 41.2 | 12.69 |
| 63C37-088 | 0.88 | 127.8 | 1.00 | 84843 | 2693 | 25.8 | 22919 | 13.4 | 33.0 | 18265007 | -29.0 | 16.6 | 41.1 | 12.71 |
| 70C37-056 | 0.56 | 85.7 | 0.67 | 69600 | 1989 | 28.5 | 15544 | 13.5 | 8.8 | 15191986 | -28.4 | 16.4 | 42.4 | 14.04 |
| 70C37-072 | 0.72 | 110.2 | 0.87 | 89040 | 2544 | 28.4 | 19763 | 13.4 | 19.0 | 19160998 | -28.2 | 16.3 | 42.2 | 14.06 |
| 70C37-088 | 0.88 | 133.9 | 1.05 | 107730 | 3078 | 28.4 | 23768 | 13.3 | 34.5 | 22860152 | -28.1 | 16.2 | 42.1 | 14.09 |
| 76C37-056 | 0.56 | 89.1 | 0.70 | 83869 | 2207 | 30.7 | 15978 | 13.4 | 9.2 | 18125727 | -27.6 | 16.1 | 43.4 | 15.12 |
| 76C37-072 | 0.72 | 114.5 | 0.90 | 107344 | 2825 | 30.6 | 20317 | 13.3 | 19.7 | 22875242 | -27.5 | 16.0 | 43.2 | 15.15 |
| 76C37-088 | 0.88 | 139.2 | 1.09 | 129937 | 3419 | 30.6 | 24436 | 13.2 | 35.9 | 27308259 | -27.3 | 15.8 | 43.1 | 15.18 |
| 90C37-056 | 0.56 | 96.9 | 0.76 | 123452 | 2743 | 35.7 | 16876 | 13.2 | 10.0 | 26223585 | -26.0 | 15.4 | 46.1 | 17.31 |
| 90C37-072 | 0.72 | 124.6 | 0.98 | 158146 | 3514 | 35.6 | 21460 | 13.1 | 21.5 | 33133687 | -25.9 | 15.3 | 45.9 | 17.35 |
| 90C37-088 | 0.88 | 151.5 | 1.19 | 191603 | 4258 | 35.6 | 25814 | 13.1 | 39.1 | 39600865 | -25.7 | 15.1 | 45.8 | 17.39 |
| 90C37-114 | 1.14 | 195.3 | 1.53 | 245357 | 5452 | 35.4 | 32668 | 12.9 | 85.2 | 49578923 | -25.5 | 14.9 | 45.5 | 17.45 |
| 90C46-072 | 0.72 | 141.1 | 1.11 | 188672 | 4193 | 36.6 | 40340 | 16.9 | 24.3 | 65951368 | -35.6 | 20.8 | 53.8 | 14.26 |
| 90C46-088 | 0.88 | 171.8 | 1.35 | 228824 | 5085 | 36.5 | 48688 | 16.8 | 44.3 | 79118739 | -35.5 | 20.6 | 53.6 | 14.28 |
| 90C46-114 | 1.14 | 221.6 | 1.74 | 293536 | 6523 | 36.4 | 61961 | 16.7 | 96.7 | 99677806 | -35.2 | 20.4 | 53.3 | 14.33 |
| 140C37-072 | 0.72 | 160.5 | 1.26 | 445962 | 6371 | 52.7 | 24374 | 12.3 | 27.7 | 89564628 | -21.5 | 13.2 | 58.2 | 21.93 |
| 140C37-088 | 0.88 | 195.5 | 1.54 | 541366 | 7734 | 52.6 | 29318 | 12.2 | 50.4 | 107319635 | -21.4 | 13.1 | 58.1 | 21.96 |
| 140C37-114 | 1.14 | 252.5 | 1.98 | 695530 | 9936 | 52.5 | 37100 | 12.1 | 110.2 | 134925888 | -21.1 | 12.8 | 57.9 | 22.02 |
| 140C46-072 | 0.72 | 177.1 | 1.39 | 522240 | 7461 | 54.3 | 46347 | 16.2 | 30.5 | 172818960 | -30.2 | 18.3 | 64.2 | 19.77 |
| 140C46-088 | 0.88 | 215.7 | 1.69 | 634481 | 9064 | 54.2 | 55948 | 16.1 | 55.6 | 207827703 | -30.1 | 18.2 | 64.1 | 19.80 |
| 140C46-114 | 1.14 | 278.8 | 2.19 | 816286 | 11661 | 54.1 | 71222 | 16.0 | 121.7 | 262886169 | -29.8 | 17.9 | 63.8 | 19.85 |

For SI: 1 inch = 25.4 mm; 1 k = 1000 lb = 4.448 kN.

¹Gross and torsional properties are based on the full-unreduced cross section away from the punch-outs.

TABLE 4 (SBC)—EFFECTIVE SECTION PROPERTIES¹

| Member Designation | Design Thickness (mm) | Fy (ksi) | Effective Properties ² | | | | | | |
|--------------------|-----------------------|----------|-----------------------------------|------------------------------|--------------------|-------------------|-------------------------------|------------------|---------------------|
| | | | Ae | I _{xe} ³ | S _{xe} | φM _{nxo} | φM _{nd} ⁴ | φV _{ny} | φV _{nyNet} |
| | | | (mm ²) | (mm ⁴) | (mm ³) | (kNm) | (kNm) | (N) | (N) |
| 63C37-056 | 0.56 | 227.5 | 43.9 | 45332 | 1255 | 0.257 | 0.251 | 3101 | 1352 |
| 63C37-056 | 0.56 | 344.7 | 38.1 | 41706 | 1095 | 0.340 | 0.323 | 4699 | 1352 |
| 63C37-056 | 0.56 | 482.6 | 33.5 | 38780 | 977 | 0.425 | 0.393 | 6579 | 1352 |
| 63C37-072 | 0.72 | 227.5 | 63.2 | 61053 | 1758 | 0.360 | 0.353 | 4070 | 1730 |
| 63C37-072 | 0.72 | 344.7 | 54.8 | 56741 | 1552 | 0.482 | 0.458 | 6166 | 2130 |
| 63C37-072 | 0.72 | 482.6 | 48.4 | 53124 | 1394 | 0.606 | 0.560 | 8633 | 2249 |
| 63C37-088 | 0.88 | 227.5 | 84.5 | 77253 | 2308 | 0.473 | 0.459 | 5048 | 1971 |
| 63C37-088 | 0.88 | 344.7 | 73.5 | 71925 | 2036 | 0.632 | 0.599 | 7648 | 2576 |
| 63C37-088 | 0.88 | 482.6 | 65.2 | 67771 | 1842 | 0.800 | 0.736 | 10708 | 3048 |
| 70C37-056 | 0.56 | 227.5 | 44.5 | 57307 | 1418 | 0.290 | 0.281 | 3606 | 1495 |
| 70C37-056 | 0.56 | 344.7 | 38.1 | 52616 | 1235 | 0.383 | 0.361 | 5464 | 1495 |
| 70C37-056 | 0.56 | 482.6 | 33.5 | 48841 | 1101 | 0.478 | 0.440 | 7650 | 1495 |
| 70C37-072 | 0.72 | 227.5 | 63.9 | 77419 | 1995 | 0.408 | 0.397 | 4723 | 2148 |
| 70C37-072 | 0.72 | 344.7 | 55.5 | 71817 | 1757 | 0.545 | 0.503 | 7155 | 2490 |
| 70C37-072 | 0.72 | 482.6 | 49.0 | 67126 | 1576 | 0.684 | 0.627 | 10017 | 2490 |
| 70C37-088 | 0.88 | 227.5 | 85.8 | 98181 | 2627 | 0.538 | 0.517 | 5846 | 2604 |
| 70C37-088 | 0.88 | 344.7 | 74.2 | 91284 | 2313 | 0.718 | 0.674 | 8858 | 3205 |
| 70C37-088 | 0.88 | 482.6 | 65.8 | 85885 | 2089 | 0.907 | 0.826 | 12402 | 3710 |
| 76C37-056 | 0.56 | 227.5 | 44.5 | 68770 | 1558 | 0.319 | 0.308 | 4039 | 1594 |
| 76C37-056 | 0.56 | 344.7 | 38.1 | 63030 | 1355 | 0.420 | 0.395 | 6120 | 1594 |
| 76C37-056 | 0.56 | 482.6 | 33.5 | 58426 | 1207 | 0.524 | 0.480 | 8568 | 1594 |
| 76C37-072 | 0.72 | 227.5 | 63.9 | 93136 | 2198 | 0.450 | 0.435 | 5282 | 2506 |
| 76C37-072 | 0.72 | 344.7 | 55.5 | 86256 | 1933 | 0.600 | 0.562 | 8003 | 2658 |
| 76C37-072 | 0.72 | 482.6 | 49.0 | 80507 | 1731 | 0.752 | 0.686 | 11205 | 2658 |
| 76C37-088 | 0.88 | 227.5 | 87.1 | 118326 | 2901 | 0.594 | 0.567 | 6531 | 3042 |
| 76C37-088 | 0.88 | 344.7 | 74.8 | 109873 | 2551 | 0.792 | 0.738 | 9896 | 3744 |
| 76C37-088 | 0.88 | 482.6 | 66.5 | 103238 | 2301 | 1.000 | 0.905 | 13854 | 3963 |
| 90C37-056 | 0.56 | 482.6 | 33.5 | 86684 | 1518 | 0.659 | 0.573 | 10710 | 1772 |
| 90C37-072 | 0.72 | 227.5 | 65.2 | 141685 | 2927 | 0.599 | 0.524 | 6588 | 2957 |
| 90C37-072 | 0.72 | 344.7 | 56.1 | 133102 | 2637 | 0.818 | 0.675 | 9982 | 2957 |
| 90C37-072 | 0.72 | 482.6 | 49.7 | 119854 | 2190 | 0.951 | 0.823 | 13975 | 2957 |
| 90C37-088 | 0.88 | 227.5 | 88.4 | 177477 | 3748 | 0.768 | 0.687 | 8128 | 4064 |
| 90C37-088 | 0.88 | 344.7 | 75.5 | 167954 | 3423 | 1.062 | 0.891 | 12315 | 4415 |
| 90C37-088 | 0.88 | 482.6 | 67.1 | 160445 | 3178 | 1.380 | 1.090 | 17241 | 4417 |
| 90C37-114 | 1.14 | 227.5 | 131.6 | 237169 | 5161 | 1.057 | 0.971 | 10726 | 5236 |
| 90C37-114 | 1.14 | 344.7 | 114.2 | 225914 | 4752 | 1.474 | 1.273 | 16251 | 6445 |
| 90C37-114 | 1.14 | 482.6 | 100.6 | 215379 | 4395 | 1.909 | 1.568 | 22751 | 7446 |
| 90C46-072 | 0.72 | 227.5 | 75.5 | 166122 | 3383 | 0.693 | 0.622 | 6588 | 2957 |
| 90C46-072 | 0.72 | 344.7 | 63.9 | 153298 | 2953 | 0.916 | 0.802 | 9982 | 2957 |
| 90C46-072 | 0.72 | 482.6 | 56.1 | 138480 | 2482 | 1.078 | 0.977 | 13975 | 2958 |
| 90C46-088 | 0.88 | 227.5 | 99.4 | 206080 | 4255 | 0.871 | 0.815 | 8128 | 4064 |
| 90C46-088 | 0.88 | 344.7 | 85.8 | 194401 | 3869 | 1.200 | 1.056 | 12315 | 4417 |
| 90C46-088 | 0.88 | 482.6 | 75.5 | 181643 | 3454 | 1.500 | 1.292 | 17241 | 4417 |
| 90C46-114 | 1.14 | 227.5 | 147.1 | 276552 | 5888 | 1.206 | 1.150 | 10725 | 5236 |
| 90C46-114 | 1.14 | 344.7 | 125.8 | 259321 | 5286 | 1.640 | 1.506 | 16251 | 6445 |
| 90C46-114 | 1.14 | 482.6 | 111.6 | 247579 | 4905 | 2.131 | 1.854 | 22751 | 7446 |
| 140C37-072 | 0.72 | 227.5 | 81.9 | 396848 | 5264 | 0.958 | 1.134 | 11252 | 8024 |
| 140C37-072 | 0.72 | 344.7 | 70.3 | 367578 | 4661 | 1.286 | 1.321 | 16930 | 12041 |
| 140C37-072 | 0.72 | 482.6 | 61.9 | 343836 | 4209 | 1.625 | 1.627 | 20258 | 14270 |
| 140C37-088 | 0.88 | 227.5 | 111.0 | 508010 | 6979 | 1.270 | 1.473 | 13832 | 9762 |
| 140C37-088 | 0.88 | 344.7 | 94.2 | 472048 | 6192 | 1.708 | 1.734 | 20958 | 14790 |
| 140C37-088 | 0.88 | 482.6 | 83.2 | 443661 | 5615 | 2.168 | 2.148 | 29341 | 20706 |

| Member Designation | Design Thickness (mm) | Fy (ksi) | Effective Properties ² | | | | | | |
|--------------------|-----------------------|----------|-----------------------------------|------------------------------|--------------------|-------------------|-------------------------------|------------------|---------------------|
| | | | Ae | I _{xe} ³ | S _{xe} | φM _{nxo} | φM _{nd} ⁴ | φV _{ny} | φV _{nyNet} |
| | | | (mm ²) | (mm ⁴) | (mm ³) | (kNm) | (kNm) | (N) | (N) |
| 140C37-114 | 1.14 | 227.5 | 165.8 | 677333 | 9520 | 1.733 | 1.803 | 18144 | 12646 |
| 140C37-114 | 1.14 | 344.7 | 141.9 | 649904 | 8908 | 2.457 | 2.455 | 27494 | 19158 |
| 140C37-114 | 1.14 | 482.6 | 124.5 | 615024 | 8149 | 3.147 | 3.071 | 38491 | 26823 |
| 140C46-072 | 0.72 | 227.5 | 94.8 | 457771 | 6001 | 1.092 | 1.160 | 11252 | 8024 |
| 140C46-072 | 0.72 | 344.7 | 80.6 | 421518 | 5266 | 1.452 | 1.517 | 16930 | 12041 |
| 140C46-072 | 0.72 | 482.6 | 70.3 | 391778 | 4711 | 1.819 | 1.867 | 20258 | 14270 |
| 140C46-088 | 0.88 | 227.5 | 125.2 | 579477 | 7809 | 1.421 | 1.696 | 13832 | 9762 |
| 140C46-088 | 0.88 | 344.7 | 106.5 | 537771 | 6918 | 1.908 | 1.990 | 20958 | 14790 |
| 140C46-088 | 0.88 | 482.6 | 93.5 | 502974 | 6232 | 2.406 | 2.461 | 29341 | 20706 |
| 140C46-114 | 1.14 | 227.5 | 185.8 | 775023 | 10697 | 1.947 | 2.101 | 18144 | 12646 |
| 140C46-114 | 1.14 | 344.7 | 157.4 | 734107 | 9806 | 2.705 | 2.815 | 27494 | 19158 |
| 140C46-114 | 1.14 | 482.6 | 138.7 | 695481 | 8991 | 3.472 | 3.512 | 38491 | 26823 |

For SI: 1 inch = 25.4 mm; 1 k = 1000 lb = 4.448 kN.

¹See ESR-1538 Page 2 for definition of symbols.

²The effective properties are based on the reduced cross section at the web punch-out.

³Use I_{xe} for deflection calculations.

⁴Distortional buckling moment (φM_{nd}) is calculated without the beneficial effect of sheathing to rotational stiffness. K_φ = 0.

TABLE 5 (SBC)— LRFD WEB CRIPPLING STRENGTHS FOR SINGLE MEMBERS – One Flange - Fastened to Support ^{1,2,3} (N)

| Member Designation | Design Thickness (mm) | Fy (MPa) | Condition 1 (End 1 Flange) Fastened to Support | | | | | Condition 2 (Interior 1 Flange) Fastened to Support | | | | |
|--------------------|-----------------------|----------|--|------|------|------|-----|---|------|------|------|-----|
| | | | Bearing Length (mm) | | | | | Bearing Length (mm) | | | | |
| | | | 25 | 38 | 89 | 102 | 152 | 25 | 38 | 89 | 102 | 152 |
| 63C37-056 | 0.56 | 227.5 | 534 | 583 | 810 | 859 | - | 859 | 850 | 1090 | 1134 | - |
| 63C37-056 | 0.56 | 344.7 | 810 | 885 | 1228 | 1299 | - | 1303 | 1286 | 1650 | 1721 | - |
| 63C37-056 | 0.56 | 482.6 | 1134 | 1237 | 1721 | 1819 | - | 1824 | 1797 | 2309 | 2411 | - |
| 63C37-072 | 0.72 | 227.5 | 863 | 939 | 1294 | 1366 | - | 1490 | 1459 | 1846 | 1926 | - |
| 63C37-072 | 0.72 | 344.7 | 1312 | 1419 | 1957 | 2068 | - | 2255 | 2211 | 2798 | 2918 | - |
| 63C37-072 | 0.72 | 482.6 | 1837 | 1988 | 2745 | 2891 | - | 3158 | 3096 | 3919 | 4083 | - |
| 63C37-088 | 0.88 | 227.5 | 1254 | 1357 | 1855 | 1953 | - | 2269 | 2211 | 2771 | 2882 | - |
| 63C37-088 | 0.88 | 344.7 | 1904 | 2055 | 2811 | 2963 | - | 3434 | 3350 | 4195 | 4364 | - |
| 63C37-088 | 0.88 | 482.6 | 2664 | 2878 | 3932 | 4146 | - | 4809 | 4688 | 5872 | 6112 | - |
| 70C37-056 | 0.56 | 227.5 | 529 | 574 | 801 | 845 | - | 854 | 841 | 1081 | 1130 | - |
| 70C37-056 | 0.56 | 344.7 | 801 | 872 | 1214 | 1281 | - | 1294 | 1277 | 1637 | 1713 | - |
| 70C37-056 | 0.56 | 482.6 | 1121 | 1219 | 1699 | 1793 | - | 1815 | 1788 | 2295 | 2393 | - |
| 70C37-072 | 0.72 | 227.5 | 854 | 925 | 1277 | 1348 | - | 1481 | 1450 | 1837 | 1913 | - |
| 70C37-072 | 0.72 | 344.7 | 1294 | 1406 | 1935 | 2042 | - | 2242 | 2197 | 2785 | 2900 | - |
| 70C37-072 | 0.72 | 482.6 | 1815 | 1966 | 2709 | 2860 | - | 3140 | 3078 | 3897 | 4061 | - |
| 70C37-088 | 0.88 | 227.5 | 1241 | 1343 | 1837 | 1935 | - | 2255 | 2197 | 2753 | 2865 | - |
| 70C37-088 | 0.88 | 344.7 | 1882 | 2033 | 2780 | 2931 | - | 3416 | 3332 | 4172 | 4341 | - |
| 70C37-088 | 0.88 | 482.6 | 2638 | 2847 | 3892 | 4101 | - | 4786 | 4666 | 5845 | 6081 | - |
| 76C37-056 | 0.56 | 227.5 | 520 | 605 | 792 | 836 | - | 850 | 943 | 1076 | 1125 | - |
| 76C37-056 | 0.56 | 344.7 | 792 | 916 | 1201 | 1268 | - | 1290 | 1428 | 1628 | 1704 | - |
| 76C37-056 | 0.56 | 482.6 | 1108 | 1281 | 1681 | 1775 | - | 1802 | 2002 | 2282 | 2384 | - |
| 76C37-072 | 0.72 | 227.5 | 845 | 974 | 1268 | 1334 | - | 1472 | 1624 | 1828 | 1904 | - |
| 76C37-072 | 0.72 | 344.7 | 1281 | 1477 | 1917 | 2024 | - | 2233 | 2464 | 2771 | 2887 | - |
| 76C37-072 | 0.72 | 482.6 | 1797 | 2068 | 2687 | 2834 | - | 3127 | 3447 | 3879 | 4043 | - |
| 76C37-088 | 0.88 | 227.5 | 1232 | 1415 | 1819 | 1917 | - | 2246 | 2464 | 2745 | 2856 | - |
| 76C37-088 | 0.88 | 344.7 | 1868 | 2140 | 2758 | 2905 | - | 3403 | 3732 | 4159 | 4324 | - |
| 76C37-088 | 0.88 | 482.6 | 2616 | 2998 | 3861 | 4066 | - | 4768 | 5227 | 5823 | 6054 | - |
| 90C37-056 | 0.56 | 482.6 | 1081 | 1254 | 1641 | 1735 | - | 1784 | 1979 | 2260 | 2358 | - |

| Member Designation | Design Thickness (mm) | Fy (MPa) | Condition 1 (End 1 Flange) Fastened to Support | | | | | Condition 2 (Interior 1 Flange) Fastened to Support | | | | |
|--------------------|-----------------------|----------|--|------|------|------|------|---|------|------|-------|-------|
| | | | Bearing Length (mm) | | | | | Bearing Length (mm) | | | | |
| | | | 25 | 38 | 89 | 102 | 152 | 25 | 38 | 89 | 102 | 152 |
| 90C37-072 | 0.72 | 227.5 | 832 | 956 | 1241 | 1308 | - | 1459 | 1610 | 1810 | 1890 | - |
| 90C37-072 | 0.72 | 344.7 | 1259 | 1450 | 1882 | 1984 | - | 2215 | 2438 | 2745 | 2860 | - |
| 90C37-072 | 0.72 | 482.6 | 1761 | 2028 | 2633 | 2776 | - | 3100 | 3416 | 3843 | 4008 | - |
| 90C37-088 | 0.88 | 227.5 | 1210 | 1388 | 1788 | 1886 | 2220 | 2229 | 2442 | 2722 | 2834 | 3212 |
| 90C37-088 | 0.88 | 344.7 | 1837 | 2104 | 2709 | 2856 | 3363 | 3376 | 3701 | 4124 | 4288 | 4871 |
| 90C37-088 | 0.88 | 482.6 | 2571 | 2945 | 3794 | 3999 | 4706 | 4728 | 5182 | 5774 | 6005 | 6815 |
| 90C37-114 | 1.14 | 227.5 | 1975 | 2251 | 2869 | 3016 | 3536 | 3834 | 4177 | 4586 | 4760 | 5369 |
| 90C37-114 | 1.14 | 344.7 | 2994 | 3412 | 4346 | 4573 | 5360 | 5805 | 6325 | 6948 | 7215 | 8136 |
| 90C37-114 | 1.14 | 482.6 | 4190 | 4777 | 6085 | 6401 | 7504 | 8131 | 8856 | 9728 | 10097 | 11387 |
| 90C46-072 | 0.72 | 227.5 | 832 | 956 | 1241 | 1308 | - | 1459 | 1610 | 1810 | 1890 | - |
| 90C46-072 | 0.72 | 344.7 | 1259 | 1450 | 1882 | 1984 | - | 2215 | 2438 | 2745 | 2860 | - |
| 90C46-072 | 0.72 | 482.6 | 1761 | 2028 | 2633 | 2776 | - | 3100 | 3416 | 3843 | 4008 | - |
| 90C46-088 | 0.88 | 227.5 | 1210 | 1388 | 1788 | 1886 | 2220 | 2229 | 2442 | 2722 | 2834 | 3212 |
| 90C46-088 | 0.88 | 344.7 | 1837 | 2104 | 2709 | 2856 | 3363 | 3376 | 3701 | 4124 | 4288 | 4871 |
| 90C46-088 | 0.88 | 482.6 | 2571 | 2945 | 3794 | 3999 | 4706 | 4728 | 5182 | 5774 | 6005 | 6815 |
| 90C46-114 | 1.14 | 227.5 | 1975 | 2251 | 2869 | 3016 | 3536 | 3834 | 4177 | 4586 | 4760 | 5369 |
| 90C46-114 | 1.14 | 344.7 | 2994 | 3412 | 4346 | 4573 | 5360 | 5805 | 6325 | 6948 | 7215 | 8136 |
| 90C46-114 | 1.14 | 482.6 | 4190 | 4777 | 6085 | 6401 | 7504 | 8131 | 8856 | 9728 | 10097 | 11387 |
| 140C37-072 | 0.72 | 227.5 | 801 | 925 | 1201 | 1263 | - | 1437 | 1584 | 1784 | 1859 | - |
| 140C37-072 | 0.72 | 344.7 | 1214 | 1401 | 1819 | 1917 | - | 2180 | 2402 | 2705 | 2816 | - |
| 140C37-072 | 0.72 | 482.6 | 1704 | 1962 | 2544 | 2682 | - | 3051 | 3363 | 3785 | 3941 | - |
| 140C37-088 | 0.88 | 227.5 | 1174 | 1348 | 1735 | 1828 | 2153 | 2197 | 2411 | 2682 | 2789 | 3167 |
| 140C37-088 | 0.88 | 344.7 | 1779 | 2042 | 2629 | 2771 | 3261 | 3327 | 3652 | 4066 | 4230 | 4800 |
| 140C37-088 | 0.88 | 482.6 | 2491 | 2856 | 3679 | 3879 | 4564 | 4662 | 5111 | 5689 | 5921 | 6721 |
| 140C37-114 | 1.14 | 227.5 | 1926 | 2193 | 2793 | 2940 | 3447 | 3785 | 4124 | 4528 | 4702 | 5302 |
| 140C37-114 | 1.14 | 344.7 | 2918 | 3323 | 4235 | 4453 | 5222 | 5734 | 6245 | 6864 | 7126 | 8033 |
| 140C37-114 | 1.14 | 482.6 | 4083 | 4653 | 5925 | 6236 | 7313 | 8029 | 8745 | 9608 | 9973 | 11250 |
| 140C46-072 | 0.72 | 227.5 | 801 | 925 | 1201 | 1263 | - | 1437 | 1584 | 1784 | 1859 | - |
| 140C46-072 | 0.72 | 344.7 | 1214 | 1401 | 1819 | 1917 | - | 2180 | 2402 | 2705 | 2816 | - |
| 140C46-072 | 0.72 | 482.6 | 1704 | 1962 | 2544 | 2682 | - | 3051 | 3363 | 3785 | 3941 | - |
| 140C46-088 | 0.88 | 227.5 | 1174 | 1348 | 1735 | 1828 | 2153 | 2197 | 2411 | 2682 | 2789 | 3167 |
| 140C46-088 | 0.88 | 344.7 | 1779 | 2042 | 2629 | 2771 | 3261 | 3327 | 3652 | 4066 | 4230 | 4800 |
| 140C46-088 | 0.88 | 482.6 | 2491 | 2856 | 3679 | 3879 | 4564 | 4662 | 5111 | 5689 | 5921 | 6721 |
| 140C46-114 | 1.14 | 227.5 | 1926 | 2193 | 2793 | 2940 | 3447 | 3785 | 4124 | 4528 | 4702 | 5302 |
| 140C46-114 | 1.14 | 344.7 | 2918 | 3323 | 4235 | 4453 | 5222 | 5734 | 6245 | 6864 | 7126 | 8033 |
| 140C46-114 | 1.14 | 482.6 | 4083 | 4653 | 5925 | 6236 | 7313 | 8029 | 8745 | 9608 | 9973 | 11250 |

For SI: 1 inch = 25.4 mm; 1 k = 1000 lb = 4.448 kN.

¹Tabulated values are for unpunched webs and punched webs where the clear distance between the edge of bearing is such that the web crippling reduction factor, R_c, per AISI S100 Section C3.4.2 = 1.0. For webs with punchouts closer to the edge of bearing a web crippling reduction factor must be applied per AISI S100, Section C3.4.2.

²See notes at end of Table 6(SBC) for definitions of 1 and 2 flange loading.

³Design web crippling strengths for back-to-back members may be taken as twice the capacity of single members.

**TABLE 6 (SBC) — LRFD WEB CRIPPLING STRENGTHS FOR SINGLE MEMBERS –
Two Flange - Fastened to Support ^{1,2,3} (N)**

| Member Designation | Design Thickness (mm) | Fy (MPa) | Condition 3 (End 2 Flange) Fastened to Support | | | | | Condition 4 (Interior 2 Flange) Fastened to Support | | | | |
|--------------------|-----------------------|----------|---|------|------|------|------|--|-------|-------|-------|-------|
| | | | Bearing Length (mm) | | | | | Bearing Length (mm) | | | | |
| | | | 25 | 38 | 89 | 102 | 152 | 25 | 38 | 89 | 102 | 152 |
| 63C37-056 | 0.56 | 227.5 | 529 | 552 | 694 | 725 | - | 1272 | 1290 | 1561 | 1619 | - |
| 63C37-056 | 0.56 | 344.7 | 805 | 832 | 1054 | 1094 | - | 1926 | 1957 | 2366 | 2451 | - |
| 63C37-056 | 0.56 | 482.6 | 1125 | 1165 | 1472 | 1535 | - | 2700 | 2740 | 3314 | 3430 | - |
| 63C37-072 | 0.72 | 227.5 | 890 | 916 | 1139 | 1183 | - | 2140 | 2157 | 2576 | 2660 | - |
| 63C37-072 | 0.72 | 344.7 | 1348 | 1383 | 1726 | 1793 | - | 3238 | 3269 | 3906 | 4030 | - |
| 63C37-072 | 0.72 | 482.6 | 1886 | 1939 | 2415 | 2513 | - | 4537 | 4577 | 5467 | 5645 | - |
| 63C37-088 | 0.88 | 227.5 | 1326 | 1357 | 1673 | 1735 | - | 3203 | 3221 | 3803 | 3923 | - |
| 63C37-088 | 0.88 | 344.7 | 2006 | 2055 | 2535 | 2629 | - | 4853 | 4875 | 5765 | 5943 | - |
| 63C37-088 | 0.88 | 482.6 | 2811 | 2878 | 3550 | 3683 | - | 6797 | 6828 | 8069 | 8318 | - |
| 70C37-056 | 0.56 | 227.5 | 512 | 529 | 667 | 694 | - | 1246 | 1263 | 1530 | 1579 | - |
| 70C37-056 | 0.56 | 344.7 | 774 | 801 | 1010 | 1054 | - | 1886 | 1913 | 2313 | 2398 | - |
| 70C37-056 | 0.56 | 482.6 | 1081 | 1121 | 1415 | 1477 | - | 2638 | 2678 | 3243 | 3354 | - |
| 70C37-072 | 0.72 | 227.5 | 859 | 885 | 1103 | 1148 | - | 2095 | 2117 | 2527 | 2611 | - |
| 70C37-072 | 0.72 | 344.7 | 1303 | 1339 | 1668 | 1735 | - | 3176 | 3207 | 3830 | 3954 | - |
| 70C37-072 | 0.72 | 482.6 | 1824 | 1877 | 2340 | 2429 | - | 4448 | 4488 | 5360 | 5534 | - |
| 70C37-088 | 0.88 | 227.5 | 1286 | 1317 | 1624 | 1686 | - | 3149 | 3163 | 3741 | 3852 | - |
| 70C37-088 | 0.88 | 344.7 | 1948 | 1997 | 2464 | 2553 | - | 4768 | 4791 | 5663 | 5841 | - |
| 70C37-088 | 0.88 | 482.6 | 2731 | 2798 | 3447 | 3576 | - | 6677 | 6708 | 7931 | 8176 | - |
| 76C37-056 | 0.56 | 227.5 | 494 | 543 | 645 | 676 | - | 1223 | 1317 | 1499 | 1552 | - |
| 76C37-056 | 0.56 | 344.7 | 747 | 823 | 979 | 1023 | - | 1850 | 1997 | 2273 | 2353 | - |
| 76C37-056 | 0.56 | 482.6 | 1050 | 1157 | 1375 | 1428 | - | 2589 | 2793 | 3185 | 3296 | - |
| 76C37-072 | 0.72 | 227.5 | 836 | 916 | 1072 | 1117 | - | 2064 | 2215 | 2487 | 2571 | - |
| 76C37-072 | 0.72 | 344.7 | 1268 | 1388 | 1628 | 1690 | - | 3127 | 3354 | 3772 | 3892 | - |
| 76C37-072 | 0.72 | 482.6 | 1775 | 1939 | 2277 | 2366 | - | 4381 | 4697 | 5280 | 5449 | - |
| 76C37-088 | 0.88 | 227.5 | 1259 | 1370 | 1588 | 1646 | - | 3105 | 3314 | 3688 | 3803 | - |
| 76C37-088 | 0.88 | 344.7 | 1904 | 2073 | 2406 | 2495 | - | 4706 | 5022 | 5587 | 5760 | - |
| 76C37-088 | 0.88 | 482.6 | 2669 | 2905 | 3367 | 3496 | - | 6588 | 7033 | 7824 | 8065 | - |
| 90C37-056 | 0.56 | 482.6 | 979 | 1076 | 1281 | 1334 | - | 2495 | 2691 | 3065 | 3172 | - |
| 90C37-072 | 0.72 | 227.5 | 792 | 863 | 1014 | 1054 | - | 1997 | 2144 | 2411 | 2487 | - |
| 90C37-072 | 0.72 | 344.7 | 1197 | 1308 | 1535 | 1597 | - | 3029 | 3247 | 3652 | 3768 | - |
| 90C37-072 | 0.72 | 482.6 | 1677 | 1833 | 2148 | 2237 | - | 4239 | 4546 | 5111 | 5276 | - |
| 90C37-088 | 0.88 | 227.5 | 1197 | 1303 | 1512 | 1566 | 1766 | 3016 | 3221 | 3585 | 3692 | 4079 |
| 90C37-088 | 0.88 | 344.7 | 1815 | 1975 | 2291 | 2375 | 2678 | 4573 | 4880 | 5431 | 5596 | 6179 |
| 90C37-088 | 0.88 | 482.6 | 2540 | 2762 | 3203 | 3327 | 3745 | 6401 | 6832 | 7602 | 7833 | 8647 |
| 90C37-114 | 1.14 | 227.5 | 2046 | 2211 | 2531 | 2620 | 2931 | 5151 | 5467 | 6001 | 6174 | 6770 |
| 90C37-114 | 1.14 | 344.7 | 3096 | 3350 | 3834 | 3968 | 4444 | 7802 | 8283 | 9092 | 9355 | 10258 |
| 90C37-114 | 1.14 | 482.6 | 4337 | 4688 | 5365 | 5556 | 6219 | 10925 | 11597 | 12731 | 13096 | 14359 |
| 90C46-072 | 0.72 | 227.5 | 792 | 863 | 1014 | 1054 | - | 1997 | 2144 | 2411 | 2487 | - |
| 90C46-072 | 0.72 | 344.7 | 1197 | 1308 | 1535 | 1597 | - | 3029 | 3247 | 3652 | 3768 | - |
| 90C46-072 | 0.72 | 482.6 | 1677 | 1833 | 2148 | 2237 | - | 4239 | 4546 | 5111 | 5276 | - |
| 90C46-088 | 0.88 | 227.5 | 1197 | 1303 | 1512 | 1566 | 1766 | 3016 | 3221 | 3585 | 3692 | 4079 |
| 90C46-088 | 0.88 | 344.7 | 1815 | 1975 | 2291 | 2375 | 2678 | 4573 | 4880 | 5431 | 5596 | 6179 |
| 90C46-088 | 0.88 | 482.6 | 2540 | 2762 | 3203 | 3327 | 3745 | 6401 | 6832 | 7602 | 7833 | 8647 |
| 90C46-114 | 1.14 | 227.5 | 2046 | 2211 | 2531 | 2620 | 2931 | 5151 | 5467 | 6001 | 6174 | 6770 |
| 90C46-114 | 1.14 | 344.7 | 3096 | 3350 | 3834 | 3968 | 4444 | 7802 | 8283 | 9092 | 9355 | 10258 |
| 90C46-114 | 1.14 | 482.6 | 4337 | 4688 | 5365 | 5556 | 6219 | 10925 | 11597 | 12731 | 13096 | 14359 |

| Member Designation | Design Thickness (mm) | Fy (MPa) | Condition 3 (End 2 Flange) Fastened to Support | | | | | Condition 4 (Interior 2 Flange) Fastened to Support | | | | |
|--------------------|-----------------------|----------|--|------|------|------|------|---|-------|-------|-------|-------|
| | | | Bearing Length (mm) | | | | | Bearing Length (mm) | | | | |
| | | | 25 | 38 | 89 | 102 | 152 | 25 | 38 | 89 | 102 | 152 |
| 140C37-072 | 0.72 | 227.5 | 712 | 778 | 912 | 947 | - | 1886 | 2024 | 2273 | 2344 | - |
| 140C37-072 | 0.72 | 344.7 | 1076 | 1179 | 1383 | 1437 | - | 2856 | 3065 | 3443 | 3554 | - |
| 140C37-072 | 0.72 | 482.6 | 1508 | 1650 | 1935 | 2011 | - | 3999 | 4288 | 4822 | 4978 | - |
| 140C37-088 | 0.88 | 227.5 | 1094 | 1188 | 1379 | 1432 | 1610 | 2865 | 3060 | 3403 | 3510 | 3874 |
| 140C37-088 | 0.88 | 344.7 | 1655 | 1802 | 2091 | 2166 | 2442 | 4341 | 4635 | 5155 | 5316 | 5867 |
| 140C37-088 | 0.88 | 482.6 | 2318 | 2522 | 2927 | 3034 | 3421 | 6081 | 6490 | 7219 | 7442 | 8216 |
| 140C37-114 | 1.14 | 227.5 | 1895 | 2051 | 2344 | 2429 | 2718 | 4929 | 5231 | 5747 | 5907 | 6481 |
| 140C37-114 | 1.14 | 344.7 | 2869 | 3105 | 3554 | 3679 | 4119 | 7469 | 7927 | 8705 | 8954 | 9817 |
| 140C37-114 | 1.14 | 482.6 | 4021 | 4346 | 4973 | 5151 | 5765 | 10458 | 11098 | 12188 | 12535 | 13745 |
| 140C46-072 | 0.72 | 227.5 | 712 | 778 | 912 | 947 | - | 1886 | 2024 | 2273 | 2344 | - |
| 140C46-072 | 0.72 | 344.7 | 1076 | 1179 | 1383 | 1437 | - | 2856 | 3065 | 3443 | 3554 | - |
| 140C46-072 | 0.72 | 482.6 | 1508 | 1650 | 1935 | 2011 | - | 3999 | 4288 | 4822 | 4978 | - |
| 140C46-088 | 0.88 | 227.5 | 1094 | 1188 | 1379 | 1432 | 1610 | 2865 | 3060 | 3403 | 3510 | 3874 |
| 140C46-088 | 0.88 | 344.7 | 1655 | 1802 | 2091 | 2166 | 2442 | 4341 | 4635 | 5155 | 5316 | 5867 |
| 140C46-088 | 0.88 | 482.6 | 2318 | 2522 | 2927 | 3034 | 3421 | 6081 | 6490 | 7219 | 7442 | 8216 |
| 140C46-114 | 1.14 | 227.5 | 1895 | 2051 | 2344 | 2429 | 2718 | 4929 | 5231 | 5747 | 5907 | 6481 |
| 140C46-114 | 1.14 | 344.7 | 2869 | 3105 | 3554 | 3679 | 4119 | 7469 | 7927 | 8705 | 8954 | 9817 |
| 140C46-114 | 1.14 | 482.6 | 4021 | 4346 | 4973 | 5151 | 5765 | 10458 | 11098 | 12188 | 12535 | 13745 |

SI: 1 inch = 25.4 mm; 1 k = 1000 lb = 4.448 kN.

¹Tabulated values are for unpunched webs and punched webs where the clear distance between the edge of bearing is such that the web crippling reduction factor, R_c, per AISI S100 Section C3.4.2 = 1.0. For webs with punchouts closer to the edge of bearing a web crippling reduction factor must be applied per AISI S100, Section C3.4.2.

²See notes at end of Table 6 (SBC) for definitions of 1 and 2 flange loading.

³Design web crippling strengths for back-to-back members may be taken as twice the capacity of single members.

Web Crippling Notes (For use with Tables 5-6 (SBC)):

As defined by AISI S100:

- One-flange loading or reaction is defined as the condition where the clear distance between the bearing edges of adjacent opposite concentrated loads or reactions is equal to or greater than 1.5h.
- Two-flange loading or reaction is defined as the condition where the clear distance between the bearing edges of adjacent opposite concentrated loads or reaction is less than 1.5h.
- End loading or reaction is defined as the condition where the distance from the edge of the bearing to the end of the member is equal to or less than 1.5h.
- Interior loading or reaction is defined as the condition where the distance from the edge of the bearing to the end of the member is greater than 1.5h, except as other noted in AISI S100 Chapter C.