

ICC-ES Evaluation Report

ESR-4062

Reissued February 2024

This report also contains:


- NYCBC Supplement

Subject to renewal February 2025

- FBC Supplement

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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 13—Metal Furring</p> <p>Section: 09 22 16.13—Non-Structural Metal Stud Framing</p> | <p>REPORT HOLDER: WARE INDUSTRIES, INC., dba MARINO\WARE</p> | <p>EVALUATION SUBJECT: COLD-FORMED STEEL FRAMING</p> |  |
|--|---|---|---|

1.0 EVALUATION SCOPE

Compliance with the following codes:

2021, 2018, 2015 and 2012 [International Building Code® \(IBC\)](#)

Property evaluated:

Structural

2.0 USES

The c-shapes, tracks, and u-channels are used as structural members as defined by the North American Standard for Cold-Formed Steel Structural Framing (AISI S240) and the North American Standard for Cold-Formed Steel Framing – General Provisions (AISI S200), as applicable and may also be used as nonstructural members.

The furring channels are used as nonstructural members as defined by the North American Standard for Cold-Formed Steel Nonstructural Framing (AISI S220).

3.0 DESCRIPTION

3.1 General:

The steel framing described in this report, consisting of structural C-shapes (studs and joists), tracks, furring channels and U-channels, is cold-rolled fabricated from coils of steel. The C-shapes are manufactured with or without web punch-outs; all other framing members (tracks, U-channels and furring hat channels) are

manufactured without web punch-outs. When provided in the structural C-shapes, punch-outs measuring up to 0.75 inch by 2 inches (19 mm by 51 mm) for the 2.5-inch-deep members and either 1.5 inches by 3.25 inches (38 mm by 83 mm) or 1.5 inches by 4 inches (38 mm by 102 mm) for the other sized members are located along the centerline of the webs. The minimum distance between the end of the C-shape and the near edge of the web punch-out is 10 inches (254 mm). The minimum distance between centerlines of punch-outs is 24 inches (610 mm). See [Tables 1, 2, 7, 8](#) and [Figure 1](#) for recognized framing section names, profiles and dimensions. See [Table 9](#) for manufacturing locations.

3.2 Materials:

3.2.1 General: Steel framing members are available in design steel thicknesses ranging from 0.0188 inch to 0.1017 inch (0.478 mm to 2.58 mm), as shown in [Table 3](#), and in the sizes and configurations shown in [Tables 1, 2, 7, 8](#) and [Figure 1](#).

3.2.2 C-shapes and Tracks: C-shapes and tracks are cold-formed from galvanized steel coils conforming to ASTM A653, SS Grade 33 or Grade 50, Class 1; or ASTM A1003, Structural Grade 33, Type H, (ST33H) or Structural Grade 50, Type H (ST50H). The steel has a minimum metallic coating listed for Type H and Type L in Table 1 of ASTM A1003.

3.2.3 U-channels: U-channels are cold-formed from galvanized steel coils conforming to ASTM A653, SS Grade 33; or ASTM A1003, Structural Grade 33, Type H (ST33H), with a minimum metallic coating listed for Type H and Type L in Table 1 of ASTM A1003.

3.2.4 Furring Channels: Furring channels are cold-formed from galvanized steel coils conforming to ASTM A1003, Nonstructural Grade 33 (NS33), with a minimum metallic coating listed for Type NS in Table 1 of ASTM A1003.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The section properties indicated in [Tables 4, 5, 7](#) and [8](#) have been determined in accordance with the North American Specification for the Design of Cold-formed Steel Structural Members (AISI S100). The allowable moments as indicated in [Tables 4, 5, 7](#) and [8](#) are for use with Allowable Strength Design (ASD), and are for flexural members installed with the compression flange continuously braced. For other conditions of compression flange bracing, the allowable moment must be determined in accordance with AISI S100. Allowable concentrated loads and reactions based on web crippling are shown in [Table 6](#). The design of flexural members must address combined bending and web crippling, and combined bending and shear.

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.

5.0 CONDITIONS OF USE:

The Marino\WARE cold-formed steel framing 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 framing members are installed in accordance with the applicable code, the approved construction documents and this report.
- 5.2 Minimum uncoated steel thickness of the framing members as delivered to the jobsite is at least 95 percent of the design steel thickness noted in [Table 3](#).
- 5.3 Complete construction documents and calculations verifying compliance with this report must be submitted to the code official for each project. The calculations and construction documents 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 \(AC46\)](#), approved 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-4062) along with the name, registered trademark, or registered logo of the report holder [and/or listee] must be included in the product label.
- 7.2 In addition, at a spacing not exceeding 96 inches (2440 mm) on center, each framing member (other than the furring channel) is labeled with the name of the manufacturer (Marino\WARE) or initials (MW); the member designation as provided in [Tables 1, 2 and 8](#); the evaluation report number (ICC-ES ESR-4062); the minimum uncoated steel thickness in decimal inches; the minimum specified yield strength; and the coating designation .

At a spacing not exceeding 96 inches (2440 mm) on center, each furring channel is labeled with the name of the manufacturer (Marino\WARE) or initials (MW); the member designation as provided in [Table 7](#); the evaluation report number (ICC-ES ESR-4062); the minimum uncoated steel thickness in decimal inches; the coating designation if other than G40; and the designation "NS".

- 7.3 The report holder's contact information is the following:

WARE INDUSTRIES, INC., dba MARINO\WARE
400 METUCHEN ROAD
SOUTH PLAINFIELD, NEW JERSEY 07080
(908) 757-9000

www.marinoware.com
sales@marinoware.com

TABLE 1—C-SHAPES

| MEMBER | WEB ² (in) | FLANGE (in) | LIP (in) | THICKNESS DESIGNATION ³ (mils) | MEMBER | WEB ² (in) | FLANGE (in) | LIP (in) | THICKNESS DESIGNATION ³ (mils) |
|-------------|--------------------------|----------------|-------------|---|-------------------------|--------------------------|----------------|-------------|---|
| 250S137-33 | 2 1/2 | 1 3/8 | 3/8 | 33 | 400S250-33 | 4 | 2 1/2 | 5/8 | 33 |
| 250S137-43 | 2 1/2 | 1 3/8 | 3/8 | 43 | 400S250-43 | 4 | 2 1/2 | 5/8 | 43 |
| 250S137-54 | 2 1/2 | 1 3/8 | 3/8 | 54 | 400S250-54 | 4 | 2 1/2 | 5/8 | 54 |
| 250S137-68 | 2 1/2 | 1 3/8 | 3/8 | 68 | 400S250-68 | 4 | 2 1/2 | 5/8 | 68 |
| 250S137-97 | 2 1/2 | 1 3/8 | 3/8 | 97 | 400S250-97 | 4 | 2 1/2 | 5/8 | 97 |
| 250S162-33 | 2 1/2 | 1 5/8 | 1/2 | 33 | 400S250-118 | 4 | 2 1/2 | 5/8 | 118 |
| 250S162-43 | 2 1/2 | 1 5/8 | 1/2 | 43 | | | | | |
| 250S162-54 | 2 1/2 | 1 5/8 | 1/2 | 54 | 600S137-33 | 6 | 1 3/8 | 3/8 | 33 |
| 250S162-68 | 2 1/2 | 1 5/8 | 1/2 | 68 | 600S137-43 | 6 | 1 3/8 | 3/8 | 43 |
| 250S162-97 | 2 1/2 | 1 5/8 | 1/2 | 97 | 600S137-54 | 6 | 1 3/8 | 3/8 | 54 |
| 250S200-33 | 2 1/2 | 2 | 5/8 | 33 | 600S137-68 | 6 | 1 3/8 | 3/8 | 68 |
| 250S200-43 | 2 1/2 | 2 | 5/8 | 43 | 600S137-97 | 6 | 1 3/8 | 3/8 | 97 |
| 250S200-54 | 2 1/2 | 2 | 5/8 | 54 | 600S162-33 | 6 | 1 5/8 | 1/2 | 33 |
| 250S200-68 | 2 1/2 | 2 | 5/8 | 68 | 600S162-43 | 6 | 1 5/8 | 1/2 | 43 |
| 250S200-97 | 2 1/2 | 2 | 5/8 | 97 | 600S162-54 | 6 | 1 5/8 | 1/2 | 54 |
| 250S250-33 | 2 1/2 | 2 1/2 | 5/8 | 33 | 600S162-68 | 6 | 1 5/8 | 1/2 | 68 |
| 250S250-43 | 2 1/2 | 2 1/2 | 5/8 | 43 | 600S162-97 | 6 | 1 5/8 | 1/2 | 97 |
| 250S250-54 | 2 1/2 | 2 1/2 | 5/8 | 54 | 600S162-118 | 6 | 1 5/8 | 1/2 | 118 |
| 250S250-68 | 2 1/2 | 2 1/2 | 5/8 | 68 | 600S200-33 | 6 | 2 | 5/8 | 33 |
| 250S250-97 | 2 1/2 | 2 1/2 | 5/8 | 97 | 600S200-43 | 6 | 2 | 5/8 | 43 |
| | | | | | 600S200-54 | 6 | 2 | 5/8 | 54 |
| | | | | | 600S200-68 | 6 | 2 | 5/8 | 68 |
| 362S137-33 | 3 5/8 | 1 3/8 | 3/8 | 33 | 600S200-97 | 6 | 2 | 5/8 | 97 |
| 362S137-43 | 3 5/8 | 1 3/8 | 3/8 | 43 | 600S200-118 | 6 | 2 | 5/8 | 118 |
| 362S137-54 | 3 5/8 | 1 3/8 | 3/8 | 54 | 600S250-43 | 6 | 2 1/2 | 5/8 | 43 |
| 362S137-68 | 3 5/8 | 1 3/8 | 3/8 | 68 | 600S250-54 | 6 | 2 1/2 | 5/8 | 54 |
| 362S137-97 | 3 5/8 | 1 3/8 | 3/8 | 97 | 600S250-68 | 6 | 2 1/2 | 5/8 | 68 |
| 362S162-33 | 3 5/8 | 1 5/8 | 1/2 | 33 | 600S250-97 | 6 | 2 1/2 | 5/8 | 97 |
| 362S162-43 | 3 5/8 | 1 5/8 | 1/2 | 43 | 600S250-118 | 6 | 2 1/2 | 5/8 | 118 |
| 362S162-54 | 3 5/8 | 1 5/8 | 1/2 | 54 | 600S300-54 | 6 | 3 | 5/8 | 54 |
| 362S162-68 | 3 5/8 | 1 5/8 | 1/2 | 68 | 600S300-68 | 6 | 3 | 5/8 | 68 |
| 362S162-97 | 3 5/8 | 1 5/8 | 1/2 | 97 | 600S300-97 | 6 | 3 | 5/8 | 97 |
| 362S162-118 | 3 5/8 | 1 5/8 | 1/2 | 118 | 600S300-118 | 6 | 3 | 5/8 | 118 |
| 362S200-33 | 3 5/8 | 2 | 5/8 | 33 | | | | | |
| 362S200-43 | 3 5/8 | 2 | 5/8 | 43 | 800S137-33 ¹ | 8 | 1 3/8 | 3/8 | 33 |
| 362S200-54 | 3 5/8 | 2 | 5/8 | 54 | 800S137-43 | 8 | 1 3/8 | 3/8 | 43 |
| 362S200-68 | 3 5/8 | 2 | 5/8 | 68 | 800S137-54 | 8 | 1 3/8 | 3/8 | 54 |
| 362S200-97 | 3 5/8 | 2 | 5/8 | 97 | 800S137-68 | 8 | 1 3/8 | 3/8 | 68 |
| 362S200-118 | 3 5/8 | 2 | 5/8 | 118 | 800S137-97 | 8 | 1 3/8 | 3/8 | 97 |
| 362S250-43 | 3 5/8 | 2 1/2 | 5/8 | 43 | 800S162-33 ¹ | 8 | 1 5/8 | 1/2 | 33 |
| 362S250-54 | 3 5/8 | 2 1/2 | 5/8 | 54 | 800S162-43 | 8 | 1 5/8 | 1/2 | 43 |
| 362S250-68 | 3 5/8 | 2 1/2 | 5/8 | 68 | 800S162-54 | 8 | 1 5/8 | 1/2 | 54 |
| 362S250-97 | 3 5/8 | 2 1/2 | 5/8 | 97 | 800S162-68 | 8 | 1 5/8 | 1/2 | 68 |
| 362S250-118 | 3 5/8 | 2 1/2 | 5/8 | 118 | 800S162-97 | 8 | 1 5/8 | 1/2 | 97 |
| | | | | | 800S162-118 | 8 | 1 5/8 | 1/2 | 118 |
| 400S137-33 | 4 | 1 3/8 | 3/8 | 33 | 800S200-33 ¹ | 8 | 2 | 5/8 | 33 |
| 400S137-43 | 4 | 1 3/8 | 3/8 | 43 | 800S200-43 | 8 | 2 | 5/8 | 43 |
| 400S137-54 | 4 | 1 3/8 | 3/8 | 54 | 800S200-54 | 8 | 2 | 5/8 | 54 |
| 400S137-68 | 4 | 1 3/8 | 3/8 | 68 | 800S200-68 | 8 | 2 | 5/8 | 68 |
| 400S162-33 | 4 | 1 5/8 | 1/2 | 33 | 800S200-97 | 8 | 2 | 5/8 | 97 |
| 400S162-43 | 4 | 1 5/8 | 1/2 | 43 | 800S200-118 | 8 | 2 | 5/8 | 118 |
| 400S162-54 | 4 | 1 5/8 | 1/2 | 54 | 800S250-43 | 8 | 2 1/2 | 5/8 | 43 |
| 400S162-68 | 4 | 1 5/8 | 1/2 | 68 | 800S250-54 | 8 | 2 1/2 | 5/8 | 54 |
| 400S162-97 | 4 | 1 5/8 | 1/2 | 97 | 800S250-68 | 8 | 2 1/2 | 5/8 | 68 |
| 400S162-118 | 4 | 1 5/8 | 1/2 | 118 | 800S250-97 | 8 | 2 1/2 | 5/8 | 97 |
| 400S200-33 | 4 | 2 | 5/8 | 33 | 800S250-118 | 8 | 2 1/2 | 5/8 | 118 |
| 400S200-43 | 4 | 2 | 5/8 | 43 | 800S300-54 | 8 | 3 | 5/8 | 54 |
| 400S200-54 | 4 | 2 | 5/8 | 54 | 800S300-68 | 8 | 3 | 5/8 | 68 |
| 400S200-68 | 4 | 2 | 5/8 | 68 | 800S300-97 | 8 | 3 | 5/8 | 97 |
| 400S200-97 | 4 | 2 | 5/8 | 97 | 800S300-118 | 8 | 3 | 5/8 | 118 |
| 400S200-118 | 4 | 2 | 5/8 | 118 | | | | | |

For SI: 1 inch = 25.4 mm

Table 1 continued on next page.

TABLE 1—C-SHAPES (Continued)

| MEMBER | WEB ² (in) | FLANGE (in) | LIP (in) | THICKNESS DESIGNATION ³ (mils) | MEMBER | WEB ² (in) | FLANGE (in) | LIP (in) | THICKNESS DESIGNATION ³ (mils) |
|--------------------------|--------------------------|-------------------------------|-------------|---|--------------------------|--------------------------|-------------------------------|-------------|---|
| 1000S162-43 ¹ | 10 | 1 ⁵ / ₈ | 1/2 | 43 | 1400S162-54 ¹ | 14 | 1 ⁵ / ₈ | 1/2 | 54 |
| 1000S162-54 | 10 | 1 ⁵ / ₈ | 1/2 | 54 | 1400S162-68 | 14 | 1 ⁵ / ₈ | 1/2 | 68 |
| 1000S162-68 | 10 | 1 ⁵ / ₈ | 1/2 | 68 | 1400S162-97 | 14 | 1 ⁵ / ₈ | 1/2 | 97 |
| 1000S162-97 | 10 | 1 ⁵ / ₈ | 1/2 | 97 | 1400S162-118 | 14 | 1 ⁵ / ₈ | 1/2 | 118 |
| 1000S162-118 | 10 | 1 ⁵ / ₈ | 1/2 | 118 | 1400S200-54 ¹ | 14 | 2 | 5/8 | 54 |
| 1000S200-43 ¹ | 10 | 2 | 5/8 | 43 | 1400S200-68 | 14 | 2 | 5/8 | 68 |
| 1000S200-54 | 10 | 2 | 5/8 | 54 | 1400S200-97 | 14 | 2 | 5/8 | 97 |
| 1000S200-68 | 10 | 2 | 5/8 | 68 | 1400S200-118 | 14 | 2 | 5/8 | 118 |
| 1000S200-97 | 10 | 2 | 5/8 | 97 | 1400S250-54 ¹ | 14 | 2 ¹ / ₂ | 5/8 | 54 |
| 1000S200-118 | 10 | 2 | 5/8 | 118 | 1400S250-68 | 14 | 2 ¹ / ₂ | 5/8 | 68 |
| 1000S250-43 ¹ | 10 | 2 | 5/8 | 43 | 1400S250-97 | 14 | 2 ¹ / ₂ | 5/8 | 97 |
| 1000S250-54 | 10 | 2 | 5/8 | 54 | 1400S250-118 | 14 | 2 ¹ / ₂ | 5/8 | 118 |
| 1000S250-68 | 10 | 2 | 5/8 | 68 | 1400S300-54 ¹ | 14 | 3 | 5/8 | 54 |
| 1000S250-97 | 10 | 2 | 5/8 | 97 | 1400S300-68 | 14 | 3 | 5/8 | 68 |
| 1000S250-118 | 10 | 2 | 5/8 | 118 | 1400S300-97 | 14 | 3 | 5/8 | 97 |
| 1000S300-54 | 10 | 3 | 5/8 | 54 | 1400S300-118 | 14 | 3 | 5/8 | 118 |
| 1000S300-68 | 10 | 3 | 5/8 | 68 | 1400S350-54 ¹ | 14 | 3 ¹ / ₂ | 1 | 54 |
| 1000S300-97 | 10 | 3 | 5/8 | 97 | 1400S350-68 | 14 | 3 ¹ / ₂ | 1 | 68 |
| 1000S300-118 | 10 | 3 | 5/8 | 118 | 1400S350-97 | 14 | 3 ¹ / ₂ | 1 | 97 |
| 1000S350-54 | 10 | 3 ¹ / ₂ | 1 | 54 | 1400S350-118 | 14 | 3 ¹ / ₂ | 1 | 118 |
| 1000S350-68 | 10 | 3 ¹ / ₂ | 1 | 68 | | | | | |
| 1000S350-97 | 10 | 3 ¹ / ₂ | 1 | 97 | 1600S162-68 ¹ | 16 | 1 ⁵ / ₈ | 1/2 | 68 |
| 1000S350-118 | 10 | 3 ¹ / ₂ | 1 | 118 | 1600S162-97 | 16 | 1 ⁵ / ₈ | 1/2 | 97 |
| | | | | | 1600S162-118 | 16 | 1 ⁵ / ₈ | 1/2 | 118 |
| 1200S162-43 ¹ | 12 | 1 ⁵ / ₈ | 1/2 | 43 | 1600S200-68 ¹ | 16 | 2 | 5/8 | 68 |
| 1200S162-54 ¹ | 12 | 1 ⁵ / ₈ | 1/2 | 54 | 1600S200-97 | 16 | 2 | 5/8 | 97 |
| 1200S162-68 | 12 | 1 ⁵ / ₈ | 1/2 | 68 | 1600S200-118 | 16 | 2 | 5/8 | 118 |
| 1200S162-97 | 12 | 1 ⁵ / ₈ | 1/2 | 97 | 1600S250-68 ¹ | 16 | 2 ¹ / ₂ | 5/8 | 68 |
| 1200S162-118 | 12 | 1 ⁵ / ₈ | 1/2 | 118 | 1600S250-97 | 16 | 2 ¹ / ₂ | 5/8 | 97 |
| 1200S200-54 ¹ | 12 | 2 | 5/8 | 54 | 1600S250-118 | 16 | 2 ¹ / ₂ | 5/8 | 118 |
| 1200S200-68 | 12 | 2 | 5/8 | 68 | 1600S300-68 ¹ | 16 | 3 | 5/8 | 68 |
| 1200S200-97 | 12 | 2 | 5/8 | 97 | 1600S300-97 | 16 | 3 | 5/8 | 97 |
| 1200S200-118 | 12 | 2 | 5/8 | 118 | 1600S300-118 | 16 | 3 | 5/8 | 118 |
| 1200S250-54 ¹ | 12 | 2 ¹ / ₂ | 5/8 | 54 | 1600S350-68 ¹ | 16 | 3 ¹ / ₂ | 1 | 68 |
| 1200S250-68 | 12 | 2 ¹ / ₂ | 5/8 | 68 | 1600S350-97 | 16 | 3 ¹ / ₂ | 1 | 97 |
| 1200S250-97 | 12 | 2 ¹ / ₂ | 5/8 | 97 | 1600S350-118 | 16 | 3 ¹ / ₂ | 1 | 118 |
| 1200S250-118 | 12 | 2 ¹ / ₂ | 5/8 | 118 | | | | | |
| 1200S300-54 ¹ | 12 | 3 | 5/8 | 54 | | | | | |
| 1200S300-68 | 12 | 3 | 5/8 | 68 | | | | | |
| 1200S300-97 | 12 | 3 | 5/8 | 97 | | | | | |
| 1200S300-118 | 12 | 3 | 5/8 | 118 | | | | | |
| 1200S350-54 ¹ | 12 | 3 ¹ / ₂ | 1 | 54 | | | | | |
| 1200S350-68 | 12 | 3 ¹ / ₂ | 1 | 68 | | | | | |
| 1200S350-97 | 12 | 3 ¹ / ₂ | 1 | 97 | | | | | |
| 1200S350-118 | 12 | 3 ¹ / ₂ | 1 | 118 | | | | | |

For SI: 1 inch = 25.4 mm

¹ Webslenderness ratio (h/t) exceeds 200. Web stiffeners designed in accordance with AISI S100 are required at all support points and concentrated loads. Punch-outs/holes in the web are outside the scope of this report.

² Web height measured from outside face to outside face of flanges.

³ See Table 3 for design thickness, minimum thickness, and inside bend radius

TABLE 2—TRACKS

| MEMBER | WEB ² (in) | FLANGE (in) | THICKNESS DESIGNATION ³ (mils) | MEMBER | WEB ² (in) | FLANGE (in) | THICKNESS DESIGNATION ³ (mils) | MEMBER | WEB ² (in) | FLANGE (in) | THICKNESS DESIGNATION ³ (mils) |
|-------------|--------------------------|----------------|---|--------------------------|--------------------------|----------------|---|--------------------------|--------------------------|----------------|---|
| 250T125-33 | 2½ | 1¼ | 33 | 400T300-33 | 4 | 3 | 33 | 1000T125-97 | 10 | 1¼ | 97 |
| 250T125-43 | 2½ | 1¼ | 43 | 400T300-43 | 4 | 3 | 43 | 1000T125-118 | 10 | 1¼ | 118 |
| 250T125-54 | 2½ | 1¼ | 54 | 400T300-54 | 4 | 3 | 54 | 1000T200-43 ¹ | 10 | 2 | 43 |
| 250T125-68 | 2½ | 1¼ | 68 | 400T300-68 | 4 | 3 | 68 | 1000T200-54 | 10 | 2 | 54 |
| 250T125-97 | 2½ | 1¼ | 97 | 400T300-97 | 4 | 3 | 97 | 1000T200-68 | 10 | 2 | 68 |
| 250T200-33 | 2½ | 2 | 33 | 400T300-118 | 4 | 3 | 118 | 1000T200-97 | 10 | 2 | 97 |
| 250T200-43 | 2½ | 2 | 43 | | | | | 1000T200-118 | 10 | 2 | 118 |
| 250T200-54 | 2½ | 2 | 54 | 600T125-33 | 6 | 1¼ | 33 | 1000T300-43 ¹ | 10 | 3 | 43 |
| 250T200-68 | 2½ | 2 | 68 | 600T125-43 | 6 | 1¼ | 43 | 1000T300-54 | 10 | 3 | 54 |
| 250T200-97 | 2½ | 2 | 97 | 600T125-54 | 6 | 1¼ | 54 | 1000T300-68 | 10 | 3 | 68 |
| 250T300-33 | 2½ | 3 | 33 | 600T125-68 | 6 | 1¼ | 68 | 1000T300-97 | 10 | 3 | 97 |
| 250T300-43 | 2½ | 3 | 43 | 600T125-97 | 6 | 1¼ | 97 | 1000T300-118 | 10 | 3 | 118 |
| 250T300-54 | 2½ | 3 | 54 | 600T125-118 | 6 | 1¼ | 118 | | | | |
| 250T300-68 | 2½ | 3 | 68 | 600T200-33 | 6 | 2 | 33 | 1200T125-54 ¹ | 12 | 1¼ | 54 |
| 250T300-97 | 2½ | 3 | 97 | 600T200-43 | 6 | 2 | 43 | 1200T125-68 | 12 | 1¼ | 68 |
| | | | | 600T200-54 | 6 | 2 | 54 | 1200T125-97 | 12 | 1¼ | 97 |
| 362T125-33 | 3⅝ | 1¼ | 33 | 600T200-68 | 6 | 2 | 68 | 1200T125-118 | 12 | 1¼ | 118 |
| 362T125-43 | 3⅝ | 1¼ | 43 | 600T200-97 | 6 | 2 | 97 | 1200T200-54 ¹ | 12 | 2 | 54 |
| 362T125-54 | 3⅝ | 1¼ | 54 | 600T200-118 | 6 | 2 | 118 | 1200T200-68 | 12 | 2 | 68 |
| 362T125-68 | 3⅝ | 1¼ | 68 | 600T300-33 | 6 | 3 | 33 | 1200T200-97 | 12 | 2 | 97 |
| 362T125-97 | 3⅝ | 1¼ | 97 | 600T300-43 | 6 | 3 | 43 | 1200T200-118 | 12 | 2 | 118 |
| 362T125-118 | 3⅝ | 1¼ | 118 | 600T300-54 | 6 | 3 | 54 | 1200T300-54 ¹ | 12 | 3 | 54 |
| 362T200-33 | 3⅝ | 2 | 33 | 600T300-68 | 6 | 3 | 68 | 1200T300-68 | 12 | 3 | 68 |
| 362T200-43 | 3⅝ | 2 | 43 | 600T300-97 | 6 | 3 | 97 | 1200T300-97 | 12 | 3 | 97 |
| 362T200-54 | 3⅝ | 2 | 54 | 600T300-118 | 6 | 3 | 118 | 1200T300-118 | 12 | 3 | 118 |
| 362T200-68 | 3⅝ | 2 | 68 | | | | | | | | |
| 362T200-97 | 3⅝ | 2 | 97 | 800T125-33 ¹ | 8 | 1¼ | 33 | 1400T125-54 ¹ | 14 | 1¼ | 54 |
| 362T200-118 | 3⅝ | 2 | 118 | 800T125-43 | 8 | 1¼ | 43 | 1400T125-68 | 14 | 1¼ | 68 |
| 362T300-33 | 3⅝ | 3 | 33 | 800T125-54 | 8 | 1¼ | 54 | 1400T125-97 | 14 | 1¼ | 97 |
| 362T300-43 | 3⅝ | 3 | 43 | 800T125-68 | 8 | 1¼ | 68 | 1400T125-118 | 14 | 1¼ | 118 |
| 362T300-54 | 3⅝ | 3 | 54 | 800T125-97 | 8 | 1¼ | 97 | 1400T200-54 ¹ | 14 | 2 | 54 |
| 362T300-68 | 3⅝ | 3 | 68 | 800T125-118 | 8 | 1¼ | 118 | 1400T200-68 | 14 | 2 | 68 |
| 362T300-97 | 3⅝ | 3 | 97 | 800T200-33 ¹ | 8 | 2 | 33 | 1400T200-97 | 14 | 2 | 97 |
| 362T300-118 | 3⅝ | 3 | 118 | 800T200-43 | 8 | 2 | 43 | 1400T200-118 | 14 | 2 | 118 |
| | | | | 800T200-54 | 8 | 2 | 54 | 1400T300-54 ¹ | 14 | 3 | 54 |
| 400T125-33 | 4 | 1¼ | 33 | 800T200-68 | 8 | 2 | 68 | 1400T300-68 | 14 | 3 | 68 |
| 400T125-43 | 4 | 1¼ | 43 | 800T200-97 | 8 | 2 | 97 | 1400T300-97 | 14 | 3 | 97 |
| 400T125-54 | 4 | 1¼ | 54 | 800T200-118 | 8 | 2 | 118 | 1400T300-118 | 14 | 3 | 118 |
| 400T125-68 | 4 | 1¼ | 68 | 800T300-33 ¹ | 8 | 3 | 33 | | | | |
| 400T125-97 | 4 | 1¼ | 97 | 800T300-43 | 8 | 3 | 43 | 1600T125-68 ¹ | 16 | 1¼ | 68 |
| 400T125-118 | 4 | 1¼ | 118 | 800T300-54 | 8 | 3 | 54 | 1600T125-97 | 16 | 1¼ | 97 |
| 400T200-33 | 4 | 2 | 33 | 800T300-68 | 8 | 3 | 68 | 1600T125-118 | 16 | 1¼ | 118 |
| 400T200-43 | 4 | 2 | 43 | 800T300-97 | 8 | 3 | 97 | 1600T200-68 ¹ | 16 | 2 | 68 |
| 400T200-54 | 4 | 2 | 54 | 800T300-118 | 8 | 3 | 118 | 1600T200-97 | 16 | 2 | 97 |
| 400T200-68 | 4 | 2 | 68 | | | | | 1600T200-118 | 16 | 2 | 118 |
| 400T200-97 | 4 | 2 | 97 | 1000T125-43 ¹ | 10 | 1¼ | 43 | 1600T300-68 ¹ | 16 | 3 | 68 |
| 400T200-118 | 4 | 2 | 118 | 1000T125-54 | 10 | 1¼ | 54 | 1600T300-97 | 16 | 3 | 97 |
| | | | | 1000T125-68 | 10 | 1¼ | 68 | 1600T300-118 | 16 | 3 | 118 |

For SI: 1 inch = 25.4 mm, 1 plf = 1.4882 kg/m

¹ Webslenderness ratio (h/t) exceeds 200. Web stiffeners designed in accordance with AISI S100 are required at all support points and concentrated loads.

² Web height measured from inside face to inside face of flanges.

³ See Table 3 for design thickness, minimum thickness, and inside bend radius.

TABLE 3—UNCOATED STEEL THICKNESS

| THICKNESS DESIGNATION (mils) | DESIGN THICKNESS (in) | MINIMUM THICKNESS ¹ (in) | INSIDE BEND RADIUS (in) |
|---------------------------------|--------------------------|--|----------------------------|
| 18 | 0.0188 | 0.0179 | 0.0843 |
| 27 | 0.0283 | 0.0269 | 0.0796 |
| 33 | 0.0346 | 0.0329 | 0.0764 |
| 43 | 0.0451 | 0.0428 | 0.0712 |
| 54 | 0.0566 | 0.0538 | 0.0849 |
| 68 | 0.0713 | 0.0677 | 0.1069 |
| 97 | 0.1017 | 0.0966 | 0.1525 |

For SI: 1 inch = 25.4 mm.

¹Minimum thickness represents 95 percent of the design thickness and is the minimum acceptable thickness of the uncoated steel delivered to the jobsite

TABLE 4—C-SHAPE PROPERTIES^{4,5}

| MEMBER | F _y (ksi) | GROSS PROPERTIES ³ | | | | | | | EFFECTIVE PROPERTIES ² | | | | | | TORSIONAL PROPERTIES ³ | | | | | | L _u (in.) |
|-------------------------|-------------------------|-------------------------------|-------------------|--------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-------------------------|--------------------------------------|--------------------------------------|---------------------------|---------------------------|-------------------------|---------------------------|-----------------------------------|--------------------------------------|-------------------------|------------|-------------------------|-------|-------------------------|
| | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | S _x (in ³) | r _x (in.) | I _y (in ⁴) | r _y (in.) | I _x (in ⁴) | S _x (in ³) | M _{al} (in-k) | M _{ad} (in-k) | V _{ag} (lb) | V _{anet} (lb) | Jx1000 (in ⁴) | C _w (in ⁶) | x _o (in.) | m (in.) | r _o (in.) | β | |
| 250S137-33 | 33 | 0.197 | 0.671 | 0.203 | 0.163 | 1.02 | 0.0524 | 0.515 | 0.203 | 0.158 | 3.11 | 2.90 | 975 | 399 | 0.0787 | 0.0764 | -1.14 | 0.677 | 1.61 | 0.499 | 35.6 |
| 250S137-43 ⁶ | 33 | 0.255 | 0.868 | 0.261 | 0.208 | 1.01 | 0.0665 | 0.511 | 0.261 | 0.205 | 4.53 ⁶ | 4.02 | 1265 | 394 | 0.173 | 0.0959 | -1.13 | 0.670 | 1.60 | 0.501 | 33.6 |
| 250S137-43 | 50 | 0.255 | 0.868 | 0.261 | 0.208 | 1.01 | 0.0665 | 0.511 | 0.261 | 0.197 | 5.89 | 5.37 | 1917 | 597 | 0.173 | 0.0959 | -1.13 | 0.670 | 1.60 | 0.501 | 28.7 |
| 250S137-54 ⁶ | 50 | 0.316 | 1.07 | 0.318 | 0.255 | 1.00 | 0.0802 | 0.504 | 0.318 | 0.244 | 8.22 ⁶ | 7.06 | 2353 | 565 | 0.337 | 0.115 | -1.12 | 0.663 | 1.58 | 0.504 | 27.1 |
| 250S137-68 ⁶ | 50 | 0.390 | 1.33 | 0.386 | 0.309 | 0.995 | 0.0956 | 0.495 | 0.386 | 0.308 | 10.7 ⁶ | 9.13 | 2866 | 519 | 0.661 | 0.138 | -1.10 | 0.653 | 1.56 | 0.507 | 26.8 |
| 250S137-97 ⁶ | 50 | 0.533 | 1.82 | 0.507 | 0.406 | 0.975 | 0.121 | 0.476 | 0.507 | 0.406 | 14.8 ⁶ | 14.7 | 3798 | 429 | 1.84 | 0.176 | -1.06 | 0.633 | 1.52 | 0.513 | 26.5 |
| 250S162-33 | 33 | 0.223 | 0.759 | 0.235 | 0.188 | 1.03 | 0.0870 | 0.624 | 0.235 | 0.180 | 3.55 | 3.39 | 975 | 399 | 0.0891 | 0.146 | -1.47 | 0.859 | 1.90 | 0.401 | 44.1 |
| 250S162-43 ⁶ | 33 | 0.289 | 0.983 | 0.302 | 0.242 | 1.02 | 0.111 | 0.620 | 0.302 | 0.240 | 5.22 ⁶ | 4.70 | 1265 | 394 | 0.196 | 0.184 | -1.46 | 0.852 | 1.89 | 0.402 | 42.1 |
| 250S162-43 | 50 | 0.289 | 0.983 | 0.302 | 0.242 | 1.02 | 0.111 | 0.620 | 0.302 | 0.217 | 6.50 | 6.30 | 1917 | 597 | 0.196 | 0.184 | -1.46 | 0.852 | 1.89 | 0.402 | 35.7 |
| 250S162-54 ⁶ | 50 | 0.358 | 1.22 | 0.370 | 0.296 | 1.02 | 0.135 | 0.613 | 0.370 | 0.284 | 9.42 ⁶ | 8.28 | 2353 | 565 | 0.383 | 0.223 | -1.44 | 0.845 | 1.87 | 0.404 | 33.9 |
| 250S162-68 ⁶ | 50 | 0.443 | 1.51 | 0.450 | 0.360 | 1.01 | 0.162 | 0.605 | 0.450 | 0.357 | 12.1 ⁶ | 10.7 | 2866 | 519 | 0.752 | 0.268 | -1.42 | 0.835 | 1.85 | 0.405 | 33.7 |
| 250S162-97 ⁶ | 50 | 0.610 | 2.07 | 0.597 | 0.478 | 0.990 | 0.210 | 0.587 | 0.597 | 0.477 | 16.9 ⁶ | 16.8 | 3798 | 429 | 2.10 | 0.346 | -1.39 | 0.815 | 1.80 | 0.408 | 36.9 |
| 250S200-33 | 33 | 0.258 | 0.877 | 0.279 | 0.223 | 1.04 | 0.154 | 0.773 | 0.273 | 0.197 | 3.90 | 3.94 | 975 | 399 | 0.103 | 0.302 | -1.93 | 1.11 | 2.32 | 0.312 | 56.0 |
| 250S200-43 | 33 | 0.334 | 1.14 | 0.358 | 0.287 | 1.04 | 0.198 | 0.769 | 0.358 | 0.278 | 5.49 | 5.48 | 1265 | 394 | 0.227 | 0.382 | -1.91 | 1.10 | 2.31 | 0.312 | 56.1 |
| 250S200-43 | 50 | 0.334 | 1.14 | 0.358 | 0.287 | 1.04 | 0.198 | 0.769 | 0.355 | 0.252 | 7.56 | 7.30 | 1917 | 597 | 0.227 | 0.382 | -1.91 | 1.10 | 2.31 | 0.312 | 45.3 |
| 250S200-54 | 50 | 0.415 | 1.41 | 0.440 | 0.352 | 1.03 | 0.241 | 0.763 | 0.440 | 0.321 | 9.60 | 9.64 | 2353 | 565 | 0.443 | 0.464 | -1.90 | 1.09 | 2.29 | 0.313 | 45.5 |
| 250S200-68 ⁶ | 50 | 0.515 | 1.75 | 0.538 | 0.430 | 1.02 | 0.293 | 0.755 | 0.537 | 0.417 | 13.8 ⁶ | 12.6 | 2866 | 519 | 0.872 | 0.561 | -1.88 | 1.08 | 2.27 | 0.313 | 43.4 |
| 250S200-97 ⁶ | 50 | 0.711 | 2.42 | 0.719 | 0.575 | 1.01 | 0.386 | 0.737 | 0.719 | 0.575 | 19.8 ⁶ | 19.7 | 3798 | 429 | 2.45 | 0.735 | -1.84 | 1.06 | 2.23 | 0.314 | 43.3 |

Table 4 continued on next page.

TABLE 4—C-SHAPE PROPERTIES^{4,5} (Continued)

| MEMBER | F _y (ksi) | GROSS PROPERTIES ³ | | | | | | | EFFECTIVE PROPERTIES ² | | | | | | TORSIONAL PROPERTIES ³ | | | | | | L _u (in.) |
|--------------------------|-------------------------|-------------------------------|-------------------|--------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-------------------------|--------------------------------------|--------------------------------------|---------------------------|---------------------------|-------------------------|---------------------------|-----------------------------------|--------------------------------------|-------------------------|------------|-------------------------|-------|-------------------------|
| | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | S _x (in ³) | r _x (in.) | I _y (in ⁴) | r _y (in.) | I _x (in ⁴) | S _x (in ³) | M _{al} (in-k) | M _{ad} (in-k) | V _{ag} (lb) | V _{anet} (lb) | Jx1000 (in ⁴) | C _w (in ⁶) | x _o (in.) | m (in.) | r _o (in.) | β | |
| 250S250-33 | 33 | 0.292 | 0.995 | 0.331 | 0.265 | 1.07 | 0.262 | 0.946 | 0.310 | 0.214 | 4.22 | 4.28 | 975 | 399 | 0.117 | 0.503 | -2.42 | 1.37 | 2.80 | 0.258 | 66.5 |
| 250S250-43 | 33 | 0.379 | 1.29 | 0.426 | 0.341 | 1.06 | 0.336 | 0.941 | 0.423 | 0.297 | 5.87 | 6.01 | 1265 | 394 | 0.257 | 0.638 | -2.40 | 1.36 | 2.79 | 0.258 | 66.8 |
| 250S250-43 | 50 | 0.379 | 1.29 | 0.426 | 0.341 | 1.06 | 0.336 | 0.941 | 0.400 | 0.265 | 7.95 | 7.90 | 1917 | 597 | 0.257 | 0.638 | -2.40 | 1.36 | 2.79 | 0.258 | 53.9 |
| 250S250-54 | 50 | 0.471 | 1.60 | 0.524 | 0.419 | 1.06 | 0.412 | 0.935 | 0.505 | 0.341 | 10.2 | 10.5 | 2353 | 565 | 0.503 | 0.778 | -2.39 | 1.35 | 2.77 | 0.258 | 54.1 |
| 250S250-68 | 50 | 0.586 | 1.99 | 0.643 | 0.514 | 1.05 | 0.503 | 0.926 | 0.638 | 0.446 | 13.4 | 13.9 | 2866 | 519 | 0.993 | 0.944 | -2.37 | 1.34 | 2.75 | 0.258 | 54.5 |
| 250S250-97 ⁶ | 50 | 0.813 | 2.77 | 0.865 | 0.692 | 1.03 | 0.670 | 0.908 | 0.865 | 0.664 | 22.3 ⁶ | 20.6 | 3798 | 429 | 2.80 | 1.25 | -2.33 | 1.32 | 2.71 | 0.258 | 52.4 |
| 362S137-33 | 33 | 0.236 | 0.80 | 0.479 | 0.264 | 1.42 | 0.0594 | 0.501 | 0.479 | 0.232 | 4.59 | 4.45 | 1024 | 521 | 0.0942 | 0.165 | -1.00 | 0.615 | 1.81 | 0.694 | 34.7 |
| 362S137-43 | 33 | 0.306 | 1.04 | 0.616 | 0.340 | 1.42 | 0.0755 | 0.497 | 0.616 | 0.320 | 6.32 | 6.25 | 1739 | 676 | 0.207 | 0.208 | -0.991 | 0.608 | 1.80 | 0.697 | 34.6 |
| 362S137-43 | 50 | 0.306 | 1.04 | 0.616 | 0.340 | 1.42 | 0.0755 | 0.497 | 0.616 | 0.292 | 8.73 | 8.27 | 2141 | 832 | 0.207 | 0.208 | -0.991 | 0.608 | 1.80 | 0.697 | 28.0 |
| 362S137-54 | 50 | 0.379 | 1.29 | 0.756 | 0.417 | 1.41 | 0.0911 | 0.490 | 0.756 | 0.381 | 11.4 | 11.0 | 3372 | 1016 | 0.405 | 0.251 | -0.978 | 0.601 | 1.79 | 0.700 | 27.9 |
| 362S137-68 | 50 | 0.470 | 1.60 | 0.923 | 0.509 | 1.40 | 0.109 | 0.481 | 0.922 | 0.493 | 14.8 | 14.5 | 4370 | 1004 | 0.797 | 0.302 | -0.959 | 0.592 | 1.77 | 0.704 | 27.8 |
| 362S137-97 ⁶ | 50 | 0.648 | 2.20 | 1.23 | 0.678 | 1.38 | 0.138 | 0.461 | 1.23 | 0.662 | 24.1 ⁶ | 24.1 | 5943 | 875 | 2.23 | 0.390 | -0.922 | 0.573 | 1.72 | 0.713 | 25.1 |
| 362S162-33 | 33 | 0.262 | 0.89 | 0.551 | 0.304 | 1.45 | 0.0993 | 0.616 | 0.551 | 0.268 | 5.29 | 5.18 | 1024 | 521 | 0.105 | 0.297 | -1.31 | 0.789 | 2.05 | 0.592 | 42.6 |
| 362S162-43 | 33 | 0.340 | 1.16 | 0.710 | 0.392 | 1.45 | 0.127 | 0.611 | 0.710 | 0.372 | 7.34 | 7.27 | 1739 | 676 | 0.230 | 0.376 | -1.30 | 0.782 | 2.04 | 0.594 | 42.5 |
| 362S162-43 | 50 | 0.340 | 1.16 | 0.710 | 0.392 | 1.45 | 0.127 | 0.611 | 0.710 | 0.321 | 9.62 | 9.64 | 2141 | 832 | 0.230 | 0.376 | -1.30 | 0.782 | 2.04 | 0.594 | 34.4 |
| 362S162-54 | 50 | 0.422 | 1.44 | 0.873 | 0.482 | 1.44 | 0.154 | 0.604 | 0.873 | 0.444 | 13.3 | 12.8 | 3372 | 1016 | 0.451 | 0.457 | -1.28 | 0.774 | 2.02 | 0.597 | 34.4 |
| 362S162-68 | 50 | 0.524 | 1.78 | 1.070 | 0.590 | 1.43 | 0.186 | 0.596 | 1.07 | 0.574 | 17.2 | 16.9 | 4370 | 1004 | 0.887 | 0.552 | -1.26 | 0.765 | 2.00 | 0.600 | 34.4 |
| 362S162-97 ⁶ | 50 | 0.724 | 2.46 | 1.440 | 0.792 | 1.41 | 0.241 | 0.577 | 1.44 | 0.776 | 27.5 ⁶ | 27.5 | 5943 | 875 | 2.50 | 0.723 | -1.23 | 0.745 | 1.95 | 0.606 | 31.5 |
| 362S162-118 ⁶ | 50 | 0.863 | 2.94 | 1.670 | 0.923 | 1.39 | 0.274 | 0.563 | 1.67 | 0.904 | 33.1 ⁶ | 33.1 | 6996 | 784 | 4.44 | 0.828 | -1.20 | 0.731 | 1.92 | 0.611 | 31.1 |
| 362S200-33 | 33 | 0.297 | 1.01 | 0.648 | 0.358 | 1.48 | 0.177 | 0.772 | 0.637 | 0.294 | 5.81 | 5.96 | 1024 | 521 | 0.118 | 0.577 | -1.74 | 1.03 | 2.41 | 0.478 | 53.6 |
| 362S200-43 | 33 | 0.385 | 1.31 | 0.836 | 0.461 | 1.47 | 0.227 | 0.767 | 0.836 | 0.427 | 8.43 | 8.38 | 1739 | 676 | 0.261 | 0.734 | -1.73 | 1.02 | 2.40 | 0.480 | 53.5 |
| 362S200-43 | 50 | 0.385 | 1.31 | 0.836 | 0.461 | 1.47 | 0.227 | 0.767 | 0.830 | 0.377 | 11.3 | 11.1 | 2141 | 832 | 0.261 | 0.734 | -1.73 | 1.02 | 2.40 | 0.480 | 43.3 |
| 362S200-54 | 50 | 0.478 | 1.63 | 1.030 | 0.568 | 1.47 | 0.277 | 0.761 | 1.03 | 0.490 | 14.7 | 14.8 | 3372 | 1016 | 0.511 | 0.896 | -1.72 | 1.02 | 2.38 | 0.482 | 43.3 |
| 362S200-68 | 50 | 0.595 | 2.03 | 1.270 | 0.698 | 1.46 | 0.337 | 0.753 | 1.27 | 0.666 | 20.0 | 19.6 | 4370 | 1004 | 1.01 | 1.09 | -1.70 | 1.01 | 2.36 | 0.484 | 43.3 |
| 362S200-97 ⁶ | 50 | 0.826 | 2.81 | 1.710 | 0.944 | 1.44 | 0.446 | 0.735 | 1.71 | 0.929 | 32.0 ⁶ | 32.0 | 5943 | 875 | 2.85 | 1.44 | -1.66 | 0.986 | 2.32 | 0.487 | 40.5 |
| 362S200-118 ⁶ | 50 | 0.988 | 3.36 | 2.010 | 1.110 | 1.43 | 0.514 | 0.721 | 2.01 | 1.09 | 38.6 ⁶ | 38.6 | 6996 | 784 | 5.08 | 1.66 | -1.63 | 0.971 | 2.28 | 0.490 | 40.2 |
| 362S250-33 | 33 | 0.331 | 1.13 | 0.760 | 0.419 | 1.51 | 0.299 | 0.951 | 0.716 | 0.315 | 6.23 | 6.36 | 1024 | 521 | 0.132 | 0.965 | -2.21 | 1.28 | 2.84 | 0.395 | 64.2 |
| 362S250-43 | 33 | 0.430 | 1.46 | 0.980 | 0.541 | 1.51 | 0.385 | 0.946 | 0.973 | 0.449 | 8.88 | 9.02 | 1739 | 676 | 0.292 | 1.23 | -2.20 | 1.28 | 2.83 | 0.396 | 64.1 |
| 362S250-43 | 50 | 0.430 | 1.46 | 0.980 | 0.541 | 1.51 | 0.385 | 0.946 | 0.921 | 0.390 | 11.7 | 11.8 | 2141 | 832 | 0.292 | 1.23 | -2.20 | 1.28 | 2.83 | 0.396 | 51.9 |
| 362S250-54 | 50 | 0.535 | 1.82 | 1.210 | 0.668 | 1.50 | 0.473 | 0.940 | 1.16 | 0.514 | 15.4 | 15.8 | 3372 | 1016 | 0.571 | 1.51 | -2.18 | 1.27 | 2.81 | 0.397 | 52.0 |
| 362S250-68 | 50 | 0.666 | 2.27 | 1.490 | 0.822 | 1.50 | 0.578 | 0.931 | 1.48 | 0.689 | 20.6 | 21.2 | 4370 | 1004 | 1.13 | 1.84 | -2.17 | 1.26 | 2.79 | 0.398 | 52.0 |
| 362S250-97 ⁶ | 50 | 0.927 | 3.16 | 2.030 | 1.120 | 1.48 | 0.773 | 0.913 | 2.03 | 1.05 | 35.2 ⁶ | 32.4 | 5943 | 875 | 3.20 | 2.45 | -2.13 | 1.24 | 2.75 | 0.401 | 49.3 |
| 362S250-118 ⁶ | 50 | 1.110 | 3.78 | 2.390 | 1.320 | 1.47 | 0.898 | 0.899 | 2.39 | 1.26 | 43.3 ⁶ | 44.7 | 6996 | 784 | 5.72 | 2.85 | -2.10 | 1.22 | 2.71 | 0.402 | 49.1 |

Table 4 continued on next page.

TABLE 4—C-SHAPE PROPERTIES^{4,5} (Continued)

| MEMBER | F _y (ksi) | GROSS PROPERTIES ³ | | | | | | | EFFECTIVE PROPERTIES ² | | | | | | TORSIONAL PROPERTIES ³ | | | | | L _u (in.) | |
|--------------------------|-------------------------|-------------------------------|-------------------|--------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-------------------------|--------------------------------------|--------------------------------------|---------------------------|---------------------------|-------------------------|---------------------------|-----------------------------------|--------------------------------------|-------------------------|------------|-------------------------|-------------------------|------|
| | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | S _x (in ³) | r _x (in.) | I _y (in ⁴) | r _y (in.) | I _x (in ⁴) | S _x (in ³) | M _{al} (in-k) | M _{ad} (in-k) | V _{ag} (lb) | V _{anet} (lb) | Jx1000 (in ⁴) | C _w (in ⁶) | x _o (in.) | m (in.) | r _o (in.) | | β |
| 400S137-33 | 33 | 0.249 | 0.85 | 0.603 | 0.302 | 1.556 | 0.061 | 0.496 | 0.603 | 0.259 | 5.12 | 4.97 | 976 | 595 | 0.099 | 0.204 | -0.965 | 0.597 | 1.897 | 0.741 | 34.5 |
| 400S137-43 | 33 | 0.323 | 1.10 | 0.776 | 0.388 | 1.551 | 0.078 | 0.491 | 0.776 | 0.359 | 7.09 | 7.02 | 1739 | 810 | 0.219 | 0.257 | -0.954 | 0.591 | 1.886 | 0.744 | 34.3 |
| 400S137-43 | 50 | 0.323 | 1.10 | 0.776 | 0.388 | 1.551 | 0.078 | 0.491 | 0.776 | 0.326 | 9.75 | 9.27 | 2141 | 997 | 0.219 | 0.257 | -0.954 | 0.591 | 1.886 | 0.744 | 27.8 |
| 400S137-54 | 50 | 0.401 | 1.36 | 0.953 | 0.477 | 1.543 | 0.094 | 0.484 | 0.953 | 0.428 | 12.82 | 12.40 | 3372 | 1223 | 0.428 | 0.311 | -0.940 | 0.583 | 1.870 | 0.747 | 27.7 |
| 400S137-68 | 50 | 0.497 | 1.69 | 1.165 | 0.583 | 1.531 | 0.112 | 0.475 | 1.165 | 0.558 | 16.70 | 16.50 | 4871 | 1356 | 0.842 | 0.375 | -0.922 | 0.574 | 1.849 | 0.751 | 27.6 |
| 400S162-33 | 33 | 0.275 | 0.94 | 0.692 | 0.346 | 1.586 | 0.103 | 0.611 | 0.692 | 0.299 | 5.91 | 5.80 | 976 | 595 | 0.110 | 0.363 | -1.263 | 0.768 | 2.118 | 0.644 | 42.3 |
| 400S162-43 | 33 | 0.357 | 1.21 | 0.892 | 0.446 | 1.581 | 0.131 | 0.606 | 0.892 | 0.417 | 8.23 | 8.16 | 1739 | 810 | 0.242 | 0.460 | -1.252 | 0.761 | 2.106 | 0.647 | 42.2 |
| 400S162-43 | 50 | 0.357 | 1.21 | 0.892 | 0.446 | 1.581 | 0.131 | 0.606 | 0.892 | 0.359 | 10.75 | 10.80 | 2141 | 997 | 0.242 | 0.460 | -1.252 | 0.761 | 2.106 | 0.647 | 34.2 |
| 400S162-54 | 50 | 0.443 | 1.51 | 1.098 | 0.549 | 1.574 | 0.159 | 0.600 | 1.098 | 0.497 | 14.89 | 14.40 | 3372 | 1223 | 0.473 | 0.560 | -1.238 | 0.754 | 2.090 | 0.649 | 34.1 |
| 400S162-68 | 50 | 0.550 | 1.87 | 1.346 | 0.673 | 1.564 | 0.192 | 0.591 | 1.346 | 0.648 | 19.41 | 19.10 | 4871 | 1356 | 0.933 | 0.677 | -1.220 | 0.745 | 2.069 | 0.653 | 34.0 |
| 400S162-97 ⁶ | 50 | 0.762 | 2.59 | 1.813 | 0.907 | 1.542 | 0.250 | 0.572 | 1.813 | 0.892 | 31.60 ⁶ | 31.60 | 6658 | 1207 | 2.627 | 0.889 | -1.182 | 0.725 | 2.026 | 0.660 | 31.1 |
| 400S162-118 ⁶ | 50 | 0.910 | 3.10 | 2.119 | 1.059 | 1.526 | 0.283 | 0.558 | 2.118 | 1.042 | 38.10 ⁶ | 38.10 | 7869 | 1102 | 4.679 | 1.020 | -1.154 | 0.711 | 1.993 | 0.665 | 30.7 |
| 400S200-33 | 33 | 0.310 | 1.05 | 0.812 | 0.406 | 1.619 | 0.183 | 0.769 | 0.798 | 0.329 | 6.49 | 6.65 | 976 | 595 | 0.124 | 0.697 | -1.688 | 1.007 | 2.462 | 0.530 | 53.1 |
| 400S200-43 | 33 | 0.402 | 1.37 | 1.048 | 0.524 | 1.615 | 0.235 | 0.764 | 1.047 | 0.478 | 9.45 | 9.38 | 1739 | 810 | 0.272 | 0.886 | -1.676 | 1.000 | 2.450 | 0.532 | 53.0 |
| 400S200-43 | 50 | 0.402 | 1.37 | 1.048 | 0.524 | 1.615 | 0.235 | 0.764 | 1.040 | 0.422 | 12.63 | 12.40 | 2141 | 997 | 0.272 | 0.886 | -1.676 | 1.000 | 2.450 | 0.532 | 43.0 |
| 400S200-54 | 50 | 0.500 | 1.70 | 1.292 | 0.646 | 1.608 | 0.287 | 0.758 | 1.292 | 0.549 | 16.43 | 16.60 | 3372 | 1223 | 0.534 | 1.083 | -1.662 | 0.993 | 2.433 | 0.534 | 42.9 |
| 400S200-68 | 50 | 0.622 | 2.12 | 1.590 | 0.795 | 1.599 | 0.349 | 0.750 | 1.589 | 0.751 | 22.47 | 22.00 | 4871 | 1356 | 1.054 | 1.318 | -1.643 | 0.983 | 2.412 | 0.536 | 42.9 |
| 400S200-97 ⁶ | 50 | 0.864 | 2.94 | 2.155 | 1.078 | 1.580 | 0.463 | 0.732 | 2.155 | 1.063 | 36.70 ⁶ | 36.70 | 6658 | 1207 | 2.978 | 1.749 | -1.605 | 0.963 | 2.368 | 0.541 | 40.0 |
| 400S200-118 ⁶ | 50 | 1.034 | 3.52 | 2.533 | 1.266 | 1.565 | 0.533 | 0.718 | 2.532 | 1.249 | 44.20 ⁶ | 44.30 | 7869 | 1102 | 5.317 | 2.024 | -1.577 | 0.948 | 2.335 | 0.544 | 39.6 |
| 400S250-33 | 33 | 0.344 | 1.17 | 0.948 | 0.474 | 1.660 | 0.310 | 0.949 | 0.894 | 0.352 | 6.95 | 7.07 | 976 | 595 | 0.137 | 1.165 | -2.151 | 1.259 | 2.878 | 0.441 | 63.7 |
| 400S250-43 | 33 | 0.447 | 1.52 | 1.224 | 0.612 | 1.655 | 0.399 | 0.945 | 1.215 | 0.503 | 9.93 | 10.00 | 1739 | 810 | 0.303 | 1.486 | -2.139 | 1.252 | 2.865 | 0.443 | 63.7 |
| 400S250-43 | 50 | 0.447 | 1.52 | 1.224 | 0.612 | 1.655 | 0.399 | 0.945 | 1.151 | 0.436 | 13.06 | 13.10 | 2141 | 997 | 0.303 | 1.486 | -2.139 | 1.252 | 2.865 | 0.443 | 51.6 |
| 400S250-54 | 50 | 0.556 | 1.89 | 1.512 | 0.756 | 1.649 | 0.490 | 0.938 | 1.450 | 0.576 | 17.24 | 17.60 | 3372 | 1223 | 0.594 | 1.821 | -2.124 | 1.244 | 2.848 | 0.444 | 51.6 |
| 400S250-68 | 50 | 0.693 | 2.36 | 1.865 | 0.932 | 1.640 | 0.599 | 0.929 | 1.843 | 0.775 | 23.19 | 23.70 | 4871 | 1356 | 1.174 | 2.225 | -2.105 | 1.235 | 2.826 | 0.445 | 51.6 |
| 400S250-97 ⁶ | 50 | 0.965 | 3.29 | 2.542 | 1.271 | 1.623 | 0.801 | 0.911 | 2.542 | 1.191 | 40.10 ⁶ | 36.40 | 6658 | 1207 | 3.329 | 2.978 | -2.066 | 1.214 | 2.781 | 0.448 | 48.8 |
| 400S250-118 ⁶ | 50 | 1.158 | 3.94 | 2.999 | 1.500 | 1.609 | 0.932 | 0.897 | 2.999 | 1.436 | 49.40 ⁶ | 44.40 | 7869 | 1102 | 5.956 | 3.467 | -2.037 | 1.199 | 2.746 | 0.450 | 48.5 |

Table 4 continued on next page.

TABLE 4—C-SHAPE PROPERTIES^{4,5} (Continued)

| MEMBER | F _y (ksi) | GROSS PROPERTIES ³ | | | | | | | EFFECTIVE PROPERTIES ² | | | | | | TORSIONAL PROPERTIES ³ | | | | | L _u (in.) | |
|--------------------------|-------------------------|-------------------------------|-------------------|--------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-------------------------|--------------------------------------|--------------------------------------|---------------------------|---------------------------|-------------------------|---------------------------|-----------------------------------|--------------------------------------|-------------------------|------------|-------------------------|-------------------------|------|
| | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | S _x (in ³) | r _x (in.) | I _y (in ⁴) | r _y (in.) | I _x (in ⁴) | S _x (in ³) | M _{al} (in-k) | M _{ad} (in-k) | V _{ag} (lb) | V _{anet} (lb) | Jx1000 (in ⁴) | C _w (in ⁶) | X _o (in.) | m (in.) | r _o (in.) | | β |
| 600S137-33 | 33 | 0.318 | 1.08 | 1.582 | 0.527 | 2.230 | 0.069 | 0.464 | 1.540 | 0.455 | 8.98 | 7.76 | 638 | 638 | 0.127 | 0.500 | -0.807 | 0.519 | 2.416 | 0.889 | 33.5 |
| 600S137-43 | 33 | 0.413 | 1.41 | 2.042 | 0.681 | 2.224 | 0.087 | 0.459 | 2.036 | 0.645 | 12.74 | 11.20 | 1415 | 1240 | 0.280 | 0.633 | -0.796 | 0.513 | 2.406 | 0.890 | 33.2 |
| 600S137-43 | 50 | 0.413 | 1.41 | 2.042 | 0.681 | 2.224 | 0.087 | 0.459 | 1.999 | 0.579 | 17.33 | 14.60 | 1415 | 1240 | 0.280 | 0.633 | -0.796 | 0.513 | 2.406 | 0.890 | 27.0 |
| 600S137-54 | 50 | 0.514 | 1.75 | 2.518 | 0.839 | 2.214 | 0.105 | 0.452 | 2.517 | 0.777 | 23.26 | 19.90 | 2822 | 1947 | 0.549 | 0.769 | -0.784 | 0.506 | 2.392 | 0.893 | 26.8 |
| 600S137-68 | 50 | 0.640 | 2.18 | 3.095 | 1.032 | 2.200 | 0.126 | 0.443 | 3.094 | 1.030 | 30.84 | 26.90 | 5350 | 2879 | 1.084 | 0.930 | -0.768 | 0.497 | 2.372 | 0.895 | 26.5 |
| 600S137-97 ⁶ | 50 | 0.889 | 3.03 | 4.189 | 1.396 | 2.171 | 0.159 | 0.423 | 4.188 | 1.396 | 50.80 ⁶ | 41.40 | 10472 | 3805 | 3.066 | 1.216 | -0.734 | 0.480 | 2.330 | 0.901 | 23.6 |
| 600S162-33 | 33 | 0.344 | 1.17 | 1.793 | 0.598 | 2.282 | 0.116 | 0.581 | 1.793 | 0.577 | 11.41 | 9.08 | 638 | 638 | 0.137 | 0.862 | -1.072 | 0.677 | 2.588 | 0.828 | 41.1 |
| 600S162-43 ⁶ | 33 | 0.447 | 1.52 | 2.316 | 0.772 | 2.277 | 0.148 | 0.576 | 2.316 | 0.767 | 16.70 ⁶ | 13.00 | 1415 | 1240 | 0.303 | 1.095 | -1.062 | 0.670 | 2.577 | 0.830 | 39.0 |
| 600S162-43 | 50 | 0.447 | 1.52 | 2.316 | 0.772 | 2.277 | 0.148 | 0.576 | 2.316 | 0.705 | 21.12 | 17.00 | 1415 | 1240 | 0.303 | 1.095 | -1.062 | 0.670 | 2.577 | 0.830 | 33.2 |
| 600S162-54 ⁶ | 50 | 0.556 | 1.89 | 2.861 | 0.954 | 2.268 | 0.181 | 0.570 | 2.860 | 0.915 | 30.30 ⁶ | 23.00 | 2822 | 1947 | 0.594 | 1.337 | -1.049 | 0.663 | 2.563 | 0.833 | 31.4 |
| 600S162-68 ⁶ | 50 | 0.693 | 2.36 | 3.525 | 1.175 | 2.255 | 0.218 | 0.561 | 3.525 | 1.164 | 39.50 ⁶ | 31.10 | 5350 | 2879 | 1.174 | 1.626 | -1.032 | 0.655 | 2.543 | 0.835 | 30.8 |
| 600S162-97 ⁶ | 50 | 0.965 | 3.29 | 4.798 | 1.599 | 2.229 | 0.283 | 0.542 | 4.797 | 1.599 | 56.70 ⁶ | 47.50 | 10472 | 3805 | 3.329 | 2.153 | -0.997 | 0.636 | 2.501 | 0.841 | 29.8 |
| 600S162-118 ⁶ | 50 | 1.158 | 3.94 | 5.654 | 1.885 | 2.209 | 0.322 | 0.527 | 5.653 | 1.884 | 68.90 ⁶ | 68.50 | 12526 | 3622 | 5.956 | 2.487 | -0.971 | 0.623 | 2.470 | 0.846 | 29.1 |
| 600S200-33 | 33 | 0.379 | 1.29 | 2.075 | 0.692 | 2.340 | 0.209 | 0.743 | 2.043 | 0.621 | 12.28 | 10.40 | 638 | 638 | 0.151 | 1.593 | -1.457 | 0.901 | 2.855 | 0.740 | 51.6 |
| 600S200-43 | 33 | 0.492 | 1.67 | 2.683 | 0.894 | 2.335 | 0.268 | 0.739 | 2.683 | 0.873 | 17.24 | 14.90 | 1415 | 1240 | 0.334 | 2.033 | -1.446 | 0.894 | 2.844 | 0.742 | 51.4 |
| 600S200-43 | 50 | 0.492 | 1.67 | 2.683 | 0.894 | 2.335 | 0.268 | 0.739 | 2.666 | 0.807 | 24.17 | 19.40 | 1415 | 1240 | 0.334 | 2.033 | -1.446 | 0.894 | 2.844 | 0.742 | 41.7 |
| 600S200-54 | 50 | 0.613 | 2.09 | 3.320 | 1.107 | 2.327 | 0.329 | 0.732 | 3.319 | 1.015 | 30.39 | 26.30 | 2822 | 1947 | 0.655 | 2.493 | -1.432 | 0.887 | 2.829 | 0.744 | 41.6 |
| 600S200-68 ⁶ | 50 | 0.764 | 2.60 | 4.101 | 1.367 | 2.316 | 0.400 | 0.723 | 4.100 | 1.317 | 43.70 ⁶ | 35.40 | 5350 | 2879 | 1.295 | 3.047 | -1.415 | 0.878 | 2.809 | 0.746 | 39.3 |
| 600S200-97 ⁶ | 50 | 1.067 | 3.63 | 5.613 | 1.871 | 2.293 | 0.530 | 0.705 | 5.612 | 1.871 | 64.50 ⁶ | 55.00 | 10472 | 3805 | 3.679 | 4.080 | -1.378 | 0.859 | 2.767 | 0.752 | 38.3 |
| 600S200-118 ⁶ | 50 | 1.282 | 4.36 | 6.643 | 2.214 | 2.276 | 0.612 | 0.691 | 6.641 | 2.214 | 78.40 ⁶ | 78.00 | 12526 | 3622 | 6.594 | 4.753 | -1.351 | 0.845 | 2.735 | 0.756 | 37.6 |
| 600S250-43 | 33 | 0.537 | 1.83 | 3.083 | 1.028 | 2.396 | 0.458 | 0.923 | 3.062 | 0.918 | 18.14 | 15.70 | 1415 | 1240 | 0.364 | 3.411 | -1.874 | 1.136 | 3.179 | 0.652 | 62.4 |
| 600S250-43 | 50 | 0.537 | 1.83 | 3.083 | 1.028 | 2.396 | 0.458 | 0.923 | 2.912 | 0.818 | 24.51 | 20.30 | 1415 | 1240 | 0.364 | 3.411 | -1.874 | 1.136 | 3.179 | 0.652 | 50.6 |
| 600S250-54 | 50 | 0.670 | 2.28 | 3.820 | 1.273 | 2.389 | 0.562 | 0.917 | 3.663 | 1.069 | 32.00 | 27.60 | 2822 | 1947 | 0.715 | 4.194 | -1.860 | 1.129 | 3.163 | 0.654 | 50.5 |
| 600S250-68 | 50 | 0.836 | 2.84 | 4.728 | 1.576 | 2.379 | 0.688 | 0.908 | 4.667 | 1.386 | 41.49 | 37.50 | 5350 | 2879 | 1.416 | 5.146 | -1.842 | 1.119 | 3.142 | 0.657 | 50.4 |
| 600S250-97 ⁶ | 50 | 1.169 | 3.98 | 6.497 | 2.166 | 2.358 | 0.923 | 0.889 | 6.496 | 2.063 | 69.40 ⁶ | 59.00 | 10472 | 3805 | 4.030 | 6.947 | -1.803 | 1.100 | 3.099 | 0.661 | 47.3 |
| 600S250-118 ⁶ | 50 | 1.407 | 4.79 | 7.715 | 2.572 | 2.342 | 1.076 | 0.874 | 7.713 | 2.498 | 85.90 ⁶ | 75.20 | 12526 | 3622 | 7.233 | 8.142 | -1.775 | 1.085 | 3.066 | 0.665 | 46.7 |
| 600S300-54 | 50 | 0.726 | 2.47 | 4.320 | 1.440 | 2.439 | 0.875 | 1.098 | 3.939 | 1.106 | 33.13 | 28.50 | 2822 | 1947 | 0.775 | 6.452 | -2.299 | 1.372 | 3.527 | 0.575 | 59.1 |
| 600S300-68 | 50 | 0.907 | 3.09 | 5.354 | 1.785 | 2.430 | 1.075 | 1.089 | 5.064 | 1.446 | 43.30 | 38.90 | 5350 | 2879 | 1.537 | 7.937 | -2.280 | 1.363 | 3.506 | 0.577 | 58.9 |
| 600S300-97 | 50 | 1.271 | 4.32 | 7.382 | 2.461 | 2.410 | 1.454 | 1.070 | 7.251 | 2.247 | 67.28 | 62.00 | 10472 | 3805 | 4.381 | 10.776 | -2.241 | 1.343 | 3.461 | 0.581 | 58.8 |
| 600S300-118 ⁶ | 50 | 1.531 | 5.21 | 8.787 | 2.929 | 2.396 | 1.704 | 1.055 | 8.785 | 2.797 | 94.20 ⁶ | 79.70 | 12526 | 3622 | 7.872 | 12.684 | -2.212 | 1.328 | 3.427 | 0.583 | 55.3 |

Table 4 continued on next page.

TABLE 4—C-SHAPE PROPERTIES^{4,5} (Continued)

| MEMBER | F _y (ksi) | GROSS PROPERTIES ³ | | | | | | | EFFECTIVE PROPERTIES ² | | | | | | TORSIONAL PROPERTIES ³ | | | | | L _u (in.) | |
|--------------------------|-------------------------|-------------------------------|-------------------|--------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-------------------------|--------------------------------------|--------------------------------------|---------------------------|---------------------------|-------------------------|---------------------------|-----------------------------------|--------------------------------------|-------------------------|------------|-------------------------|-------------------------|------|
| | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | S _x (in ³) | r _x (in.) | I _y (in ⁴) | r _y (in.) | I _x (in ⁴) | S _x (in ³) | M _{al} (in-k) | M _{ad} (in-k) | V _{ag} (lb) | V _{anet} (lb) | Jx1000 (in ⁴) | C _w (in ⁶) | x _o (in.) | m (in.) | r _o (in.) | | β |
| 800S137-33 ¹ | 33 | 0.388 | 1.32 | 3.199 | 0.800 | 2.873 | 0.073 | 0.435 | 2.972 | 0.622 | 12.29 | 10.20 | 474 | 474 | 0.155 | 0.957 | -0.696 | 0.460 | 2.988 | 0.946 | 32.5 |
| 800S137-43 | 33 | 0.503 | 1.71 | 4.135 | 1.034 | 2.866 | 0.093 | 0.430 | 3.981 | 0.896 | 17.70 | 15.00 | 1051 | 1051 | 0.341 | 1.214 | -0.687 | 0.454 | 2.979 | 0.947 | 32.2 |
| 800S137-43 | 50 | 0.503 | 1.71 | 4.135 | 1.034 | 2.866 | 0.093 | 0.430 | 3.872 | 0.795 | 23.80 | 19.30 | 1051 | 1051 | 0.341 | 1.214 | -0.687 | 0.454 | 2.979 | 0.947 | 26.2 |
| 800S137-54 | 50 | 0.627 | 2.13 | 5.111 | 1.278 | 2.855 | 0.112 | 0.423 | 4.940 | 1.083 | 32.42 | 26.80 | 2091 | 2091 | 0.670 | 1.478 | -0.676 | 0.448 | 2.964 | 0.948 | 25.9 |
| 800S137-68 | 50 | 0.782 | 2.66 | 6.305 | 1.576 | 2.839 | 0.134 | 0.414 | 6.265 | 1.468 | 43.96 | 37.10 | 4220 | 3367 | 1.325 | 1.789 | -0.661 | 0.440 | 2.944 | 0.950 | 25.6 |
| 800S137-97 | 50 | 1.093 | 3.72 | 8.600 | 2.150 | 2.806 | 0.170 | 0.394 | 8.597 | 2.149 | 64.35 | 59.70 | 10885 | 5938 | 3.767 | 2.349 | -0.630 | 0.423 | 2.902 | 0.953 | 25.0 |
| 800S162-33 ¹ | 33 | 0.413 | 1.41 | 3.583 | 0.896 | 2.944 | 0.125 | 0.550 | 3.361 | 0.710 | 14.03 | 12.20 | 474 | 474 | 0.165 | 1.630 | -0.936 | 0.607 | 3.138 | 0.911 | 40.1 |
| 800S162-43 | 33 | 0.537 | 1.83 | 4.635 | 1.159 | 2.938 | 0.160 | 0.546 | 4.483 | 1.019 | 20.14 | 17.60 | 1051 | 1051 | 0.364 | 2.076 | -0.926 | 0.601 | 3.128 | 0.912 | 39.8 |
| 800S162-43 | 50 | 0.537 | 1.83 | 4.635 | 1.159 | 2.938 | 0.160 | 0.546 | 4.377 | 0.866 | 25.93 | 22.80 | 1051 | 1051 | 0.364 | 2.076 | -0.926 | 0.601 | 3.128 | 0.912 | 32.3 |
| 800S162-54 | 50 | 0.670 | 2.28 | 5.737 | 1.434 | 2.927 | 0.194 | 0.539 | 5.568 | 1.229 | 36.79 | 31.30 | 2091 | 2091 | 0.715 | 2.539 | -0.914 | 0.594 | 3.114 | 0.914 | 32.1 |
| 800S162-68 | 50 | 0.836 | 2.84 | 7.091 | 1.773 | 2.913 | 0.235 | 0.530 | 7.052 | 1.663 | 49.80 | 42.90 | 4220 | 3367 | 1.416 | 3.093 | -0.898 | 0.586 | 3.094 | 0.916 | 31.9 |
| 800S162-97 | 50 | 1.169 | 3.98 | 9.716 | 2.429 | 2.883 | 0.305 | 0.511 | 9.713 | 2.428 | 72.70 | 68.40 | 10885 | 5938 | 4.030 | 4.114 | -0.866 | 0.568 | 3.053 | 0.920 | 31.4 |
| 800S162-118 ⁶ | 50 | 1.407 | 4.79 | 11.507 | 2.877 | 2.860 | 0.347 | 0.496 | 11.504 | 2.876 | 105.00 ⁶ | 105.00 | 16235 | 7115 | 7.233 | 4.766 | -0.842 | 0.556 | 3.023 | 0.922 | 28.0 |
| 800S200-43 | 33 | 0.582 | 1.98 | 5.303 | 1.326 | 3.018 | 0.292 | 0.708 | 5.302 | 1.293 | 25.55 | 20.30 | 1051 | 1051 | 0.395 | 3.797 | -1.277 | 0.811 | 3.353 | 0.855 | 50.3 |
| 800S200-43 | 50 | 0.582 | 1.98 | 5.303 | 1.326 | 3.018 | 0.292 | 0.708 | 5.272 | 1.066 | 31.91 | 26.30 | 1051 | 1051 | 0.395 | 3.797 | -1.277 | 0.811 | 3.353 | 0.855 | 40.9 |
| 800S200-54 | 50 | 0.726 | 2.47 | 6.574 | 1.644 | 3.009 | 0.357 | 0.701 | 6.572 | 1.499 | 44.88 | 36.00 | 2091 | 2091 | 0.775 | 4.663 | -1.265 | 0.804 | 3.338 | 0.856 | 40.7 |
| 800S200-68 ⁶ | 50 | 0.907 | 3.09 | 8.142 | 2.036 | 2.996 | 0.435 | 0.692 | 8.140 | 1.964 | 65.20 ⁶ | 49.10 | 4220 | 3367 | 1.537 | 5.712 | -1.248 | 0.796 | 3.319 | 0.859 | 38.4 |
| 800S200-97 ⁶ | 50 | 1.271 | 4.32 | 11.206 | 2.801 | 2.970 | 0.576 | 0.674 | 11.203 | 2.801 | 96.60 ⁶ | 77.90 | 10885 | 5938 | 4.381 | 7.684 | -1.214 | 0.777 | 3.278 | 0.863 | 37.2 |
| 800S200-118 ⁶ | 50 | 1.531 | 5.21 | 13.319 | 3.330 | 2.950 | 0.666 | 0.659 | 13.315 | 3.329 | 118.00 ⁶ | 99.30 | 16235 | 7115 | 7.872 | 8.981 | -1.188 | 0.764 | 3.248 | 0.866 | 36.5 |
| 800S250-43 | 33 | 0.627 | 2.13 | 6.017 | 1.504 | 3.097 | 0.500 | 0.893 | 5.979 | 1.314 | 25.96 | 21.40 | 1051 | 1051 | 0.425 | 6.374 | -1.675 | 1.043 | 3.632 | 0.787 | 61.5 |
| 800S250-43 | 50 | 0.627 | 2.13 | 6.017 | 1.504 | 3.097 | 0.500 | 0.893 | 5.693 | 1.080 | 32.32 | 27.50 | 1051 | 1051 | 0.425 | 6.374 | -1.675 | 1.043 | 3.632 | 0.787 | 49.9 |
| 800S250-54 | 50 | 0.783 | 2.66 | 7.467 | 1.867 | 3.089 | 0.614 | 0.886 | 7.171 | 1.525 | 45.67 | 37.70 | 2091 | 2091 | 0.836 | 7.850 | -1.661 | 1.036 | 3.617 | 0.789 | 49.8 |
| 800S250-68 | 50 | 0.978 | 3.33 | 9.263 | 2.316 | 3.077 | 0.752 | 0.877 | 9.141 | 2.059 | 61.65 | 51.70 | 4220 | 3367 | 1.658 | 9.653 | -1.644 | 1.027 | 3.597 | 0.791 | 49.6 |
| 800S250-97 ⁶ | 50 | 1.372 | 4.67 | 12.792 | 3.198 | 3.053 | 1.009 | 0.857 | 12.789 | 3.053 | 103.00 ⁶ | 82.90 | 10885 | 5938 | 4.731 | 13.091 | -1.607 | 1.008 | 3.555 | 0.796 | 46.4 |
| 800S250-118 ⁶ | 50 | 1.655 | 5.63 | 15.245 | 3.811 | 3.035 | 1.176 | 0.843 | 15.241 | 3.706 | 128.00 ⁶ | 107.00 | 16235 | 7115 | 8.510 | 15.395 | -1.580 | 0.994 | 3.524 | 0.799 | 45.6 |
| 800S300-54 | 50 | 0.839 | 2.86 | 8.360 | 2.090 | 3.156 | 0.959 | 1.069 | 7.666 | 1.535 | 45.97 | 38.80 | 2091 | 2091 | 0.896 | 12.076 | -2.073 | 1.271 | 3.924 | 0.721 | 58.6 |
| 800S300-68 | 50 | 1.050 | 3.57 | 10.383 | 2.596 | 3.145 | 1.179 | 1.060 | 9.842 | 2.145 | 64.21 | 53.40 | 4220 | 3367 | 1.778 | 14.888 | -2.055 | 1.262 | 3.904 | 0.723 | 58.4 |
| 800S300-97 | 50 | 1.474 | 5.02 | 14.378 | 3.594 | 3.123 | 1.595 | 1.040 | 14.120 | 3.304 | 98.91 | 86.30 | 10885 | 5938 | 5.082 | 20.304 | -2.017 | 1.243 | 3.861 | 0.727 | 58.1 |
| 800S300-118 ⁶ | 50 | 1.779 | 6.06 | 17.170 | 4.293 | 3.106 | 1.871 | 1.026 | 17.167 | 4.108 | 138.00 ⁶ | 112.00 | 16235 | 7115 | 9.149 | 23.979 | -1.989 | 1.229 | 3.829 | 0.730 | 54.5 |

Table 4 continued on next page.

TABLE 4—C-SHAPE PROPERTIES^{4,5} (Continued)

| MEMBER | F _y (ksi) | GROSS PROPERTIES ³ | | | | | | | EFFECTIVE PROPERTIES ² | | | | | | TORSIONAL PROPERTIES ³ | | | | | L _u (in.) | |
|---------------------------|-------------------------|-------------------------------|-------------------|--------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-------------------------|--------------------------------------|--------------------------------------|---------------------------|---------------------------|-------------------------|---------------------------|-----------------------------------|--------------------------------------|-------------------------|------------|-------------------------|-------------------------|------|
| | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | S _x (in ³) | r _x (in.) | I _y (in ⁴) | r _y (in.) | I _x (in ⁴) | S _x (in ³) | M _{al} (in-k) | M _{ad} (in-k) | V _{ag} (lb) | V _{anet} (lb) | Jx1000 (in ⁴) | C _w (in ⁶) | x _o (in.) | m (in.) | r _o (in.) | | β |
| 1000S162-33 ¹ | 33 | 0.483 | 1.64 | 6.200 | 1.240 | 3.584 | 0.132 | 0.522 | 5.558 | 0.900 | 17.79 | 14.80 | 377 | 377 | 0.193 | 2.692 | -0.832 | 0.550 | 3.716 | 0.950 | 39.1 |
| 1000S162-43 ¹ | 33 | 0.627 | 2.13 | 8.028 | 1.606 | 3.577 | 0.168 | 0.518 | 7.479 | 1.302 | 25.74 | 21.70 | 836 | 836 | 0.425 | 3.430 | -0.823 | 0.545 | 3.707 | 0.951 | 38.8 |
| 1000S162-43 ¹ | 50 | 0.627 | 2.13 | 8.028 | 1.606 | 3.577 | 0.168 | 0.518 | 7.255 | 1.099 | 32.91 | 27.80 | 836 | 836 | 0.425 | 3.430 | -0.823 | 0.545 | 3.707 | 0.951 | 31.5 |
| 1000S162-54 | 50 | 0.783 | 2.66 | 9.953 | 1.991 | 3.566 | 0.204 | 0.511 | 9.310 | 1.572 | 47.06 | 38.70 | 1660 | 1660 | 0.836 | 4.198 | -0.812 | 0.538 | 3.693 | 0.952 | 31.3 |
| 1000S162-68 | 50 | 0.978 | 3.33 | 12.329 | 2.466 | 3.550 | 0.247 | 0.502 | 11.919 | 2.155 | 64.51 | 53.80 | 3345 | 3345 | 1.658 | 5.121 | -0.798 | 0.531 | 3.673 | 0.953 | 31.0 |
| 1000S162-97 | 50 | 1.372 | 4.67 | 16.972 | 3.394 | 3.517 | 0.320 | 0.483 | 16.966 | 3.269 | 97.89 | 88.00 | 9862 | 7175 | 4.731 | 6.827 | -0.768 | 0.514 | 3.632 | 0.955 | 30.4 |
| 1000S162-118 | 50 | 1.655 | 5.63 | 20.175 | 4.035 | 3.491 | 0.364 | 0.469 | 20.168 | 4.034 | 120.77 | 115.00 | 16235 | 9536 | 8.510 | 7.924 | -0.746 | 0.502 | 3.601 | 0.957 | 30.0 |
| 1000S200-43 ¹ | 33 | 0.672 | 2.29 | 9.088 | 1.818 | 3.676 | 0.309 | 0.677 | 8.550 | 1.470 | 29.05 | 25.40 | 836 | 836 | 0.456 | 6.236 | -1.147 | 0.743 | 3.910 | 0.914 | 49.3 |
| 1000S200-43 ¹ | 50 | 0.672 | 2.29 | 9.088 | 1.818 | 3.676 | 0.309 | 0.677 | 8.273 | 1.270 | 38.03 | 32.70 | 836 | 836 | 0.456 | 6.236 | -1.147 | 0.743 | 3.910 | 0.914 | 40.0 |
| 1000S200-54 | 50 | 0.839 | 2.86 | 11.281 | 2.256 | 3.666 | 0.378 | 0.671 | 10.651 | 1.705 | 51.05 | 45.10 | 1660 | 1660 | 0.896 | 7.665 | -1.135 | 0.737 | 3.896 | 0.915 | 39.8 |
| 1000S200-68 | 50 | 1.050 | 3.57 | 13.998 | 2.800 | 3.652 | 0.460 | 0.662 | 13.594 | 2.420 | 72.46 | 62.20 | 3345 | 3345 | 1.778 | 9.401 | -1.120 | 0.729 | 3.877 | 0.917 | 39.6 |
| 1000S200-97 | 50 | 1.474 | 5.02 | 19.341 | 3.868 | 3.622 | 0.610 | 0.643 | 19.335 | 3.741 | 112.00 | 101.00 | 9862 | 7175 | 5.082 | 12.679 | -1.087 | 0.711 | 3.836 | 0.920 | 39.0 |
| 1000S200-118 | 50 | 1.779 | 6.06 | 23.058 | 4.612 | 3.600 | 0.704 | 0.629 | 23.051 | 4.610 | 138.03 | 131.00 | 16235 | 9536 | 9.149 | 14.848 | -1.064 | 0.699 | 3.806 | 0.922 | 38.7 |
| 1000S250-43 ¹ | 33 | 0.717 | 2.44 | 10.205 | 2.041 | 3.771 | 0.531 | 0.860 | 10.145 | 1.617 | 31.95 | 26.80 | 836 | 836 | 0.486 | 10.481 | -1.518 | 0.965 | 4.155 | 0.867 | 60.7 |
| 1000S250-43 ¹ | 50 | 0.717 | 2.44 | 10.205 | 2.041 | 3.771 | 0.531 | 0.860 | 9.136 | 1.342 | 40.19 | 34.30 | 836 | 836 | 0.486 | 10.481 | -1.518 | 0.965 | 4.155 | 0.867 | 49.3 |
| 1000S250-54 | 50 | 0.896 | 3.05 | 12.680 | 2.536 | 3.762 | 0.653 | 0.854 | 12.202 | 1.879 | 56.27 | 47.60 | 1660 | 1660 | 0.957 | 12.922 | -1.505 | 0.958 | 4.141 | 0.868 | 49.1 |
| 1000S250-68 | 50 | 1.121 | 3.81 | 15.755 | 3.151 | 3.749 | 0.799 | 0.844 | 15.553 | 2.769 | 82.90 | 65.70 | 3345 | 3345 | 1.899 | 15.909 | -1.488 | 0.950 | 4.121 | 0.870 | 48.8 |
| 1000S250-97 ⁶ | 50 | 1.576 | 5.36 | 21.832 | 4.366 | 3.722 | 1.073 | 0.825 | 21.826 | 4.181 | 141.00 ⁶ | 107.00 | 9862 | 7175 | 5.432 | 21.632 | -1.454 | 0.932 | 4.080 | 0.873 | 45.6 |
| 1000S250-118 ⁶ | 50 | 1.903 | 6.48 | 26.086 | 5.217 | 3.702 | 1.250 | 0.810 | 26.079 | 5.082 | 175.00 ⁶ | 140.00 | 16235 | 9536 | 9.788 | 25.490 | -1.428 | 0.918 | 4.050 | 0.876 | 44.8 |
| 1000S300-54 | 50 | 0.953 | 3.24 | 14.079 | 2.816 | 3.845 | 1.024 | 1.037 | 12.824 | 1.903 | 56.96 | 49.00 | 1660 | 1660 | 1.017 | 19.888 | -1.892 | 1.185 | 4.409 | 0.816 | 58.0 |
| 1000S300-68 | 50 | 1.192 | 4.06 | 17.512 | 3.502 | 3.833 | 1.258 | 1.027 | 16.643 | 2.803 | 83.91 | 68.00 | 3345 | 3345 | 2.020 | 24.551 | -1.874 | 1.176 | 4.389 | 0.818 | 57.8 |
| 1000S300-97 | 50 | 1.677 | 5.71 | 24.323 | 4.865 | 3.808 | 1.702 | 1.007 | 23.895 | 4.498 | 134.68 | 111.00 | 9862 | 7175 | 5.783 | 33.570 | -1.838 | 1.158 | 4.347 | 0.821 | 57.4 |
| 1000S300-118 ⁶ | 50 | 2.028 | 6.90 | 29.114 | 5.823 | 3.789 | 1.997 | 0.992 | 29.108 | 5.586 | 188.00 ⁶ | 146.00 | 16235 | 9536 | 10.426 | 39.725 | -1.811 | 1.144 | 4.316 | 0.824 | 53.8 |
| 1000S350-54 | 50 | 1.052 | 3.58 | 16.223 | 3.245 | 3.928 | 1.768 | 1.297 | 15.099 | 2.328 | 69.70 | 60.70 | 1660 | 1660 | 1.123 | 36.575 | -2.546 | 1.566 | 4.857 | 0.725 | 72.2 |
| 1000S350-68 | 50 | 1.317 | 4.48 | 20.208 | 4.042 | 3.917 | 2.185 | 1.288 | 19.745 | 3.418 | 102.33 | 83.70 | 3345 | 3345 | 2.232 | 45.277 | -2.529 | 1.557 | 4.837 | 0.727 | 72.0 |
| 1000S350-97 | 50 | 1.855 | 6.31 | 28.152 | 5.630 | 3.895 | 2.992 | 1.270 | 28.146 | 5.118 | 153.24 | 136.00 | 9862 | 7175 | 6.397 | 62.280 | -2.492 | 1.538 | 4.795 | 0.730 | 71.6 |
| 1000S350-118 ⁶ | 50 | 2.245 | 7.64 | 33.777 | 6.755 | 3.879 | 3.543 | 1.256 | 33.770 | 6.426 | 213.00 ⁶ | 176.00 | 16235 | 9536 | 11.544 | 74.030 | -2.465 | 1.524 | 4.764 | 0.732 | 67.8 |
| 1200S162-43 ¹ | 33 | 0.717 | 2.44 | 12.676 | 2.113 | 4.203 | 0.174 | 0.493 | 11.338 | 1.585 | 31.32 | 25.10 | 694 | 694 | 0.486 | 5.177 | -0.742 | 0.499 | 4.297 | 0.970 | 37.8 |
| 1200S162-43 ¹ | 50 | 0.717 | 2.44 | 12.676 | 2.113 | 4.203 | 0.174 | 0.493 | 10.943 | 1.332 | 39.88 | 32.00 | 694 | 694 | 0.486 | 5.177 | -0.742 | 0.499 | 4.297 | 0.970 | 30.7 |
| 1200S162-54 ¹ | 50 | 0.896 | 3.05 | 15.735 | 2.623 | 4.191 | 0.212 | 0.486 | 14.138 | 1.914 | 57.31 | 45.00 | 1377 | 1377 | 0.957 | 6.340 | -0.732 | 0.493 | 4.282 | 0.971 | 30.5 |
| 1200S162-68 | 50 | 1.121 | 3.81 | 19.524 | 3.254 | 4.174 | 0.255 | 0.477 | 18.256 | 2.645 | 79.19 | 63.30 | 2770 | 2770 | 1.899 | 7.739 | -0.719 | 0.485 | 4.262 | 0.972 | 30.2 |
| 1200S162-97 | 50 | 1.576 | 5.36 | 26.974 | 4.496 | 4.138 | 0.332 | 0.459 | 26.610 | 4.091 | 122.49 | 106.00 | 8145 | 7410 | 5.432 | 10.331 | -0.691 | 0.470 | 4.220 | 0.973 | 29.5 |
| 1200S162-118 | 50 | 1.903 | 6.48 | 32.155 | 5.359 | 4.110 | 0.377 | 0.445 | 32.143 | 5.168 | 154.73 | 140.00 | 14982 | 11034 | 9.788 | 12.002 | -0.670 | 0.459 | 4.188 | 0.974 | 29.0 |

Table 4 continued on next page.

TABLE 4—C-SHAPE PROPERTIES^{4,5} (Continued)

| MEMBER | F _y (ksi) | GROSS PROPERTIES ³ | | | | | | | EFFECTIVE PROPERTIES ² | | | | | | TORSIONAL PROPERTIES ³ | | | | | L _u (in.) | |
|---------------------------|-------------------------|-------------------------------|-------------------|--------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-------------------------|--------------------------------------|--------------------------------------|---------------------------|---------------------------|-------------------------|---------------------------|-----------------------------------|--------------------------------------|-------------------------|------------|-------------------------|-------------------------|------|
| | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | S _x (in ³) | r _x (in.) | I _y (in ⁴) | r _y (in.) | I _x (in ⁴) | S _x (in ³) | M _{al} (in-k) | M _{ad} (in-k) | V _{ag} (lb) | V _{anet} (lb) | Jx1000 (in ⁴) | C _w (in ⁶) | x _o (in.) | m (in.) | r _o (in.) | | β |
| 1200S200-54 ¹ | 50 | 0.953 | 3.24 | 17.668 | 2.945 | 4.307 | 0.394 | 0.643 | 16.104 | 2.073 | 62.06 | 53.10 | 1377 | 1377 | 1.017 | 11.550 | -1.032 | 0.681 | 4.475 | 0.947 | 39.0 |
| 1200S200-68 | 50 | 1.192 | 4.06 | 21.954 | 3.659 | 4.291 | 0.479 | 0.634 | 20.708 | 2.963 | 88.71 | 74.00 | 2770 | 2770 | 2.020 | 14.176 | -1.017 | 0.673 | 4.456 | 0.948 | 38.7 |
| 1200S200-97 | 50 | 1.677 | 5.71 | 30.425 | 5.071 | 4.259 | 0.635 | 0.615 | 30.066 | 4.660 | 139.51 | 122.00 | 8145 | 7410 | 5.783 | 19.150 | -0.987 | 0.656 | 4.415 | 0.950 | 38.1 |
| 1200S200-118 | 50 | 2.028 | 6.90 | 36.357 | 6.060 | 4.234 | 0.733 | 0.601 | 36.345 | 5.865 | 175.59 | 160.00 | 14982 | 11034 | 10.426 | 22.451 | -0.964 | 0.644 | 4.384 | 0.952 | 37.7 |
| 1200S250-54 ¹ | 50 | 1.009 | 3.43 | 19.686 | 3.281 | 4.417 | 0.683 | 0.823 | 17.261 | 2.149 | 64.34 | 56.60 | 1377 | 1377 | 1.078 | 19.505 | -1.378 | 0.892 | 4.699 | 0.914 | 48.3 |
| 1200S250-68 | 50 | 1.263 | 4.30 | 24.490 | 4.082 | 4.403 | 0.836 | 0.813 | 22.905 | 3.007 | 90.04 | 79.00 | 2770 | 2770 | 2.141 | 24.034 | -1.362 | 0.884 | 4.680 | 0.915 | 48.1 |
| 1200S250-97 | 50 | 1.779 | 6.05 | 34.025 | 5.671 | 4.373 | 1.122 | 0.794 | 33.668 | 5.037 | 150.82 | 131.00 | 8145 | 7410 | 6.134 | 32.734 | -1.329 | 0.867 | 4.639 | 0.918 | 47.5 |
| 1200S250-118 | 50 | 2.152 | 7.32 | 40.736 | 6.789 | 4.351 | 1.307 | 0.779 | 40.724 | 6.540 | 195.82 | 172.00 | 14982 | 11034 | 11.065 | 38.619 | -1.305 | 0.854 | 4.609 | 0.920 | 47.1 |
| 1200S300-54 ¹ | 50 | 1.066 | 3.63 | 21.704 | 3.617 | 4.513 | 1.074 | 1.004 | 18.842 | 2.273 | 68.04 | 58.70 | 1377 | 1377 | 1.138 | 30.051 | -1.743 | 1.111 | 4.941 | 0.876 | 57.4 |
| 1200S300-68 | 50 | 1.335 | 4.54 | 27.026 | 4.504 | 4.500 | 1.320 | 0.994 | 25.752 | 3.318 | 99.33 | 82.10 | 2770 | 2770 | 2.262 | 37.127 | -1.726 | 1.103 | 4.921 | 0.877 | 57.2 |
| 1200S300-97 | 50 | 1.881 | 6.40 | 37.624 | 6.271 | 4.473 | 1.786 | 0.975 | 36.984 | 5.830 | 174.56 | 136.00 | 8145 | 7410 | 6.484 | 50.853 | -1.691 | 1.085 | 4.880 | 0.880 | 56.7 |
| 1200S300-118 ⁶ | 50 | 2.276 | 7.75 | 45.116 | 7.519 | 4.452 | 2.096 | 0.960 | 45.103 | 7.231 | 244.00 ⁶ | 180.00 | 14982 | 11034 | 11.703 | 60.251 | -1.666 | 1.071 | 4.849 | 0.882 | 53.0 |
| 1200S350-54 ¹ | 50 | 1.165 | 3.96 | 24.866 | 4.144 | 4.620 | 1.866 | 1.266 | 22.233 | 2.788 | 83.47 | 73.30 | 1377 | 1377 | 1.244 | 54.279 | -2.363 | 1.478 | 5.342 | 0.804 | 71.4 |
| 1200S350-68 | 50 | 1.459 | 4.97 | 31.002 | 5.167 | 4.609 | 2.306 | 1.257 | 30.331 | 4.062 | 121.61 | 101.00 | 2770 | 2770 | 2.473 | 67.251 | -2.346 | 1.469 | 5.322 | 0.806 | 71.2 |
| 1200S350-97 | 50 | 2.059 | 7.01 | 43.277 | 7.213 | 4.585 | 3.159 | 1.239 | 43.267 | 6.590 | 197.30 | 166.00 | 8145 | 7410 | 7.098 | 92.673 | -2.310 | 1.450 | 5.281 | 0.809 | 70.8 |
| 1200S350-118 ⁶ | 50 | 2.493 | 8.49 | 52.002 | 8.667 | 4.567 | 3.741 | 1.225 | 51.990 | 8.259 | 274.00 ⁶ | 217.00 | 14982 | 11034 | 12.821 | 110.302 | -2.284 | 1.436 | 5.251 | 0.811 | 66.9 |
| | | | | | | | | | | | | | | | | | | | | | |
| 1400S162-54 ¹ | 50 | 1.009 | 3.43 | 23.311 | 3.330 | 4.806 | 0.218 | 0.464 | 20.091 | 2.256 | 67.53 | 50.20 | 1176 | 1176 | 1.078 | 8.980 | -0.667 | 0.454 | 4.874 | 0.981 | 29.7 |
| 1400S162-68 | 50 | 1.263 | 4.30 | 28.963 | 4.138 | 4.788 | 0.262 | 0.456 | 26.125 | 3.135 | 93.85 | 71.50 | 2364 | 2364 | 2.141 | 10.966 | -0.654 | 0.447 | 4.854 | 0.982 | 29.4 |
| 1400S162-97 | 50 | 1.779 | 6.05 | 40.130 | 5.733 | 4.749 | 0.341 | 0.438 | 38.613 | 4.914 | 147.14 | 122.00 | 6938 | 6938 | 6.134 | 14.651 | -0.628 | 0.433 | 4.811 | 0.983 | 28.7 |
| 1400S162-118 | 50 | 2.152 | 7.32 | 47.944 | 6.849 | 4.720 | 0.387 | 0.424 | 47.537 | 6.282 | 188.07 | 162.00 | 12743 | 11285 | 11.065 | 17.032 | -0.609 | 0.422 | 4.778 | 0.984 | 28.2 |
| 1400S200-54 ¹ | 50 | 1.066 | 3.63 | 25.960 | 3.709 | 4.936 | 0.406 | 0.617 | 22.812 | 2.440 | 73.05 | 59.90 | 1176 | 1176 | 1.138 | 16.355 | -0.946 | 0.633 | 5.063 | 0.965 | 38.2 |
| 1400S200-68 | 50 | 1.335 | 4.54 | 32.295 | 4.614 | 4.919 | 0.494 | 0.608 | 29.512 | 3.504 | 104.92 | 84.40 | 2364 | 2364 | 2.262 | 20.083 | -0.932 | 0.625 | 5.043 | 0.966 | 37.9 |
| 1400S200-97 | 50 | 1.881 | 6.40 | 44.867 | 6.410 | 4.884 | 0.655 | 0.590 | 43.369 | 5.580 | 167.06 | 142.00 | 6938 | 6938 | 6.484 | 27.156 | -0.904 | 0.609 | 5.002 | 0.967 | 37.3 |
| 1400S200-118 | 50 | 2.276 | 7.75 | 53.715 | 7.674 | 4.858 | 0.756 | 0.576 | 53.310 | 7.096 | 212.47 | 188.00 | 12743 | 11285 | 11.703 | 31.861 | -0.883 | 0.598 | 4.971 | 0.968 | 36.8 |
| 1400S250-54 ¹ | 50 | 1.122 | 3.82 | 28.711 | 4.102 | 5.058 | 0.707 | 0.794 | 24.330 | 2.527 | 75.65 | 64.70 | 1176 | 1176 | 1.199 | 27.675 | -1.272 | 0.835 | 5.275 | 0.942 | 47.6 |
| 1400S250-68 | 50 | 1.406 | 4.78 | 35.753 | 5.108 | 5.043 | 0.865 | 0.784 | 32.488 | 3.550 | 106.29 | 91.00 | 2364 | 2364 | 2.383 | 34.118 | -1.256 | 0.827 | 5.256 | 0.943 | 47.3 |
| 1400S250-97 | 50 | 1.982 | 6.75 | 49.778 | 7.111 | 5.011 | 1.161 | 0.765 | 48.297 | 6.010 | 179.94 | 153.00 | 6938 | 6938 | 6.835 | 46.520 | -1.225 | 0.811 | 5.215 | 0.945 | 46.7 |
| 1400S250-118 | 50 | 2.400 | 8.17 | 59.693 | 8.528 | 4.987 | 1.353 | 0.751 | 59.291 | 7.880 | 235.92 | 203.00 | 12743 | 11285 | 12.342 | 54.927 | -1.202 | 0.798 | 5.184 | 0.946 | 46.2 |

Table 4 continued on next page.

TABLE 4—C-SHAPE PROPERTIES^{4,5} (Continued)

| MEMBER | F _y (ksi) | GROSS PROPERTIES ³ | | | | | | | EFFECTIVE PROPERTIES ² | | | | | | TORSIONAL PROPERTIES ³ | | | | | L _u (in.) | |
|---------------------------|-------------------------|-------------------------------|-------------------|--------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-------------------------|--------------------------------------|--------------------------------------|---------------------------|---------------------------|-------------------------|---------------------------|-----------------------------------|--------------------------------------|-------------------------|------------|-------------------------|-------------------------|------|
| | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | S _x (in ³) | r _x (in.) | I _y (in ⁴) | r _y (in.) | I _x (in ⁴) | S _x (in ³) | M _{al} (in-k) | M _{ad} (in-k) | V _{ag} (lb) | V _{anet} (lb) | Jx1000 (in ⁴) | C _w (in ⁶) | x _o (in.) | m (in.) | r _o (in.) | | β |
| 1400S300-54 ¹ | 50 | 1.179 | 4.01 | 31.462 | 4.495 | 5.166 | 1.115 | 0.972 | 25.548 | 2.580 | 77.25 | 67.60 | 1176 | 1176 | 1.259 | 42.691 | -1.617 | 1.046 | 5.500 | 0.914 | 56.8 |
| 1400S300-68 | 50 | 1.477 | 5.03 | 39.211 | 5.602 | 5.152 | 1.370 | 0.963 | 34.328 | 3.655 | 109.43 | 95.20 | 2364 | 2364 | 2.503 | 52.772 | -1.601 | 1.038 | 5.480 | 0.915 | 56.5 |
| 1400S300-97 | 50 | 2.084 | 7.09 | 54.689 | 7.813 | 5.123 | 1.854 | 0.943 | 52.219 | 6.372 | 190.78 | 160.00 | 6938 | 6938 | 7.186 | 72.365 | -1.568 | 1.020 | 5.440 | 0.917 | 55.9 |
| 1400S300-118 | 50 | 2.524 | 8.59 | 65.671 | 9.382 | 5.100 | 2.175 | 0.928 | 65.272 | 8.426 | 252.29 | 213.00 | 12743 | 11285 | 12.981 | 85.812 | -1.544 | 1.008 | 5.409 | 0.919 | 55.5 |
| 1400S350-54 ¹ | 50 | 1.278 | 4.35 | 35.839 | 5.120 | 5.296 | 1.947 | 1.234 | 30.915 | 3.249 | 97.28 | 85.30 | 1176 | 1176 | 1.365 | 76.252 | -2.207 | 1.400 | 5.868 | 0.859 | 70.7 |
| 1400S350-68 | 50 | 1.602 | 5.45 | 44.718 | 6.388 | 5.283 | 2.406 | 1.225 | 42.938 | 4.710 | 141.01 | 119.00 | 2364 | 2364 | 2.715 | 94.534 | -2.190 | 1.391 | 5.849 | 0.860 | 70.4 |
| 1400S350-97 | 50 | 2.262 | 7.70 | 62.521 | 8.932 | 5.257 | 3.296 | 1.207 | 62.505 | 8.190 | 245.22 | 195.00 | 6938 | 6938 | 7.799 | 130.430 | -2.155 | 1.373 | 5.809 | 0.862 | 69.9 |
| 1400S350-118 ⁶ | 50 | 2.742 | 9.33 | 75.217 | 10.745 | 5.238 | 3.903 | 1.193 | 75.197 | 10.259 | 340.00 ⁶ | 257.00 | 12743 | 11285 | 14.098 | 155.387 | -2.130 | 1.360 | 5.779 | 0.864 | 66.1 |
| 1600S162-68 ¹ | 50 | 1.406 | 4.78 | 40.929 | 5.116 | 5.395 | 0.268 | 0.436 | 35.573 | 3.624 | 108.49 | 78.50 | 2062 | 2062 | 2.383 | 14.816 | -0.601 | 0.415 | 5.446 | 0.988 | 28.6 |
| 1600S162-97 | 50 | 1.982 | 6.75 | 56.845 | 7.106 | 5.355 | 0.348 | 0.419 | 53.192 | 5.738 | 171.79 | 136.00 | 6042 | 6042 | 6.835 | 19.807 | -0.577 | 0.401 | 5.402 | 0.989 | 27.9 |
| 1600S162-118 | 50 | 2.400 | 8.17 | 68.040 | 8.505 | 5.324 | 0.394 | 0.405 | 66.027 | 7.398 | 221.51 | 183.00 | 11086 | 11086 | 12.342 | 23.035 | -0.559 | 0.391 | 5.369 | 0.989 | 27.4 |
| 1600S200-68 ¹ | 50 | 1.477 | 5.03 | 45.307 | 5.663 | 5.538 | 0.506 | 0.585 | 40.059 | 4.045 | 121.10 | 93.40 | 2062 | 2062 | 2.503 | 27.155 | -0.862 | 0.584 | 5.635 | 0.977 | 37.1 |
| 1600S200-97 | 50 | 2.084 | 7.09 | 63.072 | 7.884 | 5.501 | 0.671 | 0.567 | 59.472 | 6.500 | 194.60 | 159.00 | 6042 | 6042 | 7.186 | 36.744 | -0.835 | 0.569 | 5.593 | 0.978 | 36.4 |
| 1600S200-118 | 50 | 2.524 | 8.59 | 75.627 | 9.453 | 5.473 | 0.774 | 0.554 | 73.635 | 8.331 | 249.43 | 213.00 | 11086 | 11086 | 12.981 | 43.132 | -0.815 | 0.558 | 5.561 | 0.979 | 35.9 |
| 1600S250-68 ¹ | 50 | 1.549 | 5.27 | 49.830 | 6.229 | 5.673 | 0.889 | 0.758 | 43.935 | 4.092 | 122.52 | 102.00 | 2062 | 2062 | 2.624 | 46.230 | -1.167 | 0.778 | 5.841 | 0.960 | 46.5 |
| 1600S250-97 | 50 | 2.186 | 7.44 | 69.498 | 8.687 | 5.639 | 1.193 | 0.739 | 65.945 | 6.982 | 209.05 | 173.00 | 6042 | 6042 | 7.536 | 63.082 | -1.138 | 0.762 | 5.799 | 0.962 | 45.9 |
| 1600S250-118 | 50 | 2.649 | 9.01 | 83.452 | 10.432 | 5.613 | 1.390 | 0.724 | 81.480 | 9.221 | 276.08 | 232.00 | 11086 | 11086 | 13.619 | 74.524 | -1.116 | 0.750 | 5.769 | 0.963 | 45.4 |
| 1600S300-68 ¹ | 50 | 1.620 | 5.51 | 54.353 | 6.794 | 5.792 | 1.411 | 0.933 | 46.265 | 4.210 | 126.04 | 107.00 | 2062 | 2062 | 2.745 | 71.609 | -1.494 | 0.981 | 6.055 | 0.939 | 55.8 |
| 1600S300-97 | 50 | 2.288 | 7.78 | 75.924 | 9.491 | 5.761 | 1.910 | 0.914 | 71.014 | 7.391 | 221.28 | 182.00 | 6042 | 6042 | 7.887 | 98.275 | -1.463 | 0.964 | 6.014 | 0.941 | 55.1 |
| 1600S300-118 | 50 | 2.773 | 9.44 | 91.278 | 11.410 | 5.737 | 2.240 | 0.899 | 89.323 | 9.835 | 294.47 | 245.00 | 11086 | 11086 | 14.258 | 116.606 | -1.439 | 0.951 | 5.983 | 0.942 | 54.7 |
| 1600S350-68 ¹ | 50 | 1.745 | 5.94 | 61.638 | 7.705 | 5.944 | 2.490 | 1.195 | 55.181 | 5.180 | 155.09 | 135.00 | 2062 | 2062 | 2.957 | 127.370 | -2.055 | 1.322 | 6.402 | 0.897 | 69.7 |
| 1600S350-97 | 50 | 2.466 | 8.39 | 86.292 | 10.786 | 5.916 | 3.410 | 1.176 | 82.842 | 8.382 | 250.95 | 224.00 | 6042 | 6042 | 8.500 | 175.896 | -2.022 | 1.304 | 6.362 | 0.899 | 69.1 |
| 1600S350-118 | 50 | 2.990 | 10.18 | 103.917 | 12.990 | 5.895 | 4.039 | 1.162 | 101.987 | 11.304 | 338.45 | 296.00 | 11086 | 11086 | 15.375 | 209.692 | -1.998 | 1.291 | 6.332 | 0.900 | 68.8 |

For SI: 1 inch = 25.4 mm; 1 kip-in = 112.99 N-m; 1 lb = 4.45 N.

¹Web slenderness ratio (h/t) exceeds 200. Web stiffeners designed in accordance with AISI S100 are required at support points and concentrated Loads. Holes/punch-outs in the web are outside the scope of this report.

²Effective properties except for V_{ag} are based on members with punch-outs.

³Gross and torsional properties are based on the full, unreduced cross-section, away from web punch-outs.

⁴Use the effective moment of inertia for deflection calculation.

⁵Allowable moment is lesser of M_{al} and M_{ad}. Distortional buckling is based on an assumed KΦ = 0.

⁶Cold work of forming applied.

SYMBOLS

I_x = Moment of inertia about x-axis
 S_x = Section modulus about x-axis
 r_x = Radius of gyration about x-axis
 J = Moment of inertia about y-axis
 r_y = Radius of gyration about y-axis
 M_{al} = Allowable bending moment about x-axis based on local buckling

M_{ad} = Allowable moment about x-axis based on distortional buckling
 V_{ag} = Allowable shear of unpunched web section
 V_{anet} = Allowable shear of punched web section
 J = St. Venant torsion constant
 C_w = Torsional warping constant

x_o = Distance from shear center to the centroid along the principal X-axis
 m = Distance from shear center to mid-plane of web
 r_o = Polar radiud of gyration about shear center
 β = Torsional flexural constant
 L_u = Unbraced length below which lateral-torsional buckling is not considered

TABLE 5—TRACK PROPERTIES³

| MEMBER | F _y (ksi) | GROSS PROPERTIES ² | | | | | | | EFFECTIVE PROPERTIES ² | | | | TORSIONAL PROPERTIES ² | | | | | |
|--------------------------|-------------------------|-------------------------------|-------------------|--------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-------------------------|--------------------------------------|--------------------------------------|---------------------------|-------------------------|-----------------------------------|--------------------------------------|-------------------------|------------|-------------------------|-------|
| | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | S _x (in ³) | r _x (in.) | I _y (in ⁴) | r _y (in.) | I _x (in ⁴) | S _x (in ³) | M _{al} (in-k) | V _{ag} (lb) | Jx1000 (in ⁴) | C _w (in ⁶) | x _o (in.) | m (in.) | r _o (in.) | β |
| 250T125-33 | 33 | 0.173 | 0.59 | 0.192 | 0.145 | 1.05 | 0.027 | 0.397 | 0.167 | 0.103 | 2.03 | 1024 | 0.069 | 0.033 | -0.760 | 0.456 | 1.36 | 0.687 |
| 250T125-43 | 33 | 0.225 | 0.77 | 0.250 | 0.188 | 1.06 | 0.035 | 0.395 | 0.233 | 0.147 | 2.91 | 1356 | 0.153 | 0.043 | -0.755 | 0.453 | 1.36 | 0.690 |
| 250T125-43 | 50 | 0.225 | 0.77 | 0.250 | 0.188 | 1.06 | 0.035 | 0.395 | 0.221 | 0.137 | 4.09 | 2054 | 0.153 | 0.043 | -0.755 | 0.453 | 1.36 | 0.690 |
| 250T125-54 | 50 | 0.282 | 0.96 | 0.318 | 0.236 | 1.06 | 0.044 | 0.392 | 0.299 | 0.188 | 5.64 | 2563 | 0.302 | 0.054 | -0.749 | 0.449 | 1.36 | 0.696 |
| 250T125-68 | 50 | 0.355 | 1.21 | 0.408 | 0.297 | 1.07 | 0.054 | 0.389 | 0.405 | 0.262 | 7.85 | 3199 | 0.602 | 0.069 | -0.740 | 0.444 | 1.36 | 0.704 |
| 250T125-97 | 50 | 0.506 | 1.72 | 0.604 | 0.423 | 1.09 | 0.074 | 0.383 | 0.604 | 0.423 | 12.67 | 4476 | 1.745 | 0.102 | -0.724 | 0.434 | 1.37 | 0.719 |
| 250T200-33 | 33 | 0.225 | 0.77 | 0.280 | 0.212 | 1.12 | 0.097 | 0.658 | 0.204 | 0.112 | 2.22 | 1024 | 0.090 | 0.118 | -1.418 | 0.813 | 1.92 | 0.455 |
| 250T200-43 | 33 | 0.293 | 1.00 | 0.366 | 0.275 | 1.12 | 0.126 | 0.657 | 0.290 | 0.163 | 3.21 | 1356 | 0.199 | 0.153 | -1.413 | 0.810 | 1.92 | 0.457 |
| 250T200-43 | 50 | 0.293 | 1.00 | 0.366 | 0.275 | 1.12 | 0.126 | 0.657 | 0.272 | 0.150 | 4.48 | 2054 | 0.199 | 0.153 | -1.413 | 0.810 | 1.92 | 0.457 |
| 250T200-54 | 50 | 0.367 | 1.25 | 0.466 | 0.346 | 1.13 | 0.157 | 0.654 | 0.374 | 0.209 | 6.25 | 2563 | 0.392 | 0.195 | -1.405 | 0.806 | 1.92 | 0.462 |
| 250T200-68 | 50 | 0.462 | 1.57 | 0.600 | 0.437 | 1.14 | 0.196 | 0.652 | 0.519 | 0.296 | 8.87 | 3199 | 0.784 | 0.251 | -1.396 | 0.800 | 1.92 | 0.469 |
| 250T200-97 | 50 | 0.659 | 2.24 | 0.894 | 0.626 | 1.17 | 0.275 | 0.646 | 0.861 | 0.510 | 15.28 | 4476 | 2.271 | 0.374 | -1.376 | 0.789 | 1.92 | 0.484 |
| 250T300-33 | 33 | 0.294 | 1.00 | 0.398 | 0.301 | 1.16 | 0.290 | 0.993 | 0.240 | 0.119 | 2.36 | 1024 | 0.117 | 0.360 | -2.349 | 1.301 | 2.80 | 0.298 |
| 250T300-43 | 33 | 0.383 | 1.30 | 0.521 | 0.391 | 1.17 | 0.376 | 0.991 | 0.344 | 0.174 | 3.43 | 1356 | 0.260 | 0.470 | -2.343 | 1.299 | 2.80 | 0.299 |
| 250T300-43 | 50 | 0.383 | 1.30 | 0.521 | 0.391 | 1.17 | 0.376 | 0.991 | 0.320 | 0.159 | 4.77 | 2054 | 0.260 | 0.470 | -2.343 | 1.299 | 2.80 | 0.299 |
| 250T300-54 | 50 | 0.480 | 1.64 | 0.664 | 0.492 | 1.18 | 0.470 | 0.989 | 0.445 | 0.223 | 6.69 | 2563 | 0.513 | 0.599 | -2.335 | 1.294 | 2.79 | 0.302 |
| 250T300-68 | 50 | 0.605 | 2.06 | 0.856 | 0.623 | 1.19 | 0.589 | 0.987 | 0.627 | 0.319 | 9.56 | 3199 | 1.025 | 0.773 | -2.324 | 1.288 | 2.79 | 0.307 |
| 250T300-97 | 50 | 0.862 | 2.93 | 1.279 | 0.896 | 1.22 | 0.831 | 0.981 | 1.074 | 0.563 | 16.86 | 4476 | 2.973 | 1.158 | -2.303 | 1.276 | 2.78 | 0.316 |
| | | | | | | | | | | | | | | | | | | |
| 362T125-33 | 33 | 0.212 | 0.72 | 0.438 | 0.232 | 1.44 | 0.030 | 0.377 | 0.384 | 0.174 | 3.44 | 1024 | 0.085 | 0.076 | -0.658 | 0.409 | 1.63 | 0.836 |
| 362T125-43 | 33 | 0.276 | 0.94 | 0.571 | 0.302 | 1.44 | 0.039 | 0.375 | 0.530 | 0.245 | 4.84 | 1739 | 0.187 | 0.098 | -0.654 | 0.407 | 1.62 | 0.838 |
| 362T125-43 | 50 | 0.276 | 0.94 | 0.571 | 0.302 | 1.44 | 0.039 | 0.375 | 0.508 | 0.230 | 6.89 | 2141 | 0.187 | 0.098 | -0.654 | 0.407 | 1.62 | 0.838 |
| 362T125-54 | 50 | 0.346 | 1.18 | 0.723 | 0.378 | 1.45 | 0.048 | 0.373 | 0.677 | 0.312 | 9.34 | 3372 | 0.370 | 0.123 | -0.648 | 0.404 | 1.63 | 0.841 |
| 362T125-68 | 50 | 0.436 | 1.48 | 0.921 | 0.475 | 1.45 | 0.060 | 0.370 | 0.907 | 0.427 | 12.78 | 4703 | 0.738 | 0.156 | -0.641 | 0.399 | 1.63 | 0.846 |
| 362T125-97 | 50 | 0.621 | 2.11 | 1.343 | 0.675 | 1.47 | 0.082 | 0.364 | 1.343 | 0.675 | 20.21 | 6622 | 2.140 | 0.226 | -0.626 | 0.390 | 1.64 | 0.854 |
| 362T125-118 ⁴ | 50 | 0.757 | 2.58 | 1.667 | 0.821 | 1.48 | 0.098 | 0.359 | 1.667 | 0.821 | 28.2 ⁴ | 8008 | 3.894 | 0.278 | -0.615 | 0.383 | 1.65 | 0.860 |
| 362T200-33 | 33 | 0.264 | 0.90 | 0.619 | 0.328 | 1.53 | 0.110 | 0.645 | 0.463 | 0.190 | 3.76 | 1024 | 0.105 | 0.269 | -1.270 | 0.754 | 2.09 | 0.631 |
| 362T200-43 | 33 | 0.343 | 1.17 | 0.808 | 0.427 | 1.53 | 0.142 | 0.643 | 0.647 | 0.270 | 5.34 | 1739 | 0.233 | 0.350 | -1.265 | 0.752 | 2.09 | 0.633 |
| 362T200-43 | 50 | 0.343 | 1.17 | 0.808 | 0.427 | 1.53 | 0.142 | 0.643 | 0.613 | 0.252 | 7.56 | 2141 | 0.233 | 0.350 | -1.265 | 0.752 | 2.09 | 0.633 |
| 362T200-54 | 50 | 0.431 | 1.47 | 1.024 | 0.536 | 1.54 | 0.177 | 0.641 | 0.829 | 0.345 | 10.34 | 3372 | 0.460 | 0.442 | -1.259 | 0.748 | 2.09 | 0.638 |
| 362T200-68 | 50 | 0.543 | 1.85 | 1.307 | 0.675 | 1.55 | 0.221 | 0.638 | 1.133 | 0.480 | 14.38 | 4703 | 0.919 | 0.564 | -1.250 | 0.743 | 2.09 | 0.643 |
| 362T200-97 | 50 | 0.773 | 2.63 | 1.917 | 0.963 | 1.58 | 0.308 | 0.632 | 1.834 | 0.804 | 24.06 | 6622 | 2.666 | 0.825 | -1.232 | 0.732 | 2.10 | 0.655 |
| 362T200-118 | 50 | 0.944 | 3.21 | 2.388 | 1.176 | 1.59 | 0.371 | 0.627 | 2.388 | 1.072 | 32.10 | 8008 | 4.852 | 1.026 | -1.219 | 0.724 | 2.10 | 0.663 |
| 362T300-33 | 33 | 0.333 | 1.13 | 0.861 | 0.457 | 1.61 | 0.327 | 0.992 | 0.541 | 0.197 | 3.89 | 1024 | 0.133 | 0.811 | -2.159 | 1.234 | 2.87 | 0.434 |
| 362T300-43 | 33 | 0.434 | 1.48 | 1.124 | 0.594 | 1.61 | 0.425 | 0.990 | 0.763 | 0.290 | 5.73 | 1739 | 0.294 | 1.055 | -2.153 | 1.231 | 2.86 | 0.435 |
| 362T300-43 | 50 | 0.434 | 1.48 | 1.124 | 0.594 | 1.61 | 0.425 | 0.990 | 0.718 | 0.270 | 8.08 | 2141 | 0.294 | 1.055 | -2.153 | 1.231 | 2.86 | 0.435 |
| 362T300-54 | 50 | 0.544 | 1.85 | 1.425 | 0.746 | 1.62 | 0.531 | 0.988 | 0.979 | 0.371 | 11.11 | 3372 | 0.581 | 1.337 | -2.146 | 1.227 | 2.86 | 0.439 |
| 362T300-68 | 50 | 0.685 | 2.33 | 1.823 | 0.941 | 1.63 | 0.665 | 0.985 | 1.354 | 0.519 | 15.55 | 4703 | 1.161 | 1.711 | -2.136 | 1.221 | 2.86 | 0.443 |
| 362T300-97 | 50 | 0.977 | 3.32 | 2.682 | 1.348 | 1.66 | 0.937 | 0.979 | 2.248 | 0.887 | 26.55 | 6622 | 3.367 | 2.518 | -2.116 | 1.209 | 2.86 | 0.453 |
| 362T300-118 | 50 | 1.192 | 4.06 | 3.350 | 1.650 | 1.68 | 1.134 | 0.975 | 2.998 | 1.206 | 36.09 | 8008 | 6.130 | 3.145 | -2.101 | 1.201 | 2.86 | 0.460 |

Table 5 continued on next page.

TABLE 5—TRACK PROPERTIES³ (Continued)

| MEMBER | F _y (ksi) | GROSS PROPERTIES ² | | | | | | | EFFECTIVE PROPERTIES ² | | | | TORSIONAL PROPERTIES ² | | | | | |
|--------------------------|-------------------------|-------------------------------|-------------------|--------------------------------------|--------------------------------------|-------------------------|--------------------------------------|-------------------------|--------------------------------------|--------------------------------------|---------------------------|-------------------------|-----------------------------------|--------------------------------------|-------------------------|------------|-------------------------|-------|
| | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | S _x (in ³) | r _x (in.) | I _y (in ⁴) | r _y (in.) | I _x (in ⁴) | S _x (in ³) | M _{al} (in-k) | V _{ag} (lb) | Jx1000 (in ⁴) | C _w (in ⁶) | x _o (in.) | m (in.) | r _o (in.) | β |
| 1200T125-54 ¹ | 50 | 0.820 | 2.79 | 13.335 | 2.186 | 4.03 | 0.060 | 0.271 | 11.351 | 1.286 | 38.51 | 1354 | 0.876 | 1.820 | -0.333 | 0.230 | 4.06 | 0.993 |
| 1200T125-68 | 50 | 1.033 | 3.51 | 16.826 | 2.747 | 4.04 | 0.074 | 0.268 | 15.686 | 1.934 | 57.91 | 2712 | 1.750 | 2.270 | -0.329 | 0.227 | 4.06 | 0.993 |
| 1200T125-97 | 50 | 1.472 | 5.01 | 24.078 | 3.897 | 4.04 | 0.102 | 0.264 | 23.961 | 3.443 | 103.07 | 7901 | 5.076 | 3.171 | -0.322 | 0.222 | 4.07 | 0.994 |
| 1200T125-118 | 50 | 1.798 | 6.12 | 29.472 | 4.740 | 4.05 | 0.122 | 0.260 | 29.472 | 4.491 | 134.45 | 14431 | 9.243 | 3.812 | -0.316 | 0.218 | 4.07 | 0.994 |
| 1200T200-54 ¹ | 50 | 0.905 | 3.08 | 16.464 | 2.699 | 4.27 | 0.236 | 0.510 | 12.780 | 1.350 | 40.42 | 1354 | 0.966 | 6.714 | -0.730 | 0.487 | 4.36 | 0.972 |
| 1200T200-68 | 50 | 1.140 | 3.88 | 20.791 | 3.395 | 4.27 | 0.294 | 0.508 | 17.950 | 2.058 | 61.63 | 2712 | 1.931 | 8.431 | -0.725 | 0.483 | 4.36 | 0.972 |
| 1200T200-97 | 50 | 1.625 | 5.53 | 29.805 | 4.824 | 4.28 | 0.410 | 0.502 | 29.167 | 3.820 | 114.36 | 7901 | 5.602 | 11.946 | -0.714 | 0.476 | 4.37 | 0.973 |
| 1200T200-118 | 50 | 1.984 | 6.75 | 36.531 | 5.876 | 4.29 | 0.493 | 0.498 | 36.531 | 5.278 | 158.03 | 14431 | 10.201 | 14.513 | -0.706 | 0.471 | 4.38 | 0.974 |
| 1200T300-54 ¹ | 50 | 1.018 | 3.46 | 20.636 | 3.383 | 4.50 | 0.745 | 0.855 | 14.142 | 1.391 | 41.66 | 1354 | 1.087 | 20.211 | -1.375 | 0.884 | 4.78 | 0.917 |
| 1200T300-68 | 50 | 1.282 | 4.36 | 26.079 | 4.258 | 4.51 | 0.932 | 0.852 | 20.112 | 2.140 | 64.07 | 2712 | 2.173 | 25.471 | -1.369 | 0.880 | 4.79 | 0.918 |
| 1200T300-97 | 50 | 1.828 | 6.22 | 37.441 | 6.060 | 4.53 | 1.311 | 0.847 | 33.474 | 4.052 | 121.31 | 7901 | 6.304 | 36.357 | -1.355 | 0.871 | 4.80 | 0.920 |
| 1200T300-118 | 50 | 2.232 | 7.60 | 45.942 | 7.389 | 4.54 | 1.584 | 0.842 | 43.213 | 5.696 | 170.53 | 14431 | 11.478 | 44.420 | -1.346 | 0.865 | 4.81 | 0.922 |
| 1400T125-54 ¹ | 50 | 0.933 | 3.18 | 19.977 | 2.814 | 4.63 | 0.061 | 0.256 | 16.041 | 1.517 | 45.43 | 1160 | 0.997 | 2.559 | -0.299 | 0.209 | 4.64 | 0.996 |
| 1400T125-68 | 50 | 1.175 | 4.00 | 25.196 | 3.536 | 4.63 | 0.076 | 0.254 | 22.385 | 2.293 | 68.65 | 2322 | 1.992 | 3.189 | -0.296 | 0.206 | 4.65 | 0.996 |
| 1400T125-97 | 50 | 1.676 | 5.70 | 36.025 | 5.019 | 4.64 | 0.104 | 0.249 | 34.790 | 4.134 | 123.77 | 6759 | 5.778 | 4.445 | -0.289 | 0.201 | 4.65 | 0.996 |
| 1400T125-118 | 50 | 2.046 | 6.96 | 44.068 | 6.106 | 4.64 | 0.124 | 0.246 | 44.008 | 5.454 | 163.28 | 12342 | 10.520 | 5.334 | -0.284 | 0.197 | 4.66 | 0.996 |
| 1400T200-54 ¹ | 50 | 1.018 | 3.46 | 24.221 | 3.412 | 4.88 | 0.242 | 0.487 | 17.783 | 1.589 | 47.57 | 1160 | 1.087 | 9.520 | -0.665 | 0.449 | 4.95 | 0.982 |
| 1400T200-68 | 50 | 1.282 | 4.36 | 30.571 | 4.291 | 4.88 | 0.301 | 0.485 | 25.204 | 2.432 | 72.82 | 2322 | 2.173 | 11.942 | -0.661 | 0.446 | 4.95 | 0.982 |
| 1400T200-97 | 50 | 1.828 | 6.22 | 43.774 | 6.098 | 4.89 | 0.420 | 0.479 | 41.581 | 4.559 | 136.50 | 6759 | 6.304 | 16.883 | -0.651 | 0.439 | 4.96 | 0.983 |
| 1400T200-118 | 50 | 2.232 | 7.60 | 53.606 | 7.427 | 4.90 | 0.505 | 0.476 | 53.546 | 6.354 | 190.25 | 12342 | 11.478 | 20.479 | -0.644 | 0.434 | 4.97 | 0.983 |
| 1400T300-54 ¹ | 50 | 1.131 | 3.85 | 29.881 | 4.209 | 5.14 | 0.769 | 0.825 | 19.487 | 1.636 | 48.97 | 1160 | 1.208 | 28.800 | -1.271 | 0.829 | 5.36 | 0.944 |
| 1400T300-68 | 50 | 1.425 | 4.85 | 37.737 | 5.297 | 5.15 | 0.963 | 0.822 | 27.927 | 2.523 | 75.55 | 2322 | 2.415 | 36.258 | -1.265 | 0.825 | 5.36 | 0.944 |
| 1400T300-97 | 50 | 2.032 | 6.91 | 54.105 | 7.538 | 5.16 | 1.354 | 0.816 | 47.088 | 4.816 | 144.19 | 6759 | 7.005 | 51.644 | -1.252 | 0.817 | 5.37 | 0.946 |
| 1400T300-118 | 50 | 2.481 | 8.44 | 66.324 | 9.189 | 5.17 | 1.636 | 0.812 | 62.022 | 6.816 | 204.08 | 12342 | 12.755 | 62.998 | -1.243 | 0.811 | 5.38 | 0.947 |
| 1600T125-68 ¹ | 50 | 1.318 | 4.49 | 35.916 | 4.421 | 5.22 | 0.077 | 0.241 | 30.575 | 2.651 | 79.38 | 2029 | 2.233 | 4.273 | -0.268 | 0.189 | 5.23 | 0.997 |
| 1600T125-97 | 50 | 1.879 | 6.40 | 51.323 | 6.276 | 5.23 | 0.106 | 0.237 | 48.074 | 4.826 | 144.48 | 5906 | 6.479 | 5.945 | -0.262 | 0.184 | 5.24 | 0.997 |
| 1600T125-118 | 50 | 2.294 | 7.81 | 62.756 | 7.637 | 5.23 | 0.125 | 0.234 | 61.272 | 6.420 | 192.23 | 10781 | 11.797 | 7.126 | -0.257 | 0.181 | 5.24 | 0.998 |
| 1600T200-68 ¹ | 50 | 1.425 | 4.85 | 42.914 | 5.282 | 5.49 | 0.307 | 0.464 | 34.142 | 2.806 | 84.00 | 2029 | 2.415 | 16.123 | -0.607 | 0.414 | 5.54 | 0.988 |
| 1600T200-97 | 50 | 2.032 | 6.91 | 61.398 | 7.508 | 5.50 | 0.428 | 0.459 | 56.883 | 5.299 | 158.64 | 5906 | 7.005 | 22.755 | -0.598 | 0.408 | 5.55 | 0.988 |
| 1600T200-118 | 50 | 2.481 | 8.44 | 75.146 | 9.145 | 5.50 | 0.515 | 0.455 | 73.686 | 7.433 | 222.56 | 10781 | 12.755 | 27.568 | -0.592 | 0.403 | 5.55 | 0.989 |
| 1600T300-68 ¹ | 50 | 1.567 | 5.33 | 52.245 | 6.430 | 5.77 | 0.988 | 0.794 | 37.541 | 2.906 | 87.02 | 2029 | 2.656 | 49.199 | -1.176 | 0.776 | 5.95 | 0.961 |
| 1600T300-97 | 50 | 2.235 | 7.61 | 74.833 | 9.151 | 5.79 | 1.389 | 0.788 | 63.832 | 5.580 | 167.07 | 5906 | 7.706 | 69.964 | -1.165 | 0.769 | 5.95 | 0.962 |
| 1600T300-118 | 50 | 2.729 | 9.29 | 91.667 | 11.155 | 5.80 | 1.678 | 0.784 | 84.496 | 7.939 | 237.69 | 10781 | 14.033 | 85.244 | -1.156 | 0.763 | 5.96 | 0.962 |

For SI: 1 inch = 25.4 mm; 1 kip-in = 112.99 N-m; 1 lb = 4.45 N.

¹Web slenderness ratio (h/t) exceeds 200. Web stiffeners designed in accordance with AISI S100 are required at support points and concentrated loads.

²Gross, effective, and torsional properties are based on the full, unreduced cross-section.

³Use the effective moment of inertia for deflection calculation.

⁴Cold work of forming applied.

SYMBOLS

- I_x = Moment of inertia about x-axis
- S_x = Section modulus about x-axis
- r_x = Radius of gyration about x-axis
- I_y = Moment of inertia about y-axis
- r_y = Radius of gyration about y-axis
- M_{al} = Allowable bending moment about x-axis based on local buckling
- V_{ag} = Allowable shear of unpunched web section

- J = St. Venant torsion constant
- C_w = Torsional warping constant
- x_o = Distance from shear center to the centroid along the principal X-axis
- m = Distance from shear center to mid-plane of web
- r_o = Polar radius of gyration about shear center
- β = Torsional flexural constant
- L_u = Unbraced length below which lateral-torsional buckling is not considered

TABLE 6—ALLOWABLE CONCENTRATED LOADS AND END REACTIONS FOR C-SHAPES BASED ON WEB CRIPPLING² (pounds)

| STUD DESIGNATION | F _y (ksi) | CONDITION 1 (E1F) | | | | CONDITION 2 (I1F) | | | | CONDITION 3 (E2F) | | | | CONDITION 4 (I2F) | | | |
|------------------|----------------------|---------------------|------------|------------|------------|---------------------|------------|------------|------------|---------------------|------------|------------|------------|---------------------|------------|------------|------------|
| | | Bearing Length (in) | | | | Bearing Length (in) | | | | Bearing Length (in) | | | | Bearing Length (in) | | | |
| | | 1 | 3.5 | 4 | 6 | 1 | 3.5 | 4 | 6 | 1 | 3.5 | 4 | 6 | 1 | 3.5 | 4 | 6 |
| 162S__-33 | 33 | 180 | See Note 1 | See Note 1 | See Note 1 | 336 | See Note 1 | See Note 1 | See Note 1 | 170 | See Note 1 | See Note 1 | See Note 1 | 441 | See Note 1 | See Note 1 | See Note 1 |
| 250 S__-33 | 33 | 173 | 271 | 285 | See Note 1 | 330 | 453 | 472 | See Note 1 | 150 | 201 | 209 | See Note 1 | 411 | 519 | 535 | See Note 1 |
| 250 S__-43 | 33 | 287 | 443 | 466 | See Note 1 | 580 | 780 | 810 | See Note 1 | 267 | 351 | 364 | See Note 1 | 720 | 892 | 918 | See Note 1 |
| 250 S__-54 | 50 | 656 | 996 | 1046 | See Note 1 | 1350 | 1785 | 1850 | See Note 1 | 652 | 842 | 870 | See Note 1 | 1730 | 2109 | 2165 | See Note 1 |
| 250 S__-68 | 50 | 990 | 1480 | 1552 | See Note 1 | 2073 | 2693 | 2785 | See Note 1 | 1049 | 1333 | 1375 | See Note 1 | 2750 | 3302 | 3384 | See Note 1 |
| 250 S__-97 | 50 | 1872 | 2726 | See Note 1 | See Note 1 | 4025 | 5095 | See Note 1 | See Note 1 | 2167 | 2683 | See Note 1 | See Note 1 | 5597 | 6575 | See Note 1 | See Note 1 |
| 350 S__-33 | 33 | 166 | 260 | 274 | 323 | 324 | 445 | 463 | 526 | 131 | 175 | 182 | 205 | 384 | 484 | 499 | 551 |
| 350 S__-43 | 33 | 278 | 428 | 451 | 528 | 571 | 768 | 798 | 900 | 240 | 315 | 326 | 365 | 680 | 842 | 866 | 949 |
| 350 S__-54 | 50 | 637 | 967 | 1016 | 1186 | 1331 | 1761 | 1825 | 2046 | 594 | 768 | 794 | 883 | 1645 | 2005 | 2059 | 2245 |
| 350 S__-68 | 50 | 965 | 1441 | 1512 | 1758 | 2047 | 2660 | 2751 | 3068 | 970 | 1232 | 1271 | 1406 | 2631 | 3159 | 3238 | 3510 |
| 350 S__-97 | 50 | 1831 | 2666 | 2790 | See Note 1 | 3983 | 5041 | 5198 | See Note 1 | 2035 | 2520 | 2592 | See Note 1 | 5397 | 6339 | 6479 | See Note 1 |
| 362 S__-33 | 33 | 165 | 259 | 273 | 322 | 323 | 444 | 462 | 525 | 129 | 173 | 179 | 202 | 381 | 480 | 495 | 547 |
| 362 S__-43 | 33 | 277 | 427 | 449 | 526 | 570 | 767 | 796 | 898 | 236 | 311 | 322 | 360 | 675 | 836 | 860 | 943 |
| 362 S__-54 | 50 | 634 | 963 | 1012 | 1182 | 1329 | 1758 | 1822 | 2043 | 588 | 760 | 785 | 874 | 1635 | 1994 | 2047 | 2232 |
| 362 S__-68 | 50 | 962 | 1437 | 1507 | 1752 | 2044 | 2657 | 2747 | 3064 | 961 | 1221 | 1259 | 1393 | 2618 | 3143 | 3221 | 3492 |
| 362 S__-97 | 50 | 1827 | 2659 | 2783 | 3212 | 3978 | 5035 | 5192 | 5738 | 2020 | 2501 | 2573 | 2821 | 5374 | 6313 | 6452 | 6936 |
| 400 S__-33 | 33 | 163 | 256 | 269 | 317 | 322 | 442 | 460 | 522 | 122 | 164 | 170 | 192 | 372 | 469 | 483 | 534 |
| 400 S__-43 | 33 | 274 | 422 | 444 | 520 | 567 | 763 | 792 | 893 | 227 | 299 | 309 | 346 | 662 | 819 | 843 | 924 |
| 400 S__-54 | 50 | 628 | 954 | 1002 | 1170 | 1323 | 1750 | 1813 | 2034 | 569 | 735 | 760 | 846 | 1607 | 1960 | 2012 | 2194 |
| 400 S__-68 | 50 | 953 | 1424 | 1494 | 1737 | 2036 | 2646 | 2736 | 3051 | 936 | 1188 | 1226 | 1356 | 2579 | 3096 | 3173 | 3440 |
| 400 S__-97 | 50 | 1814 | 2640 | 2762 | 3189 | 3965 | 5018 | 5174 | 5718 | 1978 | 2448 | 2518 | 2761 | 5309 | 6236 | 6374 | 6852 |
| 550 S__-33 | 33 | 155 | 243 | 256 | 302 | 315 | 432 | 450 | 511 | 100 | 134 | 139 | 157 | 339 | 428 | 441 | 487 |
| 550 S__-43 | 33 | 262 | 405 | 426 | 499 | 556 | 749 | 778 | 877 | 195 | 256 | 265 | 297 | 614 | 760 | 782 | 858 |
| 550 S__-54 | 50 | 606 | 920 | 966 | 1128 | 1302 | 1722 | 1784 | 2001 | 502 | 649 | 671 | 746 | 1508 | 1838 | 1887 | 2058 |
| 550 S__-68 | 50 | 923 | 1380 | 1447 | 1683 | 2007 | 2608 | 2697 | 3007 | 844 | 1071 | 1105 | 1223 | 2441 | 2931 | 3003 | 3256 |
| 550 S__-97 | 50 | 1766 | 2571 | 2691 | 3106 | 3917 | 4957 | 5111 | 5648 | 1826 | 2261 | 2325 | 2550 | 5078 | 5965 | 6097 | 6555 |

Table 6 continued on next page.

TABLE 6— ALLOWABLE CONCENTRATED LOADS AND END REACTIONS FOR C-SHAPES BASED ON WEB CRIPPLING² (pounds) (Continued)

| STUD DESIGNATION | F _y (ksi) | CONDITION 1 ³ (E1F) | | | | CONDITION 2 ³ (I1F) | | | | CONDITION 3 ³ (E2F) | | | | CONDITION 4 ³ (I2F) | | | |
|------------------|----------------------|--------------------------------|------|------|------|--------------------------------|------|------|------|--------------------------------|------|------|------|--------------------------------|------|------|------|
| | | Bearing Length (in) | | | | Bearing Length (in) | | | | Bearing Length (in) | | | | Bearing Length (in) | | | |
| | | 1 | 3.5 | 4 | 6 | 1 | 3.5 | 4 | 6 | 1 | 3.5 | 4 | 6 | 1 | 3.5 | 4 | 6 |
| 600 S -33 | 33 | 153 | 240 | 253 | 297 | 313 | 430 | 447 | 507 | 93 | 125 | 130 | 146 | 329 | 416 | 429 | 473 |
| 600 S -43 | 33 | 259 | 400 | 420 | 493 | 553 | 745 | 773 | 872 | 185 | 243 | 252 | 282 | 600 | 743 | 764 | 838 |
| 600 S -54 | 50 | 599 | 909 | 956 | 1116 | 1295 | 1713 | 1775 | 1991 | 482 | 623 | 644 | 716 | 1478 | 1802 | 1850 | 2017 |
| 600 S -68 | 50 | 914 | 1366 | 1433 | 1666 | 1998 | 2596 | 2685 | 2994 | 816 | 1036 | 1069 | 1183 | 2399 | 2881 | 2952 | 3201 |
| 600 S -97 | 50 | 1752 | 2551 | 2669 | 3081 | 3902 | 4939 | 5093 | 5628 | 1781 | 2205 | 2268 | 2487 | 5010 | 5885 | 6014 | 6466 |
| 800 S -43 | 33 | 247 | 381 | 401 | 470 | 542 | 730 | 757 | 854 | 150 | 197 | 204 | 228 | 548 | 678 | 698 | 765 |
| 800 S -64 | 50 | 575 | 872 | 917 | 1070 | 1272 | 1682 | 1743 | 1955 | 409 | 529 | 547 | 608 | 1370 | 1670 | 1714 | 1869 |
| 800 S -68 | 50 | 882 | 1318 | 1382 | 1607 | 1966 | 2555 | 2642 | 2946 | 716 | 910 | 939 | 1038 | 2250 | 2701 | 2768 | 3001 |
| 800 S -97 | 50 | 1702 | 2477 | 2592 | 2992 | 3850 | 4873 | 5025 | 5553 | 1618 | 2003 | 2060 | 2259 | 4761 | 5593 | 5716 | 6145 |
| 1000 S -54 | 50 | 553 | 840 | 882 | 1031 | 1251 | 1655 | 1715 | 1923 | 346 | 447 | 462 | 514 | 1275 | 1554 | 1595 | 1740 |
| 1000 S -68 | 50 | 854 | 1275 | 1338 | 1555 | 1938 | 2518 | 2604 | 2904 | 629 | 799 | 824 | 912 | 2119 | 2544 | 2607 | 2826 |
| 1000 S -97 | 50 | 1657 | 2412 | 2525 | 2914 | 3805 | 4815 | 4965 | 5487 | 1476 | 1827 | 1879 | 2060 | 4545 | 5338 | 5456 | 5866 |
| 1200 S -68 | 50 | 828 | 1237 | 1298 | 1509 | 1913 | 2485 | 2570 | 2866 | 551 | 699 | 721 | 798 | 2001 | 2402 | 2462 | 2669 |
| 1200 S -97 | 50 | 1618 | 2355 | 2464 | 2844 | 3764 | 4764 | 4912 | 5428 | 1348 | 1668 | 1716 | 1882 | 4350 | 5109 | 5222 | 5614 |

For SI: 1 inch = 25.4 mm; 1 pound = 4.4482 N; 1 ksl = 6.89 Mpa.

¹ Bearing length to web height ratio, N/h, exceeds 2. Web stiffeners are required.

² Values are for members fastened to supports.

³ Allowable web conditions are as follows (See Figure 2 for illustration):

Condition 1 – End One Flange Loading (E1F)
Condition 2 – Interior One Flange Loading (I1F)

Condition 3 – End Two Flange Loading (E2F)
Condition 4 – Interior Two Flange Loading (I2F)

TABLE 7—FURRING CHANNELS PROPERTIES^{1,2}

| SECTION | F _y (ksi) | DESIGN THICKNESS (in) | GROSS PROPERTIES | | | | | | EFFECTIVE PROPERTIES | | |
|------------|----------------------|-----------------------|-------------------------|----------------|-----------------------------------|---------------------|-----------------------------------|---------------------|-----------------------------------|-----------------------------------|------------------------|
| | | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | r _x (in) | I _y (in ⁴) | r _y (in) | I _x (in ⁴) | S _x (in ³) | M _a (ft-lb) |
| 087F125-18 | 33 | 0.0188 | 0.070 | 0.239 | 0.009 | 0.356 | 0.0422 | 0.774 | 0.0086 | 0.0160 | 26.41 |
| 087F125-27 | 33 | 0.0283 | 0.105 | 0.357 | 0.013 | 0.353 | 0.0628 | 0.774 | 0.0131 | 0.0272 | 44.78 |
| 087F125-30 | 33 | 0.0312 | 0.115 | 0.392 | 0.014 | 0.352 | 0.0691 | 0.774 | 0.0143 | 0.0307 | 50.47 |
| 087F125-33 | 33 | 0.0346 | 0.127 | 0.433 | 0.016 | 0.351 | 0.0763 | 0.774 | 0.0157 | 0.0337 | 55.43 |

For SI: 1 inch = 25.4 mm; 1 inch² = 645 mm²; 1 inch³ = 1.64x10⁴; 1 inch⁴ = 4.15x10⁵ mm⁴; 1 lb/lin ft = 14.5939 N/m; 1 kip-in = 112.99 N-m; 1 ksl = 6.89 Mpa.

¹ For deflection calculations, use effective I_x.

² Effective properties are given as the minimum value for positive or negative bending.

SYMBOLS

I_x = Strong axis moment of inertia
r_x = Strong axis radius of gyration

I_y = Weak axis moment of inertia
r_y = Weak axis radius of gyration

S_x = Strong axis section modulus
M_a = Strong axis allowable bending moment

TABLE 8—U-CHANNEL PROPERTIES¹

| SECTION | F _y (ksi) | DESIGN THICKNESS | GROSS | | | | | | EFFECTIVE PROPERTIES | | | |
|------------|----------------------|------------------|-------------------------|----------------|-----------------------------------|---------------------|-----------------------------------|---------------------|-----------------------------------|-----------------------------------|-----------------------|---------------------|
| | | | Area (in ²) | Weight (lb/ft) | I _x (in ⁴) | r _x (in) | I _y (in ⁴) | r _y (in) | I _x (in ⁴) | S _x (in ³) | M _a (in-k) | V _a (lb) |
| 75U050-54 | 33 | 0.0566 | 0.087 | 0.30 | 0.007 | 0.288 | 0.002 | 0.155 | 0.007 | 0.019 | 0.45 | 315 |
| 150U050-54 | 33 | 0.0566 | 0.129 | 0.44 | 0.039 | 0.547 | 0.003 | 0.144 | 0.039 | 0.052 | 1.22 | 840 |
| 200U050-54 | 33 | 0.0566 | 0.157 | 0.54 | 0.079 | 0.709 | 0.003 | 0.136 | 0.079 | 0.079 | 1.87 | 1190 |

For SI: 1 inch = 25.4 mm; 1 inch² = 645 mm²; 1 inch³ = 1.64x10⁴; 1 inch⁴ = 4.15x10⁵ mm⁴; 1 lb/lin ft = 14.5939 N/m; 1 kip-in = 112.99 N-m; 1 ksi = 6.89 Mpa; 1 lb = 4.45 N.

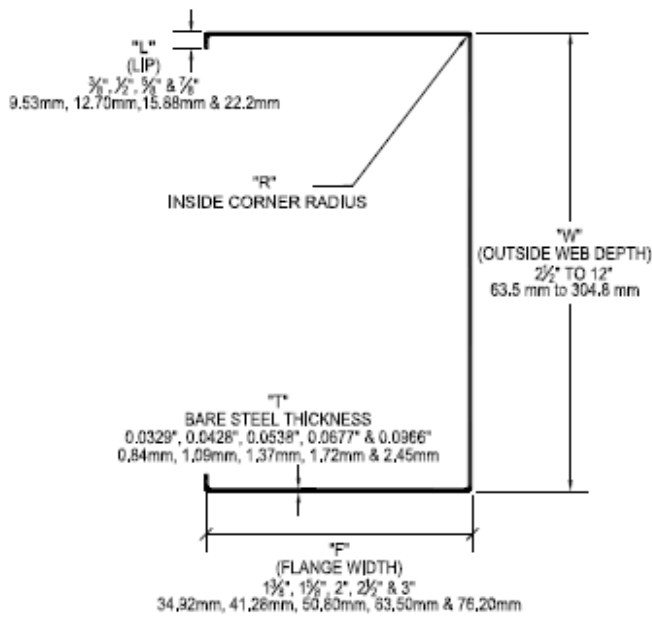
¹ For deflection calculations, use effective I_x.

SYMBOLS

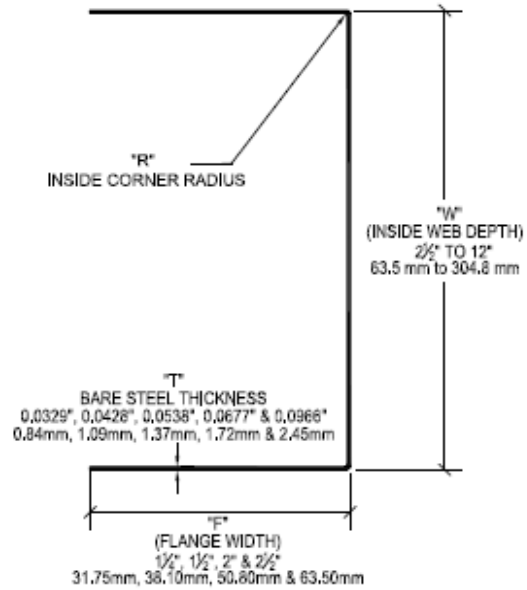
I_x = Strong axis moment of inertia I_y = Weak axis moment of inertia S_x = Strong axis section modulus V_a = Allowable shear of web section
 r_x = Strong axis radius of gyration r_y = Weak axis radius of gyration M_a = Strong axis allowable bending moment

TABLE 9—MANUFACTURING LOCATIONS

| | | |
|--|--|--|
| Marino\WARE – South Plainfield South Plainfield, NJ 07080 | Marino\WARE – East Chicago East Chicago, IN 46312 | Marino\WARE – Griffin Griffin, GA 30223 |
|--|--|--|



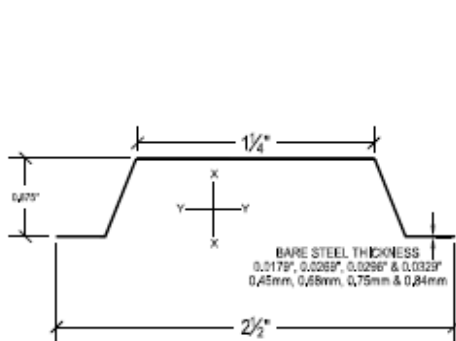
STRUCTURAL STUD



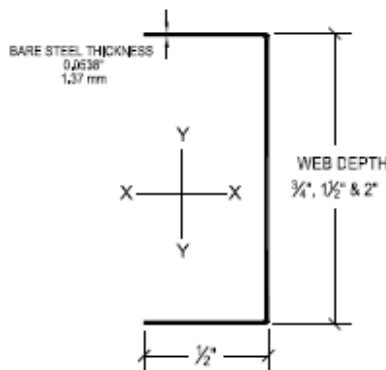
STRUCTURAL TRACK

C-SHAPE

TRACK



FURRING HAT CHANNEL



U-CHANNEL

FIGURE 1—SECTION PROFILES

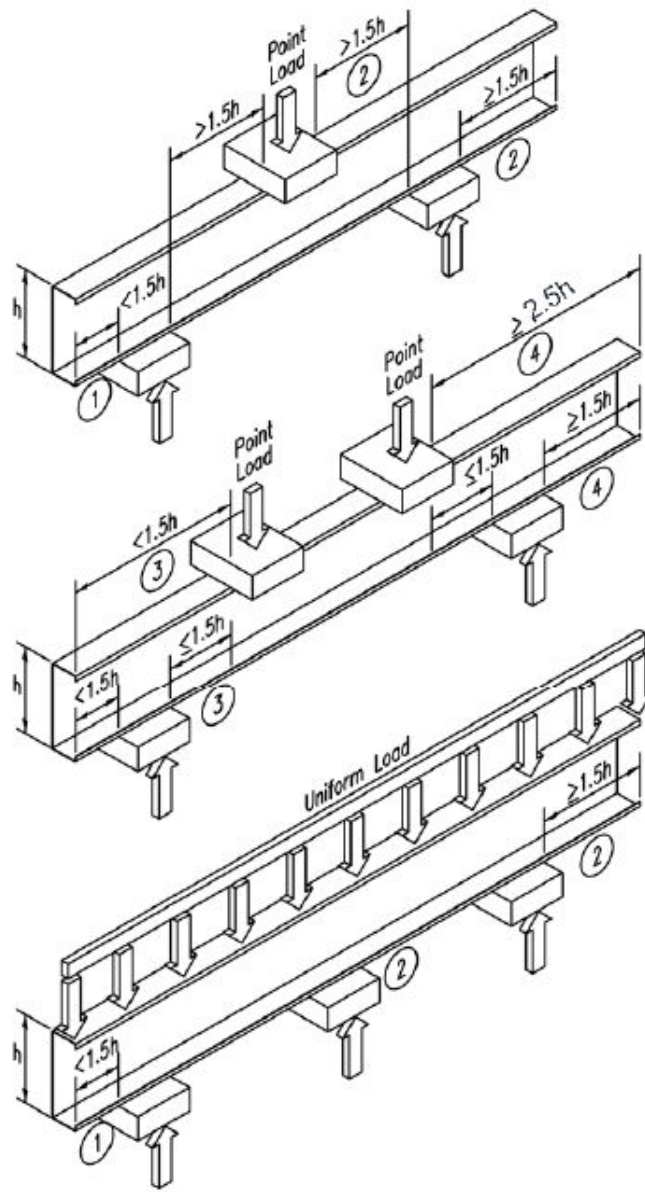


FIGURE 2

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

DIVISION: 09 00 00—FINISHES

Section: 09 22 13—Metal Furring

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

REPORT HOLDER:

WARE INDUSTRIES, INC., dba MARINO\WARE

EVALUATION SUBJECT:

COLD-FORMED STEEL FRAMING

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that MARINO\WARE Cold-Formed Steel Framing, described in ICC-ES evaluation report ESR-4062, has also been evaluated for compliance with the code noted below as adopted by the New York City Department of Building.

Applicable code edition:

- 2022 *New York City Building Code*

2.0 CONCLUSION

The MARINO\WARE Cold-Formed Steel Framing, described in Sections 2.0 through 7.0 of the evaluation report ESR-4062, complies with the New York City Building Code Chapter 22, and are subject to conditions of use described in this supplement.

3.0 CONDITION OF USE

The MARINO\WARE Cold-Formed Steel Framing, described in the evaluation report must comply with all the following conditions:

- All applicable sections in the evaluation report ESR-4062.
- The design, installation, conditions of use and identification of the MARINO\WARE Cold-Formed Steel Framing are in accordance with the 2015 *International Building Code*® (2015 IBC) provisions noted in the evaluation report ESR-4062.
- The design, installation, and inspection are in accordance with additional requirements of the 2022 *New York City Building Code* Chapters 16, 17 and 22, as applicable.

This supplement expires concurrently with the evaluation report, reissued February 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

DIVISION: 09 00 00—FINISHES

Section: 09 22 13—Metal Furring

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

REPORT HOLDER:

WARE INDUSTRIES, INC., dba MARINO\WARE

EVALUATION SUBJECT:

COLD-FORMED STEEL FRAMING

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that MARINO\WARE Cold-Formed Steel Framing, described in ICC-ES evaluation report ESR-4062, has also been evaluated for compliance with the code noted below.

Applicable code edition:2023 and 2020 *Florida Building Code—Building***2.0 CONCLUSIONS**

The MARINO\WARE Cold-Formed Steel Framing, described in Sections 2.0 through 7.0 of the evaluation report ESR-4062, complies with the *Florida Building Code—Building*. The design requirements must be in accordance with the *Florida Building Code—Building*. The installation requirements noted in ICC-ES evaluation report ESR-4062 for the 2021 and 2018 *International Building Code*® (IBC) meet the requirements of the *Florida Building Code—Building*.

Use of the MARINO\WARE Cold-formed Steel Framing has also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building*.

Exception 1: Members noted with footnote 6 in Table 4 and footnote 4 in Table 5 include cold work of forming in the allowable moment and have not been evaluated for compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* (Section 2222.3).

Exception 2: Members with a thickness designation of 18 mils or 27 mils with a coating of less than G90 have not been evaluated for compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building*.

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 February 2024.