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COLD-FORMED STEEL FRAMING MEMBERS

CSI Sections:

- 05 40 00 Cold-Formed Metal Framing**
- 05 41 00 Structural Metal Stud Framing**
- 05 42 00 Cold-Formed Metal Joist Framing**
- 09 22 16 Non-Structural Metal Framing**

1.0 RECOGNITION

Livio Building Systems' cold-formed steel framing members recognized in this report have been evaluated for use as floor framing, roof framing, ceiling framing, and wall framing. The structural properties of the cold-formed steel framing members comply with the intent of the provisions of the following codes and regulations:

- 2021 and 2018 International Building Code® (IBC)
- 2021 and 2018 International Residential Code® (IRC)
- 2022 and 2019 California Building Code (CBC) – attached Supplement
- 2022 and 2019 California Residential Code (CRC) – attached Supplement
- 2023 and 2020 Florida Building Code-Building – attached Supplement
- 2023 and 2020 Florida Building Code-Residential – attached Supplement
- 2023 and 2020 City of Los Angeles Building Code (LABC) – Supplement attached
- 2023 and 2020 City of Los Angeles Residential Code (LABC) – Supplement attached

2.0 LIMITATIONS

Use of the cold-formed steel framing members recognized in this report is subject to the following limitations:

2.1 The cold-formed steel framing members shall be installed in accordance with the applicable code, the approved plans, and this report. Where there is a conflict, the most restrictive requirements shall govern.

2.2 Plans, calculations, and specifications verifying compliance with this report shall be submitted to the building official when applying for a building permit. The documents

shall 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.

2.3 Minimum uncoated base steel thickness of the framing members delivered to the job site shall be not less than 95 percent of the design thickness.

2.4 Members shall be designed by a registered design professional using the structural properties provided in this report.

2.5 The cold-formed steel framing members and panelized assemblies recognized in this report are produced by Livio Building Systems Pvt. Ltd. in Pune, Maharashtra, India.

3.0 PRODUCT USE

3.1 General:

Livio Building Systems' cold-formed steel framing members are used for floor framing, wall framing, ceiling framing, and roof framing. Design and installation shall comply with the applicable requirements in IBC Section 2211. Cold-formed steel framing members corresponding to the dimensions specified in Tables R505.2.3, R603.2.3, and R804.2.3 of the IRC may be used in accordance with the prescriptive provisions of Sections 505, 603, and 804 of the IRC. For all other applications under the IRC, the cold-formed steel framing members shall be designed in accordance with Section R301.1. Cold-formed steel framing members corresponding to the dimensions specified in Table A4-1 of AISI S230 may be used in accordance with the provisions of AISI S230.

Livio Building Systems' cold-formed steel framing members described in this report are available as prefabricated non-load-bearing and load-bearing wall panel assemblies, floor assemblies, and roof panel assemblies where specified in the approved plans and specifications. These assemblies shall be constructed in accordance with requirements set forth in the approved plans and specifications and shall comply with applicable provisions in Section K107 of the IBC.

3.2 Design:

The design properties found in Tables 2 and 4 of this report have been calculated in accordance with the North American Specification for Design of Cold-formed Steel Structural Members (AISI S100). The values are based on allowable strength design (ASD) and are based on the gross section unless otherwise noted. The structural design of prefabricated panelized assemblies is outside the scope of this report.



3.3 Installation:

The installation of the Livio Building Systems' cold-formed steel framing members shall be in accordance with the approved plans, the applicable building code, and this report. In the case of conflict, the most conservative requirement shall apply. A copy of the approved plans shall be available at the job site during installation.

3.4 Inspection:

All panelized members, components, and their attachments shall be inspected in the Livio Building Systems' approved fabrication facility. Once the panel assembly leaves the fabrication facility, additional inspections of the members and connections are no longer required, except as needed for erection and connection to the supporting elements. A certificate of compliance shall be provided for each panel in accordance with Section 1704.2.5.1 of the IBC.

4.0 PRODUCT DESCRIPTION

4.1 Framing Members

Livio Building Systems' cold-formed steel framing members consist of structural C-section (joists and studs) and track cold-formed steel framing members. All framing members comply with AISI S220 and AISI S240. The framing members are cold-rolled from coils of steel complying with Section 4.2 of this report. C-sections are rolled with or without web punch-outs (holes). When provided, the punch-outs are located along the centerline of the C-section spaced not less than 24 inches (610 mm) on centers. A minimum of 10 inches (254 mm) is provided between the near edge of the punch-out and the end of the member. Tracks are rolled without punch-outs. Tables 1 and 3 of this report provide the section designations and member dimensions. Tables 2 and 4 of this report provide the section design properties. Tables 5 and 6 of this report provide the allowable web crippling loads. Figure 1 of this report provides illustrations of the framing members and punch-outs.

4.2 Material Information

The cold-formed steel framing members cold-formed from galvanized steel coils produced to ASTM A653, SS Grade 33; ASTM A653, SS Grade 50, Class 1; ASTM A1003, Structural Grade 33, Type H (ST33H); or ASTM A1003, Structural Grade 50, Type H (ST50H). The steel has a minimum G60 galvanized coating designation in accordance with ASTM A653.

4.3 Prefabricated Panelization Information:

Livio Building Systems' cold-formed steel framing members are utilized in the shop manufacturing of prefabricated panelized wall systems, floor systems, or roof systems. The panels are shipped to the job site as a bare frame. These panelized walls and floors or roofs are erected at the job site

to form completed interior and exterior structural wall and structural floor or roof systems for single and multi-story buildings. The panels are then finished out with utilities, insulation, hardware, sheathing, etc., as applicable. The panels are also used for interior and exterior non-load-bearing wall systems.

4.4 Fasteners:

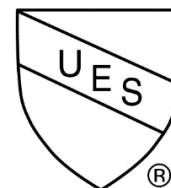
The evaluation of the fasteners in Livio Building Systems' panels is outside the scope of this report. Documentation shall be provided to the building official demonstrating the fasteners comply with the applicable code and the requirements of the registered design professional.

5.0 IDENTIFICATION

At spacing of not more than 96 inches (2440 mm) on center, the cold-formed steel framing members are identified by the Livio Building Systems' name; the section designation; the minimum uncoated steel thickness in decimal inches; the minimum specified yield strength; the coating designation; and evaluation report number (ER-779).

Each Livio Building Systems' panel assembly described in Section 4.3 of this report is identified with a project-specific panel number that corresponds to the respective floor within the approved building plans. In addition, the panel will also have a label identifying the manufacturer's name (Livio Building Systems) and the IAPMO Report Number (ER-779).

The IAPMO Uniform Evaluation Service Mark of Conformity also may be used as shown below:



IAPMO UES ER-779

6.0 SUBSTANTIATING DATA

6.1 Calculations in accordance with AISI S100.

6.2 Quality control manual.

6.3 Data in accordance with IAPMO UES EC-020 (Adopted December 2014, Revised January 2020) for Structural Steel Approved Fabricator Inspection Programs.



7.0 REFERENCE CODE SECTIONS

The code references apply to the recognition provided in this report but may not include every code section related to the use of this product.

7.1 International Building Code:

- Section 104.11 Alternative materials, design and methods of construction and equipment.
- Section 2210.1 General
- Section 2211.1 Structural framing.
- Section 2211.2 Nonstructural members.
- Table 2508.1 Installation of Gypsum Construction.
- Table 2511.1.1 Installation of Plaster Construction.

7.2 International Residential Code:

- Section R104.11 Alternative materials, design and methods of construction and equipment.
- Section R301.1 Application.
- Section R505 Cold-Formed Steel Floor Framing.
- Section R603 Cold-Formed Steel Wall Framing.
- Section R804 Cold-Formed Steel Roof Framing.

8.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on Livio Building Systems' cold-formed steel framing members to assess conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product certification. Products are manufactured at locations noted in Section 2.5 of this report under a quality control program with periodic inspection under the supervision of IAPMO UES.

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org

**General Notes to Tables:**

1. Inside bend radius for all members is 0.120 inch (3 mm).
2. For deflection determination, the effective moment of inertia shall be used.
3. Tabulated gross properties are based on the full, unreduced section away from punch-outs.

Definitions of Structural Property Symbols

F_y = Yield stress

Gross Properties

- I_{xx} : Moment of inertia of the gross section about the X-X axis (strong axis).
 S_{xx} : Section modulus of the gross section about the X-X axis (strong axis).
 R_x : Radius of gyration of the gross section about the X-X axis (strong axis).
 I_{yy} : Moment of inertia of the gross section about the Y-Y (weak axis).
 R_y : Radius of gyration of the gross section about the Y-Y axis (weak axis).

Effective Properties

- I_{xx} : Effective moment of inertia for deflection about the X-X axis (strong axis).
 S_{xx} : Effective section modulus about the X-X axis (strong axis).
 M_a : Allowable bending moment.
 M_{a-L} : Allowable moment at yield, based on local buckling.
 M_{a-D} : Allowable moment based on distortional buckling (assuming $K\phi = 0$) per AISI S100 F4.
 V_a : Allowable shear.
 V_{ag} : Allowable strong axis shear away from punchouts, per AISI S100 G2.
 V_{aNet} : Allowable strong axis shear at a punchout, per AISI S100 G3.

Torsional Properties

- J : St. Venant torsional 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 the mid-plane of the web.
 R_o : Polar radius of gyration about the centroidal principal axis.
 b : $1-(X_o/R_o)^2$
 L_u : The longest weak axis (L_y) and torsional (L_t) unbraced length at which lateral-torsional buckling is restrained in accordance with AISI S100 F2.

For SI:

- 1 inch = 25.4 mm
1 inch² = 645.16 mm²
1 inch³ = 16,387.064 mm³
1 inch⁴ = 416,231 mm⁴
1 lbf = 4.4482 N
1 lb/ft = 14.5939 N/m
1 inch-kip = 12.8 N-m
1 ksi = 6.895 MPa



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TABLE 1—C-SECTIONS

Section	Design Thickness (in)	Minimum Thickness (in)	Height ¹ (in)	Flange (in)	Lip (in)	Area (in ²)	Weight (lb/ft)
362S162-33	0.0346	0.0329	3 ⁵ / ₈	1 ⁵ / ₈	1/2	0.260	0.88
362S162-43	0.0451	0.0428	3 ⁵ / ₈	1 ⁵ / ₈	1/2	0.336	1.14
362S162-54	0.0566	0.0538	3 ⁵ / ₈	1 ⁵ / ₈	1/2	0.419	1.42
362S162-68	0.0713	0.0677	3 ⁵ / ₈	1 ⁵ / ₈	1/2	0.522	1.78
362S200-33	0.0346	0.0329	3 ⁵ / ₈	2	5/8	0.294	1.00
362S200-43	0.0451	0.0428	3 ⁵ / ₈	2	5/8	0.381	1.30
362S200-54	0.0566	0.0538	3 ⁵ / ₈	2	5/8	0.475	1.62
362S200-68	0.0713	0.0677	3 ⁵ / ₈	2	5/8	0.593	2.02
362S250-43	0.0451	0.0428	3 ⁵ / ₈	2 1/2	5/8	0.426	1.45
362S250-54	0.0566	0.0538	3 ⁵ / ₈	2 1/2	5/8	0.532	1.81
362S250-68	0.0713	0.0677	3 ⁵ / ₈	2 1/2	5/8	0.665	2.26
400S162-33	0.0346	0.0329	4	1 ⁵ / ₈	1/2	0.273	0.93
400S162-43	0.0451	0.0428	4	1 ⁵ / ₈	1/2	0.353	1.20
400S162-54	0.0566	0.0538	4	1 ⁵ / ₈	1/2	0.440	1.50
400S162-68	0.0713	0.0677	4	1 ⁵ / ₈	1/2	0.549	1.87
400S200-33	0.0346	0.0329	4	2	5/8	0.307	1.05
400S200-43	0.0451	0.0428	4	2	5/8	0.398	1.35
400S200-54	0.0566	0.0538	4	2	5/8	0.496	1.69
400S200-68	0.0713	0.0677	4	2	5/8	0.620	2.11
400S250-43	0.0451	0.0428	4	2 1/2	5/8	0.443	1.51
400S250-54	0.0566	0.0538	4	2 1/2	5/8	0.553	1.88
400S250-68	0.0713	0.0677	4	2 1/2	5/8	0.691	2.35
600S162-33	0.0346	0.0329	6	1 ⁵ / ₈	1/2	0.342	1.16
600S162-43	0.0451	0.0428	6	1 ⁵ / ₈	1/2	0.443	1.51
600S162-54	0.0566	0.0538	6	1 ⁵ / ₈	1/2	0.553	1.88
600S162-68	0.0713	0.0677	6	1 ⁵ / ₈	1/2	0.691	2.35
600S200-33	0.0346	0.0329	6	2	5/8	0.376	1.28
600S200-43	0.0451	0.0428	6	2	5/8	0.488	1.66
600S200-54	0.0566	0.0538	6	2	5/8	0.610	2.07
600S200-68	0.0713	0.0677	6	2	5/8	0.763	2.60
600S250-43	0.0451	0.0428	6	2 1/2	5/8	0.533	1.81
600S250-54	0.0566	0.0538	6	2 1/2	5/8	0.666	2.27
600S250-68	0.0713	0.0677	6	2 1/2	5/8	0.834	2.84
800S162-33 ²	0.0346	0.0329	8	1 ⁵ / ₈	1/2	0.411	1.40
800S162-43	0.0451	0.0428	8	1 ⁵ / ₈	1/2	0.533	1.81
800S162-54	0.0566	0.0538	8	1 ⁵ / ₈	1/2	0.666	2.27
800S162-68	0.0713	0.0677	8	1 ⁵ / ₈	1/2	0.834	2.84
800S200-33 ²	0.0346	0.0329	8	2	5/8	0.446	1.52
800S200-43	0.0451	0.0428	8	2	5/8	0.578	1.97
800S200-54	0.0566	0.0538	8	2	5/8	0.723	2.46
800S200-68	0.0713	0.0677	8	2	5/8	0.905	3.08
800S250-43	0.0451	0.0428	8	2 1/2	5/8	0.624	2.12
800S250-54	0.0566	0.0538	8	2 1/2	5/8	0.779	2.65
800S250-68	0.0713	0.0677	8	2 1/2	5/8	0.977	3.32
1000S162-43 ²	0.0451	0.0428	10	1 ⁵ / ₈	1/2	0.624	2.12
1000S162-54	0.0566	0.0538	10	1 ⁵ / ₈	1/2	0.779	2.65
1000S162-68	0.0713	0.0677	10	1 ⁵ / ₈	1/2	0.977	3.32
1000S200-43 ²	0.0451	0.0428	10	2	5/8	0.669	2.28
1000S200-54	0.0566	0.0538	10	2	5/8	0.836	2.84
1000S200-68	0.0713	0.0677	10	2	5/8	1.048	3.57
1000S250-43 ²	0.0451	0.0428	10	2 1/2	5/8	0.714	2.43
1000S250-54	0.0566	0.0538	10	2 1/2	5/8	0.893	3.04
1000S250-68	0.0713	0.0677	10	2 1/2	5/8	1.119	3.81
1200S162-43 ²	0.0451	0.0428	12	1 ⁵ / ₈	1/2	0.714	2.43
1200S162-54 ²	0.0566	0.0538	12	1 ⁵ / ₈	1/2	0.893	3.04
1200S162-68	0.0713	0.0677	12	1 ⁵ / ₈	1/2	1.119	3.81
1200S200-43 ²	0.0451	0.0428	12	2	5/8	0.759	2.58
1200S200-54 ²	0.0566	0.0538	12	2	5/8	0.949	3.23
1200S200-68	0.0713	0.0677	12	2	5/8	1.191	4.05
1200S250-43 ²	0.0451	0.0428	12	2 1/2	5/8	0.804	2.74
1200S250-54 ²	0.0566	0.0538	12	2 1/2	5/8	1.006	3.42
1200S250-68	0.0713	0.0677	12	2 1/2	5/8	1.262	4.29

¹Height measured from outside face to outside face of flanges.

²Web-height to thickness ratio exceeds 200. Web stiffeners are required a all support points and concentrated loads.



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TABLE 2—C-SECTION MEMBER PROPERTIES

Section	F _y (ksi)	Gross Properties					Effective Properties					Torsional Properties						L _u ² (in)	
		I _{xx} (in ⁴)	S _{xx} (in ³)	R _x (in)	I _{yy} (in ⁴)	R _y (in)	I _{xx} (in ⁴)	S _{xx} (in ³)	M _a -L (in-k)	M _a -D (in-k)	V _{ag} (lb)	V _a -Net (lb)	J (in ⁴)	Cw (in ⁶)	X _o (in)	m (in)	R _o (in)		β
362S162-33	33	0.542	0.299	1.446	0.097	0.612	0.542	0.261	5.16	5.13	1024	497	0.104	0.297	-1.306	0.789	2.042	0.591	42.7
362S162-43	33	0.697	0.385	1.440	0.124	0.607	0.697	0.367	7.26	7.18	1739	641	0.228	0.376	-1.294	0.782	2.029	0.594	42.7
362S162-43	50	0.697	0.385	1.440	0.124	0.607	0.697	0.325	9.74	9.54	2141	789	0.228	0.376	-1.294	0.782	2.029	0.594	34.5
362S162-54	50	0.861	0.475	1.435	0.151	0.602	0.861	0.441	13.20	12.76	3372	977	0.447	0.457	-1.280	0.774	2.015	0.596	34.4
362S162-68	50	1.063	0.587	1.427	0.185	0.595	1.063	0.572	17.12	16.85	4335	981	0.885	0.552	-1.263	0.765	1.997	0.600	34.4
362S200-33	33	0.640	0.353	1.475	0.174	0.769	0.640	0.298	5.90	5.91	1024	497	0.117	0.577	-1.739	1.030	2.406	0.478	53.7
362S200-43	33	0.823	0.454	1.470	0.222	0.764	0.823	0.421	8.33	8.30	1739	641	0.258	0.734	-1.726	1.024	2.392	0.479	53.7
362S200-43	50	0.823	0.454	1.470	0.222	0.764	0.823	0.371	11.10	10.97	2141	789	0.258	0.734	-1.726	1.024	2.392	0.479	43.5
362S200-54	50	1.019	0.562	1.464	0.273	0.759	1.019	0.492	14.73	14.71	3372	977	0.507	0.896	-1.713	1.016	2.378	0.481	43.4
362S200-68	50	1.260	0.695	1.457	0.335	0.752	1.260	0.664	19.89	19.63	4335	981	1.006	1.089	-1.695	1.006	2.359	0.483	43.4
362S250-43	33	0.968	0.534	1.507	0.378	0.942	0.968	0.441	8.71	8.94	1739	641	0.289	1.230	-2.196	1.277	2.825	0.396	64.3
362S250-43	50	0.968	0.534	1.507	0.378	0.942	0.936	0.387	11.57	11.69	2141	789	0.289	1.230	-2.196	1.277	2.825	0.396	52.1
362S250-54	50	1.199	0.661	1.502	0.467	0.937	1.190	0.513	15.35	15.77	3372	977	0.568	1.506	-2.182	1.269	2.810	0.397	52.0
362S250-68	50	1.485	0.819	1.495	0.575	0.930	1.485	0.690	20.67	21.23	4335	981	1.126	1.837	-2.164	1.259	2.790	0.398	52.1
400S162-33	33	0.682	0.341	1.581	0.101	0.608	0.682	0.291	5.76	5.74	999	586	0.109	0.363	-1.260	0.768	2.112	0.644	42.4
400S162-43	33	0.877	0.438	1.576	0.128	0.602	0.877	0.412	8.15	8.06	1739	775	0.239	0.460	-1.249	0.761	2.099	0.646	42.3
400S162-43	50	0.877	0.438	1.576	0.128	0.602	0.877	0.364	10.89	10.68	2141	954	0.239	0.460	-1.249	0.761	2.099	0.646	34.3
400S162-54	50	1.084	0.542	1.570	0.157	0.597	1.084	0.495	14.82	14.33	3372	1184	0.470	0.560	-1.235	0.754	2.085	0.649	34.2
400S162-68	50	1.340	0.670	1.562	0.191	0.590	1.340	0.646	19.34	19.15	4836	1330	0.930	0.677	-1.219	0.745	2.067	0.652	34.0
400S200-33	33	0.801	0.401	1.615	0.180	0.766	0.801	0.334	6.60	6.60	999	586	0.123	0.697	-1.685	1.007	2.457	0.529	53.2
400S200-43	33	1.032	0.516	1.610	0.230	0.761	1.032	0.472	9.34	9.29	1739	775	0.270	0.886	-1.673	1.000	2.444	0.531	53.2
400S200-43	50	1.032	0.516	1.610	0.230	0.761	1.032	0.415	12.41	12.26	2141	954	0.270	0.886	-1.673	1.000	2.444	0.531	43.1
400S200-54	50	1.278	0.639	1.605	0.283	0.755	1.278	0.552	16.53	16.47	3372	1184	0.530	1.083	-1.660	0.993	2.429	0.533	43.0
400S200-68	50	1.583	0.791	1.598	0.347	0.749	1.583	0.749	22.42	22.06	4836	1330	1.051	1.318	-1.642	0.983	2.410	0.536	42.9
400S250-43	33	1.208	0.604	1.651	0.392	0.941	1.208	0.493	9.75	9.96	1739	775	0.300	1.486	-2.136	1.252	2.859	0.442	63.8
400S250-43	50	1.208	0.604	1.651	0.392	0.941	1.171	0.432	12.93	13.00	2141	954	0.300	1.486	-2.136	1.252	2.859	0.442	51.7
400S250-54	50	1.498	0.749	1.646	0.484	0.935	1.488	0.574	17.20	17.58	3372	1184	0.590	1.821	-2.122	1.244	2.844	0.443	51.7
400S250-68	50	1.858	0.929	1.639	0.596	0.928	1.858	0.776	23.24	23.73	4836	1330	1.172	2.225	-2.105	1.235	2.824	0.445	51.6
600S162-33	33	1.769	0.590	2.275	0.114	0.577	1.769	0.562	11.10	9.01	648	648	0.136	0.861	-1.069	0.677	2.580	0.828	41.2
600S162-43	33	2.281	0.760	2.269	0.145	0.572	2.281	0.760	15.03	12.86	1440	1233	0.300	1.095	-1.058	0.670	2.568	0.830	41.0
600S162-43	50	2.281	0.760	2.269	0.145	0.572	2.281	0.705	21.10	16.83	1440	1233	0.300	1.095	-1.058	0.670	2.568	0.830	33.2
600S162-54	50	2.829	0.943	2.262	0.178	0.567	2.829	0.919	27.50	22.91	2858	1939	0.590	1.337	-1.046	0.663	2.556	0.832	33.1
600S162-68	50	3.510	1.170	2.253	0.216	0.559	3.510	1.170	35.03	31.14	5350	2861	1.172	1.626	-1.031	0.655	2.540	0.835	32.8
600S200-33	33	2.051	0.684	2.335	0.206	0.740	2.042	0.633	12.52	10.34	648	648	0.150	1.593	-1.454	0.901	2.849	0.739	51.7
600S200-43	33	2.648	0.883	2.329	0.264	0.735	2.648	0.858	16.95	14.74	1440	1233	0.331	2.033	-1.443	0.894	2.837	0.741	51.5
600S200-43	50	2.648	0.883	2.329	0.264	0.735	2.648	0.790	23.66	19.25	1440	1233	0.331	2.033	-1.443	0.894	2.837	0.741	41.8
600S200-54	50	3.288	1.096	2.323	0.324	0.729	3.288	1.015	30.38	26.17	2858	1939	0.651	2.493	-1.430	0.887	2.823	0.743	41.6
600S200-68	50	4.086	1.362	2.315	0.398	0.722	4.086	1.333	39.91	35.51	5350	2861	1.293	3.047	-1.414	0.878	2.807	0.746	41.4
600S250-43	33	3.048	1.016	2.391	0.451	0.919	3.048	0.898	17.75	15.56	1440	1233	0.362	3.411	-1.871	1.136	3.172	0.652	62.5
600S250-43	50	3.048	1.016	2.391	0.451	0.919	2.911	0.812	24.33	20.16	1440	1233	0.362	3.411	-1.871	1.136	3.172	0.652	50.7
600S250-54	50	3.788	1.263	2.385	0.556	0.914	3.730	1.062	31.79	27.52	2858	1939	0.711	4.194	-1.857	1.129	3.158	0.654	50.6
600S250-68	50	4.713	1.571	2.377	0.685	0.906	4.703	1.386	41.50	37.56	5350	2861	1.413	5.145	-1.841	1.119	3.140	0.656	50.4
800S162-33 ¹	33	3.540	0.885	2.935	0.123	0.547	3.360	0.694	13.71	12.07	479	479	0.164	1.630	-0.933	0.607	3.128	0.911	40.1
800S162-43	33	4.572	1.143	2.928	0.156	0.542	4.452	1.013	20.02	17.47	1065	1065	0.362	2.076	-0.923	0.601	3.118	0.912	39.9
800S162-43	50	4.572	1.143	2.928	0.156	0.542	4.379	0.878	26.29	22.63	1065	1065	0.362	2.076	-0.923	0.601	3.118	0.912	32.4
800S162-54	50	5.681	1.420	2.920	0.191	0.536	5.555	1.226	36.71	31.20	2110	2110	0.711	2.539	-0.912	0.594	3.106	0.914	32.2
800S162-68	50	7.064	1.766	2.910	0.233	0.529	7.047	1.660	49.70	43.05	4235	3365	1.413	3.093	-0.898	0.586	3.091	0.916	31.9
800S200-33 ¹	33	4.054	1.014	3.017	0.224	0.709	4.054	0.834	16.48	14.00	479	479	0.178	2.971	-1.285	0.817	3.355	0.853	50.6
800S200-43	33	5.241	1.310	3.010	0.287	0.704	5.241	1.276	25.21	20.17	1065	1065	0.392	3.797	-1.274	0.811	3.344	0.855	50.4
800S200-43	50	5.241	1.310	3.010	0.287	0.704	5.241	1.052	31.50	26.14	1065	1065	0.392	3.797	-1.274	0.811	3.344	0	



EVALUATION REPORT

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TABLE 2—C-SECTION MEMBER PROPERTIES (Continued)

Section	F _y (ksi)	Gross Properties					Effective Properties						Torsional Properties						L _u ² (in ²)
		I _{xx} (in ⁴)	S _{xx} (in ³)	R _x (in)	I _{yy} (in ⁴)	R _y (in)	I _{xx} (in ⁴)	S _{xx} (in ³)	M _a -L (in-k)	M _a -D (in-k)	V _{ag} (lb)	V _a -Net (lb)	J (in ⁴)	Cw (in ⁶)	Xo (in)	m (in)	Ro (in)	β	
1200S162-43'	33	12.535	2.089	4.191	0.170	0.489	11.343	1.580	31.21	24.95	700	700	0.484	5.177	-0.739	0.499	4.284	0.970	37.8
1200S162-43'	50	12.535	2.089	4.191	0.170	0.489	11.055	1.354	40.53	31.79	700	700	0.484	5.177	-0.739	0.499	4.284	0.970	30.7
1200S162-54'	50	15.607	2.601	4.182	0.208	0.483	14.217	1.914	57.31	44.84	1386	1386	0.953	6.340	-0.730	0.493	4.272	0.971	30.5
1200S162-68	50	19.460	3.243	4.170	0.254	0.476	18.349	2.642	79.10	63.48	2777	2777	1.897	7.739	-0.718	0.485	4.258	0.972	30.2
1200S200-43'	33	14.077	2.346	4.307	0.316	0.645	12.934	1.769	34.97	29.65	700	700	0.514	9.391	-1.040	0.687	4.478	0.946	48.4
1200S200-43'	50	14.077	2.346	4.307	0.316	0.645	12.657	1.521	45.55	37.89	700	700	0.514	9.391	-1.040	0.687	4.478	0.946	39.3
1200S200-54'	50	17.539	2.923	4.299	0.389	0.640	16.240	2.091	62.60	52.90	1386	1386	1.014	11.550	-1.029	0.681	4.466	0.947	39.0
1200S200-68	50	21.889	3.648	4.288	0.477	0.633	20.821	2.962	88.68	74.11	2777	2777	2.017	14.176	-1.016	0.673	4.452	0.948	38.7
1200S250-43'	33	15.688	2.615	4.418	0.548	0.825	14.663	1.820	35.96	31.79	700	700	0.545	15.812	-1.386	0.899	4.703	0.913	59.8
1200S250-43'	50	15.688	2.615	4.418	0.548	0.825	13.805	1.567	46.93	40.55	700	700	0.545	15.812	-1.386	0.899	4.703	0.913	48.6
1200S250-54'	50	19.557	3.260	4.410	0.676	0.820	18.262	2.151	64.40	56.52	1386	1386	1.074	19.505	-1.375	0.892	4.691	0.914	48.4
1200S250-68	50	24.426	4.071	4.400	0.832	0.812	23.526	3.016	90.29	79.09	2777	2777	2.138	24.034	-1.361	0.884	4.676	0.915	48.1

¹Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.

TABLE 3—TRACKS

Section	Design Thickness (in)	Minimum Thickness (in)	Height ² (in)	Flange (in)	Area (in ²)	Weight (lb/ft)
362T150-33	0.0346	0.0329	3 ⁵ / ₈	1 ¹ / ₂	0.229	0.78
362T150-43	0.0451	0.0428	3 ⁵ / ₈	1 ¹ / ₂	0.299	1.02
362T150-54	0.0566	0.0538	3 ⁵ / ₈	1 ¹ / ₂	0.375	1.27
362T150-68	0.0713	0.0677	3 ⁵ / ₈	1 ¹ / ₂	0.471	1.60
362T200-33	0.0346	0.0329	3 ⁵ / ₈	2	0.264	0.90
362T200-43	0.0451	0.0428	3 ⁵ / ₈	2	0.344	1.17
362T200-54	0.0566	0.0538	3 ⁵ / ₈	2	0.431	1.47
362T200-68	0.0713	0.0677	3 ⁵ / ₈	2	0.543	1.85
362T250-43	0.0451	0.0428	3 ⁵ / ₈	2 ¹ / ₂	0.389	1.32
362T250-54	0.0566	0.0538	3 ⁵ / ₈	2 ¹ / ₂	0.488	1.66
362T250-68	0.0713	0.0677	3 ⁵ / ₈	2 ¹ / ₂	0.614	2.09
362T300-54	0.0566	0.0538	3 ⁵ / ₈	3	0.544	1.85
362T300-68	0.0713	0.0677	3 ⁵ / ₈	3	0.685	2.33
400T150-33	0.0346	0.0329	4	1 ¹ / ₂	0.242	0.82
400T150-43	0.0451	0.0428	4	1 ¹ / ₂	0.316	1.07
400T150-54	0.0566	0.0538	4	1 ¹ / ₂	0.396	1.35
400T150-68	0.0713	0.0677	4	1 ¹ / ₂	0.498	1.70
400T200-33	0.0346	0.0329	4	2	0.277	0.94
400T200-43	0.0451	0.0428	4	2	0.361	1.23
400T200-54	0.0566	0.0538	4	2	0.452	1.54
400T200-68	0.0713	0.0677	4	2	0.569	1.94
400T250-43	0.0451	0.0428	4	2 ¹ / ₂	0.406	1.38
400T250-54	0.0566	0.0538	4	2 ¹ / ₂	0.509	1.73
400T250-68	0.0713	0.0677	4	2 ¹ / ₂	0.641	2.18
400T300-54	0.0566	0.0538	4	3	0.566	1.92
400T300-68	0.0713	0.0677	4	3	0.712	2.42
600T150-33	0.0346	0.0329	6	1 ¹ / ₂	0.311	1.06
600T150-43	0.0451	0.0428	6	1 ¹ / ₂	0.406	1.38
600T150-54	0.0566	0.0538	6	1 ¹ / ₂	0.509	1.73
600T150-68	0.0713	0.0677	6	1 ¹ / ₂	0.641	2.18
600T200-33	0.0346	0.0329	6	2	0.346	1.18
600T200-43	0.0451	0.0428	6	2	0.451	1.53
600T200-54	0.0566	0.0538	6	2	0.566	1.92
600T200-68	0.0713	0.0677	6	2	0.712	2.42
600T250-43	0.0451	0.0428	6	2 ¹ / ₂	0.496	1.69
600T250-54	0.0566	0.0538	6	2 ¹ / ₂	0.622	2.12
600T250-68	0.0713	0.0677	6	2 ¹ / ₂	0.783	2.67
600T300-54	0.0566	0.0538	6	3	0.679	2.31
600T300-68	0.0713	0.0677	6	3	0.855	2.91
800T150-33 ¹	0.0346	0.0329	8	1 ¹ / ₂	0.381	1.30
800T150-43	0.0451	0.0428	8	1 ¹ / ₂	0.496	1.69
800T150-54	0.0566	0.0538	8	1 ¹ / ₂	0.622	2.12
800T150-68	0.0713	0.0677	8	1 ¹ / ₂	0.783	2.67

¹Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.

²Height measured from inside face to inside face of flanges.

Table 3 continued on next page.



EVALUATION REPORT

Number: 779

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TABLE 3—TRACKS (Continued)

Section	Design Thickness (in)	Minimum Thickness (in)	Height ² (in)	Flange (in)	Area (in ²)	Weight (lb/ft)
800T150-33 ¹	0.0346	0.0329	8	1½	0.381	1.30
800T150-43	0.0451	0.0428	8	1½	0.496	1.69
800T150-54	0.0566	0.0538	8	1½	0.622	2.12
800T150-68	0.0713	0.0677	8	1½	0.783	2.67
800T200-33 ¹	0.0346	0.0329	8	2	0.415	1.41
800T200-43	0.0451	0.0428	8	2	0.541	1.84
800T200-54	0.0566	0.0538	8	2	0.679	2.31
800T200-68	0.0713	0.0677	8	2	0.855	2.91
800T250-43	0.0451	0.0428	8	2½	0.586	1.99
800T250-54	0.0566	0.0538	8	2½	0.735	2.50
800T250-68	0.0713	0.0677	8	2½	0.926	3.15
800T300-54	0.0566	0.0538	8	3	0.792	2.69
800T300-68	0.0713	0.0677	8	3	0.997	3.39
1000T150-43 ¹	0.0451	0.0428	10	1½	0.586	1.99
1000T150-54	0.0566	0.0538	10	1½	0.735	2.50
1000T150-68	0.0713	0.0677	10	1½	0.926	3.15
1000T200-43 ¹	0.0451	0.0428	10	2	0.631	2.15
1000T200-54	0.0566	0.0538	10	2	0.792	2.69
1000T200-68	0.0713	0.0677	10	2	0.997	3.39
1000T250-43 ¹	0.0451	0.0428	10	2½	0.676	2.30
1000T250-54	0.0566	0.0538	10	2½	0.849	2.89
1000T250-68	0.0713	0.0677	10	2½	1.069	3.64
1000T300-54	0.0566	0.0538	10	3	0.905	3.08
1000T300-68	0.0713	0.0677	10	3	1.140	3.88
1200T150-43 ¹	0.0451	0.0428	12	1½	0.676	2.30
1200T150-54 ¹	0.0566	0.0538	12	1½	0.849	2.89
1200T150-68	0.0713	0.0677	12	1½	1.069	3.64
1200T200-43 ¹	0.0451	0.0428	12	2	0.721	2.46
1200T200-54 ¹	0.0566	0.0538	12	2	0.905	3.08
1200T200-68	0.0713	0.0677	12	2	1.140	3.88
1200T250-54 ¹	0.0566	0.0538	12	2½	0.962	3.27
1200T250-68	0.0713	0.0677	12	2½	1.211	4.12
1200T300-54 ¹	0.0566	0.0538	12	3	1.018	3.47
1200T300-68	0.0713	0.0677	12	3	1.282	4.36

¹Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.

²Height measured from inside face to inside face of flanges.

TABLE 4—TRACK MEMBER PROPERTIES

Section	Gross Properties					Effective Properties - F _y = 33 ksi				Effective Properties - F _y = 50 ksi				Torsional Properties					
	I _{xx} (in ⁴)	S _{xx} (in ³)	R _x (in)	I _{yy} (in ⁴)	R _y (in)	I _{xx} (in ⁴)	S _{xx} (in ³)	M _a (in-k)	V _a (lb)	I _{xx} (in ⁴)	S _{xx} (in ³)	M _a (in-k)	V _a (lb)	J (in ⁴)	C _w (in ⁶)	X _o (in)	m (in)	R _o (in)	β
362T150-33	0.507	0.266	1.487	0.050	0.466	0.426	0.185	3.67	1024	x	x	x	x	0.092	0.127	-0.852	0.520	1.777	0.770
362T150-43	0.663	0.346	1.490	0.064	0.464	0.592	0.262	5.19	1739	0.565	0.246	7.38	2141	0.203	0.165	-0.848	0.517	1.776	0.772
362T150-54	0.834	0.432	1.492	0.080	0.462	x	x	x	x	0.751	0.332	9.94	3372	0.400	0.207	-0.842	0.514	1.775	0.775
362T150-68	1.055	0.543	1.496	0.099	0.459	x	x	x	x	1.000	0.452	13.52	4686	0.799	0.259	-0.835	0.510	1.774	0.778
362T200-33	0.631	0.331	1.546	0.110	0.644	0.478	0.196	3.87	1024	x	x	x	x	0.105	0.277	-1.268	0.752	2.101	0.636
362T200-43	0.825	0.430	1.549	0.142	0.642	0.671	0.279	5.50	1739	0.636	0.260	7.80	2141	0.233	0.360	-1.263	0.749	2.099	0.638
362T200-54	1.039	0.538	1.552	0.177	0.640	x	x	x	x	0.851	0.353	10.56	3372	0.460	0.452	-1.257	0.746	2.097	0.641
362T200-68	1.314	0.676	1.556	0.221	0.637	x	x	x	x	1.147	0.484	14.48	4686	0.920	0.569	-1.249	0.742	2.095	0.644
362T250-43	0.987	0.515	1.593	0.260	0.818	0.737	0.290	5.73	1739	0.696	0.271	8.11	2141	0.264	0.661	-1.699	0.987	2.468	0.526
362T250-54	1.243	0.645	1.597	0.324	0.815	x	x	x	x	0.936	0.368	11.01	3372	0.521	0.830	-1.693	0.984	2.466	0.529
362T250-68	1.574	0.810	1.601	0.406	0.813	x	x	x	x	1.270	0.506	15.16	4686	1.040	1.046	-1.685	0.979	2.462	0.532
362T300-54	1.448	0.751	1.631	0.531	0.988	x	x	x	x	1.009	0.379	11.35	3372	0.581	1.366	-2.143	1.225	2.869	0.442
362T300-68	1.834	0.943	1.636	0.665	0.985	x	x	x	x	1.376	0.523	15.67	4686	1.161	1.724	-2.135	1.220	2.864	0.444
400T150-33	0.632	0.301	1.615	0.051	0.460	0.534	0.214	4.23	950	x	x	x	x	0.097	0.159	-0.820	0.505	1.868	0.807
400T150-43	0.825	0.392	1.617	0.066	0.458	0.740	0.301	5.95	1739	0.708	0.284	8.49	2104	0.214	0.206	-0.815	0.503	1.868	0.810
400T150-54	1.038	0.490	1.619	0.082	0.456	x	x	x	x	0.937	0.381	11.4	3372	0.423	0.257	-0.810	0.500	1.867	0.812
400T150-68	1.312	0.615	1.623	0.102	0.453	x	x	x	x	1.245	0.516	15.45	5187	0.844	0.323	-0.803	0.496	1.866	0.815

¹Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.

²Where Effective Properties are listed as 'x', section is not available in the yield point (F_y).

Table 4 continued on the next page.



EVALUATION REPORT

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TABLE 4—TRACK MEMBER PROPERTIES (Continued)

Section	Gross Properties					Effective Properties ² - Fy = 33 ksi				Effective Properties ² - Fy = 50 ksi				Torsional Properties						
	I _{xx} (in ⁴)	S _{xx} (in ³)	R _x (in)	I _{yy} (in ⁴)	R _y (in)	I _{xx} (in ⁴)	S _{xx} (in ³)	M _a (in-k)	V _a (lb)	I _{xx} (in ⁴)	S _{xx} (in ³)	M _a (in-k)	V _a (lb)	J (in ⁴)	Cw (in ⁶)	Xo (in)	m (in)	Ro (in)	β	
400T200-33	0.781	0.373	1.679	0.113	0.638	0.598	0.226	4.46	950	x	x	x	x	0.110	0.345	-1.226	0.735	2.175	0.682	
400T200-43	1.021	0.485	1.682	0.146	0.636	0.835	0.320	6.32	1739	0.794	0.300	8.98	2104	0.245	0.449	-1.221	0.732	2.174	0.684	
400T200-54	1.285	0.607	1.685	0.182	0.634	x	x	x	x	1.059	0.405	12.11	3372	0.483	0.562	-1.215	0.729	2.172	0.687	
400T200-68	1.625	0.762	1.689	0.227	0.631	x	x	x	x	1.422	0.552	16.53	5187	0.965	0.707	-1.208	0.725	2.171	0.690	
400T250-43	1.216	0.578	1.731	0.268	0.813	0.916	0.333	6.58	1739	0.867	0.312	9.34	2104	0.275	0.821	-1.650	0.968	2.526	0.573	
400T250-54	1.532	0.724	1.735	0.335	0.811	x	x	x	x	1.162	0.422	12.63	3372	0.544	1.031	-1.644	0.964	2.524	0.576	
400T250-68	1.938	0.909	1.739	0.418	0.808	x	x	x	x	1.571	0.578	17.31	5187	1.086	1.299	-1.636	0.960	2.521	0.579	
400T300-54	1.778	0.840	1.773	0.548	0.984	x	x	x	x	1.252	0.435	13.03	3372	0.604	1.694	-2.088	1.204	2.911	0.485	
400T300-68	2.251	1.056	1.778	0.686	0.982	x	x	x	x	1.701	0.598	17.9	5187	1.207	2.137	-2.080	1.200	2.907	0.488	
600T150-33	1.605	0.519	2.270	0.057	0.426	1.362	0.315	6.22	627	x	x	x	x	0.124	0.396	-0.683	0.438	2.408	0.920	
600T150-43	2.094	0.674	2.271	0.073	0.424	1.927	0.489	9.67	1389	1.815	0.428	12.81	1389	0.275	0.514	-0.679	0.436	2.408	0.921	
600T150-54	2.631	0.844	2.273	0.091	0.422	x	x	x	x	2.432	0.623	18.65	2745	0.544	0.641	-0.674	0.433	2.408	0.922	
600T150-68	3.318	1.060	2.276	0.113	0.419	x	x	x	x	3.176	0.897	26.84	5350	1.086	0.801	-0.669	0.430	2.409	0.923	
600T200-33	1.932	0.624	2.363	0.126	0.604	1.569	0.347	6.86	627	x	x	x	x	0.138	0.861	-1.047	0.653	2.654	0.844	
600T200-43	2.522	0.812	2.365	0.163	0.602	2.120	0.576	11.38	1389	2.065	0.480	14.37	1389	0.306	1.119	-1.042	0.651	2.654	0.846	
600T200-54	3.170	1.017	2.368	0.203	0.600	x	x	x	x	2.681	0.728	21.79	2745	0.604	1.399	-1.037	0.648	2.653	0.847	
600T200-68	4.002	1.278	2.371	0.254	0.597	x	x	x	x	3.558	0.977	29.26	5350	1.207	1.755	-1.031	0.644	2.653	0.849	
600T250-43	2.951	0.950	2.439	0.303	0.781	2.315	0.584	11.54	1389	2.254	0.477	14.29	1389	0.336	2.041	-1.434	0.876	2.935	0.761	
600T250-54	3.710	1.190	2.442	0.377	0.779	x	x	x	x	2.922	0.751	22.49	2745	0.664	2.557	-1.429	0.872	2.934	0.763	
600T250-68	4.685	1.496	2.446	0.472	0.776	x	x	x	x	3.892	1.023	30.62	5350	1.327	3.213	-1.422	0.869	2.933	0.765	
600T300-54	4.250	1.364	2.502	0.622	0.957	x	x	x	x	3.153	0.741	22.18	2745	0.725	4.184	-1.840	1.104	3.250	0.679	
600T300-68	5.368	1.714	2.506	0.778	0.954	x	x	x	x	4.187	1.059	31.69	5350	1.448	5.264	-1.833	1.099	3.248	0.682	
800T150-33 ¹	3.201	0.782	2.900	0.060	0.397	2.617	0.430	8.49	468	x	x	x	x	0.152	0.761	-0.587	0.387	2.985	0.961	
800T150-43	4.174	1.017	2.901	0.077	0.395	3.752	0.677	13.37	1036	3.495	0.586	17.54	1036	0.336	0.985	-0.583	0.385	2.985	0.962	
800T150-54	5.241	1.273	2.902	0.096	0.393	x	x	x	x	4.749	0.863	25.84	2048	0.664	1.227	-0.579	0.382	2.986	0.962	
800T150-68	6.607	1.599	2.904	0.119	0.390	x	x	x	x	6.384	1.263	37.82	4094	1.327	1.532	-0.574	0.379	2.986	0.963	
800T200-33 ¹	3.776	0.922	3.015	0.135	0.570	2.842	0.440	8.7	468	x	x	x	x	0.166	1.659	-0.916	0.588	3.203	0.918	
800T200-43	4.926	1.200	3.017	0.175	0.569	4.116	0.699	13.81	1036	3.805	0.601	18	1036	0.367	2.153	-0.912	0.586	3.203	0.919	
800T200-54	6.187	1.503	3.019	0.218	0.566	x	x	x	x	5.215	0.892	26.71	2048	0.725	2.690	-0.907	0.583	3.203	0.920	
800T200-68	7.803	1.889	3.022	0.272	0.564	x	x	x	x	7.080	1.319	39.49	4094	1.448	3.369	-0.902	0.579	3.203	0.921	
800T250-43	5.677	1.383	3.112	0.326	0.746	4.660	0.766	15.14	1036	4.550	0.634	18.98	1036	0.397	3.931	-1.272	0.800	3.444	0.864	
800T250-54	7.133	1.733	3.114	0.407	0.744	x	x	x	x	5.876	0.983	29.44	2048	0.785	4.919	-1.267	0.797	3.444	0.865	
800T250-68	8.999	2.178	3.117	0.509	0.741	x	x	x	x	7.621	1.567	46.91	4094	1.569	6.174	-1.261	0.793	3.443	0.866	
800T300-54	8.079	1.963	3.194	0.675	0.923	x	x	x	x	6.303	0.980	29.36	2048	0.846	8.041	-1.650	1.019	3.712	0.802	
800T300-68	10.195	2.468	3.197	0.844	0.920	x	x	x	x	8.192	1.560	46.71	4094	1.690	10.104	-1.643	1.015	3.711	0.804	
1000T150-43 ¹	7.246	1.419	3.516	0.080	0.370	6.291	0.864	17.08	826	5.806	0.744	22.27	826	0.397	1.630	-0.512	0.344	3.572	0.979	
1000T150-54	9.096	1.778	3.517	0.100	0.368	x	x	x	x	7.965	1.103	33.03	1633	0.785	2.029	-0.509	0.342	3.573	0.980	
1000T150-68	11.461	2.234	3.518	0.124	0.366	x	x	x	x	10.809	1.631	48.84	3265	1.569	2.530	-0.504	0.339	3.573	0.980	
1000T200-43 ¹	8.411	1.648	3.650	0.183	0.539	6.831	0.890	17.59	826	6.262	0.762	22.81	826	0.428	3.580	-0.812	0.533	3.778	0.954	
1000T200-54	10.561	2.064	3.652	0.228	0.536	x	x	x	x	8.659	1.137	34.05	1633	0.846	4.469	-0.808	0.530	3.778	0.954	
1000T200-68	13.313	2.594	3.654	0.284	0.534	x	x	x	x	11.862	1.696	50.77	3265	1.690	5.592	-0.803	0.527	3.779	0.955	
1000T250-43 ¹	9.576	1.876	3.763	0.344	0.713	7.290	0.907	17.92	826	6.646	0.774	23.16	826	0.459	6.550	-1.145	0.736	3.997	0.918	
1000T250-54	12.027	2.351	3.765	0.429	0.711	x	x	x	x	9.247	1.159	34.71	1633	0.906	8.191	-1.141	0.733	3.997	0.919	
1000T250-68	15.164	2.955	3.767	0.536	0.708	x	x	x	x	12.756	1.738	52.04	3265	1.811	10.271	-1.135	0.729	3.998	0.919	
1000T300-54	13.492	2.637	3.861	0.714	0.888	x	x	x	x	10.916	1.221	36.55	1633	0.967	13.396	-1.498	0.946	4.235	0.875	
1000T300-68	17.015	3.316	3.864	0.893	0.885	x	x	x	x	14.149	1.918	57.44	3265	1.932	16.821	-1.492	0.942	4.235	0.876	
1200T150-43 ¹	11.491	1.882	4.122	0.083	0.349	9.584	1.052	20.79	687	8.780	0.901	26.98	687	0.459	2.453	-0.457	0.311	4.162	0.988	
1200T150-54 ¹	14.422	2.358	4.122	0.102	0.347	x	x	x	x	12.142	1.343	40.22	1358	0.906	3.053	-0.454	0.309	4.162	0.988	
1200T150-68	18.168	2.963	4.123	0.127	0.345	x	x	x	x	16.616	1.999	59.86	2716	1.811	3.804	-0.450	0.307	4.162	0.988	
1200T200-43 ¹	13.159	2.155	4.271	0.189	0.512	10.331	1.081	21.37	687	9.401	0.922	27.61	687	0.489	5.416	-0.733	0.488	4.363	0.972	
1200T200-54 ¹	16.520	2.701	4.272	0.236	0.510	x	x	x	x	13.098	1.382	41.37	1358	0.967	6.759	-0.729	0.486	4.364	0.972	
1200T200-68	20.817	3.395	4.274	0.294	0.508	x	x	x	x	18.085	2.072	62.04	2716	1.932	8.452	-0.724	0.483	4.364	0.972	
1200T250-43 ¹	14.828	2.429	4.398	0.357	0.683	10.960	1.101	21.75	687	9.922	0.936	28.02	687	0.520	9.938	-1.042	0.681	4.571	0.948	
1200T250-54 ¹	18.618	3.044	4.400	0.445	0.680	x	x	x	x	13.907	1.									

¹Web-height to thickness ratio exceeds 200. Web Stiffeners are required at all support points and concentrated loads.

²Where Effective Properties are listed as 'x', section is not available in the yield point (F_y).



EVALUATION REPORT

Number: 779

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TABLE 5—SINGLE MEMBER ALLOWABLE WEB CRIPPLNG LOADS^{1,2} (lbs)

Section	F _y (ksi)	Condition 1				Condition 2				Condition 3				Condition 4			
		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
362S_-33	33	155	243	256	301	281	387	402	456	126	169	175	197	366	462	476	526
362S_-43	33	260	401	422	494	501	675	701	790	231	303	314	352	650	804	827	907
362S_-43	50	394	607	639	749	760	1023	1062	1197	350	460	476	533	984	1219	1254	1375
362S_-54	50	611	927	974	1138	1232	1629	1688	1893	579	749	774	861	1597	1947	1999	2180
362S_-68	50	951	1420	1490	1732	1997	2596	2684	2993	957	1215	1254	1387	2599	3120	3198	3467
400S_-33	33	153	239	252	297	280	384	400	454	120	160	166	187	357	451	465	513
400S_-43	33	257	396	417	489	499	671	697	786	222	292	302	338	637	788	811	889
400S_-43	50	389	600	632	740	756	1017	1056	1191	336	442	458	512	965	1195	1229	1347
400S_-54	50	605	918	965	1126	1226	1622	1681	1885	561	725	749	833	1570	1914	1965	2143
400S_-68	50	942	1408	1477	1717	1989	2585	2673	2981	931	1183	1220	1350	2560	3074	3150	3416
600S_-33	33	143	224	236	278	272	374	389	441	91	122	127	143	317	399	412	455
600S_-43	33	243	375	395	463	487	655	680	767	181	238	246	275	577	714	734	805
600S_-43	50	368	568	598	701	738	993	1031	1162	274	360	373	417	874	1082	1113	1220
600S_-54	50	576	875	920	1074	1200	1587	1645	1845	475	614	634	706	1443	1759	1806	1969
600S_-68	50	904	1350	1416	1647	1952	2536	2623	2925	812	1031	1064	1177	2381	2860	2930	3177
800S_-43	33	232	357	376	441	477	642	666	751	146	192	199	223	527	652	671	735
800S_-43	50	351	541	570	668	722	972	1009	1138	222	292	302	338	798	988	1016	1114
800S_-54	50	553	839	882	1030	1178	1558	1615	1811	403	521	539	599	1337	1630	1673	1825
800S_-68	50	872	1302	1366	1588	1920	2496	2581	2878	713	906	934	1033	2233	2681	2748	2979
1000S_-54	50	532	808	849	992	1159	1533	1589	1782	341	440	455	506	1244	1517	1557	1698
1000S_-68	50	843	1260	1322	1537	1893	2460	2544	2837	626	795	820	908	2103	2525	2587	2805
1200S_-68	50	818	1222	1282	1491	1868	2428	2511	2800	548	696	718	794	1985	2384	2443	2649

¹Member fastened to support.

²See Figure 2 for Condition 1, Condition 2, Condition 3, and Condition 4.

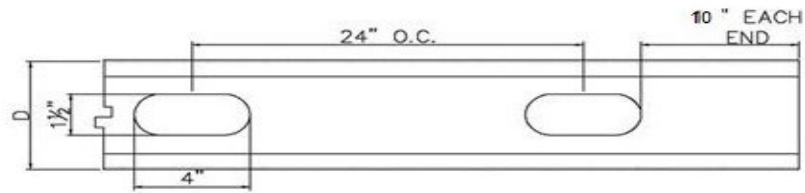
TABLE 6—BACK-TO-BACK MEMBERS ALLOWABLE WEB CRIPPLNG LOADS^{2,3} (lbs)

Section	F _y (ksi)	Condition 1				Condition 2				Condition 3				Condition 4			
		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
362S_-33	33	725	---	---	---	997	---	---	---	443	---	---	---	915	---	---	---
362S_-43	33	1191	---	---	---	1710	---	---	---	804	---	---	---	1689	---	---	---
362S_-43	50	1804	---	---	---	2592	---	---	---	1219	---	---	---	2560	---	---	---
362S_-54	50	2755	---	---	---	4098	---	---	---	2006	---	---	---	4269	---	---	---
362S_-68	50	4233	---	---	---	6510	---	---	---	3303	---	---	---	7107	---	---	---
400S_-33	33	724	1103	---	---	996	1319	---	---	428	540	---	---	882	1114	---	---
400S_-43	33	1190	1779	---	---	1710	2218	---	---	781	967	---	---	1641	2032	---	---
400S_-43	50	1803	2696	---	---	2590	3360	---	---	1183	1465	---	---	2486	3078	---	---
400S_-54	50	2754	4050	---	---	4096	5224	---	---	1957	2386	---	---	4165	5078	---	---
400S_-68	50	4231	6117	---	---	6507	8161	---	---	3234	3883	---	---	6959	8357	---	---
600S_-33	33	722	1100	1156	---	994	1315	1363	---	355	448	462	---	732	924	953	---
600S_-43	33	1187	1775	1863	---	1706	2213	2288	---	674	835	858	---	1416	1753	1803	---
600S_-43	50	1799	2690	2822	---	2585	3353	3467	---	1021	1264	1301	---	2145	2656	2732	---
600S_-54	50	2748	4042	4234	---	4088	5214	5381	---	1731	2110	2167	---	3684	4491	4611	---
600S_-68	50	4224	6106	6386	---	6496	8146	8391	---	2917	3502	3589	---	6277	7537	7724	---
800S_-43	33	1185	1772	1859	2162	1703	2209	2284	2545	585	724	745	816	1228	1521	1564	1715
800S_-43	50	1796	2685	2817	3276	2580	3346	3460	3856	886	1097	1128	1237	1861	2304	2370	2598
800S_-54	50	2744	4036	4227	4894	4081	5205	5372	5952	1543	1881	1931	2105	3282	4002	4108	4480
800S_-68	50	4217	6097	6376	7347	6486	8134	8379	9229	2653	3185	3264	3539	5709	6855	7025	7616
1000S_-54	50	2740	4030	4221	4887	4076	5198	5364	5943	1377	1679	1724	1880	2931	3573	3669	4000
1000S_-68	50	4212	6089	6368	7337	6478	8124	8368	9217	2421	2908	2980	3231	5211	6257	6412	6952
1200S_-68	50	4207	6082	6361	7328	6470	8114	8358	9207	2213	2658	2724	2953	4763	5719	5861	6355

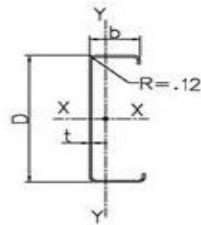
¹Bearing length to web height ratio (N/h) exceeds 1.0.

²Members fastened to support.

³See Figure 2 for Condition 1, Condition 2, Condition 3, and Condition 4.

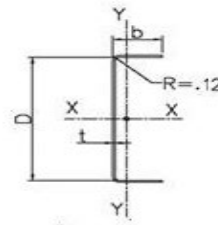


STANDARD PUNCH-OUT, ALL PROFILES



D = 3½, 4, 6,
8, 10, 12
b = 1½, 2, 2½
t = 68, 54, 43 33,
30 MILS

STRUCTURAL STUD



D = 3½, 4, 6,
8, 10, 12
b = 1½, 2, 2½
t = 68, 54, 43 33,
30 MILS

STRUCTURAL TRACK

FIGURE 1—C-SECTION AND TRACK PROFILES

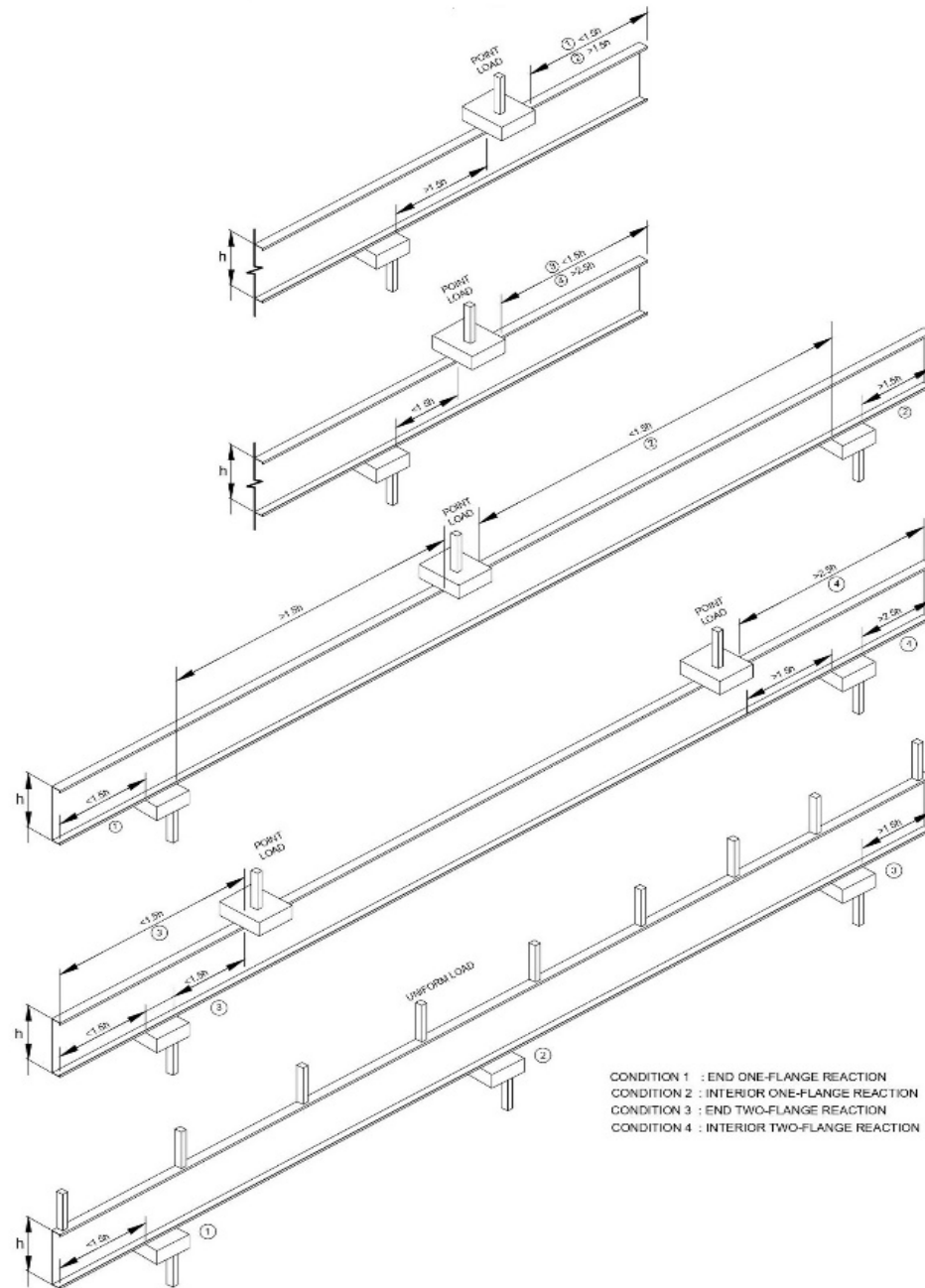


FIGURE 2—WEB CRIPPLING LOAD CONDITIONS



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COLD-FORMED STEEL FRAMING MEMBERS

CSI Sections:

- 05 40 00 Cold-Formed Metal Framing**
- 05 41 00 Structural Metal Stud Framing**
- 05 42 00 Cold-Formed Metal Joist Framing**

1.0 RECOGNITION

The Livio Building Systems' cold-formed steel framing members as evaluated and represented in IAPMO UES Evaluation Report ER-779 and with changes as noted in this supplement are satisfactory alternatives for use in buildings built under the following codes (and regulations):

- 2022 and 2019 California Building Code (CBC)
- 2022 and 2019 California Residential Code (CRC)

2.0 LIMITATIONS

Use of the Livio Building Systems' cold-formed steel framing members when installed, designed, and recognized in this report, are subject to the limitations stated in Evaluation Report ER-779 and the following additional limitations:

2.1 For use under the 2022 CBC and 2022 CRC, the Livio Building Systems' cold-formed steel framing members shall comply with the provisions applicable to the 2021 IBC or 2021 IRC in IAPMO UES ER-779.

2.2 For use under the 2019 CBC and 2019 CRC, the Livio Building Systems' cold-formed steel framing members shall comply with the provisions applicable to the 2018 IBC or 2018 IRC in IAPMO UES ER-779.

2.3 The cold-formed steel framing members shall be installed and identified in accordance with this report, codes listed in Section 1.0 of this report, and the approved plans. Where conflicts occur, the more restrictive shall govern.

2.4 Plans, calculations, and specifications verifying compliance with this report shall be submitted to the building official for approval. The documents shall 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.

2.5 Construction regulated by DSA SS and HCAI (formerly OSHPD) shall comply with Chapter 22A and Sections 2210A and 2211A of the CBC.

2.6 In accordance with Section 2211A.7 of the CBC, prescriptive framing is not permitted construction regulated by DSA SS and HCAI (formerly OSHPD).

2.7 This supplement expires concurrently with ER-779.

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org



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COLD-FORMED STEEL FRAMING MEMBERS

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- 05 41 00–Structural Metal Stud Framing**
- 05 42 00–Cold Formed Metal Joist Framing**

1.0 RECOGNITION

The Livio Building Systems' cold-formed steel framing members as evaluated and represented in IAPMO UES Evaluation Report ER-779 and with changes as noted in this supplement are satisfactory alternatives for use in buildings built under the following codes:

- 2023 and 2020 Florida Building Code, Building
- 2023 and 2020 Florida Building Code, Residential

2.0 FINDINGS

Use of the Livio Building Systems' cold-formed steel framing members when installed, designed, and recognized in this report, are subject to the limitations stated in Evaluation Report ER-779 and the following additional limitations:

2.1 Use of Livio Building Systems' cold-formed steel framing members for compliance with the High-Velocity Hurricane Zone provisions of the Florida Building Code, Building, and Florida Building Code, Residential, has not been evaluated and is outside the scope of this report.

2.2 Design requirements shall be determined in accordance with the Florida Building Code, Building, or Florida Building Code, Residential, as applicable.

2.3 Installation for the 2023 Florida Building Code, Building, and 2023 Florida Building Code, Residential, shall be in accordance with the 2021 International Building Code or 2021 International Residential Code, as applicable, requirements in IAPMO UES ER-779 with modifications as noted in the supplement.

2.4 Installation for the 2020 Florida Building Code, Building, and 2020 Florida Building Code, Residential, shall be in accordance with the 2018 International Building Code or 2018 International Residential Code, as applicable, requirements in IAPMO UES ER-779 with modifications as noted in the supplement.

2.5 Plans, calculations, and specifications verifying compliance with this report shall be submitted to the building official for approval. The documents shall 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.

2.6 For products falling under [Section 5\(d\)](#) of Florida Rule 61G20-3.001, verification is required that the report holder's quality assurance program is audited by a quality assurance entity, approved by the Florida Building Commission (or the building official when the report holder does not possess an approval by the Commission), to provide oversight and determine that the products are being manufactured as described in this evaluation report to establish continual product performance.

2.7 This supplement expires concurrently with ER-779.

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org



CITY OF LOS ANGELES SUPPLEMENT

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COLD-FORMED STEEL FRAMING MEMBERS

CSI Sections:

**05 40 00—Cold Formed Metal Framing
05 41 00—Structural Metal Stud Framing
05 42 00—Cold Formed Metal Joist Framing**

1.0 RECOGNITION

Livio Building Systems' cold-formed steel framing members as evaluated and presented in IAPMO UES Evaluation Report ER-779 and with changes as noted in the California supplement and this supplement are satisfactory alternatives for use in buildings built under the following codes:

- 2023 and 2020 City of Los Angeles Building Code (LABC)
- 2023 and 2020 City of Los Angeles Residential Code (LARC)

2.0 LIMITATIONS

Use of the Livio Building Systems' cold-formed steel framing members when installed, designed, and recognized in this report, are subject to the limitations stated in Evaluation Report ER-779 and the following additional limitations:

2.1 For use under the 2023 LABC and 2023 LARC, the Livio Building Systems' cold-formed steel framing members shall comply with the provisions applicable to the 2022 CBC or 2022 CRC in the California Supplement to IAPMO UES ER-779.

2.2 For use under the 2020 LABC and 2020 LARC, the Livio Building Systems' cold-formed steel framing members shall comply with the provisions applicable to the 2019 CBC or 2019 CRC in the California Supplement to IAPMO UES ER-779.

2.3 Plans, calculations, and specifications verifying compliance with this report shall be submitted to the building official for approval. Plans and calculations shall be prepared, stamped, and signed by a California registered design professional where required by the statutes of the City of Los Angeles.

2.4 The cold-formed steel framing members shall be installed and identified in accordance with ER-779 and the approved plans. Where conflicts occur, the more restrictive shall govern.

2.5 The design, installation, and inspection of the Livio Building Systems' cold-formed steel framing members shall be in accordance with LABC Chapters 16 and 22, as applicable, due to local amendments to these chapters.

2.6 This supplement expires concurrently with ER-779.

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