ICC-ES Evaluation Report

ESR-1538

Reissued September 2025

Subject to renewal September 2026

This report also contains:

- CA Supplement
- FL Supplement w/ HVHZ
- SBC Supplement

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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 16.13—Non-Structural Metal Stud Framing**	**REPORT HOLDER:** **SCOTTSDALE CONSTRUCTION SYSTEMS** **ADDITIONAL LISTEES:** **DVELE OMEGA CORPORATION** **SICLA STEEL FRAMING**	**EVALUATION SUBJECT:** **COLD-FORMED STEEL FRAMING MEMBERS**	

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2024, 2021, 2018, 2015 and 2012 *International Building Code*® (IBC)
- 2024, 2021, 2018, 2015 and 2012 *International Residential Code* (IRC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)†

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

Property evaluated:

- Structural

2.0 USES

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

3.0 DESCRIPTION

3.1 General:

Member designations are provided in Table 2. Gross, torsional and effective properties are provided in Tables 3 and 4. See Figure 1. Punch-outs are noncircular holes with a diameter of 1.125 inches by 4 inches (28.6 mm by 102 mm) spaced 24 inches (610 mm) on center. The punch-outs are a minimum of 10 inches (254 mm) clear from the ends of the studs.

3.2 Material:

The framing members are cold-rolled from steel coils complying with the specification listed in Table 1.

4.0 DESIGN AND INSTALLATION

4.1 Design:

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

4.2 Installation:

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

5.0 CONDITIONS OF USE:

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

5.1 The cold-formed steel framing members must be installed in accordance with the applicable code, the approved plans and this report.

5.2 Minimum uncoated base-metal thickness of the framing members as delivered to the jobsite must be at least 95 percent of the design base-metal thickness.

5.3 Complete plans and calculations verifying compliance with this report must be submitted to the code official for each project at the time of permit application. The calculations and drawings must be prepared and sealed by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.4 The framing members are manufactured under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Cold-formed Steel Framing Members (AC46), dated October 2019 (editorially revised February 2024).

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-1538) along with the name, registered trademark, or registered logo of the report holder or listee must be included in the product label.

7.2 In addition, each member must have a legible label, stamp or embossment, at a maximum of 96 inches (2440 mm) on center; member designation; minimum base-metal thickness (uncoated) in decimal thickness or mils; in addition to the following:

- All members with a G40 coating and members complying with the non-loading bearing specifications in Table 1 must also have the designation “NS”.
- Load-bearing members must also have the minimum yield strength, and the protective coating designation (minimum G60).

7.3 The report holder’s contact information is the following:

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7.4 The additional listees contact information are the following:

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DEFINITIONS OF SYMBOLS

Gross Properties

I_x - moment of inertia of the cross section about the x-axis

S_x - section modulus about the x-axis

R_x - radius of gyration of cross section about the x-axis

I_y - moment of inertia of the cross section about the y-axis

R_y - radius of gyration of cross section about the y-axis

Effective Properties

A_e - Effective area for compression based on local buckling at stress = Fy

I_{xe} - moment of inertia of the cross section about the x-axis

S_{xe} - section modulus about the x-axis

ϕM_{nxo} - Flexural strength (factored resistance) about the X-X axis

M_{ad} - Flexural strength (factored resistance) for distortional buckling about the X-X axis

ϕV_{nv} - Shear strength (factored resistance) with no web hole

ϕV_{nvNet} - Shear strength (factored resistance) with web hole

Torsional and Other Properties

J - St. Venant torsion constant.

C_w - Warping constant

X_o - Distance from shear center to neutral axis in the x-direction

m - Distance from shear center to mid-plane of web

R_o - Polar radius of gyration of cross section about the shear center

β - Torsional flexural constant. $1-(X_o/R_o)^2$

K_ϕ - Rotational stiffness.

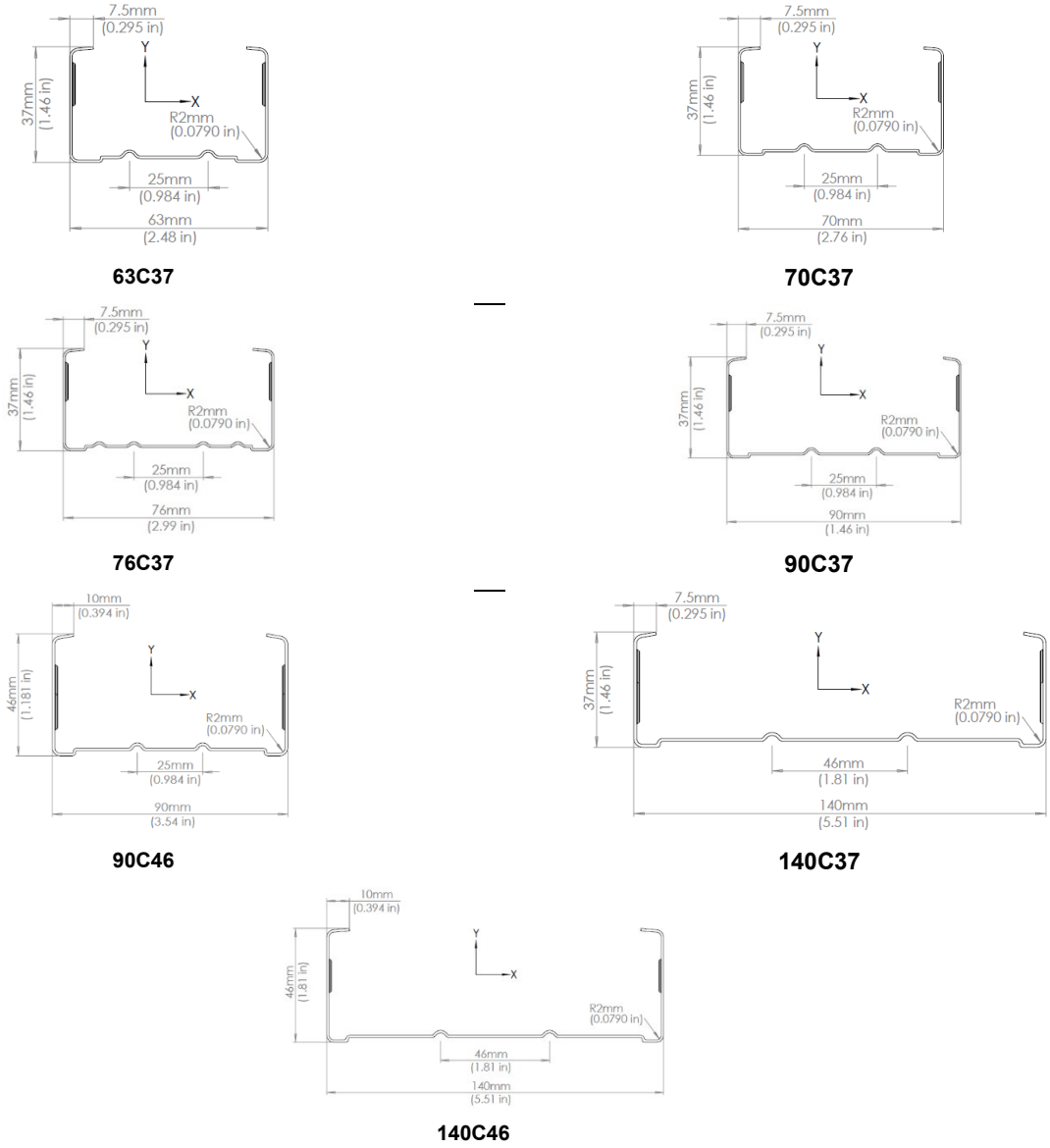

FIGURE 1 – COLD FORMED STEEL FRAMING MEMBER SECTIONS

TABLE 1—STEEL SPECIFICATIONS[1,2]

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

[1]The steel has either a minimum metallic coating designation of G40 or G60 coating.
[2]The NS grades of steels and G40 coatings are limited to nonstructural applications as defined by AISI S220.

TABLE 2—MEMBER DESIGNATION

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

TABLE 3—GROSS AND TORSIONAL SECTION PROPERTIES[1]

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

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

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

TABLE 4—EFFECTIVE SECTION PROPERTIES[1, 5]

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

TABLE 4—EFFECTIVE SECTION PROPERTIES[1, 5] (Continued)

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

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

[1]See Page 2 for definition of symbols.
[2]The effective properties are based on the reduced cross section at the web punch-out.
[3]Use I_{xe} deflection calculations.
[4]Distortional buckling moment (ϕM_{nd}) is calculated without the beneficial effect of sheathing to rotational stiffness. $K_\phi = 0$.
[5]Available ASD strengths may be determined by dividing the tabulated LRFD values by 1.5.

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

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

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

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

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

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

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

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

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

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

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

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

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

[1]Tabulated values are for unpunched webs and punched webs where the clear distance between the edge of bearing is such that the web crippling reduction factor, Rc, per AISI S100 Section C3.4.2 = 1.0. For webs with punchouts closer to the edge of bearing a web crippling reduction factor must be applied per AISI S100, Section C3.4.2.
[2]See notes at end of Table 6 for definitions of 1 and 2 flange loading.
[3]Design web crippling strengths for back-to-back members may be taken as twice the capacity of single members.

Web Crippling Notes (For use with Tables 5-6):
As defined by AISI S100:

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

ICC-ES Evaluation Report

ESR-1538 CA Supplement

Reissued September 2025

This report is subject to renewal September 2026.

DIVISION: 05 00 000—METALS
Section: 05 40 00—Cold-Formed Metal Framing
Section: 05 41 00—Structural Metal Stud Framing
Section: 05 42 00—Cold-Formed Metal Joist Framing
Section: 05 44 00—Cold-Formed Metal Trusses

REPORT HOLDER:

SCOTTSDALE CONSTRUCTION SYSTEMS

EVALUATION SUBJECT:

COLD-FORMED STEEL FRAMING MEMBERS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

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

Applicable code editions:

- 2022 *California Building Code* (CBC)

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

- 2022 *California Residential Code* (CRC)

2.0 CONCLUSIONS

2.1 CBC:

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

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

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

2.2 CRC:

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

This supplement expires concurrently with the evaluation report, reissued September 2025

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DIVISION: 05 00 000—METALS
Section: 05 40 00—Cold-Formed Metal Framing
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Section: 05 42 00—Cold-Formed Metal Joist Framing
Section: 05 44 00—Cold-Formed Metal Trusses

REPORT HOLDER:

SCOTTSDALE CONSTRUCTION SYSTEMS

EVALUATION SUBJECT:

COLD-FORMED STEEL FRAMING MEMBERS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

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

Applicable code editions:

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

2.0 CONCLUSIONS

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

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

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official, when the report holder does not possess an approval by the Commission). Florida Rule 61G20-3 is applicable to products and/or systems which comprise the building envelope and structural frame for compliance with the structural requirements of the Florida Building Code.

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DIVISION: 05 00 000—METALS
Section: 05 40 00—Cold-Formed Metal Framing
Section: 05 41 00—Structural Metal Stud Framing
Section: 05 42 00—Cold-Formed Metal Joist Framing
Section: 05 44 00—Cold-Formed Metal Trusses

DIVISION: 09 00 00—FINISHES
Section: 09 22 16.13—Non-Structural Metal Stud Framing

REPORT HOLDER:

SCOTTSDALE CONSTRUCTION SYSTEMS

EVALUATION SUBJECT:

COLD-FORMED STEEL FRAMING MEMBERS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

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

Applicable code edition:

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

2.0 CONCLUSIONS

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

3.0 CONDITIONS OF USE.

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

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

This supplement expires concurrently with the evaluation report, reissued September 2025.

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TABLE 2 (SBC) —MEMBER DESIGNATION

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

For Imperial Units: 1 m = 39.4 in

TABLE 3 (SBC)—GROSS AND TORSIONAL SECTION PROPERTIES[1]

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

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

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

TABLE 4 (SBC)—EFFECTIVE SECTION PROPERTIES[1]

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

TABLE 4 (SBC)—EFFECTIVE SECTION PROPERTIES[1]

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

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

[1]See ESR-1538 Page 2 for definition of symbols.
[2]The effective properties are based on the reduced cross section at the web punch-out.
[3]Use I_{xe} for deflection calculations.
[4]Distortional buckling moment (ϕM_{nd}) is calculated without the beneficial effect of sheathing to rotational stiffness. $K_\phi = 0$.

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

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

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

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

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

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

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

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

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

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

TABLE 6 (SBC) — LRFD WEB CRIPPLING STRENGTHS FOR SINGLE MEMBERS – Two Flange - Fastened to Support [1,2,3] (N) (Continued)

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

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

[1]Tabulated values are for unpunched webs and punched webs where the clear distance between the edge of bearing is such that the web crippling reduction factor, Rc, per AISI S100 Section C3.4.2 = 1.0. For webs with punchouts closer to the edge of bearing a web crippling reduction factor must be applied per AISI S100, Section C3.4.2.
[2]See notes at end of Table 6 (SBC) for definitions of 1 and 2 flange loading.
[3]Design web crippling strengths for back-to-back members may be taken as twice the capacity of single members.

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

As defined by AISI S100:

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