ICC-ES Evaluation Report

ESR-2093-AU

Issued September 2023

Subject to renewal September 2024

DIVISION: 05 00 000—METALS	REPORT HOLDER:	EVALUATION SUBJECT:
Section: 05 40 00—Cold-Formed Metal Framing	**SCOTTSDALE CONSTRUCTION SYSTEMS**	**COLD-FORMED STEEL FRAMING MEMBERS**
Section: 05 41 00—Structural Metal Stud Framing	**ADDITIONAL LISTEE:**	
Section: 05 42 00—Cold-Formed Metal Joist Framing	**DVELE OMEGA CORPORATION**	
Section: 05 44 00—Cold-Formed Metal Trusses		

1.0 EVALUATION SCOPE

Compliance with the following code:

- *National Construction Code* (NCC) *2022 Building Code of Australia (BCA) –Volumes One and Two*

Compliance with the following NCC code provisions:

- **VOLUME 1: For Class 2 to 9 Buildings (Non-Residential)**

B1D1: Deemed-to-Satisfy Provisions

B1D2: Resistance to Actions

B1D4 (c)(ii): Determination of structural resistance of materials and forms of construction, Steel construction, Cold-formed steel structures: AS/NZS 4600

State or Territory Variations:

Northern Territory: NT B1D4(c)(ii)

Queensland: QLD B1D4(c)(ii)

Western Australia: WA B1D3, WA B1D4(c)(ii)

- **VOLUME 2: For Class 1 and 10 Buildings (Residential)**

H1D1: Deemed-to-Satisfy Provisions

H1D2: Structural Provisions

H1D6(3)(c): Framing, Performance requirement, Cold-formed steel structures: AS/NZS 4600.

2.0 USES

The cold-formed steel framing members are used for top and bottom chords of trusses in load-bearing roofs and floors.

3.0 DESCRIPTION

3.1 General:

Member designations are provided in Table 1. Also, see Figure 1.

3.2 Material:

The framing members are cold-rolled from steel coils complying with AS/NZS 1397 material grades G300 (1.55 mm), G350 (0.55, 0.75, 0.85, 0.95, and 1.15 mm), and G550 (0.55, 0.75, 0.85, 0.95 and 1.15 mm). The members have the minimum Z275 coating per AS/NZS 4680.

4.0 DESIGN AND INSTALLATION

4.1 Structural Design:

The resistance values in Tables 2 and 3 have been determined in accordance with the Australian/New Zealand Standard for Cold-Formed Steel Structures (AS/NZS 4600:2018) based on limit state design (LSD) values.

Truss design, assembly, and installation may comply with the provisions of Australia NASH Standard Part 1: 2005 (Amendments A, B and C), Residential and Low Rise Steel Framing – Design Criteria and Australia NASH Standard Part 2: 2014 (Amendment A), Residential and Low Rise Steel Framing – Design Solutions.

4.2 Durability:

Cold-formed steel framing members must be installed in interior, dry and protected environments unless corrosion protection in conformance with Section 1.6.5.2 of AS/NZS 4600:2018 is provided and justified to the satisfaction of the code official.

4.3 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 comply with, or are suitable alternatives 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 Recognition of complete cold-formed steel truss assemblies is outside the scope of this report. The design, quality assurance, installation, and testing of the cold-formed steel trusses must comply with NASH Standards referenced in Section 4.1, and are subject to approval by the code official.

5.5 The framing members are manufactured under quality control programs with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

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

6.2 Calculations in accordance with Australian/New Zealand Standard for Cold-Formed Steel Structures (AS/NZS 4600:2018)

6.3 Quality control documentation.

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-2093-AU) along with the name, registered trademark, or registered logo of the report holder 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; the minimum yield strength; and the protective coating designation (minimum Z275, AZ150, or AM150).

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

SCOTTSDALE CONSTRUCTION SYSTEMS
P.O. BOX 520981
SALT LAKE CITY, UT 84152, USA
1 (888) 406-2080

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7.4 The additional listee contact information is the following:

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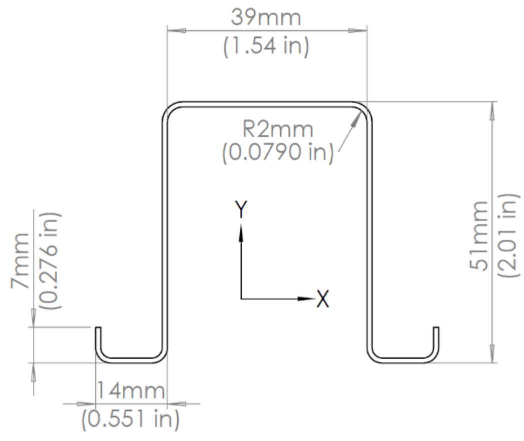
DEFINITIONS OF SYMBOLS

A_e	Effective area for compression based on local buckling at stress = Fy
ϕN_s	Design section capacity of the member in compression
ϕN_{cd}	Design section capacity of the member in compression for distortional buckling
ϕN_{ty}	Design tension capacity (gross section yielding)
I_{ye}	Effective moment of inertia about the Y-Y axis at yield
Z_{ey}	Effective section modulus about the Y-Y axis at yield
ϕM_{sy}	Design section moment capacity about the Y-Y axis at yield.
I_{xe+}	Effective moment of inertia about the X-X axis, for positive bending (top flange in compression), at yield.
Z_{ex+}	Effective section modulus about the X-X axis, for positive bending (top flange in compression), at yield.
ϕM_{sx+}	Design section moment capacity for local buckling about the X-X axis, for positive bending (top flange in compression), at yield.
I_{xe-}	Effective moment of inertia about the X-X axis, for negative bending (bottom flanges in compression), at yield.
Z_{ex-}	Effective section modulus about the X-X axis, for negative bending (bottom flanges in compression), at yield.
ϕM_{sx-}	Design section moment capacity for local buckling about the X-X axis, for negative bending (bottom flanges in compression), at yield.
ϕM_{bd}	Design member moment capacity for distortional buckling about the X-X axis (negative bending, bottom flanges in compression).



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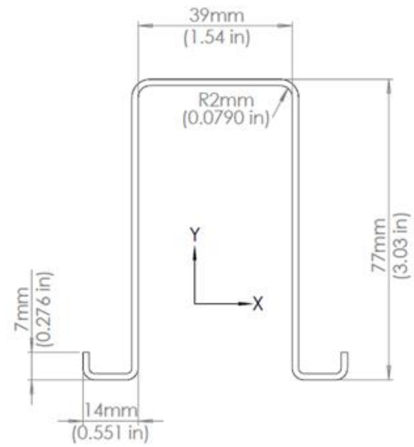

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FIGURE 1—HAT SECTIONS

TABLE 1—MEMBER DESIGNATION

Member Designation	Thickness (mm)	Web (mm)	Flange (mm)
51H39-055	0.55	51	39
51H39-075	0.75	51	39
51H39-085	0.85	51	39
51H39-095	0.95	51	39
51H39-115	1.15	51	39
77H39-075	0.75	77	39
77H39-085	0.85	77	39
77H39-095	0.95	77	39
77H39-115	1.15	77	39
77H39-155	1.55	77	39

For Imperial Units: 1 m = 39.4 in

TABLE 2—GROSS AND TORSIONAL PROPERTIES

Member Designation	Design Steel Thickness (mm)	Gross Properties						Torsional Properties			
		Weight	Area	I_x	R_x	I_y	R_y	Y_o	J	C_w	R_o
		(kg/m)	(mm^2)	(mm^4)	(mm)	(mm^4)	(mm)	(mm)	(mm^4)	(mm^6)	(mm)
51H39-055	0.55	0.755	96.218	36461	19.467	41264	20.709	44.446	9.700	8458011	52.756
51H39-075	0.75	1.024	130.413	48967	19.377	55928	20.709	44.377	24.448	11256758	52.666
51H39-085	0.85	1.157	147.352	55070	19.332	63192	20.709	44.340	35.481	12606248	52.618
51H39-095	0.95	1.289	164.185	61074	19.287	70412	20.709	44.300	49.384	13924150	52.567
51H39-115	1.15	1.551	197.534	72785	19.196	84718	20.709	44.214	87.064	16470088	52.461
77H39-075	0.75	1.330	169.413	132864	28.005	71333	20.520	69.639	31.761	33365075	77.813
77H39-085	0.85	1.504	191.552	149710	27.956	80740	20.531	69.617	46.126	37515831	77.779
77H39-095	0.95	1.677	213.585	166352	27.908	90122	20.541	69.591	64.245	41605867	77.741
77H39-115	1.15	2.020	257.334	199026	27.810	10881	20.564	69.531	113.426	49615162	77.659
77H39-155	1.55	2.697	343.563	261936	27.612	14593	20.610	69.376	275.096	65027720	77.461

For Imperial Units: 1 m = 39.4 in; 1 kg/m = 0.672 lb/ft.

TABLE 3—EFFECTIVE PROPERTIES AND LIMIT STATE DESIGN VALUES

Member Designation	Design Steel Thickness (mm)	Fy (MPa)	Axial				Y-Y Axis Bending			Positive X-X Bending			Negative X-X Bending			
			A_e	ϕN_s	ϕN_{cd}	ϕN_t	I_{ye}	Z_{ey}	ϕM_{sy}	I_{xe+}	Z_{ex+}	ϕM_{sx+}	I_{xe-}	Z_{ex-}	ϕM_{sx-}	ϕM_{bd}
			(mm^2)	(kN)	(kN)	(kN)	(mm^4)	(mm^3)	(kNm)	(mm^4)	(mm^3)	(kNm)	(mm^4)	(mm^3)	(kNm)	(kNm)
51H39-055	0.55	350	62.270	18.525	18.930	26.278	36710	1023	0.340	31343	1152	0.383	36461	1406	0.468	0.303
51H39-055	0.55	550	59.931	20.886	20.649	34.411	36229	1002	0.390	30809	1123	0.437	36461	1406	0.548	0.333
51H39-075	0.75	350	98.706	29.365	29.186	35.616	52465	1506	0.501	45061	1722	0.573	48967	1880	0.625	0.458
51H39-075	0.75	550	90.575	38.109	35.637	46.641	50945	1438	0.676	43390	1626	0.765	48967	1880	0.884	0.568
51H39-085	0.85	350	118.811	35.346	34.813	40.243	60541	1760	0.585	52046	2023	0.673	55070	2109	0.701	0.542
51H39-085	0.85	550	109.080	45.895	42.812	52.699	58821	1681	0.791	50158	1911	0.899	55070	2109	0.992	0.675
51H39-095	0.95	350	139.892	41.618	40.124	44.840	68681	2018	0.671	59038	2300	0.765	61074	2333	0.776	0.621
51H39-095	0.95	550	125.332	58.593	52.711	58.719	66218	1904	0.995	56341	2166	1.132	61074	2333	1.219	0.829
51H39-115	1.15	350	184.017	54.745	51.411	53.948	84718	2529	0.841	72785	2768	0.920	72785	2768	0.920	0.788
77H39-075	0.75	550	92.742	39.021	31.052	60.588	57146	1515	0.713	120027	3003	1.412	132864	3403	1.600	0.766
77H39-085	0.85	350	123.304	36.683	31.888	52.314	69163	1893	0.629	142674	3671	1.221	149710	3827	1.273	0.748
77H39-085	0.85	550	112.257	47.232	38.021	68.506	66487	1786	0.840	138337	3505	1.648	149710	3827	1.800	0.918
77H39-095	0.95	550	129.353	60.473	47.179	76.386	70658	1868	0.976	155348	3964	2.071	166352	4245	2.218	1.129
77H39-115	1.15	350	195.390	58.129	49.857	70.279	90401	2466	0.820	199026	5060	1.682	199026	5060	1.682	1.116
77H39-115	1.15	550	173.316	81.025	63.389	92.032	82203	2156	1.127	192202	4977	2.600	199026	5060	2.644	1.466
77H39-155	1.55	300	306.271	78.099	70.304	75.957	144662	4295	1.224	261936	6610	1.884	261936	6610	1.884	1.490

For Imperial Units: 1 m = 39.4 in; 1 kg/m = 0.672 lb/ft; 1 kN = 224.8 lb; kN-m = 651.5 k-in

[1]Axial properties A_e and ϕN_s are based on local buckling of member at F_y, fully braced against global buckling.
[2]ϕN_{cd} is based on $K\phi$= 0 and no discrete bracing against distortional buckling
[3]All local buckling allowable moments, ϕM_{sx+} and ϕM_{sx-} are based on members fully braced against flexural and torsional-flexural buckling.
[4]Allowable distortional buckling moment, ϕM_{bd} is based on $K\phi$ = 0 and no discrete bracing against distortional buckling.
[5]Y-Y axis is symmetric for bending. Properties for "positive" or "negative" bending are identical.
[6]Positive X-X Bending is for the top flange in compression.
[7]Negative X-X Bending is for the bottom flanges in compression.