ICC-ES Evaluation Report

ESR-1538-AU

Issued December 2023

Subject to renewal December 2024

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

1.0 EVALUATION SCOPE

Compliance with the following codes:

- *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 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 circular holes with a diameter 28 mm (1.10 in) spaced at 600 mm (23.6 in). The punch-outs are a minimum of 250 mm (9.84 in) 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 Australian/New Zealand Standard for Cold-Formed Steel Structures (AS/NZS 4600:2018) based on limit state design (LSD) values.

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 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

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-1538-AU) 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:

- Load-bearing members must also have the minimum yield strength, and the protective coating designation (minimum Z275).

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

Gross Properties

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

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

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

I_{yy} - moment of inertia of the cross section about the y-axis

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

Torsional 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 $1-(X_o/R_o)^2$

Effective Properties

A_e - Effective area for compression at stress = Fy

ϕN_s - Design section capacity of the member in compression

ϕN_{ty} - Design tension capacity (gross section yielding)

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

Z_{ex} - Effective section modulus about the x-axis

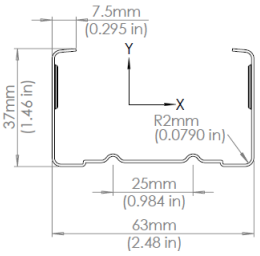
ϕM_{sx} - Design section moment capacity based on local buckling

ϕM_{bd} - Design member moment capacity based on distortional buckling

ϕV_{vx} - Design shear capacity about the x-axis

ϕV_{vy} - Design shear capacity about the y-axis

ϕR_b - Design web crippling capacity



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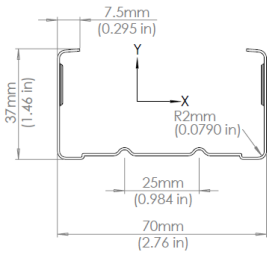

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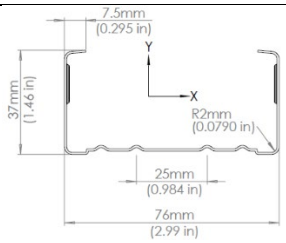

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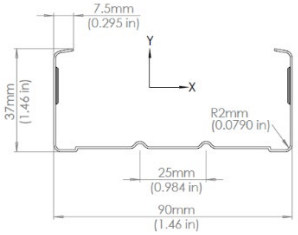

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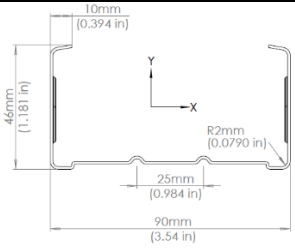

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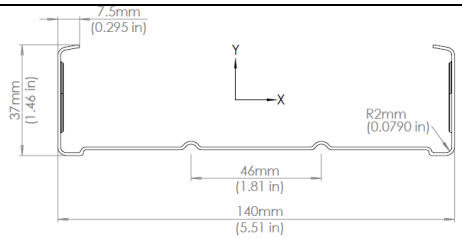

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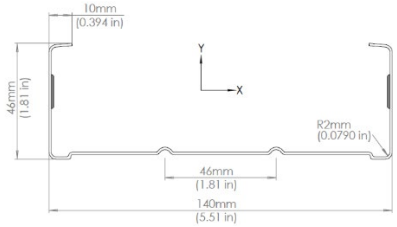

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FIGURE 1 – COLD FORMED STEEL FRAMING MEMBER SECTIONS

TABLE 1— MINIMUM STEEL YIELD STRESS[1,2]

Standard	Steel Grade:			
	G350	G550		
AS/NZS 1397	F_y =350 MPa	t < 0.6 mm	0.9 > $t \leq$ 0.6 mm	$t \geq$ 0.9
		F_y = 410 MPa	F_y = 495 MPa	F_y = 550 MPa

[1]The steel has a minimum Z275 coating per AS/NZS 4680.

[2] Minimum strength of steel conforming to AS/NZS 4600:2018 Table 1.5.2.

[3] t refers to material thickness.

TABLE 2—MEMBER DESIGNATION

Member Designation	Thickness (mm)	Web (mm)	Flange (mm)
63C37-055	0.55	63	37
63C37-075	0.75	63	37
63C37-095	0.95	63	37
70C37-055	0.55	70	37
70C37-075	0.75	70	37
70C37-095	0.95	70	37
76C37-055	0.55	76	37
76C37-075	0.75	76	37
76C37-095	0.95	76	37
90C37-055	0.55	90	37
90C37-075	0.75	90	37
90C37-095	0.95	90	37
90C37-115	1.15	90	37
90C46-055	0.55	90	46
90C46-075	0.75	90	46
90C46-095	0.95	90	46
90C46-115	1.15	90	46
140C46-075	0.75	140	46
140C46-095	0.95	140	46
140C46-115	1.15	140	46

For Imperial Units: 1 m = 39.4 in

TABLE 3—GROSS AND TORSIONAL SECTION PROPERTIES[2]

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) M	R_y (mm)	J (mm^4)	C_w (mm^6)	Xo (mm)	m (mm)	Ro (mm)	β
63C37-055	0.55	80.97	0.64	54301	1724	25.90	14821	13.54	8.16	12036075	-29.3	16.83	41.38	0.50
63C37-075	0.75	109.5	0.86	73011	2318	25.82	19806	13.45	20.53	15899632	-29.1	16.66	41.18	0.50
63C37-095	0.95	137.5	1.08	91166	2894	25.74	24577	13.36	41.39	19503984	-28.9	16.49	40.98	0.50
70C37-055	0.55	84.82	0.67	68861	1967	28.49	15368	13.47	8.55	15038731	-28.3	16.45	42.40	0.55
70C37-075	0.75	114.7	0.90	92659	2647	28.41	20539	13.38	21.52	19886304	-28.1	16.28	42.20	0.55
70C37-095	0.95	144.2	1.13	11579	3308	28.33	25490	13.29	43.39	24419878	-28.0	16.10	42.00	0.56
76C37-055	0.55	88.12	0.69	82977	2184	30.69	15799	13.40	8.88	17942467	-27.6	16.14	43.40	0.60
76C37-075	0.75	119.2	0.94	11171	2940	30.60	21116	13.31	22.36	23743927	-27.4	15.96	43.20	0.60
76C37-095	0.95	149.9	1.18	13969	3676	30.52	26208	13.22	45.10	29179459	-27.2	15.77	43.00	0.60
90C37-055	0.55	95.82	0.75	12213	2714	35.70	16689	13.20	9.66	25957321	-26.0	15.44	46.11	0.68
90C37-075	0.75	129.7	1.02	16461	3658	35.62	22306	13.11	24.33	34399588	-25.8	15.26	45.91	0.68
90C37-095	0.95	163.2	1.28	20606	4579	35.53	27687	13.02	49.10	42336256	-25.6	15.07	45.71	0.69
90C37-115	1.15	196.2	1.54	24648	5478	35.44	32834	12.93	86.49	49783193	-25.4	14.88	45.51	0.69
90C46-055	0.55	108.4	0.85	14555	3235	36.63	31265	16.98	10.94	51467051	-35.7	20.93	53.94	0.56
90C46-075	0.75	147.0	1.15	19643	4365	36.55	41956	16.89	27.56	68519851	-35.5	20.75	53.74	0.56
90C46-095	0.95	185.0	1.45	24621	5471	36.47	52289	16.81	55.67	84723797	-35.3	20.55	53.53	0.56
90C46-115	1.15	222.6	1.75	29490	6553	36.39	62265	16.72	98.15	100102104	-35.2	20.36	53.32	0.56
140C46-075	0.75	184.5	1.45	54389	7770	54.29	48210	16.16	34.59	179633203	-30.2	18.32	64.20	0.78
140C46-095	0.95	232.5	1.83	68321	9760	54.20	60094	16.07	69.96	222788700	-30.0	18.12	64.01	0.78
140C46-115	1.15	280.1	2.20	82012	1171	54.10	71576	15.98	123.50	264027906	-29.8	17.91	63.81	0.78

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

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

TABLE 4—EFFECTIVE SECTION PROPERTIES[1]

Member Designation	Design Thickness (mm)	Fy (MPa)	Effective Properties[2]						
			A_e	I_{xe}[3]	Z_{xe}	ϕM_{sx}	ϕM_{bdx}[4]	ϕV_{ny}	ϕV_{nyNet}
			(mm^2)	(mm^4)	(mm^3)	(kNm)	(kNm)	(kN)	(kN)
63C37-055	0.55	350	36.80	40913	1068.0	0.3551	0.3361	2.496	1.256
63C37-055	0.55	410	34.74	39543	1012.4	0.3943	0.3691	2.496	1.256
63C37-075	0.75	350	57.53	59341	1628.0	0.5413	0.5153	5.875	2.139
63C37-075	0.75	495	50.94	55485	1459.1	0.6861	0.6360	6.374	2.321
63C37-095	0.95	350	79.53	78300	2237.2	0.7439	0.7094	9.425	2.673
63C37-095	0.95	550	68.43	72388	1960.1	1.0242	0.9400	11.815	3.351
70C37-055	0.55	350	37.00	51589	1203.9	0.4003	0.3753	2.227	1.383
70C37-055	0.55	410	34.91	49821	1140.5	0.4442	0.4120	2.227	1.383
70C37-075	0.75	350	58.06	75124	1843.6	0.6130	0.5771	5.682	2.561
70C37-075	0.75	495	51.32	70123	1649.6	0.7757	0.7115	5.682	2.561
70C37-095	0.95	350	81.76	99442	2544.3	0.8460	0.7967	9.425	3.316
70C37-095	0.95	550	70.13	91755	2223.8	1.1620	1.0538	11.619	4.089
76C37-055	0.55	350	37.13	61784	1320.6	0.4391	0.4092	2.039	1.472
76C37-055	0.55	410	35.02	59628	1250.6	0.4871	0.4490	2.039	1.472
76C37-075	0.75	350	58.38	90248	2029.0	0.6746	0.6306	5.198	2.727
76C37-075	0.75	495	51.54	84119	1813.2	0.8527	0.7767	5.198	2.727
76C37-095	0.95	350	83.05	119768	2809.0	0.9340	0.8724	9.425	3.867
76C37-095	0.95	550	70.99	110319	2450.6	1.2804	1.1524	10.626	4.360
90C37-055	0.55	350	37.31	91569	1658.3	0.5514	0.4884	1.702	1.630
90C37-055	0.55	410	35.18	88398	1571.5	0.6121	0.5356	1.702	1.630
90C37-075	0.75	350	58.86	140136	2804.1	0.9324	0.7564	4.337	3.025
90C37-075	0.75	495	51.88	125773	2315.0	1.0886	0.9300	4.337	3.025
90C37-095	0.95	350	84.04	182194	3733.2	1.2413	1.0514	8.857	4.843
90C37-095	0.95	550	71.62	171640	3389.5	1.7710	1.3848	8.857	4.843
90C37-115	1.15	350	113.62	226242	4748.7	1.5789	1.3671	13.811	6.194
90C46-055	0.55	350	44.48	108538	1959.5	0.5792	0.5771	1.732	1.659
90C46-055	0.55	410	41.22	103765	1829.4	0.6334	0.6282	1.702	1.630
90C46-075	0.75	350	67.92	161543	3143.7	1.0453	0.8906	4.337	3.077
90C46-075	0.75	495	59.19	44931	2606.1	1.2255	1.0942	4.411	3.077
90C46-095	0.95	350	95.14	211150	4226.0	1.4052	1.2340	8.857	4.924
90C46-095	0.95	550	80.32	194371	3687.4	1.9266	1.6231	9.007	4.924
90C46-115	1.15	350	125.17	259746	5284.9	1.7573	1.5903	13.811	6.194
140C46-075	0.75	350	68.17	410042	4777.3	1.5884	1.4048	2.725	2.725
140C46-075	0.75	495	59.27	376036	4202.4	1.9762	1.7169	2.725	2.725
140C46-095	0.95	350	95.96	565600	7079.4	2.3539	1.9676	5.554	5.554
140C46-095	0.95	550	80.71	495465	5666.7	2.9608	2.5684	5.554	5.554
140C46-115	1.15	350	127.70	735156	9803.0	3.2596	2.5776	9.882	8.413

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]See Page 3 for definition of symbols.
[2]Effective properties are based on the reduced cross section at the web punch-out. Punch-outs are circular holes with a diameter of 28 mm spaced at 600 mm.
[3]Use I_{xe} deflection calculations.
[4]Distortional buckling moment (ϕM_{bdx}) is calculated without the beneficial effect of sheathing to rotational stiffness. $K_\phi = 0$.

TABLE 5 — DESIGN BEARING WEB CRIPPLING LOADS (ϕR_b) FOR SINGLE MEMBERS – One Flange Loading (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	45	90	125	150	25	45	90	125	150
63C37-055	0.55	350	705	874	-	-	-	1213	1414	-	-	-
63C37-055	0.55	410	825	1023	-	-	-	1421	1657	-	-	-
63C37-075	0.75	350	1287	1581	-	-	-	2373	2736	-	-	-
63C37-075	0.75	495	1820	2235	-	-	-	3356	3869	-	-	-
63C37-095	0.95	350	2021	2465	-	-	-	3903	4460	-	-	-
63C37-095	0.95	550	3177	3874	-	-	-	6133	7009	-	-	-
70C37-055	0.55	350	694	860	1131	-	-	1205	1405	1730	-	-
70C37-055	0.55	410	813	1008	1325	-	-	1412	1646	2027	-	-
70C37-075	0.75	350	1270	1561	2033	2321	-	2360	2720	3306	3663	-
70C37-075	0.75	495	1797	2207	2875	3282	-	3337	3847	4676	5181	-
70C37-095	0.95	350	1999	2438	3152	3587	-	3883	4438	5340	5890	-
70C37-095	0.95	550	3142	3831	4953	5636	-	6102	6974	8391	9255	-
76C37-055	0.55	350	685	850	1117	-	-	1198	1397	1721	-	-
76C37-055	0.55	410	803	995	1309	-	-	1404	1637	2015	-	-
76C37-075	0.75	350	1257	1545	2012	2297	-	2349	2707	3291	3646	-
76C37-075	0.75	495	1778	2185	2846	3248	-	3322	3829	4654	5157	-
76C37-095	0.95	350	1981	2416	3123	3554	-	3867	4420	5318	5866	-
76C37-095	0.95	550	3114	3797	4908	5585	-	6077	6945	8357	9217	-
90C37-055	0.55	350	666	826	1086	-	-	1184	1380	1700	-	-
90C37-055	0.55	410	780	968	1272	-	-	1387	1617	1991	-	-
90C37-075	0.75	350	1229	1509	1966	2245	2420	2325	2680	3257	3609	3831
90C37-075	0.75	495	1738	2135	2781	3174	3422	3288	3790	4607	5105	5418
90C37-095	0.95	350	1942	2368	3062	3484	3750	3833	4380	5270	5813	6155
90C37-095	0.95	550	3052	3722	4811	5475	5893	6023	6883	8282	9135	9672
90C37-115	1.15	350	2801	3394	4360	4948	5318	5704	6473	7725	8488	8969
90C46-055	0.55	350	666	826	1086	-	-	1184	1380	1700	-	-
90C46-055	0.55	410	780	968	1272	-	-	1387	1617	1991	-	-
90C46-075	0.75	350	1229	1509	1966	2245	2420	2325	2680	3257	3609	3831
90C46-075	0.75	495	1738	2135	2781	3174	3422	3288	3790	4607	5105	5418
90C46-095	0.95	350	1942	2368	3062	3484	3750	3833	4380	5270	5813	6155
90C46-095	0.95	550	3052	3722	4811	5475	5893	6023	6883	8282	9135	9672
90C46-115	1.15	350	2801	3394	4360	4948	5318	5704	6473	7725	8488	8969
140C46-075	0.75	350	1142	1403	1828	2086	2249	2253	2597	3156	3497	3712
140C46-075	0.75	495	1615	1984	2585	2951	3181	3186	3672	4464	4946	5250
140C46-095	0.95	350	1824	2224	2875	3272	3522	3728	4261	5127	5654	5987
140C46-095	0.95	550	2866	3495	4518	5142	5534	5859	6695	8056	8886	9408
140C46-115	1.15	350	2649	3210	4123	4679	5030	5563	6314	7535	8279	8748

For Imperial Units: 1 m = 39.4 in; 1 kN = 224.8 lb; 1 MPa = 145 psi

[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 — DESIGN BEARING LOADS (ϕR_b) FOR SINGLE MEMBERS – Two Flange Loading (N)[1,2,3]

Member Designation	Design Thickness (mm)	Fy (MPa)	Condition 3 (End 2 Flange) Fastened to Support					Condition 2 (Interior 2 Flange) Fastened to Support				
			Bearing Length (mm)					Bearing Length (mm)				
			25	45	90	125	150	25	45	90	125	150
63C37-055	0.55	350	525	605	-	-	-	1529	1712	-	-	-
63C37-055	0.55	410	615	709	-	-	-	1791	2006	-	-	-
63C37-075	0.75	350	1071	1220	-	-	-	2983	3305	-	-	-
63C37-075	0.75	495	1514	1726	-	-	-	4218	4674	-	-	-
63C37-095	0.95	350	1806	2041	-	-	-	4919	5408	-	-	-
63C37-095	0.95	550	2837	3207	-	-	-	7729	8498	-	-	-
70C37-055	0.55	350	495	571	694	-	-	1487	1665	1955	-	-
70C37-055	0.55	410	580	669	813	-	-	1742	1951	2290	-	-
70C37-075	0.75	350	1025	1168	1401	1543	-	2917	3232	3744	4056	-
70C37-075	0.75	495	1449	1652	1982	2183	-	4125	4571	5295	5736	-
70C37-095	0.95	350	1742	1969	2337	2562	-	4826	5306	6086	6562	-
70C37-095	0.95	550	2737	3094	3673	4026	-	7584	8338	9564	10311	-
76C37-055	0.55	350	471	543	660	-	-	1453	1627	1910	-	-
76C37-055	0.55	410	552	636	773	-	-	1702	1906	2237	-	-
76C37-075	0.75	350	987	1126	1350	1487	-	2863	3172	3675	3982	-
76C37-075	0.75	495	1397	1592	1909	2103	-	4050	4487	5198	5631	-
76C37-095	0.95	350	1690	1910	2268	2486	-	4751	5223	5991	6459	-
76C37-095	0.95	550	2656	3001	3564	3906	-	7465	8207	9414	10150	-
90C37-055	0.55	350	418	481	585	-	-	1379	1544	1812	-	-
90C37-055	0.55	410	489	564	686	-	-	1615	1808	2123	-	-
90C37-075	0.75	350	906	1033	1239	1364	1443	2747	3043	3525	3819	4005
90C37-075	0.75	495	1281	1460	1752	1930	2041	3885	4304	4986	5402	5664
90C37-095	0.95	350	1577	1782	2116	2320	2448	4586	5042	5784	6236	6521
90C37-095	0.95	550	2478	2801	3325	3645	3847	7207	7923	9089	9799	10247
90C37-115	1.15	350	2431	2729	3213	3509	3695	6899	7539	8580	9215	9615
90C46-055	0.55	350	418	481	585	-	-	1379	1544	1812	-	-
90C46-055	0.55	410	489	564	686	-	-	1615	1808	2123	-	-
90C46-075	0.75	350	906	1033	1239	1364	1443	2747	3043	3525	3819	4005
90C46-075	0.75	495	1281	1460	1752	1930	2041	3885	4304	4986	5402	5664
90C46-095	0.95	350	1577	1782	2116	2320	2448	4586	5042	5784	6236	6521
90C46-095	0.95	550	2478	2801	3325	3645	3847	7207	7923	9089	9799	10247
90C46-115	1.15	350	2431	2729	3213	3509	3695	6899	7539	8580	9215	9615
140C46-075	0.75	350	660	752	902	994	1051	2394	2653	3073	3329	3491
140C46-075	0.75	495	933	1064	1276	1405	1487	3386	3752	4346	4709	4937
140C46-095	0.95	350	1236	1397	1658	1818	1918	4090	4497	5158	5561	5815
140C46-095	0.95	550	1942	2195	2606	2856	3014	6427	7066	8105	8739	9138
140C46-115	1.15	350	1986	2229	2625	2867	3019	6244	6824	7766	8341	8703

For Imperial Units: 1 m = 39.4 in; 1 kN = 224.8 lb; 1 MPa = 145 psi

[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.

As defined in AS 4600:2018

- One-flange loading or reaction occurs when the clear distance between the bearing edges of adjacent opposite concentrated loads or reactions is greater than $1.5d_1$.
- Two-flange loading or reaction occurs when the clear distance between the bearing edges of adjacent opposite concentrated loads or reaction is equal to or less than$1.5d_1$.
- End loading or reaction occurs when the distance from the edge of the bearing to the end of the member is equal to or less than $1.5d_1$.
- Interior loading or reaction occurs when the distance from the edge of the bearing to the end of the member is greater than $1.5d_1$.

Where d_1 is the depth of the flat portion of the web.