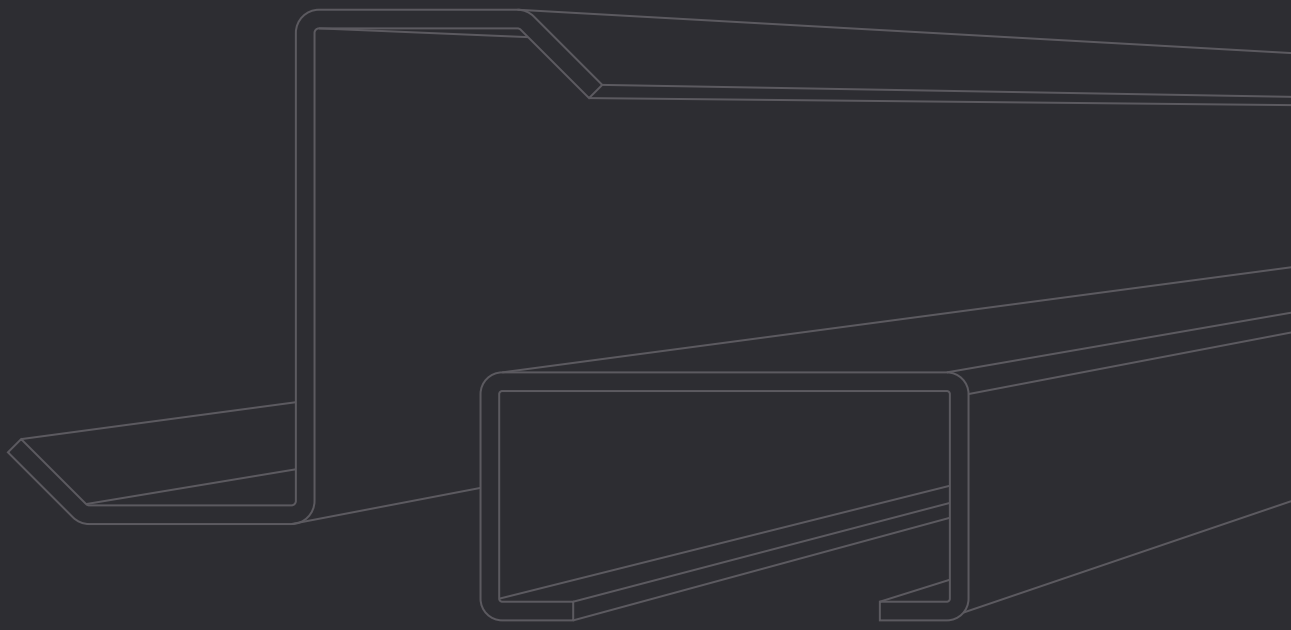


PURLINS AND GIRTS

CANADA

CANAM BUILDINGS

Table of contents

Products, services and solutions

Canam Group Inc. (“Canam”) specializes in the design and fabrication of steel joists and joist girders, steel deck, purlins and girts, welded wideflange shapes (WWF), load-bearing steel stud walls, Murox prefabricated building system, Econox relocatable buildings and Hambro composite floor system. Canam offers value-added engineering and drafting services, architectural flexibility and tailored solutions and services.

Canam has redefined building design and construction with a collaborative approach that can reduce installation time of building structures by up to 20%.

Because product quality, site supervision and deadlines are critical aspects for any project, our reliability makes life easier for our clients. Furthermore, a rigorous site management process has been developed to deliver projects on time. Modern equipment, well-trained staff and quality products are what sets us apart. Regardless of the project, Canam will meet your needs, while complying with current building code requirements.

Our exceptional service means just-in-time delivery at your convenience. In order to eliminate delays, our fleet of trucks delivers your product on time, regardless of your location and schedule. Depending on the region and delivery point, steel products up to 16 ft. (4.9 m) wide by 120 ft. (36.5 m) long can be transported. Canam is one of the largest structural steel and steel joists manufacturers in North America.

CAUTIONARY STATEMENT

Although every effort was made to ensure that the information contained in this catalog is factual and that the numerical values presented herein are consistent with applicable standards, Canam does not assume any responsibility whatsoever for errors or oversights that may result from the use or interpretation of this data.

Anyone making use of this catalog assumes all liability arising from such use. All comments and suggestions for improvements to this publication are greatly appreciated and will receive full consideration in future editions.

Purlins and girts are complementary products primarily used in walls and roofs of structural steel buildings. All purlins and girts are cold-formed using high-performance steel in order to maximise capacity over weight while meeting the strictest quality standards.

Canam fabricates a complete range of C and Z sections for use as purlins and girts at its plant in Boucherville, Quebec. The nominal depth of these sections varies from 6 in. (152 mm) to 14 in. (356 mm).

BENEFITS

The use of automated production equipment eliminates waste by cutting sections to exact lengths which in turn translates into substantial cost savings for our clients. Sections can also be manufactured from shop drawings provided to us by clients. Upon request and at a very competitive price, a coat of red or grey primer, in compliance with CPMA standard 1-73A, can be applied to cold-formed sections.

STEEL

Steel used to fabricate purlins and girts complies with the requirements of ASTM A1011 HSLAS Standard.

DESIGN

Resistance and properties of all cold-formed C and Z sections comply with the requirements of the CSA S136-16 North American Specification for the Design of Cold Formed Steel Structural Members.

TOLERANCES

The fabrication tolerances of all cold-formed C and Z sections comply with those specified in the CSA-A660-10 standard for the Certification of Manufacturers of Steel Building Systems. Material thickness tolerances comply with standard CSA S136-16.

COMPLETE FABRICATION SERVICES

In addition to standard cut-to-length, punching and painting services, Canam offers clients a complete fabrication solution for purlins and girts.

Clients who rely on Canam for the fabrication of purlins and girts, profit from multiple benefits:

- A finished product delivered directly to site;
- Time saving (no product handling);
- Lower labor costs.

To obtain a quote or for additional information, please contact a Canam sales representative.

DISTORTIONAL BUCKLING (CSA S136-16 SECTION F4)

Purlins and girts are mainly designed as flexural members. The bending resistance of flexural members are differentiated by whether or not the member is laterally braced. If members are laterally supported across their full-length, they are designed according to the nominal section resistance. Since the distortional buckling has an intermediate buckling half wavelength, the distortional buckling needs to be considered even for braced members.

Distortional buckling is characterized by the instability of the entire compression flange which rotates about the web-flange junction. Distortional buckling may govern the design in lipped sections where discrete bracing is present (preventing lateral-torsional buckling) and where the compression flange is either not attached or not fully engaged by fasteners which are spaced too far apart along the sheathing. Presence of sheathing can restrict the flange rotation and increase the distortional buckling capacity. However, it is conservative to neglect the rotational stiffness provided by sheathing ($k\phi$). Due to large combinations of sheathing and attachments, Canam tables provide conservative distortional buckling resisting moments by neglecting the rotational stiffness ($k\phi$).

THROUGH-FASTENED OR STANDING SEAM ROOF

The use of a through-fastened or standing seam roof does not preclude the need for proper purlins bracing. Standard practice shows that:

- Standing seam roof can only provide partial lateral stability.
- Through-fastened roof can provide lateral stability.

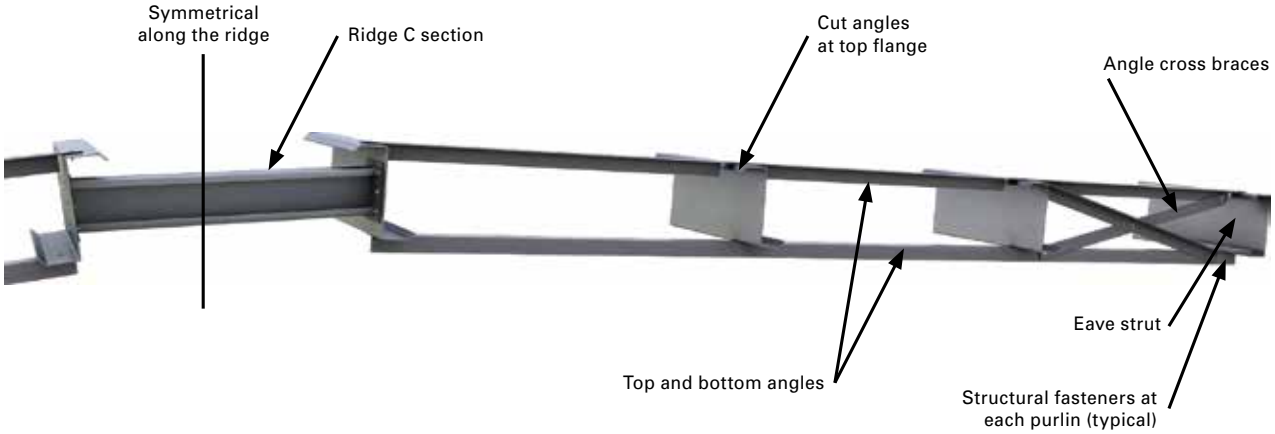
Although the roof structure can provide lateral stability, it does not provide any torsional stability for Z and C sections. Discrete bracing should therefore be incorporated in the design phase in order to control lateral-torsional buckling.

DISCRETE BRACING

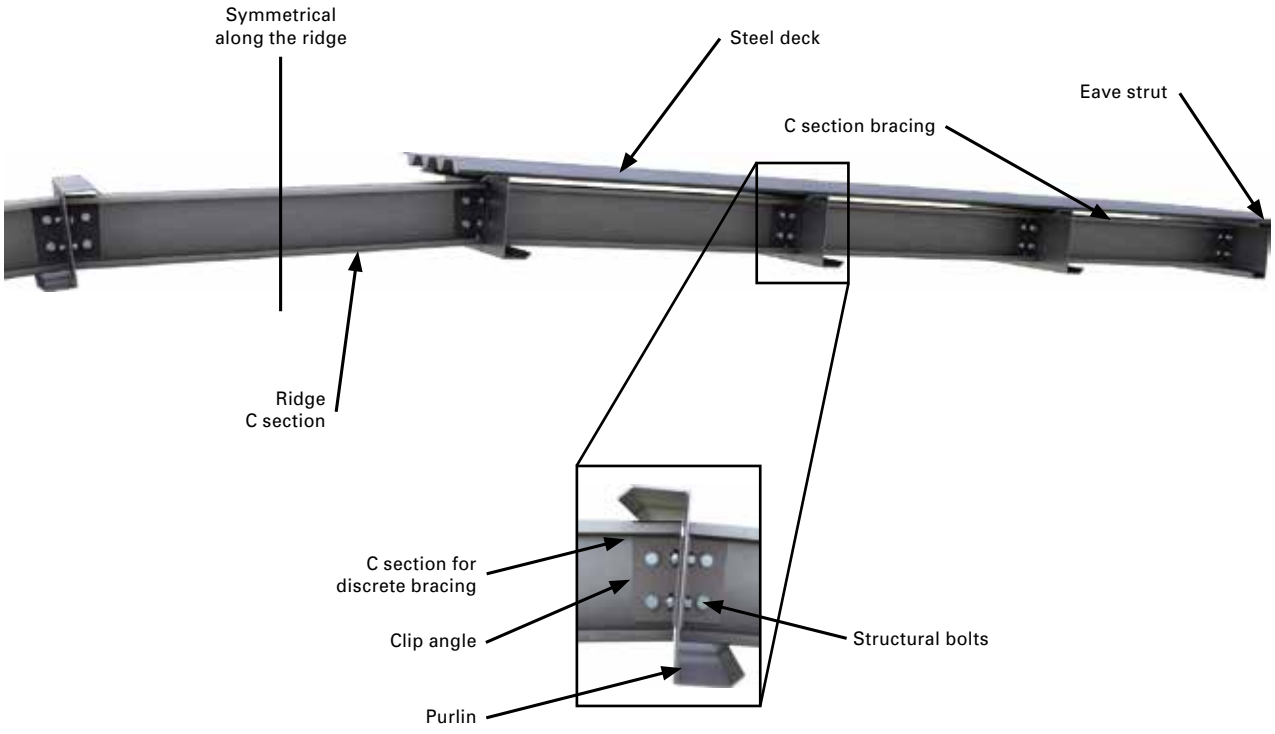
A discrete brace can take a multitude of different forms as seen in the following figures. All of these types of bracing are discrete because the movement is controlled only at the particular brace point (Galambos 1998). The required bracing force and stiffness for this type of brace is dependent on the number of braces provided.

EXAMPLES OF LATERAL STABILITY

Type 1

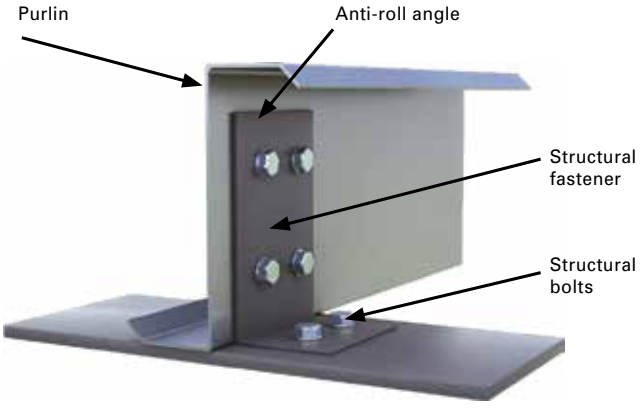


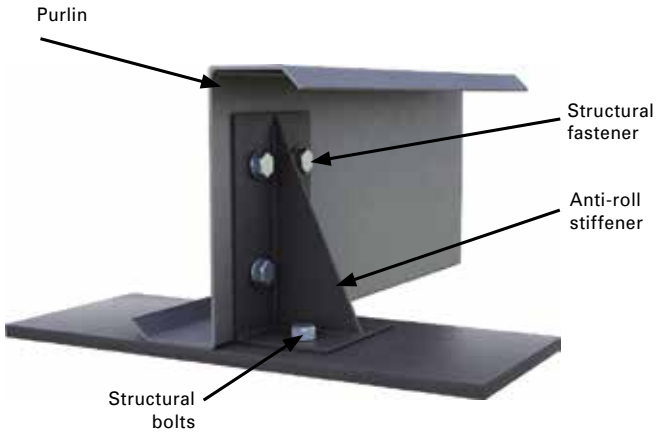
Type 2



ANCHORAGE OF PURLIN BRACING (ANTI-ROLL SAFEGUARD)

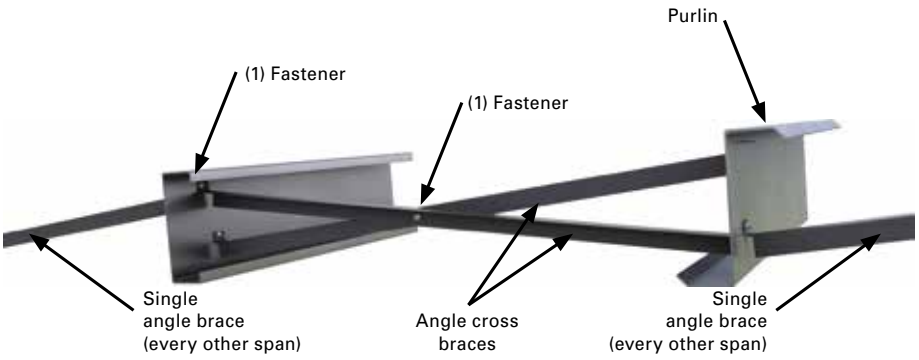
If no discrete bracing line is used, anchorage is required at each purlin support and must be designed to resist in-plane forces. In certain instances, anti-roll clips may also be necessary.





If one or more discrete bracing lines are used between purlin supports, the supports must be designed to resist in-plane forces as explained in the paragraph above. Substantial anchorage is required for the discrete bracing line at each eave and ridge end. The applied load on each line can be calculated according to standard CSA S136-16 section I6.4.

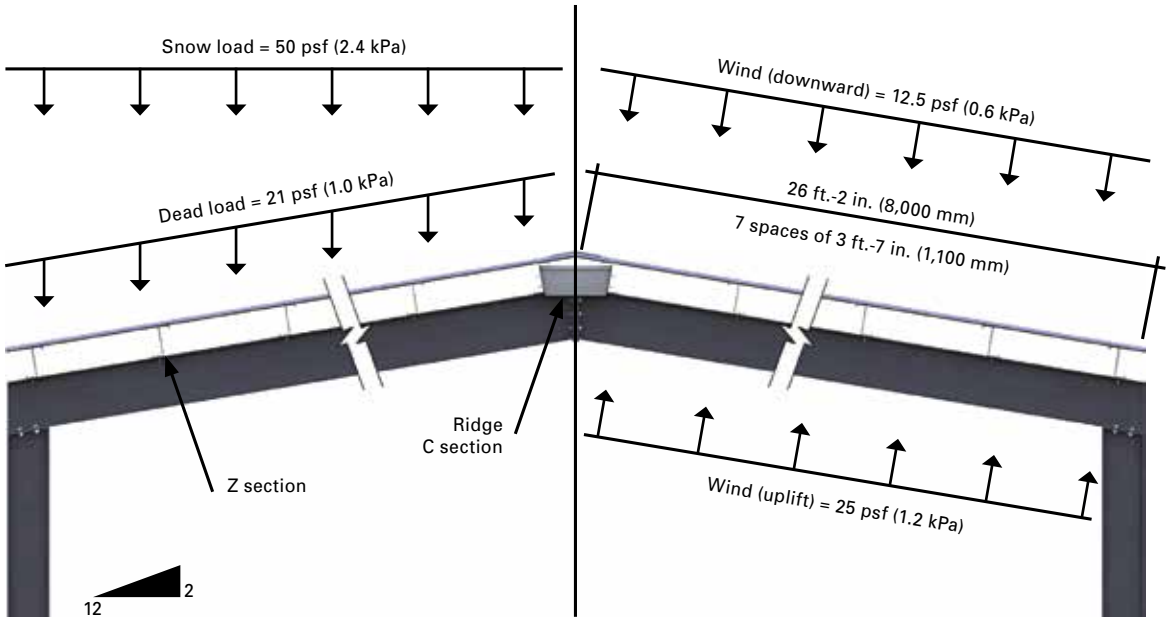
Lateral stability of purlins



Note:

The purlin bracing is installed the same way regardless of the secondary member type being used, including C and Z sections, struts, angles, etc.

CALCULATION EXAMPLE

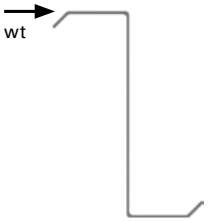


Single span of L_x = 19 ft.-8 in. (6,000 mm) with a 3 ft.-7 in. (1,100 mm) spacing between Z sections. There are eight purlins [seven spaces of 3 ft.-7 in. (1,100 mm)] per building slope with a roof pitch of 2:12 (angle of a = 9.46 degrees). The sloped length of one side is 26 ft.-1 in. (8,000 mm) with 12 in. (300 mm) between the ridge and the last section.

Loads	Imperial	Metric
dead load (dl) =	21.0 psf	1.0 kPa
snow load (sl) =	50.0 psf	2.4 kPa
gross wind downward load (wd) =	12.5 psf	0.6 kPa
gross wind uplift load (wu) =	25.0 psf	1.2 kPa

Step 1: Calculation of Z section wn and wt loads

	Imperial	Metric
wn dl = dl cos(a) × spacing	74.2 lb./ft.	1.09 kN/m
wn sl = sl $[\cos(a)]^2$ × spacing	174.3 lb./ft.	2.57 kN/m
wn wd = wd × spacing	44.8 lb./ft.	0.66 kN/m
wn wu = wu × spacing	–89.6 lb./ft.	–1.32 kN/m



	Imperial	Metric
wt dl = dl sin(a) × spacing	12.4 lb./ft.	0.18 kN/m
wt sl = sl cos(a) sin(a) × spacing	29.1 lb./ft.	0.43 kN/m

Step 2: Load combinations according to the 2015 National Building Code (NBC)

Gravity	Imperial	Metric
1.25 wn dl + 1.5 wn sl + 0.4 wn wd =	372.1 lb./ft.	5.48 kN/m
1.25 wn dl + 0.5 wn sl + 1.4 wn wd =	242.6 lb./ft.	3.57 kN/m
wn_f =	372.1 lb./ft.	5.48 kN/m
wt_f = 1.25 wt dl + 1.5 wt sl =	59.2 lb./ft.	0.87 kN/m

Uplift	Imperial	Metric
$wn_f(-)$ = 0.9 wn dl + 1.4 wn wu =	–58.7 lb./ft.	–0.87 kN/m

Step 3: Calculation of member internal forces

Single span	Imperial	Metric
$M_{fx} = wn_f \times L^2_x/8$	17.99 kip·ft.	24.66 kN·m
$M_{fy} = wt_f \times L^2_t/8$	0.72 kip·ft.	0.98 kN·m
$M_f(-) = wn_f(-) \times L^2_x/8$	–2.84 kip·ft.	–3.92 kN·m
$V_f = wn_f \times L_x/2$	3.66 kip	16.44 kN

L_t is the maximum distance between discrete bracings. According to the Canam table, one row of discrete bracing is required at midspan.
Therefore, L_t = 9 ft.–10 in. (3,000 mm).

Step 4: Preliminary choice of a section

Section choice: 356Z76-326M (1400Z300-128)
Assumption: The standing seam roof, with connections at 24 in. (610 mm) c/c, provides partial lateral support of the Z section's compression flange.

Calculation of the positive moment

Canam table values	Imperial	Metric
L_t =	10 ft.	3,000 mm
M_u =	22.64 kip·ft.	31.66 kN·m
$M_{rx} = M_u$	22.64 kip·ft.	31.66 kN·m
$M_{ry} = 0.9\ S_yF_y$	4.99 kip·ft.	6.77 kN·m

Interaction equation	Imperial	Metric
$M_{fx}/M_{rx} + M_{fy}/M_{ry}$ =	0.94 < 1 ACCEPTABLE	0.92 < 1 ACCEPTABLE

Calculation of the negative moment

Canam table values	Imperial	Metric
L_t =	10 ft.	3,000 mm
$M_r(-)$ =	22.64 kip·ft.	31.66 kN·m

Interaction Equation	Imperial	Metric
$M_f(-) / M_r(-)$ =	0.13 < 1 ACCEPTABLE	0.12 < 1 ACCEPTABLE

Calculation of shear

Canam table values	Imperial	Metric
V_r =	20.79 kip	92.48 kN
Interaction equation	Imperial	Metric
V_f / V_r =	0.18 < 1 ACCEPTABLE	0.18 < 1 ACCEPTABLE

Calculation of web crippling with 4 in. (100 mm) of bearing

Canam table values	Imperial	Metric
P_r =	5.50 kip	24.46 kN
Interaction equation	Imperial	Metric
V_f / P_r =	0.67 < 1 ACCEPTABLE	0.67 < 1 ACCEPTABLE

Reinforcement between the bearing and the support in the section's web is not required.

Calculation of deflection

	Imperial	Metric
$I_{x\ min.}(L/180) = \frac{180 \times 5\ (0.9\ wn\ sl + 0.75\ wn\ wd) \times L^3_x}{384 \times E}$ =	16.58 in.^{4}	7.00 × 10^6 mm^4

The I_x inertia of section 356Z76-326M is 77.4 in.^{4} (32.2 × 10^6 mm^4), which is greater than the minimum inertia.
Section 356Z76-326M is acceptable.

Step 5: Design of the row of bracing members and the ridge connection

As per Discrete bracing load coefficient table on page 16:

L_x = 20 ft. (6,000 mm)

Roof slope = 2:12 pitch and one bracing line

Coefficient = 1.454 (0.438) / section / 1.0 kip/ft. (1.0 kN/m).

The factored vertical load is given by:

	Imperial	Metric
w_{vf} = [1.25 wn dl + 1.5 wn sl] / cos(a) =	0.36 kip/ft.	5.29 kN/m

The axial load of eight sloped sections can then be calculated as follows:

	Imperial	Metric
Coefficient × 8 purlins × w_{vf} =	4.2 kip / bracing line	18.5 kN / bracing line

The discrete bracing line and the ridge beam must be designed to transfer the load calculated above. Since the pitch is no greater than 2:12, welded angles with cross bridging can be used as lateral restraints. The cross bridging will be placed at every three spacings. Other types of lateral restraints may be used as shown previously.

DISCRETE BRACING LOAD COEFFICIENTS

Coefficients presented in the tables on pages 12 to 19 are based on CSA S136-16 standard, Equation I6.4.1-2 shown below:

$$P_i=(C1)\ W_{pi}\left\{\left[\left(\frac{C2}{1{,}000}\right)\frac{I_{xy}\,L}{I_x\,d}+(C3)\ \frac{(m+0.25\,b)\,t}{d^2}\right]\alpha\cos\theta-(C4)\sin(\theta)\right\}$$

Where

$W_{pi} = w_i\,L$

w_i = Distributed gravity load per unit length

L = Purlin span length

m = Distance from shear center to mid-plane of web (m = 0 for Z sections)

b = Top flange width of purlin

t = Purlin thickness

α = + 1 for top flange facing in the up-slope direction
- 1 for top flange facing in the down-slope direction

θ = Angle between vertical and plane of purlin web

Coefficients for equation I6.4.1-2 (CSA S136-16)
Standing seam, single span

Bracing Line	C1	C2	C3	C4
0 = support only	0.5	8.3	28	0.61
1 = mid-point	1.0	7.5	15	0.62
2 = one-third point	0.5	7.3	21	0.73

Coefficients for equation I6.4.1-2 (CSA S136-16)
Through fastened, single span

Bracing Line	C1	C2	C3	C4
0 = support only	0.5	8.2	33	0.99
1 = mid-point	1.0	7.6	44	0.96
2 = one-third point	0.5	7.8	42	0.98

Notes:

Lateral stiffness of restraints shall satisfy the minimum stiffness requirements of Equation I6.4.1-7

Tables on pages 12 to 19 are valid only for the following conditions:

- Single span

- Standing seam roof

- Top flange facing up-slope direction

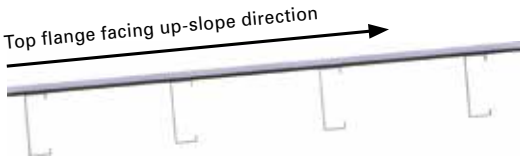
See section I6.4 (CSA S136-16) for more information and other conditions not shown in tables.

METRIC

C Sections on 2:12 pitch

Discrete bracing load coefficients (Pn) – Standing seam roof at 9.46 degrees

Single span



Span (mm)	3,000	3,000	3,000	4,500	4,500	4,500	6,000	6,000	6,000	7,500	7,500	7,500
Bracing line / Section	0	1	2	0	1	2	0	1	2	0	1	2
152S70-144M	-0.006	-0.151	-0.072	-0.009	-0.227	-0.108	-0.012	-0.302	-0.143	-0.015	-0.378	-0.179
152S70-181M	0.029	-0.113	-0.045	0.044	-0.170	-0.068	0.058	-0.227	-0.091	0.073	-0.283	-0.113
152S70-218M	0.064	-0.076	-0.019	0.096	-0.114	-0.029	0.128	-0.152	-0.038	0.160	-0.190	-0.048
152S70-254M	0.099	-0.039	0.007	0.148	-0.058	0.010	0.197	-0.078	0.014	0.247	-0.097	0.017
152S70-290M	0.133	-0.002	0.032	0.199	-0.003	0.049	0.266	-0.005	0.065	0.332	-0.006	0.081
152S70-326M	0.167	0.034	0.058	0.250	0.051	0.087	0.333	0.068	0.116	0.417	0.085	0.145
203S70-144M	-0.074	-0.223	-0.122	-0.110	-0.335	-0.184	-0.147	-0.447	-0.245	-0.184	-0.558	-0.306
203S70-181M	-0.055	-0.203	-0.108	-0.082	-0.305	-0.162	-0.110	-0.407	-0.217	-0.137	-0.508	-0.271
203S70-218M	-0.036	-0.183	-0.094	-0.054	-0.275	-0.142	-0.072	-0.367	-0.189	-0.091	-0.459	-0.236
203S70-254M	-0.018	-0.164	-0.081	-0.027	-0.246	-0.121	-0.036	-0.327	-0.161	-0.045	-0.409	-0.201
203S70-290M	0.000	-0.144	-0.067	0.001	-0.216	-0.100	0.001	-0.289	-0.134	0.001	-0.361	-0.167
203S70-326M	0.018	-0.125	-0.053	0.027	-0.187	-0.080	0.037	-0.250	-0.107	0.046	-0.312	-0.134
229S89-181M	-0.056	-0.204	-0.109	-0.083	-0.306	-0.163	-0.111	-0.408	-0.218	-0.139	-0.510	-0.272
229S89-218M	-0.037	-0.184	-0.095	-0.056	-0.276	-0.142	-0.074	-0.369	-0.190	-0.093	-0.461	-0.237
229S89-254M	-0.019	-0.165	-0.081	-0.028	-0.247	-0.122	-0.037	-0.329	-0.162	-0.047	-0.411	-0.203
229S89-290M	0.000	-0.145	-0.068	-0.001	-0.218	-0.101	-0.001	-0.290	-0.135	-0.001	-0.363	-0.169
229S89-326M	0.018	-0.126	-0.054	0.026	-0.189	-0.081	0.035	-0.251	-0.108	0.044	-0.314	-0.135
254S89-144M	-0.090	-0.241	-0.135	-0.135	-0.361	-0.202	-0.180	-0.482	-0.269	-0.225	-0.602	-0.337
254S89-181M	-0.075	-0.225	-0.124	-0.113	-0.338	-0.185	-0.150	-0.450	-0.247	-0.188	-0.563	-0.309
254S89-218M	-0.060	-0.209	-0.113	-0.091	-0.314	-0.169	-0.121	-0.419	-0.225	-0.151	-0.523	-0.281
254S89-254M	-0.046	-0.194	-0.102	-0.069	-0.291	-0.152	-0.092	-0.387	-0.203	-0.115	-0.484	-0.254
254S89-290M	-0.031	-0.178	-0.091	-0.047	-0.267	-0.136	-0.063	-0.356	-0.181	-0.078	-0.446	-0.227
254S89-326M	-0.017	-0.163	-0.080	-0.026	-0.244	-0.120	-0.034	-0.326	-0.160	-0.043	-0.407	-0.200
305S89-181M	-0.100	-0.252	-0.142	-0.150	-0.378	-0.213	-0.200	-0.504	-0.284	-0.250	-0.630	-0.356
305S89-218M	-0.090	-0.241	-0.135	-0.135	-0.362	-0.202	-0.180	-0.483	-0.270	-0.226	-0.603	-0.337
305S89-254M	-0.080	-0.231	-0.128	-0.121	-0.346	-0.191	-0.161	-0.462	-0.255	-0.201	-0.577	-0.319
305S89-290M	-0.071	-0.220	-0.120	-0.106	-0.331	-0.180	-0.142	-0.441	-0.241	-0.177	-0.551	-0.301
305S89-326M	-0.061	-0.210	-0.113	-0.092	-0.315	-0.170	-0.122	-0.420	-0.226	-0.153	-0.526	-0.283
356S89-218M	-0.108	-0.260	-0.148	-0.162	-0.390	-0.222	-0.215	-0.520	-0.296	-0.269	-0.650	-0.370
356S89-254M	-0.101	-0.253	-0.143	-0.151	-0.379	-0.214	-0.202	-0.505	-0.286	-0.252	-0.631	-0.357
356S89-290M	-0.094	-0.245	-0.138	-0.141	-0.368	-0.206	-0.188	-0.490	-0.275	-0.235	-0.613	-0.344
356S89-326M	-0.087	-0.238	-0.133	-0.131	-0.357	-0.199	-0.174	-0.476	-0.265	-0.218	-0.595	-0.331

P_n = load coefficient per purlin for 1 kN/m of factored vertical load per discrete bracing line (positive when restraint is required to prevent purlins from translating in the up-slope roof direction).

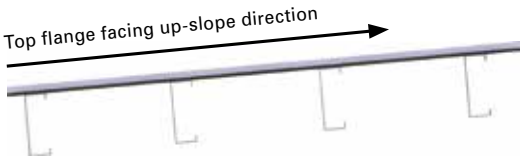
Cumulative axial load in bracing line (kN) = number of purlins per slope x P_n value indicated in the table x factored vertical load per purlin in kN/m.

Please refer to page 40 for former nomenclature of sections.

C Sections on 2:12 pitch

Discrete bracing load coefficients (Pn) – Standing seam roof at 9.46 degrees

Single span



Span (ft.)	10	10	10	15	15	15	20	20	20	25	25	25
Bracing line / Section	0	1	2	0	1	2	0	1	2	0	1	2
600S275-57	-0.020	-0.504	-0.239	-0.030	-0.755	-0.359	-0.040	-1.007	-0.478	-0.050	-1.259	-0.598
600S275-71	0.097	-0.378	-0.151	0.146	-0.567	-0.226	0.195	-0.755	-0.302	0.243	-0.944	-0.377
600S275-86	0.214	-0.253	-0.064	0.320	-0.380	-0.096	0.427	-0.506	-0.128	0.534	-0.633	-0.159
600S275-100	0.329	-0.130	0.023	0.493	-0.195	0.034	0.658	-0.260	0.045	0.822	-0.324	0.056
600S275-114	0.443	-0.008	0.108	0.664	-0.012	0.162	0.885	-0.015	0.216	1.107	-0.019	0.270
600S275-128	0.556	0.113	0.193	0.833	0.170	0.289	1.111	0.226	0.385	1.389	0.283	0.482
800S275-57	-0.245	-0.745	-0.408	-0.368	-1.117	-0.612	-0.490	-1.489	-0.816	-0.613	-1.862	-1.020
800S275-71	-0.183	-0.678	-0.361	-0.274	-1.016	-0.541	-0.365	-1.355	-0.722	-0.456	-1.694	-0.902
800S275-86	-0.121	-0.611	-0.315	-0.181	-0.917	-0.472	-0.241	-1.223	-0.629	-0.302	-1.528	-0.786
800S275-100	-0.059	-0.546	-0.269	-0.089	-0.819	-0.403	-0.119	-1.092	-0.537	-0.149	-1.364	-0.672
800S275-114	0.001	-0.481	-0.223	0.002	-0.721	-0.335	0.002	-0.962	-0.446	0.003	-1.202	-0.558
800S275-128	0.061	-0.417	-0.178	0.092	-0.625	-0.267	0.122	-0.833	-0.356	0.153	-1.042	-0.445
900S350-71	-0.185	-0.680	-0.363	-0.278	-1.021	-0.544	-0.370	-1.361	-0.726	-0.463	-1.701	-0.907
900S350-86	-0.123	-0.614	-0.317	-0.185	-0.921	-0.475	-0.247	-1.228	-0.633	-0.308	-1.536	-0.791
900S350-100	-0.062	-0.549	-0.271	-0.093	-0.823	-0.406	-0.124	-1.097	-0.541	-0.155	-1.372	-0.676
900S350-114	-0.001	-0.484	-0.225	-0.002	-0.725	-0.338	-0.003	-0.967	-0.450	-0.004	-1.209	-0.563
900S350-128	0.059	-0.419	-0.180	0.088	-0.629	-0.270	0.118	-0.838	-0.360	0.147	-1.048	-0.450
1000S350-57	-0.300	-0.803	-0.449	-0.450	-1.205	-0.673	-0.600	-1.606	-0.898	-0.749	-2.008	-1.122
1000S350-71	-0.250	-0.750	-0.412	-0.376	-1.125	-0.618	-0.501	-1.501	-0.824	-0.626	-1.876	-1.029
1000S350-86	-0.201	-0.698	-0.375	-0.302	-1.047	-0.563	-0.403	-1.396	-0.750	-0.503	-1.744	-0.938
1000S350-100	-0.153	-0.646	-0.339	-0.229	-0.969	-0.508	-0.306	-1.291	-0.677	-0.382	-1.614	-0.846
1000S350-114	-0.105	-0.594	-0.302	-0.157	-0.891	-0.454	-0.209	-1.188	-0.605	-0.262	-1.485	-0.756
1000S350-128	-0.057	-0.543	-0.267	-0.085	-0.814	-0.400	-0.114	-1.086	-0.533	-0.142	-1.357	-0.667
1200S350-71	-0.334	-0.839	-0.474	-0.500	-1.259	-0.711	-0.667	-1.679	-0.948	-0.834	-2.098	-1.185
1200S350-86	-0.301	-0.804	-0.450	-0.451	-1.206	-0.674	-0.602	-1.609	-0.899	-0.752	-2.011	-1.124
1200S350-100	-0.268	-0.769	-0.425	-0.402	-1.154	-0.638	-0.537	-1.539	-0.850	-0.671	-1.924	-1.063
1200S350-114	-0.236	-0.735	-0.401	-0.354	-1.102	-0.602	-0.472	-1.470	-0.802	-0.590	-1.837	-1.003
1200S350-128	-0.204	-0.701	-0.377	-0.306	-1.051	-0.566	-0.408	-1.402	-0.754	-0.510	-1.752	-0.943
1400S350-86	-0.359	-0.867	-0.493	-0.538	-1.300	-0.740	-0.718	-1.733	-0.986	-0.897	-2.167	-1.233
1400S350-100	-0.336	-0.842	-0.476	-0.504	-1.263	-0.714	-0.672	-1.684	-0.952	-0.840	-2.105	-1.190
1400S350-114	-0.313	-0.817	-0.459	-0.470	-1.226	-0.688	-0.626	-1.635	-0.918	-0.783	-2.044	-1.147
1400S350-128	-0.290	-0.793	-0.442	-0.436	-1.190	-0.663	-0.581	-1.586	-0.884	-0.726	-1.983	-1.105

P_n = load coefficient per purlin for 1 kip/ft. of factored vertical load per discrete bracing line (positive when restraint is required to prevent purlins from translating in the up-slope roof direction).

Cumulative axial load in bracing line (kip) = number of purlins per slope x P_n value indicated in the table x factored vertical load per purlin in kip/ft.

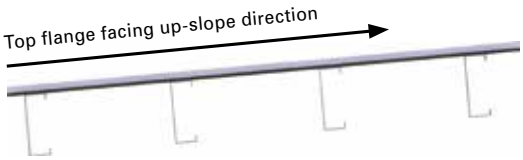
Please refer to page 40 for former nomenclature of sections.

METRIC

C Sections on 4:12 pitch

Discrete bracing load coefficients (Pn) – Standing seam roof at 18.43 degrees

Single span



Span (mm)	3,000	3,000	3,000	4,500	4,500	4,500	6,000	6,000	6,000	7,500	7,500	7,500
Bracing line / Section	0	1	2	0	1	2	0	1	2	0	1	2
152S70-144M	-0.150	-0.439	-0.242	-0.226	-0.659	-0.363	-0.301	-0.879	-0.484	-0.376	-1.098	-0.605
152S70-181M	-0.117	-0.403	-0.217	-0.175	-0.605	-0.325	-0.233	-0.806	-0.433	-0.291	-1.008	-0.542
152S70-218M	-0.083	-0.367	-0.192	-0.125	-0.551	-0.287	-0.166	-0.734	-0.383	-0.208	-0.918	-0.479
152S70-254M	-0.050	-0.332	-0.167	-0.075	-0.497	-0.250	-0.100	-0.663	-0.333	-0.125	-0.829	-0.417
152S70-290M	-0.017	-0.296	-0.142	-0.025	-0.444	-0.213	-0.034	-0.593	-0.284	-0.042	-0.741	-0.355
152S70-326M	0.016	-0.261	-0.118	0.023	-0.392	-0.176	0.031	-0.523	-0.235	0.039	-0.654	-0.294
203S70-144M	-0.215	-0.509	-0.291	-0.323	-0.763	-0.436	-0.431	-1.018	-0.582	-0.538	-1.272	-0.727
203S70-181M	-0.197	-0.490	-0.277	-0.296	-0.734	-0.416	-0.395	-0.979	-0.555	-0.493	-1.224	-0.693
203S70-218M	-0.180	-0.470	-0.264	-0.269	-0.706	-0.396	-0.359	-0.941	-0.528	-0.449	-1.176	-0.660
203S70-254M	-0.162	-0.452	-0.251	-0.243	-0.677	-0.376	-0.324	-0.903	-0.501	-0.405	-1.129	-0.627
203S70-290M	-0.144	-0.433	-0.238	-0.217	-0.649	-0.356	-0.289	-0.866	-0.475	-0.361	-1.082	-0.594
203S70-326M	-0.127	-0.414	-0.225	-0.191	-0.621	-0.337	-0.254	-0.829	-0.449	-0.318	-1.036	-0.561
229S89-181M	-0.198	-0.490	-0.278	-0.297	-0.736	-0.417	-0.396	-0.981	-0.556	-0.495	-1.226	-0.695
229S89-218M	-0.180	-0.471	-0.264	-0.270	-0.707	-0.397	-0.361	-0.943	-0.529	-0.451	-1.178	-0.661
229S89-254M	-0.163	-0.452	-0.251	-0.244	-0.679	-0.377	-0.325	-0.905	-0.502	-0.407	-1.131	-0.628
229S89-290M	-0.145	-0.434	-0.238	-0.218	-0.650	-0.357	-0.290	-0.867	-0.476	-0.363	-1.084	-0.595
229S89-326M	-0.128	-0.415	-0.225	-0.192	-0.622	-0.338	-0.255	-0.830	-0.450	-0.319	-1.037	-0.563
254S89-144M	-0.231	-0.526	-0.303	-0.347	-0.789	-0.454	-0.462	-1.052	-0.605	-0.578	-1.315	-0.757
254S89-181M	-0.217	-0.511	-0.292	-0.325	-0.766	-0.438	-0.434	-1.021	-0.584	-0.542	-1.276	-0.730
254S89-218M	-0.203	-0.495	-0.281	-0.304	-0.743	-0.422	-0.406	-0.991	-0.563	-0.507	-1.239	-0.703
254S89-254M	-0.189	-0.480	-0.271	-0.283	-0.721	-0.406	-0.378	-0.961	-0.542	-0.472	-1.201	-0.677
254S89-290M	-0.175	-0.466	-0.260	-0.262	-0.698	-0.391	-0.350	-0.931	-0.521	-0.437	-1.164	-0.651
254S89-326M	-0.161	-0.451	-0.250	-0.242	-0.676	-0.375	-0.322	-0.901	-0.500	-0.403	-1.127	-0.625
305S89-181M	-0.241	-0.536	-0.310	-0.361	-0.804	-0.465	-0.482	-1.073	-0.620	-0.602	-1.341	-0.775
305S89-218M	-0.231	-0.526	-0.303	-0.347	-0.789	-0.454	-0.463	-1.052	-0.606	-0.579	-1.315	-0.757
305S89-254M	-0.222	-0.516	-0.296	-0.333	-0.774	-0.444	-0.444	-1.032	-0.592	-0.555	-1.290	-0.740
305S89-290M	-0.213	-0.506	-0.289	-0.319	-0.759	-0.433	-0.426	-1.012	-0.578	-0.532	-1.265	-0.722
305S89-326M	-0.204	-0.496	-0.282	-0.305	-0.744	-0.423	-0.407	-0.993	-0.564	-0.509	-1.241	-0.705
356S89-218M	-0.248	-0.544	-0.315	-0.372	-0.816	-0.473	-0.496	-1.088	-0.631	-0.621	-1.360	-0.789
356S89-254M	-0.242	-0.537	-0.310	-0.362	-0.806	-0.466	-0.483	-1.074	-0.621	-0.604	-1.343	-0.776
356S89-290M	-0.235	-0.530	-0.306	-0.353	-0.795	-0.458	-0.470	-1.060	-0.611	-0.588	-1.325	-0.764
356S89-326M	-0.228	-0.523	-0.301	-0.343	-0.784	-0.451	-0.457	-1.046	-0.601	-0.571	-1.307	-0.752

P_n = load coefficient per purlin for 1 kN/m of factored vertical load per discrete bracing line (positive when restraint is required to prevent purlins from translating in the up-slope roof direction).

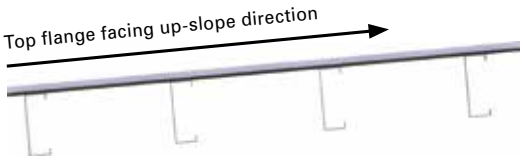
Cumulative axial load in bracing line (kN) = number of purlins per slope x P_n value indicated in the table x factored vertical load per purlin in kN/m.

Please refer to page 40 for former nomenclature of sections.

C Sections on 4:12 pitch

Discrete bracing load coefficients (Pn) – Standing seam roof at 18.43 degrees

Single span



Span (ft.)	10	10	10	15	15	15	20	20	20	25	25	25
Bracing line / Section	0	1	2	0	1	2	0	1	2	0	1	2
600S275-57	-0.502	-1.465	-0.807	-0.752	-2.197	-1.211	-1.003	-2.929	-1.614	-1.254	-3.662	-2.018
600S275-71	-0.389	-1.344	-0.722	-0.583	-2.015	-1.083	-0.777	-2.687	-1.445	-0.972	-3.359	-1.806
600S275-86	-0.277	-1.224	-0.638	-0.415	-1.836	-0.958	-0.554	-2.448	-1.277	-0.692	-3.059	-1.596
600S275-100	-0.166	-1.105	-0.555	-0.249	-1.658	-0.833	-0.332	-2.210	-1.111	-0.415	-2.763	-1.388
600S275-114	-0.056	-0.988	-0.473	-0.085	-1.482	-0.710	-0.113	-1.975	-0.946	-0.141	-2.469	-1.183
600S275-128	0.052	-0.871	-0.392	0.078	-1.307	-0.588	0.104	-1.743	-0.784	0.130	-2.179	-0.980
800S275-57	-0.718	-1.696	-0.969	-1.077	-2.545	-1.454	-1.436	-3.393	-1.939	-1.795	-4.241	-2.423
800S275-71	-0.658	-1.632	-0.924	-0.987	-2.448	-1.386	-1.316	-3.264	-1.848	-1.645	-4.080	-2.311
800S275-86	-0.598	-1.568	-0.880	-0.898	-2.352	-1.319	-1.197	-3.137	-1.759	-1.496	-3.921	-2.199
800S275-100	-0.539	-1.505	-0.835	-0.809	-2.258	-1.253	-1.079	-3.010	-1.671	-1.349	-3.763	-2.089
800S275-114	-0.481	-1.443	-0.792	-0.722	-2.164	-1.188	-0.962	-2.886	-1.583	-1.203	-3.607	-1.979
800S275-128	-0.424	-1.381	-0.748	-0.635	-2.071	-1.123	-0.847	-2.762	-1.497	-1.059	-3.452	-1.871
900S350-71	-0.660	-1.635	-0.926	-0.990	-2.452	-1.389	-1.321	-3.269	-1.852	-1.651	-4.087	-2.315
900S350-86	-0.601	-1.571	-0.882	-0.901	-2.357	-1.322	-1.202	-3.142	-1.763	-1.502	-3.928	-2.204
900S350-100	-0.542	-1.508	-0.837	-0.813	-2.262	-1.256	-1.084	-3.016	-1.675	-1.355	-3.770	-2.093
900S350-114	-0.484	-1.445	-0.794	-0.725	-2.168	-1.190	-0.967	-2.891	-1.587	-1.209	-3.613	-1.984
900S350-128	-0.426	-1.383	-0.750	-0.639	-2.075	-1.125	-0.851	-2.767	-1.500	-1.064	-3.458	-1.875
1000S350-57	-0.771	-1.753	-1.009	-1.156	-2.629	-1.513	-1.541	-3.506	-2.018	-1.926	-4.382	-2.522
1000S350-71	-0.723	-1.702	-0.973	-1.085	-2.553	-1.460	-1.446	-3.404	-1.946	-1.808	-4.255	-2.433
1000S350-86	-0.676	-1.651	-0.938	-1.014	-2.477	-1.407	-1.352	-3.303	-1.876	-1.690	-4.129	-2.344
1000S350-100	-0.629	-1.601	-0.903	-0.944	-2.402	-1.354	-1.258	-3.203	-1.805	-1.573	-4.003	-2.257
1000S350-114	-0.583	-1.552	-0.868	-0.874	-2.328	-1.302	-1.166	-3.103	-1.736	-1.457	-3.879	-2.170
1000S350-128	-0.537	-1.502	-0.834	-0.805	-2.254	-1.250	-1.074	-3.005	-1.667	-1.342	-3.756	-2.084
1200S350-71	-0.803	-1.788	-1.033	-1.205	-2.681	-1.550	-1.606	-3.575	-2.066	-2.008	-4.469	-2.583
1200S350-86	-0.772	-1.754	-1.009	-1.157	-2.631	-1.514	-1.543	-3.508	-2.019	-1.929	-4.385	-2.524
1200S350-100	-0.740	-1.720	-0.986	-1.110	-2.581	-1.479	-1.481	-3.441	-1.972	-1.851	-4.301	-2.465
1200S350-114	-0.709	-1.687	-0.963	-1.064	-2.531	-1.444	-1.419	-3.374	-1.926	-1.773	-4.218	-2.407
1200S350-128	-0.679	-1.654	-0.940	-1.018	-2.481	-1.410	-1.357	-3.309	-1.880	-1.697	-4.136	-2.350
1400S350-86	-0.827	-1.814	-1.051	-1.241	-2.721	-1.577	-1.655	-3.628	-2.103	-2.069	-4.535	-2.629
1400S350-100	-0.805	-1.790	-1.035	-1.208	-2.685	-1.552	-1.611	-3.580	-2.070	-2.013	-4.475	-2.587
1400S350-114	-0.783	-1.767	-1.018	-1.175	-2.650	-1.528	-1.567	-3.533	-2.037	-1.958	-4.416	-2.546
1400S350-128	-0.762	-1.743	-1.002	-1.142	-2.615	-1.503	-1.523	-3.486	-2.004	-1.904	-4.358	-2.505

P_n = load coefficient per purlin for 1 kip/ft. of factored vertical load per discrete bracing line (positive when restraint is required to prevent purlins from translating in the up-slope roof direction).

Cumulative axial load in bracing line (kip) = number of purlins per slope x P_n value indicated in the table x factored vertical load per purlin in kip/ft.

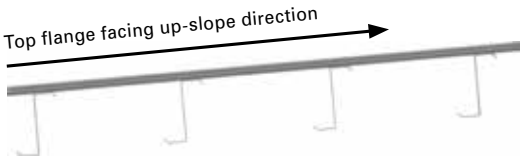
Please refer to page 40 for former nomenclature of sections.

METRIC

Z Sections on 2:12 pitch

Discrete bracing load coefficients (Pn) – Standing seam roof at 9.46 degrees

Single span



Span (mm)	3,000	3,000	3,000	4,500	4,500	4,500	6,000	6,000	6,000	7,500	7,500	7,500
Bracing line / Section	0	1	2	0	1	2	0	1	2	0	1	2
152Z76-144M	0.026	-0.025	-0.031	0.133	0.132	0.035	0.302	0.402	0.157	0.534	0.784	0.333
152Z76-181M	0.039	-0.011	-0.022	0.152	0.153	0.050	0.328	0.429	0.176	0.565	0.818	0.357
152Z76-218M	0.052	0.003	-0.012	0.171	0.173	0.064	0.353	0.456	0.195	0.597	0.852	0.381
152Z76-253M	0.065	0.017	-0.002	0.191	0.194	0.079	0.379	0.483	0.214	0.629	0.886	0.405
152Z76-290M	0.078	0.030	0.007	0.210	0.214	0.093	0.404	0.511	0.233	0.661	0.920	0.429
152Z76-326M	0.091	0.044	0.017	0.229	0.235	0.107	0.430	0.538	0.253	0.693	0.954	0.453
203Z76-144M	-0.056	-0.156	-0.101	-0.034	-0.145	-0.108	0.020	-0.075	-0.086	0.106	0.054	-0.035
203Z76-181M	-0.049	-0.149	-0.095	-0.024	-0.134	-0.100	0.034	-0.060	-0.075	0.124	0.072	-0.022
203Z76-218M	-0.041	-0.141	-0.090	-0.013	-0.123	-0.092	0.048	-0.046	-0.065	0.142	0.091	-0.009
203Z76-254M	-0.034	-0.133	-0.084	-0.002	-0.111	-0.084	0.062	-0.031	-0.054	0.159	0.109	0.004
203Z76-290M	-0.027	-0.126	-0.079	0.008	-0.100	-0.076	0.076	-0.016	-0.043	0.177	0.128	0.017
203Z76-326M	-0.020	-0.118	-0.074	0.019	-0.089	-0.068	0.090	-0.001	-0.033	0.194	0.146	0.030
229Z76-181M	-0.072	-0.185	-0.114	-0.070	-0.209	-0.139	-0.043	-0.188	-0.141	0.009	-0.122	-0.121
229Z76-218M	-0.066	-0.179	-0.110	-0.061	-0.200	-0.132	-0.032	-0.177	-0.133	0.022	-0.108	-0.111
229Z76-254M	-0.060	-0.173	-0.106	-0.053	-0.191	-0.126	-0.021	-0.165	-0.124	0.036	-0.093	-0.100
229Z76-290M	-0.055	-0.167	-0.102	-0.045	-0.182	-0.120	-0.010	-0.153	-0.116	0.050	-0.079	-0.090
229Z76-326M	-0.049	-0.161	-0.097	-0.036	-0.173	-0.113	0.001	-0.142	-0.108	0.064	-0.065	-0.080
254Z76-181M	-0.088	-0.210	-0.128	-0.102	-0.262	-0.166	-0.097	-0.278	-0.187	-0.072	-0.259	-0.191
254Z76-218M	-0.083	-0.205	-0.125	-0.096	-0.254	-0.161	-0.088	-0.268	-0.180	-0.061	-0.247	-0.182
254Z76-254M	-0.079	-0.200	-0.121	-0.089	-0.247	-0.156	-0.079	-0.259	-0.174	-0.050	-0.235	-0.174
254Z76-290M	-0.074	-0.195	-0.118	-0.082	-0.240	-0.151	-0.070	-0.250	-0.167	-0.039	-0.224	-0.166
254Z76-326M	-0.070	-0.190	-0.114	-0.075	-0.233	-0.146	-0.061	-0.240	-0.160	-0.028	-0.212	-0.157
305Z76-181M	-0.109	-0.242	-0.145	-0.144	-0.328	-0.201	-0.166	-0.391	-0.245	-0.175	-0.431	-0.279
305Z76-218M	-0.105	-0.239	-0.143	-0.139	-0.323	-0.198	-0.160	-0.385	-0.241	-0.167	-0.423	-0.273
305Z76-254M	-0.102	-0.235	-0.141	-0.134	-0.318	-0.194	-0.153	-0.378	-0.236	-0.160	-0.415	-0.267
305Z76-290M	-0.099	-0.232	-0.138	-0.129	-0.313	-0.190	-0.147	-0.372	-0.232	-0.152	-0.407	-0.261
305Z76-326M	-0.096	-0.229	-0.136	-0.125	-0.309	-0.187	-0.141	-0.365	-0.227	-0.144	-0.399	-0.256
356Z76-181M	-0.121	-0.261	-0.155	-0.168	-0.367	-0.221	-0.206	-0.457	-0.280	-0.235	-0.531	-0.330
356Z76-218M	-0.118	-0.258	-0.154	-0.164	-0.363	-0.219	-0.201	-0.453	-0.276	-0.229	-0.526	-0.326
356Z76-254M	-0.116	-0.256	-0.152	-0.161	-0.360	-0.216	-0.197	-0.448	-0.273	-0.224	-0.520	-0.321
356Z76-290M	-0.114	-0.253	-0.150	-0.157	-0.356	-0.214	-0.192	-0.443	-0.269	-0.218	-0.514	-0.317
356Z76-326M	-0.111	-0.251	-0.148	-0.154	-0.353	-0.211	-0.188	-0.438	-0.266	-0.212	-0.508	-0.313

P_n = load coefficient per purlin for 1 kN/m of factored vertical load per discrete bracing line (positive when restraint is required to prevent purlins from translating in the up-slope roof direction).

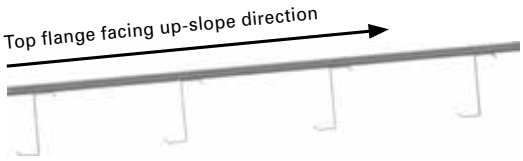
Cumulative axial load in bracing line (kN) = number of purlins per slope x P_n value indicated in the table x factored vertical load per purlin in kN/m.

Please refer to page 40 for former nomenclature of sections.

Z Sections on 2:12 pitch

Discrete bracing load coefficients (Pn) – Standing seam roof at 9.46 degrees

Single span



Span (ft.)	10	10	10	15	15	15	20	20	20	25	25	25
Bracing line / Section	0	1	2	0	1	2	0	1	2	0	1	2
600Z300-57	0.094	-0.070	-0.099	0.458	0.467	0.131	1.033	1.387	0.546	1.820	2.689	1.147
600Z300-71	0.137	-0.025	-0.067	0.522	0.536	0.179	1.119	1.478	0.610	1.927	2.802	1.227
600Z300-86	0.180	0.021	-0.034	0.586	0.604	0.227	1.204	1.569	0.674	2.033	2.915	1.307
600Z300-100	0.223	0.067	-0.002	0.651	0.673	0.275	1.289	1.660	0.738	2.139	3.028	1.386
600Z300-114	0.266	0.113	0.030	0.715	0.741	0.323	1.375	1.750	0.802	2.246	3.141	1.466
600Z300-128	0.309	0.159	0.062	0.779	0.809	0.371	1.460	1.841	0.866	2.352	3.254	1.545
800Z300-57	-0.182	-0.514	-0.332	-0.107	-0.470	-0.352	0.079	-0.226	-0.274	0.376	0.219	-0.098
800Z300-71	-0.158	-0.489	-0.314	-0.071	-0.433	-0.325	0.126	-0.176	-0.238	0.435	0.280	-0.054
800Z300-86	-0.134	-0.463	-0.296	-0.036	-0.395	-0.298	0.174	-0.127	-0.203	0.494	0.342	-0.011
800Z300-100	-0.111	-0.438	-0.278	0.000	-0.357	-0.272	0.221	-0.077	-0.168	0.552	0.403	0.033
800Z300-114	-0.087	-0.412	-0.260	0.036	-0.320	-0.245	0.268	-0.027	-0.133	0.611	0.464	0.077
800Z300-128	-0.063	-0.387	-0.242	0.071	-0.282	-0.218	0.315	0.022	-0.097	0.670	0.526	0.121
900Z300-71	-0.236	-0.610	-0.379	-0.227	-0.686	-0.457	-0.133	-0.608	-0.460	0.045	-0.377	-0.389
900Z300-86	-0.217	-0.590	-0.365	-0.199	-0.656	-0.436	-0.096	-0.569	-0.432	0.091	-0.329	-0.355
900Z300-100	-0.198	-0.570	-0.351	-0.171	-0.627	-0.415	-0.059	-0.530	-0.405	0.137	-0.282	-0.320
900Z300-114	-0.179	-0.550	-0.337	-0.143	-0.597	-0.394	-0.022	-0.491	-0.377	0.183	-0.234	-0.286
900Z300-128	-0.161	-0.530	-0.323	-0.115	-0.567	-0.373	0.015	-0.453	-0.349	0.229	-0.186	-0.252
1000Z300-71	-0.291	-0.696	-0.425	-0.336	-0.863	-0.550	-0.316	-0.911	-0.616	-0.228	-0.838	-0.624
1000Z300-86	-0.276	-0.680	-0.413	-0.314	-0.840	-0.533	-0.286	-0.880	-0.593	-0.191	-0.800	-0.596
1000Z300-100	-0.260	-0.663	-0.402	-0.291	-0.816	-0.516	-0.256	-0.848	-0.571	-0.154	-0.761	-0.568
1000Z300-114	-0.245	-0.647	-0.391	-0.268	-0.792	-0.499	-0.226	-0.817	-0.549	-0.117	-0.723	-0.541
1000Z300-128	-0.230	-0.631	-0.379	-0.246	-0.768	-0.482	-0.196	-0.786	-0.527	-0.080	-0.684	-0.513
1200Z300-71	-0.361	-0.804	-0.483	-0.476	-1.089	-0.667	-0.547	-1.295	-0.813	-0.575	-1.422	-0.921
1200Z300-86	-0.350	-0.793	-0.475	-0.460	-1.072	-0.656	-0.527	-1.273	-0.798	-0.550	-1.395	-0.902
1200Z300-100	-0.339	-0.782	-0.467	-0.444	-1.056	-0.644	-0.506	-1.251	-0.783	-0.524	-1.369	-0.883
1200Z300-114	-0.329	-0.771	-0.459	-0.429	-1.039	-0.632	-0.485	-1.230	-0.767	-0.499	-1.343	-0.864
1200Z300-128	-0.318	-0.760	-0.452	-0.413	-1.023	-0.621	-0.464	-1.208	-0.752	-0.473	-1.316	-0.845
1400Z300-71	-0.401	-0.868	-0.517	-0.557	-1.220	-0.736	-0.682	-1.517	-0.928	-0.777	-1.760	-1.094
1400Z300-86	-0.394	-0.860	-0.511	-0.545	-1.208	-0.727	-0.667	-1.502	-0.917	-0.759	-1.741	-1.080
1400Z300-100	-0.386	-0.851	-0.506	-0.534	-1.196	-0.719	-0.652	-1.486	-0.906	-0.740	-1.722	-1.066
1400Z300-114	-0.378	-0.843	-0.500	-0.522	-1.184	-0.710	-0.637	-1.470	-0.895	-0.721	-1.703	-1.052
1400Z300-128	-0.370	-0.835	-0.494	-0.511	-1.172	-0.702	-0.622	-1.454	-0.883	-0.702	-1.683	-1.038

P_n = load coefficient per purlin for 1 kip/ft. of factored vertical load per discrete bracing line (positive when restraint is required to prevent purlins from translating in the up-slope roof direction).

Cumulative axial load in bracing line (kip) = number of purlins per slope x P_n value indicated in the table x factored vertical load per purlin in kip/ft.

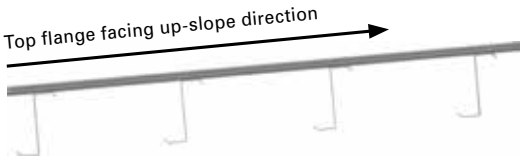
Please refer to page 40 for former nomenclature of sections.

METRIC

Z Sections on 4:12 pitch

Discrete bracing load coefficients (Pn) – Standing seam roof at 18.43 degrees

Single span



Span (mm)	3,000	3,000	3,000	4,500	4,500	4,500	6,000	6,000	6,000	7,500	7,500	7,500
Bracing line / Section	0	1	2	0	1	2	0	1	2	0	1	2
152Z76-144M	-0.119	-0.318	-0.203	-0.089	-0.314	-0.226	0.001	-0.202	-0.195	0.151	0.019	-0.112
152Z76-181M	-0.107	-0.305	-0.194	-0.071	-0.294	-0.212	0.026	-0.176	-0.177	0.182	0.052	-0.089
152Z76-218M	-0.095	-0.291	-0.185	-0.052	-0.275	-0.198	0.050	-0.149	-0.159	0.213	0.084	-0.066
152Z76-253M	-0.082	-0.278	-0.175	-0.034	-0.255	-0.184	0.075	-0.123	-0.140	0.244	0.117	-0.043
152Z76-290M	-0.070	-0.265	-0.166	-0.015	-0.235	-0.170	0.100	-0.097	-0.122	0.274	0.149	-0.020
152Z76-326M	-0.058	-0.252	-0.157	0.003	-0.215	-0.156	0.124	-0.071	-0.103	0.305	0.182	0.003
203Z76-144M	-0.198	-0.444	-0.270	-0.250	-0.581	-0.363	-0.271	-0.661	-0.429	-0.259	-0.683	-0.467
203Z76-181M	-0.191	-0.437	-0.265	-0.240	-0.570	-0.355	-0.257	-0.646	-0.419	-0.242	-0.666	-0.454
203Z76-218M	-0.184	-0.430	-0.259	-0.230	-0.559	-0.348	-0.243	-0.632	-0.408	-0.226	-0.648	-0.441
203Z76-254M	-0.178	-0.422	-0.254	-0.219	-0.548	-0.340	-0.230	-0.618	-0.398	-0.209	-0.630	-0.429
203Z76-290M	-0.171	-0.415	-0.249	-0.209	-0.537	-0.332	-0.216	-0.603	-0.388	-0.192	-0.613	-0.416
203Z76-326M	-0.164	-0.408	-0.244	-0.199	-0.527	-0.325	-0.202	-0.589	-0.378	-0.175	-0.595	-0.404
229Z76-181M	-0.214	-0.472	-0.283	-0.284	-0.642	-0.393	-0.331	-0.769	-0.482	-0.353	-0.853	-0.549
229Z76-218M	-0.208	-0.466	-0.279	-0.276	-0.634	-0.387	-0.320	-0.758	-0.474	-0.340	-0.839	-0.539
229Z76-254M	-0.203	-0.460	-0.275	-0.268	-0.625	-0.381	-0.309	-0.747	-0.466	-0.327	-0.825	-0.529
229Z76-290M	-0.197	-0.454	-0.271	-0.260	-0.617	-0.375	-0.299	-0.736	-0.458	-0.314	-0.811	-0.520
229Z76-326M	-0.192	-0.448	-0.267	-0.252	-0.608	-0.369	-0.288	-0.724	-0.450	-0.300	-0.797	-0.510
254Z76-181M	-0.229	-0.496	-0.296	-0.315	-0.693	-0.419	-0.383	-0.855	-0.526	-0.431	-0.984	-0.616
254Z76-218M	-0.225	-0.491	-0.293	-0.309	-0.686	-0.415	-0.374	-0.846	-0.520	-0.421	-0.973	-0.608
254Z76-254M	-0.220	-0.487	-0.290	-0.302	-0.679	-0.410	-0.366	-0.837	-0.513	-0.410	-0.962	-0.600
254Z76-290M	-0.216	-0.482	-0.286	-0.296	-0.672	-0.405	-0.357	-0.828	-0.507	-0.399	-0.951	-0.592
254Z76-326M	-0.212	-0.477	-0.283	-0.289	-0.665	-0.400	-0.348	-0.819	-0.500	-0.388	-0.939	-0.584
305Z76-181M	-0.249	-0.527	-0.313	-0.355	-0.757	-0.453	-0.449	-0.965	-0.582	-0.530	-1.150	-0.701
305Z76-218M	-0.246	-0.524	-0.311	-0.351	-0.752	-0.450	-0.443	-0.958	-0.578	-0.523	-1.142	-0.695
305Z76-254M	-0.243	-0.520	-0.308	-0.346	-0.747	-0.446	-0.437	-0.952	-0.573	-0.515	-1.135	-0.690
305Z76-290M	-0.240	-0.517	-0.306	-0.342	-0.743	-0.443	-0.431	-0.946	-0.569	-0.508	-1.127	-0.684
305Z76-326M	-0.237	-0.514	-0.304	-0.337	-0.738	-0.440	-0.425	-0.940	-0.565	-0.501	-1.119	-0.679
356Z76-181M	-0.261	-0.545	-0.323	-0.378	-0.794	-0.473	-0.487	-1.028	-0.615	-0.588	-1.246	-0.750
356Z76-218M	-0.259	-0.543	-0.321	-0.375	-0.791	-0.470	-0.483	-1.023	-0.612	-0.582	-1.241	-0.746
356Z76-254M	-0.256	-0.540	-0.319	-0.372	-0.787	-0.468	-0.479	-1.019	-0.609	-0.577	-1.235	-0.742
356Z76-290M	-0.254	-0.538	-0.318	-0.368	-0.784	-0.465	-0.474	-1.014	-0.605	-0.571	-1.230	-0.738
356Z76-326M	-0.252	-0.536	-0.316	-0.365	-0.780	-0.463	-0.470	-1.010	-0.602	-0.566	-1.224	-0.734

P_n = load coefficient per purlin for 1 kN/m of factored vertical load per discrete bracing line (positive when restraint is required to prevent purlins from translating in the up-slope roof direction).

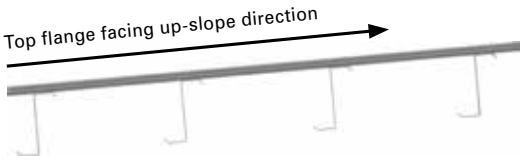
Cumulative axial load in bracing line (kN) = number of purlins per slope x P_n value indicated in the table x factored vertical load per purlin in kN/m.

Please refer to page 40 for former nomenclature of sections.

Z Sections on 4:12 pitch

Discrete bracing load coefficients (Pn) – Standing seam roof at 18.43 degrees

Single span



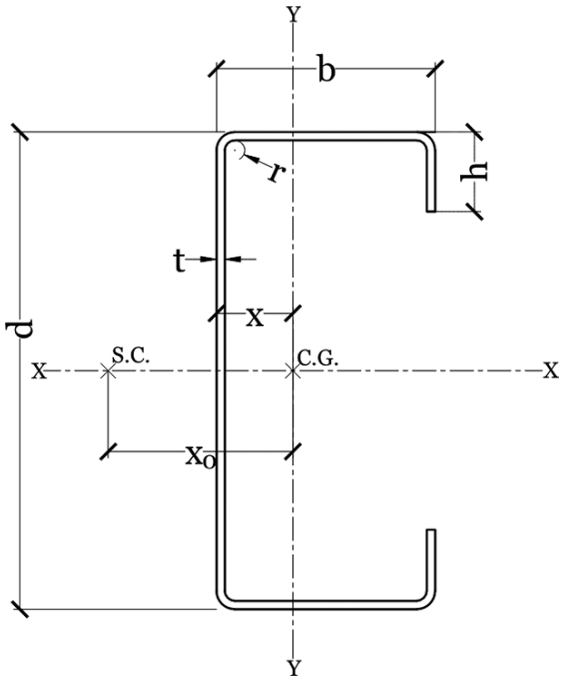
Span (ft.)	10	10	10	15	15	15	20	20	20	25	25	25
Bracing line / Section	0	1	2	0	1	2	0	1	2	0	1	2
600Z300-57	-0.392	-1.048	-0.672	-0.283	-1.021	-0.740	0.029	-0.626	-0.629	0.545	0.135	-0.339
600Z300-71	-0.351	-1.004	-0.641	-0.221	-0.955	-0.694	0.111	-0.539	-0.568	0.647	0.244	-0.263
600Z300-86	-0.309	-0.960	-0.610	-0.159	-0.889	-0.647	0.194	-0.452	-0.506	0.750	0.353	-0.186
600Z300-100	-0.268	-0.916	-0.579	-0.098	-0.823	-0.601	0.276	-0.364	-0.445	0.852	0.461	-0.110
600Z300-114	-0.227	-0.872	-0.548	-0.036	-0.758	-0.555	0.358	-0.277	-0.383	0.954	0.570	-0.033
600Z300-128	-0.186	-0.828	-0.517	0.026	-0.692	-0.509	0.440	-0.190	-0.322	1.057	0.678	0.043
800Z300-57	-0.658	-1.475	-0.896	-0.826	-1.923	-1.204	-0.888	-2.178	-1.417	-0.844	-2.240	-1.537
800Z300-71	-0.635	-1.450	-0.879	-0.792	-1.887	-1.178	-0.843	-2.130	-1.383	-0.787	-2.181	-1.495
800Z300-86	-0.612	-1.426	-0.862	-0.758	-1.850	-1.153	-0.797	-2.082	-1.350	-0.731	-2.122	-1.453
800Z300-100	-0.589	-1.401	-0.845	-0.723	-1.814	-1.127	-0.752	-2.035	-1.316	-0.674	-2.063	-1.411
800Z300-114	-0.566	-1.377	-0.828	-0.689	-1.778	-1.101	-0.707	-1.987	-1.282	-0.618	-2.004	-1.369
800Z300-128	-0.542	-1.353	-0.810	-0.655	-1.742	-1.076	-0.661	-1.939	-1.248	-0.562	-1.945	-1.327
900Z300-71	-0.709	-1.567	-0.942	-0.942	-2.130	-1.305	-1.093	-2.545	-1.597	-1.162	-2.814	-1.817
900Z300-86	-0.691	-1.548	-0.928	-0.915	-2.102	-1.285	-1.057	-2.508	-1.570	-1.118	-2.768	-1.784
900Z300-100	-0.673	-1.529	-0.915	-0.888	-2.073	-1.265	-1.021	-2.471	-1.543	-1.074	-2.722	-1.751
900Z300-114	-0.655	-1.510	-0.901	-0.861	-2.045	-1.245	-0.985	-2.433	-1.517	-1.029	-2.675	-1.718
900Z300-128	-0.637	-1.490	-0.887	-0.834	-2.016	-1.224	-0.950	-2.396	-1.490	-0.985	-2.629	-1.685
1000Z300-71	-0.762	-1.649	-0.986	-1.047	-2.301	-1.394	-1.268	-2.837	-1.746	-1.425	-3.257	-2.043
1000Z300-86	-0.747	-1.634	-0.975	-1.025	-2.278	-1.378	-1.239	-2.807	-1.725	-1.389	-3.220	-2.016
1000Z300-100	-0.733	-1.618	-0.964	-1.003	-2.255	-1.362	-1.210	-2.776	-1.704	-1.354	-3.183	-1.989
1000Z300-114	-0.718	-1.603	-0.953	-0.982	-2.232	-1.345	-1.182	-2.746	-1.682	-1.318	-3.146	-1.963
1000Z300-128	-0.703	-1.587	-0.942	-0.960	-2.209	-1.329	-1.153	-2.716	-1.661	-1.282	-3.109	-1.936
1200Z300-71	-0.829	-1.754	-1.042	-1.181	-2.518	-1.508	-1.491	-3.206	-1.936	-1.759	-3.818	-2.329
1200Z300-86	-0.819	-1.743	-1.034	-1.166	-2.502	-1.496	-1.471	-3.185	-1.922	-1.734	-3.793	-2.310
1200Z300-100	-0.809	-1.732	-1.027	-1.151	-2.486	-1.485	-1.451	-3.164	-1.907	-1.710	-3.767	-2.292
1200Z300-114	-0.799	-1.722	-1.019	-1.136	-2.470	-1.474	-1.431	-3.144	-1.892	-1.685	-3.742	-2.274
1200Z300-128	-0.788	-1.711	-1.011	-1.120	-2.454	-1.463	-1.411	-3.123	-1.877	-1.661	-3.717	-2.256
1400Z300-71	-0.868	-1.815	-1.075	-1.259	-2.644	-1.574	-1.621	-3.420	-2.047	-1.953	-4.144	-2.495
1400Z300-86	-0.861	-1.807	-1.069	-1.248	-2.632	-1.565	-1.606	-3.405	-2.036	-1.935	-4.125	-2.482
1400Z300-100	-0.853	-1.799	-1.063	-1.237	-2.620	-1.557	-1.591	-3.390	-2.025	-1.917	-4.107	-2.468
1400Z300-114	-0.846	-1.791	-1.058	-1.226	-2.609	-1.549	-1.577	-3.375	-2.015	-1.899	-4.088	-2.455
1400Z300-128	-0.839	-1.783	-1.052	-1.215	-2.597	-1.541	-1.562	-3.359	-2.004	-1.881	-4.070	-2.442

P_n = load coefficient per purlin for 1 kip/ft. of factored vertical load per discrete bracing line (positive when restraint is required to prevent purlins from translating in the up-slope roof direction).

Cumulative axial load in bracing line (kip) = number of purlins per slope x P_n value indicated in the table x factored vertical load per purlin in kip/ft.

Please refer to page 40 for former nomenclature of sections.

C SECTION PROPERTIES



Dimensions

d = section depth
b = flange width
h = lip length
t = steel thickness
C.G. = center of gravity
S.C. = shear center
r = inside bend radius = 3.2 mm

Properties

I_x eff. = effective moment of inertia about axis X-X at maximum compressive stress = 0.6 F_y
S_x eff. = effective elastic section modulus about axis X-X
r_x = radius of gyration about axis X-X
I_y = gross moment of inertia about axis Y-Y
S_y eff. = effective elastic section modulus about axis Y-Y
r_y = radius of gyration about axis Y-Y
J = St. Venant torsion constant
C_w = warping constant
A_g = gross area of section
x = distance from exterior fiber of web to center of gravity
x_o = distance from shear center to center of gravity

Example

152S70-144M
152 = section depth (mm)
S = nomenclature
70 = flange width (mm)
144 = minimum steel thickness, i.e. 95% of the design thickness (10^{-2} mm)
M = International System of Units (SI) designation (metric)

Section			Dimension					Property										
No.	Nomenclature	Former Nomenclature	d mm	b mm	h mm	t mm	Gage	I_x eff. $x10^6$ mm^4	S_x eff. $x10^3$ mm^3	r_x mm	I_y $x10^6$ mm^4	S_y eff. $x10^3$ mm^3	r_y mm	J mm^4	C_w $x10^9$ mm^6	A_g mm^2	x mm	x_o mm
1	152S70-144M	C152x4.3	152.4	69.9	25.4	1.52	16	1.84	22.06	60.89	0.37	7.46	27.09	389	2.04	503	24.41	59.30
2	152S70-181M	C152x5.2	152.4	69.9	25.4	1.91	14	2.30	28.68	60.71	0.45	9.44	26.91	756	2.48	625	24.41	58.86
3	152S70-218M	C152x6.0	152.4	69.9	25.4	2.29	13	2.73	35.86	60.52	0.53	11.38	26.74	1,300	2.90	746	24.41	58.41
4	152S70-254M	C152x7.0	152.4	69.9	25.4	2.67	12	3.15	41.35	60.34	0.61	13.24	26.57	2,052	3.29	865	24.41	57.97
5	152S70-290M	C152x8.3	152.4	69.9	25.4	3.05	11	3.56	46.70	60.16	0.69	15.03	26.40	3,045	3.66	983	24.41	57.52
6	152S70-326M	C152x8.9	152.4	69.9	25.4	3.43	10	3.96	51.92	59.97	0.76	16.65	26.23	4,311	4.00	1,100	24.41	57.07
7	203S70-144M	C203x5.1	203.2	69.9	25.4	1.52	16	3.59	32.58	79.26	0.41	7.51	26.47	449	3.60	580	21.25	53.32
8	203S70-181M	C203x6.0	203.2	69.9	25.4	1.91	14	4.51	42.24	79.05	0.50	9.52	26.29	873	4.40	722	21.26	52.89
9	203S70-218M	C203x7.0	203.2	69.9	25.4	2.29	13	5.36	52.76	78.85	0.59	11.50	26.11	1,502	5.15	862	21.27	52.46
10	203S70-254M	C203x8.0	203.2	69.9	25.4	2.67	12	6.19	60.94	78.65	0.67	13.42	25.94	2,373	5.86	1,001	21.28	52.03
11	203S70-290M	C203x9.1	203.2	69.9	25.4	3.05	11	7.00	68.94	78.45	0.76	15.27	25.76	3,525	6.53	1,138	21.29	51.60
12	203S70-326M	C203x10.6	203.2	69.9	25.4	3.43	10	7.80	76.78	78.25	0.83	17.04	25.59	4,994	7.17	1,274	21.30	51.17
13	229S89-181M	C229x6.8	228.6	88.9	25.4	1.91	14	6.73	52.42	90.41	0.92	13.44	33.02	1,020	9.82	843	26.97	66.63
14	229S89-218M	C229x8.0	228.6	88.9	25.4	2.29	13	8.20	63.38	90.21	1.09	16.33	32.84	1,755	11.55	1,007	26.98	66.19
15	229S89-254M	C229x9.4	228.6	88.9	25.4	2.67	12	9.48	76.11	90.01	1.25	19.16	32.66	2,775	13.19	1,170	26.98	65.75
16	229S89-290M	C229x10.7	228.6	88.9	25.4	3.05	11	10.74	89.95	89.81	1.40	21.93	32.48	4,124	14.77	1,332	26.98	65.31
17	229S89-326M	C229x11.9	228.6	88.9	25.4	3.43	10	11.98	101.80	89.62	1.56	24.62	32.30	5,847	16.27	1,492	26.99	64.87
18	254S89-144M	C254x5.7	254.0	88.9	25.4	1.52	16	6.77	43.21	99.59	0.77	10.57	32.83	554	10.03	716	25.55	64.39
19	254S89-181M	C254x7.0	254.0	88.9	25.4	1.91	14	8.60	60.37	99.39	0.95	13.47	32.64	1,078	12.29	891	25.56	63.95
20	254S89-218M	C254x8.6	254.0	88.9	25.4	2.29	13	10.48	73.19	99.18	1.12	16.37	32.46	1,856	14.46	1,065	25.57	63.52
21	254S89-254M	C254x10.0	254.0	88.9	25.4	2.67	12	12.13	87.77	98.98	1.29	19.23	32.28	2,935	16.54	1,238	25.58	63.09
22	254S89-290M	C254x11.3	254.0	88.9	25.4	3.05	11	13.75	103.64	98.77	1.45	22.02	32.10	4,364	18.52	1,409	25.58	62.66
23	254S89-326M	C254x12.7	254.0	88.9	25.4	3.43	10	15.34	117.31	98.57	1.61	24.73	31.92	6,189	20.42	1,579	25.59	62.22
24	305S89-181M	C305x8.0	304.8	88.9	25.4	1.91	14	13.20	71.59	116.94	1.00	13.51	31.86	1,195	18.28	988	23.15	59.27
25	305S89-218M	C305x9.5	304.8	88.9	25.4	2.29	13	16.09	94.32	116.72	1.19	16.43	31.67	2,058	21.52	1,182	23.17	58.85
26	305S89-254M	C305x11	304.8	88.9	25.4	2.67	12	18.64	112.85	116.50	1.36	19.32	31.49	3,256	24.64	1,373	23.18	58.44
27	305S89-290M	C305x12.5	304.8	88.9	25.4	3.05	11	21.15	133.00	116.28	1.53	22.15	31.31	4,844	27.62	1,564	23.20	58.02
28	305S89-326M	C305x14.0	304.8	88.9	25.4	3.43	10	23.61	150.55	116.06	1.70	24.90	31.12	6,871	30.48	1,753	23.22	57.60
29	356S89-218M	C356x10.4	355.6	88.9	25.4	2.29	13	23.23	108.67	133.82	1.24	16.48	30.87	2,260	30.30	1,298	21.20	54.89
30	356S89-254M	C356x12.1	355.6	88.9	25.4	2.67	12	26.93	140.25	133.58	1.42	19.38	30.69	3,578	34.71	1,509	21.22	54.48
31	356S89-290M	C356x13.8	355.6	88.9	25.4	3.05	11	30.56	165.02	133.34	1.60	22.24	30.50	5,323	38.94	1,719	21.25	54.08
32	356S89-326M	C356x15.5	355.6	88.9	25.4	3.43	10	34.15	186.78	133.11	1.77	25.02	30.32	7,554	43.00	1,927	21.28	53.68

SELECTION TABLE

Resistance

F_y = steel yield strength = 345 MPa
V_r = factored shear strength
B_r int. = factored web crippling strength with 102 mm of interior support
B_r ext.= factored web crippling strength with 102 mm of exterior support
M_r = factored moment resistance considering lateral and distortional buckling

Design assumptions

- The values in the table have been calculated according to Limit States Design (LSD) and CSA S136-16 standard for cold-formed steel.
- Shaded M_r values indicates that distortional buckling may govern the design for the given section if the compression flange is not restrained against distortional buckling.
- The design engineer shall determine the cases when distortional buckling is applicable.
- Rotational rigidity of the sheathing is neglected ($k\phi = 0$) and moment gradient factor has been conservatively set to 1 (ß= 1) for the calculation of the distortional buckling resistance.
- The web crippling resistance is calculated with one flange loading condition.
- The shear resistance is taken as the minimum between the elastic resistance (F_y) of the gross section and the plastic resistance (F_u) of the net section.
- The net section for shear is taken with:
  - 2 bolt holes of 14 mm diameter for section depth d < 203 mm
  - 3 bolt holes of 14 mm diameter for section depth d ≥ 203 mm

Example – Wall girt selection

Single span: 7,500 mm
Girt spacing: 1,600 mm
Positive external wind pressure: 0.38 + 0.32 = 0.70 kPa
Negative external wind pressure: 0.28 + 0.32 = 0.60 kPa
Two rows of discrete bracing are used to prevent the section from buckling at a third of the span.
Metal siding is fixed to the exterior flange at 300 mm c/c. The cladding is considered to prevent distortional buckling and lateral-torsional buckling.
Deflections are limited to span / 180 considering the wall composition.

Positive w_f = 1.4 x 0.70 kPa x 1.6 m = 1.57 kN/m
Negative w_f = 1.4 x 0.60 kPa x 1.6 m = 1.34 kN/m
$M_f^+ = 1.57 \text{ kN/m} \times (7.5 \text{ m})^2 / 8 = 11.04 \text{ kN·m}$
$M_f^- = 1.34 \text{ kN/m} \times (7.5 \text{ m})^2 / 8 = 9.45 \text{ kN·m}$
$V_f = 1.57 \text{ kN/m} \times 7.5 \text{ m} / 2 = 5.89 \text{ kN}$

$$I_{min.} \text{ (deflection < span / 180)} = \frac{180 \times 5 \times 0.75 \times 1.12 \text{ kN/m} \times (7{,}500 \text{ mm})^3}{384 \times 203{,}000 \text{ MPa}}$$

$I_{min.} = 4.1 \times 10^6 \text{ mm}^4$

The Properties table lists many sections with a value of I_x greater than $I_{min.}$
203S70-254M $I_x = 6.19 \times 10^6 \text{ mm}^4$
229S89-181M $I_x = 6.73 \times 10^6 \text{ mm}^4$
254S89-144M $I_x = 6.77 \times 10^6 \text{ mm}^4$

The sections can be verified with the use of the selection tables:
$M_r^+ = M_r$ @ 0 m > M_f^+
M_r^- = min. (M_r flexural-torsional @ 2.5m, M_r distortional buckling) > M_f^-

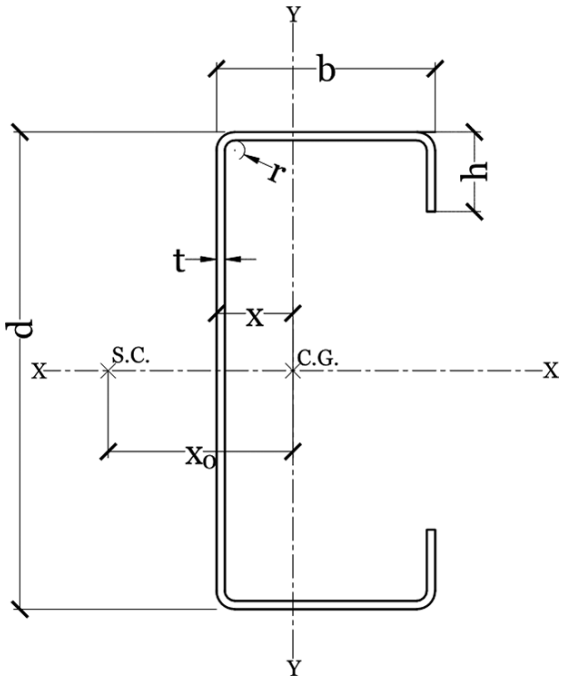
The discrete bracings must be connected to the section according to standard S136-16.
$V_r > V_f$
$P_r > V_f$ except for 254S89-144M

If this section is chosen, the connection to the support must be made by bolting the web in order to prevent web crippling over the support.

Section			Web crippling		Distortional buckling
No.	Nomenclature	V_r kN	B_r ext. kN	B_r int. kN	M_r kN·m
1	152S70-144M	19.4	6.0	10.8	6.27
2	152S70-181M	33.7	9.0	16.9	8.40
3	152S70-218M	48.5	12.7	24.3	10.60
4	152S70-254M	60.3	16.8	33.0	12.82
5	152S70-290M	68.5	21.5	43.0	14.49
6	152S70-326M	76.5	26.7	54.2	16.11
7	203S70-144M	14.3	5.7	10.6	8.63
8	203S70-181M	28.1	8.7	16.6	11.64
9	203S70-218M	48.5	12.3	24.0	14.80
10	203S70-254M	66.1	16.4	32.6	18.04
11	203S70-290M	86.3	20.9	42.4	21.32
12	203S70-326M	107.8	26.0	53.5	23.82
13	229S89-181M	24.9	8.6	16.5	14.07
14	229S89-218M	43.1	12.1	23.8	18.02
15	229S89-254M	66.1	16.1	32.4	22.14
16	229S89-290M	86.3	20.7	42.2	26.39
17	229S89-326M	109.2	25.7	53.3	30.72
18	254S89-144M	11.4	5.5	10.4	11.56
19	254S89-181M	22.3	8.5	16.4	15.76
20	254S89-218M	38.6	11.9	23.7	20.23
21	254S89-254M	61.5	15.9	32.2	24.92
22	254S89-290M	86.3	20.4	42.0	29.76
23	254S89-326M	109.2	25.4	53.0	34.72
24	305S89-181M	18.4	8.2	16.2	19.10
25	305S89-218M	31.9	11.6	23.4	24.63
26	305S89-254M	50.8	15.6	31.9	30.47
27	305S89-290M	76.1	20.0	41.6	36.55
28	305S89-326M	108.6	24.9	52.5	42.81
29	356S89-218M	27.2	11.3	23.2	28.91
30	356S89-254M	43.3	15.2	31.6	35.90
31	356S89-290M	64.8	19.6	41.2	43.23
32	356S89-326M	92.5	24.5	52.1	50.84

Lateral-torsional buckling																	Nomenclature (imperial)
M_r (kN-m) unsupported length (mm)																	
0	1,500	1,800	2,100	2,400	2,700	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	
6.84	6.84	6.61	6.30	5.95	5.54	5.07	4.16	3.27	2.62	2.16	1.81	1.55	1.34	1.18	1.05	0.94	600S275-57
8.90	8.90	8.66	8.34	7.84	7.28	6.58	5.29	4.13	3.33	2.76	2.33	2.01	1.75	1.55	1.39	1.25	600S275-71
11.13	11.13	10.67	10.08	9.41	8.67	7.86	6.38	5.02	4.08	3.40	2.90	2.52	2.21	1.97	1.78	1.61	600S275-86
12.83	12.83	12.30	11.62	10.87	10.04	9.14	7.51	5.96	4.88	4.10	3.52	3.08	2.73	2.44	2.21	2.02	600S275-100
14.49	14.49	13.89	13.14	12.31	11.40	10.42	8.67	6.96	5.75	4.86	4.20	3.70	3.29	2.97	2.70	2.48	600S275-114
16.11	16.11	15.45	14.63	13.73	12.76	11.72	9.87	8.03	6.67	5.69	4.95	4.37	3.91	3.54	3.24	2.98	600S275-128
10.11	10.11	9.69	9.20	8.63	7.97	7.22	5.77	4.49	3.58	2.93	2.45	2.08	1.80	1.57	1.39	1.24	800S275-57
13.11	13.10	12.67	12.12	11.33	10.40	9.28	7.23	5.60	4.49	3.70	3.11	2.66	2.31	2.03	1.80	1.62	800S275-71
16.37	16.34	15.54	14.61	13.54	12.36	11.05	8.66	6.75	5.44	4.50	3.81	3.28	2.86	2.53	2.26	2.04	800S275-86
18.91	18.86	17.93	16.86	15.64	14.29	12.82	10.12	7.93	6.43	5.36	4.56	3.94	3.46	3.08	2.77	2.51	800S275-100
21.39	21.32	20.28	19.07	17.71	16.21	14.58	11.61	9.16	7.48	6.27	5.36	4.67	4.12	3.69	3.33	3.03	800S275-114
23.82	23.73	22.57	21.24	19.75	18.11	16.35	13.16	10.45	8.58	7.23	6.23	5.45	4.84	4.35	3.94	3.61	800S275-128
16.26	16.26	16.26	15.79	15.21	14.54	13.79	12.34	10.62	8.81	7.20	6.01	5.10	4.39	3.83	3.38	3.01	900S350-71
19.66	19.66	19.66	19.08	18.36	17.54	16.68	15.25	13.17	10.57	8.67	7.26	6.19	5.35	4.69	4.15	3.71	900S350-86
23.61	23.61	23.61	23.01	22.28	21.46	20.29	18.13	15.33	12.36	10.18	8.56	7.32	6.36	5.60	4.98	4.47	900S350-100
27.91	27.91	27.91	26.98	25.91	24.72	23.44	20.79	17.50	14.19	11.73	9.91	8.52	7.44	6.57	5.87	5.29	900S350-114
31.58	31.58	31.58	30.57	29.43	28.18	26.50	23.28	19.71	16.08	13.35	11.33	9.79	8.58	7.61	6.83	6.18	900S350-128
13.41	13.41	13.41	13.11	12.74	12.32	11.84	10.91	9.37	7.68	6.42	5.42	4.58	3.93	3.41	2.99	2.65	1000S350-57
18.73	18.73	18.73	18.22	17.52	16.73	15.84	14.13	12.09	9.97	8.13	6.78	5.75	4.94	4.30	3.79	3.37	1000S350-71
22.71	22.71	22.71	21.99	21.13	20.16	19.15	17.44	14.91	11.93	9.76	8.16	6.94	5.99	5.24	4.63	4.13	1000S350-86
27.23	27.23	27.23	26.48	25.61	24.63	23.24	20.69	17.33	13.91	11.43	9.59	8.19	7.10	6.23	5.53	4.95	1000S350-100
32.15	32.15	32.14	31.02	29.75	28.36	26.85	23.67	19.76	15.93	13.14	11.07	9.49	8.26	7.28	6.48	5.83	1000S350-114
36.39	36.39	36.36	35.15	33.80	32.33	30.31	26.48	22.21	17.99	14.90	12.60	10.85	9.48	8.39	7.50	6.77	1000S350-128
22.21	22.21	22.20	21.72	21.15	20.50	19.76	17.91	15.16	12.38	10.09	8.39	7.10	6.09	5.29	4.65	4.12	1200S350-71
29.26	29.26	29.22	28.23	27.08	25.77	24.43	22.08	18.55	14.77	12.07	10.06	8.53	7.35	6.40	5.64	5.02	1200S350-86
35.01	35.01	34.94	33.92	32.73	31.36	29.51	26.11	21.51	17.17	14.06	11.76	10.01	8.64	7.55	6.68	5.96	1200S350-100
41.26	41.26	41.14	39.65	37.96	36.10	34.07	29.72	24.45	19.58	16.09	13.49	11.52	9.98	8.76	7.77	6.96	1200S350-114
46.71	46.71	46.54	44.93	43.13	41.15	38.38	33.21	27.41	22.02	18.15	15.28	13.09	11.39	10.03	8.93	8.02	1200S350-128
33.72	33.72	33.64	32.88	32.00	31.00	30.11	27.01	22.36	17.77	14.49	12.06	10.21	8.77	7.63	6.70	5.95	1400S350-86
43.51	43.51	43.34	42.00	40.45	38.62	36.24	31.87	25.86	20.60	16.83	14.04	11.92	10.27	8.95	7.89	7.03	1400S350-100
51.20	51.20	50.91	49.00	46.84	44.44	41.84	36.14	29.35	23.43	19.19	16.05	13.67	11.81	10.33	9.13	8.15	1400S350-114
57.95	57.95	57.59	55.52	53.20	50.57	47.01	40.34	32.82	26.27	21.58	18.10	15.46	13.39	11.75	10.43	9.34	1400S350-128

C SECTION PROPERTIES



Dimensions

d = section depth
b = flange width
h = lip length
t = steel thickness
C.G. = center of gravity
S.C. = shear center
r = inside bend radius = 0.13 in.

Properties

I_x eff. = effective moment of inertia about axis X-X at maximum compressive stress = 0.6 F_y
S_x eff. = effective elastic section modulus about axis X-X
r_x = radius of gyration about axis X-X
I_y = gross moment of inertia about axis Y-Y
S_y eff. = effective elastic section modulus about axis Y-Y
r_y = radius of gyration about axis Y-Y
J = St. Venant torsion constant
C_w = warping constant
A_g = gross area of section
x = distance from exterior fiber of web to center of gravity
x_o = distance from shear center to center of gravity

Example

600S275-57
600 = section depth (10^{-2} in.)
S = nomenclature
275 = flange width (10^{-2} in.)
57 = minimum steel thickness, i.e. 95% of the design thickness (10^{-3} in.)

Section			Dimension					Property										
No.	Nomenclature	Former Nomenclature	d	b	h	t	Gage	I_x eff.	S_x eff.	r_x	I_y	S_y eff.	r_y	J	C_w	A_g	x	x_o
			in.	in.	in.	in.		$in.^4$	$in.^3$	in.	$in.^4$	$in.^3$	in.	$x10^{-3}$ $in.^4$	$in.^6$	$in.^2$	in.	in.
1	600S275-57	C6x2.9	6.00	2.75	1.00	0.060	16	4.41	1.35	2.40	0.89	0.46	1.07	0.94	7.58	0.78	0.96	2.33
2	600S275-71	C6x3.5	6.00	2.75	1.00	0.075	14	5.54	1.75	2.39	1.09	0.58	1.06	1.82	9.23	0.97	0.96	2.32
3	600S275-86	C6x4.0	6.00	2.75	1.00	0.090	13	6.57	2.19	2.38	1.28	0.69	1.05	3.12	10.78	1.16	0.96	2.30
4	600S275-100	C6x4.7	6.00	2.75	1.00	0.105	12	7.57	2.52	2.38	1.47	0.81	1.05	4.93	12.25	1.34	0.96	2.28
5	600S275-114	C6x5.6	6.00	2.75	1.00	0.120	11	8.55	2.85	2.37	1.65	0.92	1.04	7.32	13.62	1.52	0.96	2.26
6	600S275-128	C6x6.0	6.00	2.75	1.00	0.135	10	9.50	3.17	2.36	1.82	1.02	1.03	10.36	14.91	1.70	0.96	2.25
7	800S275-57	C8x3.4	8.00	2.75	1.00	0.060	16	8.63	1.99	3.12	0.98	0.46	1.04	1.08	13.42	0.90	0.84	2.10
8	800S275-71	C8x4.0	8.00	2.75	1.00	0.075	14	10.84	2.58	3.11	1.20	0.58	1.04	2.10	16.37	1.12	0.84	2.08
9	800S275-86	C8x4.7	8.00	2.75	1.00	0.090	13	12.88	3.22	3.10	1.41	0.70	1.03	3.61	19.17	1.34	0.84	2.07
10	800S275-100	C8x5.4	8.00	2.75	1.00	0.105	12	14.87	3.72	3.10	1.62	0.82	1.02	5.70	21.82	1.55	0.84	2.05
11	800S275-114	C8x6.1	8.00	2.75	1.00	0.120	11	16.83	4.21	3.09	1.81	0.93	1.01	8.47	24.32	1.76	0.84	2.03
12	800S275-128	C8x7.1	8.00	2.75	1.00	0.135	10	18.74	4.69	3.08	2.00	1.04	1.01	12.00	26.69	1.97	0.84	2.01
13	900S350-71	C9x4.6	9.00	3.50	1.00	0.075	14	16.16	3.20	3.56	2.21	0.82	1.30	2.45	36.57	1.31	1.06	2.62
14	900S350-86	C9x5.4	9.00	3.50	1.00	0.090	13	19.69	3.87	3.55	2.61	1.00	1.29	4.22	42.99	1.56	1.06	2.61
15	900S350-100	C9x6.3	9.00	3.50	1.00	0.105	12	22.78	4.64	3.54	3.00	1.17	1.29	6.67	49.14	1.81	1.06	2.59
16	900S350-114	C9x7.2	9.00	3.50	1.00	0.120	11	25.81	5.49	3.54	3.37	1.34	1.28	9.91	55.00	2.06	1.06	2.57
17	900S350-128	C9x8.0	9.00	3.50	1.00	0.135	10	28.79	6.21	3.53	3.74	1.50	1.27	14.05	60.60	2.31	1.06	2.55
18	1000S350-57	C10x3.8	10.00	3.50	1.00	0.060	16	16.25	2.64	3.92	1.85	0.64	1.29	1.33	37.36	1.11	1.01	2.53
19	1000S350-71	C10x4.7	10.00	3.50	1.00	0.075	14	20.66	3.68	3.91	2.28	0.82	1.29	2.59	45.78	1.38	1.01	2.52
20	1000S350-86	C10x5.8	10.00	3.50	1.00	0.090	13	25.18	4.47	3.90	2.70	1.00	1.28	4.46	53.86	1.65	1.01	2.50
21	1000S350-100	C10x6.7	10.00	3.50	1.00	0.105	12	29.14	5.36	3.90	3.10	1.17	1.27	7.05	61.59	1.92	1.01	2.48
22	1000S350-114	C10x7.6	10.00	3.50	1.00	0.120	11	33.03	6.32	3.89	3.49	1.34	1.26	10.48	68.98	2.18	1.01	2.47
23	1000S350-128	C10x8.5	10.00	3.50	1.00	0.135	10	36.86	7.16	3.88	3.87	1.51	1.26	14.87	76.05	2.45	1.01	2.45
24	1200S350-71	C12x5.4	12.00	3.50	1.00	0.075	14	31.72	4.37	4.60	2.41	0.82	1.25	2.87	68.07	1.53	0.91	2.33
25	1200S350-86	C12x6.4	12.00	3.50	1.00	0.090	13	38.66	5.76	4.60	2.85	1.00	1.25	4.94	80.15	1.83	0.91	2.32
26	1200S350-100	C12x7.4	12.00	3.50	1.00	0.105	12	44.78	6.89	4.59	3.27	1.18	1.24	7.82	91.74	2.13	0.91	2.30
27	1200S350-114	C12x8.4	12.00	3.50	1.00	0.120	11	50.80	8.12	4.58	3.68	1.35	1.23	11.64	102.86	2.42	0.91	2.28
28	1200S350-128	C12x9.4	12.00	3.50	1.00	0.135	10	56.73	9.19	4.57	4.08	1.52	1.23	16.51	113.51	2.72	0.91	2.27
29	1400S350-86	C14x7.0	14.00	3.50	1.00	0.090	13	55.80	6.63	5.27	2.97	1.01	1.22	5.43	112.83	2.01	0.83	2.16
30	1400S350-100	C14x8.1	14.00	3.50	1.00	0.105	12	64.69	8.56	5.26	3.41	1.18	1.21	8.60	129.24	2.34	0.84	2.15
31	1400S350-114	C14x9.3	14.00	3.50	1.00	0.120	11	73.43	10.07	5.25	3.84	1.36	1.20	12.79	145.00	2.66	0.84	2.13
32	1400S350-128	C14x10.4	14.00	3.50	1.00	0.135	10	82.04	11.40	5.24	4.26	1.53	1.19	18.15	160.11	2.99	0.84	2.11

SELECTION TABLE

Resistance

F_y = steel yield strength = 50 ksi
V_r = factored shear strength
B_r int. = factored web crippling strength with 4 in. of interior support
B_r ext.= factored web crippling strength with 4 in. of exterior support
M_r = factored moment resistance considering lateral and distortional buckling

Design assumptions

- The values in the table have been calculated according to Limit States Design (LSD) and CSA S136-16 standard for cold-formed steel.
- Shaded M_r values indicates that distortional buckling may govern the design for the given section if the compression flange is not restrained against distortional buckling.
- The design engineer shall determine the cases when distortional buckling is applicable.
- Rotational rigidity of the sheathing is neglected ($k\phi = 0$) and moment gradient factor has been conservatively set to 1 (ß= 1) for the calculation of the distortional buckling resistance.
- The web crippling resistance is calculated with one flange loading condition.
- The shear resistance is taken as the minimum between the elastic resistance (F_y) of the gross section and the plastic resistance (F_u) of the net section.
- The net section for shear is taken with:
  - 2 bolt holes of 9/16 in. diameter for section depth d < 8 in.
  - 3 bolt holes of 9/16 in. diameter for section depth d ≥ 8 in.

Example – Wall girt selection

Single span: 25 ft.
Girt spacing: 5 ft.
Positive external wind pressure: 8.0 + 6.6 = 14.6 psf
Negative external wind pressure: 5.9 + 6.6 = 12.5 psf
Two rows of discrete bracing are used to prevent the section from buckling at a third of the span.
Metal siding is fixed to the exterior flange at 12 in. c/c. The cladding is considered to prevent distortional buckling and lateral-torsional buckling.
Deflections are limited to span / 180 considering the wall composition.

Positive w_f = 1.4 x 14.6 psf x 5.0 ft. = 102 lb./ft.
Negative w_f = 1.4 x 12.5 psf x 5.0 ft. = 88 lb./ft.
M_f^+ = 0.102 kip/ft. x (25 ft.)^2 / 8 = 8.0 kip•ft.
M_f^- = 0.088 kip/ft. x (25 ft.)^2 / 8 = 6.9 kip•ft.
V_f = 0.102 kip/ft. x 25 ft. / 2 = 1.28 kip

$$I_{min.} \text{ (deflection < span / 180)} = \frac{180 \times 5 \times 0.75 \times 0.073 \text{ kip/ft.} \times (25 \text{ ft.})^3 \times 144}{384 \times 29{,}500 \text{ ksi}}$$

$I_{min.}$ = 9.8 in.^{4}

The Properties table lists many sections with a value of I_x greater than $I_{min.}$
800S275-71 I_x = 10.84 in.^{4}
900S350-71 I_x = 16.16 in.^{4}
1000S350-57 I_x = 16.25 in.^{4}

The sections can be verified with the use of the selection tables:
M_r^+ = M_r @ 0 ft. > M_f^+
M_r^- = min. (M_r flexural-torsional @ 8 ft.-4 in., M_r distortional) > M_f^-

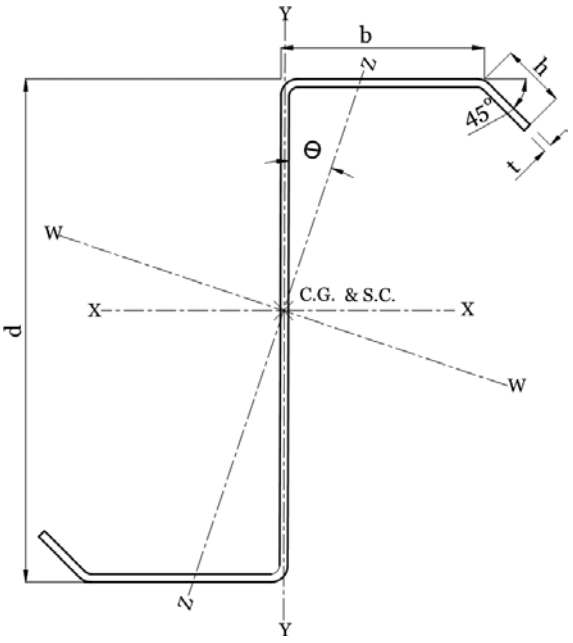
The discrete bracings must be connected to the section according to standard S136-16.
$V_r > V_f$
$P_r > V_f$ except for 1000S350-57

If this section is chosen, the connection to the support must be made by bolting the web in order to prevent web crippling over the support.

Section			Web crippling		Distortional buckling
No.	Nomenclature	V_r kip	B_r ext. kip	B_r int. kip	M_r kip-ft.
1	600S275-57	4.37	1.34	2.42	4.62
2	600S275-71	7.58	2.03	3.80	6.19
3	600S275-86	10.91	2.85	5.47	7.82
4	600S275-100	13.56	3.78	7.42	9.46
5	600S275-114	15.39	4.83	9.66	10.69
6	600S275-128	17.20	6.00	12.17	11.88
7	800S275-57	3.22	1.29	2.38	6.36
8	800S275-71	6.32	1.96	3.74	8.59
9	800S275-86	10.91	2.76	5.39	10.92
10	800S275-100	14.85	3.68	7.33	13.31
11	800S275-114	19.40	4.71	9.54	15.73
12	800S275-128	24.24	5.85	12.04	17.57
13	900S350-71	5.59	1.93	3.71	10.37
14	900S350-86	9.69	2.72	5.36	13.29
15	900S350-100	14.85	3.63	7.28	16.33
16	900S350-114	19.40	4.65	9.49	19.46
17	900S350-128	24.55	5.78	11.97	22.66
18	1000S350-57	2.55	1.24	2.34	8.53
19	1000S350-71	5.01	1.90	3.69	11.62
20	1000S350-86	8.68	2.68	5.32	14.92
21	1000S350-100	13.82	3.58	7.24	18.38
22	1000S350-114	19.40	4.60	9.44	21.95
23	1000S350-128	24.55	5.72	11.91	25.61
24	1200S350-71	4.14	1.85	3.64	14.09
25	1200S350-86	7.18	2.61	5.26	18.17
26	1200S350-100	11.43	3.50	7.17	22.47
27	1200S350-114	17.10	4.50	9.35	26.96
28	1200S350-128	24.41	5.60	11.80	31.58
29	1400S350-86	6.12	2.55	5.21	21.32
30	1400S350-100	9.74	3.42	7.10	26.48
31	1400S350-114	14.57	4.41	9.26	31.89
32	1400S350-128	20.79	5.50	11.70	37.50

Lateral-torsional buckling																	Nomenclature (metric)
M_r (kip-ft.) unsupported length (ft.)																	
0	5	6	7	8	9	10	11	12	13	14	15	16	18	20	22	24	
5.05	5.05	4.86	4.62	4.35	4.04	3.68	3.28	2.85	2.46	2.14	1.88	1.67	1.34	1.11	0.94	0.81	152S70-144M
6.56	6.56	6.37	6.11	5.74	5.30	4.77	4.19	3.59	3.10	2.70	2.39	2.13	1.73	1.44	1.23	1.07	152S70-181M
8.21	8.21	7.83	7.38	6.87	6.31	5.70	5.04	4.35	3.76	3.30	2.93	2.62	2.15	1.81	1.56	1.36	152S70-218M
9.46	9.46	9.03	8.51	7.94	7.31	6.63	5.90	5.14	4.47	3.94	3.51	3.15	2.61	2.22	1.92	1.69	152S70-254M
10.69	10.69	10.20	9.63	9.00	8.31	7.57	6.79	5.97	5.22	4.62	4.13	3.73	3.11	2.66	2.32	2.06	152S70-290M
11.88	11.88	11.34	10.72	10.04	9.30	8.52	7.69	6.84	6.01	5.35	4.80	4.35	3.66	3.15	2.77	2.47	152S70-326M
7.46	7.43	7.12	6.74	6.31	5.81	5.23	4.58	3.93	3.37	2.92	2.56	2.26	1.81	1.49	1.25	1.07	203S70-144M
9.67	9.63	9.32	8.88	8.27	7.56	6.71	5.78	4.90	4.21	3.66	3.22	2.85	2.30	1.90	1.61	1.39	203S70-181M
12.07	12.01	11.40	10.69	9.88	8.98	7.99	6.92	5.88	5.07	4.42	3.90	3.47	2.82	2.35	2.00	1.74	203S70-218M
13.95	13.86	13.16	12.34	11.42	10.39	9.27	8.06	6.88	5.95	5.21	4.62	4.12	3.38	2.83	2.43	2.12	203S70-254M
15.78	15.67	14.88	13.96	12.93	11.79	10.55	9.23	7.92	6.87	6.04	5.37	4.82	3.97	3.36	2.90	2.55	203S70-290M
17.57	17.44	16.56	15.55	14.42	13.18	11.84	10.42	8.99	7.83	6.91	6.17	5.55	4.61	3.93	3.41	3.01	203S70-326M
11.99	11.99	11.99	11.60	11.16	10.65	10.08	9.44	8.73	7.94	7.20	6.31	5.57	4.45	3.65	3.06	2.61	229S89-181M
14.50	14.50	14.49	14.01	13.47	12.84	12.21	11.57	10.84	9.86	8.62	7.57	6.70	5.38	4.43	3.73	3.20	229S89-218M
17.42	17.42	17.39	16.91	16.36	15.72	14.82	13.86	12.83	11.48	10.06	8.85	7.86	6.34	5.25	4.45	3.83	229S89-254M
20.58	20.58	20.54	19.82	19.00	18.10	17.13	16.00	14.60	13.10	11.53	10.17	9.05	7.34	6.12	5.21	4.51	229S89-290M
23.30	23.30	23.24	22.46	21.59	20.65	19.33	17.90	16.37	14.74	13.04	11.53	10.29	8.39	7.03	6.02	5.24	229S89-326M
9.89	9.89	9.88	9.64	9.36	9.04	8.67	8.26	7.79	7.01	6.20	5.52	4.94	4.02	3.28	2.73	2.31	254S89-144M
13.81	13.81	13.80	13.38	12.86	12.25	11.57	10.82	9.97	9.04	8.15	7.13	6.29	5.02	4.11	3.44	2.93	254S89-181M
16.75	16.75	16.71	16.15	15.50	14.76	14.01	13.25	12.35	11.18	9.74	8.54	7.55	6.05	4.97	4.18	3.57	254S89-218M
20.09	20.09	20.04	19.46	18.80	18.03	16.97	15.84	14.59	12.99	11.34	9.96	8.83	7.11	5.87	4.95	4.26	254S89-254M
23.72	23.72	23.63	22.78	21.82	20.76	19.62	18.25	16.58	14.80	12.96	11.41	10.14	8.20	6.81	5.77	4.98	254S89-290M
26.84	26.84	26.74	25.82	24.80	23.67	22.10	20.40	18.57	16.63	14.62	12.90	11.49	9.34	7.79	6.64	5.76	254S89-326M
16.38	16.38	16.34	15.98	15.54	15.05	14.48	13.74	12.61	11.35	10.13	8.86	7.81	6.22	5.08	4.23	3.59	305S89-181M
21.58	21.58	21.49	20.73	19.86	18.86	17.86	16.82	15.55	13.93	12.08	10.57	9.34	7.46	6.11	5.11	4.35	305S89-218M
25.82	25.82	25.71	24.92	24.03	22.94	21.53	20.02	18.28	16.14	14.02	12.29	10.87	8.71	7.17	6.02	5.15	305S89-254M
30.44	30.44	30.24	29.11	27.83	26.42	24.89	22.99	20.75	18.34	15.96	14.02	12.43	10.00	8.26	6.97	5.98	305S89-290M
34.45	34.45	34.22	33.00	31.63	30.07	27.96	25.67	23.20	20.56	17.93	15.77	14.01	11.32	9.39	7.96	6.87	305S89-326M
24.87	24.87	24.76	24.19	23.51	22.75	22.02	20.65	18.95	16.80	14.53	12.71	11.21	8.93	7.30	6.10	5.18	356S89-218M
32.10	32.10	31.88	30.86	29.68	28.24	26.43	24.49	22.18	19.43	16.83	14.74	13.02	10.41	8.53	7.15	6.09	356S89-254M
37.76	37.76	37.43	35.98	34.33	32.51	30.54	28.02	25.14	22.04	19.12	16.77	14.84	11.90	9.79	8.23	7.04	356S89-290M
42.74	42.74	42.34	40.77	39.01	36.94	34.23	31.27	28.08	24.65	21.42	18.81	16.67	13.41	11.08	9.35	8.03	356S89-326M

Z SECTION PROPERTIES



Dimensions

d = section depth
b = flange width
h = lip length
t = steel thickness
C.G. = center of gravity
S.C. = shear center
r = inside bend radius = 3.2 mm

Properties

I_x eff. = effective moment of inertia about axis X-X at maximum compressive stress = 0.6 F_y
S_x eff. = effective elastic section modulus about axis X-X
r_x = radius of gyration about axis X-X
I_y = gross moment of inertia about axis Y-Y
S_y eff. = effective elastic section modulus about axis Y-Y
r_y = radius of gyration about axis Y-Y
$r_{min.}$ = radius of gyration about axis Z-Z
J = St. Venant torsion constant
C_w = warping constant
A_g = gross area of section
Θ = angle between axis Z-Z and Y-Y

Example

152Z76-144M
152 = section depth (mm)
Z = nomenclature
76 = flange width (mm)
144 = minimum steel thickness, i.e. 95% of the design thickness (10^{-2} mm)
M = International System of Units (SI) designation (metric)

Section			Dimension					Property										
No.	Nomenclature	Former Nomenclature	d mm	b mm	h mm	t mm	Gage	I_x eff. x 10^6 mm^4	S_x eff. x 10^3 mm^3	r_x mm	I_y x 10^6 mm^4	S_y eff. x 10^3 mm^3	r_y mm	$r_{min.}$ mm	J mm^4	C_w x 10^9 mm^6	A_g mm^2	θ deg,
1	152Z76-144M	Z152x4.5	152.4	76.2	24.1	1.52	16	1.96	21.97	62.20	0.94	8.27	42.18	23.87	407	3.44	526	31.19
2	152Z76-181M	Z152x5.4	152.4	76.2	24.1	1.91	14	2.50	28.00	62.03	1.16	9.71	42.03	23.78	792	4.23	655	31.17
3	152Z76-218M	Z152x6.4	152.4	76.2	24.1	2.29	13	3.00	34.54	61.86	1.37	12.92	41.88	23.69	1,364	5.00	783	31.15
4	152Z76-253M	Z152x7.6	152.4	76.2	24.1	2.67	12	3.46	42.80	61.69	1.58	16.56	41.73	23.60	2,158	5.74	910	31.13
5	152Z76-290M	Z152x8.6	152.4	76.2	24.1	3.05	11	3.92	49.77	61.52	1.79	19.54	41.59	23.52	3,209	6.45	1,036	31.11
6	152Z76-326M	Z152x9.7	152.4	76.2	24.1	3.43	10	4.37	57.36	61.35	1.99	21.79	41.44	23.43	4,552	7.14	1,161	31.08
7	203Z76-144M	Z203x5.1	203.2	76.2	24.1	1.52	16	3.80	31.85	80.75	0.94	8.33	39.38	24.72	467	6.51	603	21.74
8	203Z76-181M	Z203x6.3	203.2	76.2	24.1	1.91	14	4.84	41.12	80.57	1.16	9.79	39.23	24.62	909	8.01	752	21.71
9	203Z76-218M	Z203x7.3	203.2	76.2	24.1	2.29	13	5.81	50.58	80.39	1.37	12.98	39.08	24.53	1,566	9.48	899	21.67
10	203Z76-254M	Z203x8.8	203.2	76.2	24.1	2.67	12	6.73	62.41	80.22	1.59	16.58	38.94	24.44	2,479	10.89	1,045	21.64
11	203Z76-290M	Z203x10	203.2	76.2	24.1	3.05	11	7.63	72.57	80.04	1.79	19.54	38.79	24.35	3,688	12.27	1,191	21.60
12	203Z76-326M	Z203x11.2	203.2	76.2	24.1	3.43	10	8.52	83.84	79.86	1.99	21.79	38.64	24.26	5,234	13.60	1,336	21.57
13	229Z76-181M	Z229x6.6	228.6	76.2	24.1	1.91	14	6.36	48.31	89.55	1.16	9.83	38.03	24.69	968	10.41	800	18.57
14	229Z76-218M	Z229x7.7	228.6	76.2	24.1	2.29	13	7.64	59.37	89.37	1.37	13.00	37.88	24.60	1,667	12.32	957	18.54
15	229Z76-254M	Z229x9.2	228.6	76.2	24.1	2.67	12	8.85	73.10	89.18	1.59	16.59	37.73	24.51	2,639	14.17	1,113	18.50
16	229Z76-290M	Z229x10.6	228.6	76.2	24.1	3.05	11	10.05	84.97	89.00	1.79	19.54	37.59	24.42	3,928	15.97	1,268	18.46
17	229Z76-326M	Z229x11.9	228.6	76.2	24.1	3.43	10	11.22	98.20	88.82	1.99	21.79	37.44	24.33	5,576	17.71	1,423	18.43
18	254Z76-181M	Z254x6.8	254.0	76.2	24.1	1.91	14	8.14	55.54	98.37	1.16	9.86	36.93	24.64	1,026	13.16	848	16.11
19	254Z76-218M	Z254x8.2	254.0	76.2	24.1	2.29	13	9.79	68.66	98.18	1.37	13.02	36.78	24.55	1,768	15.57	1,015	16.07
20	254Z76-254M	Z254x9.8	254.0	76.2	24.1	2.67	12	11.34	84.36	97.99	1.59	16.59	36.64	24.46	2,800	17.92	1,181	16.04
21	254Z76-290M	Z254x11.2	254.0	76.2	24.1	3.05	11	12.87	98.04	97.81	1.79	19.54	36.49	24.36	4,168	20.20	1,346	16.00
22	254Z76-326M	Z254x12.5	254.0	76.2	24.1	3.43	10	14.39	113.30	97.62	1.99	21.79	36.35	24.27	5,917	22.41	1,510	15.97
23	305Z76-181M	Z305x7.7	304.8	76.2	24.1	1.91	14	12.53	65.64	115.61	1.16	9.90	34.99	24.36	1,143	19.70	945	12.53
24	305Z76-218M	Z305x9.2	304.8	76.2	24.1	2.29	13	15.07	88.74	115.42	1.37	13.05	34.84	24.26	1,971	23.34	1,131	12.50
25	305Z76-254M	Z305x10.9	304.8	76.2	24.1	2.67	12	17.48	108.64	115.22	1.59	16.61	34.70	24.17	3,121	26.87	1,316	12.46
26	305Z76-290M	Z305x12.4	304.8	76.2	24.1	3.05	11	19.86	126.15	115.03	1.79	19.54	34.56	24.08	4,647	30.31	1,501	12.43
27	305Z76-326M	Z305x14	304.8	76.2	24.1	3.43	10	22.21	145.71	114.84	1.99	21.79	34.42	23.99	6,600	33.65	1,684	12.40
28	356Z76-181M	Z356x8.5	355.6	76.2	24.1	1.91	14	17.05	71.78	132.44	1.16	9.94	33.32	23.96	1,260	27.68	1,042	10.08
29	356Z76-218M	Z356x10.1	355.6	76.2	24.1	2.29	13	20.99	93.19	132.24	1.37	13.07	33.18	23.86	2,173	32.80	1,247	10.05
30	356Z76-254M	Z356x11.9	355.6	76.2	24.1	2.67	12	24.75	120.34	132.04	1.59	16.62	33.04	23.77	3,442	37.78	1,452	10.02
31	356Z76-290M	Z356x13.6	355.6	76.2	24.1	3.05	11	28.50	144.94	131.84	1.79	19.54	32.90	23.68	5,127	42.62	1,655	9.99
32	356Z76-326M	Z356x15.4	355.6	76.2	24.1	3.43	10	32.20	172.77	131.64	1.99	21.80	32.77	23.58	7,283	47.34	1,858	9.96

SELECTION TABLE

Resistance

F_y = steel yield strength = 345 MPa
V_r = factored shear strength
B_r int. = factored web crippling strength with 102 mm of interior support
B_r ext.= factored web crippling strength with 102 mm of exterior support
M_r = factored moment resistance considering lateral and distortional buckling

Design assumptions

- The values in the table have been calculated according to Limit States Design (LSD) and CSA S136-16 standard for cold-formed steel.
- Shaded M_r values indicates that distortional buckling may govern the design for the given section if the compression flange is not restrained against distortional buckling.
- The design engineer shall determine the cases when distortional buckling is applicable.
- Rotational rigidity of the sheathing is neglected ($k\phi = 0$) and moment gradient factor has been conservatively set to 1 (ß= 1) for the calculation of the distortional buckling resistance.
- The web crippling resistance is calculated with one flange loading condition.
- The shear resistance is taken as the minimum between the elastic resistance (F_y) of the gross section and the plastic resistance (F_u) of the net section.
- The net section for shear is taken with:
  - 2 bolt holes of 14 mm diameter for section depth d < 203 mm
  - 3 bolt holes of 14 mm diameter for section depth d ≥ 203 mm

Example – Wall girt selection

Single span: 7,500 mm
Girt spacing: 1,600 mm
Positive external wind pressure: 0.38 + 0.32 = 0.70 kPa
Negative external wind pressure: 0.28 + 0.32 = 0.60 kPa
Two rows of discrete bracing are used to prevent the section from buckling at a third of the span.
Metal siding is fixed to the exterior flange at 300 mm c/c. The cladding is considered to prevent distortional buckling and lateral-torsional buckling.
Deflections are limited to span / 180 considering the wall composition.

Positive w_f = 1.4 x 0.70 kPa x 1.6 m = 1.57 kN/m
Negative w_f = 1.4 x 0.60 kPa x 1.6 m = 1.34 kN/m
M_f^+ = 1.57 kN/m x (7.5 m)^2 / 8 = 11.04 kN•m
M_f^- = 1.34 kN/m x (7.5 m)^2 / 8 = 9.45 kN•m
V_f = 1.57 kN/m x 7.5 m / 2 = 5.89 kN

$$I_{min.} \text{ (deflection < span / 180)} = \frac{180 \times 5 \times 0.75 \times 1.12 \text{ kN/m} \times (7{,}500 \text{ mm})^3}{384 \times 203{,}000 \text{ MPa}}$$

$I_{min.} = 4.1 \times 10^6$ mm^4

The Properties table lists many sections with a value of I_x greater than $I_{min.}$
203Z76-181M $I_x = 4.84 \times 10^6$ mm^4
229Z76-181M $I_x = 6.36 \times 10^6$ mm^4
254Z76-181M $I_x = 8.14 \times 10^6$ mm^4

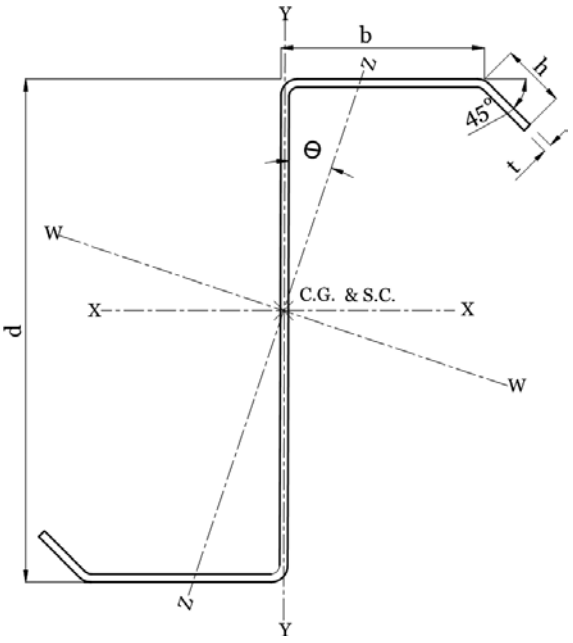
The sections can be verified with the use of the selection tables:
$M_r^+ = M_r$ @ 0 m > M_f^+
M_r^- = min. (M_r flexural-torsional @ 2.5m, M_r distortional buckling) > M_f^-

The discrete bracings must be connected to the section according to standard S136-16.
$V_r > V_f$
$P_r > V_f$

Section			Web crippling		Distortional buckling
No.	Nomenclature	V_r kN	B_r ext. kN	B_r int. kN	M_r kN·m
1	152Z76-144M	19.4	6.0	10.8	5.48
2	152Z76-181M	33.7	9.0	16.9	7.49
3	152Z76-218M	48.5	12.7	24.3	9.64
4	152Z76-253M	60.3	16.8	33.0	11.89
5	152Z76-290M	68.5	21.5	43.0	14.23
6	152Z76-326M	76.5	26.7	54.2	16.62
7	203Z76-144M	14.3	5.7	10.6	7.46
8	203Z76-181M	28.1	8.7	16.6	10.26
9	203Z76-218M	48.5	12.3	24.0	13.29
10	203Z76-254M	66.1	16.4	32.6	16.49
11	203Z76-290M	86.3	20.9	42.4	19.84
12	203Z76-326M	107.8	26.0	53.5	23.31
13	229Z76-181M	24.9	8.6	16.5	11.67
14	229Z76-218M	43.1	12.1	23.8	15.15
15	229Z76-254M	66.1	16.1	32.4	18.85
16	229Z76-290M	86.3	20.7	42.2	22.74
17	229Z76-326M	109.2	25.7	53.3	26.77
18	254Z76-181M	22.3	8.5	16.4	13.07
19	254Z76-218M	38.6	11.9	23.7	17.01
20	254Z76-254M	61.5	15.9	32.2	21.23
21	254Z76-290M	86.3	20.4	42.0	25.66
22	254Z76-326M	109.2	25.4	53.0	30.28
23	305Z76-181M	18.4	8.2	16.2	15.83
24	305Z76-218M	31.9	11.6	23.4	20.72
25	305Z76-254M	50.8	15.6	31.9	25.97
26	305Z76-290M	76.1	20.0	41.6	31.54
27	305Z76-326M	108.6	24.9	52.5	37.39
28	356Z76-181M	15.7	8.0	16.0	18.48
29	356Z76-218M	27.2	11.3	23.2	24.31
30	356Z76-254M	43.3	15.2	31.6	30.61
31	356Z76-290M	64.8	19.6	41.2	37.34
32	356Z76-326M	92.5	24.5	52.1	44.44

Lateral-torsional buckling																	Nomenclature (imperial)
M_r (kN-m) unsupported length (mm)																	
0	1,500	1,800	2,100	2,400	2,700	3,000	3,500	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500	8,000	
6.82	6.81	6.57	6.28	5.94	5.54	5.09	4.17	3.32	2.65	2.16	1.81	1.54	1.33	1.16	1.02	0.91	600Z300-57
8.69	8.68	8.36	7.97	7.51	6.99	6.52	5.38	4.17	3.34	2.75	2.31	1.97	1.71	1.50	1.33	1.20	600Z300-71
10.72	10.71	10.39	10.01	9.58	8.95	8.23	6.49	5.06	4.07	3.37	2.84	2.44	2.13	1.88	1.68	1.51	600Z300-86
13.28	13.27	12.75	12.15	11.48	10.73	9.64	7.63	5.98	4.84	4.03	3.42	2.96	2.59	2.30	2.07	1.87	600Z300-100
15.44	15.43	14.88	14.26	13.31	12.21	11.01	8.81	6.94	5.66	4.73	4.04	3.51	3.10	2.76	2.49	2.27	600Z300-114
17.80	17.79	16.95	15.98	14.89	13.69	12.39	10.04	7.96	6.52	5.48	4.71	4.12	3.65	3.27	2.96	2.71	600Z300-128
9.88	9.85	9.59	9.11	8.56	7.92	7.18	5.73	4.50	3.58	2.92	2.43	2.05	1.76	1.53	1.35	1.20	800Z300-57
12.76	12.68	12.16	11.54	10.80	9.97	9.23	7.29	5.62	4.48	3.67	3.06	2.60	2.24	1.96	1.73	1.54	800Z300-71
15.69	15.61	15.08	14.45	13.73	12.67	11.46	8.74	6.76	5.41	4.44	3.72	3.18	2.75	2.41	2.14	1.91	800Z300-86
19.36	19.24	18.41	17.46	16.40	15.07	13.32	10.20	7.93	6.36	5.25	4.42	3.79	3.29	2.90	2.58	2.32	800Z300-100
22.52	22.37	21.50	20.51	18.91	17.13	15.18	11.69	9.12	7.35	6.09	5.15	4.43	3.87	3.43	3.06	2.77	800Z300-114
26.01	25.79	24.46	22.91	21.14	19.18	17.04	13.21	10.35	8.38	6.97	5.93	5.12	4.50	4.00	3.59	3.25	800Z300-128
14.99	14.87	14.23	13.47	12.56	11.57	10.66	8.27	6.37	5.07	4.14	3.45	2.93	2.52	2.19	1.93	1.72	900Z300-71
18.42	18.28	17.62	16.85	15.93	14.64	13.11	9.90	7.65	6.10	5.00	4.18	3.56	3.07	2.69	2.38	2.12	900Z300-86
22.68	22.46	21.46	20.30	19.03	17.35	15.22	11.53	8.94	7.16	5.88	4.94	4.22	3.66	3.22	2.85	2.56	900Z300-100
26.36	26.13	25.07	23.81	21.88	19.71	17.33	13.18	10.25	8.24	6.80	5.73	4.92	4.28	3.78	3.37	3.03	900Z300-114
30.47	30.10	28.49	26.60	24.46	22.06	19.43	14.86	11.60	9.36	7.76	6.57	5.66	4.95	4.38	3.92	3.54	900Z300-128
17.23	17.12	16.40	15.49	14.40	13.23	12.12	9.26	7.13	5.67	4.62	3.85	3.26	2.80	2.44	2.14	1.90	1000Z300-71
21.30	21.10	20.30	19.35	18.21	16.68	14.78	11.07	8.54	6.81	5.57	4.65	3.95	3.41	2.97	2.62	2.34	1000Z300-86
26.17	25.85	24.65	23.28	21.75	19.68	17.15	12.88	9.97	7.97	6.54	5.48	4.67	4.04	3.54	3.13	2.80	1000Z300-100
30.42	30.06	28.80	27.25	24.94	22.36	19.51	14.70	11.41	9.15	7.53	6.33	5.42	4.71	4.14	3.68	3.30	1000Z300-114
35.15	34.61	32.69	30.44	27.88	25.01	21.86	16.54	12.88	10.36	8.56	7.23	6.21	5.41	4.78	4.26	3.84	1000Z300-128
20.36	20.16	19.56	18.83	17.93	16.71	15.07	11.29	8.68	6.89	5.61	4.66	3.94	3.38	2.93	2.57	2.28	1200Z300-71
27.53	27.14	26.01	24.68	23.01	20.92	18.15	13.46	10.37	8.25	6.73	5.60	4.75	4.08	3.56	3.13	2.78	1200Z300-86
33.71	33.11	31.46	29.58	27.49	24.50	21.04	15.63	12.06	9.62	7.87	6.57	5.58	4.81	4.20	3.71	3.31	1200Z300-100
39.14	38.48	36.73	34.49	31.35	27.82	23.91	17.80	13.77	11.00	9.03	7.56	6.44	5.57	4.88	4.32	3.87	1200Z300-114
45.21	44.22	41.60	38.54	35.03	31.10	26.76	19.97	15.49	12.41	10.21	8.58	7.34	6.37	5.60	4.97	4.46	1200Z300-128
22.27	21.91	21.06	20.02	18.72	17.53	16.09	12.28	9.71	7.88	6.53	5.48	4.63	3.97	3.44	3.01	2.66	1400Z300-71
28.91	28.53	27.64	26.57	25.03	23.09	19.99	15.23	12.02	9.71	7.91	6.58	5.57	4.78	4.15	3.65	3.23	1400Z300-86
37.33	36.62	35.04	33.23	31.21	27.80	23.93	18.20	14.20	11.30	9.22	7.69	6.52	5.61	4.89	4.30	3.82	1400Z300-100
44.97	44.16	42.46	39.97	36.46	32.44	27.90	20.96	16.18	12.90	10.55	8.82	7.50	6.47	5.65	4.99	4.45	1400Z300-114
53.60	52.24	49.29	45.79	41.72	37.08	31.66	23.47	18.16	14.51	11.90	9.97	8.50	7.35	6.44	5.70	5.10	1400Z300-128

Z SECTION PROPERTIES



Dimensions

d = section depth
b = flange width
h = lip length
t = steel thickness
C.G. = center of gravity
S.C. = shear center
r = inside bend radius = 0.13 in.

Properties

I_x eff. = effective moment of inertia about axis X-X at maximum compressive stress = 0.6 F_y
S_x eff. = effective elastic section modulus about axis X-X
r_x = radius of gyration about axis X-X
I_y = gross moment of inertia about axis Y-Y
S_y eff. = effective elastic section modulus about axis Y-Y
r_y = radius of gyration about axis Y-Y
$r_{min.}$ = radius of gyration about axis Z-Z
J = St. Venant torsion constant
C_w = warping constant
A_g = gross area of section
Θ = angle between axis Z-Z and Y-Y

Example

600Z300-57
600 = section depth (10^{-2} in.)
Z = nomenclature
300 = flange width (10^{-2} in.)
57 = minimum steel thickness, i.e. 95% of the design thickness (10^{-3} in.)

Section			Dimension					Property										
No.	Nomenclature	Former Nomenclature	d	b	h	t	Gage	I_x eff.	S_x eff.	r_x	I_y	S_y eff.	r_y	$r_{min.}$	J $x10^{-3}$	C_w	A_g	θ
			in.	in.	in.	in.		$in.^4$	$in.^3$	in.	$in.^4$	$in.^3$	in.	in.	$in.^4$	$in.^6$	$in.^2$	deg.
1	600Z300-57	Z6x3.0	6.00	3.00	0.95	0.060	16	4.71	1.34	2.45	2.25	0.50	1.66	0.94	0.98	12.81	0.81	31.19
2	600Z300-71	Z6x3.6	6.00	3.00	0.95	0.075	14	6.01	1.71	2.44	2.78	0.59	1.65	0.94	1.90	15.76	1.01	31.17
3	600Z300-86	Z6x4.3	6.00	3.00	0.95	0.090	13	7.20	2.11	2.44	3.30	0.79	1.65	0.93	3.28	18.61	1.21	31.15
4	600Z300-100	Z6x5.1	6.00	3.00	0.95	0.105	12	8.32	2.61	2.43	3.81	1.01	1.64	0.93	5.18	21.36	1.41	31.13
5	600Z300-114	Z6x5.8	6.00	3.00	0.95	0.120	11	9.42	3.04	2.42	4.31	1.19	1.64	0.93	7.71	24.02	1.61	31.11
6	600Z300-128	Z6x6.5	6.00	3.00	0.95	0.135	10	10.50	3.50	2.42	4.79	1.33	1.63	0.92	10.94	26.58	1.80	31.08
7	800Z300-57	Z8x3.4	8.00	3.00	0.95	0.060	16	9.13	1.94	3.18	2.25	0.51	1.55	0.97	1.12	24.23	0.93	21.74
8	800Z300-71	Z8x4.2	8.00	3.00	0.95	0.075	14	11.63	2.51	3.17	2.78	0.60	1.54	0.97	2.18	29.84	1.16	21.71
9	800Z300-86	Z8x4.9	8.00	3.00	0.95	0.090	13	13.96	3.09	3.17	3.30	0.79	1.54	0.97	3.76	35.29	1.39	21.67
10	800Z300-100	Z8x5.9	8.00	3.00	0.95	0.105	12	16.16	3.81	3.16	3.81	1.01	1.53	0.96	5.96	40.57	1.62	21.64
11	800Z300-114	Z8x6.7	8.00	3.00	0.95	0.120	11	18.33	4.43	3.15	4.31	1.19	1.53	0.96	8.86	45.69	1.85	21.60
12	800Z300-128	Z8x7.5	8.00	3.00	0.95	0.135	10	20.46	5.12	3.14	4.79	1.33	1.52	0.96	12.58	50.64	2.07	21.57
13	900Z300-71	Z9x4.4	9.00	3.00	0.95	0.075	14	15.29	2.95	3.53	2.78	0.60	1.50	0.97	2.32	38.78	1.24	18.57
14	900Z300-86	Z9x5.2	9.00	3.00	0.95	0.090	13	18.36	3.62	3.52	3.30	0.79	1.49	0.97	4.01	45.88	1.48	18.54
15	900Z300-100	Z9x6.2	9.00	3.00	0.95	0.105	12	21.27	4.46	3.51	3.81	1.01	1.49	0.96	6.34	52.77	1.73	18.50
16	900Z300-114	Z9x7.1	9.00	3.00	0.95	0.120	11	24.14	5.19	3.50	4.31	1.19	1.48	0.96	9.44	59.46	1.97	18.46
17	900Z300-128	Z9x8.0	9.00	3.00	0.95	0.135	10	26.97	5.99	3.50	4.79	1.33	1.47	0.96	13.40	65.94	2.21	18.43
18	1000Z300-71	Z10x4.6	10.00	3.00	0.95	0.075	14	19.56	3.39	3.87	2.78	0.60	1.45	0.97	2.47	49.00	1.31	16.11
19	1000Z300-86	Z10x5.5	10.00	3.00	0.95	0.090	13	23.51	4.19	3.87	3.30	0.79	1.45	0.97	4.25	58.00	1.57	16.07
20	1000Z300-100	Z10x6.6	10.00	3.00	0.95	0.105	12	27.25	5.15	3.86	3.81	1.01	1.44	0.96	6.73	66.74	1.83	16.04
21	1000Z300-114	Z10x7.5	10.00	3.00	0.95	0.120	11	30.93	5.98	3.85	4.31	1.19	1.44	0.96	10.01	75.23	2.09	16.00
22	1000Z300-128	Z10x8.4	10.00	3.00	0.95	0.135	10	34.57	6.91	3.84	4.79	1.33	1.43	0.96	14.22	83.46	2.34	15.97
23	1200Z300-71	Z12x5.2	12.00	3.00	0.95	0.075	14	30.10	4.01	4.55	2.78	0.60	1.38	0.96	2.75	73.38	1.46	12.53
24	1200Z300-86	Z12x6.2	12.00	3.00	0.95	0.090	13	36.20	5.42	4.54	3.30	0.80	1.37	0.96	4.73	86.91	1.75	12.50
25	1200Z300-100	Z12x7.3	12.00	3.00	0.95	0.105	12	41.99	6.63	4.54	3.81	1.01	1.37	0.95	7.50	100.06	2.04	12.46
26	1200Z300-114	Z12x8.3	12.00	3.00	0.95	0.120	11	47.71	7.70	4.53	4.31	1.19	1.36	0.95	11.16	112.86	2.33	12.43
27	1200Z300-128	Z12x9.4	12.00	3.00	0.95	0.135	10	53.35	8.89	4.52	4.79	1.33	1.36	0.94	15.86	125.29	2.61	12.40
28	1400Z300-71	Z14x5.7	14.00	3.00	0.95	0.075	14	40.96	4.38	5.21	2.78	0.61	1.31	0.94	3.03	103.07	1.61	10.08
29	1400Z300-86	Z14x6.8	14.00	3.00	0.95	0.090	13	50.43	5.69	5.21	3.30	0.80	1.31	0.94	5.22	122.13	1.93	10.05
30	1400Z300-100	Z14x8.0	14.00	3.00	0.95	0.105	12	59.47	7.34	5.20	3.81	1.01	1.30	0.94	8.27	140.68	2.25	10.02
31	1400Z300-114	Z14x9.1	14.00	3.00	0.95	0.120	11	68.47	8.85	5.19	4.31	1.19	1.30	0.93	12.32	158.73	2.57	9.99
32	1400Z300-128	Z14x10.3	14.00	3.00	0.95	0.135	10	77.36	10.54	5.18	4.79	1.33	1.29	0.93	17.50	176.29	2.88	9.96

SELECTION TABLE

Resistance

F_y = steel yield strength = 50 ksi
V_r = factored shear strength
B_r int. = factored web crippling strength with 4 in. of interior support
B_r ext.= factored web crippling strength with 4 in. of exterior support
M_r = factored moment resistance considering lateral and distortional buckling

Design assumptions

- The values in the table have been calculated according to Limit States Design (LSD) and CSA S136-16 standard for cold-formed steel.
- Shaded M_r values indicates that distortional buckling may govern the design for the given section if the compression flange is not restrained against distortional buckling.
- The design engineer shall determine the cases when distortional buckling is applicable.
- Rotational rigidity of the sheathing is neglected ($k\phi = 0$) and moment gradient factor has been conservatively set to 1 (ß= 1) for the calculation of the distortional buckling resistance.
- The web crippling resistance is calculated with one flange loading condition.
- The shear resistance is taken as the minimum between the elastic resistance (F_y) of the gross section and the plastic resistance (F_u) of the net section.
- The net section for shear is taken with:
  - 2 bolt holes of $^9/_{16}$ in. diameter for section depth d < 8 in.
  - 3 bolt holes of $^9/_{16}$ in. diameter for section depth d ≥ 8 in.

Example – Wall girt selection

Single span: 25 ft.
Girt spacing: 5 ft.
Positive external wind pressure: 8.0 + 6.6 = 14.6 psf
Negative external wind pressure: 5.9 + 6.6 = 12.5 psf
Two rows of discrete bracing are used to prevent the section from buckling at a third of the span.
Metal siding is fixed to the exterior flange at 12 in. c/c. The cladding is considered to prevent distortional buckling and lateral-torsional buckling.
Deflections are limited to span / 180 considering the wall composition.

Positive w_f = 1.4 x 14.6 psf x 5.0 ft. = 102 lb./ft.
Negative w_f = 1.4 x 12.5 psf x 5.0 ft. = 88 lb./ft.
M_f^+ = 0.102 kip/ft. x (25 ft.)^2 / 8 = 8.0 kip•ft.
M_f^- = 0.088 kip/ft. x (25 ft.)^2 / 8 = 6.9 kip•ft.
V_f = 0.102 kip/ft. x 25 ft. / 2 = 1.28 kip

$$I_{min.} \text{ (deflection < span / 180)} = \frac{180 \times 5 \times 0.75 \times 0.073 \text{ kip/ft.} \times (25 \text{ ft.})^3 \times 144}{384 \times 29{,}500 \text{ ksi}}$$

$I_{min.}$ = 9.8 in.^{4}

The Properties table lists many sections with a value of I_x greater than $I_{min.}$
800Z300-71 I_x = 11.63 in.^{4}
900Z300-71 I_x = 15.29 in.^{4}
1000Z300-71 I_x = 19.56 in.^{4}

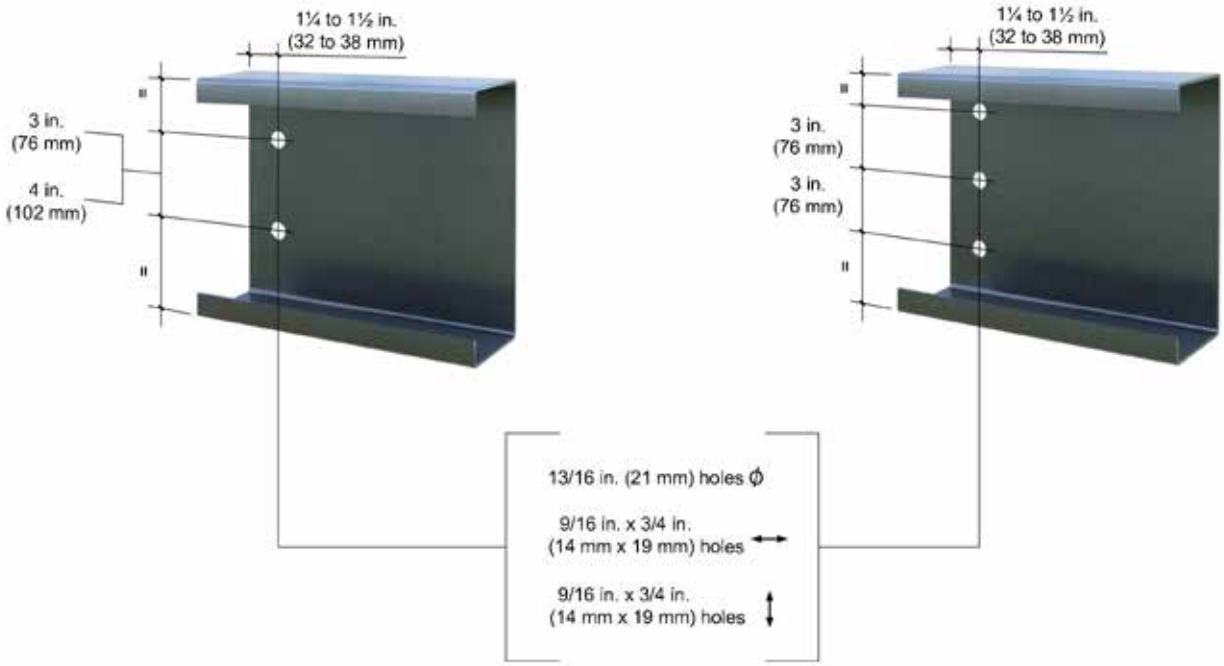
The sections can be verified with the use of the selection tables:
M_r^+ = M_r @ 0 ft. > M_f^+
M_r^- = min. (M_r flexural-torsional @ 8 ft.-4 in., M_r distortional) > M_f^-

The discrete bracings must be connected to the section according to standard S136-16.
$V_r > V_f$
$P_r > V_f$

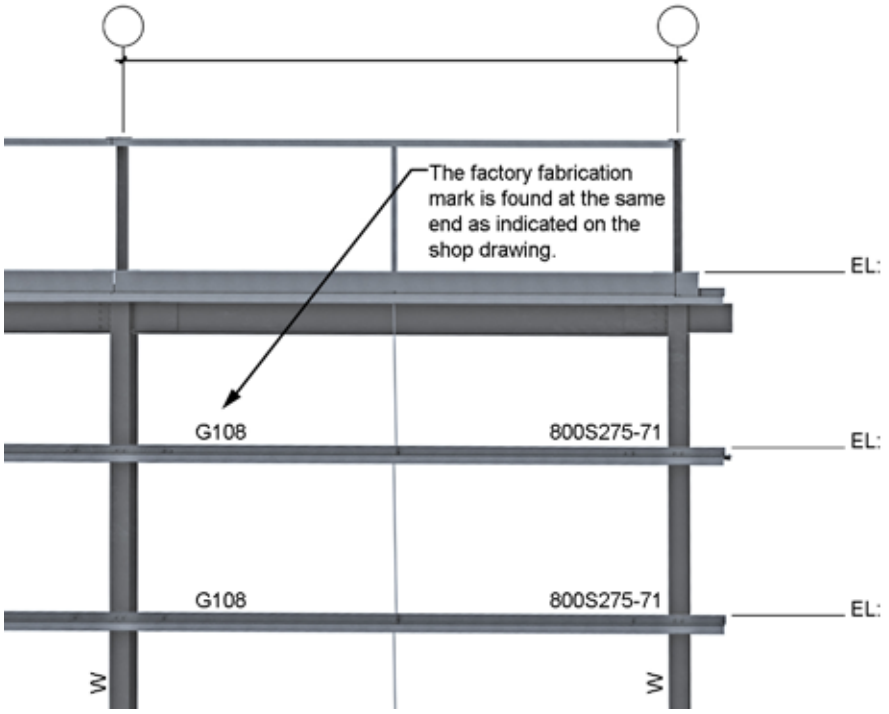
Section			Web crippling		Distortional buckling
No.	Nomenclature	V_r kip	B_r ext. kip	B_r int. kip	M_r kip-ft.
1	600Z300-57	4.37	1.34	2.42	4.04
2	600Z300-71	7.58	2.03	3.80	5.52
3	600Z300-86	10.91	2.85	5.47	7.11
4	600Z300-100	13.56	3.78	7.42	8.77
5	600Z300-114	15.39	4.83	9.66	10.49
6	600Z300-128	17.20	6.00	12.17	12.26
7	800Z300-57	3.22	1.29	2.38	5.50
8	800Z300-71	6.32	1.96	3.74	7.57
9	800Z300-86	10.91	2.76	5.39	9.80
10	800Z300-100	14.85	3.68	7.33	12.17
11	800Z300-114	19.40	4.71	9.54	14.64
12	800Z300-128	24.24	5.85	12.04	17.19
13	900Z300-71	5.59	1.93	3.71	8.60
14	900Z300-86	9.69	2.72	5.36	11.17
15	900Z300-100	14.85	3.63	7.28	13.90
16	900Z300-114	19.40	4.65	9.49	16.77
17	900Z300-128	24.55	5.78	11.97	19.75
18	1000Z300-71	5.01	1.90	3.69	9.64
19	1000Z300-86	8.68	2.68	5.32	12.55
20	1000Z300-100	13.82	3.58	7.24	15.66
21	1000Z300-114	19.40	4.60	9.44	18.93
22	1000Z300-128	24.55	5.72	11.91	22.34
23	1200Z300-71	4.14	1.85	3.64	11.68
24	1200Z300-86	7.18	2.61	5.26	15.28
25	1200Z300-100	11.43	3.50	7.17	19.16
26	1200Z300-114	17.10	4.50	9.35	23.27
27	1200Z300-128	24.41	5.60	11.80	27.58
28	1400Z300-71	3.53	1.80	3.60	13.63
29	1400Z300-86	6.12	2.55	5.21	17.93
30	1400Z300-100	9.74	3.42	7.10	22.58
31	1400Z300-114	14.57	4.41	9.26	27.55
32	1400Z300-128	20.79	5.50	11.70	32.78

Lateral-torsional buckling																	Nomenclature (metric)
M_r (kip-ft.) unsupported length (ft.)																	
0	5	6	7	8	9	10	11	12	13	14	15	16	18	20	22	24	
5.03	5.01	4.83	4.60	4.34	4.04	3.69	3.29	2.86	2.49	2.16	1.89	1.67	1.34	1.10	0.92	0.79	152Z76-144M
6.41	6.39	6.14	5.84	5.49	5.09	4.75	4.31	3.65	3.13	2.72	2.39	2.12	1.71	1.41	1.19	1.03	152Z76-181M
7.90	7.88	7.64	7.35	7.02	6.53	5.98	5.19	4.41	3.80	3.31	2.92	2.60	2.11	1.75	1.49	1.29	152Z76-218M
9.79	9.76	9.36	8.91	8.40	7.80	6.97	6.08	5.19	4.49	3.93	3.47	3.10	2.53	2.12	1.82	1.58	152Z76-253M
11.39	11.35	10.93	10.46	9.72	8.88	7.97	7.00	6.01	5.21	4.57	4.06	3.64	2.99	2.53	2.18	1.91	152Z76-290M
13.13	13.07	12.43	11.70	10.87	9.96	8.98	7.93	6.86	5.97	5.26	4.68	4.21	3.49	2.96	2.57	2.26	152Z76-326M
7.29	7.25	7.04	6.68	6.26	5.77	5.20	4.55	3.92	3.38	2.93	2.56	2.26	1.80	1.47	1.23	1.04	203Z76-144M
9.41	9.33	8.93	8.46	7.89	7.28	6.72	5.85	4.93	4.22	3.66	3.21	2.84	2.27	1.86	1.56	1.33	203Z76-181M
11.58	11.49	11.08	10.60	10.04	9.23	8.26	7.00	5.92	5.08	4.41	3.87	3.43	2.76	2.28	1.92	1.65	203Z76-218M
14.28	14.14	13.51	12.79	11.99	10.94	9.61	8.17	6.92	5.95	5.18	4.56	4.05	3.27	2.72	2.30	1.99	203Z76-254M
16.61	16.46	15.79	15.00	13.79	12.44	10.95	9.35	7.94	6.84	5.97	5.27	4.69	3.82	3.18	2.71	2.35	203Z76-290M
19.19	18.95	17.94	16.76	15.42	13.93	12.30	10.55	8.98	7.77	6.80	6.01	5.37	4.39	3.68	3.16	2.75	203Z76-326M
11.06	10.93	10.45	9.86	9.17	8.44	7.75	6.64	5.60	4.79	4.15	3.63	3.20	2.56	2.10	1.75	1.49	229Z76-181M
13.59	13.45	12.95	12.36	11.63	10.66	9.44	7.93	6.70	5.74	4.98	4.37	3.86	3.10	2.55	2.14	1.83	229Z76-218M
16.73	16.51	15.75	14.88	13.91	12.58	10.96	9.24	7.82	6.71	5.83	5.13	4.55	3.66	3.03	2.56	2.20	229Z76-254M
19.44	19.21	18.41	17.41	15.94	14.30	12.48	10.55	8.95	7.70	6.71	5.91	5.25	4.25	3.53	3.00	2.59	229Z76-290M
22.47	22.12	20.89	19.45	17.82	16.00	14.01	11.88	10.10	8.71	7.60	6.71	5.98	4.86	4.06	3.47	3.01	229Z76-326M
12.71	12.60	12.04	11.34	10.51	9.64	8.78	7.44	6.27	5.36	4.64	4.05	3.58	2.85	2.33	1.95	1.66	254Z76-181M
15.71	15.52	14.91	14.19	13.29	12.13	10.62	8.88	7.50	6.42	5.56	4.87	4.31	3.45	2.83	2.37	2.02	254Z76-218M
19.31	19.00	18.09	17.05	15.90	14.26	12.33	10.32	8.73	7.49	6.50	5.70	5.05	4.06	3.35	2.82	2.42	254Z76-254M
22.43	22.11	21.14	19.92	18.17	16.20	14.03	11.77	9.97	8.57	7.45	6.55	5.82	4.69	3.89	3.29	2.83	254Z76-290M
25.93	25.43	23.96	22.25	20.31	18.13	15.73	13.23	11.23	9.67	8.43	7.43	6.61	5.35	4.45	3.79	3.28	254Z76-326M
15.02	14.84	14.38	13.82	13.13	12.17	10.88	9.06	7.63	6.52	5.64	4.92	4.34	3.45	2.82	2.35	1.99	305Z76-181M
20.31	19.95	19.10	18.09	16.78	15.20	13.02	10.80	9.11	7.79	6.74	5.90	5.21	4.15	3.40	2.84	2.42	305Z76-218M
24.86	24.33	23.08	21.65	20.07	17.72	15.09	12.54	10.58	9.06	7.86	6.88	6.08	4.87	4.00	3.35	2.86	305Z76-254M
28.87	28.28	26.96	25.19	22.80	20.12	17.15	14.27	12.06	10.34	8.98	7.88	6.98	5.60	4.62	3.89	3.33	305Z76-290M
33.35	32.47	30.48	28.15	25.49	22.50	19.20	16.00	13.54	11.63	10.11	8.89	7.89	6.36	5.26	4.45	3.83	305Z76-326M
16.43	16.12	15.47	14.67	13.67	12.81	11.56	9.77	8.38	7.28	6.39	5.65	5.04	4.06	3.31	2.75	2.33	356Z76-181M
21.33	20.99	20.32	19.50	18.29	16.78	14.34	12.12	10.39	9.01	7.90	6.94	6.12	4.88	3.98	3.32	2.82	356Z76-218M
27.54	26.92	25.73	24.35	22.72	20.11	17.17	14.50	12.41	10.67	9.24	8.08	7.14	5.70	4.67	3.90	3.32	356Z76-254M
33.17	32.48	31.19	29.21	26.54	23.47	20.00	16.81	14.19	12.15	10.53	9.23	8.16	6.53	5.37	4.51	3.85	356Z76-290M
39.54	38.37	36.13	33.46	30.36	26.82	22.64	18.82	15.90	13.64	11.84	10.39	9.20	7.39	6.09	5.13	4.40	356Z76-326M

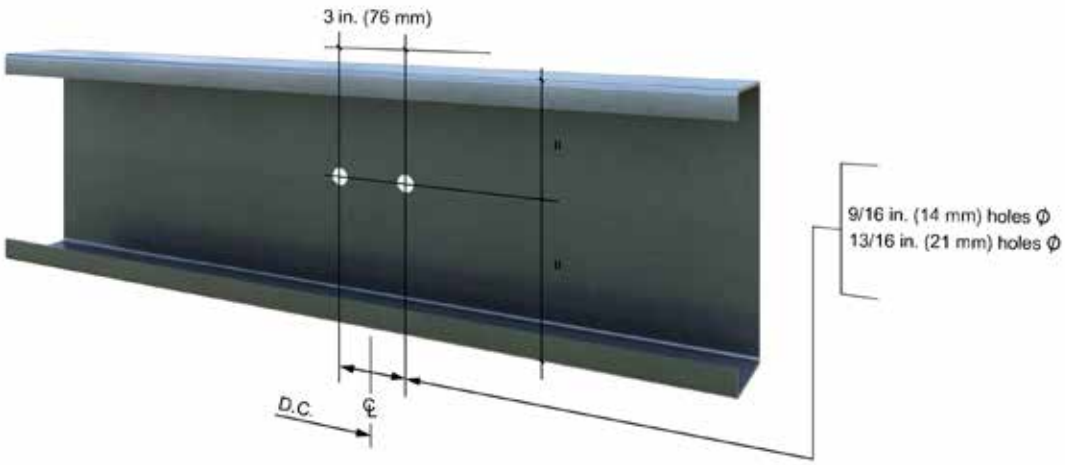
ASSEMBLY HOLES



FABRICATION MARKS

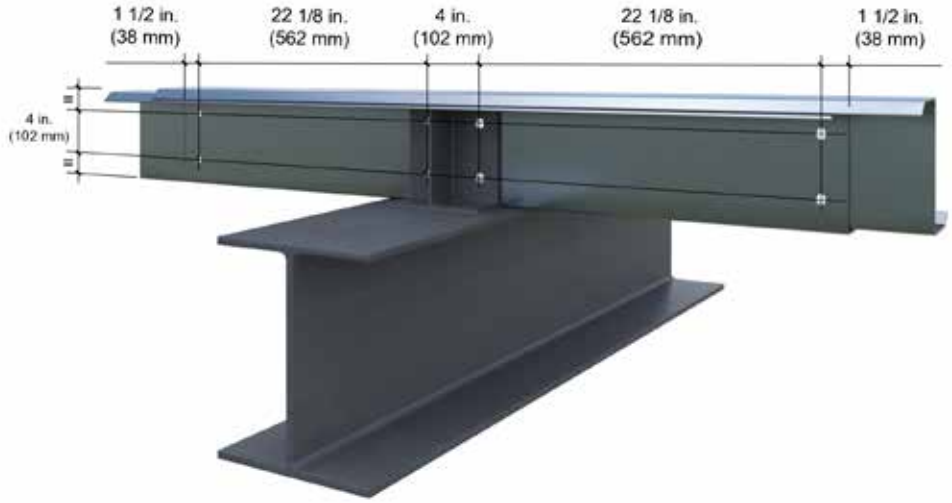


SAG ROD HOLES

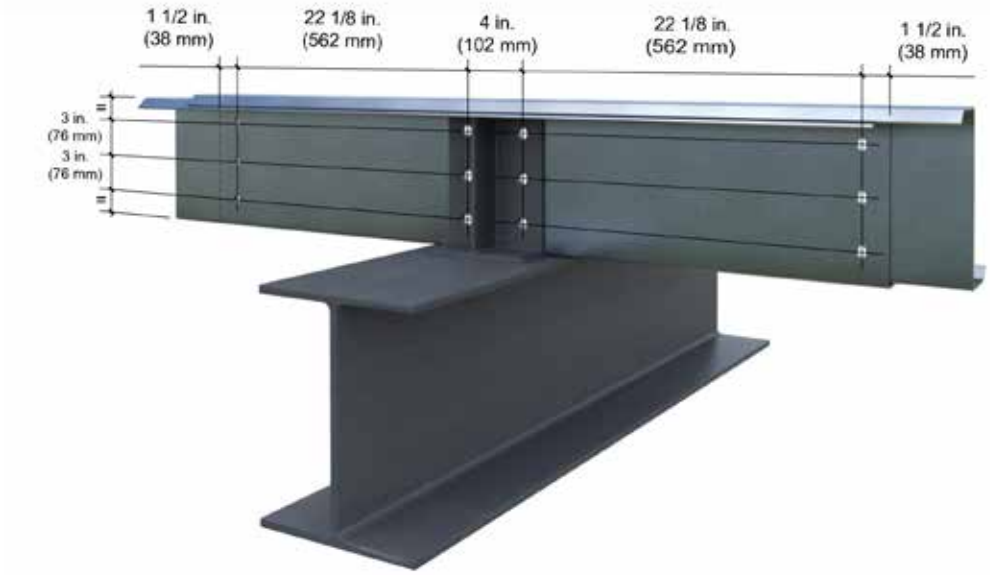


OVERLAPPING Z SECTIONS

OVERLAPPING JOINTS FOR SECTIONS ≤ 8¼ IN. (210 MM)

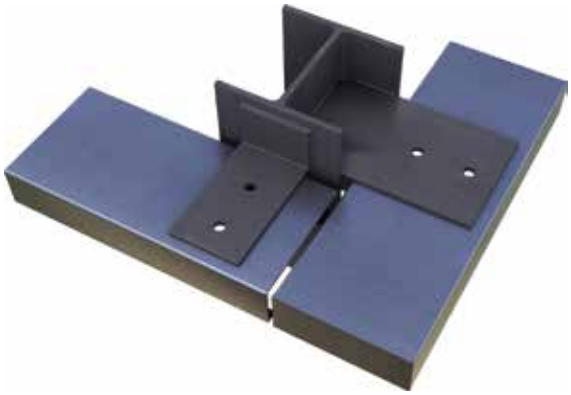


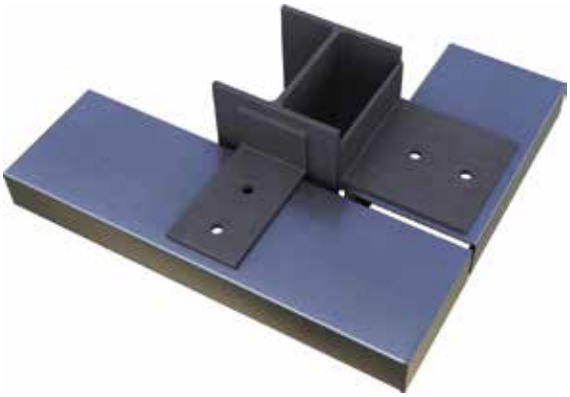
OVERLAPPING JOINTS FOR SECTIONS > 8¼ IN. (210 MM)

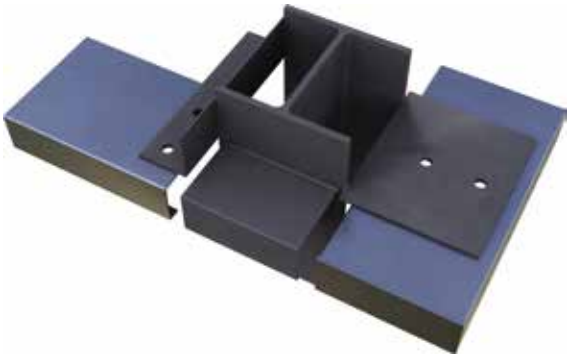


INTERIOR GIRT TO COLUMN CONNECTION DETAILS

EXTERIOR GIRT TO CORNER COLUMN CONNECTION DETAILS







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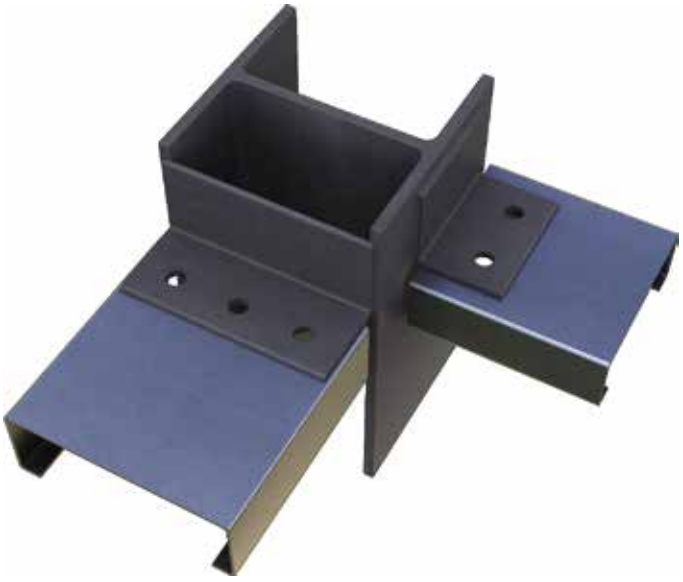

NOMENCLATURE CONCORDANCE (NEW VS. FORMER)

C Section			
Metric		Imperial	
Nomenclature	Former nomenclature	Nomenclature	Former nomenclature
152S70-144M	C152x4.3	600S275-57	C6x2.9
152S70-181M	C152x5.2	600S275-71	C6x3.5
152S70-218M	C152x6.0	600S275-86	C6x4.0
152S70-254M	C152x7.0	600S275-100	C6x4.7
152S70-290M	C152x8.3	600S275-114	C6x5.6
152S70-326M	C152x8.9	600S275-128	C6x6.0
203S70-144M	C203x5.1	800S275-57	C8x3.4
203S70-181M	C203x6.0	800S275-71	C8x4.0
203S70-218M	C203x7.0	800S275-86	C8x4.7
203S70-254M	C203x8.0	800S275-100	C8x5.4
203S70-290M	C203x9.1	800S275-114	C8x6.1
203S70-326M	C203x10.6	800S275-128	C8x7.1
229S89-181M	C229x6.8	900S350-71	C9x4.6
229S89-218M	C229x8.0	900S350-86	C9x5.4
229S89-254M	C229x9.4	900S350-100	C9x6.3
229S89-290M	C229x10.7	900S350-114	C9x7.2
229S89-326M	C229x11.9	900S350-128	C9x8.0
254S89-144M	C254x5.7	1000S350-57	C10x3.8
254S89-181M	C254x7.0	1000S350-71	C10x4.7
254S89-218M	C254x8.6	1000S350-86	C10x5.8
254S89-254M	C254x10.0	1000S350-100	C10x6.7
254S89-290M	C254x11.3	1000S350-114	C10x7.6
254S89-326M	C254x12.7	1000S350-128	C10x8.5
305S89-181M	C305x8.0	1200S350-71	C12x5.4
305S89-218M	C305x9.5	1200S350-86	C12x6.4
305S89-254M	C305x11	1200S350-100	C12x7.4
305S89-290M	C305x12.5	1200S350-114	C12x8.4
305S89-326M	C305x14.0	1200S350-128	C12x9.4
356S89-218M	C356x10.4	1400S350-86	C14x7.0
356S89-254M	C356x12.1	1400S350-100	C14x8.1
356S89-290M	C356x13.8	1400S350-114	C14x9.3
356S89-326M	C356x15.5	1400S350-128	C14x10.4

Z Section			
Metric		Imperial	
Nomenclature	Former nomenclature	Nomenclature	Former nomenclature
152Z76-144M	Z152x4.5	600Z300-57	Z6x3.0
152Z76-181M	Z152x5.4	600Z300-71	Z6x3.6
152Z76-218M	Z152x6.4	600Z300-86	Z6x4.3
152Z76-253M	Z152x7.6	600Z300-100	Z6x5.1
152Z76-290M	Z152x8.6	600Z300-114	Z6x5.8
152Z76-326M	Z152x9.7	600Z300-128	Z6x6.5
203Z76-144M	Z203x5.1	800Z300-57	Z8x3.4
203Z76-181M	Z203x6.3	800Z300-71	Z8x4.2
203Z76-218M	Z203x7.3	800Z300-86	Z8x4.9
203Z76-254M	Z203x8.8	800Z300-100	Z8x5.9
203Z76-290M	Z203x10	800Z300-114	Z8x6.7
203Z76-326M	Z203x11.2	800Z300-128	Z8x7.5
229Z76-181M	Z229x6.6	900Z300-71	Z9x4.4
229Z76-218M	Z229x7.7	900Z300-86	Z9x5.2
229Z76-254M	Z229x9.2	900Z300-100	Z9x6.2
229Z76-290M	Z229x10.6	900Z300-114	Z9x7.1
229Z76-326M	Z229x11.9	900Z300-128	Z9x8.0
254Z76-181M	Z254x6.8	1000Z300-71	Z10x4.6
254Z76-218M	Z254x8.2	1000Z300-86	Z10x5.5
254Z76-254M	Z254x9.8	1000Z300-100	Z10x6.6
254Z76-290M	Z254x11.2	1000Z300-114	Z10x7.5
254Z76-326M	Z254x12.5	1000Z300-128	Z10x8.4
305Z76-181M	Z305x7.7	1200Z300-71	Z12x5.2
305Z76-218M	Z305x9.2	1200Z300-86	Z12x6.2
305Z76-254M	Z305x10.9	1200Z300-100	Z12x7.3
305Z76-290M	Z305x12.4	1200Z300-114	Z12x8.3
305Z76-326M	Z305x14	1200Z300-128	Z12x9.4
356Z76-181M	Z356x8.5	1400Z300-71	Z14x5.7
356Z76-218M	Z356x10.1	1400Z300-86	Z14x6.8
356Z76-254M	Z356x11.9	1400Z300-100	Z14x8.0
356Z76-290M	Z356x13.6	1400Z300-114	Z14x9.1
356Z76-326M	Z356x15.4	1400Z300-128	Z14x10.3

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