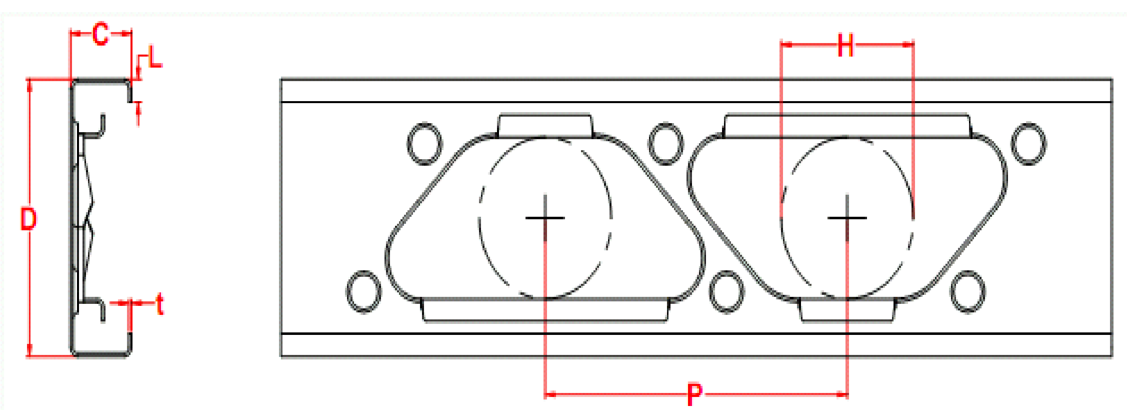
Lightweight Steel Framing

DeltaStud Load Tables

for

Wind Bearing and Combined Wind & Axial Load Bearing Condition



May 2006

Table of Contents

Continued on Next Page

Table of Contents

DeltaStud Combined Wind and Axial Load Bearing Condition

Scope of this Catalogue

This catalogue provides technical information about Steelform DeltaStud framing products for curtain wall and load bearing wall applications. All calculations, whenever applicable, were based on CSA S136 (North American Specification for the Design of Cold-Formed Steel Structural Members) and the National Building Code of Canada. Physical tests were carried out to substantiate the calculated values contained in the load tables of this catalogue.

Design load tables are presented as well as illustrative examples of typical construction applications. These design examples are meant to assist the design engineer in understanding the application of DeltaStud and should not be used without the approval of a competent design professional. It is also recommended that the design engineer be familiar with the appropriate reference documents listed herein.

These documents may be obtained from either the Canadian Sheet Steel Building Institute and CSA in Canada, or the American Iron and Steel Institute in the United States. Additional assistance regarding the application of Steelform steel framing products can be obtained by contacting Steelform.

Roger A. LaBoube, Ph.D, P.E.

The load tables and technical information contained in this catalogue were prepared by Dr. Roger A. LaBoube, Ph.D, P.E. Professor LaBoube received his engineering degrees from the University of Missouri-Rolla. He has approximately 14 years of industry experience, with ten of those years with Butler Manufacturing Company in Research and Development.

Since 1978, Dr. LaBoube has held faculty positions at Iowa State University, the University of Kansas, and the Missouri University of Science & Technology (formerly University of Missouri-Rolla). Dr. Laboube is Curator’s Teaching Professor Emeritus of Civil Engineering and Director of the Center for Cold-Formed Steel Structures at Missouri University of Science & Technology.

Dr. Laboube is active professionally in the following activities:

- A member of the AISI Committee on Specifications for the Design of Cold-Formed Steel Structural Members.
- Currently serves as Chairman of the Education Subcommittee of the Committee on Specifications.
- A member of the AISI Committee on Framing Standards and chairs the Design Methods Subcommittee.
- Co-author with Dr. Wei-Wen Yu, *Cold-Formed Steel Design*, 4th edition, John Wiley & Sons.
- Has authored or co-authored the following AISI design guides:

The Design Guide for Cold-Formed Steel Trusses.
Design Guide for Beams with Web Openings.
A Design Guide for Designing with Standing Seam Roof Panels (co-author).

- Is actively involved in cold-formed steel research.
- Has served as a consultant to manufacturers and consulting engineers on numerous topics related to cold-formed steel members and connections.

Professor LaBoube can be contacted at:

Tel: (573)341-4481
Fax: (573)341-4729
laboube@mst.edu

Design Criteria and Technical Data

General

All structural design properties have been computed in accordance with CSA S136-01, when applicable.

Material

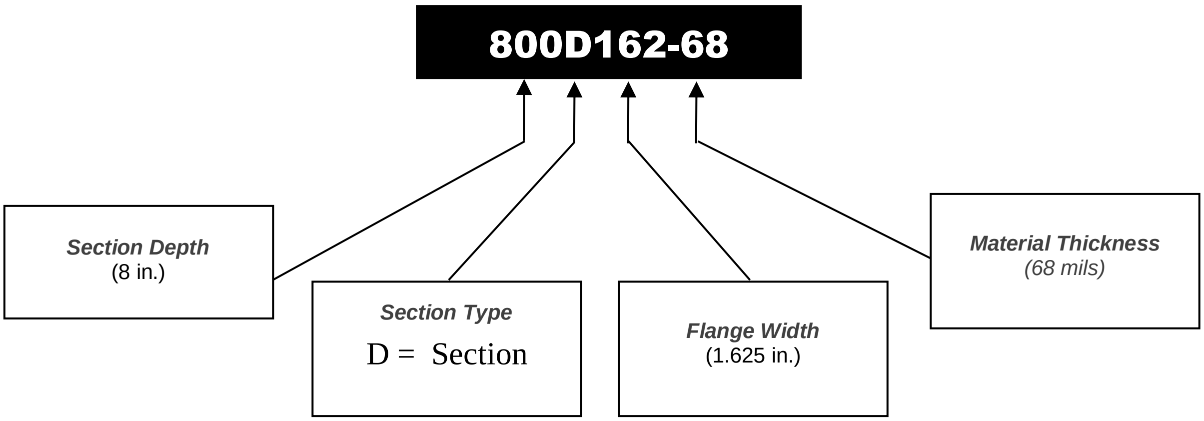
Products are formed from sheet steel with a minimum yield stress of 33 ksi or 50 ksi. The sheet steels meet the requirements of CSA S136-01. The minimum yield stress is 33 ksi for products having thickness less than 54 mils. For products having thickness equal to or greater than 54 mils, the yield stress is 50 ksi.

Limit State Design (LSD)

Limit states design in accordance with CSA S136-01 and the National Building Code of Canada, 1995, were used to develop the load tables. Thus, load tables for load bearing DeltaStud provide factored resistances. When using the load bearing DeltaStud tables, factored resistances must be compared with factored loads.

Product Identification

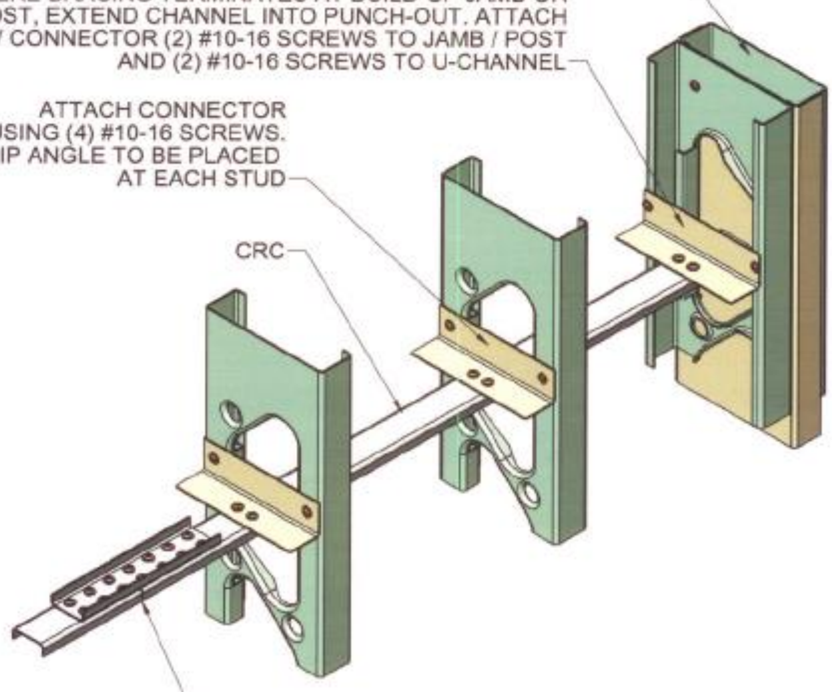
The product designator was established in accordance with the AISI *Standard for Cold-Formed Steel Framing – General Provisions*. The designator shall consist of the following:



Listed below is the nomenclature for the following standard gauges used for the DeltaStud sections:

Nomenclature	Gauge	Design Thickness
33 mils	20	0.0346
43 mils	18	0.0451
54 mils	16	0.0566
68 mils	14	0.0713

DeltaStud Connection Details



THIS BRACING IS NOT SUTABLE FOR WALL STUDS DEEPER THAN 6"

EACH END OF LATERAL BRACING MUST BE RIGIDLY FIXED OR OTHERWISE PREVENTED FROM HORIZONTAL MOVEMENT.

CRC LATERAL BRACING

Section Geometries

Curtain Wall DeltaStud Tables

(Wind Bearing Only)

The maximum single-span stud lengths are presented for the nominal, building code specified wind loads.

Maximum stud heights are limited by either strength or deflection of either L/360, L/600, or L/720.

Load tables are based on simply supported spans. The tabulated values do not apply when the stud is continuous over a support.

Sheathing is assumed to provide full lateral support on both sides of the stud. The sheathing must have adequate strength and stiffness to preclude twisting or lateral buckling.

In accordance with CSSBI S5-00, "Guide Specification for Wind Bearing Steel Studs", lateral bracing (bridging) should be provided at equally spaced intervals not to exceed 1500mm. Lateral bracing is required to align the studs during construction.

Web crippling nominal strength was considered. End connections must be designed for the applied end reaction resulting from the wind load.

Other Serviceability Load Limits for Curtain Wall DeltaStud

Other serviceability limits may be determined by multiplying the L/360 stud length by the cube root of the ratio of the desired serviceability limit over the L/360 limit. For example, to determine a stud span length for an L/240 limit multiply by $(360/240)^{1/3} = 1.45$.

Load Bearing Wall DeltaStud Tables

(Combined Wind and Axial Load Condition)

General

Maximum axial factored resistance is presented for an all-steel design and a sheathing braced design. An all steel design is based on the use of both weak axis and torsional bracing (bridging).

Load tables are based on simply supported spans. The tabulated values do not apply when the stud is continuous over a support.

In accordance with CSSBI S6-00, "Guide Specification for Lightweight Steel Framing", lateral bracing (bridging) should be provided at equally spaced intervals not to exceed

1200mm. Lateral bracing is required to align the studs during construction and to preclude weak axis buckling and rotation of the stud.

Both stud flanges must be attached to the bottom and top track sections. The studs must be installed in accordance with the American Iron and Steel Institute's *Standard for Cold-Formed Steel Framing – General Provisions*.

Web crippling nominal strength was not considered. End connections must be designed for the applied end reaction.

Sheathing is to be properly connected to both the top and bottom tracks to enhance the restraint provided to the stud and to assist with the stability of the wall assembly.

All-Steel Design

The factored resistance is based on the bracing (bridging) to provide weak axis buckling and rotation of the stud.

Clause D4(a) of CSA S136-01 applies.

Sheathing Braced Design

The factored resistance is based on sheathing providing full lateral support to both flanges of the wall stud. The sheathing must have adequate strength and stiffness to preclude lateral buckling or twisting.

Sheathing materials must retain adequate strength and stiffness for the expected life of the wall assembly. The design documents must stipulate that the sheathing is a structural element.

Sheathing material is to be fastened on both flanges of the wall stud with a minimum of No. 6 self-drilling screws spaced at 300mm maximum.

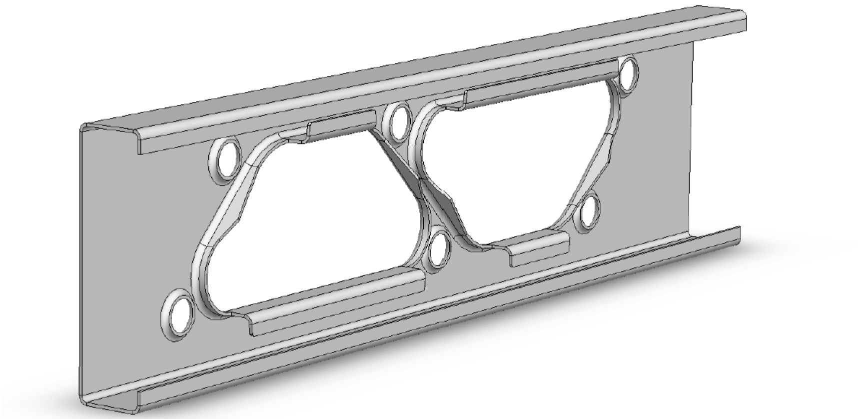
DeltaStud

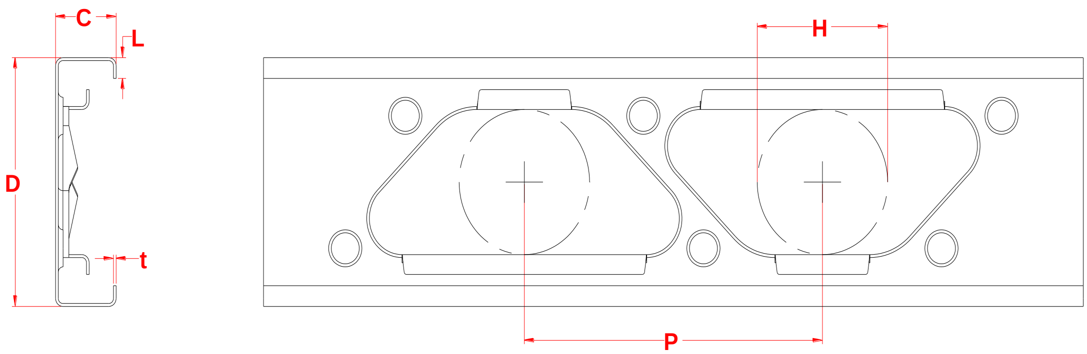
Section properties for gross and effective DeltaStud sections are provided.

Track Sections

Track section properties are presented.
The factored resistance, $M_r = \varphi\ M_n$, in accordance with Clause C3.1.1 (a) of CSA S136-01.

DeltaStud Section Profile





Section Depth	Flange	Lip	Hole Diameter	Pitch
D	**C**	**L**	**H**	**P**
3.625"	**1.625"**	**0.500"**	**2.125"**	**4.000"**
4.000"	**1.625"**	**0.500"**	**2.125"**	**4.000"**
6.000"	**1.625"**	**0.500"**	**3.500"**	**8.000"**
8.000"	**1.625"**	**0.500"**	**3.500"**	**8.000"**

all inside bend radii are t x 2.

DeltaStud Section Properties												
	Dimension		Net Properties								Net Effective Properties	
S-T-U-F Designator	D (in.)	L (in.)	AREA (in.^{2})	I_x (in.^{4})	r_x (in.)	S_x (in.^{3})	I_y (in.^{4})	r_y (in.)	θV_{nx} (kips)	θM_{nx} (k-in.)	S_x (in.^{3})	I_{xd} (in.^{4})
362D162-33	3.625	0.500	0.239	0.584	1.562	0.322	0.075	0.560	1.310	9.085	0.321	0.567
362D162-43	3.625	0.500	0.307	0.749	1.561	0.413	0.095	0.556	2.226	12.269	0.413	0.749
362D162-54	3.625	0.500	0.379	0.922	1.560	0.509	0.116	0.552	4.316	22.343	0.509	0.911
362D162-68	3.625	0.500	0.468	1.136	1.559	0.627	0.140	0.547	5.593	28.214	0.627	1.136
400D162-33	4.000	0.500	0.252	0.723	1.693	0.361	0.080	0.564	1.249	10.197	0.359	0.702
400D162-43	4.000	0.500	0.324	0.928	1.692	0.464	0.102	0.560	2.226	13.779	0.464	0.928
400D162-54	4.000	0.500	0.400	1.145	1.691	0.573	0.124	0.557	4.316	25.122	0.572	1.130
400D162-68	4.000	0.500	0.494	1.412	1.690	0.706	0.150	0.552	6.235	31.775	0.706	1.412
600D162-33	6.000	0.500	0.302	1.924	2.525	0.641	0.090	0.547	0.817	18.183	0.637	1.874
600D162-43	6.000	0.500	0.389	2.477	2.524	0.826	0.115	0.543	1.812	24.527	0.826	2.477
600D162-54	6.000	0.500	0.494	3.118	2.511	1.057	0.149	0.549	3.613	44.865	1.054	3.074
600D162-68	6.000	0.500	0.597	3.797	2.523	1.266	0.169	0.533	6.848	56.952	1.266	3.797

Standard Track Section Properties											
S-T-U-F Designator	D (in.)	C (in.)	Area (in.^{2})	Weight (lb/ft)	I_x (in.^{4})	r_x (in.)	S_x (in.^{3})	I_y (in.^{4})	r_y (in.)	θV_{nx} (kip)	θM_{nx} (kip-ft)
362T125-33	3.630	1.250	0.212	0.721	0.438	1.438	0.232	0.030	0.377	1.310	5.173
362T125-43	3.630	1.250	0.276	0.939	0.571	1.439	0.302	0.039	0.375	2.226	7.287
362T125-54	3.630	1.250	0.346	1.177	0.723	1.445	0.378	0.048	0.373	4.316	14.075
362T125-68	3.630	1.250	0.436	1.482	0.921	1.454	0.475	0.060	0.370	6.020	19.262
400T125-33	4.000	1.250	0.225	0.765	0.549	1.563	0.265	0.031	0.371	1.202	5.976
400T125-43	4.000	1.250	0.293	0.996	0.716	1.564	0.344	0.040	0.369	2.226	8.382
400T125-54	4.000	1.250	0.367	1.250	0.904	1.569	0.431	0.049	0.367	4.316	16.173
400T125-68	4.000	1.250	0.462	1.573	1.151	1.578	0.541	0.061	0.364	6.662	22.036
600T125-33	6.000	1.250	0.294	1.000	1.428	2.204	0.465	0.034	0.339	0.796	8.828
600T125-43	6.000	1.250	0.383	1.303	1.861	2.205	0.604	0.044	0.337	1.762	13.713
600T125-54	6.000	1.250	0.480	1.635	2.344	2.209	0.756	0.054	0.335	3.492	26.693
600T125-68	6.000	1.250	0.605	2.059	2.970	2.216	0.950	0.067	0.333	6.848	38.681