

ICC-ES Evaluation Report

ESR-2766

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DIVISION: 05—METALS**Section: 05400—Cold-Formed Metal Framing****Section: 05410—Load-Bearing Metal Studs****DIVISION: 09—FINISHES****Section: 09110—Nonload-Bearing Wall Framing****REPORT HOLDER:****METAL TECH, INC.**

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www.4mtsteel.com**EVALUATION SUBJECT:****LOAD-BEARING AND NONLOAD-BEARING WALL
STEEL STUDS AND TRACKS****1.0 EVALUATION SCOPE****Compliance with the following code:**2006 *International Building Code*® (IBC)**Property evaluated:**

Structural

2.0 USES

The steel studs and tracks described in this report are used for framing of nonload-bearing interior walls, curtain walls and load-bearing walls.

3.0 DESCRIPTION**3.1 General:**

The load-bearing and nonload-bearing wall steel studs and tracks described in this report are factory-formed at Metal Tech's Murrieta, California, and Menifee, California, facilities, from coils of light gage steel, and are manufactured with and without web punch-outs. When provided, punch-outs measuring up to 1.5 inches by 4 inches (38.2 mm by 102 mm) are located a minimum of 24 inches (610 mm) on center along the centerline of the webs of the studs. The minimum distance between the end of the stud and the near edge of the web punch-out is 10 inches (254 mm). See Table 2 and Figure 1 for recognized stud and track section names, profiles and dimensions. The values in each of the tables of this report are for studs with punch-outs.

3.2 Material:

The studs and tracks are cold-formed from galvanized steel coils conforming to ASTM A 653, SS Grade 33 or Grade 50 Class 1 or 3; or ASTM A 1003 Structural Grade

33 Type H (ST33H), Nonstructural Grade 33 (NS33) or Structural Grade 50 Type H (ST50H). The SS Grade and Structural Grade steel has a minimum G60 galvanization coating designation complying with ASTM A 653; the Nonstructural Grade steel has a minimum G40 galvanization coating designation complying with ASTM A 653. Steel studs and tracks are available in design base-metal thicknesses ranging from 0.0346 inch to 0.0668 inch (0.879 mm to 1.70 mm), as shown in Table 1 of this report, and in the sizes and configurations shown in Table 2 and Figure 1.

4.0 DESIGN AND INSTALLATION**4.1 General:**

The section properties indicated in Table 3 of this report have been determined in accordance with the North American Specification for Design of Cold-formed Steel Structural Members, including 2004 Supplement (AISI-NAS). The allowable moments, M_a , as indicated in Table 3 of this report, are for use with Allowable Stress Design (ASD), and are for flexural members installed with the compression flange continuously braced. For other conditions of compression flange bracing, the allowable moment must be determined in accordance with AISI-NAS. Allowable concentrated loads and reactions based on web crippling are in Table 4, for related web crippling loading conditions. The design of flexural members must address combined bending and web crippling, and combined bending and shear, as applicable, in accordance with the AISI-NAS.

4.2 Installation:

The studs and tracks must be installed in accordance with the IBC, the manufacturer's published installation instructions and this report. If there is a conflict between the manufacturer's published installation instructions and this report, this report governs. The manufacturer's published installation instructions must be available at the jobsite at all times. Use of studs and tracks having a G40 galvanization coating designation is limited to interior nonload-bearing walls with lateral loads of 5 psf (240 Pa) or less.

5.0 CONDITIONS OF USE

The Metal Tech studs and tracks described in this report comply with, or are suitable alternatives to what is specified in, the code indicated in Section 1.0 of this report, subject to the following conditions:

5.1 The studs and tracks are installed in accordance with the IBC, Metal Tech's published installation instructions and this report.

- 5.2 Minimum uncoated base-metal thickness of the studs and tracks as delivered to the jobsite is at least 95 percent of the design base-metal thickness noted in Table 1 of this report.
- 5.3 Use of studs and tracks having a G40 galvanization coating designation is limited to interior nonload-bearing walls with lateral loads of 5 psf (240 Pa) or less.
- 5.4 Complete plans and calculations verifying compliance with this report must be submitted to the code official for each project. The calculations and plans must be prepared and sealed by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Cold-formed Steel Framing Members (AC46), dated February 2007 (editorially revised April 2008).

7.0 IDENTIFICATION

At a spacing not exceeding 48 inches (1219 mm) on center, each steel stud and track is stamped with the Metal Tech name; the section name as provided in Table 2 of this report; the evaluation report number (ICC-ES ESR-2766); the minimum uncoated base-metal thickness in decimal inches; the steel designation and minimum specified yield strength; and the galvanization coating designation for studs and tracks with a G60 galvanization coating designation.

TABLE 1—UNCOATED BASE-METAL THICKNESSES

DESIGN THICKNESS (in)	MINIMUM THICKNESS ¹	
	(in)	(mils)
0.0346	0.0329	33
0.0451	0.0428	43
0.0566	0.0538	54
0.0668	0.0635	64

For SI: 1 inch = 25.4 mm; 1 mil = 0.0254 mm.

¹Minimum thickness represents 95 percent of the design thickness and is the minimum acceptable thickness of the uncoated base-metal delivered to the jobsite.

TABLE 2-A

PROFILE DESCRIPTIONS ¹						
Metal Studs						
SECTION	F _y (ksi)	Minimum Thickness (mils)	STUD DEPTH (in)	FLANGE WIDTH (in)	LIP LENGTH (in)	INSIDE CORNER RADII (in)
350S162-33	33	33	3.50	1.625	0.5	0.0764
350S162-43	33	43	3.50	1.625	0.5	0.0712
350S162-54	50	54	3.50	1.625	0.5	0.0849
400S250-43	33	43	4.00	2.50	0.5	0.0712
400S250-54	50	54	4.00	2.50	0.5	0.0849
400S250-64	50	64	4.00	2.50	0.5	0.1069
600S250-43	33	43	6.00	2.50	0.5	0.0712
600S250-54	50	54	6.00	2.50	0.5	0.0849
600S250-64	50	64	6.00	2.50	0.5	0.1069
800S250-43	33	43	8.00	2.50	0.5	0.0712
800S250-54	50	54	8.00	2.50	0.5	0.0849
800S250-64	50	64	8.00	2.50	0.5	0.1069

For SI: 1 inch = 25.4 mm; 1 ksi = 6.89 MPa.

TABLE 2-B

PROFILE DESCRIPTIONS ¹					
Metal Tracks					
SECTION	F _y (ksi)	Minimum Thickness (mils)	TRACK DEPTH (in)	FLANGE WIDTH (in)	INSIDE CORNER RADII (in)
350T213-43	33	43	3.50	2.125	0.0712
350T213-54	50	54	3.50	2.125	0.0849

For SI: 1 inch = 25.4 mm; 1 ksi = 6.89 MPa.

TABLE 3-A

STRUCTURAL PROPERTIES										Metal Studs									
SECTION	F _y (ksi)	Minimum Thickness (mils)	GROSS SECTION PROPERTIES				EFFECTIVE SECTION PROPERTIES				ALLOWABLE MOMENT, M _a (ft-lbf)				TORSIONAL SECTION PROPERTIES				
			Weight (lbf/ft)	Area (in ²)	I _{xx} (in ⁴)	R _x (in)	I _{yy} (in ⁴)	R _y (in)	I _{xx} (in ⁴)	S _{xx} (in ³)	Area (in ²)	J (x10 ³ in ⁴)	C _w (in ⁶)	X _o (in)	R _o (in)	Beta			
350S162-33	33	33	0.877	0.258	0.508	1.404	0.098	0.617	0.508	0.257	0.191	424	0.1029	0.2729	-1.3509	2.0439	0.5631		
350S162-43	33	43	1.137	0.334	0.654	1.400	0.125	0.612	0.654	0.357	0.259	587	0.2265	0.3453	-1.3390	2.0314	0.5655		
350S162-54	50	54	1.412	0.415	0.804	1.393	0.152	0.606	0.804	0.426	0.330	1062	0.4430	0.4183	-1.3307	2.0191	0.5657		
400S250-43	33	43	1.482	0.436	1.201	1.660	0.370	0.922	1.190	0.448	0.297	738	0.2953	1.2529	-2.0692	2.8085	0.4572		
400S250-54	50	54	1.845	0.542	1.483	1.654	0.454	0.915	1.450	0.530	0.393	1322	0.5790	1.5312	-2.0606	2.7961	0.4569		
400S250-64	50	64	2.158	0.634	1.721	1.647	0.523	0.908	1.687	0.665	0.491	1659	0.9431	1.7628	-2.0556	2.7864	0.4558		
600S250-43	33	43	1.789	0.526	3.016	2.395	0.424	0.898	2.940	0.839	0.284	1381	0.3565	2.9846	-1.8082	3.1322	0.6667		
600S250-54	50	54	2.230	0.655	3.735	2.387	0.520	0.891	3.563	1.003	0.364	2501	0.6999	3.6598	-1.7990	3.1191	0.6673		
600S250-64	50	64	2.612	0.768	4.347	2.380	0.599	0.884	4.244	1.217	0.484	3035	1.1418	4.2262	-1.7926	3.1075	0.6672		
800S250-43	33	43	2.096	0.548	5.882	3.090	0.462	0.866	5.797	1.177	0.281	1938	0.4177	5.6740	-1.6124	3.5914	0.7984		
800S250-54	50	54	2.615	0.769	7.298	3.082	0.567	0.859	7.043	1.417	0.357	3534	0.8207	6.9710	-1.6030	3.5780	0.7993		
800S250-64	50	64	3.067	0.901	8.508	3.072	0.653	0.851	8.308	1.819	0.474	4538	1.3405	8.0647	-1.596	3.5654	0.7996		

For SI: 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 in² = 645 mm²; 1 in³ = 1.64x10³ mm³; 1 in⁴ = 4.16x10⁶ mm⁴; 1 in⁶ = 2.69x10¹⁰ mm⁶; 1 ft-lbf = 1.36 Nm; 1 lbf/ft = 14.6 N/m; 1 ksi

NOTES:

- Gross properties are based on the full-unreduced cross section of the studs, away from web punchouts.
- Use the effective moment of inertia for deflection calculations.
- Table values are based on studs with web punchouts.

SYMBOLS:

- I_{xx}=Strong axis moment of inertia.
- R_x=Strong axis radius of gyration.
- I_{yy}=Weak axis moment of inertia.
- R_y=Weak axis radius of gyration.
- S_{xx}=Strong axis section modulus.
- M_a=Allowable bending moment.
- J=St. Venant torsion constant.
- C_w=Torsional warping constant.
- X_o=Distance from shear center to neutral axis.
- R_o=Torsional radii of gyration.
- Beta=Torsional flexural constant.

TABLE 3-B

STRUCTURAL PROPERTIES										Metal Tracks									
SECTION	F _y (ksi)	Minimum Thickness (mils)	GROSS SECTION PROPERTIES				EFFECTIVE SECTION PROPERTIES				ALLOWABLE MOMENT, M _a (ft-lbf)				TORSIONAL SECTION PROPERTIES				
			Weight (lbf/ft)	Area (in ²)	I _{xx} (in ⁴)	R _x (in)	I _{yy} (in ⁴)	R _y (in)	I _{xx} (in ⁴)	S _{xx} (in ³)	Area (in ²)	J (x10 ³ in ⁴)	C _w (in ⁶)	X _o (in)	R _o (in)	Beta			
350T213-43	33	43	1.1632	0.3418	0.7099	1.4411	0.1631	0.6907	0.5702	0.2086	0.1750	344	0.2318	0.3421	-1.4214	2.1387	0.5583		
350T213-54	50	54	1.4521	0.4267	0.8795	1.4356	0.2026	0.6890	0.7123	0.2665	0.2460	665	0.4557	0.4227	-1.4220	2.1349	0.5563		

For SI: 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 in² = 645 mm²; 1 in³ = 1.64x10³ mm³; 1 in⁴ = 4.16x10⁶ mm⁴; 1 in⁶ = 2.69x10¹⁰ mm⁶; 1 ft-lbf = 1.36 Nm; 1 lbf/ft = 14.6 N/m; 1 ksi

NOTES:

- Gross properties are based on the full-unreduced cross section of the tracks.
- Use the effective moment of inertia for deflection calculations.

SYMBOLS:

- I_{xx}=Strong axis moment of inertia.
- R_x=Strong axis radius of gyration.
- I_{yy}=Weak axis moment of inertia.
- R_y=Weak axis radius of gyration.
- S_{xx}=Strong axis section modulus.
- M_a=Allowable bending moment.
- J=St. Venant torsion constant.
- C_w=Torsional warping constant.
- X_o=Distance from shear center to neutral axis.
- R_o=Torsional radii of gyration.
- Beta=Torsional flexural constant.

TABLE 4

ALLOWABLE CONCENTRATED LOADS AND END REACTIONS BASED ON WEB CRIPPLING^{1,2}				
Metal Studs				
SECTION	Cond 1³ (lbs)	Cond 2⁴ (lbs)	Cond 3³ (lbs)	Cond 4⁴ (lbs)
350S162-33	166	445	131	484
350S162-43	278	768	240	842
350S162-54	637	594	1761	2005
400S250-43	274	763	227	819
400S250-54	628	1750	569	1960
400S250-64	842	2324	812	2711
400S250-64	259	745	185	743
600S250-54	599	1713	482	1802
600S250-64	806	2279	703	2514
600S250-64	247	730	150	678
800S250-54	575	1682	409	1670
800S250-64	776	2241	612	2350

¹ Values are for unpunched members and for punched members where the clear distance between the edge of bearing and the edge of the punchout is at least 2.5 times the depth of the web.

² Allowable web conditions are as follows:

(See Figure 2 for illustration)

Cond 1 - End One Flange Loading

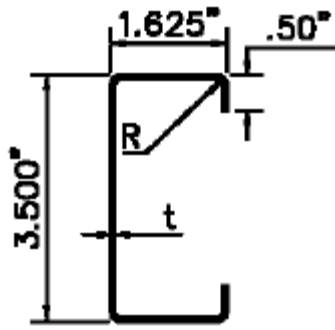
Cond 3 - End Two Flange Loading

Cond 2 - Interior One Flange Loading

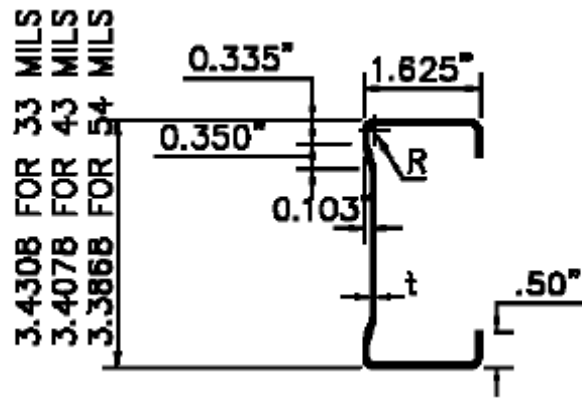
Cond 4 - Interior Two Flange Loading

³ Values are based on 1-inch end bearing length.

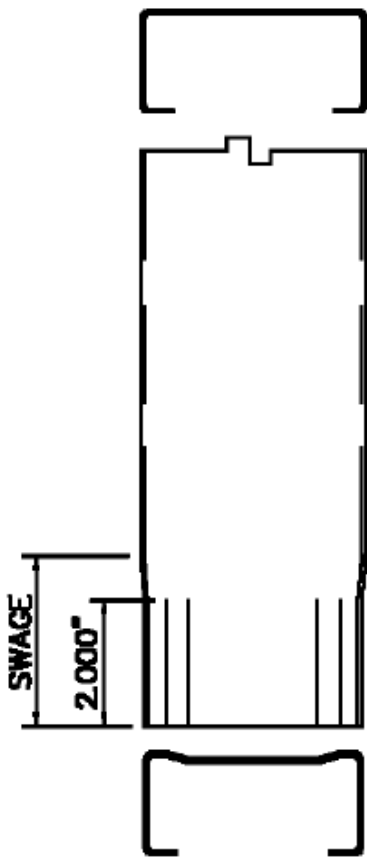
⁴ Values are based on 3.5-inch interior bearing length.



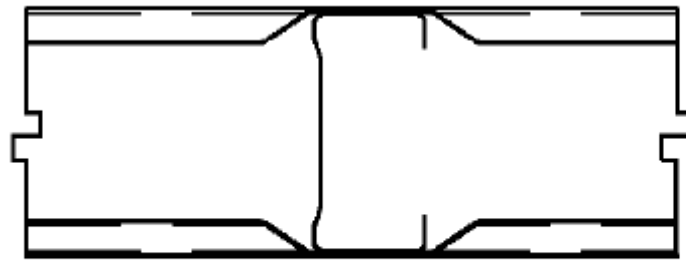
350S162 STUD
SECTION PROFILE



350S162 STUD SECTION
AT SWAGED END

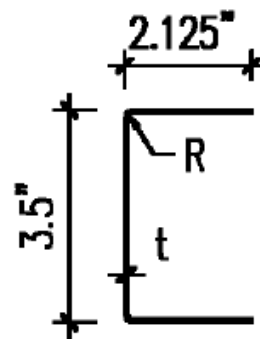


VIEW OF SWAGED END



STUD
LOCATION

PLAN VIEW OF TRACK



350T213 TRACK SECTION PROFILE

FIGURE 1—TYPICAL STUD AND TRACK SECTION PROFILES

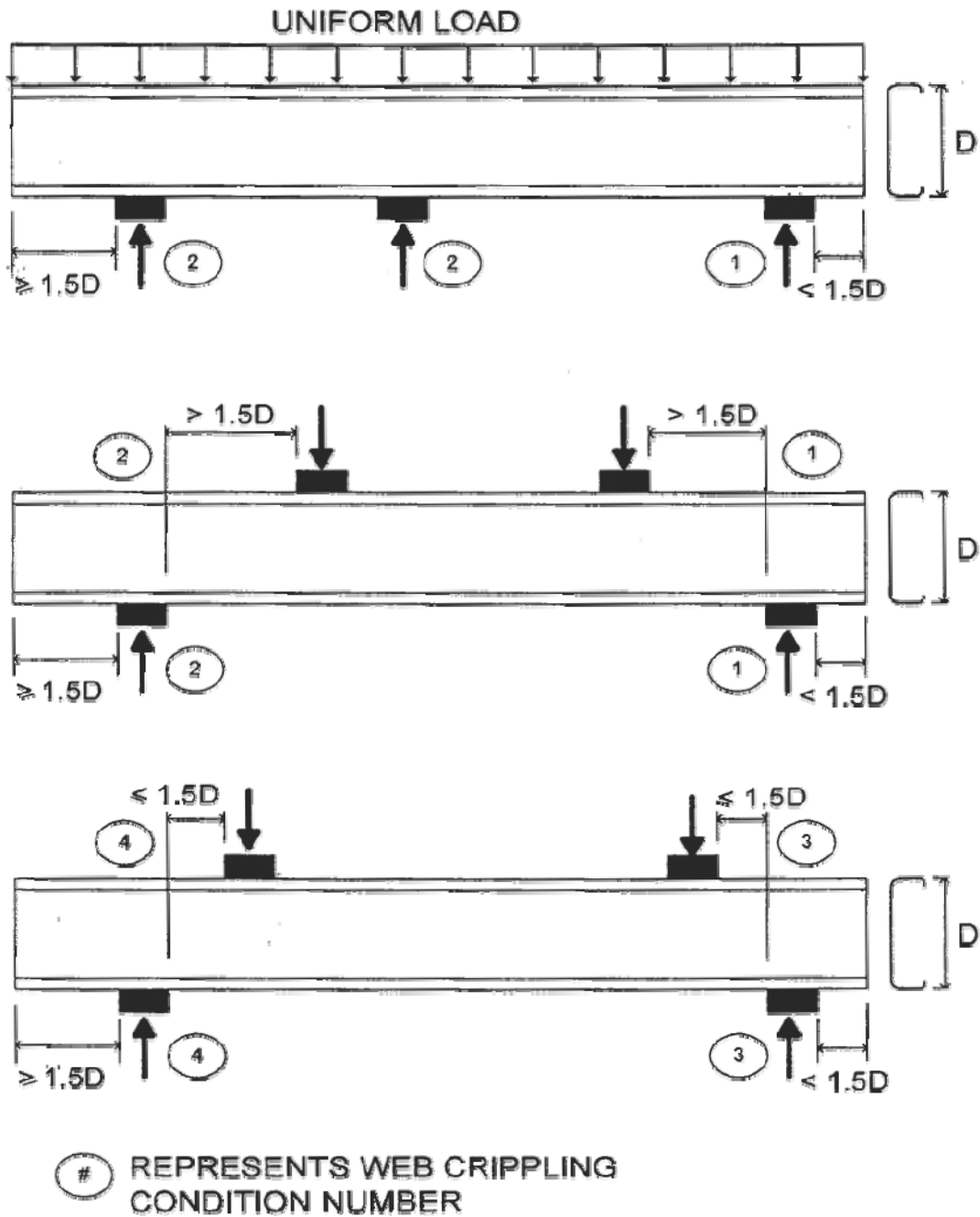


FIGURE 2—WEB CRIPPLING CONDITIONS