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RESEARCH REPORT: RR 26128
(CSI # 05 40 00 and 09 21 16)

REEVALUATION DUE
DATE: April 1, 2019
Issued Date: April 1, 2018
Code: 2017 LABC

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GENERAL APPROVAL – Howick Cold Formed Steel Framing Load Bearing and Non-Load Bearing Members

DETAILS

Howick's cold-formed steel profiles are recognized for use in framing of non-load bearing interior walls, curtain walls, and load bearing walls. The steel components described in this report comply with Section 2210 of the 2017 Los Angeles Building Code (LABC).

Howick's deflection track is a top track that is recognized for use in non-load-bearing, cold-formed steel framed wall assemblies where vertical movements between the top of the wall and supporting structure must be accommodated. The deflection track may accommodate up to +/- 3/4-in. of vertical movement.

The structural cold-formed steel profiles recognized in this report are limited to those products noted in Table 2, Table 5, and Table 6, as fabricated at the manufacturing facility herein. The components are formed from coils of steel in machines, such as the one shown in Figure 1, and have been designed in accordance with Section 2210 of the 2017 LABC. See Figure 1 for component cross sections. Material thickness, yield strength and section properties are provided in Table 1, Table 2, Table 5, and Table 6.

Structural members are cold-formed from steel coils conforming to ASTM A1003 Structural Grade 33 Type H (ST33H), Structural Grade 55 Type H (ST50H) or Structural Grade 80 Type H

(HSLAS 80). Additionally structural members may conform to ASTM A653 Structural Steel (SS) Grade 33 or SS Grade 50 Class 1. Structural members have a minimum protective coating of G60 or AZ50 as described in ASTM A653 and ASTM A792, respectively.

The sections evaluated in this report are identified in Table 2. Gross, effective, and torsional section properties are set forth in Table 2 through Table 5.

The studs may be manufactured with or without web punch-outs. When punch-outs are provided, they are located along the center of the web and have a maximum width of 1-1/2 in. (64 mm) and maximum length of 4-1/2-in. (114 mm) in members having an out-to-out flange width of 1.625-in. Members having out-to-out flange widths of 2-in. have stiffened circular holes having a 3-in. diameter for 8-in. deep members and 5.5-in. diameter for deeper members. The holes are spaced a minimum of 24-in. on center and not less than 12-in. (254 mm) from each end of the member. Punch-outs in sections having an *h/t* ratio exceeding 200, as identified in Table 3, shall not be provided unless evaluated independently from this report. Members having flange widths greater than 2-in. have not been evaluated for web punch-outs.

Tracks may be provided with a stiffening lip that is removed only at the stud locations (Figure 1).

Deflection tracks consist of an unstiffened C-shape with flanges having 1/4-in. wide by up to 1-1/2 in. long vertical slots spaced every 1-in. to 24-in. on-center along the length of the section.

The approval is subject to the following conditions:

1. The scope of this report is limited to cold-formed steel profiles specified herein. Details related to incorporation of the product beyond that scope are the responsibility of the designer of record.

2. Analysis and design under the Los Angeles Building Code shall be in accordance with LABC Section 2210. Structural capacities shall be determined in accordance with the applicable edition of AISI S100 based on structural properties provided in this report

3. General. Cold-formed steel profiles shall be fabricated, identified and erected in accordance with this report, the approved construction documents and the 2017 Los Angeles Building Code. In the event of a conflict between the manufacturer's published installation instructions and this report, this report shall govern. Approved construction documents shall be available at all times on the jobsite during installation.

4. Construction documents demonstrating compliance with this approval shall be submitted to the Structural Plan Check Section of the Permit and Engineering Bureau for review. The calculations and detail drawings shall be prepared, signed and sealed by a licensed structural or civil engineer or architect registered in the State of California.

5. Minimum uncoated base steel thickness of the framing members delivered to the jobsite shall be 95 percent of the design thickness shown in Table 1.

6. All material shall be stored dry and shall be kept free of excessive corrosion.

7. Stud member end reactions, resulting from allowable heights and loads, as noted in the accompanying tables, shall be checked with the web crippling tables noted in this report.

8. Howick framing members are marked, at a maximum of 96 inches on center, with the manufacturer's name, the section designation, the minimum uncoated steel thickness, the minimum specified yield strength, the metallic coating designation, the Los Angeles Research Report Number (LARR 26128).

DISCUSSION

This report is in compliance with the 2017 City of Los Angeles Building Code.

The approval is based on calculations in accordance with AISI S100 North American Specification for the Design of Cold-Formed Steel Structural Members, 2007 Edition, with Supplement 2, dated 2010.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this approval have been met in the project in which it is to be used.

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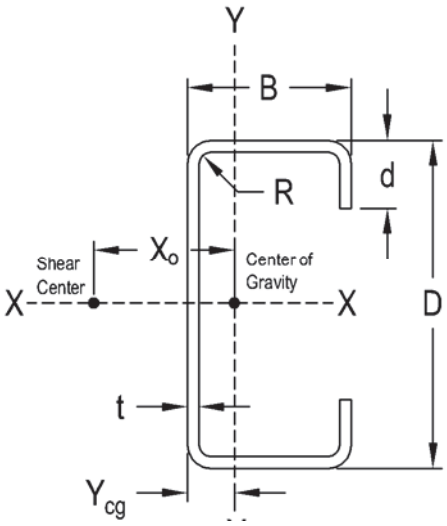
EB
LARR 26128
TLB1800041
R03/21/18
2210, 2211, AISI S100

Table 1: Typical Base Metal Thicknesses

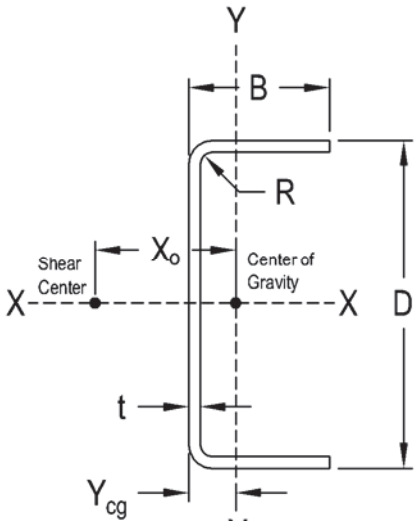
Thickness (mils)	Minimum Thickness[1] (in.)	Design Thickness (in.)	Reference Gage[2]
33	0.0329	0.0346	20 - Structural
43	0.0428	0.0451	18
54	0.0538	0.0566	16

[1] Minimum thickness represents 95% of the design thickness and is the minimum acceptable thickness delivered to the job site in accordance with AISI S100, Section A2.4.

[2] U.S. standard gage for uncoated hot- and cold-rolled sheets. Gage numbers are only provided as a reference and should not be used to order, design or specify steel studs, joists or tracks.



Stud (S) Section



Track (T) and Deflection Track (DT) Section

Figure 1: Stud and Track Geometry

Table 2: Section Designations and Gross Properties

Designation	Section Geometry					Gross Section Properties[1, 2]							
	Web Depth D (in.)	Flange Width B (in.)	Design Thickness t (in.)	Lip Length d (in.)	Bend Radius R (in.)	Area ($in.^2$)	Weight (lbf/ft)	I_{xx} ($in.^4$)	S_{xx} ($in.^3$)	R_x (in.)	I_{yy} ($in.^4$)	S_{yy} ($in.^3$)	R_y (in.)
STUD (S) GROSS SECTION PROPERTIES													
350S162-33	3.500	1.625	0.0346	0.500	0.0625	0.259	0.880	0.511	0.292	1.406	0.099	0.092	0.618
350S162-43	3.500	1.625	0.0451	0.500	0.0625	0.335	1.140	0.657	0.375	1.400	0.126	0.117	0.613
362S175-33	3.625	1.750	0.0346	0.500	0.0625	0.272	0.924	0.582	0.321	1.464	0.119	0.103	0.662
362S175-43	3.625	1.750	0.0451	0.500	0.0625	0.352	1.200	0.748	0.413	1.458	0.152	0.131	0.657
600S175-33	6.000	1.750	0.0346	0.500	0.0625	0.354	1.200	1.880	0.626	2.304	0.140	0.108	0.628
600S175-43	6.000	1.750	0.0451	0.500	0.0625	0.459	1.560	2.420	0.807	2.297	0.178	0.138	0.623
600S175-54	6.000	1.750	0.0566	0.500	0.0625	0.573	1.950	3.010	1.002	2.291	0.218	0.169	0.618
DEFLECTION TRACK (DT) GROSS SECTION PROPERTIES													
362DT216-43	3.625	2.156	0.0451	--	0.0625	0.351	1.190	0.778	0.429	1.490	0.172	0.111	0.700
600DT216-43	6.000	2.156	0.0451	--	0.0625	0.458	1.560	2.470	0.823	2.323	0.200	0.119	0.661
600DT216-54	6.000	2.156	0.0566	--	0.0625	0.573	1.950	3.080	1.026	2.318	0.249	0.148	0.659

[1] Definitions of structural properties:

Area The cross sectional area of the full un-reduced cross-section of the studs, away from any punch outs.

Weight The weight per foot of the full un-reduced cross-section of the studs, away from any punch outs.

I_{xx} Moment of inertia of the gross section about the strong axis (X-X)

S_{xx} Section modulus of the gross section about the strong axis (X-X)

R_x Radius of gyration of the gross section about the strong axis (X-X)

I_{yy} Moment of inertia of the gross section about the weak axis (Y-Y)

S_{yy} Section modulus of the gross section about the weak axis (Y-Y)

R_y Radius of gyration of the gross section about the weak axis (Y-Y)

[2] Tabulated gross properties are based on the full un-reduced cross section of the studs, away from any pushouts.

Table 3: Web Depth-to-Thickness Ratios[1, 2, 3] (h/t)

Designation	Web Depth, D (in.)	33 mil 0.0346 in.	43 mil 0.0451 in.	54 mil 0.0566 in.
350S	3.500	96	73	58
362S	3.625	99	76	60
600S	6.000	168	128	102

[1] *h* value used for *h/t* calculations is the flat width of the web, which is the out-to-out size, minus twice the thickness, minus twice the inside bend radius.

[2] Where *h/t* values exceed 200, bearing stiffeners satisfying the requirements of AISI S100, Section C3.7.1, must be provided and holes in the web are not permitted unless evaluated independently.

[3] *h/t* values exceeding 260 are marked with a dash (-), such members shall not be as structural members.

Table 4: Torsional Properties[1]

Designation	Design Thickness (in.)	J ($in.^4$)	C_w ($in.^6$)	r_o (in.)	x_o (in.)	m (in.)	j (in.)	β
STUD (S) TORSIONAL PROPERTIES								
350S162-33	0.0346	0.000103	0.277	2.030	-1.325	0.796	2.070	0.573
350S162-43	0.0451	0.000227	0.350	2.020	-1.313	0.789	2.060	0.575
362S175-33	0.0346	0.000108	0.352	2.150	-1.422	0.851	2.180	0.561
362S175-43	0.0451	0.000238	0.446	2.130	-1.410	0.844	2.180	0.563
600S175-33	0.0346	0.000141	1.020	2.660	-1.173	0.735	3.300	0.806
600S175-43	0.0451	0.000311	1.300	2.650	-1.162	0.729	3.300	0.808
600S175-54	0.0566	0.000612	1.590	2.640	-1.150	0.722	3.310	0.810
DEFLECTION TRACK (DT) TORSIONAL PROPERTIES								
362DT216-43	0.0451	0.000238	0.387	2.170	-1.419	0.834	2.260	0.574
600DT216-43	0.0451	0.000310	1.260	2.690	-1.177	0.728	3.320	0.808
600DT216-54	0.0566	0.000612	1.570	2.680	-1.174	0.726	3.310	0.808

[1] Definitions of torsional properties:

- J St. Venant torsional constant
- C_w Torsional warping constant
- r_o Polar radius of gyration about the shear center
- x_o Distance from the shear center to the centroid along the principal X-Axis
- m Distance from the shear center to the mid-plane of the web
- j Section property for torsional-flexural buckling
- β $1 – (x_o/r_o)^2$

Table 5: Effective Section Properties[1, 2, 3]

Designation	Steel Grade	ST33H: F_y = 33 ksi, F_u = 45 ksi ST50H: F_y = 50 ksi, F_u = 65 ksi HSLAS 80: F_y = 80 ksi, F_u = 90 ksi I_{xe} (in.^{4})	S_{xe} (in.^{3})	F_{ya} (ksi)	M_{al} (kip-in.)	M_{ad} (kip-in.)	L_u (in.)	V_a (lb)	V_{aPO} (lb)
STUD (S) EFFECTIVE SECTION PROPERTIES									
350S162-33	ST33H	0.511	0.280	35.6	5.60	5.20	41.9	1024	495
	ST50H	0.510	0.260	53.4	7.70	6.90	35.6	1115	539
	ST80H	0.490	0.228	82.5	10.90	9.30	28.3	1115	539
350S162-43	ST33H	0.660	0.370	36.2	8.10	7.30	41.2	1739	637
	ST50H	0.660	0.340	54.2	10.10	9.80	35.4	2141	784
	ST80H	0.650	0.310	83.3	14.70	13.40	28.1	2485	911
362S175-33	ST33H	0.580	0.300	35.4	5.90	5.60	44.8	1024	529
	ST50H	0.570	0.270	53.2	8.20	7.30	37.9	1074	555
	ST80H	0.547	0.236	82.4	11.30	9.80	30.3	1074	555
362S175-43	ST33H	0.750	0.395	36.0	8.52	7.80	44.2	1739	662
	ST50H	0.750	0.360	53.9	10.80	10.40	37.8	2141	839
	ST80H	0.710	0.328	83.1	15.70	14.10	30.0	2394	939
600S175-33	ST33H	1.880	0.590	35.4	11.70	9.70	46.3	635	635
	ST50H	1.870	0.490	53.2	14.50	12.50	38.0	635	635
	ST80H	1.824	0.389	82.4	18.70	16.60	30.5	935	635
600S175-43	ST33H	2.420	0.780	36.0	16.70	13.90	44.0	1411	1241
	ST50H	2.420	0.720	53.9	21.60	18.20	37.5	1411	1241
	ST80H	2.366	0.580	83.1	27.80	24.30	30.0	1411	1241
600S175-54	ST33H	3.000	1.000	36.6	21.90	18.70	43.3	2739	1910
	ST50H	3.010	0.950	54.7	28.30	24.80	35.6	2800	1952
	ST80H	2.962	0.837	83.9	40.10	33.50	29.6	2800	1952
30 ksi DEFLECTION TRACK (DT) EFFECTIVE SECTION PROPERTIES									
362DT216-43	ST33H	0.605	0.257	33.0	5.07	5.07	49.5	1739	--
	ST50H	0.571	0.239	50.0	7.15	7.15	40.4	2141	--
	ST80H	0.541	0.211	80.0	10.1	10.1	32.1	2394	--
600DT216-43	ST33H	2.00	0.549	33.0	10.8	10.8	49.0	1411	--
	ST50H	1.95	0.444	50.0	13.3	13.3	40.3	1411	--
	ST80H	1.90	0.355	80.0	17.0	17.0	32.2	1411	--
600DT216-54	ST33H	2.63	0.731	33.0	14.5	14.5	48.9	2739	--
	ST50H	2.51	0.689	50.0	20.6	20.6	39.8	2800	--
	ST80H	2.43	0.554	80.0	26.5	26.5	31.9	2800	--

[1] Definitions of structural properties:

I_{xe} Moment of inertia for deflection calculations about the strong axis (X-X)

S_{xe} Effective section modulus about the strong axis (X-X) Stress = F_{ya} based on local buckling

F_{ya} Average yield stress of section considering the cold work of forming

M_{al} Allowable bending moment limited by local buckling only about the X-X axis

M_{ad} Allowable bending moment limited by distortional buckling, assuming $K\phi = 0$ (no bracing from sheathing) and $\beta = 1.0$ (no moment gradient)

L_u Maximum unbraced length for lateral-torsional buckling. Members are considered fully braced when the unbraced length is less than L_u. If the unbraced length exceeds L_u then lateral-torsional buckling must be evaluated independently.

V_a Allowable strong axis (X-X) shear load, away from punch-out

V_{aPO} Allowable strong axis (X-X) shear at the punch-out, see limitations in note 3

[2] For deflection calculations, use the effective moment of inertia

[3] Where *h/t* values exceed 200, bearing stiffeners satisfying the requirements of AISI S100, Section C3.7.1, must be provided and the shear strengths provided do not apply.

[4] Members evaluated using the direct strength analysis method due to elements exceeding slenderness limits in AISI S100, Section B1.1.

Table 6: Deflection Track (DT) Allowable Stud Lateral End Reaction (lbf)[1]

Designation	Max. Gap[2] (in.)	F_y = 33 ksi Stud Spacing (in. on-center)			F_y = 50 ksi Stud Spacing (in. on-center)			F_y = 80 ksi Stud Spacing (in. on-center)		
		12	16	24	12	16	24	12	16	24
362DT216-43	0.50	144	163	163	218	247	247	349	396	396
600DT216-43	0.50	144	163	163	218	247	247	349	396	396
600DT216-54	0.50	213	213	213	323	323	323	516	516	516
362DT216-43	0.75	96	123	123	145	187	187	232	299	299
600DT216-43	0.75	96	123	123	145	187	187	232	299	299
600DT216-54	0.75	151	158	158	229	240	240	366	384	384

[1] The allowable reaction is the point load allowed into the deflection track imposed by a single stud.
[2] Values apply where the distance between the stud web at the end of the stud and the track web does not exceed stated maximum gap.