LEGACY REPORT

NER-529

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Legacy report on the BOCA® *National Building Code*/1996, the 1997 *Standard Building Code*©, and the 1997 *Uniform Building Code*™

DIVISION 05 - METALS
Section 05400 - Cold-Formed Metal Framing

ALPINE ENGINEERED PRODUCTS, INC.
1950 MARLEY DRIVE
HAINES CITY, FLORIDA 33844

LISTEE:

Unimast, Inc.
4825 North Scott Street, Suite 300
Schiller Park, Illinois 60176

1.0 SUBJECT

Alpine TrusSteel Sections

2.0 PROPERTY FOR WHICH EVALUATION IS SOUGHT

Structural

3.0 DESCRIPTION

3.1 General

Alpine TrusSteel Sections consist of four series of framing member profiles that are intended for use as components of truss assemblies to transfer imposed loads to supporting construction. The Alpine TrusSteel Sections are cold rolled steel with a “U” cross-section. Each member within a series has identical cross-sectional dimensions except for the thickness of the steel from which the members are fabricated. See Figures 1, 2, 3 and 4 of this report.

3.2 Section Types

3.2.1 Series 1

The three Alpine TrusSteel Sections in Series 1 are identified as 28TSC2.75 1.5 x 2.75-28-55KSI G60, 33TSC2.75 1.5 x 2.75-33-55KSI G60 and 43TSC2.75 1.5 x 2.75-43-55KSI G60 and have uncoated design thicknesses of 0.0299 inches (0.76 mm), 0.0346 inches (0.88 mm) and 0.0451 inches (1.15 mm) respectively. See Figure 1 of this report.

3.2.2 Series 2

The four Alpine TrusSteel Sections in Series 2 are identified as 28TSC4.00 2.5X4.00-28-55KSI G60, 33TSC4.00 2.5X4.00-33-55KSI G60, 43TSC4.00 2.5X4.00-43-55KSI G60 and 54TSC4.00 2.5X4.00-54-55KSI G60 and have uncoated design thicknesses of 0.0299 in. (0.76 mm), 0.0346 in. (0.88 mm), 0.0451 in. (1.15 mm) and 0.0566 in. (1.44 mm), respectively. See Figure 2 of this report.

3.2.3 Series 3

The one Alpine TrusSteel splice section in Series 3 is identified as 33TSCS2.75 1.41X2.47-33-55KSI G60 and has an uncoated design thickness of 0.0346 in. (0.88 mm). See Figure 3 of this report.

3.2.4 Series 4

The one Alpine TrusSteel splice section in Series 4 is identified as 54TSCS4.00 2.37X3.38-54-55KSI G60 and has an uncoated design thickness of 0.0566 in. (1.44 mm). See Figure 4 of this report.

3.3 Materials

The Alpine TrusSteel Sections are formed from ASTM A653, Structural Steel, Grade 50, Class 1 steel having a minimum yield strength of 55,000 psi, a minimum tensile strength of 65,000 psi, and a hot-dipped galvanized coating conforming to ASTM A653-98, G60.

4.0 INSTALLATION

The design and construction of the Alpine TrusSteel Sections shall be in accordance with the cold-formed steel structural design standard referenced by, and the requirements of, the *BOCA National Building Code/1996* (Section 2206), the *1997 Standard Building Code* (Section 2204), and the *1997 Uniform Building Code* (Section 2217), as applicable. The allowable design properties and allowable loads indicated in Tables 1 and 2 of this report shall be used in the structural design of the Alpine TrusSteel Sections.

The Alpine TrusSteel Sections are designed for use as components of truss assemblies. The design and fabrication of truss assemblies fabricated from Alpine TrusSteel sections are not within the scope of this report. Where confirmation of truss assembly design is requested, procedures in Section F

of the AISI Specification for the Design of Cold-Formed Steel Structural Members, as referenced in the BOCA® *National Building Code*/1996, the 1997 *Standard Building Code*©, and the 1997 *Uniform Building Code*™shall be used as guidelines.

5.0 IDENTIFICATION

Alpine TrusSteel Sections shall be individually marked with the manufacturer's name and member identification, as described in Section 3.2 of this report, the ICC-ES Legacy evaluation report number (NER-529), and the minimum uncoated steel thickness.

Each bundle of Alpine TrusSteel Sections shall be provided with a label containing the manufacturer's name and address, type of member, production date and NEW report number.

6.0 EVIDENCE SUBMITTED

6.1 *Quality Assurance Program Manual for Alpine Engineered Products, Inc.,* Revision No. 4, dated March 12, 1999.

6.2 Computer input data and output results from Cold-Formed Steel (CFS) Design Software for the Alpine TrusSteel Sections, dated December 20, 1996, prepared, signed and sealed by Stuart Lee Lewis, P.E., for the first series of Alpine TrusSteel Sections.

6.3 Computer input data and output results from Cold-Formed Steel (CFS) Design Software for the Alpine TrusSteel Sections; dated August 20, 1998, for the second and third series, and September 1, 1998, for the fourth series; prepared, signed and sealed by Sowrirajan Raghavachary, P.E.

6.4 Calculations for the verification of computer program outputs, dated November 26, 1996, prepared, signed and sealed by Stuart Lee Lewis, P.E.

6.5 *Quality Control and Inspection Procedure Manual for TrusSteel,* manufactured at Unimast Incorporated, Morrow, Georgia, dated March 22, 1999 (revised).

6.6 *Quality Control and Inspection Procedure Manual for TrusSteel,* manufactured at Unimast Incorporated, Franklin Park, Illinois, dated March 15, 1999 (revised).

7.0 CONDITIONS OF USE

The ICC-ES Subcommittee for the National Evaluation Service finds that Alpine TrusSteel Sections described in this report comply with the BOCA® *National Building Code/*1996, the 1997 *Standard Building Code*©, and the 1997 *Uniform Building Code*™, subject to the following conditions:

7.1 Design and construction shall be in accordance with this report and the manufacturer's assembly instructions. This report does not evaluate structural connections of the Alpine TrusSteel Sections.

7.2 Alpine Engineered Products, Inc., shall provide the user of this report with complete instructions on the assembly of the Alpine TrusSteel Sections. When manufacturer's assembly instructions differ from this report, this report shall be null and void. Information within the manufacturer's assembly instructions that is not specifically evaluated in this report is beyond the scope of this report.

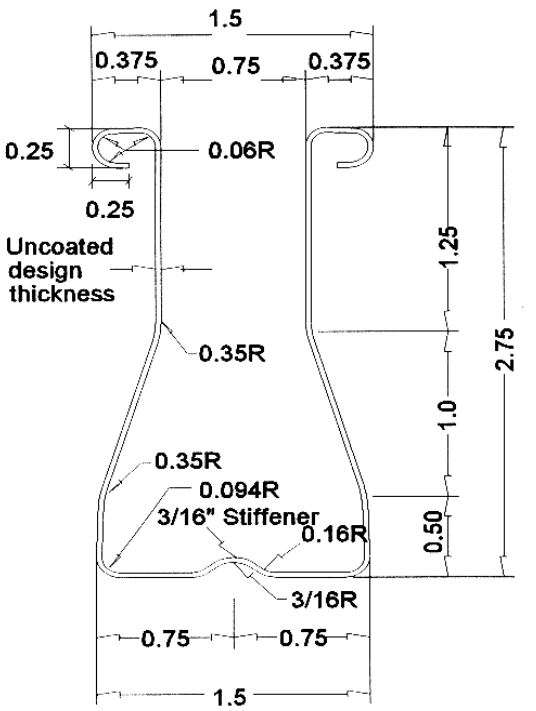
7.3 Design calculations and details, using the values in the tables of this report, for specific applications shall be furnished to the code official verifying compliance with this report and the applicable code. The individual preparing such documents shall possess the necessary credentials regarding competency and qualifications as required by the applicable code and the professional registration laws of the state where the construction is undertaken. The documents shall describe the connections and installation of the Alpine TrusSteel Sections. The construction documents shall be available on the job site during installation.

7.4 The uncoated minimum steel thickness of cold-formed members discussed in this report, as delivered to the job site, shall be a minimum of 95 percent of the uncoated thickness used in the design.

7.5 This report is limited to TrusSteel sections manufactured at the Alpine Engineered Products, Inc., facility in Sacramento, California, and the Unimast, Inc., facilities in Franklin Park, Illinois, and Morrow, Georgia.

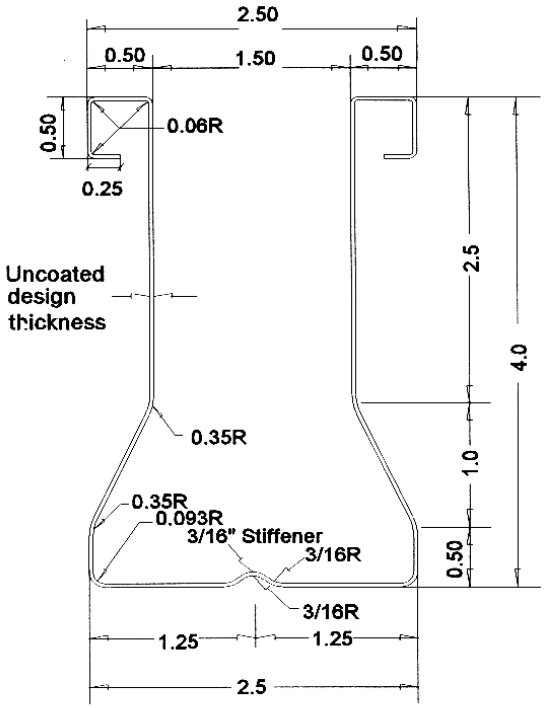
7.6 Recognition of complete truss or other assemblies fabricated from the TrusSteel Sections is beyond the scope of this report. Trusses shall be fabricated by an approved fabricator monitored by a quality assurance program in accordance with the applicable code.

7.7 This report is subject to periodic re-examination. For information on the current status of this report, consult the ICC-ES website.



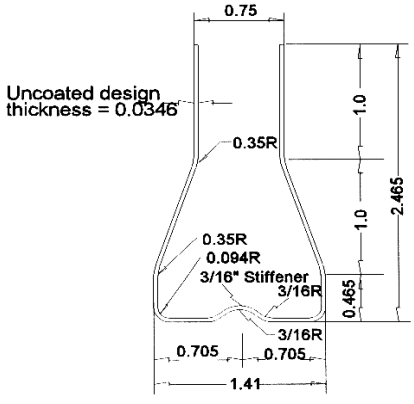
Uncoated Design Thickness:
28TSC2.75 1.5 x 2.75 - 28 - 55KSI G60 = 0.0299
33TSC2.75 1.5 x 2.75 - 33 - 55KSI G60 = 0.0346
43TSC2.75 1.5 x 2.75 - 43 - 55KSI G60 = 0.0451

Figure 1*
ALPINE TRUSSTEEL SECTION - SERIES 1



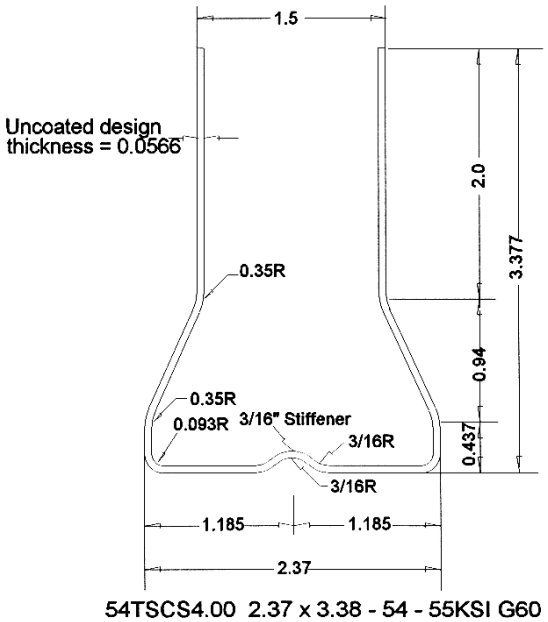
Uncoated Design Thickness
28TSC4.00 2.5 x 4.00 - 28 - 55KSI G60 = 0.0299
33TSC4.00 2.5 x 4.00 - 33 - 55KSI G60 = 0.0346
43TSC4.00 2.5 x 4.00 - 43 - 55KSI G60 = 0.0451
54TSC4.00 2.5 x 4.00 - 54 - 55KSI G60 = 0.0566

Figure 2*
ALPINE TRUSSTEEL SECTION - SERIES 2



33TSCS2.75 1.41 x 2.47 - 33 - 55KSI G60

Figure 3*
ALPINE TRUSSTEEL SPLICE SECTION - SERIES 3



54TSCS4.00 2.37 x 3.38 - 54 - 55KSI G60

Figure 4*
ALPINE TRUSSTEEL SPLICE SECTION - SERIES 4

Notes:
1. All dimensions indicated in Figures 1 to 4 are in inches.
2. 28, 33, 43 and 54 denote the uncoated minimum steel thickness in thousandths of an inch, as delivered to the job site.

*THESE DRAWINGS ARE FOR ILLUSTRATION PURPOSES ONLY. THEY ARE NOT INTENDED FOR USE AS CONSTRUCTION DOCUMENTS FOR THE PURPOSE OF DESIGN, FABRICATION OR ERECTION.

TABLE 1 — STRUCTURAL PROPERTIES OF ALPINE STEEL SECTIONS

SECTION NAME	T in.	WEIGHT lbs./ft	GROSS SECTION PROPERTIES					EFFECTIVE SECTION PROPERTIES			TORSIONAL SECTION PROPERTIES				
			A_g in^2	I_x in^4	r_x in.	I_y in^4	r_y in.	A_e in^2	$+S_x$ in^3	$-S_x$ in^3	x_o in.	y_o in.	$J*10^{-4}$ in^4	C_w in^6	r_o in.
28TSC2.75 1.5X2.75-28-55KSI G60	0.0299	0.83	0.2510	0.2450	0.9880	0.0709	0.5315	0.2415	0.1754	0.1754	0.0000	2.6894	0.7480	0.1163	2.9140
33TSC2.75 1.5X2.75-33-55KSI G60	0.0346	0.97	0.2888	0.2803	0.9852	0.0813	0.5306	0.2859	0.2002	0.2002	0.0000	2.6851	1.1524	0.1315	2.9089
43TSC2.75 1.5X2.75-43-55KSI G60	0.0451	1.26	0.3716	0.3562	0.9790	0.1040	0.5289	0.3716	0.2532	0.2532	0.0000	2.6747	2.5194	0.1629	2.8969
28TSC4.00 2.5X4.00-28-55KSI G60	0.0299	1.29	0.3808	0.8081	1.4568	0.3139	0.9079	0.3084	0.3869	0.3484	0.0000	3.7645	1.1347	0.7392	4.1374
33TSC4.00 2.5X4.00-33-55KSI G60	0.0346	1.49	0.4390	0.9284	1.4542	0.3617	0.9077	0.3677	0.4438	0.4240	0.0000	3.7612	1.7517	0.8442	4.1335
43TSC4.00 2.5X4.00-43-55KSI G60	0.0451	1.93	0.5673	1.1902	1.4484	0.4649	0.9053	0.5033	0.5672	0.5672	0.0000	3.7541	3.8465	1.0708	4.1244
54TSC4.00 2.5X4.00-54-55KSI G60	0.0566	2.40	0.7052	1.4660	1.4418	0.5745	0.9026	0.6589	0.6963	0.6963	0.0000	3.7451	7.5310	1.3017	4.1133
33TSCS2.75 1.41X2.47-33-55KSI G60	0.0346	0.75	0.2193	0.1368	0.7898	0.0500	0.4774	0.1505	0.0924	0.0427	0.0000	2.1290	0.8753	0.0852	2.3204
54TSCS4.00 2.37X3.38-54-55KSI G60	0.0566	1.76	0.5181	0.6200	1.0939	0.3356	0.8048	0.3592	0.2950	0.0726	0.0000	2.7780	5.5328	0.7149	3.0922

NOTE: Effective moment of inertia and section modulii are equal to the gross values when stress in extreme fiber is at yield stress
1 inch=25.4 mm; 1 lb.=4.448 N

Notes for Table 1:

T = Design steel thickness;
A_g = Gross sectional area
I_x = Moment of inertia about x-x axis;
r_x = Gross radius of gyration about x-x axis
I_y = Gross moment of inertia about y-y axis
r_y = Gross radius of gyration about y-y axis
A_e = Effective sectional area with stress in extreme fiber at yield stress (F_y)
S_x = Minimum effective section modulus about major x-x axis. $+S_x$ is for positive bending (compression at the closed end of the section) and $-S_x$ is for negative bending (compression at the open end of the section);
x_o, y_o = Distance from shear center to centroid along the principal x and y axes
J = St. Venant torsional constant;
C_w = Torsional warping constant of the cross section
r_0 = Polar radius of gyration about shear center

TABLE 2— ALLOWABLE VALUES

SECTION NAME	ALLOWABLE VALUES			
	TENSION Ta lbs.	COMPRESSION Pa lbs.	POS. MOMENT +Ma in-lbs.	NEG. MOMENT -Ma in-lbs.
28TSC2.75 1.5X2.75-28-55KSI G60	8283	6931	5787	5787
33TSC2.75 1.5X2.75-33-55KSI G60	9530	8203	6607	6607
43TSC2.75 1.5X2.75-43-55KSI G60	12263	10663	8354	8354
28TSC4.00 2.5X4.00-28-55KSI G60	12566	8849	12766	11497
33TSC4.00 2.5X4.00-33-55KSI G60	14486	10551	14645	13991
43TSC4.00 2.5X4.00-43-55KSI G60	18722	14442	18716	18716
54TSC4.00 2.5X4.00-54-55KSI G60	23272	18907	22977	22977
33TSCS2.75 1.41X2.47-33-55KSI G60	7238	4317	3049	1408
54TSCS4.00 2.37X3.38-54-55KSI G60	17098	10307	9735	2395

Ta = Allowable axial tension assuming no screw holes
Pa = Allowable axial compression for a fully braced section
Ma = Allowable bending moment about major x-x axis, if bending stress only exists with lateral buckling precluded. Positive moment causes compression at the closed end of the section and negative moment causes compression at the open end of the section.

NOTE: 1 lb. = 4.448 N; 1 in-lb. = 112.985 N-mm