



# ICBO Evaluation Service, Inc.

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## EVALUATION REPORT

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ER-5638

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Filing Category: DESIGN—Steel (038)

### ALPINE TRUSSTEEL SECTIONS

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

UNIMAST, INC.  
4825 NORTH SCOTT STREET, SUITE 300  
SCHILLER PARK, ILLINOIS 60176

### 1.0 SUBJECT

Alpine TrusSteel Sections.

### 2.0 DESCRIPTION

#### 2.1 General:

Alpine TrusSteel Sections are available in four series of framing member profiles, and are intended for use as components of truss assemblies transferring imposed loads to supporting construction. The Alpine TrusSteel Sections are cold-rolled steel with a "U" shaped 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.

#### 2.2 Section Types:

**2.2.1 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 inch (0.76 mm), 0.0346 inch (0.88 mm) and 0.0451 inch (1.15 mm), respectively. See Figure 1 of this report.

**2.2.2 Series 2:** The four Alpine TrusSteel Sections in Series 2 are identified as 28TSC4.00 2.5 x 4.00-28-55KSI G60, 33TSC4.00 2.5 x 4.00-33-55KSI G60, 43TSC4.00 2.5 x 4.00-43-55KSI G60 and 54TSC4.00 2.5 x 4.00-54-55KSI G60, and have uncoated design thicknesses of 0.0299 inch (0.76 mm), 0.0346 inch (0.88 mm), 0.0451 inch (1.15 mm) and 0.0566 inch (1.44 mm), respectively. See Figure 2 of this report.

**2.2.3 Series 3:** The one Alpine TrusSteel splice section in Series 3 is identified as 33TSCS2.75 1.41 x 2.47-33-55KSI G60, and has an uncoated design thickness of 0.0346 inch (0.88 mm). See Figure 3 of this report.

**2.2.4 Series 4:** The one Alpine TrusSteel splice section in Series 4 is identified as 54TSCS4.00 2.37 x 3.38-54-55KSI G60, and has an uncoated design thickness of 0.0566 inch (1.44 mm). See Figure 4 of this report.

#### 2.3 Materials:

The Alpine TrusSteel Sections are formed from ASTM A 653, 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 G60 requirements.

### 2.4 Design:

The Alpine TrusSteel Sections comply with the AISI Specification for Design of Cold-formed Steel Structural Members referenced in Chapter 22, Division VII, of the UBC. The allowable design properties and allowable loads indicated in Tables 1 and 2 of this report must 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 required, test procedures in accordance with Section F of the AISI Specification for the Design of Cold-Formed Steel Structural Members, as referenced in Chapter 22, Division VII, Section 2217, of the UBC, must be used as a guideline.

### 2.5 Identification:

Alpine TrusSteel Sections must be individually marked at 48 inches (1219 mm) on center with the name "TrusSteel"; the member identification, as described in Section 2.2 of this report; the evaluation report number (either ICBO ES ER-5638 or NER-529); the minimum uncoated steel thickness; and the steel minimum yield strength, if greater than 33,000 psi (228 MPa).

Each bundle of Alpine TrusSteel Sections must be provided with a label bearing the manufacturer's name (Alpine Engineered Products, Inc., or Unimast, Inc.) and address, the type of member, the production date and the evaluation report number (either ICBO ES ER-5638 or NER-529).

### 3.0 EVIDENCE SUBMITTED

Descriptive details and structural calculations in accordance with the ICBO ES Acceptance Criteria for Steel Studs, Joists and Tracks (AC46), dated April 1998.

### 4.0 FINDINGS

**That the Alpine TrusSteel Sections described in this report comply with the 1997 Uniform Building Code™, subject to the following conditions:**

- 4.1 Allowable design properties and allowable loads are in accordance with Tables 1 and 2 of this report and the manufacturer's instructions. This report does not evaluate structural connections of the Alpine TrusSteel Sections.**
- 4.2 For each project, complete plans and engineering calculations for specific applications, using the values in the tables of this report, are submitted and approved by the building official.**
- 4.3 The uncoated minimum steel thickness of cold-formed members discussed in this report, as delivered to the jobsite, is a minimum of 95 percent of the uncoated thickness used in the design.**

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- 4.4 The Alpine TrusSteel Sections are manufactured at the Alpine Engineered Products, Inc., facility in Sacramento, California, and at the Unimast, Inc., facilities in Franklin Park, Illinois, and Morrow, Georgia.
- 4.5 Recognition of complete truss or other assemblies fabricated from the Alpine TrusSteel Sections is beyond the scope of this report.

Trusses are fabricated by a fabricator approved by Alpine Engineered Products, Inc., and fabrication is monitored by a quality assurance program in accordance with the code.

This report is subject to re-examination in two years.

TABLE 1—STRUCTURAL PROPERTIES OF ALPINE STEEL SECTIONS<sup>1</sup>

SECTION NAME	T in.	WEIGHT lbs./ft.	GROSS SECTION PROPERTIES						EFFECTIVE SECTION PROPERTIES			TORSIONAL SECTION PROPERTIES				
			A <sub>g</sub> in <sup>2</sup>	I <sub>x</sub> in <sup>4</sup>	r <sub>x</sub> in.	I <sub>y</sub> in <sup>4</sup>	r <sub>y</sub> in.	A <sub>e</sub> in <sup>2</sup>	+S <sub>x</sub> in <sup>3</sup>	-S <sub>x</sub> in <sup>3</sup>	x <sub>o</sub> in.	y <sub>o</sub> in.	J*10 <sup>-4</sup> in <sup>4</sup>	C <sub>w</sub> in <sup>6</sup>	r <sub>o</sub> 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	
33TSC52.75 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	
54TSC54.00 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	

For SI: 1 inch = 25.4 mm, 1 pound/ft = 1.488 kg/m.

<sup>1</sup>Effective moment of inertia and section moduli are equal to the gross values when stress in extreme fiber is at yield stress.

Notes for Table 1:

- T = Design steel thickness;
- A<sub>g</sub> = Gross sectional area
- I<sub>x</sub> = Moment of inertia about x-x axis;
- r<sub>x</sub> = Gross radius of gyration about x-x axis
- I<sub>y</sub> = Gross moment of inertia about y-y axis
- r<sub>y</sub> = Gross radius of gyration about y-y axis
- A<sub>e</sub> = Effective sectional area with stress in extreme fiber at yield stress (F<sub>y</sub>)
- S<sub>x</sub> = Minimum effective section modulus about major x-x axis. +S<sub>x</sub> is for positive bending (compression at the closed end of the section) and -S<sub>x</sub> is for negative bending (compression at the open end of the section);
- x<sub>o</sub>, y<sub>o</sub> = Distance from shear center to centroid along the principal x and y axes
- J = St. Venant torsional constant;
- C<sub>w</sub> = Torsional warping constant of the cross section
- r<sub>o</sub> = Polar radius of gyration about shear center

TABLE 2—ALLOWABLE VALUES

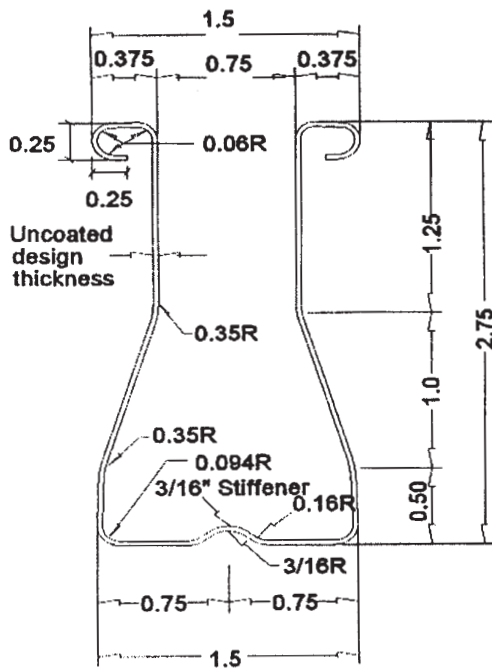
SECTION	ALLOWABLE VALUES			
	Tension, $T_a$ (lbs.)	Compression, $P_a$ (lbs.)	Positive Moment, $+M_a$ (in.-lbs.)	Negative Moment, $-M_a$ (in.-lbs.)
28TSC2.75 1.5 × 2.75-28-55KSI G60	8,283	6,931	5,787	5,787
33TSC2.75 1.5 × 2.75-33-55KSI G60	9,530	8,203	6,607	6,607
43TSC2.75 1.5 × 2.75-43-55KSI G60	12,263	10,663	8,354	8,354
28TSC4.00 2.5 × 4.00-28-55KSI G60	12,566	8,849	12,766	11,497
33TSC4.00 2.5 × 4.00-33-55KSI G60	14,486	10,551	14,645	13,991
43TSC4.00 2.5 × 4.00-43-55KSI G60	18,722	14,442	18,716	18,716
54TSC4.00 2.5 × 4.00-54-55KSI G60	23,272	18,907	22,977	22,977
33TSCS2.75 1.41 × 2.47-33-55KSI G60	7,238	4,317	3,049	1,408
54TSCS4.00 2.37 × 3.38-54-55KSI G60	17,098	10,307	9,735	2,395

For **SI**: 1 pound = 4.445 N, 1 in.-lb. = 112.985 N-mm.

$T_a$  = Allowable axial tension, assuming no screw holes.

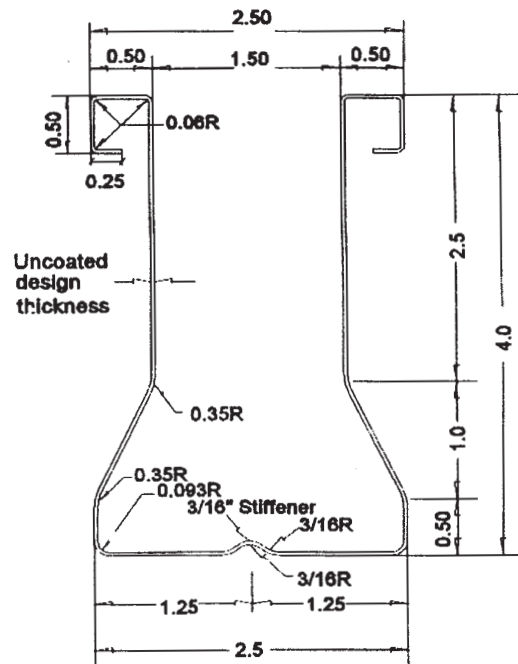
$P_a$  = Allowable axial compression for a fully-braced section.

$M_a$  = 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.



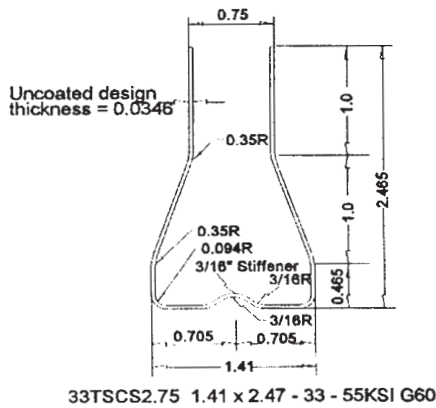
Uncoated Design Thickness:  
 28TSC2.75 1.5 x 2.75 - 28 - 55KSI G60 = 0.0299  
 33TSC2.75 1.5 x 2.75 - 33 - 55KSI G60 = 0.0346  
 43TSC2.75 1.5 x 2.75 - 43 - 55KSI G60 = 0.0451

Figure 1\*  
 ALPINE TRUSSTEEL SECTION - SERIES 1



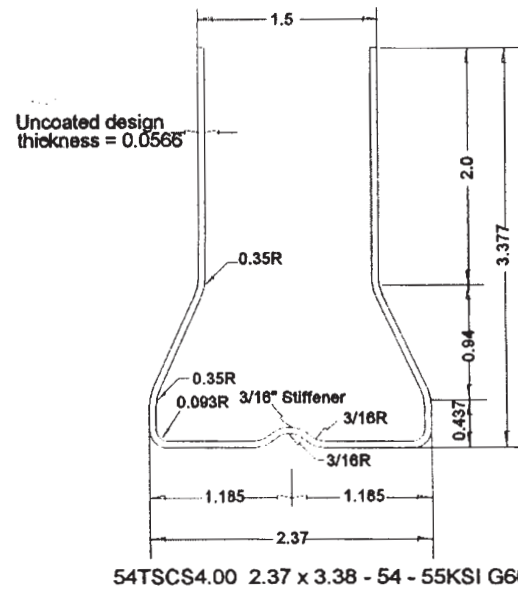
Uncoated Design Thickness  
 28TSC4.00 2.5 x 4.00 - 28 - 55KSI G60 = 0.0299  
 33TSC4.00 2.5 x 4.00 - 33 - 55KSI G60 = 0.0346  
 43TSC4.00 2.5 x 4.00 - 43 - 55KSI G60 = 0.0451  
 54TSC4.00 2.5 x 4.00 - 54 - 55KSI G60 = 0.0566

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.