

ICC-ES Evaluation Report

ESR-2765

Reissued November 1, 2011

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**DIVISION: 06 00 00—WOOD, PLASTICS AND
COMPOSITES**
Section: 06 17 53—Shop Fabricated Wood Trusses

REPORT HOLDER:

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EVALUATION SUBJECT:**TP-500 TRUSS PLATES****1.0 EVALUATION SCOPE****Compliance with the following codes:**

- 2009 and 2006 *International Building Code*® (IBC)
- 2009 and 2006 *International Residential Code*® (IRC)

Property evaluated:

Structural

2.0 USES

The Hanson Truss TP-500 truss plates are metal connector plates used as joint connector components of wood frame trusses.

3.0 DESCRIPTION

The TP-500 truss plates are formed from No. 18 gage [0.0478 inch (1.2 mm) base-metal thickness] or No. 20 gage [0.0359 inch (0.9 mm) base-metal thickness] galvanized steel complying with ASTM A 653, Grade 37, designation SS. The No. 18 gage [0.0478 inch (1.2 mm)] plates have a G 90 coating and the No. 20 gage [0.0359 inch (0.9 mm)] plates have a G 60 coating.

The teeth are punched in pairs, two per hole, along the length of the plate. The teeth are spaced 1 inch (25 mm) on center along the length and are spaced $\frac{1}{4}$ inch (6.4 mm) on center laterally. Each pair of teeth is staggered 0.10 inch (2.5 mm) from adjacent pairs. The teeth have a slight twist and are 0.120 inch (3 mm) wide by 0.33 inch (8.4 mm) long, with a concave back. They have a 45-degree rake on the ends and are perpendicular to the original blank.

The plates are manufactured in varying dimensions, with widths from 1 inch to 12 inches (25.4 mm to 305 mm) in 1-inch (25.4 mm) increments, and with lengths up to

24 inches (610 mm) in 1-inch (25 mm) increments. The direction of the rake is reversed in alternate rows. The plates are applied to truss members in pairs, one plate on each face of each joint, by means of a roller or hydraulic press. See Figure 1 for plate details.

4.0 DESIGN AND INSTALLATION**4.1 General:**

The allowable loads recognized in Tables 1, 2 and 3 are for plates pressed into wood truss members using hydraulic-platen embedment presses; multiple roller presses that use partial embedment followed by full embedment rollers; or combinations of partial embedment roller presses and hydraulic-platen presses that feed trusses into a stationary finish roller press or single-pass roller presses.

Allowable lateral resistance values for the metal connector plates must be reduced by a strength reduction factor, Q_R , shown in Table 4, when the plates are installed with a single-pass, full-embedment system in lumber having a specific gravity of 0.49 or less, or in Louisiana-Pacific Corporation LP SolidStart LVL as described in ICC-ES evaluation report [ESR-2403](#). When truss fabricators use single-pass roller presses, the rollers must have minimum 18-inch (457 mm) diameters. Plates embedded with a single-pass, full-embedment roller press must be preset before passing through the roller press by striking at least two opposite corners of each plate with a hammer.

Trusses must be assembled within the tolerances provided by the Truss Plate Institute's Quality Criteria for Metal Plate Connected Wood Trusses, shown as Chapter 3 in ANSI/TPI 1, National Design Standard for Metal Plate Connected Wood Truss Construction.

4.2 Allowable Design Values:

Allowable design values for the TP-500 truss plates to be used in the design of metal plate connected wood trusses are shown in Tables 1, 2 and 3. These values are based on ANSI/TPI 1. A copy of the ANSI/TPI 1 standard must be supplied to the building department when this is requested by the code official.

The allowable design values are applicable for metal plate connected wood trusses when connections are made with identical plates on opposite sides of the joint. The design, manufacture and installation of the wood trusses employing the truss plates must comply with Section 2303.4 of the IBC or Section R502.11 and R802.10, of the IRC, as applicable.

5.0 CONDITIONS OF USE

The Hanson Truss TP-500 truss plates described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 This evaluation report and the manufacturer's published installation instructions, when required by the code official, must be submitted at the time of permit application. In the event of a conflict between the manufacturer's published installation instructions and this report, the instructions in this report govern.
- 5.2 Each application for a building permit, using these metal connector plates, must be accompanied by documentation showing that the design, manufacture and proposed installation conform with the requirements of the applicable code.
- 5.3 This report establishes plate design values only. For items not covered by this report, such as truss design, fabrication, quality assurance and special inspection, refer to IBC Section 2303.4 or IRC Sections R502.11 and R802.10, as applicable.
- 5.4 The design values (lateral resistance values, tension effectiveness ratios, and shear effectiveness ratios) used in the design of trusses with TP-500 truss plates, must not exceed those listed in Tables 1, 2 and 3 of this report. Load combination reductions and adjustment factors must be in accordance with the applicable code.
- 5.5 All lumber used in the fabrication of trusses using TP-500 truss plates must be graded in compliance with the applicable building code and must have a moisture content not exceeding 19 percent at the time of assembly. Wet service factors from ANSI/TPI 1-2002 Section 6.4.5 or ANSI/TPI1-2007 Section 6.4.6 must be applied to the table values when the lumber moisture content exceeds 19 percent. Allowable values shown in the tables of this report are not applicable to metal connector plates embedded in either fire-retardant-treated lumber or preservative-treated lumber.
- 5.6 Metal connector plates must be installed in pairs, on opposite faces of truss members.
- 5.7 Metal connector plates subject to corrosive environments must be protected in accordance with Section 6.5 of ANSI/TPI 1.

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the National Design Standard for Metal-Plate-Connected Wood Truss Construction, ANSI/TPI 1-2007.
- 6.2 Data in accordance with the National Design Standard for Metal-Plate-Connected Wood Truss Construction, ANSI/TPI 1-2002.
- 6.3 A quality control manual.

7.0 IDENTIFICATION

The truss plates are identified by the initials TP5, stamped at intervals on each plate, and by the plates' dimensional characteristics. Additionally, boxes containing the TP-500 truss plates are identified with the name of the manufacturer (Hanson Truss, Inc.), the product name (TP-500), dimensional characteristics, and the evaluation report number (ESR-2765).

TABLE 1—ALLOWABLE LATERAL RESISTANCE VALUES

PLATE MODEL	LUMBER SPECIES	SPECIFIC GRAVITY	DIRECTION OF GRAIN AND LOAD WITH RESPECT TO LENGTH OF PLATE ¹			
			AA	EA	AE	EE
Allowable Load Per Plate ² (pounds per square inch of plate contact area)						
TP-500-No. 18 gage	Douglas fir-larch ³	0.49	114	126	85	102
	Hem-fir ³	0.43	108	103	71	68
	Spruce-pine-fir ³	0.42	128	119	85	70
TP-500-No. 20 gage	Douglas fir-larch ³	0.49	153	151	91	108
	Hem-fir ³	0.43	112	117	87	87
	Spruce-pine-fir ³	0.42	120	113	88	98
TP-500-No. 20 gage	LP SolidStart LVL ^{4,5}	N/A	118	96	112	134

For SI: 1 lb/inch² = 6.89kPa.

¹ See Figure 2 for a description of plate orientation.

² Metal connector plates are installed in pairs on opposite faces of truss members.

³ Values are based on gross area method.

⁴ Values are based on net area method.

⁵ LP SolidStart LVL is recognized in [ESR-2403](#). The plates must be installed with the long axis of the teeth perpendicular to the glue lines.

TABLE 2—ALLOWABLE TENSION VALUES AND TENSION EFFECTIVENESS RATIOS¹

PLATE MODEL	DIRECTION OF LOAD WITH RESPECT TO LENGTH OF PLATE ²			
	0°	90°	0°	90°
	Allowable Tension Load ³ (pounds per inch per pair of plates)		Tension Effectiveness Ratio	
TP-500-No. 18	1367	1086	0.59	0.47
TP-500-No. 20	1246	880	0.60	0.47

For SI: 1 inch = 25.4 mm, 1-lb/inch = 0.175 N/mm.

¹ See Figure 3 for a description of plate orientation.

² The length of the plate refers to the dimension of the longitudinal axis of the area of the plate from which the plate teeth were sheared during the plate fabrication.

³ The allowable tension loads are based on a base metal thickness of 0.0359 inch and 0.0478 inch for the No. 20 and No. 18 gage steel plates, respectively.

TABLE 3—ALLOWABLE SHEAR VALUES AND SHEAR EFFECTIVENESS RATIOS

PLATE MODEL	DIRECTION OF LOAD WITH RESPECT TO LENGTH OF PLATE ²											
	0°	30°	60°	90°	120°	150°	0°	30°	60°	90°	120°	150°
	Allowable Tension Load ¹ (pounds per inch per pair of plates)						Shear Effectiveness Ratio					
TP-500-No. 18	654	676	1228	649	438	497	0.42	0.44	0.79	0.42	0.29	0.32
TP-500-No. 20	545	650	1064	626	357	401	0.43	0.51	0.85	0.49	0.29	0.32

For SI: 1-lb/inch = 0.175 N/mm.

¹ The allowable shear loads are based on a base metal thickness of 0.0359 inch and 0.0478 inch for the No. 20 and No. 18 gage steel plates, respectively.

² The length of the plate refers to the dimension of the longitudinal axis of the area of the plate from which the plate teeth were sheared during the plate fabrication.

TABLE 4—ALLOWABLE LATERAL LOAD ADJUSTMENT FACTOR FOR METAL PLATE CONNECTOR PLATES INSTALLED WITH SINGLE-PASS ROLLER PRESSES

PLATE MODEL	LUMBER SPECIES SPECIFIC GRAVITY	LATERAL LOAD ADJUSTMENT FACTOR, Q _R ¹
TP-500-No. 18 gage	0.49 and less	1.0
	0.50 and greater	Not permitted for a single-pass roller presses
TP-500-No. 20 gage	0.49 and less	1.0
	0.50 and greater	Not permitted for a single-pass roller presses
TP-500-No. 20 gage	LP SolidStart LVL	0.96

¹ The adjustment factor applies to single-pass roller presses with a diameter of 18 inches (457 mm) or greater.

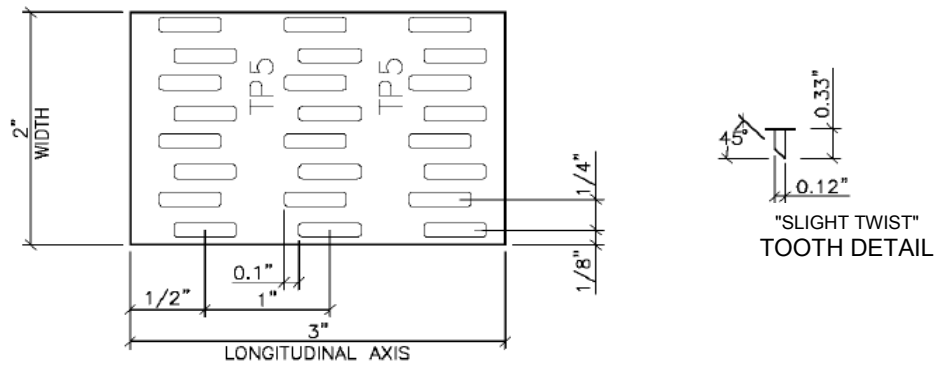


FIGURE 1—TP-500 PLATE

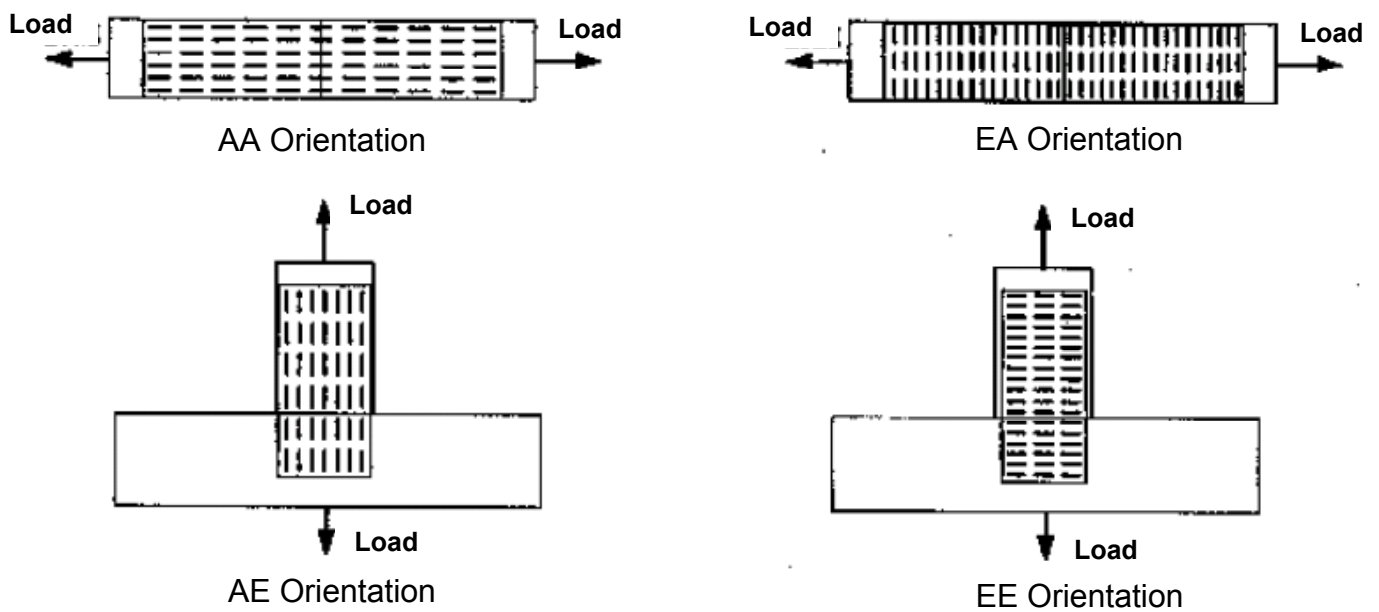
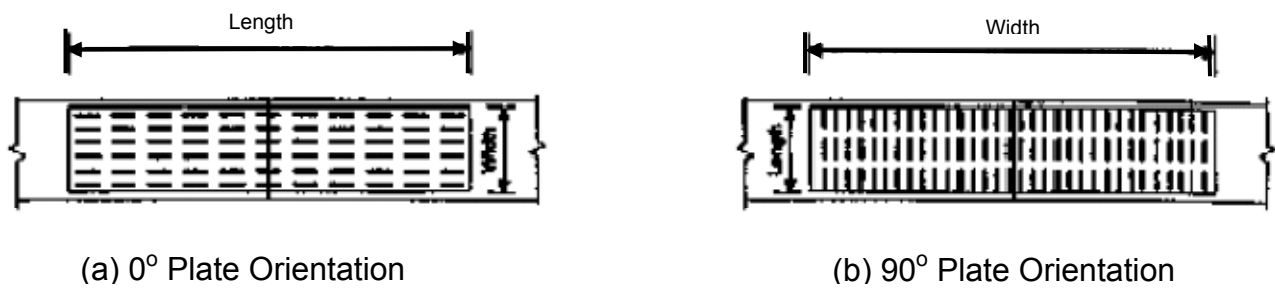


FIGURE 2—PLATE ORIENTATIONS



(a) 0° Plate Orientation

(b) 90° Plate Orientation

FIGURE 3—PLATE LENGTH AND WIDTH