

# ICC-ES Evaluation Report

## ESR-3080

Issued June 1, 2010

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

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**DIVISION: 06—WOOD AND PLASTICS**  
**Section: 06175—Truss Plates**

### REPORT HOLDER:

**MORTON BUILDINGS, INC.**  
**POST OFFICE BOX 399**  
**MORTON, ILLINOIS 61550**  
**(309) 263-6270**  
[www.mortonbuildings.com](http://www.mortonbuildings.com)

### EVALUATION SUBJECT:

**MORTON 18 GAGE AND 20 GAGE TRUSS PLATES**

#### 1.0 EVALUATION SCOPE

##### Compliance with the following codes:

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

##### Property evaluated:

Structural

#### 2.0 USES

The Morton truss plates are used as joint connectors of light-framed wood roof and floor trusses.

#### 3.0 DESCRIPTION

Morton truss plates are manufactured to various lengths and widths, and have integral teeth that are designed to laterally transmit loads between wood truss members. The plates are fabricated from ASTM A 653, Designation SS, Grade 33, No. 18 gage [0.0520 inch (1.321 mm) total thickness] and No. 20 gage [0.0380 inch (0.965 mm)] steel sheets with a G90 galvanization coating [0.00077 inch (0.0196 mm) thickness on each side]. The base-metal thicknesses are 0.0505 inch (1.283 mm) and 0.0365 inch (0.927 mm), respectively. The steel sheets are punched to form six  $\frac{5}{16}$ -inch-deep (7.9 mm) arrowhead-type teeth per circular plug. The teeth are evenly spaced around the plug at 60-degree intervals. The plugs are approximately  $\frac{5}{8}$  inch (15.9 mm) in diameter and are spaced  $1\frac{1}{4}$  inches (31.7 mm) on center in each direction. The teeth are pressed into the wood members with overhead or roller presses in accordance with the plate manufacturer's specifications. See Figure 1 for details of the plates.

#### 4.0 INSTALLATION AND DESIGN

##### 4.1 Installation:

All truss plates must be pressed into the wood for the full depth of their teeth, using full embedment single pass roller

presses having 24-inch-diameter (588 mm) rollers. Trusses must be assembled within the tolerances provided by the Truss Plate Institute (TPI) Quality Criteria for Metal Plate Connected Wood Trusses, shown as Chapter 3 in ANSI/TPI 1-2007, National Design Standard for Metal Plate Connected Wood Truss Construction.

##### 4.2 Allowable Design Values:

Tables 1 through 3 provide allowable lateral loads, tension loads, shear loads, and reduction factors for the metal plate connectors. Allowable design values are applicable when the connection is made with identical plates on opposite sides of the joint. These values are based on ANSI/TPI 1-2007. A copy of ANSI/TPI 1-2007 must be supplied to the code official upon request. This evaluation report is limited to the evaluation of the metal connector plates described in this report connected to lumber. The design, manufacture, quality assurance and installation of trusses employing the truss plates have not been evaluated and, when applicable, must comply with IBC Section 2303.4 or IRC Sections R502.11 and R802.10.

#### 5.0 CONDITIONS OF USE

The Morton 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, this report governs.
- 5.2** Each application for a building permit using these truss plate connectors must be accompanied by calculations, details and other documentation showing that the design, manufacture and proposed installation conform to the requirements of the applicable code. The calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 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 ANSI/TPI 1, engineering drawings and the applicable code.
- 5.4** The design values used in the design of trusses using Morton connector plates must not exceed those listed

in Tables 1, 2 and 3. Load combination reductions must be in accordance with the applicable code.

- 5.5 All lumber used in the fabrication of trusses using Morton connector plates must be graded in compliance with the applicable code and must have a moisture content not to exceed 19 percent at the time of assembly. Wet service factors from Section 6.4.6 of ANSI/TPI 1-2007 must be applied to the table values when the lumber moisture content exceeds 19 percent. Allowable design 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 Galvanized G90 metal plate connectors subject to corrosive environments must be protected in accordance with Section 6.5 of ANSI/TPI 1-2007.

5.8 Morton truss connector plates are manufactured in Morton, Illinois.

**6.0 EVIDENCE SUBMITTED**

- 6.1 Data in accordance with ANSI/TPI 1-2007.
- 6.2 Manufacturer’s descriptive literature.
- 6.3 Quality documentation.

**7.0 IDENTIFICATION**

The Morton truss plates are identified by a hexagon stamped every 1 1/4 inches (31.7 mm) along the center of the plate. The No. 18 and No. 20 gage plates have the number “18” or the letter “m”, respectively, embossed inside the hexagon. Additionally, boxes containing the Morton truss plates must be labeled with the Morton Buildings, Inc., name, the truss plate model (No. 20 gage or No. 18 gage) and the evaluation report number (ESR-3080).

**TABLE 1—ALLOWABLE LATERAL RESISTANCE VALUES<sup>1</sup>**

TYPE OF PLATE	LUMBER SPECIES	SPECIFIC GRAVITY	DIRECTION OF GRAIN AND LOAD WITH RESPECT TO LENGTH OF PLATE <sup>2</sup>			
			AA	EA	AE	EE
			Allowable Load Per Plate (pounds per square inch of plate connector area) <sup>3,4</sup>			
No. 20 gage	Southern yellow pine	0.55	98	89	86	77
No. 18 gage	Southern yellow pine	0.55	108	114	63	91

For SI: 1 lbf/inch<sup>2</sup> = 6.89 kPa.

<sup>1</sup>See Figure 3 for a description of plate orientation.

<sup>2</sup>The length of plate refers to the orientation of the tooth rosettes with respect to the direction of feed through the punch press.

<sup>3</sup>Metal connector plates must be installed in pairs on opposite faces of truss members.

<sup>4</sup>Allowable lateral resistance values for the metal plates are rated by the gross area method.

**TABLE 2—ALLOWABLE TENSION VALUES AND TENSION EFFICIENT RATIOS<sup>1</sup>**

PLATE MODEL	DIRECTION OF LOAD WITH RESPECT TO LENGTH OF PLATE <sup>2</sup>			
	0°	90°	0°	90°
	Allowable Tension Load <sup>3</sup> (pounds per inch per pair of plates)		Tension Load Efficiency Ratio	
No. 20 gage	878	830	0.58	0.55
No. 18 gage	1,164	1,092	0.55	0.52

For SI: 1 lbf/inch = 0.175 N/mm.

<sup>1</sup>See Figure 4 for a description of plate orientation.

<sup>2</sup>The length of plate refers to the orientation of the tooth rosettes with respect to the direction of feed through the punch press.

<sup>3</sup>Allowable tension load =  $F_{Tc} [(t - 0.0015)/0.95] \times$  efficiency ratio.

**TABLE 3—ALLOWABLE SHEAR VALUES AND SHEA EFFICIENCY RATIOS<sup>1</sup>**

PLATE MODEL	DIRECTION OF LOAD WITH RESPECT TO LENGTH OF PLATE <sup>2</sup>											
	0°	30°	60°	90°	120°	150°	0°	30°	60°	90°	120°	150°
	Allowable Shear Load <sup>3</sup> (pounds per inch per pair of plates)						Shear Load Efficiency Ratio					
No. 20 gage	556	578	566	546	632	560	0.58	0.60	0.59	0.57	0.66	0.58
No. 18 gage	792	754	766	826	760	746	0.56	0.53	0.54	0.58	0.54	0.53

For SI: 1 lbf/inch = 0.175 N/mm.

<sup>1</sup>See Figure 5 for description of plate orientation.

<sup>2</sup>The length of plate refers to the orientation of the tooth rosettes with respect to the direction of feed through the punch press.

<sup>3</sup>Allowable shear load =  $F_{Vc} [(t - 0.0015)/0.95] \times$  efficiency ratio.

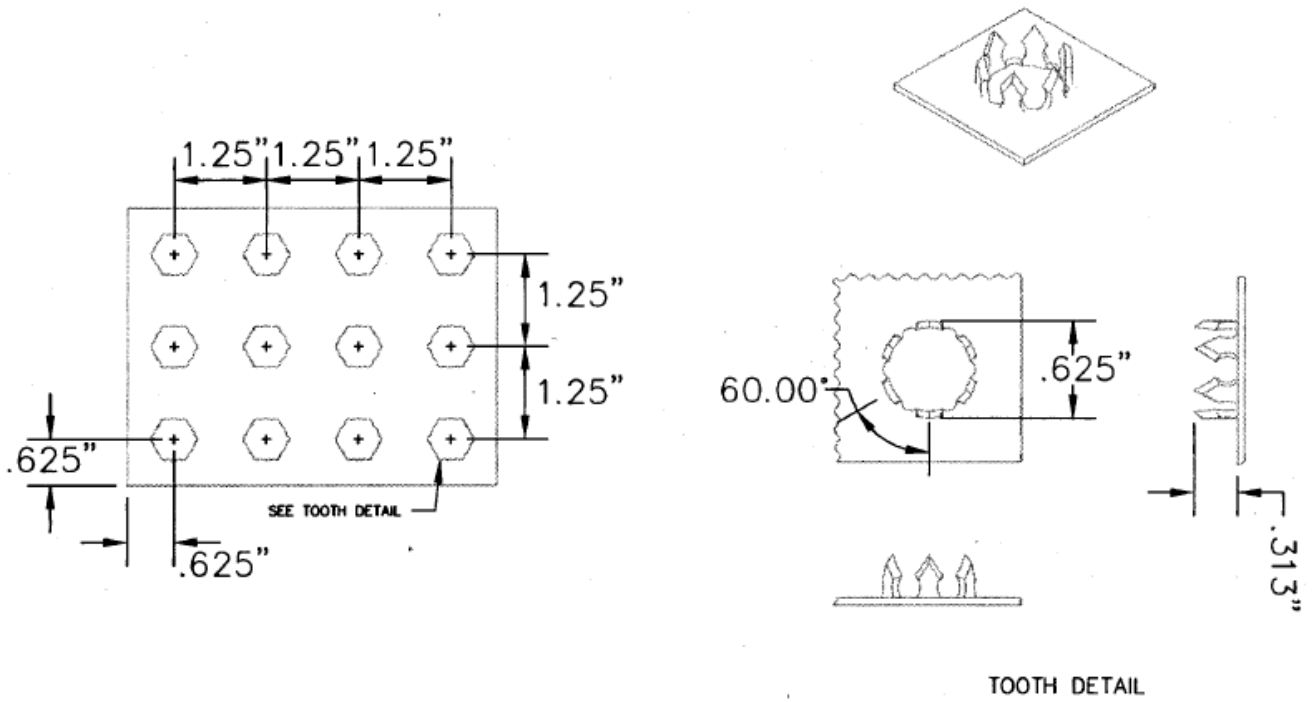


FIGURE 1—METAL CONNECTOR PLATE DIMENSIONS

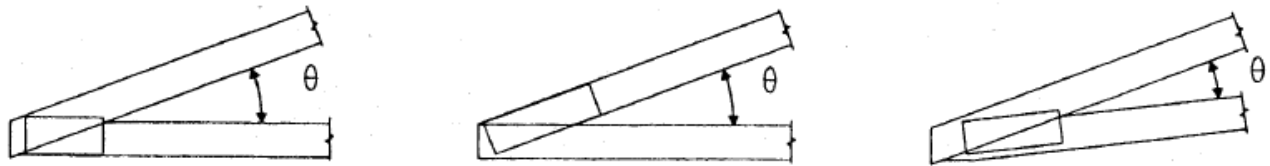


FIGURE 2—HEEL JOINTS TO WHICH THE REDUCTION FACTOR,  $H_r$ , APPLIES

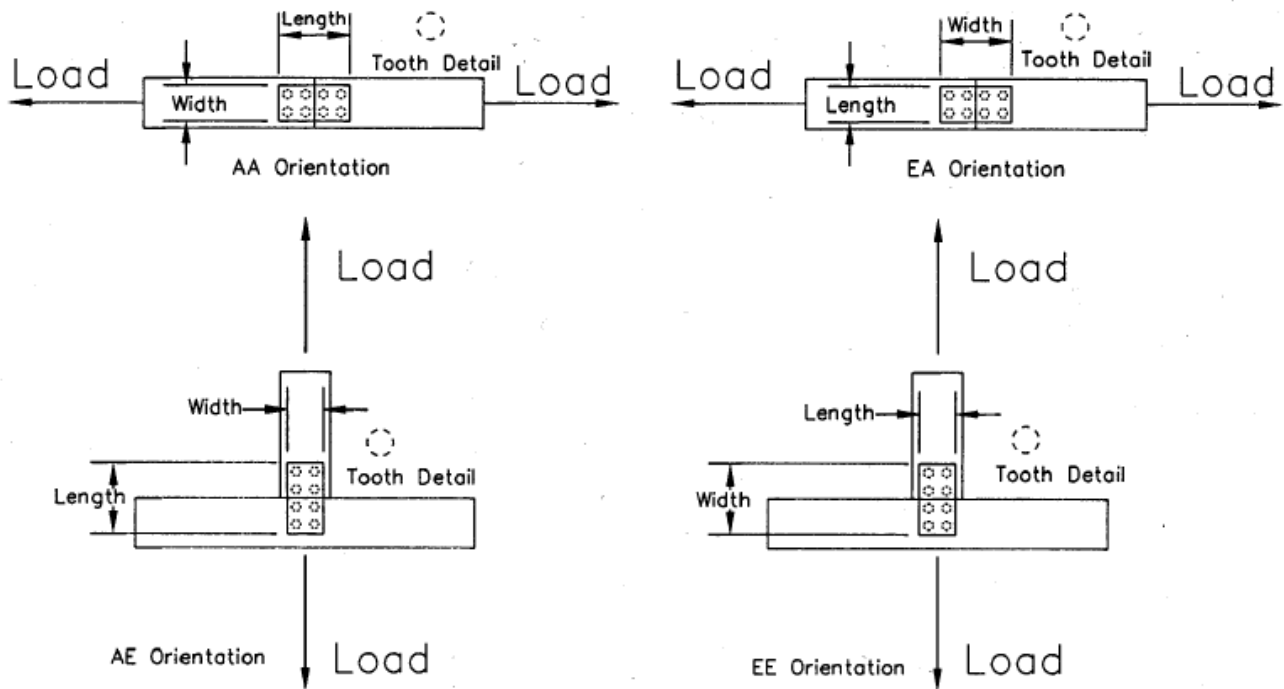


FIGURE 3—PLATE ORIENTATION FOR LATERAL RESISTANCE VALUES

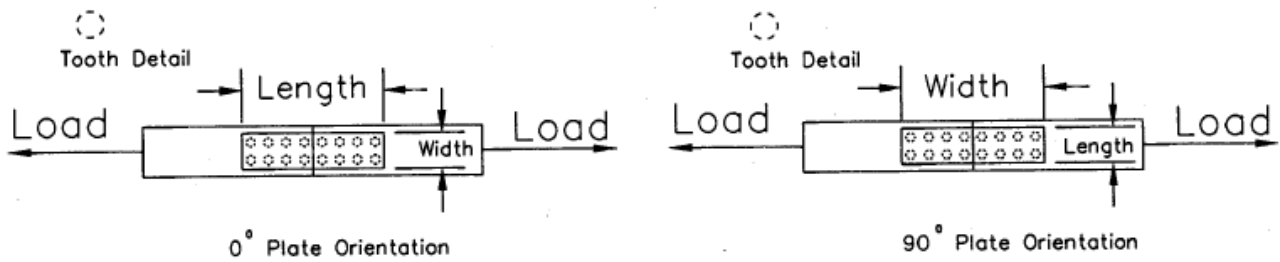


FIGURE 4—PLATE ORIENTATION FOR ALLOWABLE TENSION VALUES

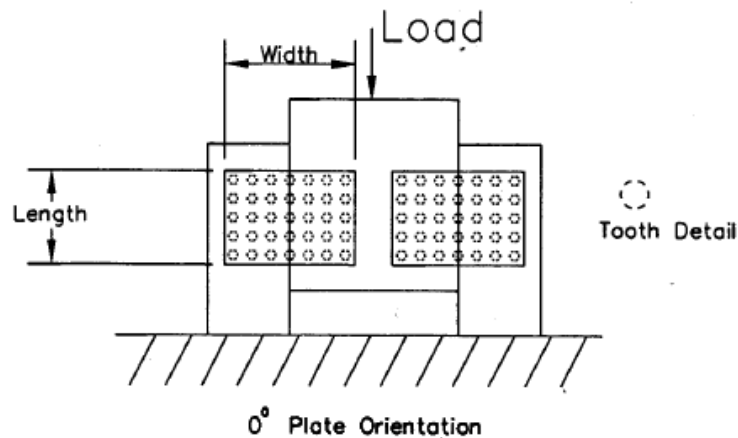


FIGURE 5—PLATE ORIENTATION FOR ALLOWABLE SHEAR VALUES