

ICC-ES Evaluation Report

ESR-1988*

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

REPORT HOLDER:

MITEK INDUSTRIES, INC.
 14515 NORTH OUTER FORTY, SUITE 300
 CHESTERFIELD, MISSOURI 63017
 (314) 434-1200
www.mii.com

EVALUATION SUBJECT:

MiTek® TRUSS CONNECTOR PLATES: TL18, MT18, MT18HS™, M18SHS™, TL20 and MT20

1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2009 *International Building Code*® (2009 IBC)
- 2009 *International Residential Code*® (2009 IRC)
- 2006 *International Building Code*® (2006 IBC)
- 2006 *International Residential Code*® (2006 IRC)
- 1997 *Uniform Building Code*™ (UBC)

Property evaluated:

Structural

2.0 USES

MiTek® metal truss connector plates are used as joint connector components of light wood-frame trusses.

3.0 DESCRIPTION
3.1 MiTek® TL18 and MT18:

Models TL18 and MT18 metal truss connector plates are manufactured from minimum No. 18 gage [0.0466 inch total thickness (1.18 mm)], ASTM A 653 SS, Grade 40 steel, with a G60 galvanization coating [0.0005 inch thickness on each side (0.013 mm)] and having a base-metal thickness of 0.0456 inch (1.16 mm). The plates have teeth $\frac{3}{8}$ inch (9.5 mm) long, punched in pairs formed at right angles to the face of the parent metal so that two teeth per hole occur along the length. The spacing along the longitudinal direction of each punched slot is 1 inch (25.4 mm) on center. The transverse centerlines of adjacent slots are staggered 0.10 inch (2.54 mm). The distance between longitudinal centerlines of the slots is 0.25 inch (6.35 mm). There are eight teeth per square inch (645 mm²) of surface area. Plates are available in $\frac{1}{2}$ -inch (12.7 mm) width increments, up to 12 inches (304.8 mm), and lengthwise in 1-inch (25.4 mm) multiples. See Figure 1 for details.

3.2 MiTek® MT18HS™:

Model MT18HS™ metal truss connector plates are manufactured from minimum No. 18 gage [0.0466 inch total thickness (1.18 mm)], ASTM A 653, Grade 60, high-strength, low-alloy steel (HSLAS) with a G60 galvanization coating [0.0005 inch thickness on each side (0.013 mm)] and having a base-metal thickness of 0.0456 inch (1.16 mm). The plate has teeth $\frac{3}{8}$ inch (9.5 mm) long, punched in pairs formed at right angles to the face of the parent metal so that two teeth per hole occur along the length. The spacing along the longitudinal direction of each punched slot is 1 inch (25.4 mm) on center. The transverse centerlines of adjacent slots are staggered 0.10 inch (2.54 mm). The distance between longitudinal centerlines of the slots is 0.25 inch (6.35 mm). There are eight teeth per square inch (645 mm²) of surface area. Plates are available in $\frac{1}{2}$ -inch (12.7 mm) width increments, up to 12 inches (304.8 mm), and lengthwise in 1-inch (25.4 mm) multiples. See Figure 1 for details.

3.3 MiTek® M18SHS™:

Model M18SHS™ metal truss connector plates are manufactured from minimum No. 18 gage [0.0466-inch (1.18 mm) total thickness], hot-dipped galvanized steel that meets the requirements of ASTM A 653 SS, Grade 80 steel, with a G60 galvanization coating [0.0005 inch thickness on each side (0.013 mm)] and having a base metal thickness of 0.0456 inch (1.16 mm). The plates have $\frac{3}{8}$ -inch-long (9.5 mm) teeth, punched in pairs formed at right angles to the face of the parent metal so that two teeth per hole occur along the length. The spacing along the longitudinal direction of each punched slot is 1 inch (25.4 mm) on center. The transverse centerlines of adjacent slots are staggered 0.10 inch (2.54 mm). The distance between longitudinal centerlines of slots is 0.25 inch (6.35 mm). There are eight teeth per square inch (645 mm²) of surface area. Plates are available in $\frac{1}{2}$ -inch-width (12.7 mm) increments, up to 12 inches (304.8 mm), and lengthwise in 1-inch (25.4 mm) multiples. See Figure 1 for details.

3.4 MiTek® TL20 and MT20™:

Models TL20 and MT20™ metal truss connector plates are manufactured from minimum No. 20 gage [0.0356 inch total thickness (0.9 mm)], ASTM A 653 SS, Grade 40 steel, with a G60 galvanization coating [0.0005 inch thickness on each side (0.013 mm)] and having a base-metal thickness of 0.0346 inch (0.88 mm). The plates have teeth $\frac{3}{8}$ inch (9.5 mm) long, punched in pairs formed at right angles to the face of the parent metal so that two teeth per hole occur along the length. The spacing along the longitudinal direction of each punched slot is 1 inch (25.4 mm) on

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center. The transverse centerlines of adjacent slots are staggered 0.10 inch (2.54 mm). The distance between longitudinal centerlines of the slots is 0.25 inch (6.35 mm). There are eight teeth per square inch (645 mm²) of surface area. Plates are available in 1/2-inch width (12.7 mm) increments, up to 12 inches (304.8 mm), and lengthwise in 1-inch (25.4 mm) multiples. See Figure 1 for details.

4.0 DESIGN AND INSTALLATION

4.1 General:

All truss plates are pressed into the wood for the full depth of their teeth by 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. 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 MiTek® metal truss connector plates to be used in the design of metal plate connected wood roof and floor trusses are shown in Tables 1 and 2. Allowable design values are applicable when the connection is made with identical plates on opposite sides of the joint. This evaluation report is limited to the evaluation of connection capacity of the MiTek® metal truss connector plates listed in this report. The design, manufacture, and installation of trusses employing the truss plates have not been evaluated.

5.0 CONDITIONS OF USE

The MiTek® Industries metal truss connector 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 document, the instructions in this document govern.
- 5.2 Each application for a building permit, using these truss plate connectors, 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 ANSI/TPI 1, engineering drawings and the applicable code.
- 5.4 The design values (lateral resistance values, effective tension strength ratios, and effective shear resistance ratios) used in the design of trusses, using MiTek® Industries metal truss connector plates, must not exceed those listed in Tables 1 and 2 of this report. Load combination reductions must be in accordance with the applicable code.
- 5.5 All lumber used in the fabrication of trusses using MiTek® Industries metal truss connector 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 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 truss connector plates must be installed in pairs on opposite faces of truss members.
- 5.7 Galvanized G60 metal truss plate connectors subject to corrosive environments must be protected in accordance with Section 6.5 of ANSI/TPI 1.
- 5.8 MiTek® metal truss connector plates are manufactured in St. Charles, Missouri; Phoenix, Arizona; Tampa, Florida; Edenton, North Carolina; and Bradford, Ontario, Canada.

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 Manufacturer’s descriptive literature.
- 6.3 A quality control manual.

7.0 IDENTIFICATION

The MiTek® connectors are identified by an imprint of the plate name embossed into the surface of the plate (for example, the MT20™ plate is embossed “MT20”). Additionally, boxes containing the connector plates must be labeled with the MiTek® Industries name, the metal connector plate model, and the evaluation report number (ESR-1988).

TABLE 1—ALLOWABLE LATERAL RESISTANCE VALUES, HYDRAULIC-PLATEN EMBEDMENT³ (lb/in²/PLATE)

LUMBER SPECIES	SG	AA	EA	AE	EE
TL18, MT18, MT18HS™, M18SHS™, TL20 and MT20™					
Douglas fir–larch	0.49	248	203	170	171
Hem-fir	0.43	188	159	133	141
Spruce-pine-fir	0.42	206	162	125	122
Southern pine	0.55	244	192	171	178

For SI: 1lb/in² = 6.9 kPa.

NOTES:

¹Tooth-holding units = psi for a single plate (double for plates on both faces when applying to area on only one face). To achieve values, plates must be installed on opposite sides of joint.

²AA = Plate parallel to load, wood grain parallel to load.

EA = Plate perpendicular to load, wood grain parallel to load.

AE = Plate parallel to load, wood grain perpendicular to load.

EE = Plate perpendicular to load, wood grain perpendicular to load.

³All truss plates are pressed into the wood for the full depth of their teeth by 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.

TABLE 2—EFFECTIVE TENSION AND SHEAR RESISTANCE ALLOWABLE DESIGN VALUES¹

PROPERTY FORCE DIRECTION	TL18 AND MT18		MT18HS™		M18SHS™		TL20 AND MT20™	
	Efficiency	Pounds/ inch/Pair of Connector Plates	Efficiency	Pounds/ inch/Pair of Connector Plates	Efficiency	Pounds/ inch/Pair of Connector Plates	Efficiency	Pounds/ inch/Pair of Connector Plates
Tension values in accordance with Section 5.4.4.2 of TPI-1 (Minimum Net Section over the joint) ²								
Tension @ 0°	0.5	1149	0.48	1596	0.52	2247	0.49	857
Tension @ 90°	0.52	1208	0.5	1671	0.53	2292	0.49	854
Tension values in accordance with TPI-1 with a deviation [see Section 5.4.9 (e)] (Maximum Net Section Occurs over the joint) ³								
Tension @ 0°	0.59	1349	0.59	1975	0.6	2586	0.59	1035
Tension @ 90°	0.53	1214	0.51	1727	0.54	2341	0.49	861
Shear Values								
Shear @ 0°	0.56	874	0.55	1099	0.53	1363	0.51	604
Shear @ 30°	0.66	1023	0.57	1153	0.57	1482	0.74	876
Shear @ 60°	0.83	1283	0.74	1492	0.7	1805	0.82	970
Shear @ 90°	0.49	757	0.52	1052	0.39	1012	0.58	686
Shear @ 120°	0.39	608	0.4	802	0.41	1073	0.42	498
Shear @ 150°	0.45	702	0.37	745	0.33	868	0.5	592

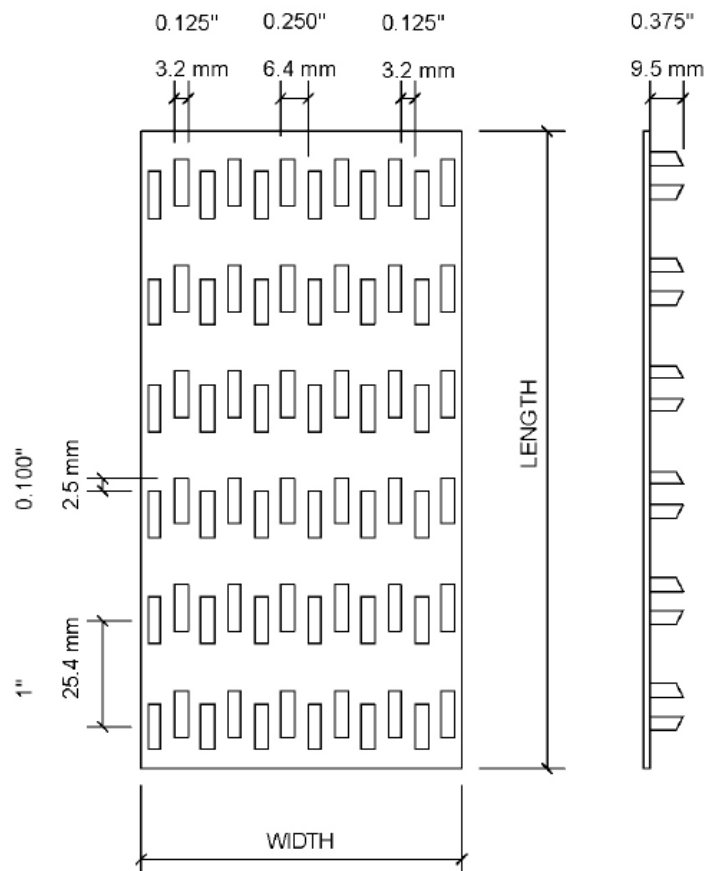
For SI: 1 lb/inch = 0.175 N/mm, 1 inch = 25.4 mm.

NOTES:

¹Minimum coated thickness is 0.0356 inch (0.904 mm) for 20 gage, or 0.0466 inch (1.184 mm) for 18 gage in accordance with Section 4.3.4 of ANSI/TPI 1. Minimum coating thickness for G60 is 0.0010 inch (0.025 mm) total for both sides in accordance with Sections 4.3.3.2 and 6.3.4.1.3 of ANSI/TPI 1.

²Minimum Net Section – A line through the plate’s tooth pattern with the minimum amount of steel for a specified orientation. For these plates, this line passes through a line of holes.

³Maximum Net Section – A line through the plate’s tooth pattern with the maximum amount of steel for a specified orientation. For these plates, this line passes through a section of the plate with no holes.



MT18, TL18, MT18HS, M18SHS, MT20, TL20

FIGURE 1—APPROXIMATE DIMENSIONS OF MITEK CONNECTOR PLATES (inches) (1 inch = 25.4 mm)

ICC-ES Evaluation Report**ESR-1988 Supplement**

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DIVISION: 60 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 17 53—Shop-Fabricated Wood Trusses**REPORT HOLDER:****MITEK INDUSTRIES**
14515 NORTH OUTER FORTY, SUITE 300
CHESTERFIELD, MISSOURI 63017
(314) 434-1200
www.mii.com**EVALUATION SUBJECT:****MiTek® TRUSS CONNECTOR PLATES: TL18, MT18, MT18HS™, M18SHS™, TL20 AND MT20****1.0 EVALUATION SCOPE****Compliance with the following codes:**

- 2007 Florida Building Code—Building
- 2007 Florida Building Code—Residential

Property evaluated:

Structural

2.0 PURPOSE OF THIS SUPPLEMENT

This supplement is issued to indicate that the MiTek® Truss Connector Plates: TL18, MT18, MT18HS™, M18SHS™, TL20 AND MT20 described in Sections 2.0 through 7.0 of the master report comply with the 2007 Florida Building Code—Building and the 2007 Florida Building Code—Residential, when designed and installed in accordance with the master evaluation report.

For products falling under Florida Rule 9N-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the master report issued December 1, 2010.

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 17 53—Shop-Fabricated Wood Trusses**REPORT HOLDER:****MITEK INDUSTRIES, INC.**
14515 NORTH OUTER FORTY, SUITE 300
CHESTERFIELD, MISSOURI 63017
(317) 434-1200
www.mii.com**EVALUATION SUBJECT:****Mitek® TRUSS CONNECTOR PLATES: TL18, MT18, MT18HS™, M18SHS™, TL20 AND MT20****1.0 EVALUATION SCOPE****Compliance with the following code:**2010 *California Building Code* (CBC)**Property evaluated:**

Structural

2.0 PURPOSE OF THIS SUPPLEMENT

This supplement is issued to indicate that the Mitek® Truss connector plates TL18, MT18, MT18HS™, M18SHS™, TL20 and MT20, described in the master report ESR-1988 comply with the 2010 *California Building Code*, Chapters 16, 16A, 17, 17A, and 23, when design and installation are in accordance with the IBC provisions described in the master evaluation report and with Chapters 16, 16A, 17, 17A, and 23 of the 2010 *California Building Code*.

This supplement expires concurrently with the master evaluation report issued December 1, 2010.