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Legacy report on the BOCA® *National Building Code/1999*

DIVISION: 06—WOOD AND PLASTICS

Section: 06170—Prefabricated Structural Wood

REPORT HOLDER:

MITEK INDUSTRIES, INC.
14515 NORTH OUTER FORTY
SUITE 300
CHESTERFIELD, MISSOURI 63017

EVALUATION SUBJECT:

MITEK T-L-S AND MT16 METAL PLATE CONNECTORS

EVALUATION SCOPE

Compliance with the following code:

BOCA® *National Building Code/1999*

- Section 2313.3 Prefabricated trusses

Compliance with the following referenced standard:

- *TPI 1-1995 - National Design Standard for Metal-Plate-Connected Wood Truss Connection*

DESCRIPTION

The MiTek T-L-S and MT16 metal plate connectors are 16-gauge steel plates that are used in the fabrication of metal-plate-connected wood trusses. The MT16 is the renamed product identified as MiTek T-L-S metal plate connector. This report refers to both product names, although the difference between the two products is in name only. The connector plates have a yield strength (F_y) of 40,000 psi and are stamped from ASTM A653, Grade 40, 16-gauge steel, zinc coated (galvanized) by the hot dip process.

The MiTek T-L-S and MT16 metal plate connectors have a staggered-tooth design and are identified by the letters and numbers MiTek T-L-S or MT16 permanently stamped on each plate. The plates have 0.375-inch long teeth punched in pairs formed at right angles to the face of the parent metal, two per hole along the length. The spacing along the longitudinal direction of each punched slot is 0.75-inch. The spacing along the transverse direction of each punched slot is 0.515-inch. There are 4.8 teeth per square inch of plate surface area. The plates are installed using a hydraulic press.

CONDITIONS OF USE

This report is limited to the applications and products as stated in this report. The ICC-ES Subcommittee on National Codes intends that the report be used by the code official to determine that the report subject complies with the code requirements specifically addressed, provided that this product is installed in accordance with the following conditions:

- The allowable lateral resistance for the MiTek T-L-S and MT16 metal plate connectors shall not exceed those listed in Table 1 of this report. The allowable tensile and shear resistance for the MiTek T-L-S and MT16 metal plate connectors shall be determined using the appropriate ratios as indicated in Tables 2 and 3 of this report. These values shall be used in accordance with the TPI 1-95, *National Design Standard for Metal-Plate-Connected Wood Truss Construction*.
- The scope of this report is limited to the use of these values when the connection is made with a plate on each side of the joint. Design stresses for joints formed with a MiTek T-L-S and MT16 metal plate connectors on only one side of the wood members are beyond the scope of this report.
- The values given in Tables 1, 2 and 3 of this report shall apply only to MiTek T-L-S and MT16 metal plate connectors that are applied by hydraulic press. Installation by roller press is outside the scope of this report.
- The design stresses given in Table 1 of this report apply only to MiTek T-L-S and MT16 metal plate connectors in the designated species of wood.
- The design of the MiTek T-L-S and MT16 metal plate connectors in pressure-treated wood are beyond the scope of this report.
- Connector plate values in Table 1 of this report shall be adjusted for duration of load in accordance with the provisions of the American Forest and Paper Association's *National Design Specification*, AFPA NDS-97. Values provided in Tables 2 and 3 of this report shall not be adjusted for duration of load but shall be increased in accordance with Section 1613.0, Combination of Loads, of the BOCA® *National Building Code/1999*, when applicable. For loads of greater than 10-year duration, in accordance with Table 2.3.2 of AFPA NDS-97, a load duration factor of 0.9 shall be applied.

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- Design documents and details shall utilize the properties given in Tables 1 through 3 of this report and shall be prepared by an individual competent and qualified in the application of structural design principles involved. The individual shall possess the registration or license in accordance with the professional registration laws of the state in which the project is constructed.
- This report is subject to periodic re-examination. For information on the current status of this report, contact the ICC-ES.

ITEMS REQUIRING VERIFICATION

- U Design calculations and details for construction utilizing MiTek T-L-S and MT16 metal plate connectors shall be furnished to the code official verifying compliance with this report.
- U The design and performance of trusses constructed with MiTek T-L-S or MT16 metal plate connectors shall comply with, at a minimum, the following:
 - Trusses shall comply with the quality control procedures in TPI 1-95. In addition, any shipping, storage, handling, erection, or fabrication procedures that cause damage or defects to lumber or to the truss plate connection shall be cause for rejecting the truss.
 - Installation and design requirements, to include but not be limited to, permanent truss member bracing locations, truss slope or depth, span and spacing, connection requirements for truss-to-truss girder, truss ply to ply and field splices and calculated deflection ratio and/or maximum deflection for live and total load.
 - The code official shall be furnished with evidence that the manufacturer of the trusses is in compliance with the Special Inspection requirements of Section 1705.2 and 2313.4 of the BOCA[®] *National Building Code/1999* and Sections 4.1 and 6.6 of the TPI 1-95

INFORMATION SUBMITTED

The following data was submitted by the proponent for demonstration of compliance with the respective code sections listed above each item of information.

- Evaluation of the MiTek 16-Gauge Metal Connector Plate in accordance with ANSI/TPI 1-1995, *National Design Standard for Metal-Plate-Connected Wood Truss Construction*, " by LAW Engineering and Environmental Services, Inc.; signed and sealed by Dan D. Blair, Jr., P.E., Principal Engineer and Robert J. Shupe, P.E., dated February 7, 1997, was submitted and indicates that the lateral resistance strength of the plates was determined in accordance with TPI 1. Table 1 of this report gives the values determined for the allowable lateral resistance of the MiTek T-L-S Metal Plate Connectors.
- Test Report No. J4728400156, dated June 14, 1984, prepared by Law Engineering Testing Company, signed by Donald B. Chandler, P.E.
- Structural calculations, dated June 21, 1984, signed and sealed by Edward E. Callahan, Jr. P.E.
 - The data listed in the two previous items, indicates that the average shear efficiency ratio was determined in accordance with TPI 1. See Table 2 of this report for the average shear efficiency ratios of the MiTek T-L-S Metal Plate Connectors.
- Test Report No. T3-05-017A, dated September 13, 1983, prepared by Osborne Laboratories, Inc. was submitted and indicates that the tension effectiveness ratio was determined in accordance with TPI 1. See Table 3 of this report for the tension effectiveness ratios of the MiTek T-L-S Metal Plate Connectors, as determined by these calculations.

APPLICATION FOR PERMIT

To aid in the use of this report, the following represents the minimum level of information to be reflected on construction documents in order to determine compliance with this research report.

- The language "See ICC-ES Legacy Report No. 96-20."
- Slope or depth, span and spacing of the truss.
- Reaction and location on the truss of each bearing support, as well as the minimum bearing width and length.
- Design loading shall include, as applicable:
 - Top chord live load;
 - Top chord dead load;
 - Bottom chord live load;
 - Bottom chord dead load;
 - Concentrated loads and their points of application.
- Adjustments to lumber and plate design values for conditions of use.
- Each reaction force.
- Plate type, thickness of gauge size; basic plate design value (specifying gross or net value); and the location of each plate, except where symmetrically located relative to the joint interface.
- Lumber size, species, grade and moisture content for each member.
- Construction documents consistent with this report.

PRODUCT IDENTIFICATION

- All MiTek Industries, Inc.'s MiTek T-L-S and MT16 metal plate connectors manufactured in accordance with this research report shall be marked at the plant with the identifying language "See ICC-ES Legacy Report No. 96-20."
- All MiTek T-L-S and MT16 metal plate connectors greater than 30in width, and 25 percent of the plates less than 30in width, shall be individually marked with the plate name.
- Each package or individual shipping unit shall be marked to indicate the production run and master coil of steel in order to provide recall ability.

TABLE 1
LATERAL RESISTANCE OF THE MiTek T-L-S AND MT16 METAL PLATE CONNECTORS

| PLATE ORIENTATION AND LOAD DIRECTION | LUMBER SPECIES | | | |
|---|----------------------|-----------------|-------------|---------|
| | Southern Yellow Pine | Spruce-Pine-Fir | Douglas-Fir | Hem-Fir |
| Allowable Lateral Resistance (lb/in²/plate) with TPI/BOCA Factors | | | | |
| 0° Parallel | 171.3 | 116.6 | 151.7 | 112.3 |
| 90° Parallel | 146.4 | 126.7 | 157.9 | 112.8 |
| 0° Perpendicular | 134.5 | 95.5 | 117.1 | 102.7 |
| 90° Perpendicular | 137.6 | 105.6 | 134.9 | 103.7 |

¹Value based on the gross area of single plate.

²Adjustment of values for duration of load shall be in accordance with "CONDITIONS OF USE" section of this report.

TABLE 2
SUMMARY OF SHEAR STRENGTH OF THE MiTek T-L-S AND MT16 METAL PLATE CONNECTORS

| CONNECTOR TYPE | PLATE ORIENTATION | | | | | |
|--|-------------------|-----|-----|-----|------|------|
| | 0° | 30° | 60° | 90° | 120° | 150° |
| Average Shear Efficiency Ratio (percent) | .70 | .66 | .81 | .67 | .65 | .55 |

¹Value based on a single plate

² t = .0580

³Allowable Shear Resistance = $.4 * F_y * [(t-.001)/0.95] * \text{Efficiency Ratio}$; $F_y = 40,000$ psi

⁴Where applicable, values shall be adjusted for wind and earthquake loadings in accordance with Chapter 16, of the BOCA[®] *National Building Code/1999*.

TABLE 3
SUMMARY OF THE TENSILE STRENGTH
OF THE MiTek T-L-S AND MT16 METAL PLATE CONNECTORS

| PLATE ORIENTATION | TENSION EFFECTIVENESS RATIO (PERCENT) |
|-------------------|---------------------------------------|
| 0° | .76 |
| 90° | .38 |

¹Value based on a single plate

² t = .0580

³Allowable Tension Resistance = $.6 * F_y * ((t-.001)/0.95) * \text{Effectiveness Ratio}$; $F_y = 40,000$ psi

⁴Where determined to be appropriate by the designer, values shall be adjusted for loadings in accordance with Chapter 16, Structural Loads, of the BOCA[®] *National Building Code/1999*.