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# ICC-ES Legacy Report

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## ER-3907

Reissued 09/2018  
This report is subject to renewal 09/2019.

**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**  
**SECTION: 06 17 36—METAL-WEB WOOD JOISTS**

**REPORT HOLDER:**

**MITEK USA, INC.**

**EVALUATION SUBJECT:**

**POSI+STRUT METAL WEB JOIST**



*"2014 Recipient of Prestigious Western States Seismic Policy Council (WSSPC) Award in Excellence"*



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## Legacy report on the 1997 *Uniform Building Code*™

**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**

**Section: 06 17 36—Metal-Web Wood Joists**

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### 1.0 SUBJECT

POSI+STRUT Metal Web Joist

### 2.0 DESCRIPTION

#### 2.1 General:

The POSI+STRUT is a V-shaped web member stamped from No. 20 gage galvanized steel complying with ASTM A653 Grade 40 with an ASTM A525 G60 coating. The modular length of the POSI+STRUT is nominally 24 inches. The webs are stamped in three depths, 7<sup>1</sup>/<sub>8</sub> inch, 9<sup>1</sup>/<sub>8</sub> inch and 11<sup>1</sup>/<sub>4</sub> inch, which are designated as POSI+STRUT 8, 10 and 12, respectively. Each arm of the “V” is formed into a channel shape, 1 inch wide with 1/2-inch flanges. The POSI+STRUT is symmetrical about a vertical center line through the lower intersection of the two arms. A truss plate is formed integrally with the upper ends of the two arms and at the lower intersection of the two arms. The teeth conform to the M20 truss plate configuration with two teeth, 1/8 inch wide and 5/16 inch long, punched from each slot as described in evaluation report ESR-1311. The POSI+STRUT 8 and 10 have 36 teeth punched at each end of each diagonal arm, and the POSI+STRUT 12 has 40 teeth at each end.

Trusses are fabricated by pressing the toothed areas of the web into the sides of 2-inch by 3-inch or 4-inch southern pine, Douglas fir, hem-fir, spruce-pine-fir light-framing or comparable MSR lumber to form a Warren configuration, parallel chord truss. Webs are installed in pairs from each end of the truss and the contact area must be free of knots. Since the webs have a modular 24-inch length, adjustment for overall truss length is provided by single overlapping webs from opposite sides at the center line or by a rectangular opening as shown in Figure 3.

The standard procedure for the particular truss machine in use is followed to clamp the chords and webs in position and to embed the teeth properly.

#### 2.2 Design:

Top chord and bottom chord bearing details are shown in Figure 1. Top chord-bearing trusses must have the first compression web double reinforced. Bearing contact shall be provided for the full width of the chord and the corresponding bearing length shall be as determined by the allowable stress perpendicular to grain for the species and grade of lumber used. Web positioning and chord splice location tolerances are shown in Figure 2. Chord splice and end block connector plates are Type M20 as detailed in evaluation report ESR-1311 and shall be sized in accordance with the design values indicated in the report.

The top flange must be laterally supported and the ends of the joists must be restrained to prevent rollover, which is normally provided by sheathing attached to the top flange, and to end walls or shear transfer panels. The fabrication tolerances and chord splice location are noted in Figure 2. Each chord may have one splice joint located within the middle 12 inches ± 3 inches of the 24-inch panel length.

Chords must be designed as continuous members, with combined axial and bending stresses not to exceed those set forth in Section 2321.1 of the code, with applicable increases as permitted in Chapter 23 of the code. Deflections are limited as set forth in the code using beam formulas based on the full cross-sectional areas of the top and bottom chords and the assigned modulus of elasticity for the lumber used. Allowable vertical shear values for web members are noted in Table 1. One-hour fire-resistive construction is based on evaluation report ESR-1311. In-plant quality control inspection must be provided in accordance with Section 2321.3 of the 1997 *Uniform Building Code*™ (UBC).

#### 2.3 One-hour Fire-resistive Floor-ceiling and Roof-ceiling Assembly:

The assembly includes 2-inch-by-4-inch (or 4-inch-by-2-inch) parallel chord, minimum 11<sup>1</sup>/<sub>4</sub>-inch-deep, POSI+STRUT 12 metal web trusses or wood trusses (wood webs) using MiTek M20 metal connector plates with minimum 5/16-inch-long teeth (evaluation report [ESR-1311](#)). When POSI+STRUT 12 trusses are used, the

continuous portion of the metal web must be at the bottom chord of the truss and the break in the web must be at the top chord. Splices may occur in the bottom chord, provided Type M16 or PTH metal connector plates are

used. Trusses are spaced a maximum of 24 inches on center.

Minimum  $1^{9}/_{32}$ -inch tongue-and-groove plywood with exterior glue is installed with the long dimension perpendicular to the trusses and end joints staggered at least 2 feet and located on truss chords. The plywood is attached to all framing members with minimum 6d coated box nails, with spacing complying with Table 23-II-B-1 of the UBC.

The ceiling consists of two layers of  $1/2$ -inch Type X gypsum wallboard. The wallboard is installed perpendicular to the span of the trusses. The first layer is secured directly to the underside of the trusses with end joints staggered 24 inches from adjacent rows. The wallboard is secured to the bottom chord of each truss with  $1^{1}/_{4}$ -inch-long Type S screws spaced 24 inches on center. The second layer of wallboard is installed with joints staggered 24 inches in each direction with the joints of the first layer. This layer is secured to each truss with  $1^{7}/_{8}$ -inch-long Type S screws spaced 12 inches on center at end joints and intermediate supports. Additional screws must be placed along the exposed butt joints of the wallboard. These fasteners are  $1^{1}/_{2}$ -inch-long Type G screws spaced 12 inches on center, 3 inches back from the joint and staggered with the Type S screws.

All wallboard joints must be reinforced with paper tape and covered with joint compound.

Nominal  $3/32$ -inch-thick gypsum veneer plaster may be applied to the entire surface of a minimum  $1/2$ -inch Type X veneer baseboard, as an alternate to paper tape embedded in cementitious compound over joints and exposed screw heads covered with compound. Joints must be reinforced with tape. The minimum  $1/2$ -inch Type X baseboard is installed in lieu of the face layer of regular Type X wallboard.

Perlite or vermiculite aggregate concrete may be placed on the flooring without affecting the fire-resistive rating. The minimum thickness of concrete is  $3/4$  inch, and a thin

plastic or paper vapor retarder should be placed on the plywood prior to placing the concrete.

Firm-Fill (evaluation report ER-4147) may be placed on the flooring without affecting the fire-resistive rating, provided the topping is installed in accordance with the respective evaluation reports.

Single-layer minimum  $1^{9}/_{32}$ -inch tongue-and-groove structural wood base panel floor sheathing-underlayments having a minimum floor-span rating of 24 inches may be used as a substitute for the  $1^{9}/_{32}$ -inch plywood specified above.

#### 2.4 Identification:

The webs are identified by a stamping of the trademark "POSI+STRUT" on one leg of each V-shaped strut.

### 3.0 EVIDENCE SUBMITTED

Descriptive literature, results of load tests conducted on full-scale and small scale trusses and calculations.

### 4.0 FINDINGS

**That the POSI+STRUT Metal Web Joist described in this report complies with the 1997 *Uniform Building Code*<sup>TM</sup> (UBC), subject to the following conditions:**

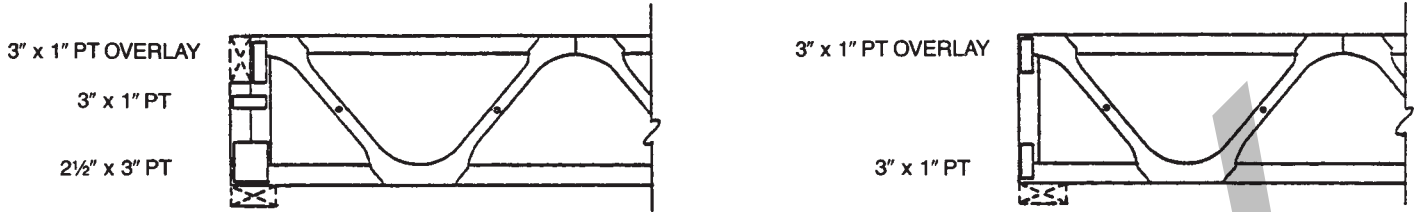
**4.1 The fabrication and design are as set forth in this report.**

**4.2 Allowable loads are recommended only when plans, truss designs and calculations are submitted to and accepted by the building official as showing compliance with the UBC, and when it is specified that fabrication inspection will be provided in accordance with Section 2321.3 of the UBC.**

**TABLE 1—ALLOWABLE VERTICAL SHEAR IN POUNDS PER PAIR OF POST+STRUT WEBS<sup>1,2</sup>**

POSI+STRUT	WEB FORCE	SOUTHERN PINE	DOUGLAS FIR	HEM-FIR AND SPRUCE-PINE-FIR
8	Compression web	800	790	630
	Tension web	600	590	500
	Tension web with nail <sup>3</sup>	880	870	700
10	Compression web	840	820	710
	Tension web	700	680	540
	Tension web with nail <sup>3</sup>	980	950	800
12	Compression web	940	840	740
	Tension web	780	700	550
	Tension web with nail <sup>3</sup>	980	900	820
16	Compression web	930	930	—
	Tension web	845	845	—
	Tension web with nail <sup>3</sup>	980	955	—

**BOTTOM CHORD BEARING**



**TOP CHORD BEARING**

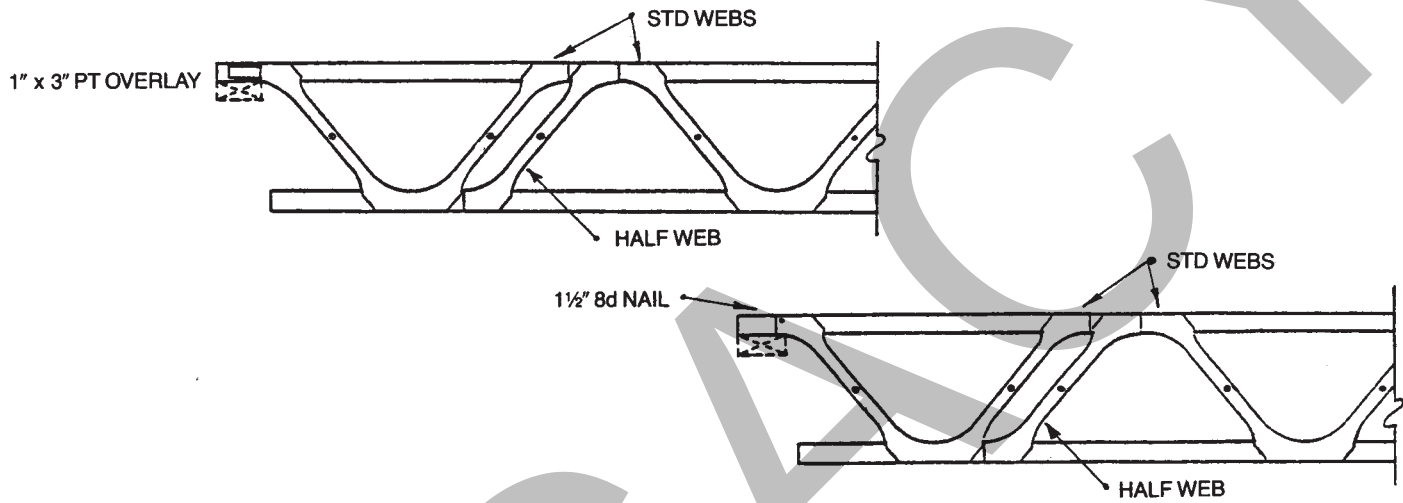


FIGURE 1—END BEARING DETAILS

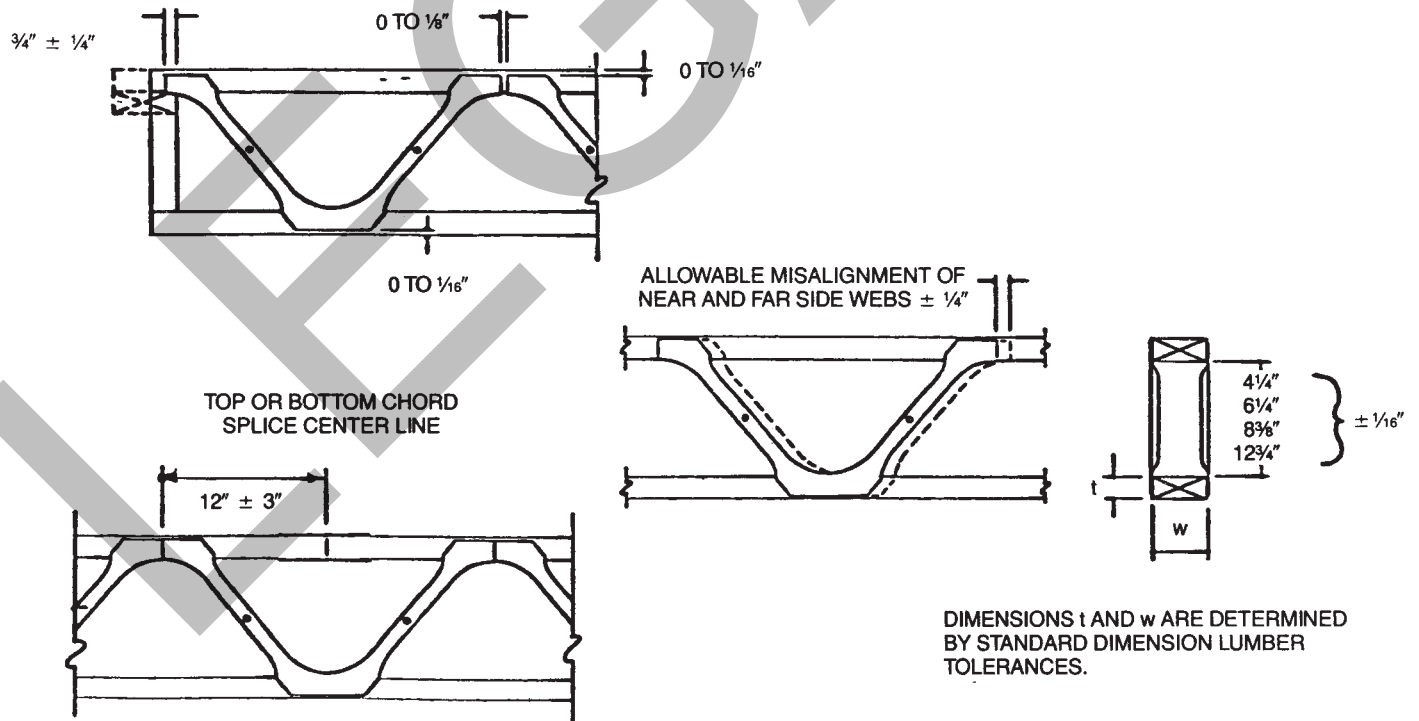
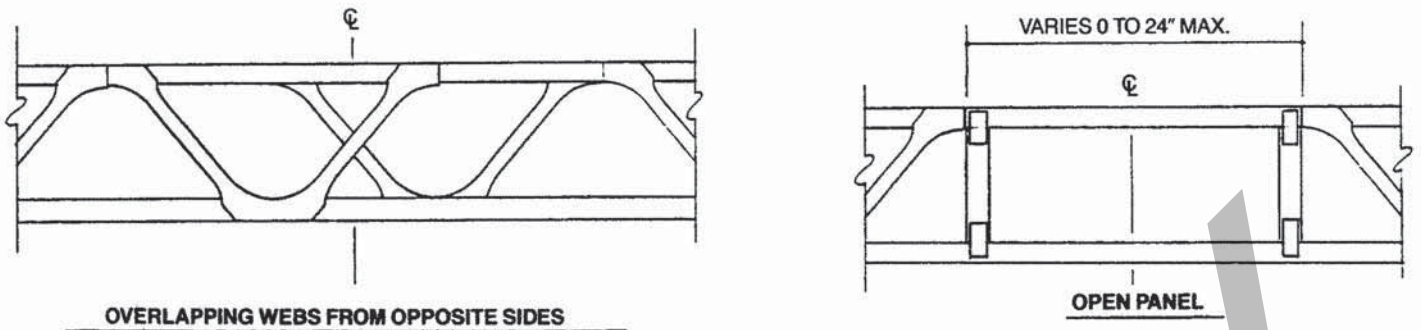


FIGURE 2—WEB-POSITIONING TOLERANCES



For joists with even numbers of webs, the center line of the open panel will occur at midspan. For joists with uneven numbers of webs, the center line of the open panel shall not be offset more than 12 inches from midspan.

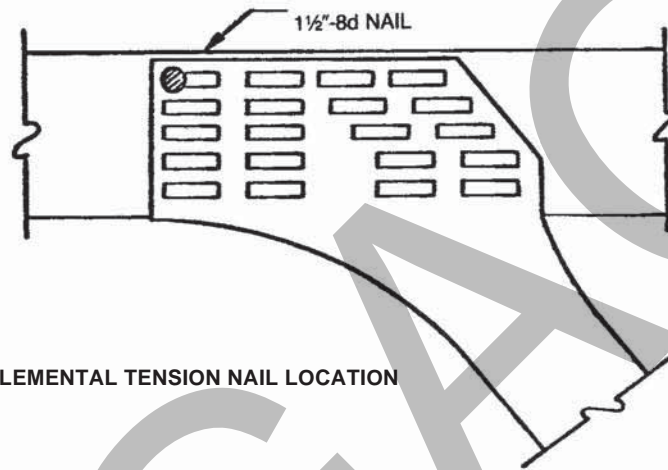


FIGURE 4—SUPPLEMENTAL TENSION NAIL LOCATION