

# ICC-ES Evaluation Report

**ESR-1472\***

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**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**  
**Section: 06 05 23—Wood, Plastic, and Composite Fastenings**

**REPORT HOLDER:**

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**EVALUATION SUBJECT:**
**SIMPSON STRONG-TIE® WSNTL WOOD SCREWS**
**1.0 EVALUATION SCOPE**
**Compliance with the following codes:**

- 2012, 2009 and 2006 *International Building Code*® (2012 IBC)
- \* ■ 2012, 2009 and ~~2006~~ *International Residential Code*® (2012 IRC)

**Property evaluated:**

Structural

**2.0 USES**

The Simpson Strong-Tie® WSNTL wood screws described in this report are used as substitutes for designs in accordance with the IBC where 8d and 10d common nails are specified for horizontal wood structural sheathing panel diaphragm applications in Tables 4.2A, 4.2B and 4.2C of AWC SDPWS (2012 IBC), 2009 IBC Tables 2306.2.1(1) and 2306.2.1(2), and 2006 IBC Tables 2306.3.1 and 2306.3.2; for code-prescribed wood connections in IBC Table 2304.9.1; for single diagonally sheathed lumber diaphragm fastening AWC SDPWS Table 4.2C and in 2006 IBC Table 2306.3.3;. The WSNTL screws are also used as substitutes for 8d and 10d common nails in structures built in accordance with the IRC, in prescriptive sheathing applications in Table R602.3(1) and in structures regulated by the IRC, where an engineered design is submitted in accordance with IRC Section R301.1.3.

**3.0 DESCRIPTION**
**3.1 General:**

The WSNTL wood screws are used to fasten wood structural sheathing panels to wood framing members in the construction of horizontal diaphragms. Reference

Tables 1 through 5 for the required installation spacings and allowable loads.

**3.2 Material:**

The WSNTL wood screws are No. 8 flat head, countersunk wood screws complying with ANSI/ASME B18.6.1, except that the screws have a minimum thread diameter of 0.175 inch (4.44 mm) and a minimum shank diameter of 0.132 inch (3.35 mm). The screws have either a yellow dichromatic finish plating or a proprietary coating.

The WSNTL2L, WSNTL2L-17, WSNTLG2, and WSNTLQ2 are 2 inches (51 mm) long. The WSNTL212, WSNTLG212, and WSNTLQ212 are 2½ inches (63.5 mm) long. The WSNTL3, WSNTLG3, and WSNTLQ3 are 3 inches (76 mm) long. The designation -17 indicates the presence of a Type 17 tip. The designations G and Q indicate proprietary coatings. The model name may end in the designation S, R, or B indicating the screws are in a collated, loose, or bulk form, respectively.

**4.0 INSTALLATION**
**4.1 Allowable Stress and Prescriptive Design:**

Allowable shear values for horizontal diaphragms consisting of wood structural sheathing panels attached to Douglas fir–larch or Southern pine lumber framing are shown in Tables 1 and 2. Allowable shear values of other wood species are adjusted by factors noted in the corresponding footnote to each table. The allowable shear capacities shown in Tables 1 and 2 are permitted to be increased by 40 percent for wind design. For applications under the 2012 and 2009 IBC, the diaphragm deflections must be calculated in accordance with AWC SDPWS Sections 4.2.2. For applications under the 2006 IBC, the diaphragm deflections must be calculated in accordance with Sections 2305.2.2 of the 2006 IBC, using the  $e_n$  values for the 10d common nail shown in Table 2305.2.2(1), as applicable.

The WSNTL withdrawal and pull-through values exceed those of a 10d common nail.

The prescriptive fastening schedule for IBC sheathing connections is shown in Table 3.

The prescriptive fastening schedule of single diagonally sheathed lumber diaphragms is shown in Table 5.

\* ~~The prescriptive fastening schedule for IRC sheathing connections is shown in Table 5.~~

The use of glue between the side and main member is not required by the code.

\*Revised January 2014

#### 4.2 Installation:

The screws must be installed in accordance with Section 11.1.4 of the National Design Specification for Wood Construction (NDS), with the exception that no predrilling is required. The screws must be installed with minimum panel edge and end distances of  $\frac{3}{8}$  inch (9.5 mm). Fasteners used in contact with preservative-treated or fire-retardant-treated lumber must, as a minimum, comply with IBC Section 2304.9.5, 2012 and 2009 IRC Section R317.3 ~~and 2006 IRC Section R319.3~~. For proprietary preservative-treated or fire-retardant-treated lumber, the lumber treater or the report holder (Simpson Strong-Tie Company) should be contacted for recommendations on minimum corrosion resistance and connection capacities of fasteners.

#### 4.3 Special Inspection:

Periodic special inspection must be provided for diaphragms components within the seismic-force-resisting system in accordance with 2012 IBC Section 1705.11 and 2009 and 2006 IBC Section 1707.1, with the exception of those structures that qualify under 2012 IBC Section 1704.2 and 2009 and 2006 IBC Section 1704.1. High load diaphragms noted in Table 2 of this report are subject to special inspection in accordance with 2012 IBC Section 1705.5.1 and 2009 and 2006 IBC Section 1704.6.1. For jurisdictions adopting the IRC, special inspections are not required.

#### 5.0 CONDITIONS OF USE

The Simpson Strong-Tie WSNTL wood screws 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 Fasteners are installed in accordance with Simpson Strong-Tie instructions and this report. In the case of conflict between this report and the manufacturer's installation instructions, this report governs.
- 5.2 Horizontal wood structural panel diaphragm design shear loads are less than or equal to the allowable loads shown in Tables 1 and 2, as applicable.
- 5.3 Use of fasteners with preservative-treated or fire-retardant-treated lumber must be in accordance with Section 4.2 of this report.
- 5.4 Single diagonally sheathed lumber diaphragm design shear loads are less than or equal to the allowable loads indicated in Section 4.2.7.2 of AWC SDPWS (2012 IBC), Section 2306.2.2 of the 2009 IBC and Section 2306.3.4 of the 2006 IBC.
- 5.5 Recognition of fasteners for corrosion resistance is outside the scope of this report.

#### 6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Wood Screws Used in Horizontal Diaphragms and Vertical Shear Walls (AC120), dated February 2013.

#### 7.0 IDENTIFICATION

Fastener packages bear a label noting the Simpson Strong-Tie Company, Inc., name and address; the product size; and the evaluation report number (ESR-1472).

**TABLE 1—ALLOWABLE SHEAR (POUNDS PER FOOT) FOR WOOD STRUCTURAL PANEL DIAPHRAGMS WITH FRAMING OF DOUGLAS FIR–LARCH OR SOUTHERN PINE<sup>a</sup> FOR WIND OR SEISMIC LOADING<sup>b</sup>**

| PANEL GRADE  | MINIMUM SCREW PENETRATION IN FRAMING (inches) | MINIMUM NOMINAL PANEL THICKNESS (inches) | MINIMUM NOMINAL WIDTH OF FRAMING MEMBERS AT ADJOINING PANEL EDGES AND BOUNDARIES (inches) <sup>c,d</sup> | BLOCKED DIAPHRAGMS  |     |                               |                | UNBLOCKED DIAPHRAGMS  |  |
|--|---|--|--|---|-----|-------------------------------|----------------|---|--|
|  |   |  |  | Screw spacing (inches) at diaphragm boundaries (all cases), at continuous panel edges parallel to load (Cases 3 and 4), and at all edges (Cases 5 and 6) <sup>e</sup> |     |                               |                | Screws spaced 6 inches maximum, at support edges <sup>e</sup>     |  |
|  |   |  |  | 6   | 4   | 2 <sup>1/2</sup> <sup>f</sup> | 2 <sup>f</sup> |   |  |
|  |   |  |  | Screw spacing (inches) at other panel edges   |     |                               |                | Case 1 (no unblocked edges or continuous joints parallel to load) | All other configurations (Cases 2, 3, 4, 5, and 6) |
| 6  | 6   | 4  | 3  |   |     |                               |                |   |  |
| Structural I / OSB   |   | 3/8                                      | 2  | 270   | 360 | 530                           | 600            | 240   | 180  |
|  |   |  | 3  | 300   | 400 | 600                           | 675            | 265   | 200  |
|  |   |  | 2  | 320   | 425 | 640                           | 730            | 285   | 215  |
|  |   |  | 3  | 360   | 480 | 720                           | 820            | 320   | 240  |
| Sheathing, single floor, and other grades covered in DOC PS1 and PS2 | 1 1/4   | 3/8                                      | 2  | 240   | 320 | 480                           | 545            | 215   | 160  |
|  |   |  | 3  | 270   | 360 | 540                           | 610            | 240   | 180  |
|  |   | 7/16                                     | 2  | 255   | 340 | 505                           | 575            | 230   | 170  |
|  |   |  | 3  | 285   | 380 | 570                           | 645            | 255   | 190  |
|  |   | 15/32                                    | 2  | 290   | 385 | 575                           | 655            | 255   | 190  |
|  |   |  | 3  | 325   | 430 | 650                           | 735            | 290   | 215  |
|  |   | 19/32                                    | 2  | 320   | 421 | 640                           | 730            | 285   | 215  |
|  |   |  | 3  | 360   | 480 | 720                           | 820            | 320   | 240  |

For **SI**: 1 inch = 25.4 mm, 1 pound per foot = 14.6 N/m.

<sup>a</sup>For framing of other species: (1) Find specific gravity for species of lumber in AF&PA National Design Specification (NDS). (2) Find shear value from table above for actual grade and multiply value by the following adjustment factor: Specific Gravity Adjustment Factor = [1-(0.5-SG)], where SG= Specific Gravity of the framing lumber. This adjustment factor must not be greater than 1.0.

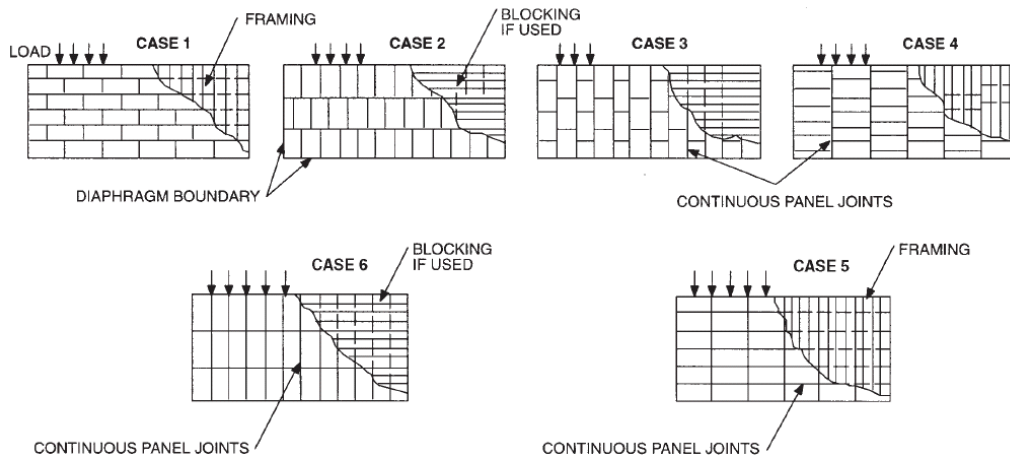
<sup>b</sup>For shear loads of normal or permanent load duration as defined by the NDS, the values in the table above must be multiplied by 0.63 or 0.56, respectively.

<sup>c</sup>The minimum nominal width of framing members not located at boundaries or adjoining panel edges must be 2 inches.

<sup>d</sup>Framing at adjoining panel edges must be 3 inches nominal or wider, and screws must be staggered where both of the following conditions are met: (1) screws having penetration into framing of more than 1 1/2 inches and (2) screws are spaced 3 inches o.c. or less.

<sup>e</sup>Space screws maximum 12 inches o.c. along intermediate framing members (6 inches o.c. where supports are spaced 48 inches o.c.).

<sup>f</sup>Framing at adjoining panel edges must be 3-inch nominal or wider, and screws must be staggered where screws are spaced 2 inches or 2 1/2 inches on center.



**TABLE 2—ALLOWABLE SHEAR (POUNDS PER FOOT) FOR WOOD STRUCTURAL PANEL BLOCKED DIAPHRAGMS UTILIZING MULTIPLE ROWS OF FASTENERS (HIGH LOAD DIAPHRAGMS) WITH FRAMING OF DOUGLAS FIR–LARCH OR SOUTHERN PINE<sup>a</sup> FOR WIND OR SEISMIC LOADING<sup>b,c,d</sup>**

| PANEL GRADE <sup>e</sup>        | MINIMUM SCREW PENETRATION IN FRAMING (inches) | MINIMUM NOMINAL PANEL THICKNESS (inches)                           | MINIMUM NOMINAL WIDTH OF FRAMING MEMBERS AT ADJOINING PANEL EDGES AND BOUNDARIES (inches) <sup>f</sup> | LINES OF FASTENERS              | BLOCKED DIAPHRAGMS                                      |       |                               |       |       |       |
|---------------------------------|---|--|--|---------------------------------|---|-------|-------------------------------|-------|-------|-------|
|                                 |   |  |  |                                 | Cases 1 and 2 <sup>g</sup>                              |       |                               |       |       |       |
|                                 |   |  |  |                                 | Fastener Spacing Per Line at Boundaries (inches)        |       |                               |       |       |       |
|                                 |   |  |  |                                 | 4   |       | 2 <sup>1</sup> / <sub>2</sub> |       |       |       |
|                                 |   |  |  |                                 | Fastener Spacing Per Line at Other Panel Edges (inches) |       |                               |       |       |       |
| 6                               |   | 4  | 4  | 3                               |   |       |                               |       |       |       |
| Structural I / OSB              | 1 <sup>1</sup> / <sub>4</sub>                 | 15 <sup>1</sup> / <sub>32</sub>                                    | 3  | 2                               | 605   | 815   | 875                           | 1,150 |       |       |
|                                 |   |  | 4  | 2                               | 700   | 915   | 1,005                         | 1,290 |       |       |
|                                 |   |  | 4  | 3                               | 875   | 1,220 | 1,285                         | 1,395 |       |       |
|                                 |   | 19 <sup>1</sup> / <sub>32</sub>                                    | 3  | 2                               | 670   | 880   | 965                           | 1,255 |       |       |
|                                 |   |  | 4  | 2                               | 780   | 990   | 1,110                         | 1,440 |       |       |
|                                 |   |  | 4  | 3                               | 965   | 1,320 | 1,405                         | 1,790 |       |       |
|                                 |   | 23 <sup>1</sup> / <sub>32</sub>                                    | 3  | 2                               | 730   | 955   | 1,050                         | 1,365 |       |       |
|                                 |   |  | 4  | 2                               | 855   | 1,070 | 1,210                         | 1,565 |       |       |
|                                 |   |  | 4  | 3                               | 1,050   | 1,430 | 1,525                         | 1,800 |       |       |
|                                 |   | Sheathing single floor and other grades covered in DOC PS1 and PS2 | 1 <sup>1</sup> / <sub>4</sub>  | 15 <sup>1</sup> / <sub>32</sub> | 3   | 2     | 525                           | 725   | 765   | 1,010 |
|                                 |   |  |  |                                 | 4   | 2     | 605                           | 815   | 875   | 1,105 |
|                                 |   |  |  |                                 | 4   | 3     | 765                           | 1,085 | 1,130 | 1,195 |
| 19 <sup>1</sup> / <sub>32</sub> | 3   |  |  | 2                               | 650   | 860   | 935                           | 1,225 |       |       |
|                                 | 4   |  |  | 2                               | 755   | 965   | 1,080                         | 1,370 |       |       |
|                                 | 4   |  |  | 3                               | 935   | 1,290 | 1,365                         | 1,485 |       |       |
| 23 <sup>1</sup> / <sub>32</sub> | 3   |  |  | 2                               | 710   | 935   | 1,020                         | 1,335 |       |       |
|                                 | 4   |  |  | 2                               | 825   | 1,050 | 1,175                         | 1,445 |       |       |
|                                 | 4   |  |  | 3                               | 1,020   | 1,400 | 1,480                         | 1,565 |       |       |

For **SI**: 1 inch = 25.4 mm, 1 pound per foot = 14.6 N/m.

<sup>a</sup>For framing of other species: (1) Find specific gravity for species of lumber in AF&PA National Design Specification (NDS). (2) Find shear value from table above for actual grade and multiply value by the following adjustment factor: Specific Gravity Adjustment Factor = [1-(0.5-SG)], where SG = Specific Gravity of the framing lumber. This adjustment factor must not be greater than 1.

<sup>b</sup>For shear loads of normal or permanent load duration as defined by the NDS, the values in the table above must be multiplied by 0.63 or 0.56, respectively.

<sup>c</sup>High load diaphragms must be subject to special inspection in accordance with IBC Section 1704.6.1.

<sup>d</sup>Fastening along intermediate framing members: Space screws maximum 12 inches o.c., except 6 inches o.c. for spans greater than 32 inches.

<sup>e</sup>Panels conforming to PS 1 or PS 2.

<sup>f</sup>The minimum nominal depth of framing members must be 3 inches. The minimum nominal depth width of framing members not located at boundaries or adjoining panel edges must be 2 inches.

<sup>g</sup>This table gives shear values for Cases 1 and 2 as shown in Table 1. The values shown are applicable to Cases 3, 4, 5, and 6 as shown in Table 1, providing fasteners at all continuous panel edges are spaced in accordance with the boundary fastener spacing.

**TABLE 3—IBC EQUIVALENT PRESCRIPTIVE FASTENING SCHEDULE**

| IBC TABLE 2304.9.1 CONNECTION                    | FASTENING | LOCATION |
|--|-----------|----------|
| 3. 1" X 6" subfloor or less to each joist        | 2 screws  | face     |
| 4. Wider than 1" x 6" subfloor to each joist     | 3 screws  | face     |
| 20. 1" diagonal brace to each stud and plate     | 2 screws  | face     |
| 21. 1" x 8" sheathing to each bearing            | 3 screws  | face     |
| 22. Wider than 1" x 8" sheathing to each bearing | 3 screws  | face     |

For **SI**: 1 inch = 25.4 mm.

**TABLE 4—IBC EQUIVALENT PRESCRIPTIVE FASTENING SCHEDULE FOR DIAGONALLY SHEATHED LUMBER DIAPHRAGMS**

| SHEATHING NOMINAL DIMENSION | FASTENING TO INTERMEDIATE AND END-BEARING STUDS | NAILING AT THE SHEAR PANEL BOUNDARIES |
|-----------------------------|---|---------------------------------------|
|                             | NUMBER OF FASTENERS PER BOARD                   |                                       |
| 1" X 6"                     | 2   | 3                                     |
| 1" X 8"                     | 3   | 4                                     |

For **SI**: 1 inch = 25.4 mm.

\*

**TABLE 5—IRC EQUIVALENT PRESCRIPTIVE FASTENING SCHEDULE**

| IRC TABLE R602.3(1) BUILDING ELEMENTS                                |   | FASTENING DESCRIPTION |                                |
|--|---|-----------------------|--------------------------------|
| 1" X 6" subfloor or less to each joist, face                         |   | 2 screws              |                                |
| 1" brace to each stud and plate, face                                |   | 2 screws              |                                |
| 1" x 6" sheathing to each bearing, face                              |   | 2 screws              |                                |
| 1" x 8" sheathing to each bearing, face                              |   | 2 screws              |                                |
| Wider than 1" x 8" sheathing to each bearing, face                   |   | 3 screws              |                                |
| Description of Building Materials                                    | Description of Fastener <sup>a</sup>                  | Spacing of Fasteners  |                                |
|  |   | Edges (inches)        | Intermediate supports (inches) |
| Wood structural panels, subfloor, roof and wall sheathing to framing |   |                       |                                |
| <sup>5</sup> / <sub>16</sub> " - <sup>1</sup> / <sub>2</sub> "       | 1 screw (all lengths)                                 | 6                     | 12                             |
| <sup>19</sup> / <sub>32</sub> " - 1"                                 | 1 screw (all lengths)                                 | 6                     | 12                             |
| 1 <sup>1</sup> / <sub>8</sub> "                                      | 1 screw (min. 2 <sup>1</sup> / <sub>2</sub> " length) | 6                     | 12                             |
| Wood structural panels, combination subfloor underlayment to framing |   |                       |                                |
| <sup>3</sup> / <sub>4</sub> " and less                               | 1 screw (all lengths)                                 | 6                     | 12                             |
| <sup>7</sup> / <sub>8</sub> " - 1"                                   | 1 screw (all lengths)                                 | 6                     | 12                             |
| 1 <sup>1</sup> / <sub>8</sub> "                                      | 1 screw (min. 2 <sup>1</sup> / <sub>2</sub> " length) | 6                     | 12                             |

For **SI**: 1 inch = 25.4 mm; 1 mile per hour = 0.447m/s.

<sup>a</sup>Screws shall be spaced at not more than 6 inches on center at all supports where spans are 48 inches or greater.

<sup>b</sup>For regions having basic wind speed of 100 mph or less, screws for attaching wood structural panel roof sheathing to gable end wall framing shall be spaced 6 inches on center. When basic wind speed is greater than 100 mph, screws for attaching panel roof sheathing to intermediate supports shall be spaced 6 inches on center for minimum 48-inch distance from ridges, eaves and gable end walls; and 4 inches on center to gable end wall framing.

<sup>c</sup>Spacing of fasteners on floor sheathing panel edges applies to panel edges supported by framing members and required blocking and at all floor perimeters only. Spacing of fasteners on roof sheathing panel edges applies to panel edges supported by framing members and required blocking. Blocking of roof or floor sheathing panel edges perpendicular to the framing members need not be provided except as required by other provisions of the code. Floor perimeter shall be supported by framing members or solid blocking.