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

REPORT HOLDER:
SIMPSON STRONG-TIE COMPANY INC.

EVALUATION SUBJECT:
SIMPSON STRONG-TIE® COUPLING TAKE-UP DEVICE (CTUD), TAKE-UP DEVICE (TUD AND ATUD), RATCHETING TAKE-UP DEVICE (RTUD), AND TAKE-UP WASHER (TUW)

1.0 EVALUATION SCOPE

Compliance with the following codes:

For evaluation for compliance with codes adopted by Los Angeles Department of Building and Safety (LADBS), see ESR-2320 LABC and LARC Supplement.

Property evaluated:
Structural

2.0 USES

The Simpson Strong-Tie® Coupling Take-Up Devices and Take-Up Devices described in this report are used in conjunction with continuous tie-down systems. They serve as part of a restraint system in wood-frame construction, to remove slack from the system by compensating for wood shrinkage and building settlement, in accordance with IBC Sections 2303.7 and 2304.3.3.

3.0 DESCRIPTION

3.1 General:

3.1.1 Coupling Take-Up Device (CTUD): The CTUD is an in-line, internally threaded coupling device that connects threaded rods together between floor levels, and removes slack in the continuous tie-down system when wood shrinkage or building settlement occurs. The device can be installed at any height in the wall, and has a rated compensation capacity of 1 inch (25 mm), to accommodate shrinkage and settlement from the story level in which it is installed. Each end of the CTUD is manufactured to create a positive stop for the threaded rod. The CTUD has witness holes to allow for inspection of proper thread engagement. The CTUD65, CTUD75, CTUD76, CTUD87, CTUD97, and CTUD98 are reducing CTUD models, allowing transition between different rod diameters. See Table 1 for recognized models and dimensions.

3.1.2 Take-Up Device (TUD and ATUD): The TUD and ATUD are in-line devices utilized at floor and roof levels to remove slack in the continuous tie-down system when wood shrinkage or building settlement occurs. The TUD and ATUD bear on a steel bearing plate installed on the top surface of the wood sole plate or top plates, and have rated compensation capacities as given in Table 2, to accommodate wood shrinkage and building settlement. Since the rod is continuous through the TUD and ATUD, the TUD, or ATUD above it must compensate for slack in the continuous tie-down system resulting from the cumulative shrinkage and settlement in the wood framing below it. See Table 2 for recognized models, rated shrinkage compensation capacities, and dimensions of the TUD and ATUD.

3.1.3 Ratcheting Take-Up Device (RTUD): The RTUD is a ratcheting device utilized at floor and roof levels to remove slack in the continuous tie-down system when wood shrinkage occurs. The RTUD sits on a steel bearing plate installed on the top surface of the wood sole plate or top plates, and is fastened to the wood framing. As shrinkage occurs, the RTUD moves downward along the threaded rod axis. When an upward force is applied, the RTUD locks into position and engages the rod to transfer the forces into the threaded rod. The RTUD has an unlimited shrinkage compensation capacity, provided there are no obstructions to the travel of the RTUD along the length of the threaded rod. See Table 3 for recognized models and dimensions of the RTUD.

3.1.4 Take-Up Washer (TUW): The TUW is a ratcheting plate washer used in combination with the SDWF screw (recognized in ESR-3046) to resist wind uplift at floor levels. The TUW is fastened to the top surface of the wood sole plate using four SD9212 screws (recognized in ESR-3046), and one SDWF is installed into the center of the TUW, through the floor cavity, and into the top plates of the wall immediately below. As the SDWF is installed, the screw head pulls the TUW side tabs downward, which engage the screw. This action allows the TUW to move downward along the screw as shrinkage occurs. When an upward force is applied, the TUW locks onto the screw and engages it to transfer the forces. The TUW has a compensation capacity of 7/8 inch (22 mm). See Table 4 for recognized models and dimensions of the TUW.
3.2 Materials:

3.2.1 CTUD and TUD: The CTUD and TUD bodies are fabricated from ASTM A311-04 (Reapproved 2015) Class B, Grade 1144, steel, with a minimum tensile strength of 126,000 psi (869 MPa), and a minimum yield strength of 105,000 psi (724 MPa). The bodies are coated with a corrosion-resistant finish specified in the approved quality documentation. The springs are fabricated from ASTM A313-13. Type 631, stainless steel torsional wire or ASTM A228-14 steel wire.

3.2.2 ATUD: The ATUD body is fabricated from ASTM B221-14 6061-T6511 aluminum. The spring is fabricated from ASTM A228-14 steel wire.

3.2.3 RTUD: The RTUD is a proprietary steel device manufactured to meet the specifications noted in the manufacturing standard associated with this report. The RTUD3 and RTUD4 housing and inserts are fabricated from cast steel. The RTUD3B, RTUD4B, RTUD5, RTUD6, RTUD7 and RTUD8 housing and inserts are fabricated from hot forged steel. Additional device components consist of steel washers, an internal tension ring and a PU foam rubber washer. Each steel component has a zinc/nickel electroplated finish with the exception of the internal tension ring.

3.2.4 TUW: The TUW plates are manufactured from No. 10 gage galvanized steel complying with ASTM A653, SS designation, Grade 33. The minimum base-metal thickness is 0.1275 inch (3.24 mm).

3.2.5 Threaded Rod: Threaded rod used with the CTUD, TUD, ATUD, and RTUD must comply with the applicable code. Rods used with the CTUD must meet the diameter and thread specifications given in Table 1, and ends of rods must be cut square. Maximum diameters for threaded rod used with the TUD and ATUD are given in Table 2. Threaded rod used with the RTUD must meet the diameter requirements, thread specification and strength requirements as specified in Table 3.

4.0 DESIGN AND INSTALLATION

4.1 Design:
Allowable design loads, deflections at allowable load, rated shrinkage compensation capacities and dimensions for CTUD models are given in Table 1. Allowable design loads, deflections at allowable load, rated shrinkage compensation capacities and dimensions for TUD and ATUD models are given in Table 2. Allowable design loads, deflections at allowable load, and dimensions for the RTUD are given in Table 3. Allowable design loads, deflections at allowable load, and dimensions for the TUW are given in Table 4. Drawings and design details for the continuous tie-down system, including threaded rods, bearing plates, anchors, and wood framing members, must comply with the code and be submitted to the code official for approval. The continuous tie-down system must also be designed such that the slack in the system due to wood shrinkage and building settlement is less than the rated compensation capacity for each CTUD, TUD, and ATUD within the system.

4.2 Installation:
The CTUD, TUD, ATUD, RTUD, and TUW must be installed in accordance with the details in this report, the manufacturer’s published installation instructions, and the drawings and design details approved by the code official. Threaded rod used with the CTUD, TUD, ATUD, or RTUD must comply with the requirements of Section 3.2.5. The continuous tie-down system must be installed plumb, such that the offset angle between the top of the floor and the bottom of the top plates or bridge block above does not exceed 1.33 degrees from vertical for the CTUD, TUD, ATUD, and RTUD. For the TUW, the SDWF screw must be installed such that its angle with respect to the plane of the TUW plate does not exceed 2.0 degrees from vertical. The activation pin on the CTUD must remain in place until both threaded rods are installed, and the nut at the sole plate above is secured in accordance with the manufacturer’s installation instructions. The activation pin on the TUD, and ATUD must remain in place until the plate washer and nut above it are secure. The TUW must be installed on the sole plate with four SD9212 screws, and the SDWF screw must be installed through the center of the TUW so that the tabs close to engage the SDWF screw threads. The go/no-go gage, supplied with the TUW, must be used in accordance with the manufacturer’s installation instructions to ensure proper installation. Figure 1 shows an installation detail for the CTUD; Figure 2 shows an installation detail for the TUD and ATUD; Figure 3 shows an installation detail for the RTUD; and Figure 4 shows an installation detail for the TUW.

5.0 CONDITIONS OF USE

The Coupling Take-Up Device (CTUD), Take-Up Device (TUD and ATUD), Ratcheting Take-Up Device (RTUD), and Take-Up Washer (TUW) 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 The devices must be installed in accordance with this report, the manufacturer’s published installation instructions and the drawings and design details approved by the code official. In the event of a conflict between this report and the manufacturer’s published installation instructions, the most restrictive governs.

5.2 The design values given in this report are for the CTUD, TUD, ATUD, RTUD, and TUW alone. No further increase in allowable load is permitted. Calculations, demonstrating that the design loads do not exceed the allowable loads and that the expected slack due to wood shrinkage and building settlement does not exceed the rated compensation capacity for each CTUD, TUD, ATUD, and/or TUW in the system, must be submitted to the code official for approval. The calculations must be prepared by a registered design professional when required by the statutes of the jurisdiction in which the project is to be constructed.

5.3 When installation is complete, the CTUD, TUD, ATUD, RTUD, and TUW are limited to installations in dry, interior locations.

5.4 The CTUD, TUD, ATUD, RTUD, and TUW must not be used to support dead loads other than their own weight.

5.5 Use of the CTUD, TUD, ATUD, RTUD, and TUW in contact with fire-retardant-treated wood or preservative-treated wood is outside of the scope of this report.

5.6 When the devices are used in continuous rod systems that resist light-frame shear wall overturning forces, calculations must be submitted to the code official confirming that the total vertical displacement, which would include steel rod elongation and the shrinkage compensating device deflection, is less than or equal to 0.200 inch (5 mm) for each story, or between restraints, whichever is more restrictive, using allowable stress design (ASD). Shear wall drift limit calculations must consider the 0.200 inch (5 mm) vertical displacement limit. This 0.200-inch (5 mm)
vertical displacement limit may be exceeded when it can be demonstrated that the shear wall story drift limit and the deformation compatibility requirements of IBC Section 1604.4 are met when considering all sources of vertical displacement.

6.0 EVIDENCE SUBMITTED

- Data in accordance with ICC-ES Acceptance Criteria for Shrinkage Compensating Devices (AC316), dated June 2013 (editorially revised November 2017).
- Data in accordance with the ICC-ES Acceptance Criteria for Shrinkage Compensating Devices (AC316), dated June 2013. (2006 IBC and IRC).

7.0 IDENTIFICATION

7.1 The CTUD, TUD, ATUD, RTUD, and TUW bear a label with the model number, evaluation report holder name (Simpson Strong-Tie Company, Inc.), and the evaluation report number (ESR-2320). The reducing CTUDs are scored at the reducing end around the outside. The TUW is packaged with one SDWF screw, four SD9212 screws, and a go/no-go gage for use in installation.

7.2 The report holder’s contact information is the following:

SIMPSON STRONG-TIE COMPANY INC.
5956 WEST LAS POSITAS BOULEVARD
PLEASANTON, CALIFORNIA 94588
(800) 999-5099
www.strongtie.com

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**TABLE 1—COUPLING TAKE-UP DEVICE (CTUD) SPECIFICATIONS**

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>THREADED ROD DIAMETER</th>
<th>DIMENSIONS</th>
<th>ALLOWABLE TENSION LOAD</th>
<th>SEATING INCREMENT, Δ₆</th>
<th>DEFLECTION AT ALLOWABLE LOAD, Δ₆</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(in - in)</td>
<td>W (in)</td>
<td>L (in)</td>
<td>(lbs)</td>
<td>(inches)</td>
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<tr>
<td>CTUD55</td>
<td>5/8 - 5/8</td>
<td>1 7/8</td>
<td>5</td>
<td>15,520</td>
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<td>CTUD65 (5)</td>
<td>3/4 - 5/8</td>
<td>2</td>
<td>5 1/2</td>
<td>31,795</td>
<td>0.003</td>
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<td>CTUD66</td>
<td>3/4 - 3/4</td>
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<td>5 1/2</td>
<td>31,795</td>
<td>0.003</td>
</tr>
<tr>
<td>CTUD75 (5)</td>
<td>7/8 - 5/8</td>
<td>2</td>
<td>5 1/2</td>
<td>31,795</td>
<td>0.003</td>
</tr>
<tr>
<td>CTUD76 (5)</td>
<td>7/8 - 3/4</td>
<td>2</td>
<td>5 1/2</td>
<td>31,795</td>
<td>0.003</td>
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<tr>
<td>CTUD77</td>
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<td>2</td>
<td>5 1/2</td>
<td>31,795</td>
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<tr>
<td>CTUD87 (5)</td>
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<td>6 1/8</td>
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</tr>
<tr>
<td>CTUD88</td>
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<td>6 1/8</td>
<td>55,955</td>
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<tr>
<td>CTUD98 (5)</td>
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<td>2 1/2</td>
<td>6 1/8</td>
<td>55,955</td>
<td>0.003</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 pound = 4.45 N.

1. Coupling Take-Up Devices (CTUD) compensate for up to 1 inch (25 mm) of wood shrinkage or building settlement.
2. Thread specification for threaded rod used with the CTUD must be UNC Class 2A, in accordance with ANSI/ASME B1.1.
3. Allowable tension loads are for the CTUD only. The attached components (including anchors, tension rods, bearing plates, wood framing members, etc.) must be designed to resist design loads in accordance with the applicable code.
4. No further increase in allowable tension load is permitted.
5. The CTUD65, CTUD75, CTUD76, CTUD87, CTUD97, and CTUD98 models are reducing CTUD models, allowing transition between different rod diameters.
6. The device average travel and seating increment, Δ₆, and deflection at allowable load, Δ₆, are additive, and describe the total movement of the device at allowable load, Δ₆. For design loads, P₀, less than the allowable load, P₆, the total movement of the device, Δ₆, is calculated as follows: Δ₆ = Δ₆ + Δ₆(P₆/P₆).

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**FIGURE 1—DIMENSIONS AND TYPICAL INSTALLATION OF THE CTUD**

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TABLE 2—TAKE-UP DEVICE (TUD / ATUD) SPECIFICATIONS

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>MAXIMUM THREADED ROD DIAMETER (in)</th>
<th>DIMENSIONS</th>
<th>ALLOWABLE LOADS</th>
<th>SEATING INCREMENT</th>
<th>DEFLECTION AT ALLOWABLE LOAD</th>
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<tr>
<td></td>
<td>W (in)</td>
<td>L (in)</td>
<td>(lbs.)</td>
<td>(inches)</td>
<td>(inches)</td>
</tr>
<tr>
<td>TUD9</td>
<td>1/8</td>
<td>2/8</td>
<td>2 1/4</td>
<td>34,655</td>
<td>0.001</td>
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<tr>
<td>TUD10</td>
<td>1/4</td>
<td>2 1/8</td>
<td>1 3/4</td>
<td>45,400</td>
<td>0.001</td>
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<tr>
<td>ATUD5</td>
<td>5/8</td>
<td>1 1/8</td>
<td>1 7/16</td>
<td>6,565</td>
<td>0.001</td>
</tr>
<tr>
<td>ATUD6-2</td>
<td>3/4</td>
<td>1 1/4</td>
<td>3 1/8</td>
<td>11,430</td>
<td>0.004</td>
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<tr>
<td>ATUD9</td>
<td>1/8</td>
<td>2 1/8</td>
<td>2 1/4</td>
<td>15,560</td>
<td>0.002</td>
</tr>
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<td>ATUD9-2</td>
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<td>2 1/8</td>
<td>3 1/8</td>
<td>12,790</td>
<td>0.002</td>
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<tr>
<td>ATUD9-3</td>
<td>1 1/8</td>
<td>2 1/8</td>
<td>5</td>
<td>11,830</td>
<td>0.002</td>
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<tr>
<td>ATUD14</td>
<td>1 3/4</td>
<td>2 1/8</td>
<td>2 1/4</td>
<td>24,395</td>
<td>0.005</td>
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<td>ATUD14-2</td>
<td>1 3/4</td>
<td>3</td>
<td>3 1/8</td>
<td>28,310</td>
<td>0.002</td>
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For SI: 1 inch = 25.4 mm, 1 pound = 4.45 N.

1Allowable loads are for the TUD and ATUD only. The attached components (including anchors, tension rods, bearing plates, wood framing members, etc.) must be designed to resist design loads in accordance with the applicable code.

2No further increase in allowable load is permitted.

3The device average travel and seating increment, ΔR, and deflection at allowable load, ΔA, are additive, and describe the total movement of the device at allowable load, ΔR. For design loads, P, the total movement of the device, ΔR, is calculated as follows: ΔR = ΔA + ΔR(P/PA).

4The RTU and ATUD only.

5The RTUD compensates for an unlimited amount of wood shrinkage, provided there are no obstructions to the travel of the RTUD along the length of the threaded rod.

6Thread specification for threaded rod used with the ATUD must be UNC Class 2A, in accordance with ANSI/ASME B1.1, and the specified minimum tensile strength, Fy, of the threaded rod must not exceed 80 ksi for the RTUD3, 90 ksi for the RTUD4, and 125 ksi for the RTUD5, RTUD6, RTUD7, and RTUD8.

7Allowable loads are for the RTUD only. The attached components (including anchors, tension rods, bearing plates, wood framing members, etc.) must be designed to resist design loads in accordance with the applicable code.

8No further increase in allowable load is permitted.

9The device average travel and seating increment, ΔR, and deflection at allowable load, ΔA, are additive, and describe the total movement of the device at allowable load, ΔR. For design loads, P, the total movement of the device, ΔR, is calculated as follows: ΔR = ΔA + ΔR(P/PA).

For SI: 1 inch = 25.4 mm, 1 pound = 4.45 N, 1 ksi = 6.89 MPa.

FIGURE 2—DIMENSIONS AND TYPICAL INSTALLATION OF THE TUD AND ATUD

TABLE 3—RATCHETING TAKE-UP DEVICE (RTUD) SPECIFICATIONS

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>THREADED ROD DIAMETER (inch)</th>
<th>DIMENSIONS (inches)</th>
<th>ALLOWABLE LOAD</th>
<th>SEATING INCREMENT</th>
<th>DEFLECTION AT ALLOWABLE LOAD</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>(lbs.)</td>
<td>(inch)</td>
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<tr>
<td>RTUD3</td>
<td>3 1/8</td>
<td>1.886</td>
<td>1.344</td>
<td>0.941</td>
<td>3,335</td>
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<tr>
<td>RTUD4</td>
<td>1 1/2</td>
<td>1.886</td>
<td>1.344</td>
<td>0.941</td>
<td>6,665</td>
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<td>RTUD3B</td>
<td>3 1/8</td>
<td>2.213</td>
<td>1.443</td>
<td>1.021</td>
<td>5,180</td>
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<tr>
<td>RTUD4B</td>
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<td>2.213</td>
<td>1.443</td>
<td>1.021</td>
<td>9,210</td>
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<td>RTUD5</td>
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<td>3.470</td>
<td>1.978</td>
<td>1.400</td>
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<td>3.470</td>
<td>1.978</td>
<td>1.400</td>
<td>20,830</td>
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<tr>
<td>RTUD7</td>
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<td>3.990</td>
<td>2.245</td>
<td>1.987</td>
<td>28,185</td>
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<td>RTUD8</td>
<td>1</td>
<td>3.990</td>
<td>2.245</td>
<td>1.987</td>
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</table>

For SI: 1 inch = 25.4 mm, 1 pound = 4.45 N, 1 ksi = 6.89 MPa.

1The RTUD compensates for an unlimited amount of wood shrinkage, provided there are no obstructions to the travel of the RTUD along the length of the threaded rod.

2RTUD must be attached to the sole plate or top plate with a minimum of two SD9112 wood screws for RTUD3, 4, 3B and 4B and two SD9212 wood screws for the RTUD5, 6, 7 and 8 as per ESR-3046.

3Thread specification for threaded rod used with the RTUD must be UNC Class 2A, in accordance with ANSI/ASME B1.1, and the specified minimum tensile strength, Fy, of the threaded rod must not exceed 80 ksi for the RTUD3, 90 ksi for the RTUD4, and 125 ksi for the RTUD5, RTUD6, RTUD7, and RTUD8.

4Allowable loads are for the RTUD only. The attached components (including anchors, tension rods, bearing plates, wood framing members, etc.) must be designed to resist design loads in accordance with the applicable code.

5No further increase in allowable load is permitted.

6The device average travel and seating increment, ΔR, and deflection at allowable load, ΔA, are additive, and describe the total movement of the device at allowable load, ΔR. For design loads, P, the total movement of the device, ΔR, is calculated as follows: ΔR = ΔA + ΔR(P/PA).
TABLE 4—TAKE-UP WASHER (TUW) SPECIFICATIONS

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>DIMENSIONS (inches)</th>
<th>FASTENER SCHEDULE</th>
<th>ALLOWABLE LOAD (lbs)</th>
<th>SEATING_INCREMENT (inches)</th>
<th>DEFLECTION AT ALLOWABLE LOAD (inches)</th>
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</thead>
<tbody>
<tr>
<td>TUW38</td>
<td>A 3.5 B 3.25</td>
<td>Sole Plate 4 – SD9212 Top Plate 1 – SDWF</td>
<td>1,410</td>
<td>0.034</td>
<td>0.0050</td>
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</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 pound = 4.45 N.

1The Take-Up Washer (TUW) compensates for up to 7/8 inch (22 mm) of wood shrinkage.
2The TUW must be attached to the sole plate with four SD9212 screws.
3The SDWF screw must be installed through the hole in the center of the TUW, normal to the plane of the TUW, through the sole plate and floor cavity, and into the top plate of the floor below, until the head of the SDWF screw pulls the TUW side tabs downward, thereby engaging the shank of the screw.
4Tabulated allowable loads are for the TUW only, and apply only to tension loads that are in-line with the long axis of the SDWF screw. The allowable load of the TUW/SDWF assembly is limited by the lesser of: a) the tabulated allowable load given above, or b) the adjusted allowable withdrawal load for the SDWF screw, as given in ESR-3046.
5The attached components (including screws and wood framing members, etc.) must be designed to resist design loads, and must account for serviceability limitations, in accordance with the applicable code.
6The TUW and SDWF have not been evaluated for lateral load transfer.
7No further increase in allowable tension load is permitted.
8The device average travel and seating increment, Δₐ, and deflection at allowable load, Δₐ, are additive, and describe the total movement of the device at allowable load, Δₐ. For design loads, P_D, less than the allowable load, P_A, the total movement of the device, Δₐ, is calculated as follows: Δₐ = Δₐ + Δₐ(P_D/P_A).
9The tabulated deflection at allowable load, Δₐ, accounts only for deformation of the TUW itself. It is not inclusive of additional deflections within the TUW/SDWF assembly, such as withdrawal and elongation of the SDWF screw.
1.0 REPORT PURPOSE AND SCOPE

Purpose:
The purpose of this evaluation report supplement is to indicate that the Simpson Strong-Tie® Coupling Take-Up Devices and Take-Up Devices, described in ICC-ES evaluation report ESR-2320, have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:
- 2020 City of Los Angeles Building Code (LABC)
- 2020 City of Los Angeles Residential Code (LARC)

2.0 CONCLUSIONS

The Simpson Strong-Tie® Coupling Take-Up Devices and Take-Up Devices, described in Sections 2.0 through 7.0 of the evaluation report ESR-2320, comply with the LABC Chapter 23, and the LARC, and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Simpson Strong-Tie® Coupling Take-Up Devices and Take-Up Devices described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report ESR-2320.
- The design, installation, conditions of use and identification of the Simpson Strong-Tie® Coupling Take-Up Devices and Take-Up Devices are in accordance with the 2018 International Building Code® (IBC) provisions noted in the evaluation report ESR-2320.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.

This supplement expires concurrently with the evaluation report, reissued November 2019 and revised March 2020.