

ICC-ES Evaluation Report

ESR-2320

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

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EVALUATION SUBJECT:**COUPLING TAKE-UP DEVICE (CTUD) AND TAKE-UP DEVICE (TUD AND ATUD)****1.0 EVALUATION SCOPE****Compliance with the following codes:**

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

Property evaluated:

Structural

2.0 USES

The 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.

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 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 at the top of the wood sole plate, 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 CTUD, 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.

3.2 Materials:

3.2.1 CTUD and TUD: The CTUD and TUD bodies are fabricated from ASTM A 311-04 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 A 313-03, Type 631, stainless steel torsional wire or ASTM A 228 steel wire.

3.2.2 ATUD: The ATUD body is fabricated from ASTM B 221 6061-T6511 aluminum. The bodies are coated with a corrosion-resistant finish specified in the approved quality documentation. The spring is fabricated from ASTM A 228 steel wire.

3.2.3 Threaded Rod: Threaded rod used with the CTUD, TUD, and ATUD 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.

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 and dimensions for TUD and ATUD models are given in Table 2. 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, and ATUD 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, or ATUD must comply with the requirements of Section 3.2.2. 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. The activation pin on the CTUD must remain in place until both threaded rods are installed, and the nut at the sole plate above it 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. Figure 1 shows an installation detail for the CTUD, and Figure 2 shows an installation detail for the TUD and ATUD.

5.0 CONDITIONS OF USE

The Coupling Take-Up Device (CTUD) and Take-Up Device (TUD and ATUD) 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, this report governs.

- 5.2** The design values given in this report are for the CTUD, TUD, and ATUD 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, and/or ATUD in the continuous tie-down 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, and ATUD are limited to installations in dry, interior locations.

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

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

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Shrinkage Compensating Devices (AC316), dated June 2011.

7.0 IDENTIFICATION

The CTUD, TUD, and ATUD 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.

TABLE 1—COUPLING TAKE-UP DEVICE (CTUD) SPECIFICATIONS¹

MODEL NUMBER	THREADED ROD DIAMETER ² (in - in)	DIMENSIONS		ALLOWABLE TENSION LOAD ^{3,4} (lbs)	SEATING INCREMENT, Δ_R ⁶ (inches)	DEFLECTION AT ALLOWABLE LOAD, Δ_A ⁶ (inches)
		W (in)	L (in)			
CTUD55	$5/8 - 5/8$	$1 7/8$	5	15,520	0.004	0.006
CTUD65 ⁽⁵⁾	$3/4 - 5/8$	2	$5 1/2$	31,795	0.003	0.060
CTUD66	$3/4 - 3/4$	2	$5 1/2$	31,795	0.003	0.060
CTUD75 ⁽⁵⁾	$7/8 - 5/8$	2	$5 1/2$	31,795	0.003	0.060
CTUD76 ⁽⁵⁾	$7/8 - 3/4$	2	$5 1/2$	31,795	0.003	0.060
CTUD77	$7/8 - 7/8$	2	$5 1/2$	31,795	0.003	0.060
CTUD87 ⁽⁵⁾	$1 - 7/8$	$2 1/2$	$6 1/8$	55,955	0.003	0.033
CTUD88	1 - 1	$2 1/2$	$6 1/8$	55,955	0.003	0.033
CTUD97 ⁽⁵⁾	$1 1/8 - 7/8$	$2 1/2$	$6 1/8$	55,955	0.003	0.033
CTUD98 ⁽⁵⁾	$1 1/8 - 1$	$2 1/2$	$6 1/8$	55,955	0.003	0.033
CTUD99	$1 1/8 - 1 1/8$	$2 1/2$	$6 1/8$	55,955	0.003	0.033

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

¹Coupling Take-Up Devices (CTUD) compensate for up to 1 inch (25 mm) of wood shrinkage or building settlement.

²Thread specification for threaded rod used with the CTUD must be UNC Class 2A, in accordance with ANSI/ASME B1.1.

³Allowable 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.

⁴No further increase in allowable tension load is permitted.

⁵The CTUD65, CTUD75, CTUD76, CTUD87, CTUD97, and CTUD98 models are reducing CTUD models, allowing transition between different rod diameters.

⁶The device average travel and seating increment, Δ_R , and deflection at allowable load, Δ_A , describe the total movement of the device at allowable load, Δ_T , and are additive. For design loads, P_D , less than the allowable load, P_A , the total movement of the device, Δ_T , is calculated as follows: $\Delta_T = \Delta_R + \Delta_A(P_D/P_A)$.

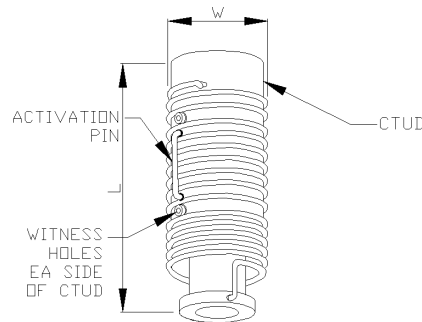


TABLE 2—TAKE-UP DEVICE (TUD / ATUD) SPECIFICATIONS

MODEL NUMBER	MAXIMUM THREADED ROD DIAMETER (in)	DIMENSIONS		RATED COMPENSATION CAPACITY (inches)	ALLOWABLE LOADS ^{1,2} (lbs.)	SEATING INCREMENT, Δ_R ³ (inches)	DEFLECTION AT ALLOWABLE LOAD, Δ_A ³ (inches)
		W (in)	L (in)				
TUD9	$1 1/8$	$2 1/8$	$2 1/4$	1	34,655	0.001	0.014
TUD10	$1 1/4$	$2 3/8$	$2 1/4$	1	45,400	0.001	0.033
ATUD5	$5/8$	$1 3/8$	$1 7/8$	$3/4$	6,565	0.001	0.009
ATUD9	$1 1/8$	$2 1/8$	$2 1/4$	1	15,560	0.002	0.013
ATUD9-2	$1 1/8$	$2 1/8$	$3 7/8$	2	12,790	0.002	0.037

For SI: 1inch = 25.4mm, 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, Δ_R , and deflection at allowable load, Δ_A , describe the total movement of the device at allowable load, Δ_T , and are additive. For design loads, P_D , less than the allowable load, P_A , the total movement of the device, Δ_T , is calculated as follows: $\Delta_T = \Delta_R + \Delta_A(P_D/P_A)$.

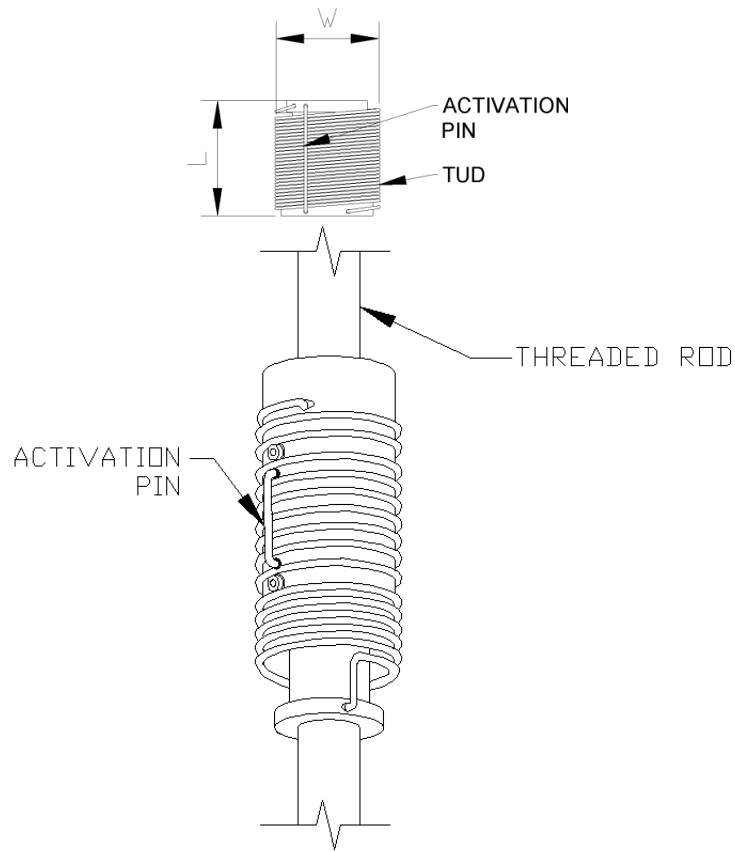


FIGURE 1—TYPICAL CTUD INSTALLATION

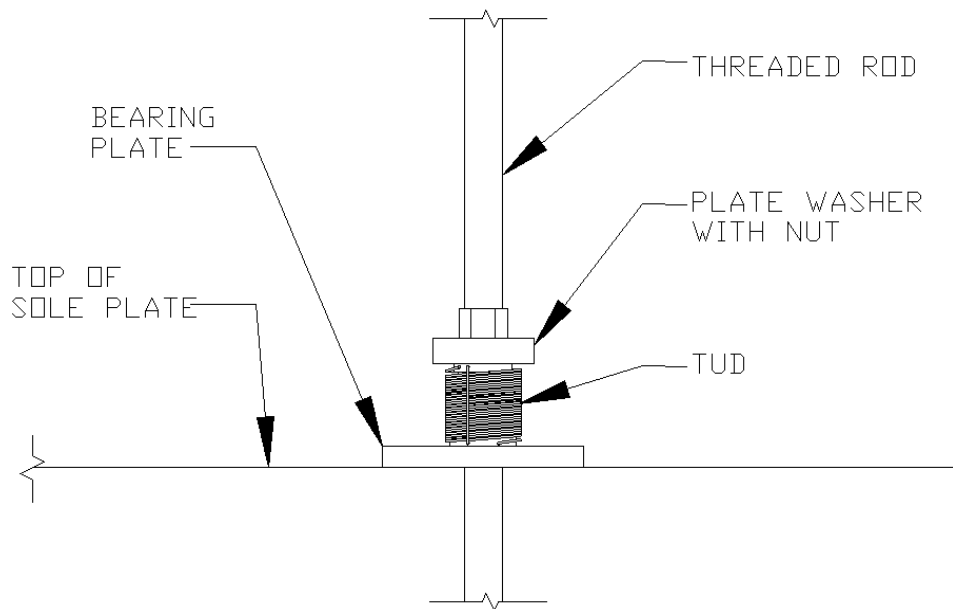


FIGURE 2—TYPICAL TUD AND ATUD INSTALLATION