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# ICC-ES Evaluation Report

# ESR-2822

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Reissued 04/2019

This report is subject to renewal 04/2021.

**DIVISION: 03 00 00—CONCRETE**  
**SECTION: 03 21 00—REINFORCING STEEL**

**REPORT HOLDER:**

**TRU-WELD DIVISION, TFP CORPORATION**

**EVALUATION SUBJECT:**

**TRU-WELD PUNCHING SHEAR RESISTOR STUDS**



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**DIVISION: 03 00 00—CONCRETE**  
**Section: 03 21 00—Reinforcing Steel**

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TRU-WELD DIVISION, TFP CORPORATION

**EVALUATION SUBJECT:**

TRU-WELD PUNCHING SHEAR RESISTOR STUDS

**1.0 EVALUATION SCOPE**

**Compliance with the following code:**

- 2015, 2012, 2009 and 2006 *International Building Code*® (IBC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)<sup>†</sup>

<sup>†</sup>The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

**Property evaluated:**

Structural

**2.0 USES**

Tru-Weld punching shear resistor (PSR) studs are large-headed shear connectors that are welded to flat steel bars and used as shear reinforcement in flat concrete slabs to replace stirrups to resist the punching shear stress in the slabs.

**3.0 DESCRIPTION**

The PSR studs are provided in  $\frac{3}{8}$ -,  $\frac{1}{2}$ -,  $\frac{5}{8}$ - and  $\frac{3}{4}$ -inch (9.5, 12.7, 15.9 and 19.1 mm) diameters and comply with the material requirements and specifications of the American Welding Society's Structural Welding Code—Steel, AWS D1.1:2010. The studs are made from ASTM A29-05 Grades 1010 through 1020 steel satisfying the following physical requirements according to Table 7.1 of AWS D1.1:2010:

- Yield strength: 51,000 psi (350 MPa), minimum.
- Tensile strength: 65,000 psi (450 MPa), minimum.
- Elongation: 20 percent in 2 inches (51 mm), minimum.
- Reduction of area: 50 percent, minimum.

Figure 1 shows the stud configuration. The dimensions of the studs are shown in Table 1.

**4.0 INSTALLATION**

**4.1 General:**

Installation of the stud/bar assemblies used to resist punching shear stresses must comply with the Shear Reinforcement for Slab report ACI 421.IR-08, ACI 318-14

for the 2015 IBC (ACI 318-11 for the 2012 IBC and ACI 318-08 for the 2009 and 2006 IBC), a current ICC-ES evaluation report complying with AC308 and the approved plans.

**4.2 Welding:**

The studs must be welded in accordance with equipment and procedures recommended by the Tru-Weld Division of TFP Corporation. All welding must comply with requirements in Section 7 of AWS D1.1:2010.

**5.0 CONDITIONS OF USE**

The Tru-Weld Punching Shear Resistor Studs described in this report comply with, or are suitable alternatives to what is specified in, the code indicated in Section 1.0 of this report, subject to the following conditions:

- 5.1** The fabricated shear stud reinforcement bar assemblies manufactured using these studs must be welded by approved fabricators of structural steel components and structural steel welding as required by the provisions of the IBC, and Section 4.2 of this report.
- 5.2** The shear stud reinforcement bars must be used for assemblies that are recognized in a current ICC-ES evaluation report prepared in accordance with AC308 (the Acceptance Criteria for Headed Shear Stud Reinforcement Assemblies for Concrete Slabs or Footings).

**6.0 EVIDENCE SUBMITTED**

- 6.1** Material specifications and quality documentation in accordance with ASTM A1044.
- 6.2** Weld base qualification tests in accordance with AWS D1.1.
- 6.3** Quality documentation.

**7.0 IDENTIFICATION**

- 7.1** The label on the packages of Tru-Weld PSR studs includes the name and address of Tru-Weld Division, TFP Corporation; product name; size; ICC-ES evaluation report number (ESR-2822); and heat number. In addition, the PSR studs are identified by the Tru-Weld logo (see Figure 2) inscribed in an indented circle on the head of each connector.
- 7.2** The report holder's contact information is the following:

**TRU-WELD DIVISION, TFP CORPORATION**  
**460 LAKE ROAD**  
**MEDINA, OHIO 44256**  
**(330) 725-7741**  
[www.truwelldstudwelding.com](http://www.truwelldstudwelding.com)

TABLE 1—TRU-WELD PSR STUD DIMENSIONS

STUD SHANK DIAMETER, D [inch (mm)]	HEAD DIAMETER, H [inch (mm)]	$\frac{H}{D}$	SHANK AREA, $S_A$ [inch <sup>2</sup> (mm <sup>2</sup> )]	HEAD AREA, $H_A$ [inch <sup>2</sup> (mm <sup>2</sup> )]	$\frac{H_A}{S_A}$	HEAD THICKNESS, T [inch (mm)]
$\frac{3}{8}$ (9.5)	1.19 (30.1)	3.17	0.110 (71)	1.112 (712)	10.1	0.26 (6.6)
$\frac{1}{2}$ (12.7)	1.58 (40.2)	3.16	0.196 (127)	1.961 (1269)	10.0	0.33 (8.4)
$\frac{5}{8}$ (15.9)	1.98 (50.2)	3.17	0.307 (199)	3.079 (1979)	10.0	0.40 (10.2)
$\frac{3}{4}$ (19.1)	2.37 (60.2)	3.16	0.442 (287)	4.412 (2846)	10.0	0.42 (10.7)

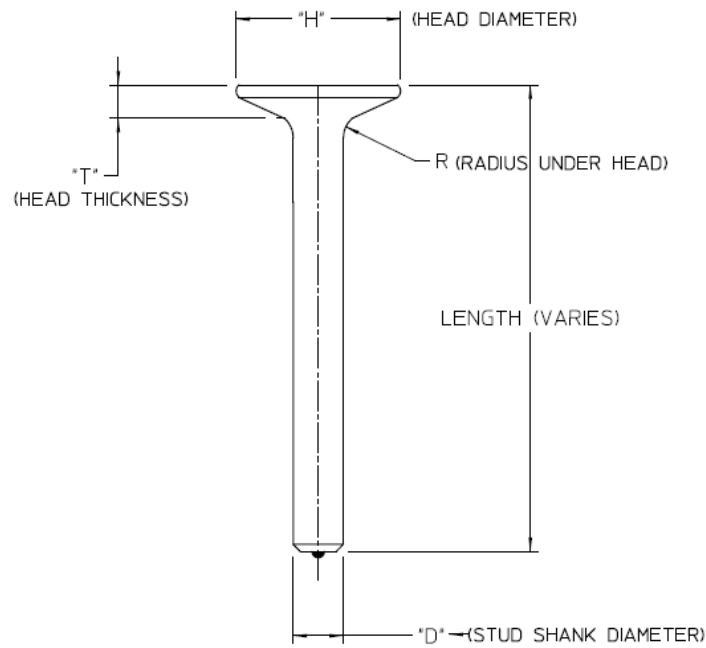


FIGURE 1—PSR STUD CONFIGURATION

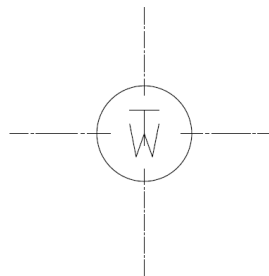


FIGURE 2—TRU- WELD LOGO