ICC-ES Evaluation Report

ESR-2822

Reissued April 2025

Subject to renewal April 2027

This report also contains:

- **City of LA Supplement**
- **CA Supplement**

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DIVISION: 03 00 00—CONCRETE Section: 03 21 00—Reinforcement Bars	REPORT HOLDER: TRU-WELD DIVISION, TFP CORPORATION	EVALUATION SUBJECT: TRU-WELD PUNCHING SHEAR RESISTOR STUDS	

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015, 2012, 2009 and 2006 *International Building Code*® (IBC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)†

†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 $^3/_8$-, $^1/_2$-, $^5/_8$- and $^3/_4$-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 D1.1:2015. 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 D1.1:2015:

- 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 DESIGN AND 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 2018 and 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 AC395 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 and preweld preparations must comply with requirements in Sections 7 and 5.14 of AWS D1.1:2015, respectively.

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 AC395 (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.tfpcorp.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^2 (mm^2)]	HEAD AREA, HA [inch2 (mm^2)]	$\frac{H_A}{S_A}$	HEAD THICKNESS, T [inch (mm)]
$^3/_8$ (9.5)	1.19 (30.1)	3.17	0.110 (71)	1.112 (712)	10.1	0.26 (6.6)
$^1/_2$ (12.7)	1.58 (40.2)	3.16	0.196 (127)	1.961 (1269)	10.0	0.33 (8.4)
$^5/_8$ (15.9)	1.98 (50.2)	3.17	0.307 (199)	3.079 (1979)	10.0	0.40 (10.2)
$^3/_4$ (19.1)	2.37 (60.2)	3.16	0.442 (287)	4.412 (2846)	10.0	0.42 (10.7)

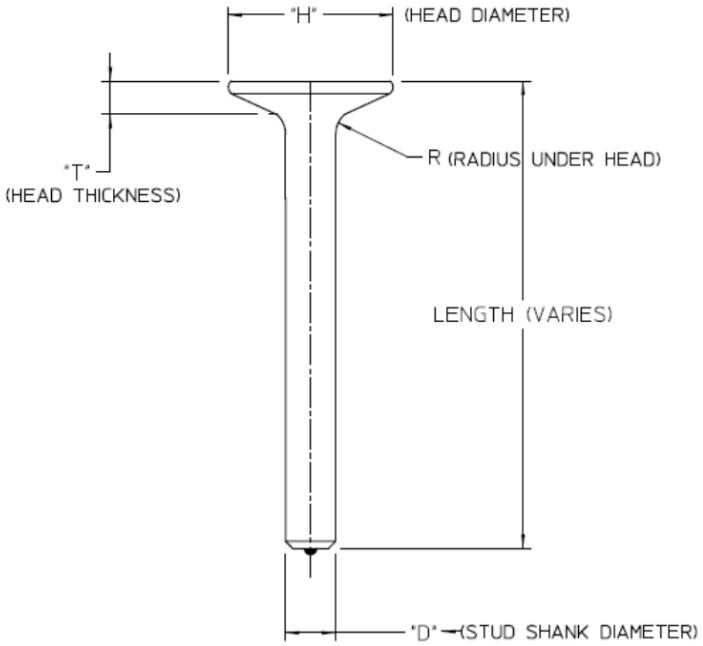

FIGURE 1—PSR STUD CONFIGURATION

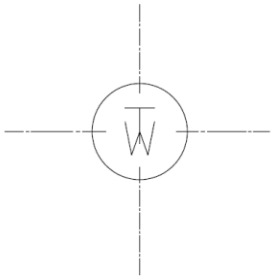

FIGURE 2—TRU- WELD LOGO

DIVISION: 03 00 00—CONCRETE
Section: 03 21 00—Reinforcement Bars

REPORT HOLDER:

TRU-WELD DIVISION, TFP CORPORATION

EVALUATION SUBJECT:

TRU-WELD PUNCHING SHEAR RESISTOR STUDS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Tru-Weld Punching Shear Resistor Studs, described in ICC-ES evaluation report ESR-2822, have also been evaluated for compliance with the code noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code edition:

2020 *City of Los Angeles Building Code (LABC)*

2.0 CONCLUSIONS

The Tru-Weld Punching Shear Resistor Studs, described in Sections 2.0 through 7.0 of the evaluation report ESR-2822, comply with the LABC Chapter 19 and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Tru-Weld Punching Shear Resistor Studs described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report ESR-2822.
- The design, installation, conditions of use and identification of the Tru-Weld Punching Shear Resistor Studs are in accordance with the 2018 *International Building Code®* (IBC) provisions noted in the evaluation report ESR-2822.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.
- The allowable strength and design strength values based on the evaluation report must take into consideration the capacity of the connection between the shear resistor studs and the connected reinforcement (which may govern).

This supplement expires concurrently with the evaluation report, reissued April 2025.

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Applicable code edition:

2019 *California Building Code* (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

2.0 CONCLUSIONS

2.1 CBC:

The Tru-Weld punching shear resistor (PSR) studs, described in Sections 2.0 through 7.0 of the evaluation report ESR-2822, comply with CBC Chapter 19, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 16, 17 and 19, as applicable.

2.1.1 OSHPD:

The applicable OSHPD Chapters and Sections of the CBC are beyond the scope of this supplement.

2.1.2 DSA:

The applicable DSA Chapters and Sections of the CBC are beyond the scope of this supplement.

This supplement expires concurrently with the evaluation report, reissued April 2025.