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ESR-2822

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

REPORT HOLDER:

TRU-WELD DIVISION, TFP CORPORATION

**460 LAKE ROAD
MEDINA, OHIO 44256**

EVALUATION SUBJECT:

TRU-WELD PUNCHING SHEAR RESISTOR STUDS



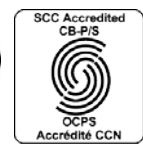
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DIVISION: 03 00 00—CONCRETE
Section: 03 21 00—Reinforcing Steel

REPORT HOLDER:

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EVALUATION SUBJECT:
TRU-WELD PUNCHING SHEAR RESISTOR STUDS
1.0 EVALUATION SCOPE
Compliance with the following code:

- 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 $\frac{3}{8}$ -, $\frac{1}{2}$ -, $\frac{5}{8}$ - 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 318-11 (ACI 318-08 for the 2009 and 2006 IBC) 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

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.

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, H_A [inch ² (mm ²)]	$\frac{H_A}{S_A}$	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)

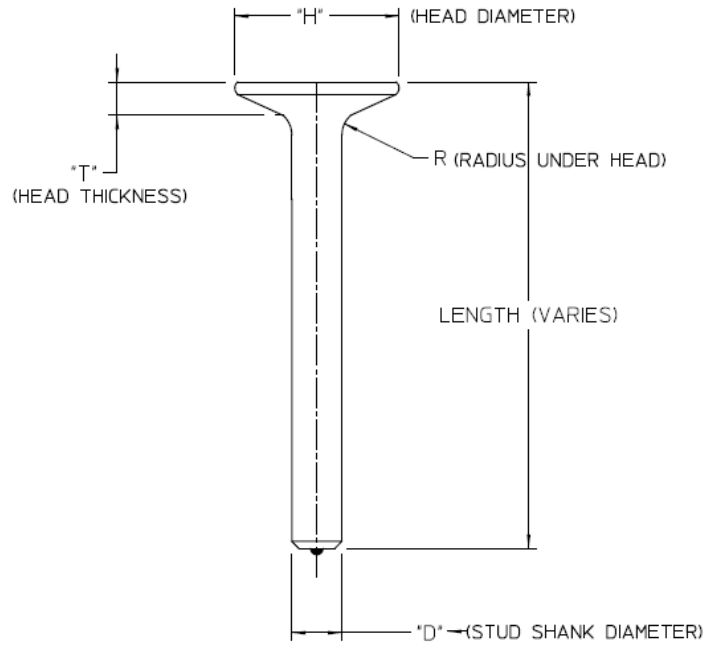


FIGURE 1—PSR STUD CONFIGURATION

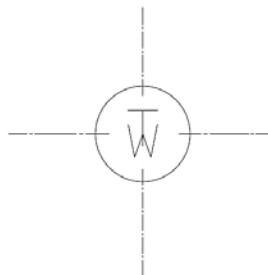


FIGURE 2—TRU- WELD LOGO