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# ESR-2577

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**DIVISION: 03 00 00—CONCRETE**  
**SECTION: 03 15 00—CONCRETE ACCESSORIES**

**REPORT HOLDER:**

**TRU-WELD DIVISION, TFP CORPORATION**

**460 LAKE ROAD  
MEDINA, OHIO 44256**

**EVALUATION SUBJECT:**

**TRU-WELD STEEL HEADED STUD ANCHORS**



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# ICC-ES Evaluation Report

**ESR-2577**

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**DIVISION: 03 00 00—CONCRETE**  
**Section: 03 15 00—Concrete Accessories**

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**EVALUATION SUBJECT:**

**TRU-WELD STEEL HEADED STUD ANCHORS**

**1.0 EVALUATION SCOPE**

**Compliance with the following codes:**

- 2015 *International Building Code*® (2015 IBC)
- 2012 *International Building Code*® (2012 IBC)
- 2009 *International Building Code*® (2009 IBC)
- 2006 *International Building Code*® (2006 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 Steel Headed Stud Anchors are intended for use as shear connectors in steel and concrete composite construction.

**3.0 DESCRIPTION**

Tru-Weld Steel Headed Stud Anchors are manufactured from ASTM A29, Grades 1010 through 1020, cold-drawn steel, and are Type B studs conforming to the requirements of AWS D1.1-2010 and Sections A3.6 and I8 of the 2010 AISC Specification for Structural Steel Buildings (ANSI/AISC 360-10). The steel headed stud anchors are provided in 1/2-, 5/8-, 3/4-, 7/8-, and 1-inch (12.7 mm, 15.9 mm, 19.1 mm, 22.2 mm, and 25.4 mm) diameters.

**4.0 DESIGN AND INSTALLATION**

**4.1 Design:**

The nominal horizontal shear strength of steel headed stud anchors is given in Table 3-21 of the AISC Steel

Construction Manual (14<sup>th</sup> edition), in accordance with AISC 360. Alternatively, the nominal shear strength of one steel headed stud anchor may be calculated in accordance with AISC 360-10 Section I8.2 for the 2015 and 2012 IBC (Sections I2.1g and I3.2d(3) of AISC 360-05 for the 2009 and 2006 IBC). The design of composite members with shear connectors must comply with the provisions of Sections 2203, 2204, 2205 and 2206 of the 2015 and 2012 IBC (Sections 2203, 2204 and 2205 of the 2009 and 2006 IBC) and Chapter I of AISC 360.

**4.2 Installation:**

Tru-Weld Steel Headed Stud Anchors are automatically end-welded directly to steel shapes (for all stud sizes described in Section 3.0 of this report) or through steel deck panels (for 3/4-inch diameter studs) with equipment and in accordance with procedures recommended by Tru-Weld Division, Tru-Fit Corporation. Welding must comply with AWS D1.1. Steel deck material must be galvanized steel complying with ASTM A653 SS Grade 40, unless field qualification tests in accordance with AWS D1.1 are conducted to the satisfaction of the code official. Base-metal thickness of the deck must conform to Section 7.2.7 of AWS D1.1. Prior to welding, steel deck surfaces and supporting beams must be clean, unpainted, and free of heavy rust and mill scale, dirt, sand, oil, water or other deleterious materials. The deck material must be tightly secured on the top flange of beams. No air gaps are permitted at welded areas. The ambient temperature must be above 32°F (0°C). No welding is permitted at temperatures below 0°F (-21.3°C). At temperatures between 0°F and 32°F (-21.3°C to 0°C), detailed welding instructions in the Tru-Weld applications manual must be followed.

The following through-steel-deck welding applications are recognized in this report:

1. Three-quarter-inch-diameter (19.1 mm) stud through one layer of No. 20 gage thick steel deck panels with a maximum 0.8-ounce-per-square-foot (244 g/m<sup>2</sup>) galvanizing.
2. Three-quarter-inch-diameter (19.1 mm) stud through one layer of No. 16 gage thick steel deck panels with a maximum 1.15-ounce-per-square-foot (351 g/m<sup>2</sup>) galvanizing.
3. Three-quarter-inch-diameter (19.1 mm) stud through two layers of No. 18 gage thick steel deck panels with maximum 1.15-ounce-per-square-foot (351 g/m<sup>2</sup>) galvanizing on each deck panel layer.

4. Three-quarter-inch-diameter (19.1 mm) stud through two layers of No. 20 gage thick steel deck panels with 0.8-ounce-per-square-foot (244 g/m<sup>2</sup>) maximum galvanizing on each deck panel layer.

#### 4.3 Special Inspection:

Special inspection during installation of steel headed stud anchors is required in accordance with 2015 and 2012 IBC Sections 1705.2 and 1705.3, Tables 1705.2.2 and 1705.3, and Chapter N of AISC 360-10 (2009 and 2006 IBC Sections 1704.3 and 1704.4 and IBC Tables 1704.3 and 1704.4). Inspector responsibilities include verifying:

1. Identification of studs.
2. Concrete mix design.
3. Quality of concrete.
4. Stud bracing.
5. Stud clearances between edges, base and adjacent studs.
6. Stud size.
7. Concrete placement.
8. Concrete testing.
9. Sampling materials.
10. Welder qualifications.
11. Weld-joint preparation.
12. Weld procedure and process.
13. Tolerances.

#### 5.0 CONDITIONS OF USE

The Tru-Weld Steel Headed Stud Anchors described in this report comply with the code noted in Section 1.0, subject to the following conditions:

- 5.1 Installation must comply with this report and the manufacturer's instructions. In the event of a conflict between this report and the manufacturer's installation instructions, this report governs.

- 5.2 Nominal shear strength of steel headed stud anchors must be designed in accordance with references given in Section 4.1 of this report.

- 5.3 Designs of composite beams and concrete slabs on formed steel deck panels must comply with the provisions of Section 4.1 of this report.

- 5.4 Design of composite construction consisting of concrete slabs on formed steel deck panels connected to steel beams is limited to steel headed stud anchors  $\frac{3}{4}$  inch (19 mm) or less in diameter.

- 5.5 The base metals (steel beams) to which the steel headed stud anchors are welded are limited to steels listed in AWS D1.1-2010, Table 3.1, Groups I and II.

- 5.6 Special inspection must take place in accordance with Section 4.3 of this report.

#### 6.0 EVIDENCE SUBMITTED

- 6.1 Reports of tests specified in AWS D1.1-2010 and the manufacturer's product data.

- 6.2 Quality documentation.

#### 7.0 IDENTIFICATION

The label on the packages of Tru-Weld Steel Headed Stud Anchors displays the name and address of Tru-Weld Division, TFP Corporation; product name, size, and heat number; and the ICC-ES evaluation report number (ESR-2577). In addition, the steel headed stud anchors are identified by the Tru-Weld logo (see Figure 1) inscribed in an indented circle on the head of each connector.

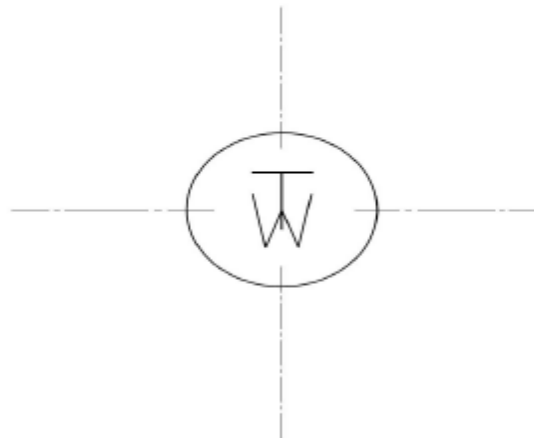


FIGURE 1—IDENTIFICATION OF A TRU WELD STEEL HEADED STUD ANCHOR