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ICC-ES Evaluation Report
ESR-2577

Reissued October 2022

Revised February 2023

This report is subject to renewal October 2024.

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

REPORT HOLDER:

TRU-WELD DIVISION, TFP CORPORATION

EVALUATION SUBJECT:

TRU-WELD STEEL HEADED STUD ANCHORS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 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.

For evaluation for compliance with codes adopted by the Los Angeles Department of Building and Safety (LADBS), see ESR-2577 LABC Supplement.

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 D1.1-2015 and Sections A3.6 and I8 of the 2016 AISC Specification for Structural Steel Buildings (ANSI/AISC 360-16). 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 (15th edition), in accordance with AISC 360. Alternatively, the nominal shear strength of one steel headed stud anchor may be calculated in accordance with AISC 360-16 Section I8.2 for the 2021 and 2018 IBC, AISC 360-10 Section I8.2 for the 2015 and 2012 IBC, and AISC 360-05 Sections I2.1g and I3.2d(3) for the 2009 and 2006 IBC. The design of composite members with shear connectors must comply with the provisions of Sections 2202, 2203, 2204, 2205, and 2206 of the 2021 and 2018 IBC (Sections 2203, 2204, 2205 and 2206 of the 2015 and 2012 IBC and 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 prepared to comply with the requirements of Section 5.14 of AWS D1.1. The surfaces 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^2) galvanizing.
2. Three-quarter-inch-diameter (19.1 mm) stud through one layer of No. 16 gage thick steel deck panels with a

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maximum 1.15-ounce-per-square-foot (351 g/m^2) 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^2) 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^2) 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 IBC Sections 1705.2 and 1705.3 and Chapter N of AISC 360 (2009 and 2006 IBC Sections 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 $^3/_4$ 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 D1.1-2015, Table 3.1, Groups I and II.

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

5.7 Tru-Weld Steel Headed Stud Anchors are manufactured under an approved quality control program by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 Reports of tests specified in AWS D1.1-2015 and the manufacturer's product data.

6.2 Quality documentation.

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-XXXX) along with the name, registered trademark, or registered logo of the report holder [and/or listee] must be included in the product label.

7.2 In addition, 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.

7.3 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

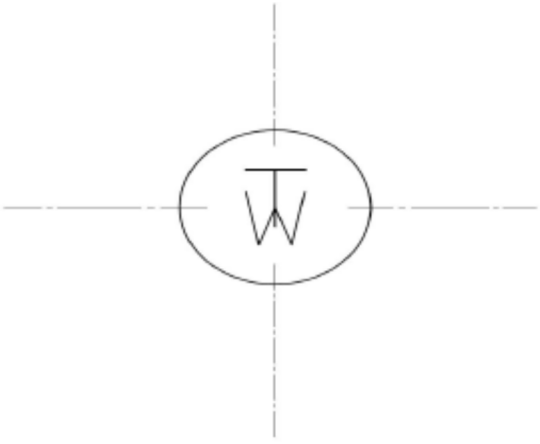

FIGURE 1—IDENTIFICATION OF A TRU WELD STEEL HEADED STUD ANCHOR

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

REPORT HOLDER:

TRU-WELD DIVISION, TFP CORPORATION

EVALUATION SUBJECT:

TRU-WELD STEEL HEADED STUD ANCHORS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Tru-Weld Steel Headed Stud Anchors, described in ICC-ES evaluation report ESR-2577, have also been evaluated for compliance with the codes 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 Steel Headed Stud Anchors, described in Sections 2.0 through 7.0 of the evaluation report ESR-2577, comply with the LABC Chapter 22, and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Tru-Weld Steel Headed Stud Anchors described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report ESR-2577.
- The design, installation, conditions of use and identification of the Tru-Weld Steel Headed Stud Anchors are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report ESR-2577.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.

This supplement expires concurrently with the evaluation report, reissued October 2022 and revised February 2023.

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ICC-ES Evaluation Report

ESR-2577 CBC Supplement

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TRU-WELD DIVISION, TFP CORPORATION

EVALUATION SUBJECT:

TRU-WELD STEEL HEADED STUD ANCHORS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Tru-Weld Steel Headed Stud Anchors, described in ICC-ES evaluation report ESR-2577, have also been evaluated for compliance with the code noted below.

Applicable code edition:

- 2022 *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 Steel Headed Stud Anchors, described in Sections 2.0 through 7.0 of the evaluation report ESR-2577, comply with CBC Chapter 22, provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 16, 17 and 22, as applicable.

2.1.1 OSHPD:

The Tru-Weld Steel Headed Stud Anchors, described in Sections 2.0 through 7.0 of the evaluation report ESR-2577, comply with CBC Chapter 22 and amendments [OSHPD 1R, 2, 3 & 5], and Chapter 22A [OSHPD 1 & 4], provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements in Sections 2.1.1.1 and 2.1.1.2 of this supplement:

2.1.1.1 Verification Test Requirements: The installation verification tests shall be in accordance with Section 2213.2 [OSHPD 1R, 2 & 5] or 2213A.2 [OSHPD 1 & 4] of the CBC, as applicable.

2.1.1.2 Special Inspection Requirements: The special inspections shall be in accordance with Section 1705.2.5 [OSHPD 1R, 2 & 5] or 1705A.2.5 [OSHPD 1 & 4] of the CBC, as applicable.

2.1.2 DSA:

The Tru-Weld Steel Headed Stud Anchors, described in Sections 2.0 through 7.0 of the evaluation report ESR-2577, comply with CBC amended Chapter 22 [DSA-SS/CC], and Chapter 22A [DSA-SS], provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements in Sections 2.1.2.1 and 2.1.2.2 of this supplement:

2.1.2.1 Verification Test Requirements: The installation verification tests shall be in accordance with Section 2212.6.2 [DSA-SS/CC] or 2213A.2 [DSA-SS] of the CBC, as applicable.

2.1.2.1 Special Inspection Requirements: The special inspections shall be in accordance with Section 1705A.2.5 [DSA-SS and DSA-SS/CC] of the CBC.

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