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RESEARCH REPORT: RR 24330
(CSI #03153)

BASED UPON ICC EVALUATION SERVICE
REPORT NO. ESR-2577

REEVALUATION DUE
DATE August 1, 2018
Issued Date: August 1, 2017
Code: 2017 LABC

GENERAL APPROVAL – Clerical Modification - Tru-Weld Stud Connectors of 1/2", 5/8", 3/4", 7/8" and 1" diameter.

DETAILS

The above assemblies and/or products are approved when in compliance with the description, use, identification and findings of Report No. ESR-2577 reissued October, 2016, revised May 2017, of the ICC Evaluation Service, Incorporated. The report in its entirety is attached and made part of this general approval.

The parts of Report No. ESR-2577 which are excluded on the attached copy have been removed by the City of Los Angeles Building and Safety Department as not being included in this approval.

Tru-Weld Stud Connectors of 1/2", 5/8", 3/4", 7/8" and 1" diameters are approved for use as shear connectors for steel-concrete composite beams.

The approval is subject to the following requirements:

1. Each container of studs is required to be certified in writing by the manufacturer certifying that the studs in the container complies with the requirements of Section 2204.1 of the 2017 City of Los Angeles Building Code. The manufacturing shall furnish the certificate to the Department inspector.

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2. Installation of the studs and design of steel-concrete composite beams using the studs shall be in accordance with Department Information Bulletin P/BC 2017-46. Concrete shall have a minimum of $F'_c = 3000$ psi.

3. Installation of the studs shall also comply to the following:

   a. The studs shall be installed only by operators qualified in accordance with AWS D1.1 Section 7.7.4 and who are thoroughly familiar with the installation equipment. A copy of the operating instructions for the equipment shall be at the job site at all times.

   b. Any stud with weld showing less than a 360 degree flash around the perimeter of the stud shall be replaced or repaired in accordance with AWS D1.1 Section 7.7.3 and 7.7.5. Before welding a new stud where a defective one has been removed, the area shall be ground smooth and flush, or in the case of a pullout of the base metal, the pocket shall be filled with weld metal using the shielded metal arc process with low hydrogen welding electrodes and then ground off flush.

   c. Where the studs are to be welded through steel deck units, the following limitations apply:

Stud Size	Max. Material Thickness	Max. Amount Galvanized (oz./sq ft.)
¾"	Single No. 20 ga	.80
¾	Double No. 20 ga	.81
¾"	Single No. 16 ga.	1.15
¾"	Double No. 18 ga.	1.16

   The amount of galvanizing shall be determined in accordance with ASTM A525. Lesser thickness deck material may be used in each case.

4. The approval includes Tru-Weld threaded studs with the same geometry, flux, arc shield, and of the same diameters (and diameters smaller by not less than 1/8-inch) specified in the attached ICC-ES evaluation report. Allowable loads shall be determined in accordance with the Los Angeles Building Code. Special Inspection as specified in Section 4.3 of the attached ICC-ES evaluation report shall be provided.

DISCUSSION

The clerical modification is to update the report to 2017 LABC.

This report is in compliance with the 2017 City of Los Angeles Building code.

The approval is based on Manufacturer's Stud Base Qualification Tests specified in AWS D1.1.

This general approval will remain effective provided the Evaluation Report is maintained valid and unrevised with the issuing organization. Any revisions to the report must be submitted to this Department, with appropriate fee, for review in order to continue the approval of the revised report.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this Approval have been met in the project in which it is to be used.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

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R07/17/2017
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Attachments: ICC ES Evaluation Report No. ESR-2577 (2 Pages)

ICC-ES Evaluation Report

ESR-2577

Reissued October 2016
Revised May 2017
This report is subject to renewal October 2018.

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

REPORT HOLDER:

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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)†~~

~~†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 (14th 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^2) 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^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.

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* Deleted by City of Los Angeles

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 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 $^3/_4$ 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.

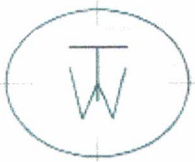

FIGURE 1—IDENTIFICATION OF A TRU WELD STEEL HEADED STUD ANCHOR