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ICC-ES Evaluation Report

Reissued August 2022

ESR-3264

This report is subject to renewal August 2024.

DIVISION: 03 00 00—CONCRETE
Section: 03 15 00—Concrete Accessories
Section: 03 21 00—Reinforcement Bars

REPORT HOLDER:

JOBSITE STUD WELDING, INC.

EVALUATION SUBJECT:

JSW STUD RAILS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015, 2012 and 2009 *International Building Code*® (IBC)

For evaluation for compliance with codes adopted by Los Angeles Department of Building and Safety (LADBS), see ESR-3264 LABC and LARC Supplement.

Property evaluated:

- Structural

2.0 USES

The JSW Stud Rails are large-headed shear studs that are welded to flat steel bars (base rails) and are used as shear reinforcement in flat concrete slabs to replace stirrups, drop panels or column capitals in increasing the punching shear resistance of the slabs.

3.0 DESCRIPTION

3.1 General:

The JSW Stud Rails are reinforcement assemblies that are formed by welding large-headed shear studs to flat steel base rails. The studs are $^3/_8$-, $^1/_2$-, $^5/_8$- and $^3/_4$-inch-diameter (9.5, 12.7, 15.9 and 19.1 mm) studs recognized in ICC-ES evaluation report as described in the manufacturer's quality manual. The stud dimensions and base rail dimensions are given in Tables 1 and 2, respectively. The JSW Stud Rails assembly and installation instructions are shown in Figures 1 and 2.

The JSW Stud Rails comply with the provisions of ASTM A1044.

3.2 Materials:

3.2.1 Studs: The studs are produced from ASTM A29 Grade 1010 through 1020 steel and must conform to the following physical and mechanical requirements in accordance with the prescribed values in Table 1 of ASTM A1044:

- Tensile strength, min, psi [MPa]: 65,000 [450]
- Yield strength, min, psi [MPa]: 51,000 [350]
- Elongation in 2 in. [50 mm], min, %: 20
- Reduction of area, min, %: 50

3.2.2 Base Rails: The base rails are produced from ASTM A36 steel plates and must conform to the following physical and mechanical requirements in accordance with the prescribed values in Table 2 of ASTM A1044:

- Tensile strength, min, psi [MPa]: 65,000 [450]
- Yield strength, min, psi [MPa]: 44,000 [300]
- Elongation in 8 in. [200 mm], min, %: 20

3.3 Stud Welding: The JSW studs are factory-welded by Jobsite Stud Welding to the flat steel base rails using welding equipment in accordance with procedures recommended by the JSW stud manufacturer. All welding complies with AWS D1.1 requirements.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: Structural design and installation of JSW Stud Rails used as punching shear reinforcement in reinforced concrete slabs must comply with the applicable provisions of ACI 318-14 for the 2018 and 2015 IBC (ACI 318-11 for the 2012 IBC and ACI 318-08 for the 2009 IBC).

4.1.2 Design Considerations: The structural design shall determine and specify the following items, based on design requirements in this report:

a. The number of studs per rail.
b. Stud spacing (S).
c. Shear rail assembly overall height (OAH), which must comply with section 8.7.7.1.1 of ACI 318-14 or Section 11.11.5 of ACI 318-11 or ACI 318-08.
d. Stud shank diameter.
e. Distance between column face and first line of studs (S_o).
f. Base rail plate length (L).

4.1.3 Earthquake Loads: Stud rail reinforcement may be used at slab-to-column connections of structures where a flat concrete slab is used together with primary seismic force-resisting systems in Seismic Categories C, D, E and

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F, such as concrete shear walls, under the following conditions:

4.1.3.1 General: Lateral force-resisting elements of the structure are designed using the IBC.

4.1.3.2 Shear Strength: The nominal shear strength provided by the concrete in the presence of the shear studs referenced in Section 22.6.6.1 of ACI 318-14 (Section 11.11.5 of ACI 318-11 for the 2012 IBC and ACI 318-08 for the 2009 IBC) must be revised as follows:

$$V_c=1.5\lambda\sqrt{f'c}b_o d$$

This revision requires revisions to the nominal shear strength, V_n, and the maximum shear stress, v_n.

Two-way slabs without beams designated as part of the seismic force–resisting system, must comply with the provisions in Section 18.4.5.8 of ACI 318-14 (Section 21.3.6.8 of ACI 318-11 for the 2012 IBC and ACI 318-08 for the 2009 IBC), except that V_c must be limited as set forth in Section 4.1.3.2 of this report.

Two-way slabs without beams, which are not designated as part of the seismic force–resisting system, must comply with the provisions in Section 18.14.5.1 of ACI 318-14 (Section 21.13.6 of ACI 318-11 for the 2012 IBC and ACI 318-08 for the 2009 IBC), except that V_c must be limited as set forth in Section 4.1.3.2 of this report and the design story drift ratio specified in Section 18.14.5.1 of ACI 318-14 (Section 21.13.6(b) of ACI 318-11 and ACI 318-08 for the 2009 IBC) must not exceed the drift ratio referenced in Table 12.12-1 of ASCE/SEI 7.

4.2 Installation:

Installation of the JSW Stud Rails must comply with the applicable provisions of the 2018, 2015, 2012 and 2009 IBC and the approved engineering plans. The JSW Stud Rails must be positioned correctly around columns and set in accordance with the IBC and the approved engineering plans and details. Concrete cover must comply with ACI 318-14 Section 20.6.1.3.5 (ACI 318-11 Section 7.7.5 for the 2012 and 2009 IBC). See Figure 2 for typical installation details.

4.3 Special Inspection:

Special inspection of shear rail reinforcement and its installation at the jobsite must comply with Section 1705.3 for the 2018, 2015 and 2012 IBC (Section 1704.4 for the 2009 IBC). The special inspector is responsible for verifying identification of the shear rail assembly per Section 7.0 of this report, along with its condition, positioning, clearances, and concrete cover.

5.0 CONDITIONS OF USE

The JSW Stud Rails described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The JSW Stud Rails must be designed, manufactured, and installed in accordance with this report and the approved plans. In the event of a conflict between this report and the approved plans, the more restrictive governs.

5.2 Design details and drawings must be in compliance with the design requirements of Section 4.1 of this report and must be approved by the code official. The calculations and drawings must be prepared by a registered design professional when required by the statutes of the jurisdiction in which the project is to be built.

5.3 Special inspections must be provided in accordance with Section 4.3 of this report.

5.4 The JSW Stud Rails are manufactured at the Jobsite Stud Welding facility in Lake Stevens, Washington, or Downey, California, under a quality-control program with third-party inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Headed Shear Stud Reinforcement Assemblies for Concrete Slabs and Footings (AC395), dated June 2017 (editorially revised November 2017).

7.0 IDENTIFICATION

7.1 The JSW Stud Rails are identified on the packaging with the product name, manufacturing date, manufacturer's name (Jobsite Stud Welding, Inc.) and address, evaluation report number (ESR-3264).

7.2 The report holder's contact information is the following:

JOBSITE STUD WELDING, INC.
14279 FERN AVE
CHINO, CALIFORNIA 91710
(425) 322-5808
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brandon@jobsitestud.com

TABLE 1—JSW STUD RAILS STUD DIMENSIONS

SHANK DIAMETER, D [in. (mm)]	HEAD DIAMETER, H [in.(mm)]	H/D RATIO	SHANK AREA, S_A [in.^{2} (mm^2)]	HEAD AREA, H_A [in.^{2} (mm^2)]	H_A/S_A RATIO	HEAD THICKNESS, T [in. (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)

TABLE 2—JSW STUD RAILS RECTANGULAR SHEAR REINFORCEMENT PLATE DIMENSIONS

SHANK DIAMETER, D [in. (mm)]	PLATE WIDTH, W [in. (mm)]	PLATE THICKNESS, TH [in. (mm)]	PLATE LENGTH, L
$^3/_8$ (9.5)	1.00 (25.4)	$^3/_{16}$ (4.8)	Determined by the registered design professional
$^1/_2$ (12.7)	1.25 (31.8)	$^1/_4$ (6.5)	
$^5/_8$ (15.9)	1.75 (44.5)	$^5/_{16}$ (7.9)	
$^3/_4$ (19.1)	2.00 (50.8)	$^3/_8$ (9.5)	

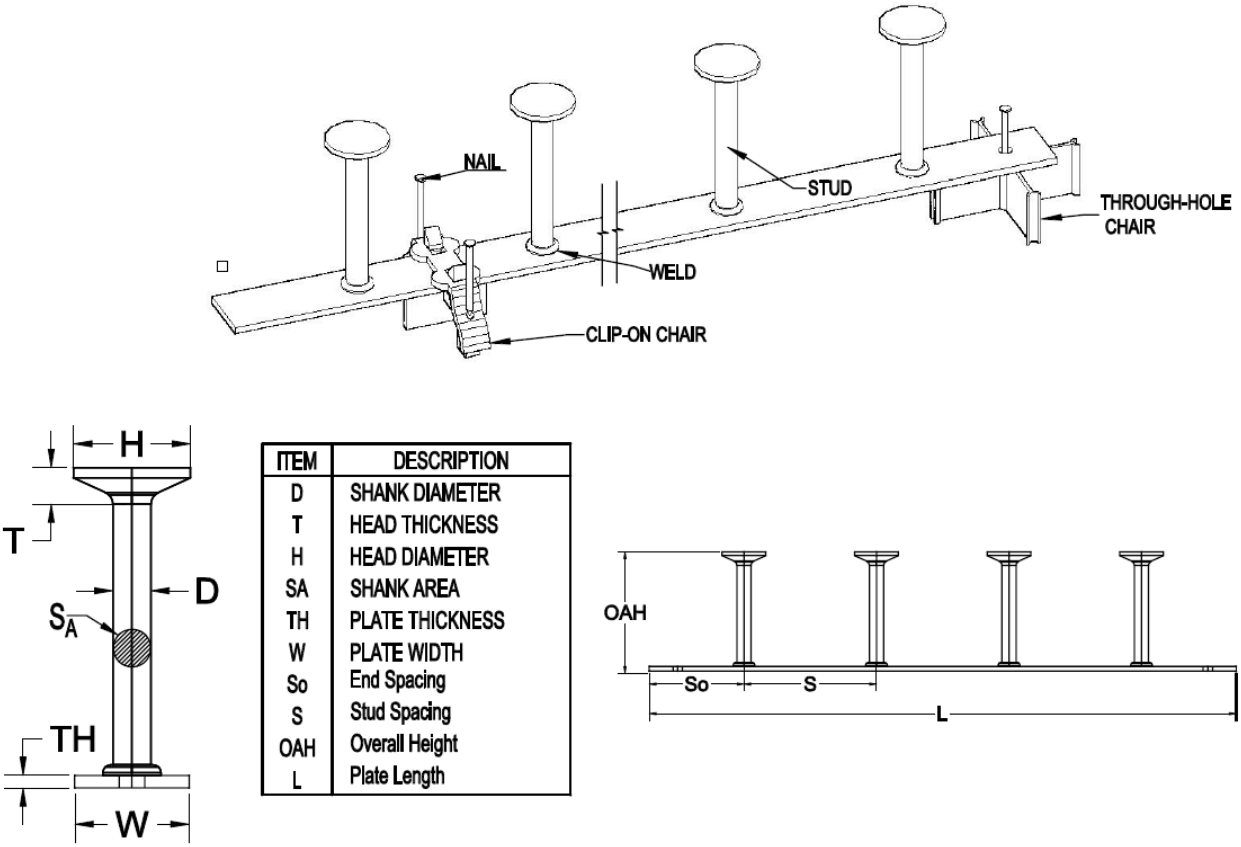

FIGURE 1—TYPICAL JSW STUD RAILS REINFORCEMENT SYSTEM ASSEMBLY

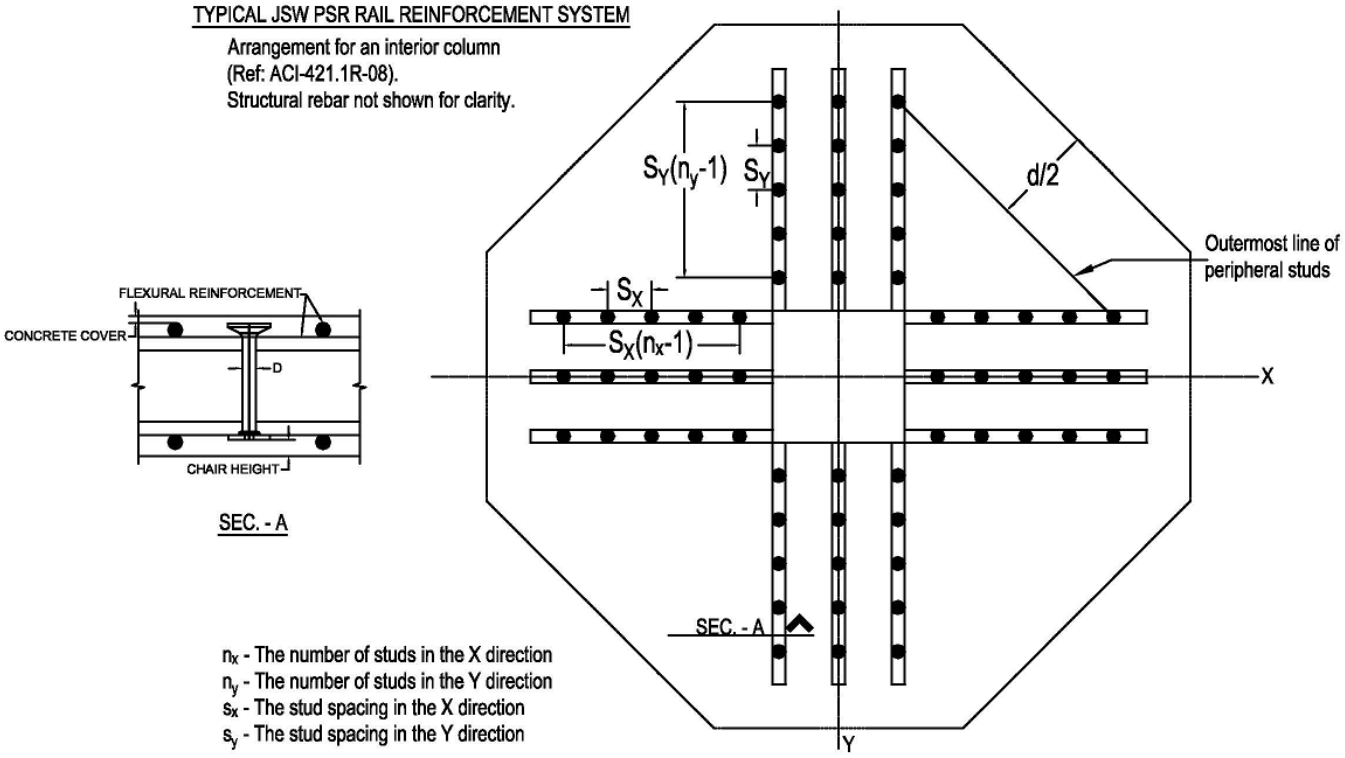

FIGURE 2—TYPICAL JSW STUD RAILS REINFORCEMENT SYSTEM DETAILS

DIVISION: 03 00 00—CONCRETE
Section: 03 15 00—Concrete Accessories
Section: 03 21 00—Reinforcement Bars

REPORT HOLDER:

JOBSITE STUD WELDING, INC.

EVALUATION SUBJECT:

JSW STUD RAILS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that JSW Stud Rails, described in ICC-ES evaluation report ESR-3264, have also been evaluated for compliance with the codes noted below as adopted by Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2017 *City of Los Angeles Building Code* (LABC)
- 2017 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

The JSW Stud Rails, described in Sections 2.0 through 7.0 of the evaluation report ESR-3264, comply with LABC Chapter 19, and LARC, and are subjected to the conditions of use described in this report.

3.0 CONDITIONS OF USE

The JSW Stud Rails described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report ESR-3264.
- The design, installation, conditions of use and labeling of the JSW Stud Rails are in accordance with the 2015 *International Building Code®* (IBC) provisions noted in the evaluation report ESR-3264.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.

This supplement expires concurrently with the evaluation report, reissued August 2022.

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DIVISION: 03 00 00 - CONCRETE
Section: 03 15 00 – Concrete Accessories
Section: 03 21 00 – Reinforcing Steel

REPORT HOLDER:

JOBSITE STUD WELDING, INC.

EVALUATION SUBJECT:

JSW STUD RAILS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that JSW Stud Rails, described in ICC-ES evaluation report ESR-3264, have also been evaluated for compliance with the code noted below.

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 JSW Stud Rails, described in Sections 2.0 through 7.0 of the evaluation report ESR- JSW Stud Rails, 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 16, 17 and 19 as applicable.

2.1.1 OSHPD:

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

2.1.2 DSA:

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

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