

ICC-ES Evaluation Report

ESR-3619

Reissued February 2024

Revised August 2024

Subject to renewal February 2025


This report also contains:

- LABC Supplement

- CBC Supplement

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| <p>DIVISION: 03 00 00— CONCRETE</p> <p>Section: 03 15 00— Concrete Accessories</p> <p>Section: 03 21 00— Reinforcing Steel</p> | <p>REPORT HOLDER:</p> <p>GONSALVES & SANTUCCI, INC., dba THE CONCO COMPANIES</p> | <p>EVALUATION SUBJECT:</p> <p>THE CONCO COMPANIES HEADED SHEAR STUD (PSR) REINFORCING ASSEMBLIES</p> |  |
|---|--|--|---|

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, and 2015 [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 [Los Angeles Department of Building and Safety \(LADBS\)](#), see [ESR-3619 LABC Supplement](#).

Property evaluated:

- Structural

2.0 USES

The Conco Companies Headed Shear Stud (PSR) Reinforcement Assemblies are used as shear reinforcement in flat concrete slabs and footings to replace or supplement stirrups, drop panels or column capitals in increasing the punching shear resistance of the flat slabs and footings.

3.0 DESCRIPTION

3.1 General:

The Conco Companies Headed Shear Stud (PSR) Reinforcement Assemblies are formed by welding large-headed shear studs to steel flat bars (base rails). The stud dimensions are given in [Table 1](#), and base rail dimensions are given in [Table 2](#). The Conco Companies PSR reinforcement assembly, and its installation, are shown in [Figure 1](#).

The Conco Companies PSR reinforcement assemblies comply with the provisions of ASTM A1044 and Section 20.4 of ACI 318-19 (Section 20.5 of ACI 318-14).

3.2 Materials:

3.2.1 Studs: The shear studs used in the Conco Companies PSR reinforcement assemblies are $3/8$ -, $1/2$ -, $5/8$ - and $3/4$ -inch-diameter (9.5, 12.7, 15.9 and 19.1 mm) single-headed studs that comply with the material requirements and specifications of ASTM A1044 in accordance with the approved quality documentation. The studs are produced from ASTM A29 Grades 1010 through 1020 steel and conform to the following physical and mechanical requirements prescribed 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 PSR studs are factory-welded by the Conco Companies to the flat steel rails in accordance with the approved Conco Companies quality documentation. All welding complies with ASTM A1044 and AWS D1.1 requirements.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: Structural design and installation of the Conco Companies PSR reinforcement assemblies used as punching shear reinforcement in reinforced concrete slabs or footings must comply with the applicable provisions of ACI 318-19 for the 2021 IBC (ACI 318-14 for the 2018 and 2015 IBC). The specified yield strength of transverse reinforcement, f_{yt} , must not exceed the specified yield strength of the shear studs defined in Section 3.2.1.

4.1.2 Design Considerations: The structural design must specify the following items, based on design requirements in this report.

- The number of studs per rail
- Stud spacing (s)
- Shear rail assembly overall height (OAH)
- Stud shank diameter
- Distance between column face and first peripheral line of studs (S_o)
- Base rail length
- Arrangement of headed shear stud reinforcement

4.1.3 Earthquake Loads: The stud rail reinforcement may be used at slab-to-column connections of structures where a flat slab is used together with the primary seismic force-resisting systems in Seismic Categories C, D, E and F, such as concrete shear walls, under the following conditions:

4.1.3.1 General: Lateral force-resisting elements of the structure are designed in accordance with 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 318-19 for the 2021 IBC (ACI 318-14 for the 2018 and 2015 IBC), must be revised as follows,

$$V_c = 1.5 \lambda \sqrt{f'_c} (b_o d) \quad \text{Eq. (1)}$$

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

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 for the 2018 and 2015 IBC, except that V_c must be limited as set forth in Eq. (1) of this report and the design story drift ratio specified in Section 18.14.5.1 of ACI 318-19 for the 2021 IBC (ACI 318-14 for the 2018 and 2015 IBC) must not exceed the drift ratio referenced in Table 12.12-1 of ASCE/SEI 7-16 with Supplement 1 for the 2021 IBC (ASCE/SEI 7-16 for the 2018 IBC; ASCE/SEI 7-10 for the 2015 IBC).

4.2 Installation:

Installation of the Conco Companies PSR reinforcement assemblies must comply with the applicable provisions of the 2021, 2018 and 2015 IBC and the approved engineering plans. The Conco Companies PSR reinforcement assemblies 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 318-19 Section 20.5.1.3.6 for the 2021 IBC (ACI 318-14 Section 20.6.1.3.5 for the 2018 and 2015 IBC). See [Figure 1](#) 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 2021, 2018 and 2015 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, location, positioning, clearances and concrete cover.

5.0 CONDITIONS OF USE:

The Conco Companies PSR reinforcement assemblies described in this report comply with, or are suitable alternatives to what is specified in, those codes noted in Section 1.0 of this report, subject to the following conditions:

- 5.1 The Conco Companies PSR reinforcement assemblies 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 Conco Companies PSR reinforcement assemblies are manufactured at the Conco Companies facilities in Rochester, Washington and Benicia, 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 or Footings \(AC395\)](#), dated June 2017 (editorially revised February 2022).

7.0 IDENTIFICATION

- 7.1 The Conco Companies PSR reinforcement assemblies are identified on the packaging with the product model, product name, product size, manufacturer's name (Gonsalves & Santucci, Inc., dba The Conco Companies) and address, the evaluation report number (ESR-3619).
- 7.2 The report holder's contact information is as follows:

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TABLE 1—PSR 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 | 0.24 (6.1) |
| 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 | 0.47 (12.0) |

TABLE 2—RECTANGULAR SHEAR REINFORCEMENT PLATE (SHEAR RAIL) DIMENSIONS

| SHANK DIAMETER, D [in. (mm)] | PLATE WIDTH, W [in. (mm)] | PLATE THICKNESS, TH [in. (mm)] | PLATE LENGTH |
|------------------------------|---------------------------|--------------------------------|--|
| 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) | 2.00 (50.8) | 5/16 (7.9) | |
| 3/4 (19.1) | 2.00 (50.8) | 3/8 (9.5) | |

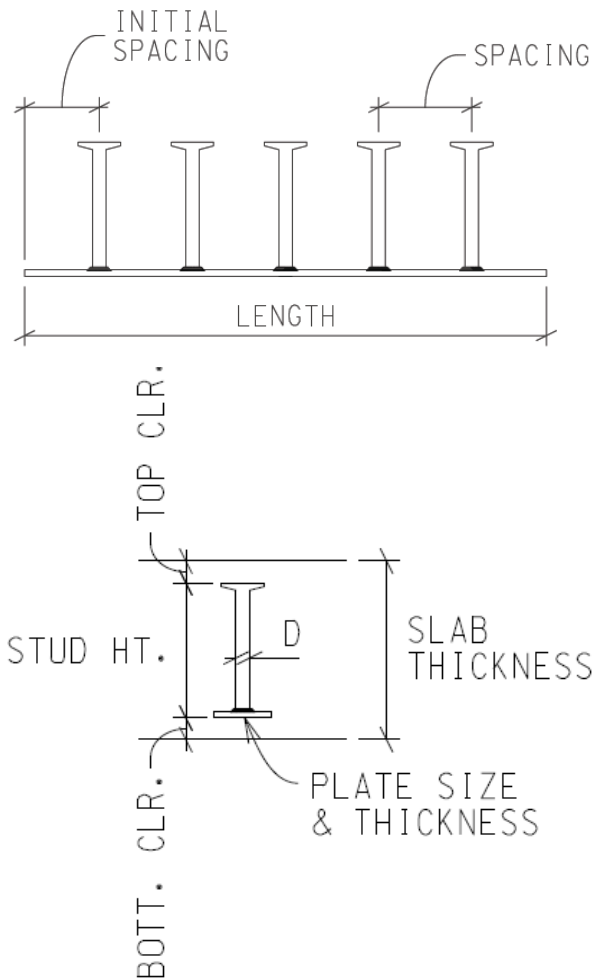


FIGURE 1—THE CONCO COMPANIES HEADED SHEAR STUD REINFORCEMENT ASSEMBLY AND INSTALLATION

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

REPORT HOLDER:

GONSALVES & SANTUCCI, INC., dba THE CONCO COMPANIES

EVALUATION SUBJECT:

THE CONCO COMPANIES HEADED SHEAR STUD (PSR) REINFORCING ASSEMBLIES

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Conco Companies Headed Shear Stud (PSR) Reinforcement Assemblies, described in ICC-ES evaluation report [ESR-3619](#), 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 editions:

- 2023 *City of Los Angeles Building Code* (LABC)

2.0 CONCLUSIONS

The Conco Companies Headed Shear Stud (PSR) Reinforcement Assemblies, described in Sections 2.0 through 7.0 of the evaluation report [ESR-3619](#), comply with the LABC Chapter 19, and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Conco Companies Head Shear Stud (PSR) Reinforcement Stud Assemblies described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-3619](#).
- The design, installation, conditions of use and identification of the Conco Companies Headed Shear Stud (PSR) Reinforcement Assemblies are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-3619](#).
- 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 February 2024 and revised August 2024.

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

REPORT HOLDER:

GONSALVES & SANTUCCI, INC., dba THE CONCO COMPANIES

EVALUATION SUBJECT:

THE CONCO COMPANIES HEADED SHEAR STUD (PSR) REINFORCING ASSEMBLIES

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that The Conco Companies Headed Shear Stud (PSR) Reinforcement Assemblies, described in ICC-ES evaluation report ESR-3619, have also been evaluated for compliance with the code(s) noted below.

Applicable code editions:

- 2019 *California Building Code* (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) and Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

2.0 CONCLUSIONS**2.1. CBC:**

The Conco Companies Headed Shear Stud (PSR) Reinforcement Assemblies, described in Sections 2.0 through 7.0 of the evaluation report ESR-3619, comply with CBC Chapter 19, provided the design and installation are in accordance with the 2018 *International Building Code*® provisions noted in the evaluation report and the additional requirements of CBC Chapters 16, 17 and 19, as applicable.

2.1.1. OSHPD: The applicable OSHPD Sections of the CBC are beyond the scope of this supplement.

2.1.2. DSA: The applicable DSA Sections of the CBC are beyond the scope of this supplement.

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