

ICC-ES Evaluation Report

ESR-2856

Reissued October 2023

Revised August 2024

Subject to renewal October 2024


This report also contains:

- **LABC Supplement**

- **CBC Supplement**

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

Copyright © 2024 ICC Evaluation Service, LLC. All rights reserved.

<p>DIVISION: 03 00 00 — CONCRETE</p> <p>Section: 03 15 00 — Concrete Accessories</p>	<p>REPORT HOLDER: NELSON STUD WELDING, INC.</p>	<p>EVALUATION SUBJECT: NELSON SHEAR CONNECTOR STUDS</p>	
--	--	--	---

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2024, 2021, 2018 and 2015 [International Building Code® \(IBC\)](#)

For evaluation for compliance with codes adopted by the [Los Angeles Department of Building and Safety \(LADBS\)](#), see [ESR-2856 LABC Supplement](#).

Property evaluated:

- Structural

2.0 USES

The Nelson shear connector studs are intended for use in steel and concrete composite construction.

3.0 DESCRIPTION

The Nelson shear connector studs are intended for use in steel and concrete composite construction and are manufactured from ASTM A29-23, Grades 1010 through 1020, cold-drawn steel. The studs conform to minimum physical properties as presented in [Table 1](#). The shear connector studs are Type B studs conforming to requirements of the American Welding Society's Structural Welding Code—Steel, AWS D1.1 -20 and Section A3.6 of the AISC Specification for Structural Steel Buildings (AISC 360-22 for the 2024 IBC, AISC 360-16 for the 2021 and 2018 IBC, AISC 360-10 for the 2015 IBC). The shear connector studs are provided in $\frac{3}{8}$ - $\frac{1}{2}$ -, $\frac{5}{8}$ -, $\frac{3}{4}$ -, $\frac{7}{8}$ - and 1-inch (9.5, 12.7, 15.9, 19.1, 22 and 25.4 mm) diameters.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The nominal horizontal shear strength of Nelson stud shear connectors [diameters from $\frac{3}{8}$ to $\frac{3}{4}$ inch (9.5 to 19.1 mm)] is given in Table 3-20 of the AISC Steel Construction Manual 16th edition (Table 3-21 of the AISC Steel Construction Manual 15th and 14th editions), in accordance with Specification for Structural Steel Buildings (AISC 360). Alternatively, the nominal shear strength of one stud shear connector may be calculated in accordance with Section I8.2a of AISC 360. The design of composite members with shear connectors must comply with the provisions of Sections 2201 and 2202 of the 2024 IBC (2203, 2204, and 2205 of the 2021, 2018, and 2015 IBC) and Chapter I of AISC 360.

For studs installed through steel deck, the steel deck material must be galvanized steel as specified in this report, unless field qualification tests in accordance with AWS D1.1-20 are conducted to the satisfaction of the code official. The following through-steel deck applications are recognized in this report:

1. Three-quarter-inch-diameter (19.1 mm) stud through one layer of No. 16 gage or thinner deck with a maximum 1.25-ounce-per-square-foot (381 g/m²) galvanization complying with ASTM A525, Class G90.
2. Three-quarter-inch-diameter (19.1 mm) stud through two layers of No. 20 gage or thinner deck with a maximum 0.6-ounce-per-square-foot (183 g/m²) galvanization on each deck layer complying with ASTM A525, Class G60.

4.2 Installation:

Nelson shear connector studs are automatically end-welded with equipment and procedures recommended by Nelson Stud Welding, Inc. All welding must comply with AISC 360 Section M2, item 4, and AWS D1.1-20. 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 to the top flange of beams. No air gaps are permitted at welded areas. The ambient temperature must be above 0°F (−18°C). Between 0°F and 32°F (−18°C and 0°C), special welding instructions in the Nelson stud installation manual must be followed.

4.3 Special Inspection:

The welding of the shear connectors requires special inspection in accordance with Sections 1705.2 and 1705.3 of the IBC. The special inspector duties include identification of studs; concrete mix design; quality of concrete; stud clearances between edges, base, and adjacent studs; stud size; concrete placement and testing; sampling materials; verifying welder's qualifications; weld-joint preparation; welding procedure and process; and tolerances.

5.0 CONDITIONS OF USE:

The Nelson Shear Connector Studs 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 Installation complies with this report and the manufacturer's instructions. In the event of conflict between this report and the manufacturer's installation instructions, this report governs.
- 5.2 The construction documents prepared or reviewed by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed specifying the Nelson shear connector studs must indicate compliance with this evaluation report and applicable codes and must be submitted to the code official for approval.
- 5.3 Nominal shear strength of shear connectors must be determined in accordance with references given in Section 4.1 of this report.
- 5.4 Design of composite beams and concrete slabs on formed steel deck panels must comply with the provisions of Section 4.1 of this report.
- 5.5 Design of composite construction consisting of concrete slabs on formed steel deck panels connected to steel beams is limited to shear connectors $\frac{3}{4}$ inch (19 mm) or less in diameter.
- 5.6 Special inspection must be in compliance with Section 4.3 of this report.
- 5.7 The Nelson Shear Connector Studs are manufactured under an approved quality-control program with third-party inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Report of tests specified in AWS D1.1; manufacturer's product data; and quality documentation.

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-2856) along with the name, registered trademark, or registered logo of the report holder must be included in the product identification.
- 7.2 In addition, the Nelson shear connector studs are identified by the letter "N" on the head of each stud. The studs are shipped in containers with a label bearing the stud size, part number, heat number, and manufacturer's code.

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

NELSON STUD WELDING, INC.
7900 WEST RIDGE ROAD
ELYRIA, OHIO 44036
(440) 329-0400
www.nelsonstud.com

TABLE 1—MINIMUM PHYSICAL PROPERTIES OF STUDS

PROPERTY	VALUE
Ultimate tensile strength	65,000 psi (450 MPa)
Yield strength—0.2% offset	51,000 psi (350 MPa)
Elongation in 2 inches (51 mm)	20 percent
Reduction of area	50 percent

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

REPORT HOLDER:

NELSON STUD WELDING, INC.

EVALUATION SUBJECT:

NELSON SHEAR CONNECTOR STUDS

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that Nelson Shear Connector Studs, described in ICC-ES evaluation report [ESR-2856](#), 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 Nelson Shear Connector Studs, described in Sections 2.0 through 7.0 of the evaluation report [ESR-2856](#), comply with the LABC Chapter 22, and are subjected to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Nelson Shear Connector Studs described in this evaluation report must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-2856](#).
- The design, installation, conditions of use and identification of the Nelson Shear Connector Studs are in accordance with the 2021 *International Building Code*® (2021 IBC) provisions noted in the evaluation report [ESR-2856](#).
- 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 2023 and revised August 2024.

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

REPORT HOLDER:

NELSON STUD WELDING, INC.

EVALUATION SUBJECT:

NELSON SHEAR CONNECTOR STUDS

1.0 REPORT PURPOSE AND SCOPE

The purpose of this evaluation report supplement is to indicate that the Nelson shear connector studs, described in ICC-ES evaluation report ESR-2856, have also been evaluated for compliance with the Chapter 22 of 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 Nelson Stud Welding, Inc. shear connector studs, described in Sections 2.0 through 7.0 of the evaluation report ESR-2856, comply with CBC Chapters 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 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.

This supplement expires concurrently with the evaluation report, reissued October 2023 and revised August 2024.