

ICC-ES Evaluation Report

ESR-1170

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DIVISION: 03 00 00—CONCRETE
Section: 03 21 00—Reinforcing Steel

REPORT HOLDER:

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

EVALUATION SUBJECT:
NELSON PUNCHING SHEAR RESISTOR STUDS
1.0 EVALUATION SCOPE
Compliance with the following codes:

- * ~~■ 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.

Property evaluated:

Structural

2.0 USES

Nelson punching shear resistor (PSR) studs are large-headed shear studs that are welded to steel plates (or steel base rails) to form headed shear stud reinforcement assemblies, which 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

Nelson punching shear resistor (PSR) studs are provided in $\frac{3}{8}$ -, $\frac{1}{2}$ -, $\frac{5}{8}$ - and $\frac{3}{4}$ -inch (9.5, 12.7, 15.9 and 19.1 mm) diameters and comply with the material requirements and specifications of ASTM A1044-05(2010). The studs are made from ASTM A29 Grades 1010 through 1020 steel satisfying the following physical requirements according to ASTM A1044:

- Yield strength: 51,000 psi (350 MPa), minimum.
- Tensile strength: 65,000 psi (450 MPa), minimum.

- Elongation: 20 percent in 2 inches (51 mm), minimum.
- Reduction of area: 50 percent, minimum.

Figure 1 shows the stud configuration. The dimensions of the studs are shown in Table 1.

4.0 INSTALLATION AND DESIGN

The end use of the PSR studs, including the manufacture of headed shear stud reinforcement products, is outside the scope of this report and must be addressed in a separate ICC-ES evaluation report showing compliance with the ICC-ES Acceptance Criteria for Headed Shear Stud Reinforcement Assemblies for Concrete Slabs and Footings (AC395).

5.0 CONDITIONS OF USE

The Nelson Punching Shear Resistor 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 condition that installation and design of the finished assemblies is in accordance with Section 4.0 of this report.

6.0 EVIDENCE SUBMITTED

- 6.1** Product specifications and drawings in accordance with ASTM A1044.
- 6.2** Weld base qualification tests in accordance with AWS D1.1-2010.
- 6.3** Quality documentation in accordance with the ICC-ES Acceptance Criteria for Quality Documentation (AC10).

7.0 IDENTIFICATION

Nelson PSR studs are identified by the name “Nelson” and the letter “N” on the head of each stud, and are shipped in packaging bearing the Nelson Stud Welding, Inc., name, the evaluation report number (ESR-1170), the stud description, the part number, the heat number, the lot number and the number of pieces in each package. Certificates of compliance with AWS D1.1:2010, and certified mill test reports on the steel used to form the studs, must be supplied by Nelson for each stud shipment.

TABLE 1—PSR STUD DIMENSIONS

STUD SHANK DIAMETER, D [inch (mm)]	HEAD DIAMETER, H [inch (mm)]	$\frac{H}{D}$	SHANK AREA, S_A [inch ² (mm ²)]	HEAD AREA, H_A [inch ² (mm ²)]	$\frac{H_A}{S_A}$	HEAD THICKNESS, T [inch (mm)]
$\frac{3}{8}$ (9.5)	1.19 (30.1)	3.17	0.110 (71)	1.112 (712)	10.1	0.24 (6.1)
$\frac{1}{2}$ (12.7)	1.58 (40.2)	3.16	0.196 (127)	1.961 (1269)	10.0	0.33 (8.4)
$\frac{5}{8}$ (15.9)	1.98 (50.2)	3.17	0.307 (199)	3.079 (1979)	10.0	0.40 (10.2)
$\frac{3}{4}$ (19.1)	2.37 (60.2)	3.16	0.442 (287)	4.412 (2846)	10.0	0.47 (12.0)

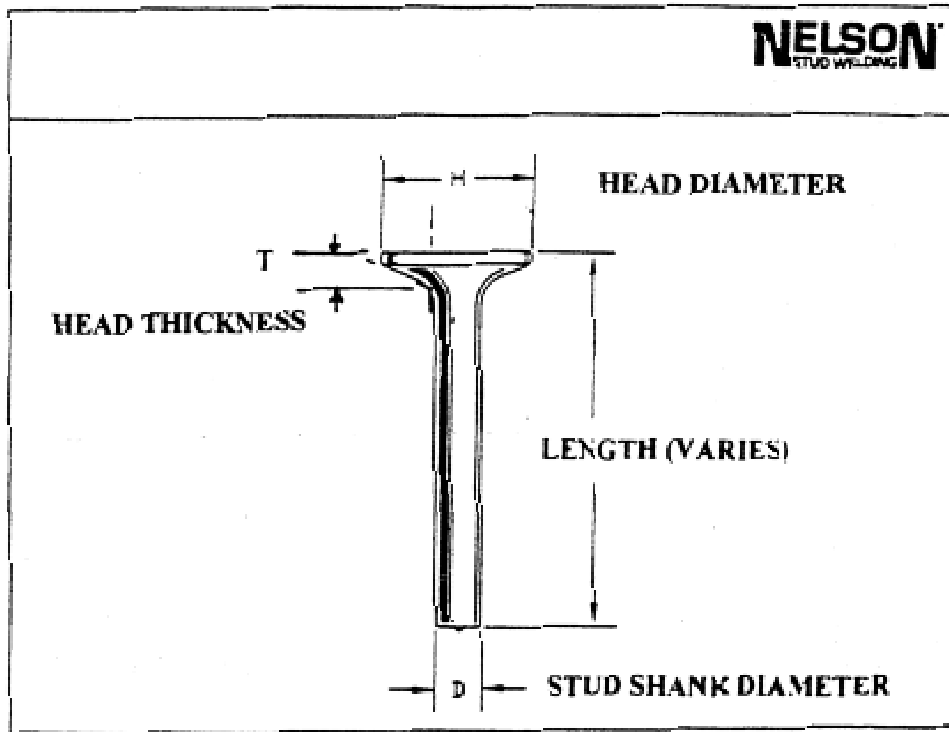


FIGURE 1—PSR STUD CONFIGURATION