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SHEARFLEX® STANDOFF SCREW

CSI Sections:

- 05 00 00 Metals
- 05 21 00 Steel Joist Framing
- 05 26 00 Composite Joist Assemblies
- 05 31 00 Steel Decking
- 05 05 23 Metal Fastenings

1.0 RECOGNITION

The **Shearflex® Standoff Screw** recognized in this report has been evaluated for use as a shear connector at the interface of a composite steel joist and a concrete floor slab to transfer longitudinal shear forces between the composite steel joist and concrete slab to ensure the composite steel joist and concrete floor slab act as a composite member. The structural and dimensional properties of the **Shearflex® Standoff Screw** were evaluated for compliance with the following codes:

- 2018, 2015 and 2012 International Building Code® (IBC)
- 2019 California Building Code (CBC) – attached Supplement

The **Shearflex® Standoff Screw** has been evaluated in accordance with IAPMO EC-023.

2.0 LIMITATIONS

Use of the **Shearflex® Standoff Screw** described in this report is subject to the following limitations:

2.1 The Shearflex® Standoff Screw is to be used only as part of the Nucor Vulcraft /Verco Group Ecospan® Composite Floor System.

2.2 This evaluation report only addresses a method of shear transfer that is an alternative to the IBC prescribed under the auspices of the Steel Joist Institute's Standard Specifications for Composite Steel Joists (SJI 200-2015), Effective August 1, 2016, Section 4.5.4, welded stud shear connectors, which are used to develop composite action between a structural concrete slab and the supporting steel joists to resist bending induced by vertical loads. Conformance with other aspects of the code, such as requirements for a

complete structural system and fire resistance ratings, is outside of the scope of the evaluation report.

2.3 Use of the **Shearflex® Standoff Screw** as part of the lateral force resisting system (wind or seismic) has not been evaluated and is beyond the scope of this report.

2.4 Composite Steel Joists shall comply with SJI 200-2015 under the 2018 IBC or SJI-CJ-2010 under the 2015 and 2012 IBC. The top chord of the composite steel joists shall be fabricated from steel conforming to:

- ASTM A529/A529M Grade 50 minimum
- ASTM A242/A242M Grade 50 minimum
- ASTM A572/A572M Grade 50 minimum
- ASTM A588/A588M Grade 50 minimum
- ASTM A992/A992M Grade 50 minimum

2.5 The thickness of the steel joist top chord shall not be less than 0.109 inches (2.77 mm) nor greater than 0.313 inches (7.95 mm).

2.6 The concrete slab may be supported by cold-formed steel decking or may be formed to span directly between the supporting steel joists. When cold-formed steel decking is used, the minimum thickness of the concrete slab above the deck shall be two inches (50.8 mm).

2.7 Steel deck panels permitted to be use with **Shearflex® Standoff Screw** are:

- 1-5/16 inch (33.3 mm) (Deep) VERCOR™, PLB™, HSB®, PLB™ FORMLOK™, B FORMLOK™, BR FORMLOK™ as manufactured by Verco Decking, Inc., a Nucor Company. Verco's steel deck panels have been evaluated in IAPMO ER 0217.
- 1.0C, 1.5C Inverted, 1.5B, 1.5BI, 1.5PLB™, 1.5VL, 1.5VLI, 1.5PLVLI, 1.5VLP, 1.5C, and 1.5VLR as manufactured by Vulcraft, a Division of Nucor Corporation. Vulcraft's steel deck panels are evaluated in ICC-ES ESR 1227.

2.8 Concrete shall comply with IBC Chapter 19, ACI 318, and SJI 200-2015 under the 2018 IBC or SJI-CJ-2010 under the 2015 and 2012 IBC. For the determination of available strength, concrete shall have a compressive strength, f'_c , of not less than 3 ksi (20.7 MPa) nor more than 10 ksi (68.9 MPa) for normal weight concrete and not less than 3 ksi (20.7 MPa) nor more than 6 ksi (41.3 MPa) for structural lightweight concrete.

The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with IBC Section 104.11. This document shall only be reproduced in its entirety.





2.9 The **Shearflex[®] Standoff Screw** is manufactured under a quality control program with inspections by IAPMO Uniform ES.

3.0 PRODUCT USE

3.1 **General:** Calculations and details showing that the fasteners and the composite connections are adequate to resist the applied loads shall be submitted to the code official for approval. The calculations shall be signed and sealed by a registered design professional, when required by the statutes of the jurisdiction in which the project is to be constructed.

3.2 Design

3.2.1 The nominal strength, Q_n , and nominal slip capacity, S_n , for the **Shearflex[®] Standoff Screw** are provided in [Table 1](#) of this report for combinations of screw size and deck panel type.

3.2.2 The nominal strength for the **Shearflex[®] Standoff Screw** and the connections made with the **Shearflex[®] Standoff Screw** are not permitted to be increased for short-duration loads.

3.2.3 The ductility of the **Shearflex[®] Standoff Screw** shall be considered in the design of composite joists.

3.2.4 The **Shearflex[®] Standoff Screw** shall be designed using the nominal strength as establish in this report as an alternative to the SJI 200-2015 under the 2018 IBC or SJI-CJ-2010, Section 103.6(d) under the 2015 and 2018 IBC.

3.3 **Installation:** The **Shearflex Standoff Screw** shall be installed in accordance with Vulcraft / Verco's installation instructions, 2016v2.0 and this report. The **Shearflex[®] Standoff Screw** shall be located in accordance with the approved construction documents. In the event of a conflict between this report and the manufacturer's published installation instructions, the more restrictive shall govern.

3.3.1 A copy of the **Shearflex[®] Standoff Screw** installation instructions, 2016v2.0, shall be supplied with delivery of the **Shearflex[®] Standoff Screw**.

3.3.2 The **Shearflex[®] Standoff Screw** shall be installed only with the Nucor Vulcraft / Verco Group Shearset[®] tool.

3.3.3 The **Shearflex[®] Standoff Screw** shall be installed with an end distance and an edge distance not less than 3/8 inch (9.5 mm) as measured from the longitudinal centerline of the screw.

4.0 PRODUCT DESCRIPTION

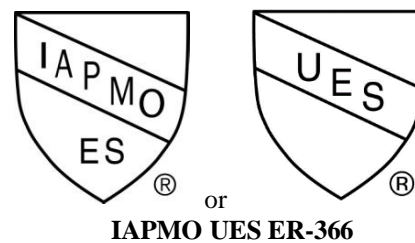
Shearflex[®] Standoff Screws are manufactured from steel conforming to SAE 4037 through hardened to a Rockwell C of 30 to 35. **Shearflex[®] Standoff Screws** are manufactured with a thread diameter of 3/8 inch (9.5 mm) and lengths of 2½ and 3 inches (63.5 and 76.2 mm). As shown in [Figure 1](#) of this report, "Thread Diameter" of the screw references the diameter of the threaded portion of the fastener. Length of the **Shearflex[®] Standoff Screw** references the distance from the underside of the steel deck clamping collar to the top of the fastener head. [Figure 1](#) of this report includes a typical profile.

Shearflex[®] Standoff Screws are manufactured by:

Elco Construction Products
Stanley Black and Decker Company
1301 Kerr Drive
Decorah, Iowa 52101
(800) 435-7213
www.elcoconstruction.com
infoElco@infastech.com

5.0 IDENTIFICATION

Shipping containers for the **Shearflex[®] Standoff Screws** are identified by the Elco Construction Products name, trademark, part description, part drawing number, and evaluation report number (ER-366). The **Shearflex[®] Standoff Screws** shall contain the Nucor head stamp "N" as shown in Figure 1 of this report. The **Shearflex[®] Standoff Screws** identification shall also include the IAPMO Uniform Evaluation Service Mark of Conformity. Either Mark of Conformity may be used as shown below:



6.0 SUBSTANTIATING DATA

6.1 Data in accordance with the IAPMO Uniform Evaluation Service Evaluation Criteria EC 023-2020, Adopted June 2015, Revised January 2020, *Evaluation Criteria for Self-Tapping, Self-Drilling Standoff Screws*.



6.2 Test reports submitted are from laboratories in compliance with ISO/IEC 17025.

7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on the **Shearflex® Standoff Screw** to assess their conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product's certification.

Brian Gerber, P.E., S.E.
Vice President, Technical Operations
Uniform Evaluation Service

Richard Beck, PE, CBO, MCP
Vice President, Uniform Evaluation Service

GP Russ Chaney
CEO, The IAPMO Group

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org

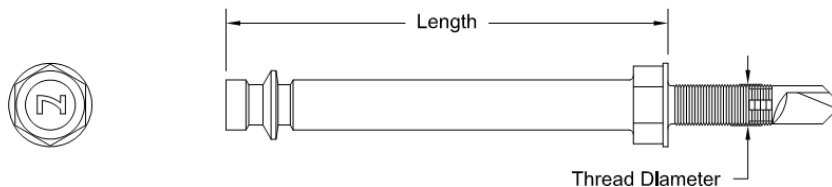


Figure 1



Table 1

Q_n, Nominal Shear Strength (lbs.) / S_n, Nominal Slip Capacity (in). ^{1,2,3,4,5}

Screw Designation	Thread Diameter (in.)	Screw Length (in.)	Steel Deck Panel	Q _n , Nominal Shear Strength(lbs) / S _n , Nominal Slip Capacity (in.)					
				Design Thickness of Structural Support (in.)					
				0.113	0.155	0.187	0.212	0.250	0.313
Shearflex® Standoff Screw	3/8	2.5	Vulcraft - SC, NE, TX 1.0C ⁶	4,400 0.970	4,420 0.854	4,420 0.840	4,420 0.725	4,420 0.695	---
Shearflex® Standoff Screw	3/8	2.5	Vulcraft - AL, NY, IN 1.0C ⁷	4,560 0.782	---	4,730 0.723	---	4,730 0.683	---
Shearflex® Standoff Screw	3/8	3	Vulcraft 1.5C Inverted, 1.5B, 1.5BI, 1.5PLB™, 1.5VL, 1.5VLI, 1.5PLVLI™, and 1.5VLP Verco PLB™, HSB®, PLB™ FORMLOK, B FORMLOK™	4,340 0.572	4,510 0.507	4,830 0.462	4,780 0.406	4,730 0.373	4,580 0.366
Shearflex® Standoff Screw	3/8	3	Vulcraft 1.5C and 1.5VLR Verco BR FORMLOK™	6,970 0.791	---	7,110 0.726	---	7,050 0.419	6,360 0.290
Shearflex® Standoff Screw	3/8	3	Verco 1-5/16 Inch (Deep) VERCOR™	4,170 0.984	4,410 0.933	4,750 0.838	4,860 0.806	4,760 0.698	4,610 0.592

- 1) Minimum $f'_c = 3$ ksi.
- 2) Nominal shear strengths and nominal slip capacities shown in the Table 1 of this report are based on testing of the Shearflex® in light weight concrete. Normal weight concrete will provide equivalent or greater nominal shear strengths.
- 3) Q_n and S_n values for structural support thicknesses between those shown in the above table may be determined via linear interpolation.
- 4) Q_n values shown are based on a maximum of one **Shearflex® Standoff Screw** per steel deck rib with the fastener installed at the center of the steel deck rib.
- 5) When Q_n values shown above are utilized in the design of composite steel joists, ϕ shall be as stipulated per the SJI 200-2015 or SJI-CJ-2010.
- 6) As manufactured by Vulcraft South Carolina, Vulcraft Nebraska, or Vulcraft Texas
- 7) As manufactured by Vulcraft Alabama, Vulcraft New York, or Vulcraft Indian



CALIFORNIA SUPPLEMENT

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1.0 Scope of Evaluation

1.1 Compliance with the following codes

- 2019 California Building Code (CBC)

2.0 RECOGNITION

The Shearflex® Standoff Screw evaluated in IAPMO UES ER-366 and this supplement, complies with the CBC, subject to the additional requirements in Section 3.0 of this supplement.

3.0 ADDITIONAL REQUIEREMENTS

3.1 Special Inspections are required in accordance with CBC Sections 1705.2 and 1705A.2, Steel Construction; and CBC Sections 1705.3 and 1705A.3, Concrete Construction.

3.2 Structural Observation is required in accordance with CBC Sections 1704.6 and 1704A.6, as applicable.

3.3 Concrete tests and materials shall comply with CBC Sections 1903, 1909.2, 1903A, and 1910A, as applicable.

3.4 As applicable for OSHPD and DSA projects, in accordance with CBC Section 2210A.1.1.2, the minimum base steel thickness of the steel deck shall be 0.0359 inches (0.9 mm), except under DSA only, for single-story open structures, where the steel deck is not used as a diaphragm and there are no suspended hangers or bracing for nonstructural components attached to the deck.