



SCAFCO STEEL STUD COMPANY PLC4, BYPASS SLAB SLIDE CLIP, EXTERIOR BYPASS CURTAIN WALL DEFLECTION CONNECTOR

CSI Division: 05 00 00 Metals

Section: 05 040 00 Cold-formed Metal Framing

Section: 05 41 00 Structural Metal Stud Framing

1.0 RECOGNITION

SCAFCO's PLC4 Bypass Slab Slide Clips have been evaluated for use as cladding supports for use with exterior insulated walls. The connectors have been evaluated for composition, durability, and structural performance. SCAFCO's PLC4 Bypass Slab Slide Clips evaluated in this report are satisfactory alternatives to the following codes and regulations:

- 2012 and 2015 International Building Code® (IBC)
- 2016 California Building Code®(CBC) – Attached Supplement
- 2014 Florida Building Code®(FBC) – Attached Supplement

2.0 LIMITATIONS

SCAFCO PLC4 Clip Connectors detailed within this report adhere to, or are acceptable alternatives to the codes listed in Section 1.0 of this report, and subject to the following conditions:

- 2.1 The connectors shall be manufactured, identified, and installed in accordance with this report and the manufacturer's instructions. Where conflicts occur, the more restrictive shall govern.
- 2.2 Design of the attached cold-formed steel member and of the main structural support member is outside the scope of this report, and is the responsibility of the design professional, and shall comply with the applicable code.
- 2.3 Plans, calculations, and specifications demonstrating compliance with this report shall be submitted to the code official for approval. The calculations shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

3.0 PRODUCT USE

SCAFCO's PLC4 Bypass Slab Slide Clips are for cold-formed steel curtain wall construction and are used to connect

and transfer lateral loads between cold formed steel framing members to a main supporting structural member, while allowing for vertical movement in conformance with the IBC Sections 2210 and 2211.

4.1 Design

4.1.1 General: The tabulated loads for the attachment of the PLC4 Clip to the cold-formed steel framing members are shown in this report and are for use with Allowable Strength Design (ASD) and are applicable to the basic load combinations contained in IBC Section 1605.3.1 and the alternative load combinations in IBC Section 1605.3.2. Allowable load increases for wind, seismic, or other applicable lateral loads shall not be permitted.

The PLC4 Clips may be fastened to the supporting structure with screws, bolts, welds, or a combination thereof. Specification and design of the connection shall be completed by a design professional, approved by the code official, and is outside the scope of this report.

Allowable loads are presented in Table 2 of this report and are the lesser of the following values derived from testing and analyses:

- Loads calculated and determined in accordance with AISI S100 Chapter F. The average ultimate test load is divided by a safety factor, Ω , derived from test results.
- The average test load at which 1/8 inch (3.2 mm) deflection of clip relative to the structure occurred.

All allowable loads assume two or three No. 14 screws, centered in the provided connector slots with secure attachment to the supporting structure.

Allowable loads tabulated for PLC4 Clips attached to 68 mil [1.73 mm] (No.14 gage) thick cold-formed steel members are also applicable to thicker members, provided the steel has a yield strength and tensile strength conforming to the minimum requirements for 68 mil (No.14 gage) thick material, outlined in Section 5.2.3 of this report.

4.1.2 PLC4 and Shouldered Screws: Allowable loads are tabulated for the PLC4 Clips in Table 2 of this report. Tabulated loads require use of proprietary No. 14 Shouldered Screws as detailed in Section 3.2.2 of this report, for the PLC4 Clip to cold-formed steel connection.

4.1.3 Cold-Formed and Structural Steel Members: Design of the cold-formed and structural steel members to which the PLC4 Clips described in this report are attached shall comply with the IBC and shall be performed by a design professional and submitted to the code official for approval. The design professional shall verify the adequacy of the supporting





framing member, and evaluate penetrations, notches, and other conditions that may affect the performance of the connectors. The design professional shall also determine the required clear distance between these conditions and the PLC4 Clips. PLC4 Clips are not permitted to replace lateral or stability bracing of the supported members. Design of bracing and verifying the adequate strength and stability of the supporting structure to resist loads imposed by the connectors shall comply with the IBC and is the responsibility of the design professional.

4.2 Installation:

4.2.1 General: Installation of the PLC4 Clips covered in this report shall be in accordance with the manufacturer's installation instructions, this evaluation report, and the codes listed in Section 1.0 of this report.

Figure 1 of this report provides installation details, including fastener placement, for the PLC4 Clips. The PLC4 Clips shall be attached to the supported cold-formed steel member using the provided No. 14 Shouldered Screws (Part Number: DX14-HW1000SD). The specified number of screws shall be installed to obtain the allowable loads listed in Table 2 of this report, with no greater than one screw in each slot. Screws shall be centered in the slots.

5.0 PRODUCT DESCRIPTION

5.1.1 PLC4 Bypass Slab Slide Clip: The PLC4 Bypass Slab Slide Clips combined with the proprietary shouldered screw connectors are used to connect cold-formed steel framing members to the main supporting structural members. The PLC4 Clips allow for the transfer of wind or seismic loads acting perpendicular to the exterior curtain wall, to the main supporting structure, while allowing relative vertical movement between the structural and exterior wall elements. Applications include attachments between cold-formed steel studs of an exterior curtain-wall system, or other cold-formed steel wall/soffit systems, and the main supporting structural system.

5.1.2 Dimensional Properties: The PLC4 Bypass Slab Slide Clips are formed from 68 mil [1.73 mm] (No.14 gage) thick steel conforming to SSFSA's SS101-13 published specification for steel with a minimum yield strength (F_y) of 57 ksi (393 MPa) and a minimum tensile strength (F_u) of 65 ksi (448 MPa). Further information in regards to the material thickness of the PLC4 Clip and may be found in Table 1 of this report. The PLC4 is an L-shaped steel connector, consisting of two legs: the longer leg with two or three vertical slotted holes for the shouldered screw attachment to cold-formed steel studs, and the shorter leg (1½ inch/38 mm) with pre-punched holes for attaching to the supporting structure. The long leg is available in 3½, 5½, 7½ and 9½ inch (89, 140, 191, and 241 mm) lengths is the responsibility of the design professional, and shall be approved by the code official. Both legs have ⅜ inch (9.5 mm) stiffening lips. The

three vertical slots are 0.28 inch (7 mm) wide, 1-inch (25.4 mm)-on-center, and 2¼ inches (57 mm) long to allow for a total of 2 inches (51 mm) of deflection, or ±1 inch (25.4 mm). Three No. 14 shouldered screws (DX14-HW1000SD), described in Section 5.2.2 of this report are provided for connection to cold formed steel material.

The PLC4 Clip also contains four 3/16" holes in the long leg for secure attachment applications. The secure attachment holes are not to be used in conjunction with the shouldered screw attachment through the vertical slots. The allowable loads for the clip in secure attachment applications, as well as the fasteners used to attach the clip to the supporting structure, are outside the scope of this report, and shall be analyzed and designed by a design professional and approved by the code official.

5.2 Materials

5.2.1 PLC4 Connectors: The connectors described in this report are manufactured from steel conforming to SSFSA's SS101-13 published specification for steel with a minimum yield strength (F_y) of 57 ksi (393 MPa) and a minimum tensile strength (F_u) of 65 ksi (448 MPa). The PLC4 connectors have a minimum base metal thickness of 0.0677 inches (1.72 mm). All connectors have minimum G90 zinc hot-dipped galvanized coating specified in accordance with ASTM A653/A653M-15. Further information in regards to the material thickness of the PLC4 Clip and may be found in Table 1 of this report.

5.2.2 No. 14 Shouldered Screws: Screws used to attach the PLC4 to the cold-formed steel framing members shall be proprietary No. 14 shouldered, self-drilling, self-tapping steel screws in compliance with ASTM C1513 (Shouldered Screw Part Number: DX14-HW1000SD). Screws are hex headed and shall have a washer diameter of 0.625 inch (15.9 mm) and a minimum length of 1 inch [25.4 mm] (washer to tip) as detailed in Figure 3 of this report. Shoulder depth is ⅛ inch (3.2 mm) to accommodate up to a 118 mil [3 mm] (No. 10 gage) thick maximum steel thickness. Screws are C 1022 Case hardened steel, with zinc plated (JS-1000 or similar) coating.

5.2.3 Cold-Formed Steel Framing: Cold-formed steel framing members, used for various applications, shall be attached to the PLC4 Clip using two or three No. 14 shouldered screws (Part Number: DX14-HW1000SD). Cold-formed steel framing members shall be manufactured from materials in compliance with the Amerimay Iron and Steel Institute (AISI) *North Amerimay Specification for the Design of Cold-Formed Steel Structural Members* (AISI S100) or conform to SSFSA's SS101-13 published specification. Allowable loads provided in this report are based on the following material properties for the cold-formed steel members:



Table A

IAPMO ER #494

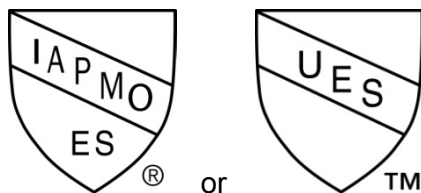
Member Thickness Designation	Design Thickness (in.)	F _y , Minimum Yield Stress (ksi)	F _u , Minimum Tensile Stress (ksi)
33 EQS (20 ga.)	0.0295	57	65
33 mil (20 ga.)	0.0346	33	45
43 EQS (18 ga.)	0.0400	57	65
43 mil (18 ga.)	0.0451	33	45
54 mil (16 ga.)	0.0566	50	65
68 mil (14 ga.)	0.0713	50	65
97 mil (12 ga.)	0.1017	50	65
118 mil (10 ga.)	0.1242	50	65
1. For SI: 1 mil = 0.0254 mm, 1 inch = 2.54 mm, 1 ksi = 6.895 MPa 2. 33EQS and 43EQS shall conform to SSFSA's SS101-13 published specification for steel with a minimum yield strength (F _y) of 57 ksi (393 MPa) and a minimum tensile strength (F _u) of 65 ksi (448 MPa).			

Use of PLC4 Clips recognized within this report with materials not conforming to the minimum requirements of this section is outside the scope of this report.

5.2.4 Structural Steel Framing: The PLC4 Clip shall be attached to the supporting structure with fasteners through the short leg of the clip. The main structural members and the attachment of the short leg of the PLC4 Clip to the structural members shall be analyzed and designed by a design professional. The specified fasteners for the rigid attachment to the structure shall be supplied by the installer.

6.0 IDENTIFICATION

The PLC4 Clips described in this report are identified with a die-stamped label on the long leg of the clip, indicating the name of the manufacturer (SCAFCO), the model number of the clip (part identification number) which corresponds with those listed in Table 2 of this report, the number of this Uniform Evaluation Report (ER-494) which identifies the clips detailed within this report. Identification shall also include the IAPMO Uniform Evaluation Service Mark of Conformity. Either Mark of Conformity as shown below may be used:



6.0 SUBSTANTIATING DATA

Data in accordance with ICC-ES Acceptance Criteria for Connectors Used With Cold-Formed Steel Structural Members (AC261), approved October 2011, editorially revised May 2015, including test results from laboratories in compliance with ISO/IEC 17025.

7.0 CONTACT INFORMATION

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8.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on SCAFCO's PLC4 Bypass Slab Slide Clips for use with steel framing to assess conformance to the codes and standards shown in Section 1.0 of this report and documents the product's certification.

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Vice President, Technical Operations
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CEO, The IAPMO Group

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



Table 1 – PLC4 Clip Material Thickness

Member Thickness Designation	Minimum Thickness (in)	Design Thickness (in)	Yield Stress (ksi)	Tensile Strength (ksi)	Minimum Galvanized Coating
68 mil (No. 14 ga.)	0.0677	0.0713	57	65	G90

For SI: 1 mil = 0.0254 mm, 1 inch = 25.4 mm, 1 ksi = 6.895 MPa

Table 2 – Allowable Loads for PLC4 Clip Part Designations

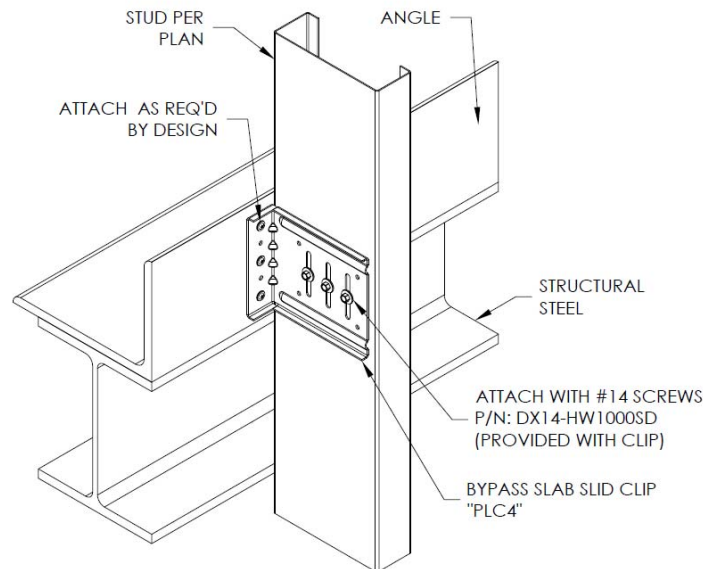
Part No.	Material Thickness (mil)	Length	Screw Attachment through Slots	Stud Thickness	Allowable Loads (lbf) F1-Direction	
					Tension	Compression
PLC4-350	68 (No. 14 ga.)	3-1/2"	2- No. 14	33 mils/ 33EQS	485	510
				43 mils/ 43EQS	601	621
				54 mils	928	935
				68 mils	1,242	1,086
				97 mils	1,242	1,086
				118 mils	1,242	1,086
PLC4-550	68 (No. 14 ga.)	5-1/2"	2- No. 14	33 mils/ 33EQS	485	510
				43 mils/ 43EQS	601	621
				54 mils	928	935
				68 mils	1,242	1,086
				97 mils	1,242	1,086
				118 mils	1,242	1,086
PLC4-550	68 (No. 14 ga.)	5-1/2"	3- No. 14	33 mils/ 33EQS	738	784
				43 mils/ 43EQS	950	1,006
				54 mils	1,367	1,411
				68 mils	1,480	1,986
				97 mils	1,480	1,986
				118 mils	1,480	1,986
PLC4-750	68 (No. 14 ga.)	7-1/2"	2- No. 14	33 mils	485	510
				43 mils/ 43EQS	601	621
				54 mils	928	935
				68 mils	1,242	1,086
				97 mils	1,242	1,086
				118 mils	1,242	1,086
PLC4-750	68 (No. 14 ga.)	7-1/2"	3- No. 14	33 mils/ 33EQS	738	784
				43 mils/ 43EQS	950	1,006
				54 mils	1,367	1,411



				68 mils	1,480	1,986
				97 mils	1,480	1,986
				118 mils	1,480	1,986
PLC4-950	68 (No. 14 ga.)	9-1/2"	2- No. 14	33 mils/ 33EQS	485	510
				43 mils/ 43EQS	601	621
				54 mils	928	935
				68 mils	1,242	1,086
				97 mils	1,242	1,086
				118 mils	1,242	1,086
PLC4-950	68 (No. 14 ga.)	9-1/2"	3- No. 14	33 mils/ 33EQS	738	784
				43 mils/ 43EQS	950	1,006
				54 mils	1,367	1,411
				68 mils	1,480	1,986
				97 mils	1,480	1,986
				118 mils	1,480	1,986

For SI: 1 mil = 0.0254 mm, 1 inch = 25.4 mm, 1 lb = 4.45N

1. SCAFCO Proprietary No. 14 Shouldered Screws (DX14-HW1000SD) described in Section 5.2.2 of this report shall be used for allowable loads
2. Allowable loads are minimum of: ASD Allowable loads from testing, or 1/8 inch relative deflection service limit.
3. Figure 2 of this report illustrates F1 Load direction and definition.
4. Number of screws shall be designated by design professional to resist applicable loading conditions.



PLC4-1 Bypass Slab Slide Clip Detail
XX NTS

Figure 1 – PLC4 Installation Detail

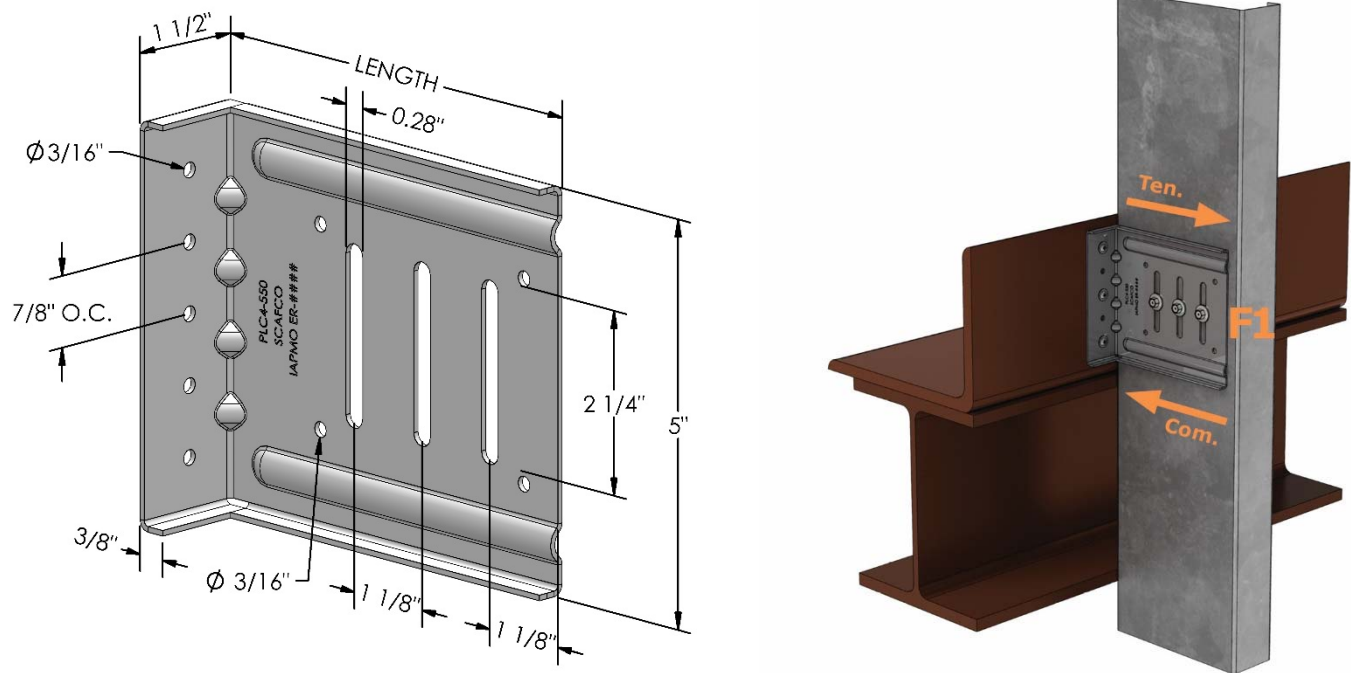


Figure 2 – PLC4 Dimensions and Load Directions

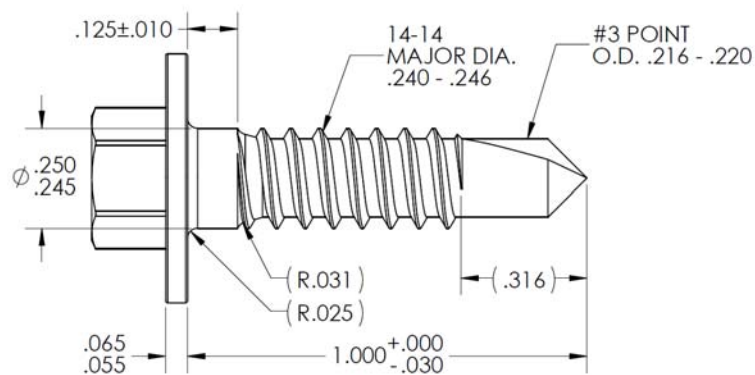


Figure 3 – SCAFCO No. 14 Shouldered Screw (DX14-HW100SD)



CALIFORNIA SUPPLEMENT

SCAFCO STEEL STUD COMPANY PLC4, BYPASS SLAB SLIDE CLIP, EXTERIOR BYPASS CURTAIN WALL DEFLECTION CONNECTOR

REPORT HOLDER:

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CSI Division: 05 – METALS

CSI Section: 05 40 00 – Cold-Formed Metal Framing

CSI Section: 05 41 00 Structural Metal Stud Framing

1.0 SCOPE OF EVALUATION

1.1 Compliance to the following codes & regulations:

- 2016 California Building Code® (CBC)

1.2 Evaluated in accordance with:

- ICC-ES AC261, approved October 2011,
editorially revised May 2015

1.3 Properties assessed:

- Structural

2.0 FINDINGS

The ® PLC4 Bypass Slab Slide Clips described in IAPMO UES Evaluation Report ER-494 comply with the 2016 CBC.

Design, Installation, and Inspection shall be in accordance with ER-0494 and supplemental requirements in Chapters 16, 16A, 17, 17A, 22 and 22A of the CBC, as applicable.



FLORIDA SUPPLEMENT

SCAFCO STEEL STUD COMPANY PLC4, BYPASS SLAB SLIDE CLIP, EXTERIOR BYPASS CURTAIN WALL DEFLECTION CONNECTOR

determine that the products are being manufactured as described in this evaluation report to establish continual product performance.

REPORT HOLDER:

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CSI Division: 05 – METALS

CSI Section: 05 40 00 – Cold-Formed Metal Framing

CSI Section: 05 41 00 Structural Metal Stud Framing

1.0 SCOPE OF EVALUATION

1.1 Compliance to the following codes & regulations:

- 2014 Florida Building Code®, Building (FBC Building)

1.2 Evaluated in accordance with:

- ICC-ES AC261, approved October 2011, editorially revised May 2015

1.3 Properties assessed:

- Structural

2.0 FINDINGS

The PLC4 Bypass Slab Slide Clips described in IAPMO UES Evaluation Report ER-0494 comply with the 2014 FBC, Building.

Design, Installation, and Inspection shall be in accordance with ER-0494 and supplemental requirements in FBC, Building Chapters 16, 17, and 22.

Compliance with the High-Velocity Hurricane Zone requirements of the FBC, Building is beyond the scope of this report supplement.

For products falling under Florida Rule 61G20-3.001, verification is required that the report holder's quality assurance program is audited by a quality assurance entity, approved by the Florida Building Commission (or the building official when the report holder does not possess an approval by the Commission), to provide oversight and