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TILT-UP CONCRETE WALL PANEL CONNECTION DEVICE

PA-EX

FULL SCALE STRUCTURAL TESTING PROGRAM

Completed under the direction of:

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ABSTRACT

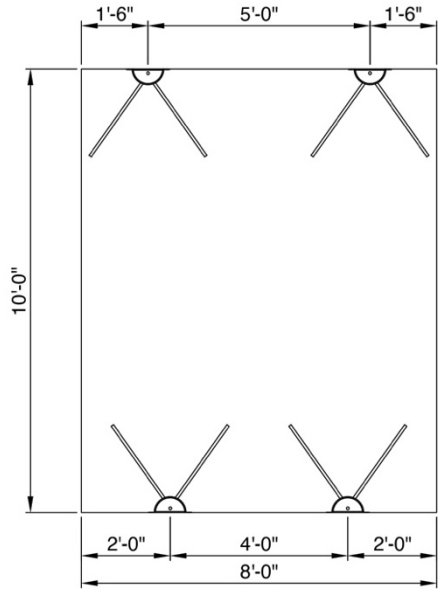
The PA-EX Tilt-Up panel to foundation connection device was engineered to meet the nominal tensile load requirements of American Concrete Institute's (ACI) code requirements (ACI 318 ('08) 16.5.1.3 sub-paragraph B).

The purpose of the testing is to confirm the PA-EX's ability to meet these nominal design capacities. In addition, a further series of tests were conducted to determine in-plane, out-of-plane and combined shear capacities.

Note: In each of the tests the PA-EX was connected to the foundation with a Simpson Strong-Tie, Torq-Cut 5/8 x 121/2 concrete anchor. Also, of note is that all tests were conducted without grout in the 1" space between bottom of panel and top of foundation. The common practice of filling this space with non-shrink grout would significantly increase the shear capacity of the PA-EX connection.

Location of PA-EX Devices in the Test Specimen

Four different structural load tests were conducted on the 8'-0" wide, 10'-0" tall and 7.25" thick precast concrete panel containing (4) PA-EX devices. The devices were located across the two 8-foot edges (top and bottom) of the panel. On one end the devices were located 1'-0" from each edge. This end was used for tension testing. On the opposite end the devices were located 2'-0" (recommended) from each edge. This end was used for in-plane, out-of-plane and combined shear testing. Test loads were applied using a hydraulic ram and a variety of loading apparatus (see formal test report).



PA-EX TEST RESULTS

TENSION ONLY TEST RESULTS (Devices located 1'-0" in from panel edge)

Nominal Design Capacity: 10 Kips Achieved Load Capacity: **18.6 Kips**

SHEAR TEST RESULTS (Devices located 2'-0" in from panel edge)

In-Plane Shear: Applied Load **10.1 Kips**

Out-of-Plane Shear: Applied Load **10.1 Kips**

Combined In-Plane /Out-of-Plane Shear: Applied Load **14.3 Kips**

Note: The loading of the PA- EX devices for in-plane, out-of-plane and combined shear testing was limited to the published material shear capacity of the Simpson Strong-Tie Titen ¾ x 8½ HD concrete anchor (see formal test report). Also, of note is that all tests were conducted without grout in the 1" space between bottom of panel and top of foundation.

Conclusion:

The PA-EX exceeded the 10,000 lbs. tension nominal design capacity with a **ductile capacity of 18,600 lbs; a 1.86 factor of safety.**

The in-plane, out-of-plane and combined shear tests demonstrated that the PA-EX, in combination with the Simpson Torq-Cut 5/8 x 121/2 concrete anchor, provide a **minimum of 10,000 lbs shear resistance.** Note further that all tests were conducted without grout in the 1" space between bottom of panel and top of foundation. The common practice of filling this space with non-shrink grout would significantly increase the shear capacity of the PA-EX connection.

END

Any engineering questions regarding the PA-EX device, testing methods, results or requests for general information may be directed to:

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