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RESEARCH REPORT: RR 25689
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GENERAL APPROVAL – Fox Block Insulating Concrete Forms (ICFs) used as a stay-in-place expanded polystyrene (EPS) form work for concrete construction

DETAILS:

Fox Block Insulated Concrete Forms (ICFs) are used as stay-in-place forms for structural concrete, load-bearing and nonload-bearing, below-grade and above-grade walls. The Fox Block ICFS consists of two 2.625-inch-thick, expanded polystyrene (EPS) foam plastic panels separated by injection-molded polypropylene plastic cross-ties, which are partially embedded into the EPS panels. The polystyrene beads used are from ICC approved manufacturers, BASF (ICC # ESR-2784) and Flint Hills Resources (ICC # ESR-1634). The Fox Block ICFs are filled at the jobsite with normal-weight concrete with a maximum aggregate size of ¾ inch and a minimum compressive strength of 3,000 psi at 28 days to provide a solid monolithic concrete wall.

The approval is subject to the following conditions:

1. Complete design and calculations shall be prepared by an engineer licensed in the State of California and approved by Structural Plan Check.
2. The clearance between the foam plastic insulating the form and exposed earth shall be 6 inches minimum in accordance with Section 2603.9 of the 2014 City of Los Angeles Building Code and Section R318.4 of the 2014 City of Los Angeles Residential Code.

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3. The plastic cross-ties have a CC1 classification, as defined in Section 2606.4 of the City of Los Angeles Building Code.
4. Fox Block ICFs are recognized for use as interior finish in building of Type I, III, II, and IV construction with condition that the EPS foam plastic insulation be separated from the building interior with an approved 15-minute thermal barrier, such as minimum 1/2 -inch-thick regular gypsum wallboard.
5. Fox Block Insulating Concrete Forms (ICFs) are recognized for use as exterior finish in building of Type I, II, III, and IV construction with condition that the exterior plaster and brick veneer be installed in accordance with the manufacturer's recommendations. Alternatively, the following Exterior Insulated Finish Systems (EIFS) lamina may be installed over the exterior of the forms when applied using the reinforcing fabric or lath, base coat and finish coat materials described in their respective evaluation reports:
 - BASF Construction Chemicals, LLC - Wall Systems, Acrocrete Acrowall-ES or Acrowall-ESV EIFS as described in ESR-2164.
 - BASF Construction Chemicals, LLC - Wall Systems, Finestone Pebbletex or Pebbletex-D EIFS as described in ESR-2165.
 - Sto Corp. StoTherm Essence as described in ESR-1720
6. Approved exterior wall coverings shall be attached to the cross-tie flanges with fasteners listed in Table 1. The fasteners must be corrosion-resistant and have sufficient length to penetrate through the cross-tie flange at least 1/4 inches. Allowable withdrawal and shear capacities are shown in Table 1.

TABLE 1

FASTENER	ALLOWABLE LOAD CAPACITY (lbf)	
	Lateral	Withdrawal
No. 6 fine-thread drywall screw by 15/8 inches	37	32
No. 6 course-thread drywall screw by 15/8 inches	45	29
#8 saw tooth-thread exterior deck screw by 2 inches	71	36
#10 wood screw by 2 1/2 inches	68	38
0.098-inch-diameter, ring shank drywall nail by 2 inches	19	16

7. Fox Block ICFs may be used to construct fire-resistance rated wall assemblies as shown in the table below. The normal weight concrete must have a minimum 28-day compressive strength of 3,000psi. The minimum size reinforcement shall be No.5 reinforcing bars. The bars must be spaced as required by ACI 318, at a minimum; bars placed vertically must be in the center of the wall, and spaced 16 inches on center; and bars placed horizontally must be spaced 16 inches on center, and must be staggered on either side of the vertical bars, from row to row. For the 4-inch ICFs, the maximum axial compressive load shall not exceed 7,500 pounds per lineal foot; for the 6- and 8-inch ICFs, the maximum axial compressive load shall not exceed 7 percent of the load determined in accordance with Chapter 19. Loads are based on a 10-foot wall height and listed in Table 2.

TABLE 2

CONCRETE THICKNESS (inches)	Fire-Resistance Rating (hours)
4	2
6	3
8	4

8. The maximum allowable pour rate into the forms shall be four feet per hour.
9. Periodic inspection by Deputy Inspectors shall be provided for placement of reinforcing steel and concrete or when an EIFS wall covering is applied. Any exception shall be approved by Structural Plan Check supervisors.

DISCUSSION

This report is in conformance with the 2014 Los Angeles City Building Code.

Section 301.1.3 of the 2014 City of Los Angeles Residential Code requires a structural design in accordance with the 2014 City of Los Angeles Building Code for buildings with concrete or masonry walls.

Approval is based on tests in accordance with ICC-ES Acceptance Criteria for Stay-in-place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls (AC353).

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this Approval have been met in the project in which it is to be used.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspect

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