

# PERMANENT INSULATING CONCRETE FORMING SYSTEM

## SECTION 03130

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#### PERMANENT FORMS

#### (PERMANENT INSULATING CONCRETE FORMING SYSTEM)

#### PART 1 GENERAL

##### 1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Work shall be conducted in accordance with General Conditions, Supplementary Conditions, Division 1 and the requirements of this Section
- B. Cast-In-Place Concrete, see section 03300 – Cast-in-place Concrete
- C. Metal Flashing, See Section 07620 – Sheet Metal Flashing and Trim

##### 1.02 DESCRIPTION

- A. Scope: This section establishes general design criteria for materials, production, erection, and evaluation of the permanent insulating concrete forming system. The work to be performed under this section of the specification shall include all engineering, labor, material, equipment, related services, and supervision required for the manufacture and delivery of the permanent insulating concrete forming system as shown on the contract drawings.

##### 1.03 APPLICABLE SPECIFICATIONS, STANDARDS AND CODES.

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM C203 Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation.
  - 2. ASTM C272 Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
  - 3. ASTM C303 Standard Test Method for Density of Preformed Block-Type Thermal Insulation.
  - 4. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
  - 5. ASTM D635 Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
  - 6. ASTM D1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
  - 7. ASTM D1622 Standard Test Method for Apparent Density of Rigid Cellular Plastics.
  - 8. ASTM D1761 Standard Test Method for Mechanical Fasteners in Wood
  - 9. ASTM D1929 Standard Test Method for Determining Ignition Temperature of Plastics.
  - 10. ASTM D2126 Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
  - 11. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 12. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
  - 13. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
  - 14. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.
  - 15. ASTM E283 Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
  - 16. ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- B. International Code Council:
  - 1. International Building Code 2003 – ICCES ESR#1182
- C. Uniform Building Code (UBC) Standard:
  - 1. UBC 26-3: Room Fire Test Standard for Interior of Foam Plastic Systems.
- D. American Concrete Institute (ACI):
  - 1. ACI 318 Building Code Requirements for Structural Concrete with Commentary.

##### 1.04 SYSTEM DESCRIPTION

- A. Structural Performance: Provide permanent insulating concrete forming system units and connections capable of withstanding design loads within limits and under conditions indicated. Refer to structural general notes for design loads.

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- B. Performance Requirements: Provide a Permanent Insulating Concrete Forming System which has been manufactured, fabricated and installed according to the following criteria:
1. Uniform Building Code (UBC) Standard:
    - a. UBC 26-3: Room Fire Test Standard for Interior of Foam Plastic Systems.
  2. Fire Tests of Building Construction & Materials (ASTM E119):
    - A. Minimum 3 hour fire resistive rating required.
  3. Sound Transmission Classification (ASTM E90):
    - A. 6" Concrete Core STC 51 with ½" Gypsum one side
    - B. 4" Concrete Core STC 50 with ½" Gypsum one side
    - C. 8" Concrete Core STC 52 with ½" Gypsum one side
  4. Air infiltration (ASTM E283): < 0.01 cfm/ft<sup>2</sup> (<0.003 m<sup>2</sup>/min)/m<sup>2</sup>).
  5. Water Penetration (ASTM E331) : no leakage visible with 8" rain per hour for 2 hour duration and a Water Transmission Pressure differential of 15 psf.
  6. Fastener Shear (#10 Wood Screw) into Web (ASTM D1761):  
Ultimate Lateral Shear Strength: 359.5 lbs (1.6 kN)  
Minimum Design Lateral Shear Strength: 112.3 lbs (0.5 kN)
  7. Fastener Withdrawal (#10 Wood Screw) into Web: (ASTM D1761):  
Ultimate Withdrawal Strength: 199 lbs (0.885 kN)  
Minimum Design Withdrawal Strength: 39.8 lbs (0.177 kN)
  8. Flame Spread Index (ASTM E84): Maximum Flame Spread Index of 25
  9. Smoke Development Index (ASTM E84) Maximum Smoke Development Index 300

### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
1. Certifications: Manufacturer's certification signed and sealed by Manufacturer's professional engineer that product complies with the requirements of this section.
  2. Professional Engineer Qualifications: A professional engineer who is employed by the Manufacturer and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installation of the permanent insulating concrete forming system that are similar to those indicated for this project in material, design and extent.
- B. Installer/Erector Qualifications:
1. Regularly engaged for the last ten (10) years in concrete forming with scope of work and scale comparable to the project. Manufacturer's certificate of competence to install/erect the permanent insulating concrete forming system similar to those required on this project.
- C. Regulatory Requirements and Approvals: Comply with the requirements of the following code criteria:
1. 2003 International Building Code
    - a. ICCES ESR 1182
- D. Pre-Installation Conference:
1. Section 01300 Administrative Requirements: Pre-Installation Conference
  2. Convene minimum one week prior to the commencing work of this section; attended by the permanent insulating concrete forming system materials manufacturers technical representative, installing trade contractor and his foreman, general contractor, construction manager, and the architect to ensure that these specifications are thoroughly understood.
  3. Review coordination and scheduling required with related work.
  4. Discuss specific expectations and responsibilities, construction procedures, specification requirements, application, environmental conditions, job and surface readiness, material storage and protection.
  5. Inspect site conditions at this time to:
    - a. Verify that work of other trades, which is required to be completed prior to commencement of work, is completed.
    - b. Determine adequacy of foundation placement, presence of foreign material, moisture and uneven surfaces, or other conditions that would prevent the installation of the permanent insulating concrete forming system from commencing or cause a foundation or wall construction failure.

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- c. Examine installation instructions of manufacturer.
- E. Should there be any deviation from the contract documents without the prior written consent of the permanent insulating concrete forming system material manufacturer, the construction Manager, the Architect and the contractor must do all necessary corrective work to make the permanent insulating concrete forming system acceptable to the Construction Manager and Architect at no additional cost to the owner.

### **1.06 SUBMITTALS**

- A. Section 01600 – Product Requirements: Submittal Procedures.
- B. Product Data: Submit manufacturers product data and installation instructions.
- C. Shop Drawings:
  - 1. Indicate joint and termination detail conditions, and conditions of interface with other materials.
  - 2. Show locations of form types and applicable structural details.
  - 3. Receive approval of details relating to the installation of the permanent insulating concrete forming system from the permanent insulating concrete forming system material manufacturer; system to be installed in a manner that the manufacturer will furnish the specified warranty for the installation.
- D. Samples: Provide selection and verification samples.
- E. Quality Assurance/Control Submittals: Submit the following:
  - 1. Test Reports: Provide test data in support of performance requirements specified in Section 1.04 B and Section 2.01 B.
  - 2. Certificates: Submit certification specified in this section.
- F. Design/Connection Calculations:
  - 1. Submit structural design and connection calculations, stamped by a registered professional engineer licensed to practice in the commonwealth of Pennsylvania.
- G. Design Modifications:
  - 1. Submit design modifications necessary to meet performance requirements and field coordination.
  - 2. Variations in details or materials shall not adversely affect the appearance, durability or strength of the units.
  - 3. Maintain general design concept without altering size of members, profiles and alignment.

### **1.07 PRODUCT DELIVERY, STORAGE & HANDLING**

- A. Delivery and Handling
  - 1. Deliver all permanent insulating concrete forming system units to the project site in such quantities and at such times to assure continuity of erection.
  - 2. Deliver materials in manufacturers original, unopened, undamaged containers with identification labels intact.
  - 3. Handle and transport units in a position consistent with the shape and design in order to avoid stresses which would cause cracking or damage.
  - 4. Lift or support units only at the points shown on the shop drawings.
  - 5. Place non-staining resilient spacers of even thickness between each bundle.
  - 6. Support units during shipment on non-staining shock-absorbing material.
- B. Storage at Job Site:
  - 1. Do not place units directly on ground.
  - 2. Store and protect units to prevent contact with soil, staining and physical damage.
  - 3. Store units, unless otherwise specified with non staining resilient supports located in the same positions as when transported.
  - 4. Store units on firm, level and smooth surfaces to prevent cracking, distortion, warping or other physical damage.
  - 5. Place units so that identification marks are discernible, and so that product can be inspected.
  - 6. Provide UV protection for stored products subjected to direct sunlight.

### **1.08 WARRANTIES, GUARANTEES, TESTING**

- A. Guarantee: Manufacturer shall guarantee the permanent insulating concrete forming system units used in the exterior applications shown and specified for structural integrity for a period of two years.
- B. Contractor shall also guarantee the work of this section against defective materials and or workmanship for a period of two years from the date of acceptance of building by the owner .

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### PART 2 PRODUCTS

#### 2.01 PERMANENT INSULATING CONCRETE FORMING SYSTEM

- A. Drawings and specifications are based upon permanent insulating concrete forming system products as manufactured by ECO-Block, LLC, at 11220 Grader Street, Suite 700, Dallas, Texas 75238, Telephone: (800) 595-0820, (214) 503-1644; Fax: (214) 342-5322; E-mail: [info@eco-block.com](mailto:info@eco-block.com); website: [www.eco-block.com](http://www.eco-block.com).
1. Substitutions: See Section 01600 – Product Requirements

#### 2.02 MATERIALS

- A. Permanent Insulating Concrete Forming System, including the following:

1. Standard Block:
  - a. Material: Expanded Polystyrene (EPS).
  - b. Dimensions (Straight Panel): 48" x 16" x 2.5" (1219 x 406 x 63.5 mm).
  - c. Thermal Resistance {R/inch} (ASTM C518): 4.193 ft<sup>2</sup>•hr•°F/Btu•in ; (0.605 K•m/W).
  - d. Flame Spread Index (ASTM E84): 0.
  - e. Smoke Development Index (ASTM E84): 300.
  - f. Dimensional Stability (ASTM D2126): -0.40%.
  - g. Flexural Strength (ASTM C203): 40.0 psi (276 kPa).
  - h. Compressive Strength (ASTM D1621): 15.0 psi (110 kPa).
  - i. Density (ASTM C1622): 1.45 to 1.60 pcf (23.2 to 25.6 kg/m<sup>3</sup>).
  - j. Water Vapor Permeance (ASTM E96): 0.88 perms (50.34 ng/(Pa•s•m<sup>2</sup>)).
  - k. Water Absorption (ASTM C272): 2.1%.
  - l. Self-Ignition Temperature (ASTM D1929): 860°F (460°C).
  - m. Sound Transmission Classification (ASTM E90): 51 with ½" Drywall one side and 6" concrete core.
  - n. Air infiltration (ASTM E283): Less than 0.01 cfm/ft<sup>2</sup> ((<0.003 m<sup>2</sup>/min)/m<sup>2</sup>).
  - o. Water Penetration (ASTM E331) : no leakage visible with 8" rain per hour for 2 hour duration and a Water Transmission Pressure differential of 15 psf
  - p. Fastener Shear (#10 Wood Screw) into Web (ASTM D1761):
    - Ultimate Lateral Shear Strength: 359.5 lbs (1.6 kN)
    - Design Lateral Shear Strength: 112.3 lbs (0.5 kN)
  - q. Fastener Withdrawal (#10 Wood Screw) into Web: (ASTM D1761):
    - Ultimate Withdrawal Strength: 199 lbs (0.885 kN)
    - Design Withdrawal Strength: 39.8 lbs (0.177 kN)

#### 2.03 ACCESSORY MATERIALS

- A. Accessory Materials: Refer to other sections for related materials.

#### 2.04 COMPONENTS

- A. Proprietary Products/System Components, including:

1. Corner Block:
  - a. Material: Expanded Polystyrene (EPS).
  - b. Size: [4" (102 mm)] [6" (152 mm)] [8" (203 mm)] [10" (254 mm)].
  - c. Dimensions: 32" (813 mm) (long side) x 16" (406 mm) (short side) x 16" (406 mm) (high) x 2.5" (64 mm) (thick).
3. 45 Degree Corner Block
  - a. Material: Expanded Polystyrene (EPS).
  - b. Size: [6" (152 mm)].
  - c. Dimensions: 32" (813 mm) (long side) x 16" (406 mm) (short side) x 16" (406 mm) (high) x 2.5" (64 mm) (thick).
4. Brick Ledge Panel:
  - a. Material: Expanded Polystyrene (EPS).
  - b. Size: [4" (102 mm)] [6" (152 mm)] [8" (203 mm)] [10" (254 mm)].
  - c. Dimensions: 48" x 16" x 7.5" (1219 x 406 x 191 mm) (EPS thickness is 2.5" (64 mm)).
5. Connectors:
  - a. Material: Acrylonitrile Butadiene Styrene (ABS).
  - b. Size: [4" (102 mm)] [6" (152 mm)] [8" (203 mm)] [10" (254 mm)].
  - c. Average Rate of Burning (ASTM D635): 1.43 cm/min.
6. 90 Degree Panel Connector Extrusion:
  - a. Material: PVC.

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- b. Size: 47" x 2.5" (1194 x 64 mm).
- 7. 45 Degree Residential Panel Connector Extrusion:
  - a. Material: PVC.
  - b. Size: 47" x 2.5" (1194 x 64 mm).

### **PART 3 EXECUTION**

#### **3.01 MANUFACTURER'S INSTRUCTIONS**

- A. Comply with the instructions and recommendations of the Permanent Insulating Concrete Forming System manufacturer.

#### **3.02 INSPECTION**

- A. Site Verification of Conditions: Verify layout matches drawings at all locations and that site conditions are appropriate for installation of the permanent insulating concrete forming system and placement of concrete.
- B. Do not proceed with work until unsatisfactory conditions have been corrected.
- C. Before erecting the permanent insulating concrete forming system the contractor shall verify that structural and anchorage inserts not within tolerances required to erect panels have been corrected
- D. Determine field conditions by actual measurements.

#### **3.03 ERECTION**

- A. Set permanent insulating concrete forming system units level, plumb, square and true within the allowable tolerances. General contractor shall provide true, level bearing surface on all field placed concrete which are to receive permanent insulating concrete forming system units. General contractor shall be responsible for providing lines, center and grades in sufficient detail to allow installation.
- B. Provide temporary supports and bracing as required to maintain position, stability and alignment as units are being permanently connected.

#### **3.04 CONSTRUCTION**

- A. Special Techniques for Wall Installation:
  - 1. Erect wall forms plumb, square and level.
  - 2. Plumb, square, diagonally brace against racking and securely attach to forms, wood bucks for doors, windows and other openings.
  - 3. Properly reinforce all cuts and weak spots in forming blocks.
  - 4. Install sleeves for penetrations and anchors for interior walls into formwork before placing concrete.
  - 5. Install and securely tie reinforcing bars so that concrete, when placed, will fully surround all bars.
  - 6. Make lintels over door and window openings integral with wall by installing required reinforcing bars as shown on structural drawings.
  - 7. Place horizontal reinforcing bars in notches in panel connectors, staggering bars side to side.
  - 8. Install vertical bars near center of wall forms.
  - 9. Place anchor bolts and straps at top of wall as shown on drawings.
  - 10. Conform to ACI 318 (or CAN 3A23.1) in concrete mixes and placement.
  - 11. Consolidate concrete during placement with not greater than 3/4" (19.1 mm) diameter vibrator or external equivalent.
  - 12. Do not add additional water to concrete during placement.
  - 13. Cut chases for electrical cable and plumbing into the blocks using a router or hot knife after concrete has been placed and cured.
- B. Special Techniques for Wall Installation - Insulated Tilt-Up Precast Applications: Form insulated tilt-up concrete walls with ECO-Block panels using one of the 3 different methodologies recommended by manufacturer:
  - 1. Method 1: Place ECO-Block panels on the casting bed prior to placing reinforced concrete.
  - 2. Method 2: Wet-set ECO-Block panels on top of freshly placed concrete.
  - 3. Method 3: Combine both methods to form a 2-sided, insulated tilt-up wall.
- C. Interface with Other Work:

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1. Where point loads from beams, girders or trusses are to be supported, increase wall width as shown on structural drawings.
2. Make connections to floor joists, roof trusses, concrete block walls and wood walls using industry standard hardware and methods shown on drawings.
3. Use brick ledge forms and 90 degree corner forms where shown on drawings.

**3.05 FIELD QUALITY CONTROL**

- A. Site Tests: [Specify required site tests.].
- B. Inspection: [Specify required inspections.].

**3.06 PROTECTION**

- A. Protect completed work from damage during subsequent construction activities on the site.
- B. All work and materials of other trades shall be adequately protected by the erector at all times.

**3.07 CLEANING**

- A. Upon completion, clean all surfaces of panels and repair all defective areas as required; leave all work clean and free of surface dirt or imperfections. Protect all work of this section from all construction damage, during and after installation.

**END OF SECTION**