

SECTION 03 11 19

PERMANENT FORMS—Insulating Concrete Forms

PART 1 - GENERAL

1.01 SUMMARY

A. Supply and installation of permanent insulating concrete forms as formwork, placement of steel reinforcement and placement of concrete into formwork.

1.02 RELATED SELECTIONS

- A. Drawings and general provisions to the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section 03 05 00 - Common Work Results for Concrete
- C. Section 03 20 00 - Concrete Reinforcing
- D. Section 03 30 00 - Cast-In-Place Concrete
- E. Section 03 40 00 - Pre-cast Concrete
- F. Section 04 00 00 - Masonry
- G. Section 05 16 00 - Metal Framing Systems
- H. Section 06 00 00 - Wood, Plastics and Composites
- I. Section 07 10 00 - Dampproofing and Waterproofing
- J. Section 07 13 00 - Sheet Waterproofing
- K. Section 07 24 00 - Exterior Insulation Finishing Systems
- L. Section 07 46 00 - Siding
- M. Section 07 60 00 - Flashing and Sheet Metal
- N. Section 08 00 00 - Openings
- O. Section 09 20 00 - Plaster and Gypsum Board
- P. Section 09 22 00 - Plaster
- Q. Section 09 70 00 - Wall Finishes

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM C 578 -- Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
 - 2. ASTM C 236 -- Steady State Thermal Performance of Building Assemblies
 - 3. ASTM C 150 -- Standard Specification for Portland Cement Types I, II, III.
 - 4. ASTM D 1761 -- Standard Test Methods for Mechanical Fasteners in Wood
 - 5. ASTM E 84 -- Standard Test Method for Determining Surface Burning Characteristics of Building Materials
 - 6. ASTM A 615 -- Steel Specifications for Steel Reinforcement
 - 7. ASTM D 1929 -- Standard Test Method for Determining Ignition Properties of Plastics
 - 8. ASTM D 635 -- Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
 - 9. ASTM D 2843 -- Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics
 - 10. ASTM E 119 -- Fire Tests of Building Construction and Materials
 - 11. ASTM D 638 -- Standard Test Method for Tensile Properties of Plastics
 - 12. ASTM E 90 -- Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions



B. American Concrete Association

1. ACI 304 -- Guide for Measuring, Mixing, Transporting and Placing Concrete
2. ACI 305 -- Hot Weather Concreting
3. ACI 306 -- Cold Weather Concreting
4. ACI 309 -- Guide for Consolidation of Concrete
5. ACI 318 -- Building Code Requirements for Reinforced Concrete
6. ACI 332 -- Guide to Residential Cast-In-Place Concrete Construction
7. ACI 347 -- Guide to Formwork for Concrete

C. International Code Council Evaluation Service, Inc. (ICC-ES)

1. AC 353 -- Acceptance Criteria for Stay-In-Place, Foam Plastic Insulating Concrete Forms (ICF) Systems for Solid Concrete Walls

1.04 SYSTEM DESCRIPTION

- A. Provide insulating concrete form product which has been manufactured and installed to withstand concrete placement loads without defects, damage, or failure and such that the cast-in-place concrete wall is designed according to ACI 318 “Building Code Requirements for Reinforced Concrete.”
- B. Furnish labor, materials, equipment, and services necessary for the complete and proper installation of all insulating concrete framework and related work, as shown on the drawings or specified herein, in accordance with all applicable requirements of the contract documents.
1. Insulating concrete wall formwork consisting of two panels of flame retardant panels of Type II expanded polystyrene (EPS) manufactured to a 1.5 lbs/cu. ft. minimum density. The two EPS panels to be connected by 6 co-polymer polypropylene plastic tie inserts designed with cross members placed 8” o.c. horizontally and 8” o.c. vertically creating a symmetrical design enhancing installation efficiency and reducing product waste. Plastic tie inserts positioned perpendicular between the EPS panels. The ICF product to be modular or pre-fabricated factory assembled forms.
 2. The ICF formwork to have consistent 2 5/8” thick EPS panels with a single row of rectangular interlocking projections and recesses designed for efficient installation with the modular ICF formwork having no top, bottom, left or right sides; which is a universal type of design. Straight and specialty blocks (90-degree corner, 45-degree corner, etc.) all possess the same design features and characteristics.
 3. Plastic tie inserts designed to allow for multiple reinforcement placement positions to comply with structural design. The rebar chair supports are two deep with a loose fit for contact splice connections.
 4. Wall system to provide a forming cavity width of a minimum 4”, 6”, or 8” (as design requires). The cavity width shall be a consistent flat rectangular cross section.
 5. Wall system plastic tie inserts to provide minimum 1 1/2”-wide fastening strips @ 8” o.c. Fastening strips to be recessed beneath the EPS panel face 5/8” and run vertically full wall height (16”) to facilitate fastening both interior and exterior.

6. Wall system consisting of two EPS panels, concrete and exterior and interior finishes to provide a minimum R22 insulation value.
 7. EPS foam to provide maximum vapor permeation of 3.5 Perm-in.
- C. Conform to the applicable building code requirements of regulatory agencies having jurisdiction.

1.05 SUBMITTALS

All submittals, which do not conform to the following requirements, will not be acceptable:

A. **SUBMITTALS OF EQUALS.** Submit insulating concrete form system to be considered as equal to the specified insulating concrete form system submitted and approved prior to bid date. Insulating concrete form system, which has been reviewed and accepted as equal to the specified form system, will be listed in an addendum prior to bid date; only then will equals be accepted at bidding. Submittals shall include the following;

1. A sample ICF formwork product.
2. Current edition of the insulating concrete form system manufacturer's specifications and installation guidelines.
3. Documentation of the manufacturer's quality control/quality assurance program for the primary insulating concrete form product supplied.
4. Descriptive list of the materials proposed for use.
5. ICF manufactured product has been evaluated for compliance with the applicable model building code.
 - Documentation of Building Officials Conference of America (BOCA) approval.
 - Documentation of Uniform Building Code (UBC) approval.
 - Documentation of Standard Building Code (SBC) approval.
 - Documentation of International Building or Residential Code (IBC or IRC) approval.
6. Documentation of fastener withdrawal from plastic tie insert flange strip.
7. Documentation of fire rating design listings where applicable.
8. Documentation of noncombustible construction approval where applicable.
9. Letter from the proposed insulating concrete form system confirming that proposed insulating concrete form manufacturer had been producing ICF products in North America for a minimum of 5 years.

B. **SUBMITTALS PRIOR TO CONTRACT AWARD:**

1. Proposed insulating concrete form manufacturer to submit product warranty prior to contract award.

C. **SUBMITTALS PRIOR TO COMMENCEMENT OF ICF WORK:**

1. Designer's printed recommendations for the proper installation of mechanical and electrical component installations, penetrations, interior and exterior finishes, and attachment of structural elements.



1.06 QUALITY ASSURANCE

- A. **ACCEPTABLE PRODUCTS AND MANUFACTURER’S QUALIFICATIONS.** A single manufacturer that has been successfully producing ICF products for not less than 5 years in North America.
- B. **AGENCY APPROVALS.** The proposed insulating concrete form product shall have been evaluated to the applicable building code and shown to be in current compliance as evidenced by an evaluation report from one of the following code agencies.
1. BOCA Evaluation Service, Inc.
 2. ICBO Evaluation Service, Inc.
 3. SMCCI Public Safety Testing and Evaluation Services Inc.
 4. ICC ES, Inc.
 5. Metro Dade Product Control Notice of Acceptance.
- C. **SCOPE OF WORK.** The work to be performed under this specification shall include but is not limited to the following: Attend necessary job meetings and furnish competent and full time supervisor, labor, all materials, tools, and equipment necessary to complete, in an acceptable manner, the insulating concrete form system installation in accordance with this specification. Comply with the application guidelines of the manufacturer of the insulating concrete form products.
- D. **CONFERENCES:** Subject to Architect’s discretion.
1. **PRELIMINARY CONFERENCE:** As soon as possible after award of insulating concrete formwork, meet with the contractor, sub-contractors, and other workers related with the insulating concrete form system including penetrating work and finish systems, architect, owner, and representatives of other entities directly concerned with performance of the insulating concrete form system.
 - a. Review requirements (Contract Documents), submittals, status of coordinating work, availability of materials, and installation facilities and establish preliminary installation schedule. Review requirements for inspections, testing, certifications, and forecaster weather conditions, governing regulations, insurance requirements, and proposed installation procedure.
 2. **PRE-APPLICATION INSULATING CONCRETE FORM CONFERENCE:**
Approximately 2-3 weeks before scheduled commencement of insulating concrete form installation and associated work, meet at project site with contractor, sub-contractors, concrete supplier, and other related work that must precede or follow formwork including architect, owner, insulating concrete form manufacturer’s representative, and other representatives directly concerned with performance of the work.
 - a. Review methods and procedures related to insulating concrete formwork, including but not necessarily limited to the following:

- a.1. Verify that site conditions are as set out in Part 1 - General Conditions. Insulating concrete form installer to coordinate provision of access, storage area, and protection of ICF product.
- a.2. Verify footing installation conforms to requirements of ¼” within level and that steps or elevation changes in footings are in 8” or 16” height increments.
- a.3. Verify that reinforcing steel dowels are in place at specified centers along footing lengths.
- a.4. Review transitions, special penetration details, area drainage, curbs, proposed openings, structural elements (lintels and bucks), and conditions of other construction that will affect insulating concrete forms.
- a.5. Review insulating concrete form requirements (drawings, specifications, and other contract documents).
- a.6. Review required submittals, both completed and yet to be completed.
- a.7. Review and finalize construction schedule related to insulating concrete formwork and verify availability of materials, installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
- a.8. Review temporary protection requirements for insulating concrete form system during and after installation.
- a.9. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in original factory packaging, bearing listing and leveling identification of product, manufacturer and lot number.
- B. Handle and store products in a location to prevent damage and soiling.
- C. Ensure that UV protection is provided for material, on-site storage should be required for an extended time period.

1.08 PROJECT CONDITIONS

- A. Use appropriate measures for protection when required to ensure proper concrete curing conditions in accordance with ACI 305 and ACI 306 during periods of weather where temperatures are above or below minimum specified by the governing or local building code for concrete.
- B. Familiarize every member of the application crew with all applicable safety regulations recommended by OSHA and other industry or local governmental groups.

1.09 SEQUENCING AND SCHEDULING

- A. Sequence installation of insulating concrete forms with related work specified in other sections to ensure that wall assemblies, including window and door accessories, trim, service penetrations, transition changes, and mechanical services are protected against damage from effects of weather, corrosion, and adjacent construction activity.



1.10 WARRANTY

- A. Insulating concrete form manufacturer to provide copies of specified product warranties.

PART 2 PRODUCTS

2.01 INSULATING CONCRETE FORM PRODUCTS

A. INSULATING CONCRETE FORM GENERAL CHARACTERISTICS:

Form units with the following characteristics and dimensions to accommodate project criteria:

1. Expand polystyrene (EPS) plastic foam units
2. Nominal 1.5 lb./cu. ft. density foam
3. A listed 3rd party agency maximum flame spread rating of 25 per ASTM E-84 and/or UL 723.
4. A listed 3rd party agency maximum smoke density rating 450 per ASTM E-84 and/or UL 723.
5. Universal and reversible interlock design for successive courses to provide wall integrity.
 - a. 9.25", 11.25", and 13.25" Straight Forms:
 - 4" Concrete Width: 48" L x 9.25" W x 16" H-2 5/8" Thick EPS
 - 6" Concrete Width: 48" L x 11.25" W x 16" H-2 5/8" Thick EPS
 - 8" Concrete Width: 48" L x 13.25" W x 16" H-2 5/8" Thick EPS
 - b. 9.25", 11.25", and 13.25" 90-degree Corners
 - 4" Concrete Width 30" x 22" L x 9.25" W x 16" H-2 5/8" Thick EPS
 - 6" Concrete Width 32" x 24" L x 11.25" W x 16" H-2 5/8" Thick EPS
 - 8" Concrete Width 34" x 26" L x 13.25" W x 16" H-2 5/8" Thick EPS
 - c. 9.25", 11.25", and 13.25" 45-degree Corners
 - 4" Concrete Width 24" x 19" L x 9.25" W x 16" H-2 5/8" Thick EPS
 - 6" Concrete Width 26" x 19" L x 11.25" W x 16" H-2 5/8" Thick EPS
 - 8" Concrete Width 28" x 20" L x 13.25" W x 16" H-2 5/8" Thick EPS
 - d. 11.25" Corbel Ledge Form
13.25" Corbel Ledge Form
 - e. 11.25" Taper Top Form
13.25" Taper Top Form
 - f. 11.25" T-Block (Short and Long)
13.25" T-Block (Short and Long)
 - g. Height Adjuster 4" Tall x 48" L x 2 5/8" Thick EPS

B. BRACING, ALIGNMENT AND SCAFFOLD SYSTEM

As an integral installation component of an insulating concrete form system, an adjustable metal scaffolding support and wall alignment system shall be provided.

1. A device with adequate degrees of adjustment to ensure the completed insulating concrete form system walls are plumb after the placement and consolidation of concrete.
2. An OSHA compliant scaffold support system to facilitate proper stacking of forms and placement of concrete.
3. System adequate to reinforce and protect completed insulating concrete form installation prior to the attachment of structural elements to protect from wind damage.

2.02 CONCRETE

- A. Concrete supplied under Section 03 30 00 shall be of strength as specified by the design engineer (measured at 28 days). Recommended aggregate size to be $\frac{3}{8}$ " minimum and $\frac{3}{4}$ " maximum. Minimum compressive strength recommended is 3000 psi for the walls and 2500 psi for footing foundations.
- B. Recommended concrete slump is 5" to 7"
- C. Perform the required concrete consolidation per ACI 304 and ACI 309 to be manufactured as specified or detailed by the structural engineer in conjunction with the insulating concrete form manufacturer's installation manual guidelines.

2.03 STEEL REINFORCEMENT

- A. Steel reinforcement shall be as specified in Section 03 21 00 and shall be supplied under that section for placement by the insulating concrete form installer.
- B. LINTEL DESCRIPTION
Lintels to be installed as specified or detailed by the structural engineer in conjunction with the insulating concrete form manufacturer's installation manual guidelines or per IRC/IBC model codes. Size and placement of top and bottom bending steel, stirrups for shear reinforcement and corner reinforcing to be verified with engineering design prior to concrete placement.
- C. STRUCTURAL STEEL STIRRUP SUPPORT FOR CORBEL LEDGE FORM
#3 reinforcing steel stirrup to be placed in accordance with structural engineer's specifications and details for the given project installation parameters.

2.04 WATERPROOFING

- A. Sheet or fluid-applied waterproofing membrane materials to be supplied under this section and installed according to manufacturer's recommendations as specified under Section 07 13 00 (Sheet Waterproofing) or Section 07 14 00 (Fluid-Applied Waterproofing).
- B. Waterproofing materials to be compatible with EPS foam form units.

- C. Drainage or protection board material to be installed adjacent to waterproofing installation and temporarily fixed or adhered in place prior to back-fill. Material supplied shall be as specified under Section 07 13 00.

2.05 PARGING

- A. Exposed exterior wall surface from waterproofing to grade line shall be covered with a durable, weather resistant covering in accordance with code requirements or a specific research report. Stucco type material or equivalent supplied under this section and installed as specified under Section 08 22 00 (Portland Cement Plaster).
- B. Alternate acrylic finish supplied and installed under Section 07 24 00 (Exterior Insulation and Finish Systems).

2.06 ACCESSORIES

- A. Window or Door Opening Buck Materials
 - 1. Extruded vinyl, wood or metal buck material.
- B. Stirrup Reinforcement for Corbel Ledge Form.
 - 1. #3 Rebar Hook - Stirrup supplied by Fox Blocks to be exclusively used in the Corbel Ledge Form, per our Engineer of Record

PART 3 EXECUTION

3.01 PREPARATION

- A. Remove all loose aggregate and foreign substances prior to commencement of insulating concrete form system installation.

3.02 INSTALLATION OF FORM UNITS

- A. Installation of forms to be in accordance with manufacturer's installation guidelines as submitted in evidence under Section 1.08.
- B. The installer shall ensure the following accepted ICF construction practices are utilized on site as outlined in the manufacturer's installation guidelines:
 - 1. Footing Foundation Construction
 - 2. Staging Materials
 - 3. Wall Layout
 - 4. Course Placement
 - 5. Horizontal Reinforcement Placement
 - 6. Door and Window Opening Construction (See 3.04 Below)
 - 7. Utility Service Penetration (See 3.03 Below)



8. Bracing, Alignment and Scaffolding
9. Vertical Reinforcement Placement
10. Lintel Construction
11. Checklist Prior to Concrete Placement
12. Concrete Placement
 - a. Placement Methods/Types (Pumping, etc.)
 - b. Mix Design
 - c. Concrete Consolidation Methods
 - d. Post Placement Methods
13. Below Grade Waterproofing Application
14. Parging/Exterior Finishes
15. Clean-up (See 3.05 Below)
16. Protection (See 3.06 Below)

3.03 SERVICE PENETRATIONS

- A. Service penetrations (electrical service conduits, water service pipes, air supply, exhaust ducts, etc.) shall be placed at the required locations as indicated by the appropriate trades. Penetrations shall be reinforced as required by the structural engineer.
- B. Provide and install material such as metal and PVC Schedule 40 pipe sleeves at service penetrations prior to placing concrete to create voids where services can be passed through at a later date.

3.04 ACCESSORY PRODUCT INSTALLATIONS

- A. Buck Materials
 1. Buck Material. Refer to the manufacturer's guidelines for installation of appropriate bucking materials.
 2. #3 Reinforcing Stirrups to be installed as specified or detailed by the structural engineer in conjunction with the insulating concrete form manufacturer's installation manual guidelines.

3.05 CLEANUP

- A. Clean up and properly dispose of all debris remaining on job site related to the installation of the insulating concrete forms.

3.06 PROTECTION

- A. Consult with exterior finish contractor concerning exposure to ultraviolet light to ensure proper finish to ICF walls.