

*(Specifier Note: The purpose of this guide specification is to assist the specifier in correctly specifying AMVIC Insulating Concrete Forming products and execution. The specifier needs to edit the guide specifications to fit the needs of specific projects. Contact an AMVIC Product Representative to assist in making the appropriate product selections. Throughout the guide specification, there are Specifier notes to assist in the editing of the file.*

## SECTION 03 11 19

### INSULATING CONCRETE FORMING (ICF)

#### PART 1 GENERAL

##### 1.01 SUMMARY

- A. Comply with the requirements for Division 1 – General Requirements.
- B. Supply and installation of **AMVIC** Insulating Concrete forms for structural cast-in-place concrete walls, installation of reinforcing steel bars and placement of concrete within the insulating concrete forms.
- C. Adequate bracing and scaffolding shall be provided by the installing contractor and shall comply with all applicable codes.

##### 1.02 WORK SCOPE

- A. Furnish all labor, materials, tools and equipment to perform the installation of **AMVIC** insulating concrete forms as manufactured by **AMVIC INC.** 501 McNicoll Avenue, Toronto, Ontario, M2H 2E2, Canada (416) 410-5674 / (877) 470-9991.
- D. Furnish all labor to install the steel reinforcing bars, placement of concrete into the insulating concrete forms and final cleanup.

##### 1.03 PRODUCTS INSTALLED BUT NOT SPECIFIED OR SUPPLIED UNDER THIS SECTION

- A. Reinforcing Steel
- B. Concrete
- C. Anchor bolts, sleeves and inserts
- D. Window and door opening bucks
- E. Penetrations

##### 1.04 RELATED SECTIONS

*(Specifier Note: ADD/DELETE/MODIFY the Section Numbers and Titles to correspond with specific project requirements. Related Sections to be added may include exterior wall finish, doors and window specific to project)*

- A. Section 01 50 00 – Temporary Facility and Controls
- B. Section 03 05 00 – Basic Concrete Materials and Methods
- C. Section 03 10 00 – Concrete Forming and Accessories
- D. Section 03 20 00 – Concrete Reinforcement
- E. Section 03 30 00 – Cast-in-Place Concrete
- F. Section 03 40 00 – Pre-Cast Concrete
- G. Section 04 00 00 – Masonry
- H. Section 05 50 00 – Metal Fabrications
- I. Section 06 00 00 – Woods and Plastics
- J. Section 07 10 00 – Damp-proofing and Waterproofing
- K. Section 07 11 00 – Damp-proofing

- L. Section 07 13 00 – Sheet Waterproofing
- M. Section 07 24 00 – Exterior Insulation and Finish System
- N. Section 07 46 00 – Siding
- O. Section 07 60 00 – Flashing and sheet Metal
- P. Section 08 00 00 – Doors and Windows
- Q. Section 09 20 00 – Plaster and Gypsum Board
- R. Section 09 70 00 – Wall Finishes

## 1.05 REFERENCES

*(Specifier Note: ADD/DELETE/MODIFY the Standards and references to correspond to the specific requirements and geographic location of the project.)*

- A. American Concrete Institute (ACI)
  - 1. ACI 301– Standard Specification for Structural Concrete
  - 2. ACI 318 – Building Code Requirements for Reinforced Concrete
  - 3. ACI 332 – Guide to Residential Cast-in-Place Concrete Construction
  - 3. ACI 347 – Guide to formwork for Concrete.
  
- B. Canadian Standards Association (CSA)
  - 1. CSA A23.1 – Concrete Materials and Methods of Concrete Construction
  - 2. CSA A23.2 – Methods of Test for Concrete
  - 3. CSA A23.3 – Design of Concrete Structures
  - 4. CSA S269.3 – Concrete Formwork
  
- C. 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 Dimensions and 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 D1929 Standard Test Method for Determining Ignition Temperature of Plastics.
  - 8. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
  - 9. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
  - 10. ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials.
  - 11. ASTM E119 - Standard test Methods for Fire Tests of Building Construction and Materials.

*(Specifier Note: DELETE reports that are not related to location of project)*

## US Evaluation Reports

12. International Code Council ICC report #ESR-1269
13. City of Los Angeles, California Report RR 25477

### D. Canadian Construction Materials Centre (CCMC)

1. CCMC #13043-R

## 1.06 SYSTEM DESCRIPTION

- A. AMVIC ICF form blocks consist of two EPS foam plastic boards separated by injection molded polypropylene webs. The webs are spaced at 6 inches (152mm) on center.
- B. The webs are sized to maintain concrete core thicknesses of 4 inches (102mm), 6 inches (152mm), 8 inches (203mm) or 10 inches (254mm).
- C. The EPS boards are 16 inches (406mm) high by 48 inches (1220mm) long (the 10 inches core block is 24 inches (609.6mm) high). The thickness of the boards is 2.5 inches (63.5mm) each measured at the center of boards.
- D. EPS foam boards are molded from BASF BF or BFL 327 beads (ICBO ES ER-3401). The foam plastic has a nominal density of 1.5 pcf (24.0 kg/m<sup>3</sup>), maximum smoke density rating of 450 and flame spread rating of 25 in accordance with ASTM E83.
- E. The foam plastic insulation complies as a type II rigid cellular polystyrene (RCPS) in accordance with ASTM C 578-95.
- F. The polypropylene webs have 1.5 inches (38.1mm) wide by 15 inches (381mm) high flanges. The flange is embedded ½ inch (12.7mm) below outside surface of the EPS foam boards to provide attachment for exterior and interior wall finishes.

## 1.07 SUBMITTALS

*(Specifier Note: ADD/DELETE/MODIFY the Section Numbers and Titles to correspond with specific project requirements)*

- A. Conform to requirements of Section 01 33 00 Submittal Procedures and Section 01 78 00 Closeout Submittals.
- B. Product Data: Submit manufacturer's literature describing products, installation procedures.
- C. Test and Legacy Reports: When requested, submit test reports to support performance requirements specified and Legacy report approvals from (ICC), (CCMC – Canada), (City of Los Angeles) as required.
- D. Steel Reinforcement: Submit schedule of reinforcing steel.
- E. Concrete: Submit proposed concrete mix design.
- F. Engineering Calculations: Provide structural calculations sealed by a Professional Engineer.

## **1.08 QUALITY ASSURANCE**

### **A. Qualifications**

1. Installer Qualifications: Installer shall have a minimum of 3 years experience in the installation of ICF products and demonstrated experience with work of scope and scale equivalent to the project.

### **B. Pre-installation Meetings**

1. Prior to starting ICF work, convene meeting at project site. Include trades responsible for installing forms, concrete, reinforcement and trades responsible for installing work that requires form modification.

### **C. Certifications**

1. Manufacturer's signed certification that product meets the requirement of this section.

### **D. Approvals and Requirements**

1. (ICC-ESR), (CCMC – Canada), (City of Los Angeles)

## **1.09 DELIVERY, STORAGE AND HANDLING**

A. Deliver the product in original factory packaging with product listing label and manufacturing label.

B. Store materials in manufacturer provided bundles, to prevent damage. Protect from extended exposure to direct sunlight.

C. Handle and store product in a location to prevent physical damage and soiling.

## **1.10 WARRANTY**

A. Contact AMVIC for a written copy of product warranty, OR

B. Refer to requirements of the project contract for warranty provisions.

## **PART 2 PRODUCTS**

### **2.01 APPROVED MANUFACTURER**

A. AMVIC Building System  
501 McNicoll Avenue,  
Toronto, Ontario, M2H 2E2  
Canada  
Tel: 416-759-7402 / 1-877-470-9991  
www.amvicsystem.com

## 2.02 MATERIALS

*(Specifier Note: Section A is for the United States only and section B and D are for Canada only. Please delete sections not appropriate or applicable to project as necessary.)*

- A. Expanded Polystyrene Type II Requirements as per **ASTM C578-95** Standard Specification for Rigid Cellular Polystyrene Thermal Insulation
1. Density (**ASTM C 1622-98**) = 1.5 lbs/ft<sup>3</sup> (Required = 1.35 min)
  2. Thermal Resistance (**ASTM C 177-97**) = 4.0 F.ft<sup>2</sup>.h/Btu (required = 4.0 min)
  3. Compressive Strength (**ASTM D 1621-94**) = 19.8 psi (required =15.0 min)
  4. Flexural Strength (**ASTM C 203-99**) = 42.57 psi (required = 40.0 min)
  5. Water Vapor Permeance (**ASTM E-96-94**) = 130.1 ng/Pa.s.m<sup>2</sup> (required = 200 max)
  6. Water Absorption (**ASTM C 272-91**) = 2.95% (required = 3.0 % max by vol)
  7. Dimensional Stability (**ASTM D 2126-94**) = 0.52% (required = 2.0 % max)
  8. Limiting Oxygen Index (**ASTM D 2863-97**) = 37% (required = 24% min)
  9. Trueness and Squareness (**ASTM C 550-95**)
    - i. Edge Trueness = 0.0197"/ft (required = 0.03125 max)
    - ii. Face Trueness = 0.0197"/ft (required = 0.03125 max)
    - iii. Length and Width Squareness = 0.0295"/ft (required = 0.0625 max)
  10. Flammability (**ASTM E 84**)
    - i. Flame Spread Index = 25 or less (25 max)
    - ii. Smoke Development Index = 450 or Less (450 max)
- B. Expanded Polystyrene Type II Requirements as per **CAN/ULC-S701-97**
1. Thermal Resistance (**ASTM C 177-97**) = 0.7 m<sup>2</sup>. 0C/W (required = 0.7 min)
  2. Water Vapor Permeance (**ASTM E 96-94**) = 130.1 ng/Pa.s.m<sup>2</sup> max (required =200 max)
  3. Dimensional Stability (**ASTM D 2126-94**) = 0.52% (required = 1.5% max)
  4. Flexural Strength (**ASTM C 203-99**) = 314.6 KPa (required = 240 min)
  5. Water Absorption (**ASTM D2842-97**) = 0.932% (required = 4.0 % by vol. max)
  6. Compressive Strength (**ASTM D 1621-94**) = 136.5 KPa (required = 110 KPa min.)
  7. Limiting Oxygen Index (**ASTM D 2863-97**) = 37% (required = 24% min)
- C. Mechanical and Physical Properties of Plastic Tie and Interlocking Profiles in accordance with **ICBOES AC116** "Acceptance Criteria for Nail & Spikes" and in conjunction with **ASTM D 1761** (Standard Test Methods for Mechanical Fasteners in Wood) and also in accordance with **CCMC** Technical Guide for "Modular Polystyrene Concrete Forms" Masterformat section 03131;
1. Type 'S' Fine thread drywall screw withdrawal load = 39.61 lbs (safety factor of 5)
  2. Type 'S' Fine thread drywall lateral resistance load = 60.22 lbs (safety factor of 3.2)
  3. Type 'W' coarse thread drywall screw withdrawal load= 38.42 lbs (safety factor of 5)
  4. Type 'W' coarse thread drywall lateral resistance load = 50.56 lbs (safety factor of 4.46)
  5. Tensile strength of web (**ASTM D 638-99**) = 253.3 lbs (safety factor of 3.2)

6. Ignition Temperature (**ASTM D 1929-68**) = 400 °C (752 °F), (min. required is (329 °C/650 °F)
  7. Burn Rate (**ASTM D 635-98**) = 20.2 mm/min (max. is 40)
  8. Smoke Density (**ASTM D 2843-93 / UBC 26-5**) = 25.8% (max. is 75%)
- D. Forming capacity in accordance with section 6.4.4 of the **CCMC** Technical Guide for Modular Expanded Polystyrene Concrete Forms Masterformat 03131;
    1. Forming Capacity = 41.4 KPa
  - E. Fire Rating in accordance with **CAN/ULC S101-M89** and **ASTM E119** “Standard Test Methods for Fire Tests of Building Construction and Materials”.
    1. 6 inches concrete core (152mm) with 2.5 inches of EPS foam on both sides under load bearing conditions has a fire rating of 3+ hours.
  - F. Calculated **R-Value of 22+** wall assembly including exterior + interior foam panels, concrete core, stucco exterior and drywall interior.
  - G. **Sound Transmission Class (STC) of 50+** for wall assembly including exterior + interior foam panels, 6 in. reinforced concrete core, stucco exterior and 5/8 in. drywall interior.

### 2.03 Concrete

- A. Concrete supplied under section 03300 shall be normal weight with 3/8 to ½ in (9.5 to 12.7 mm) aggregate size having a minimum compressive strength of 3000 psi (20 MPa) at 28 days or as specified by the design engineer.
- B. Slump shall be between 5 to 6 in. (127 to 152 mm) with a water/cement ratio less than 0.55

### 2.04 Steel

- A. Reinforcing steel grade, size, placement and spacing under section 03210 shall be as specified by the design engineer or prescriptive tables applicable to the specific project.

### 2.05 MANUFACTURED UNITS

- A. Two opposing faces of expanded polystyrene connected with polypropylene webs placed vertically 6 inches on center. Each web shall have support slots for horizontal reinforcing, and end plates on each side of the block for attaching interior and exterior finishes. Forms shall be preformed with interlocking edge to secure courses together.

*(Specifier Note: DELETE units not appropriate for use on specific project)*

- B. Standard Reversible Straight Form Units
  1. 4 inch wall width: Block Size 48 inches by 16 inches by 9 inches
  2. 6 inch wall width: Block Size 48 inches by 16 inches by 11 inches
  3. 8 inch wall width: Block Size 48 inches by 16 inches by 13 inches
  4. 10 inch wall width: Block Size 48 inches by 24 inches by 15 inches
- C. Standard 90° Reversible Corner Form Units
  1. 4 inch wall width: Block Size (36 1/2 inches +12 1/2 inches) by 16 inches by 9 inches
  2. 6 inch wall width: Block Size (26 1/2 inches +14 1/2 inches) by 16 inches by 11 inches

3. 8 inch wall width: Block Size (28 1/2 inches +16 1/2 inches) by 16 inches by 13 inches
  4. 10 inch wall width: Block Size (42 1/2 inches +18 1/2 inches) by 24 inches by 15 inches
- D. Standard 45° Reversible Corner Form Units
1. 4 inch wall width: Block Size (34 inches +10 inches) by 16 inches by 9 inches
  2. 6 inch wall width: Block Size (22 inches +10 inches) by 16 inches by 11 inches
  3. 8 inch wall width: Block Size (22 inches +10 inches) by 16 inches by 13 inches
- E. Brick ledge forms
1. 8 inch brick ledge: Block Size 48 inches by 16 inches by 15.75 inches at top wide end.
  2. 8” to 8” brick ledge: Block Size 48 inches by 16 inches by 18 inches at top wide end.
  3. 6” to 6” brick ledge: Block Size 48 inches by 16 inches by 16 inches at top wide end.
- F. Tapered Top forms
1. 6 inch taper top: Block Size 48 inches by 16 inches by 9.5 inches at top wide end.
  2. 8 inch taper top: Block Size 48 inches by 16 inches by 11.5 inches at top wide end.

## **2.06 ACCESSORIES**

- A. Bracing, wall alignment and scaffolding
- B. Anchor Bolts
- C. Door and Window Bucks
- D. Water proofing for below grade walls
- E. Sleeves for penetrations
- F. Exterior and interior finishes.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Site Verification of Conditions: Verify lines, levels and centers before proceeding with formwork. Ensure dimension agree with drawings.

### **3.02 SURFACE PREPARATION**

- A. Clean top of footings and slabs prior to starting installation of ICF. Use methods and materials approved by ICF manufacturer.
- B. Cast anchor dowels into concrete footing as per design engineer requirements and in coordination with ICF manufacturer recommended spacing and location related to the form size.

### **3.03 INSTALLATION - GENERAL**

- A. Install Insulating Concrete Forming in accordance with manufacturer's installation methods. Protect forms from damage.
- B. Install formwork, shoring and bracing to achieve design requirements and in accordance with ACI 301.
- C. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over stressing by construction loads. Reinforce all cuts and weak spots
- D. Align joints and install forms in a running bond pattern
- E. Assure alignment of polypropylene furring strips to facilitate wall covering attachment.
- F. Install reinforcing, as indicated in engineered shop drawings, over opening to provided for integral lintels with the wall.

### **3.04 INSTALLATION - FORMS**

- A. First Course
  - 1. Set corner forms
  - 2. Set straight forms, starting at corner and working to center of wall, window or door location. Set forms through openings for 2 courses, to maintain interlock.
  - 3. Cut final form to be placed. Maintain 2 inch cut increment line (center between two interlocks)
  - 4. Shim using EPS cuttings to adjust for footings and slabs out of level.
- B. Second Course: Build in same manner as first course. Staggering vertical joints a minimum of 12 inches.
- C. Attach base of wall using manufacturer recommended adhesive on side of wall with alignment system.
- D. Remove forms at openings, cutting 1/2 inch smaller to allow for adjustments
- E. Continue placing form courses, cutting forms at openings, and placing reinforcement as required.
- F. Brace walls at 6 foot intervals and 2 feet at corners.
- G. Cut forms for utility penetrations.
- H. Install horizontal reinforcing as coursing progresses.
- I. Install manufactured alignment system following installation of fourth course.

### **3.05 CONSTRUCTION**

- A. Interface with Other Work
  - 1. Provide formed openings where required for items to be embedded in or to pass through concrete work.
  - 2. Locate and set items to be cast directly into concrete.
  - 3. Coordinate with work of other trades in forming and placing openings, sleeves, bolts, anchors, other inserts.



4. Install accessories in accordance with manufacturer's instructions, straight, level and plumb. Ensure items are not disturbed during concrete placement.

B. Site Tolerances

1. Construct formwork to maintain tolerances as indicated per ACI 301 or CSA S269.3

**3.06 FIELD QUALITY CONTROL**

- A. Inspect erected formwork, shoring and bracing to ensure that work is in accordance with design, and that elements are secure.
- B. Site Tests: To be specified as required.

**3.07 CLEANING**

- A. Clean forms as installation proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

**END OF SECTION**