



Most Widely Accepted and Trusted

ICC-ES Report

ICC-ES | (800) 423-6587 | (562) 699-0543 | www.icc-es.org

ESR-2988

Issued 12/2016
This report is subject to renewal 12/2017.

DIVISION: 03 00 00—CONCRETE
SECTION: 03 11 19—INSULATING CONCRETE FORMING

REPORT HOLDER:

TF FORMING SYSTEMS, INC.

**3030-C HOLMGREN WAY
GREEN BAY, WISCONSIN 54304**

EVALUATION SUBJECT:

THERMO-FORM VERTICAL ICFS



Look for the trusted marks of Conformity!

“2014 Recipient of Prestigious Western States Seismic Policy Council (WSSPC) Award in Excellence”



ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.



ICC-ES Evaluation Report

ESR-2988

Issued December 2016

This report is subject to renewal December 2017.

www.icc-es.org | (800) 423-6587 | (562) 699-0543

A Subsidiary of the International Code Council®

DIVISION: 03 00 00—CONCRETE

Section: 03 11 19—Insulating Concrete Forming

REPORT HOLDER:

TF FORMING SYSTEMS, INC.
3030-C HOLMGREN WAY
GREEN BAY, WISCONSIN 54304
(800) 360-4634
www.tfsystem.com

EVALUATION SUBJECT:

THERMO-FORM VERTICAL ICFs

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2015, 2012, and 2009 *International Building Code*® (2015 IBC)
- 2015, 2012, and 2009 *International Residential Code*® (2015 IRC)

Properties evaluated:

- Structural
- Surface-burning characteristics
- Attic and crawl space fire evaluation
- Types I-IV (noncombustible) construction
- Fire-resistance-rated construction

2.0 USES

Thermo-Form Vertical insulating concrete forms (ICFs) are used as stay-in-place forms for structural concrete, load-bearing and nonload-bearing, below-grade and above-grade exterior and interior walls. The forms are used in construction of plain and reinforced concrete beams, lintels, exterior and interior walls and foundation and retaining walls. The forms remain in place after placement and curing of concrete and must be covered with approved interior and exterior finish materials as described in Sections 4.2.2 and 4.2.3 of this report, respectively. For use in fire-resistance-rated construction, installation must be in accordance with Section 4.3. For use in buildings of Types I, II, III and IV (noncombustible) construction, installation must be in accordance with Section 4.4.

3.0 DESCRIPTION

3.1 General:

Thermo-Form Vertical ICFs, when assembled, consist of two expanded polystyrene (EPS) foam plastic panels

separated by high density polyvinyl chloride (PVC) stud assemblies. The stud assemblies maintain the EPS panel facings at a clear distance of 4, 6, 8, 10, or 12-inches (101.6 mm, 152.4 mm, 203.2 mm, 254 mm or 304.8 mm). The ICFs are assembled at the jobsite and are filled with concrete to provide a solid monolithic flat concrete wall that complies with the flat wall system requirements in accordance with ASTM E2634 as specified in 2015 IBC Section 1903.4, 2015 IRC Sections R505.1.3.3.6.1 and R608.4.4, 2012 IBC Section 1903.3, 2012 IRC Sections R404.1.3.3.6.1 and R611.4.4, and the 2009 IRC Section R611.3.1. Thermo-Form Vertical ICF system components are also provided for assembly of 90-degree corner, 45-degree corner and taper-top forms. See Figures 1 through 3 of this report for illustration of the forms.

3.2 Materials:

3.2.1 Foam Plastic: The EPS foam plastic panels are shape molded EPS boards conforming to the manufacturer's specifications in the approved quality documentation. The EPS has a nominal density of 1.50 pcf (24 kg/m³); a flame-spread index of 25 or less and a smoke-development index of 450 or less when tested in accordance with ASTM E84; and complies with ASTM C578, Type II. The EPS panels have a width of 8 inches (203 mm), a nominal thickness of 2 or 2½ inches (50.8 or 63.5 mm) and are available in lengths up to 10 feet (3048 mm). The panels have flat faces and grooved edges for inserting the PVC stud assemblies.

3.2.2 Plastic Stud Assemblies: The plastic studs (with each stud consisting of two flanges and one web), are molded from plastic materials conforming to the specifications in the approved quality documentation and are provided in sizes to assemble ICFs for 4-, 6-, 8- 10- and 12-inch-thick (101.6, 152.4, 203.2, 254.0 and 304.8 mm) concrete walls. The stud flanges are 1.75 inches wide by 0.16 inches thick (44.4 mm by 4.0 mm). When assembled, plastic stud flanges are embedded into grooves of EPS panels and are recessed ½ inch (12.7 mm) from the exterior face of the EPS panels, and, thus are unexposed. The stud webs are spaced at 6 inches (152.4 mm) on center along the height of the ICFs, and the openings between webs facilitate concrete placement. The stud webs have notches to support longitudinal horizontal reinforcement.

The stud assemblies run the full height of the EPS panels and are embedded within the EPS panels at 8-inch (203 mm) intervals along the length of concrete walls. See Figure 3.

3.2.3 Concrete: Concrete must be normal-weight concrete complying with the applicable code, having a

maximum 1/2-inch (12.7 mm) aggregate for 4-inch-thick (101.6 mm) concrete walls and a maximum 3/4-inch (19 mm) aggregate for 6, 8, 10 and 12-inch-thick (152.4, 203.2, 254.0 and 304.8 mm) concrete walls. Concrete must have a minimum compressive strength of 2,500 psi (17.24 MPa) at 28 days. Under the IRC, the concrete must comply with 2015 IRC Sections R404.1 and R608.5.1 and 2012 and 2009 IRC Sections R404.1 and R611.5.1.

3.2.4 Reinforcement: Concrete walls must be reinforced with deformed steel reinforcement bars having a minimum specified yield stress of either 40 ksi (276 MPa) or 60 ksi (413 MPa), depending on the structural design, and must comply with Section 20.2.1.3 of ACI 318-14 under the 2015 IBC (and Section 3.5.3.1 of ACI 318-11 and -08 under the 2012 and 2009 IBC) and IBC Section 1903. If construction of the ICF walls is based on the IRC, reinforcement must comply with 2015 IRC Sections R404.1.3.3.7 and R608.5.2, and 2012 and 2009 IRC Sections R404.1.2.3.7 and R611.5.2.

3.2.5 Other Components: When required by the applicable code provisions, including 2015 IBC Section 2304.12, 2012 and 2009 IBC Section 2304.11 and IRC Section R317.1, wood members in contact with concrete for plates or window and door framing, must be treated with an approved wood preservative in accordance with the applicable code or be of a naturally-durable species, and must be attached with hot-dipped galvanized steel fasteners complying with 2015 IBC Section 2304.10.5, 2012 and 2009 IBC Section 2304.9.5 or IRC Section R317.3, as applicable. Materials other than wood are permitted for window and door framing if approved by the code official.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 IBC Method, Including Alternative IBC Wind Design in Accordance with ICC 600: For buildings constructed under the provisions of the IBC, concrete walls formed by the Thermo-Form Vertical ICFs must be designed and constructed in accordance with IBC Chapters 16 and 19, as applicable. Footings and foundations must be designed and constructed in accordance with IBC Chapter 18.

Solid concrete walls formed by flat ICFs may be designed and constructed in accordance with the prescriptive provisions of Section 409 of the ICC Standard for Residential Construction in High Wind Regions (ICC 600-14) under the 2015 IBC, or Section 209 of the ICC Standard for Residential Construction in High Wind Regions (ICC 600-2008) under the 2012 and 2009 IBC, subject to the limitations found in Exception 1 of IBC Sections 1609.1.1 and 1609.1.1.1. Design and construction under the provisions of ICC 600-14 or ICC 600-2008 are limited to resistance to wind forces.

4.1.2 IRC Method: For buildings constructed under the provisions of the IRC, concrete walls formed by the Thermo-Form Vertical ICFs, which comply with 2015 IRC Table R608.3 and Figure R608.3(1), or 2012 and 2009 IRC Section R611.3.1 and Figure R611.3(1) as flat concrete walls, must be designed and constructed in accordance with 2015 IRC Sections R404.1.3 and R608, or 2012 and 2009 IRC Sections R404.1.2 and R611, as applicable, for flat wall systems. Concrete walls constructed from ICFs that do not comply with the dimensional requirements found in 2015 IRC Table R608.3 or 2012 and 2009 IRC Table R611.3 (i.e., solid concrete wall thicker than 10 inches) must be designed and constructed in accordance with the provisions in Section 4.1.1.

The 4-inch-thick (101.6 mm) concrete walls are limited to above-grade construction in accordance with 2015 IRC Section R608 or 2012 and 2009 IRC Section R611, as applicable.

Footings and foundations must be designed and constructed in accordance with IRC Chapter 4.

4.1.3 Alternate IRC Method: When the Thermo-Form Vertical ICFs are used to construct buildings that do not conform to the applicability limits of 2015 IRC Sections R404.1.3 and R608.2 or 2012 and 2009 IRC Sections R404.1.2 and R611.2, as applicable, construction must be in accordance with the prescriptive provisions of the 2012 Prescriptive Design of Exterior Concrete Walls for One- and Two-family Dwellings (PCA 100-12) under the 2015 IBC, or the 2010 Prescriptive Design of Exterior Concrete Walls for One- and Two-family Dwellings (PCA 100-10) under the 2012 IBC (PCA 100-07 under the 2009 IBC, as applicable), or the structural analysis and design of the concrete must be in accordance with ACI 318 and IBC Chapters 16, 18 and 19.

4.2 Installation:

4.2.1 General: Thermo-Form Vertical ICFs must be installed in accordance with this report and the manufacturer's published installation instructions. The manufacturer's published installation instructions and this report must be strictly adhered to, and a copy of the instructions must be available at the jobsite at all times during installation.

The ICFs and resulting concrete walls must be supported on concrete footings complying with IBC Chapters 18 and 19 and IRC Chapter 4, as applicable. Placement of the form units must begin at a corner and proceed around the building perimeter. The amount, placement and spacing of reinforcing required must be determined for each project, based on approved plans and the applicable code. Vertical reinforcing bars embedded in the footing must extend into the base of the wall system the minimum development length necessary for compliance with Chapter 25 of ACI 318-14 under the 2015 IBC or Chapter 12 of ACI 318-11 or -08 (2012 or 2009 IBC) or 2015 IRC Section R608.5.4 or 2012 and 2009 IRC Section R611.5.4, as applicable. Additional reinforcement around doors and windows must be described in the approved plans. Concrete quality, mixing and placement must comply with ACI 318-14 as referenced in 2015 IBC Section 1901, ACI 318-11 as referenced in 2012 IBC Section 1901 (2009 IBC Section 1905) or 2015 IRC Sections R404.1.3.3 and R608.5.1, or 2012 and 2009 IRC Sections R404.1.2.3 and R611.5.1, as applicable. The minimum ambient temperature during placement must be in accordance with ACI 306. Window and door openings must be built into the forms, with frames of the same dimensions as the "rough stud opening" specified by the window or door manufacturer, prior to the placement of concrete. Connections of concrete walls to footings, floors, ceilings and roofs must be in accordance with 2015 IRC Section R608.9, or 2012 and 2009 IRC Section R611.9, as applicable, or be engineered in accordance with the IBC, whichever code is applicable. Wood ledgers must be attached to the concrete wall by removing the face shell of the form units, with the height of the removed portion being equal to the depth of the wood ledger. Anchor bolts used to connect wood ledgers, plates and framing to wall openings to the concrete must be cast in place, with the bolts sized and spaced as required by design and the applicable code. Details must be prepared to accommodate the specific job situation, in accordance with the applicable code and the

requirements of this report, subject to the approval of the code official.

4.2.2 Interior Finish:

4.2.2.1 General: The installation details in this section (Section 4.2.2) address compliance with the thermal barrier and interior finish requirements of the codes. The ICFs exposed to the building interior must be covered with an approved 15-minute thermal barrier, such as minimum ½-inch-thick (12.7 mm) gypsum wallboard complying with ASTM C1396, as required by IBC Section 2603.4 and IRC Section R316.4, as applicable. The gypsum wallboard must be installed horizontally, and must be attached to the flanges of the PVC studs with minimum No. 6, 1⁵/₈-inch-long (41mm), coarse-thread gypsum wallboard screws, spaced 12 inches (305 mm) on center vertically, and 16 inches (406 mm) on center horizontally. The screws must penetrate a minimum of ¼ inch (6.4 mm) through the plastic stud flange. Gypsum wallboard joints and screw heads must be taped and filled with joint compound in accordance with ASTM C840 or GA 216. See Section 4.2.2.2 for installation details when used as wall of attics or crawl spaces without an ignition barrier on the interior face.

4.2.2.2 Attic and Crawl Space Installation: Concrete walls formed by Thermo-Foam Vertical ICFs are permitted to be used as walls of attics and crawl spaces without an ignition barrier applied to the attic or crawl space side of the foam plastic, provided all the following conditions are met:

- Entry to the attic or crawl space is only to service utilities, and no storage is permitted.
- There are no interconnected attic or basement areas.
- Air in the attic or crawl space is not circulated to other parts of the building.
- Attic ventilation is provided when required by IBC 1203.2 or IRC Section 806 as applicable.
- Under-floor (crawl space) ventilation is provided when required by 2015 IBC Section 1203.4, 2012 and 2009 IBC Section 1203.3 or IRC Section R408.1, as applicable.
- Combustion air is provided in accordance with IMC (*International Mechanical Code*[®]) Section 701.

4.2.3 Exterior Finish:

4.2.3.1 Above Grade: When regulation is under the IBC, the exterior surface of the Thermo-Foam Vertical ICFs must be covered with an approved wall covering in accordance with the applicable code or a current ICC-ES evaluation report. When regulation is under the IRC, the ICFs must be covered on the exterior side with an approved water-resistive barrier, in accordance with IRC Sections R703.1 and R703.2, and with an approved wall covering in accordance with the IRC or a current evaluation report and must be flashed in accordance with 2015 IRC Section R703.4 or 2012 and 2009 IRC Section R703.8, as applicable. Approved exterior wall coverings must be attached to the stud flanges with the fasteners described in Table 1. The fasteners must be corrosion-resistant and have sufficient length to penetrate through the stud flange as required in Table 1. The fasteners have allowable withdrawal and lateral capacities as shown in Table 1. The maximum fastener spacing must be designed to support the gravity loads of the wall covering and resist the negative wind pressures. The negative wind pressure capacity of the exterior finish material must be the same as that recognized in the applicable code for generic

materials, or that recognized in a current ICC-ES evaluation report for proprietary materials.

4.2.3.2 Below Grade: For basement wall installations, the ICF surfaces must be dampproofed and/or waterproofed in accordance with IBC Section 1805 or IRC Section R406, as applicable. The dampproofing and waterproofing materials must be specified by TF System – The Vertical ICF, Inc., must be compatible with the ICFs and must be approved by the code official, and must be free of solvents, hydrocarbons, ketones, or esters that will adversely affect the EPS foam plastic. Adherence is required to the foundation drainage requirements in IBC Section 1805.4 or IRC Section R405.1, as applicable. No backfill is permitted to be applied against the wall until the complete floor system is in place, unless the wall is designed as a freestanding wall that does not rely on the floor system for structural support.

4.2.4 Foundation Walls: Thermo-Foam Vertical ICFs may be used to form foundation stem walls for supporting wood-framed or concrete construction and when the structure is supported on concrete footings complying with the applicable code. Design and installation of Thermo-Form ICFs as foundation stem walls must comply with IBC Section 1807.1.5 or IRC Sections R404 and 2015 IRC Section R404.1.3, or 2012 and 2009 IRC Section R404.1.2, as applicable. For concrete foundation walls under the IRC, vertical reinforcement size and spacing must be in accordance with IRC Tables R404.1.2(2), R404.1.2(3), R404.1.2(4), and R404.1.2(8). For concrete foundation walls under the IBC, vertical reinforcement size and spacing must be in accordance with IBC Table 1807.1.6.2. Alternative design and construction may be in accordance with ACI 318, ACI 332 or PCA 100 (see 2015 IRC Section R404.1.3 or 2012 and 2009 IRC Section R404.1.2, as applicable) for buildings under the IRC.

4.2.5 Retaining Walls: Concrete walls formed by Thermo-Foam Vertical ICFs may be used as retaining walls, provided the concrete walls are designed and constructed in accordance with accepted engineering principles, Section 4.1 of this report and the applicable code.

4.2.6 Protection against Termites: Where the probability of termite infestation is defined as “very heavy” by the code official, the foam plastic must be installed in accordance with 2015 and 2009 IBC Section 2603.8 or 2012 IBC Section 2603.9 or IRC Section R318.4, as applicable. Areas of very heavy termite infestation must be determined in accordance with 2015 and 2009 IBC Figure 2603.8 or 2012 IBC Figure 2603.9 or IRC Figure R301.2(6), as applicable.

4.3 Fire-resistance-rated Construction (Limited Load-bearing Walls):

Thermo-Foam Vertical ICFs may be used to construct fire-resistance-rated wall assemblies as shown in Table 2. The interior finish and exterior finish must be in accordance with Sections 4.2.2 and 4.2.3, respectively. The normalweight concrete must have a minimum 28-day compressive strength of 4,000 psi (27.6 MPa). The minimum size reinforcement must be No. 4 reinforcing bars. The bars must be as required by ACI 318. At a minimum, bars placed vertically must be in the center of the wall, and must be spaced 16 inches (406 mm) on center; and bars placed horizontally must be spaced 12 inches (305 mm) on center, and must be staggered on either side of the vertical bars, from row to row. The 6-inch concrete walls, constructed in accordance with this section (Section 4.3), and with a 10-foot (3.05 m) height, when tested in accordance with ASTM E119 and subjected to a

superimposed axial compressive load of 6,000 lbs/ft (8,929 kg/m), have a three-hour fire-resistance rating.

4.4 Types I, II, III and IV Construction (IBC):

4.4.1 General: Exterior walls constructed with Thermo-Foam Vertical ICFs for use in buildings required to be Types I, II, III and IV construction (IBC), must comply with the applicable conditions cited below:

4.4.2 Interior Finish: The EPS foam plastic insulation must be separated from the building interior with an approved 15-minute thermal barrier, such as minimum 1/2-inch-thick (12.7 mm) regular gypsum wallboard installed as specified in Section 4.2.2.1.

4.4.3 Exterior Finish—EIFS: The following EIFS (exterior insulation and finish system) 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 for EPS systems:

- Sto Corp. StoTherm® Essence as described in [ESR-1720](#).
- Sto Corp. StoTherm® ci® as described in [ESR-1748](#).
- Dryvit Systems, Inc. Dryvit Outsulation® as described in [ESR-1232](#).

4.4.4 Exterior Finish—Exterior Plaster: Metal lath and exterior plaster must comply with the applicable code, and the exterior plaster must be a minimum of 7/8-inch (22.2 mm) thick. The lath must be attached to the flanges of the plastic studs with fasteners as described in Section 4.2.3.1.

4.4.5 Exterior Finish—Brick Veneer: Anchored brick veneer must be attached to the flanges of the plastic studs with fasteners as described in Section 4.2.3.1. Installation of the 4-inch-thick (102 mm) brick veneer must comply with the applicable code, and the veneer must be installed with a minimum 1-inch (25.4 mm) air gap between the face of the exterior EPS formwork and the brick. The brick must be installed with a steel shelf angle attached to the concrete, and at each floor line and at the top of each window and door opening.

4.4.6 Fireblocking: For applications on buildings of any height, foam plastic must be discontinuous at floor lines, on the interior side of the exterior walls and on both sides of interior walls. Floor-to-wall intersections must be fireblocked in accordance with the IBC to prevent the passage of flame, smoke and hot gases from one floor to another. See Figure 4 for typical details.

4.5 Special Inspections:

4.5.1 IBC: Special inspection is required in accordance with 2015 and 2012 IBC Section 1705 (2009 IBC Section 1704, as applicable) for concrete construction, including placement of reinforcing steel and concrete, and for concrete cylinder testing. Special inspection in accordance with 2015 IBC Sections 1704.2 and 1705.16, 2012 IBC Sections 1704.2 and 1705.15, or 2009 IBC Sections 1704.1 and 1704.14, as applicable, is required when an EIFS wall covering is applied. Duties of the special inspector include verifying field preparation of materials, expiration dates, installation of components, curing of components, treatment of joints, and application of sealants.

4.5.2 IRC: For walls constructed in accordance with Section 4.1.2 or PCA 100 as described in Section 4.1.3, special inspection is not required. For walls designed for use under the IRC, in accordance with the IBC as

described in Sections 4.1.2 and 4.1.3, special inspection in accordance with Section 4.5.1 is required.

5.0 CONDITIONS OF USE

The Thermo-Form Vertical ICFs described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0, subject to the following conditions:

- 5.1** The ICF units are manufactured, identified and installed in accordance with this report and the manufacturer's published installation instructions. If there is a conflict between the manufacturer's published installation instructions and this report, the more restrictive requirements govern.
- 5.2** Thermo-Foam Vertical ICF must be separated from the building interior as described in Section 4.2.2.1 of this report, except for attic and crawl space construction as described in Section 4.2.2.2 of this report.
- 5.3** For concrete walls, formed by the Thermo-Foam Vertical ICFs, recognized as walls of attics or crawl spaces without an ignition barrier applied to the attic or crawl space side of the foam plastic, as described in Section 4.2.2.2 of this report, the exposed, inside faces of Thermo-Foam Vertical ICFs must be labeled with the ICC-ES evaluation report (ESR-2988) and the phrase "Acceptable for use in attics and crawl spaces." The label must be applied such that, at a minimum, it is visible in every 160 square feet (14.7 m²) of exposed interior wall area.
- 5.4** Walls constructed with the Thermo-Foam Vertical ICFs must be limited to Type V (IBC) construction under the IBC and dwellings under the IRC, except as described in Section 4.4 of this report. When use is in buildings required to be Type I, II, III or IV construction, as described in Section 4.4, the ICFs must have at least one label as described in Section 7.0 visible in every 160 square feet (14.7 m²) of wall area, prior to the application of wall covering.
- 5.5** When used as part of fire-resistance-rated construction, construction must be as described in Section 4.3.
- 5.6** When required by the code official, calculations and details showing compliance with the requirements of IBC Chapters 16, 18 and 19, and Section 4.1.1 of this report must be submitted to the code official for approval, except that calculations are not required when the building design is based on the prescriptive provisions in Sections 4.1.2 and 4.1.3, or when foundation design is based on the prescriptive provisions in Section 4.2.4. The calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.7** Concrete quality, mixing and placement must comply with Section 4.2.1 of this report.
- 5.8** Special inspection must be provided as described in Section 4.5 of this report.
- 5.9** In areas where the probability of termite infestation is defined as "very heavy" and when ICFs are used with wood construction, the foam plastic must be installed in accordance with Section 4.2.6.
- 5.10** When required by the code official, calculations and details showing compliance with 2015 IRC Sections R404.1.3.3.6 and R608.5.3, or 2012 and 2009 IRC

Sections R611.5.3 and R404.1.2.3.6, as applicable, must be submitted to the code official for approval. The calculations and details, establishing that the ICFs provide sufficient strength to contain concrete during placement and that the plastic studs are capable of resisting the forces created by fluid pressure of fresh concrete, must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

- 5.11** Plastic studs must be stored indoors away from direct sunlight.
- 5.12** The EPS panels are manufactured by ACH Foam Technologies, LLC in Fond Du Lac, Wisconsin; EPS panels and plastic studs are packaged and labeled by TF System Inc. at Green Bay, Wisconsin, under a quality-control program with inspections conducted by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Stay-in-place, Foam Plastic Insulating Concrete Form

(ICF) Systems for Solid Concrete Walls (AC353), dated October 2012, editorially revised October 2015 for the 2015 and 2012 IBC/IRC (dated October 2010 for the 2009 IBC/IRC).

7.0 IDENTIFICATION

Each pallet of Thermo-Form Vertical ICFs bears a label that includes the company name TF System - The Vertical ICF, the product name, the manufacturing location (Fond Du Lac, Wisconsin and Green Bay, Wisconsin); a statement "For attic and crawl space", and the evaluation report number (ESR-2988). Additionally, one ICF on each pallet is labeled on the outer sides of the ICF with the same information.

When use is in buildings required to be Type I, II, III or IV construction, as described in Section 4.4, or when use is in attic or crawl space without an ignition barrier, as described in Section 4.2.2.2, one label as described in this section must be visible in every 160 square feet (14.7 m²) of the wall area.

TABLE 1—ALLOWABLE WITHDRAWAL AND LATERAL CAPACITIES OF FASTENERS IN STUD FLANGES¹

FASTENER	ALLOWABLE LOAD CAPACITY (lbf)	
	Lateral	Withdrawal
No. 6 By 1 1/4-inch long, Coarse-Thread drywall screw	81	29
No. 6 By 1 1/4-inch long, Fine-Thread drywall screw	65	29
No. 8 By 1 1/4-inch long, GRK Climatek Coated cabinet screw	88	32

For SI: 1 inch=25.4; 1 lbf=4.45 N.

¹Fasteners must be corrosion-resistant and have sufficient length to penetrate the flanges of the plastic studs at least 1/4-inch.

TABLE 2—FIRE-RESISTANCE-RATED WALL ASSEMBLY¹

CONCRETE THICKNESS (inches)	FIRE-RESISTANCE RATING (hours)
6	3

For SI: 1 inch=25.4.

¹Walls must be constructed in accordance with Section 4.3 of this report.

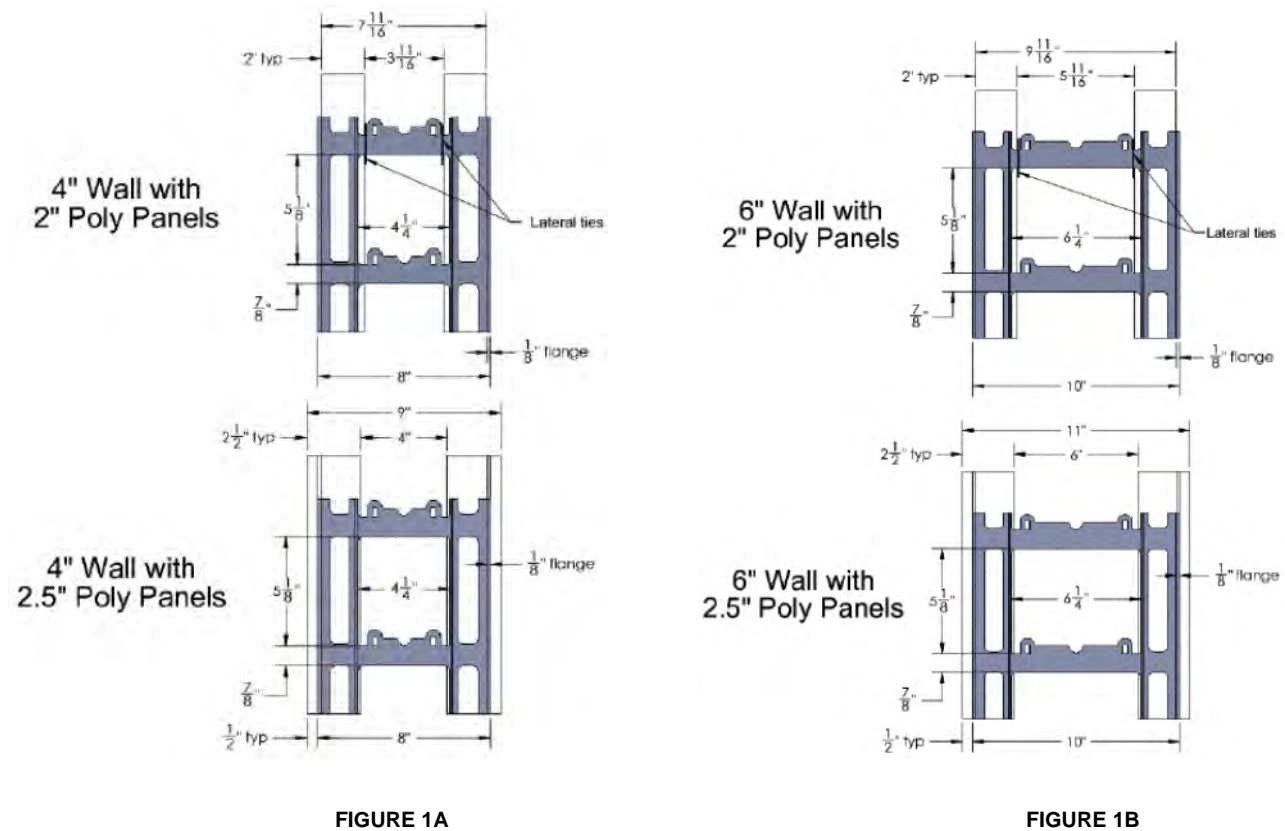


FIGURE 1A

FIGURE 1B

FIGURE 1—PLASTIC STUDS

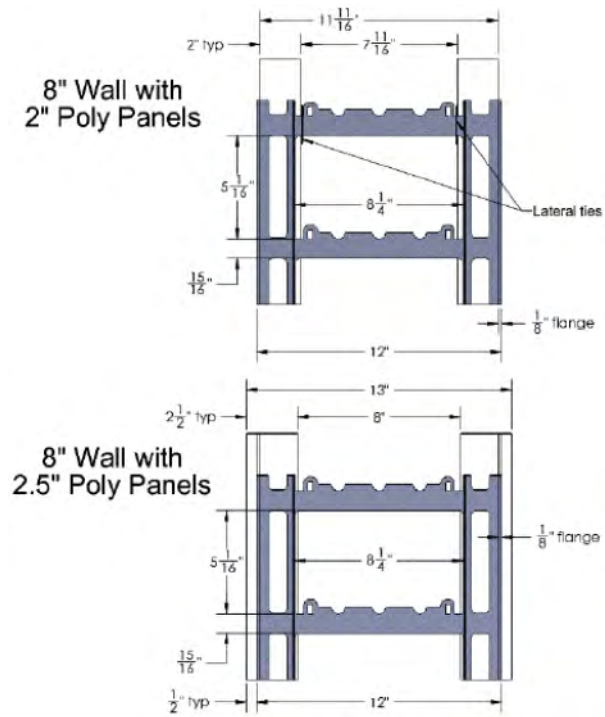


FIGURE 1C

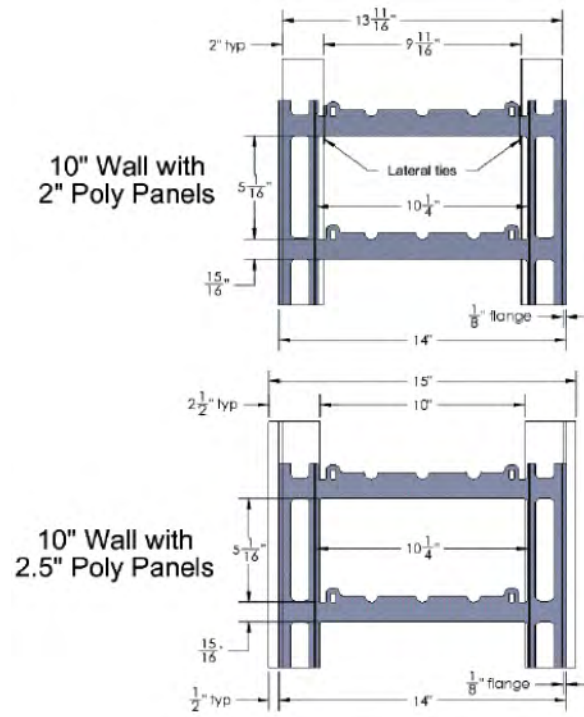


FIGURE 1D



FIGURE 1E

FIGURE 1—PLASTIC STUDS (Continued)

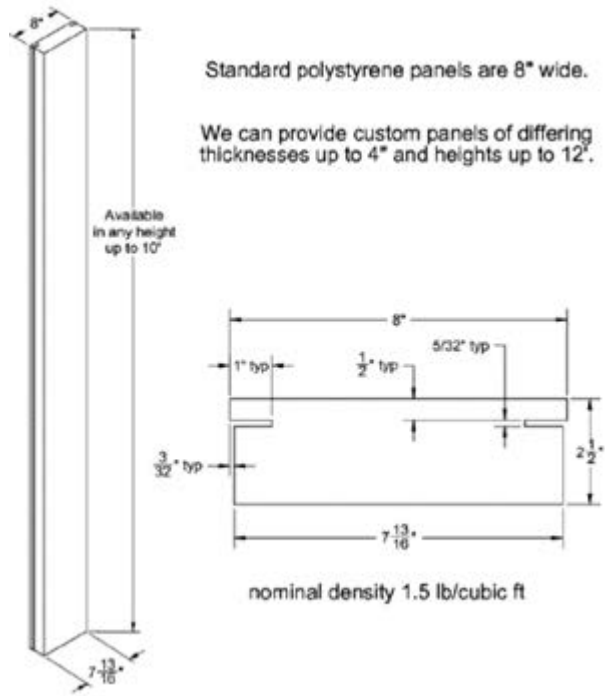


FIGURE 2—EPS PANEL

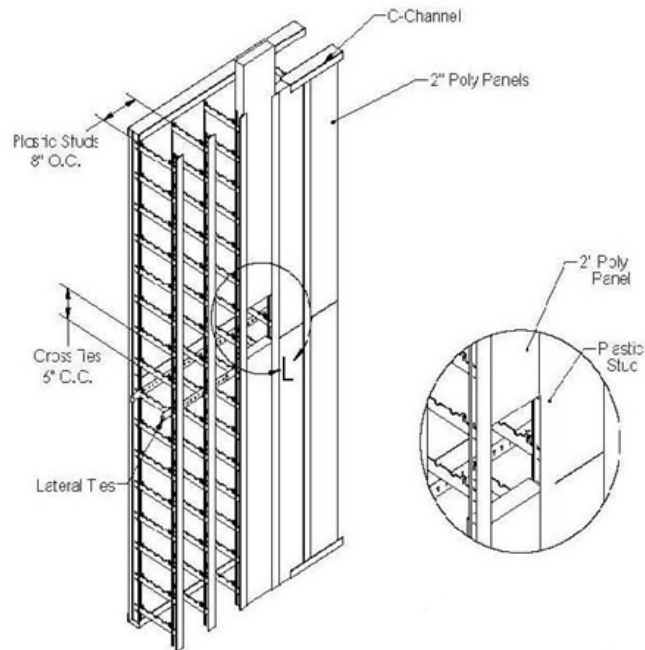


FIGURE 3—ICF ASSEMBLY

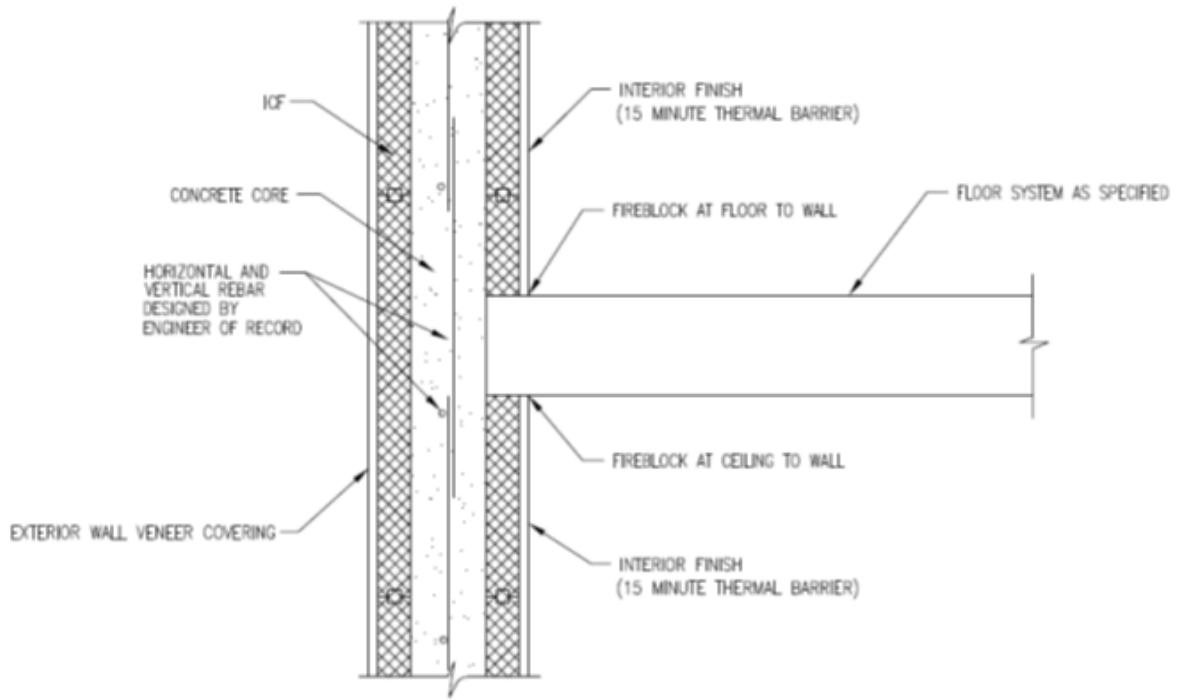


FIGURE 4—TYPICAL WALL-TO-FLOOR INTERSECTION FOR TYPE I, II, III AND IV CONSTRUCTION (IBC)