Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

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Vertical Insulated Concrete Form (ICF) System

Trade Secret Report Holder:

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CSI Designations:

DIVISION: 03 00 00 - CONCRETE

Section: 03 11 00 - Concrete Forming

Section: 03 11 19 - Insulating Concrete Forming

1 Innovative Product Evaluated[1]

1.1 Vertical ICF System

2 Product Description and Materials

2.1 The innovative product evaluated in this report is shown in **Figure 1**.

Figure 1. Vertical ICF System

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Certificate of Authorization
#29766

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2.2 The Vertical ICF System is an insulating concrete form system that will act as permanent formwork (e.g., stay-in-place forms) for cast-in-place reinforced or non-reinforced concrete. The forms are used in the construction of:

2.2.1 Plain/reinforced concrete beams and lintels

2.2.2 Exterior and interior above-grade walls (load-bearing or non-load-bearing) for residential and commercial

2.2.3 Basement/foundation walls

2.2.4 Retaining walls

2.3 The forms remain in place after placement and curing of concrete and shall be covered with an approved interior and exterior finish materials as described in **Section 9.4** and **Section 9.5**, respectively.

2.3.1 For fire-resistance-rated construction, installation shall be in accordance with **Section 9.6**.

2.4 The Vertical ICF System consists of two Expanded Polystyrene (EPS) foam plastic panels separated by high-density Polyvinyl Chloride (PVC) stud assemblies.

2.5 *EPS Panels*

2.5.1 The EPS foam plastic panels are shape molded EPS boards conforming to manufacturer specifications in the approved quality control manual.

2.5.1.1 The EPS foam conforms to ASTM C578, Type II, and has a nominal density of 1.5-pcf (24 kg/m^3).

2.5.1.2 The EPS foam plastic panels have flat faces and grooved edges for inserting the PVC stud assemblies.

2.5.1.3 Nominal dimensions of the EPS foam plastic panels are:

2.5.1.3.1 Width of 8" (203 mm),

2.5.1.3.2 Nominal thickness of 2" or 2$^1/_2$" (51 mm or 64 mm) and,

2.5.1.3.3 Available in lengths up to 10' (3.05 m).

2.6 *Plastic Studs/Cross-Ties*

2.6.1 The stud assemblies maintain the EPS panel facings at a clear distance of 4", 6", 8", 10", or 12" (102 mm, 152 mm, 203 mm, 254 mm, or 305 mm). See **Table 1** for Vertical ICF dimensions and **Figure 2** for illustrations of the PVC stud component.

Table 1. Vertical ICF Dimensions

Product	Overall Form Nominal Wall Thickness (in)		Nominal Core Thickness (in)
	2" EPS Panel	2$^1/_2$" EPS Panel	
Vertical ICF	10"	11"	6"
	12"	13"	8"
	14"	15"	10"
SI: 1 in = 25.4 mm			

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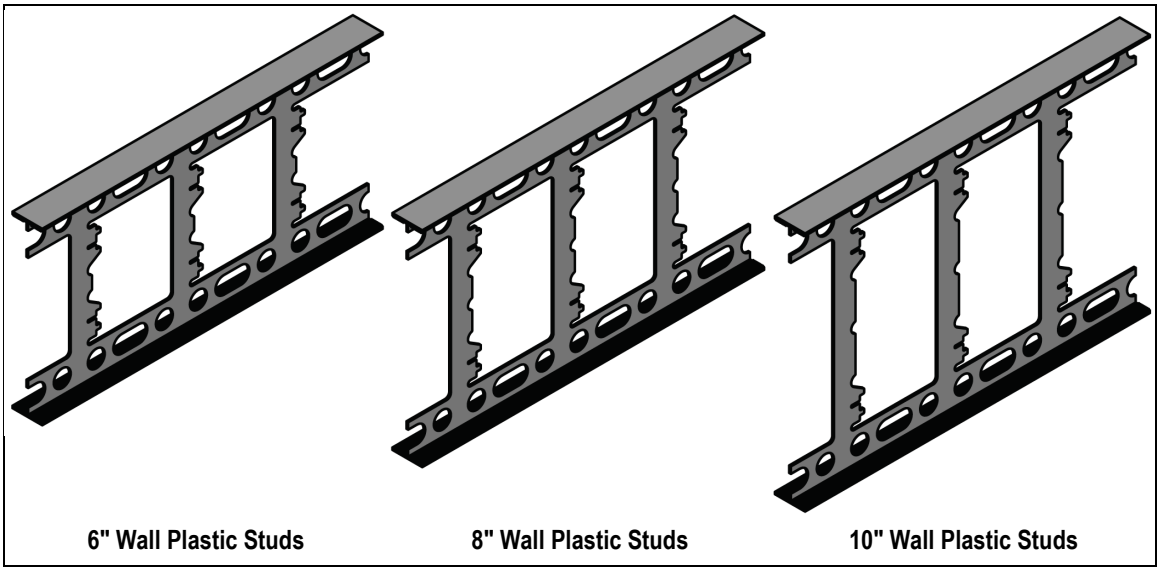

Figure 2. Vertical ICF Plastic Stud/Cross-Ties

2.6.1.1 The plastic studs (with each stud consisting of two stud flanges tied together with web sections), are molded from plastic materials conforming to the specifications in the approved quality control manual and are provided in sizes to form concrete walls of thicknesses stated in **Table 1**.

2.6.1.2 The stud flanges are $1^3/_4$" wide by 0.146" thick (44 mm by 3.7 mm). When assembled, plastic stud flanges are embedded into grooves of the EPS panels and are recessed $^1/_2$" (12.7 mm) from the exterior face of the EPS panels.

2.6.1.3 The stud webs are spaced 6" (152 mm) on center along the height of the Vertical ICF, and the openings between webs facilitate concrete placement.

2.6.1.3.1 The stud webs are designed to support horizontal reinforcement.

2.6.1.4 Stud assemblies run full-height of the EPS panels and are embedded within the EPS panels at 8" (203 mm) intervals along the length of concrete walls.

2.7 *Concrete*

2.7.1 Concrete shall be normal-weight concrete complying with the applicable code, having a maximum $^3/_4$" aggregate for 6", 8", and 10" thick (152 mm, 203 mm, and 254 mm) concrete walls.

2.7.2 Concrete shall comply with IBC Section 1901.2, IRC Section R404.1.3.3.1, and IRC Section R608.5.1.5.

2.7.2.1 Unless otherwise stated, concrete shall have a minimum compressive strength of 2,500-psi (17.2 MPa) at 28 days.

2.7.2.1.1 Under the IRC, concrete shall have a minimum compressive strength of 2,500-psi (17.2 MPa) at 28 days for buildings assigned to Seismic Design Category A, B, or C and a minimum compressive strength of 3,000-psi (20.7 MPa) in buildings assigned to Seismic Design Category D0, D1, or D2.

2.7.2.1.2 The 3-hour fire-resistance rated wall system stated in **Section 6** and installed in accordance with **Section 9** shall have a minimum compressive strength of 4,000-psi (27.6 MPa) at 28 days.

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2.7.3 Concrete walls shall be reinforced with deformed steel reinforcement bars having a minimum specified yield strength of either 40-ksi or 60-ksi (276 MPa or 413 MPa), depending on the structural design.

2.7.3.1 Deformed steel reinforcement bars shall comply with ACI 318 Section 20.2.1.3, or IRC Section R404.1.3.3.7 and IRC Section R608.5.2, as applicable.

2.7.3.2 In addition to the provisions of ACI 318, structural concrete shall comply with the requirements of IBC Section 1905, as applicable, for buildings constructed under the IBC.

2.8 The Vertical ICF System is assembled at the jobsite and is 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 IBC Section 1903.3, IRC Section R404.1.3.3.6.1, and IRC Section R608.4.4.

2.9 The Vertical ICF System components are also provided for assembly of 90-degree corner, 45-degree corner, and taper-top forms. See **Figure 3** and **Figure 4** in **Appendix A** for illustration of the forms.

2.10 As needed, review material properties for design in **Section 6** and the regulatory evaluation in **Section 8**.

3 Definitions[2]

3.1 New Materials[3] are defined as building materials, equipment, appliances, systems, or methods of construction, not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.[4] The design strength and permissible stresses shall be established by tests[5] and/or engineering analysis.[6]

3.2 Duly authenticated reports[7] and research reports[8] are test reports and related engineering evaluations that are written by an approved agency[9] and/or an approved source.[10]

3.2.1 This report utilizes intellectual property and/or trade secrets to create public domain material properties for commercial end-use.

3.2.1.1 This report protects confidential Intellectual Property and trade secrets under the regulation, 18.US.Code.90, also known as Defend Trade Secrets Act of 2016 (DTSA).[11]

3.3 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is accredited and listed in the ANAB directory.

3.4 An approved source is *"approved"* when a professional engineer (i.e., Registered Design Professional, hereinafter RDP) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[12]

3.5 Testing and/or inspections conducted for this duly authenticated report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body, and/or a licensed RDP.

3.5.1 The Center for Building Innovation (CBI) is ANAB[13] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[14] the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[15] stating the nonconformance and the path to its cure.

3.7 The regulatory authority shall accept duly authenticated reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.[16]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory. Therefore, recognition of certificates and validation statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope shall be approved.[17] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[18] and can be used in any country that is an MLA signatory found at this link: https://iaf.nu/en/recognised-abs/

3.9 Approval equity is a fundamental commercial and legal principle.[19]

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4 Applicable Local, State, and Federal Approvals; Standards; Regulations[20]

4.1 *Local, State, and Federal*

4.1.1 Approved in all local jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured local jurisdictions: Austin, Baltimore, Chicago, Clark County, Dallas, Detroit, Denver, DuPage County, Fort Worth, Houston, Kansas City, King County, Knoxville, Las Vegas, Los Angeles City, Los Angeles County, Nashville, New York City, Omaha, Philadelphia, Phoenix, Portland, San Antonio, San Diego, San Jose, San Francisco, Seattle, Sioux Falls, South Holland, St. Louis County, Texas Department of Insurance, and Wichita.[21]

4.1.2 Approved in all state jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured states: California, Florida, New Jersey, Oregon, New York, Texas, Washington, and Wisconsin.[22]

4.1.3 Approved by the Code of Federal Regulations Manufactured Home Construction: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[23] and Part 3280[24] pursuant to the use of ISO/IEC 17065 duly authenticated reports.

4.1.4 Approved means complying with the requirements of local, state, or federal legislation.

4.2 *Regulations*

4.2.1 *IBC – 18, 21, 24: International Building Code®*

4.2.2 *IRC – 18, 21, 24: International Residential Code®*

4.2.3 *IECC – 18, 21, 24: International Energy Conservation Code®*

4.2.4 *FBC-B—20, 23: Florida Building Code[25] – Building*

4.2.5 *FBC-R—20, 23: Florida Building Code[25] – Residential*

4.3 *Standards*

4.3.1 *ACI 318: Building Code Requirements for Structural Concrete and Commentary*

4.3.2 *ASTM C203: Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation*

4.3.3 *ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*

4.3.4 *ASTM D635: Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position*

4.3.5 *ASTM D638: Standard Test Method for Tensile Properties of Plastics*

4.3.6 *ASTM D732: Standard Test Method for Shear Strength of Plastics by Punch Tool*

4.3.7 *ASTM D1622/D1622M: Standard Test Method for Apparent Density of Rigid Cellular Plastics*

4.3.8 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood and Wood-Based Materials*

4.3.9 *ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics*

4.3.10 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*

4.3.11 *ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

4.3.12 *ASTM E119: Standard Test Methods for Fire Tests of Building Construction and Materials*

4.3.13 *ASTM E2634: Standard Specification for Flat Wall Insulating Concrete Form (ICF) Systems*

4.3.14 *NFPA 286: Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*

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5 Listed[26]

5.1 Equipment, materials, products, or services included in a List published by a nationally recognized testing laboratory (e.g., CBI), an approved agency (e.g., CBI and DrJ), and/or and approved source (e.g., DrJ), or other organization(s) concerned with product evaluation (e.g., DrJ), that maintains periodic inspection (e.g., CBI) of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 *Fastener Performance*

6.1.1 Fastener withdrawal and lateral resistance when installed into the plastic studs/cross-ties of the Vertical ICF System were evaluated in accordance with ASTM D1761 per ASTM E2634, Section 6.2.4.

6.1.1.1 The allowable withdrawal load strength and the allowable lateral load strength are listed in **Table 2**.

Table 2. Fastener Performance[1]

Product	Fastener	Allowable Withdrawal Load (lb)	Allowable Lateral Load (lb)
Plastic Stud/Cross-Tie	#6 - 1 5/8"	40	95
	#8 - 1 5/8"	45	115
	11-gauge, 1 1/2" HDG Roofing Nail	25	60

SI: 1 in = 25.4 mm, 1 lb = 4.45 N
1. Tested in accordance with ASTM D1761.

6.2 *Fire Performance*

6.2.1 *Surface Burning Characteristics:*

6.2.1.1 The EPS component of the Vertical ICF System was evaluated for surface burning characteristics in accordance with ASTM E84 per IBC Section 2603.3, IBC Section 2603.5.4, and IRC Section R303.3,[27] in addition to, ASTM E2634 Section 6.1.5.

6.2.1.2 Flame spread index and smoke developed index are shown in **Table 3**.

Table 3. Surface Burning Characteristics[1,2]

Product	Flame Spread Index	Smoke Developed Index	Classification
EPS Panel	< 25	< 450	Class A

1. Tested in accordance with UL 723/ASTM E84.
2. Flame spread and smoke-developed indexes are shown for comparison purposes only and are not intended to represent the performance under actual fire conditions.

6.2.2 *Room Corner Burning:*

6.2.2.1 The Vertical ICF Wall System was evaluated in accordance with NFPA 286, per ASTM E2634 Section 6.3, and met the requirements specified therein.

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6.2.3 *Fire-Resistance Rating:*

6.2.3.1 The Vertical ICF Wall System achieved a 3-hour fire-resistance rating when evaluated in accordance with ASTM E119.

6.2.3.1.1 The Vertical ICF Wall System sustained an applied load of 6,000-plf and withstood the effects of the furnace and hose stream test.

6.2.3.1.2 Concrete core shall be minimum 6" thick and shall have a minimum 28-day compressive strength of 4,000-psi (27.6 MPa).

6.2.4 *Thermal Barrier Requirements – Attics and Crawl Spaces:*

6.2.4.1 Installation shall be fully protected from the interior of the building by an approved 15-minute thermal barrier or ignition barrier as required by IBC Section 2603.4 and IRC Section R303.4,[28] except as follows:

6.2.4.1.1 When installed in an attic, crawl spaces, or other uninhabitable spaces, the Vertical ICF System is approved for use without an approved thermal barrier or ignition barrier. This includes, but is not limited to, knee and gable end walls.

6.2.4.1.2 Use without an approved thermal barrier or ignition barrier is limited to areas where:

6.2.4.1.2.1 Access to the space is required by IRC Section R807.1 or IRC Section R408.4.

6.2.4.1.2.2 Entry is made only for the purpose of repairs or maintenance. No storage is permitted.

6.2.4.1.2.3 There are no interconnected attic or basement areas.

6.2.4.1.2.4 Air in the attic or crawl space is not circulated to other parts of the building.

6.2.4.1.2.5 For vented attics, ventilation is provided when required by IBC Section 1202.2 or IRC Section R806.

6.2.4.1.2.6 For unvented attics, ventilation is not required where permitted in accordance with IRC Section R806.5.

6.2.4.1.2.7 For vented crawl spaces, ventilation is provided when required by IBC Section 1202.4 or IRC Section R408.2.

6.2.4.1.2.8 For unvented crawl spaces, ventilation is not required where permitted in accordance with IRC Section R408.3.

6.2.4.1.2.9 Combustion air is provided in accordance with the International Mechanical Code, IMC Section 701.

6.3 *Sound Transmission*

6.3.1 The Vertical ICF Wall System was evaluated for sound transmission in accordance with ASTM E90, per IBC Section 1206.2.

6.3.1.1 The Vertical ICF Wall System achieved a Sound Transmission Class (STC) of 55.

6.3.1.2 Evaluated Vertical ICF Wall System is as follows:

6.3.1.2.1 Concrete core shall be minimum 6" thick

6.3.1.2.2 $^{5}/_{8}$" Gypsum Wallboard (GWB) shall be installed on both sides

6.4 Alternative techniques shall be permitted in accordance with accepted engineering practice and experience. These provisions for the use of alternative materials, designs, and methods of construction are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed herein. This includes, but is not limited to, the following areas of engineering: mechanics of materials, structures, building science, and fire science.

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7 Certified Performance[29]

7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.[30]

7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.[31]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 The Vertical ICF System complies with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 The Vertical ICF System and its components conform to the requirements in ASTM E2634 as specified in IBC Section 1903.3, IRC Section R404.1.3.3.6.1, and IRC Section R608.4.4.

8.1.1.1 The EPS foam panels conform to ASTM C578, and the requirements specified in IBC Section 2603 and IRC Section R303.[32]

8.1.1.1.1 Surface burning performance of the EPS foam panels in accordance with ASTM E84/UL 723 for flame spread and smoke development ratings in accordance with IBC Section 2603.3, IBC Section 2603.5.4, IRC Section R302.10.1, and IRC Section R303.3.[33]

8.1.1.2 The plastic studs/cross-ties exceeded the minimum requirements listed in ASTM E2634 for tensile strength and shear strength.

8.1.1.3 The Vertical ICF System was evaluated in accordance with NFPA 286 and met the requirements defined in ASTM E2634.

8.1.1.4 The Vertical ICF System was evaluated in accordance with ASTM E119 to establish a fire-resistance rating.

8.2 Any building code, regulation and/or accepted engineering evaluations (e.g., research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ, which is an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP or approved sources. DrJ is qualified[34] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[35] respectively.

8.3 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which is also its areas of professional engineering competence.

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9 Installation

9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report, and the applicable building code.

9.2 In the event of a conflict between the manufacturer installation instructions and this report, contact the manufacturer for counsel on the proper installation method.

9.3 *General*

9.3.1 The Vertical ICF System, and the resulting concrete walls, shall be designed and constructed in accordance with IBC Chapter 16 and IBC Chapter 19, or IRC Section R404.1.3, IRC Section R608, IRC Section R608.3, and IRC Figure R608.3(1), where applicable.

9.3.1.1 Concrete walls that do not comply with the dimensional requirements found in IRC Table R608.3, (i.e., solid concrete wall thicker than 10") shall be designed and constructed in accordance with IBC Chapter 16 and IBC Chapter 19.

9.3.1.1.1 4" thick (102 mm) concrete walls formed by the Vertical ICF System are limited to above-grade construction in accordance with IRC Section R608.

9.3.2 The Vertical ICF System, and the resulting concrete walls, shall be supported on concrete footings complying with IBC Chapter 18 and IBC Chapter 19, or IRC Chapter 4, as applicable.

9.3.3 Placement of the Vertical ICF Wall System units shall begin at a corner and proceed around the building perimeter.

9.3.3.1 The amount, placement, and spacing of reinforcement required shall be determined for each project based on approved plans and the applicable code.

9.3.4 Vertical reinforcing bars embedded in the footing shall extend into the base of the wall system the minimum development length necessary for compliance with ACI 318 Chapter 25 or IRC Section R608.5.4, as applicable.

9.3.4.1 Additional reinforcement around doors and windows shall be described in the approved plans.

9.3.5 Concrete quality, mixing, and placement shall comply with ACI 318 as specified in IBC Section 1901, or ASTM C94 or ASTM C685 per IRC Section R404.1.3.3, and IRC Section R608.5, as applicable.

9.3.5.1 The minimum ambient temperature during placement shall be in accordance with ACI 306.

9.3.6 Window and door openings shall 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.

9.3.7 Connections of concrete walls to footings, floors, ceilings, and roofs shall be in accordance with IRC Section R608.9, or engineered in accordance with the IBC, whichever code is applicable.

9.3.8 Wood ledgers shall 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.

9.3.8.1 Anchor bolts used to connect wood ledgers, plates, and framing to wall openings to the concrete shall be cast in place, with the bolts sized and spaced as required by design and the applicable code.

9.3.8.2 Details shall be prepared to accommodate the specific job situation in accordance with the applicable code and the requirements of this report.

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9.4 *Interior Finish*

9.4.1 *General:*

9.4.1.1 The Vertical ICF exposed to the building interior shall be covered with an approved 15-minute thermal barrier complying with IBC Section 2603.4 and IRC Section R303.4,[36] as applicable.

9.4.1.2 Gypsum wallboard shall be installed vertically or horizontally using minimum #6 x $1^5/_8$" coarse-thread, Type W drywall screws spaced 12" (305 mm) on center vertically and 16" (406 mm) on center horizontally. Screws shall penetrate a minimum of $^1/_4$" (6.4 mm) through the plastic stud flange.

9.4.1.3 Gypsum wallboard joints and screw heads shall be taped and filled with joint compound in accordance with ASTM C840 or GA 216, per IBC Section 2508.1, or in accordance with IRC Section R702.3.5, where applicable.

9.5 *Exterior Finish*

9.5.1 *Above Grade:*

9.5.1.1 The exterior surface of the Vertical ICF shall be covered with an approved exterior wall covering in accordance with the applicable code.

9.5.1.2 Water-resistive barrier in accordance with IBC Section 1402.2 and IBC Section 1403.2, or IRC Section R703.1.1 and IRC Section R703.2, where applicable.

9.5.1.3 Flashing per IBC Section 1404.4 or IRC Section R703.4.

9.5.1.4 Approved exterior wall coverings shall be attached to the stud flanges with fasteners described in **Table 2**.

9.5.1.4.1 Fasteners shall be corrosion-resistant and shall be of sufficient length to penetrate through the stud flange as required in **Table 2**.

9.5.1.4.2 Fastener spacing shall be designed to support gravity loads of the wall covering and resist negative wind pressures.

9.5.1.4.2.1 The negative wind pressure capacity of the exterior finish material shall be the same as that recognized in the applicable code for generic materials or in a current evaluation report for proprietary materials.

9.5.2 *Below Grade:*

9.5.2.1 The exterior surface of the Vertical ICF shall be damp-proofed and/or waterproofed in accordance with IBC Section 1805 or IRC Section R406, as applicable.

9.5.2.2 Damp-proofing and waterproofing materials shall be as specified by the manufacturer and shall be compatible with the Vertical ICF.

9.5.2.2.1 Additionally, damp-proofing and waterproofing materials shall also be free of solvents, hydrocarbons, ketones, or esters that will adversely affect the EPS foam.

9.5.2.2.2 Adherence is required to the foundation drainage requirements in IBC Section 1805.4 or IRC Section R405.1, as applicable.

9.5.2.2.3 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.

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9.5.3 *Foundation Walls:*

9.5.3.1 The Vertical ICFs used to form foundation stem walls for supporting wood-framed or concrete construction shall comply with IBC Section 1807.1.5 or IRC Section R404.1.3, as applicable.

9.5.3.1.1 For concrete foundation walls under IRC, vertical reinforcement size and spacing shall be in accordance with IRC Table R404.1.3.2(2),[37] IRC Table R404.1.3.2(3),[38] IRC Table R404.1.3.2(4),[39] and IRC Table R404.1.3.2(8),[40] per IRC Section R404.1.3.2.

9.5.3.1.2 For concrete foundation walls under the IBC, vertical reinforcement size and spacing shall be in accordance with IBC Table 1807.1.6.2.

9.5.3.1.3 Alternative design and construction may be in accordance with ACI 318, ACI 322, or PCA 100, as specified in IRC Section R404.1.3.

9.5.4 *Retaining Walls:*

9.5.4.1 Concrete walls formed by Vertical ICFs may be used as retaining walls, provided the concrete walls are designed and constructed in accordance with accepted engineering principles, **Section 9.3** and the applicable code.

9.6 *Fire-Resistance Rated Construction*

9.6.1 For Vertical ICFs used to construct fire-resistance rated walls, interior finish and exterior finish shall be in accordance with **Section 9.4** and **Section 9.5**, respectively.

9.6.1.1 The concrete core shall be minimum 6" thick and shall have a height no taller than 10' (3.05 m).

9.6.2 Normal-weight concrete shall have a minimum 28-day compressive strength of 4,000-psi (27.6 MPa).

9.6.3 Minimum size reinforcement shall be #4 reinforcing bars.

9.6.4 Bars shall be as required by ACI 318.

9.6.4.1 At a minimum, bars placed vertically in the center of the wall and spaced 16" (406 mm) on center, and bars placed horizontally shall be spaced 12" (305 mm) on center and shall be staggered on either side of the vertical bars from row to row.

10 Substantiating Data

10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

10.1.1 EPS foam panel compliance with ASTM C578 from approved sources

10.1.2 Flexural strength testing in accordance with ASTM C203

10.1.3 Density testing in accordance with ASTM D1622

10.1.4 Thermal resistance testing in accordance with ASTM C518

10.1.5 Surface burning characteristics testing in accordance with ASTM E84

10.1.6 *Plastic Studs/Cross-Ties*

10.1.6.1 Rate of burning testing in accordance with ASTM D635

10.1.6.2 Ignition temperature testing in accordance with ASTM D1929

10.1.6.3 Fastener withdrawal and lateral resistance testing in accordance with ASTM D1761 as modified in accordance with ASTM E2634

10.1.6.4 Tensile strength testing in accordance with ASTM D638 as modified by ASTM E2634

10.1.6.5 Shear strength testing in accordance with ASTM D732

10.1.6.6 Room corner fire testing in accordance with NFPA 286

10.1.7 Fire-resistance rating testing in accordance ASTM E119

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10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or an RDP. Accuracy of external test data and resulting analysis is relied upon.

10.3 Where applicable, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.

10.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, or duly authenticated reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this duly authenticated report, may be dependent upon published design properties by others.

10.5 *Testing and Engineering Analysis*

10.5.1 The strength, rigidity, and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.[41]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for Vertical ICF on the DrJ Certification website.

11 Findings

11.1 As outlined in **Section 6**, the Vertical ICF System has performance characteristics that were tested and/or meet applicable regulations. In addition, they are suitable for use pursuant to its specified purpose.

11.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, Vertical ICF shall be approved for the following applications:

11.2.1 Used as stay-in-place forms for concrete construction for:

11.2.1.1 Plain/reinforced concrete beams and lintels

11.2.1.2 Exterior and interior above-grade walls (load bearing or non-load bearing) for residential and commercial

11.2.1.3 Basement/foundation walls

11.2.1.4 Retaining walls

11.3 Unless exempt by state statute, when the Vertical ICF System is to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.

11.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Pensmore Building Solutions, Inc.

11.5 IBC Section 104.2.3[42] (IRC Section R104.2.2[43] and IFC Section 104.2.3[44] are similar) in pertinent part state:

> **104.2.3 Alternative Materials, Design and Methods of Construction and Equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative is not specifically prohibited by this code and has been approved.

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11.6 **Approved:**[45] Building regulations require that the building official shall accept duly authenticated reports.[46]

11.6.1 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited.

11.6.2 An approved source is *"approved"* when an RDP is properly licensed to transact engineering commerce.

11.6.3 Federal law, Title 18 US Code Section 242, requires that, where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

11.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB Accredited Product Certification Body – Accreditation #1131.

11.8 Through the IAF Multilateral Arrangement (MLA), this duly authenticated report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 duly authenticated reports are equivalent.[47]

12 Conditions of Use

12.1 As defined in **Section 6**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.

12.2 As listed herein, the Vertical ICF System shall be subject to the following conditions:

12.2.1 Concrete walls shall be designed in accordance with ACI 318 and applicable code provisions.

12.2.1.1 The Vertical ICF System and the resulting concrete walls shall be supported on concrete footings complying with IBC Chapter 18 and IBC Chapter 19, or IRC Chapter 4, as applicable.

12.2.2 Concrete strength, reinforcement, detailing, and construction joints shall be in accordance with approved plans.

12.2.3 Bracing, pour procedures, lift heights, and consolidation limits shall comply with the manufacturer installation instructions.

12.2.4 Foam plastic shall be separated from the building interior/exterior as required by the code (e.g., thermal barrier, ignition barrier), including any required flame-spread/smoke developed limitations and finish restrictions.

12.2.5 Fire-resistance ratings are permitted only when construction in accordance with **Section 9.6**.

12.2.6 Attachment of finishes to the plastic studs/cross-ties shall be limited to the fastener(s) listed in **Table 2**.

12.3 Wood members in contact with concrete for plates or window and door framing shall be treated with an approved wood preservative in accordance with the applicable code or be a naturally-durable species and shall be attached with hot-dipped galvanized steel fasteners complying with IBC Section 2304.10.6[48] and IRC Section R304.3,[49] as applicable.

12.4 For buildings constructed under the IBC, exterior wall coverings shall comply with IBC Chapter 14.

12.5 For buildings constructed under the IBC, the EPS foam plastic on the exterior facing side of the Vertical ICF Wall System shall be protected from ignition per IBC Section 2603.5.7 when required for Types I, II, III, or IV construction, per IBC Section 2603.5.

12.5.1 Acceptable ignition barrier materials shall include those permitted by IBC Section 2603.5.7 including, but not limited to, one of the following materials:

12.5.1.1 Thermal barrier complying with IBC Section 2603.4 or IRC Section R303.4,[50] as applicable.

12.5.1.2 Minimum 1" (25 mm) thickness of concrete or masonry.

12.5.1.3 Glass-fiber reinforced concrete panels of a minimum thickness of $^{3}/_{8}$" (9.5 mm).

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12.5.1.4 Metal-faced panels having a minimum 0.019" (0.48 mm) thick aluminum or 0.016" (0.41 mm) thick corrosion-resistant steel outer facings.

12.5.1.5 Minimum 7/8" (22 mm) thickness of stucco complying with IBC Section 2510.

12.5.1.6 Minimum 1/4" (6.4 mm) thickness of fiber-cement lap, panel, or shingle siding complying with IBC Section 1404.17[51] and IBC Section 1404.17.1,[52] (IRC Section R703.10.1) or IBC Section 1404.17.2[53] (IRC Section R703.10.2).

12.6 For buildings constructed under the IRC, exterior wall coverings shall comply with IRC Section R703.

12.7 When installed in areas where the probability of termite infestation is *"very heavy"*, the installation of Vertical ICF shall meet the requirements of IBC Section 2603.8 and IRC Section R303.7.[54]

12.8 When required by adopted legislation and enforced by the building official, also known as the Authority Having Jurisdiction (AHJ) in which the project is to be constructed:

12.8.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.

12.8.2 This report and the installation instructions shall be submitted at the time of permit application.

12.8.3 This innovative product has an internal quality control program and a third-party quality assurance program.

12.8.4 At a minimum, this innovative product shall be installed per **Section 9**.

12.8.5 The review of this report by the AHJ shall comply with IBC Section 104.2.3.2 and IBC Section 105.3.1.

12.8.6 This innovative product has an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.7.2, IBC Section 110.4, IBC Section 1703, IRC Section R104.7.2, and IRC Section R109.2.

12.8.7 The application of this innovative product in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2, and any other regulatory requirements that may apply.

12.9 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, *"the building official shall make, or cause to be made, the necessary tests and investigations; or the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.2.3"*, all of IBC Section 104, and IBC Section 105.3.

12.10 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).

12.11 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

13 Identification

13.1 The Vertical ICF System, as listed in **Section 1.1**, is identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number, and other information to confirm code compliance.

13.2 Additional technical information can be found at pensmorebuildingsolutions.com.

14 Review Schedule

14.1 This report is subject to periodic review and revision. For the latest version, visit www.drjcertification.org.

14.2 For information on the status of this report, please contact DrJ Certification.

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Appendix A

1.1 ICF unit details (drawings, dimensions, plastic stud/cross-tie spacing, web widths, and fastening strips)

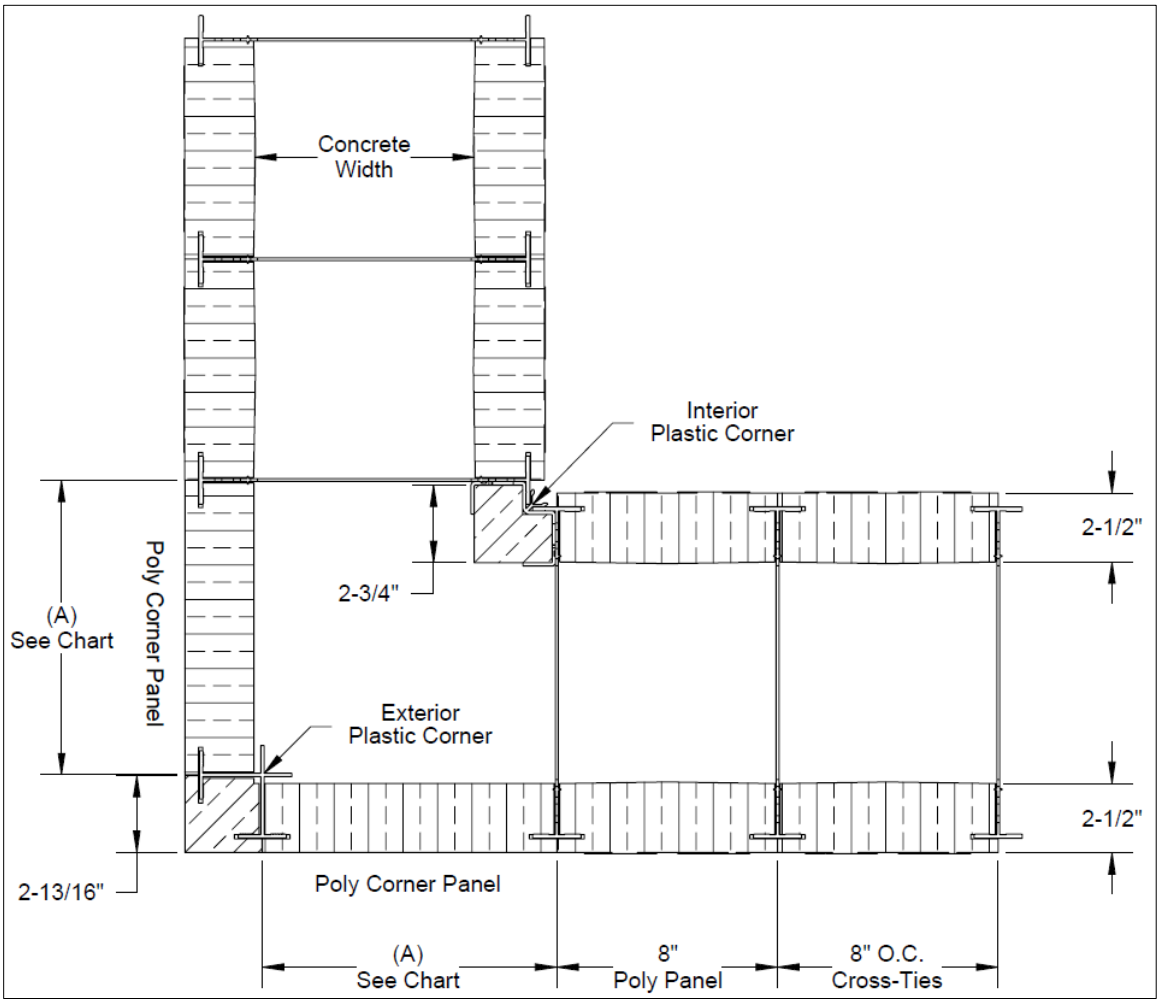

Figure 3. 90° Corner Plan Diagram

Corner Width (in)	Width of EPS Corner Panel (in)
4	$6^5/_8$"
6	$8^5/_8$"
8	$10^5/_8$"
10	$12^7/_8$"
SI: 1 in = 25.4 mm 1. Contact Pensmore Building Solutions, Inc. for dimensions on concrete walls greater than the listed maximum.	

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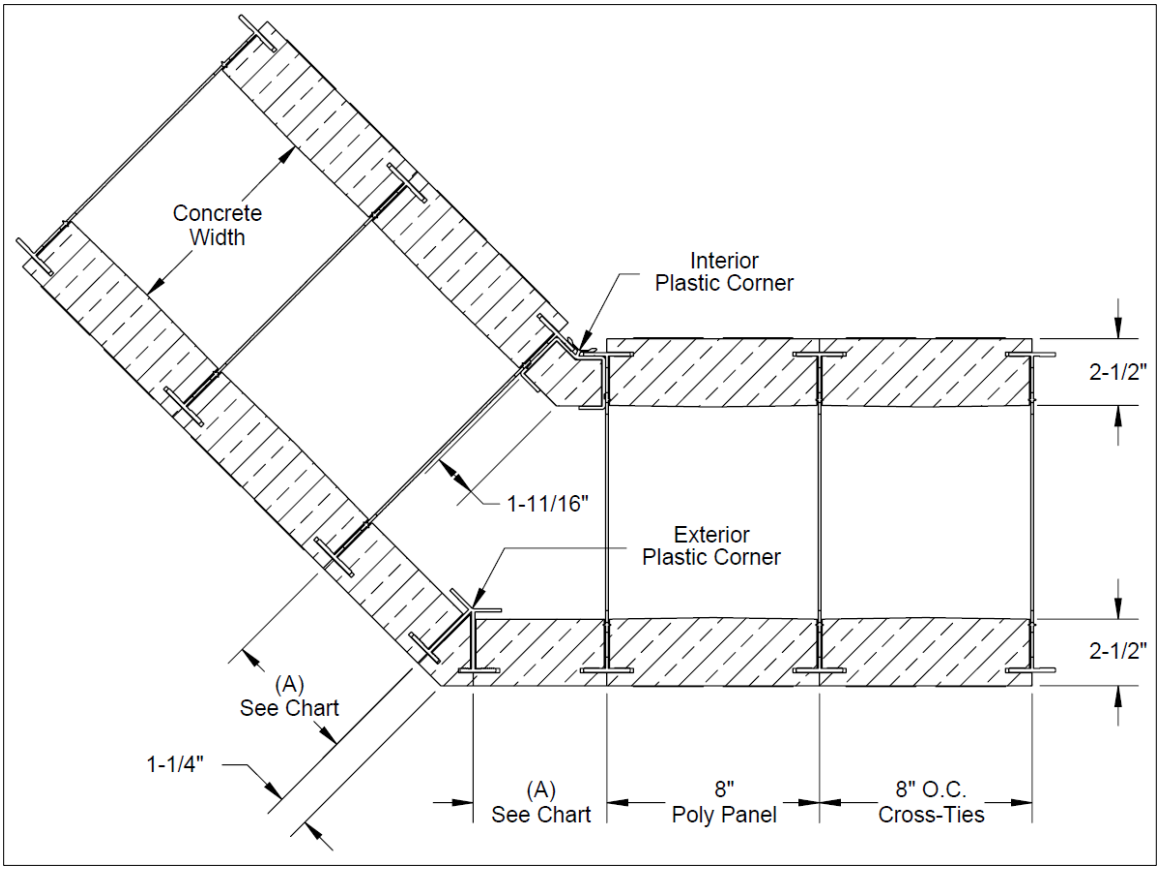

Figure 4. 45° Corner Plan Diagram

Corner Width (in)	Width of EPS Corner Panel (in)
4	$3^{3}/_{8}$"
6	$4^{1}/_{4}$"
8	5"
10	$5^{7}/_{8}$"

SI: 1 in = 25.4 mm

1. Contact Pensmore Building Solutions, Inc. for dimensions on concrete walls greater than the listed maximum.

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Issue Date: May 12, 2026
Supplement Revision Date: May 12, 2026
Subject to Renewal: July 1, 2027

FBC Supplement to Report Number 2511-111

REPORT HOLDER: Pensmore Building Solutions, Inc.

1 Evaluation Subject

1.1 Vertical ICF System

2 Purpose and Scope

2.1 Purpose

2.1.1 The purpose of this Report Supplement is to show Vertical ICF System, recognized in Report Number 2511-111, has also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.

2.2 *Applicable Code Editions*

2.2.1 *FBC-B—20, 23: Florida Building Code – Building*

2.2.2 *FBC-R—20, 23: Florida Building Code – Residential*

3 Conclusions

3.1 The Vertical ICF System, described in Report Number 2511-111, complies with the FBC-B and FBC-R and is subject to the conditions of use described in this supplement.

3.2 Where there are variations between the IBC and IRC and the FBC-B and FBC-R applicable to this report, they are listed here:

3.2.1 FBC-B Section 104 is reserved.

3.2.2 FBC-B Section 110.4 is reserved and replaces IBC Section 110.4.

3.2.3 FBC-B Section 104.6 is reserved and replaces IBC Section 104.4.

3.2.4 FBC-B Section 104.11 replaces IBC Section 104.2.3 and Section 104.2.3.2.

3.2.5 FBC-B Section 105.3 replaces IBC Section 105.3.

3.2.6 FBC-B Section 105.3.1 replaces IBC Section 105.3.1.

3.2.7 FBC-B Section 110.3 replaces IBC Section 110.3.

3.2.8 FBC-B Section 1203.2 replaces IBC Section 1202.2.

3.2.9 FBC-B Section 1203.4 replaces IBC Section 1202.4.

3.2.10 FBC-B Section 1207.2 replaces IBC Section 1206.2.

3.2.11 FBC-B Section 1403.2 replaces IBC Section 1402.2.

3.2.12 FBC-B Section 1404.2 replaces IBC Section 1403.2.

3.2.13 FBC-B Section 1405.4 replaces IBC Section 1404.4.

3.2.14 FBC-B Section 1405.16 replaces IBC Section 1404.17.

3.2.15 FBC-B Section 1405.16.1 replaces IBC Section 1404.17.1.

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3.2.16 FBC-B Section 1405.16.2 replaces IBC Section 1404.17.2.

3.2.17 FBC-B Section 1707.1 replaces IBC Section 1707.1.

3.2.18 FBC-B Chapter 19 replaces IBC Chapter 19.

3.2.19 FBC-B Section 1901 replaces IBC Section 1901.

3.2.20 FBC-B Section 1901.2 replaces IBC Section 1901.2.

3.2.21 FBC-B Section 1903.4 replaces IBC Section 1903.3.

3.2.22 FBC-B Section 1905 replaces IBC Section 1905.

3.2.23 FBC-B Section 2304.10.5 replaces IBC Section 2304.10.6.

3.2.24 FBC-B Section 2306.1 replaces IBC Section 2306.1.

3.2.25 FBC-B Section 2306.3 replaces IBC Section 2306.3.

3.2.26 FBC-B Section 2508.1 replaces IBC Section 2508.1.

3.2.27 FBC-B Section 2603 replaces IBC Section 2603.

3.2.28 FBC-B Section 2603.3 replaces IBC Section 2603.3.

3.2.29 FBC-B Section 2603.4 replaces IBC Section 2603.4.

3.2.30 FBC-B Section 2603.5 replaces IBC Section 2603.5.

3.2.31 FBC-B Section 2603.5.7 replaces IBC Section 2603.5.7.

3.2.32 FBC-B Section 2603.8 replaces IBC Section 2603.8.

3.2.33 FBC-R Section R104 and Section R109 are reserved.

3.2.34 FBC-R Section R302.10.1 replaces IRC Section R302.10.1.

3.2.35 FBC-R Section R316 replaces IRC Section R303.

3.2.36 FBC-R Section R316.3 replaces IRC Section R303.3.

3.2.37 FBC-R Section R316.4 replaces IRC Section R303.4.

3.2.38 FBC-R Section R316.7 replaces IRC Section R303.7.

3.2.39 FBC-R Section R317.3 replaces IRC Section R304.3.

3.2.40 FBC-R Section R404.1.3 replaces IRC Section R404.1.3.

3.2.41 FBC-R Section R404.1.3.2 replaces IRC Section R404.1.3.2.

3.2.42 FBC-R Section R404.1.2(2) replaces IRC Section R404.1.3.2(2).

3.2.43 FBC-R Section R404.1.2(3) replaces IRC Section R404.1.3.2(3).

3.2.44 FBC-R Section R404.1.2(4) replaces IRC Section R404.1.3.2(4).

3.2.45 FBC-R Section R404.1.2(8) replaces IRC Section R404.1.3.2(3).

3.2.46 FBC-R Section R404.1.3.3.1 replaces IRC Section R404.1.3.3.1.

3.2.47 FBC-R Section R404.1.3.3.6.1 replaces IRC Section R404.1.3.3.6.1.

3.2.48 FBC-R Section R405.1 replaces IRC Section R405.1.

3.2.49 FBC-R Section R408.2 replaces IRC Section R408.2.

3.2.50 FBC-R Section R408.3 replaces IRC Section R408.3.

3.2.51 FBC-R Section R408.4 replaces IRC Section R408.4.

3.2.52 FBC-R Section R608 replaces IRC Section R608.

3.2.53 FBC-R Table R608.3 replaces IRC Table R608.3.

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3.2.54 FBC-R Figure R608.3(1) replaces IRC Figure R608.3(1).

3.2.55 FBC-R Section R608.5.1.5 replaces IRC Section R608.5.1.5.

3.2.56 FBC-R Section R702.3.5 replaces IRC Section R702.3.5.

3.2.57 FBC-R Section R703.1.1 replaces IRC Section R703.1.1.

3.2.58 FBC-R Section R703.2 replaces IRC Section R703.2.

3.2.59 FBC-R Section R703.4 replaces IRC Section R703.4.

3.2.60 FBC-R Section R806 replaces IRC Section R806.

3.2.61 FBC-R Section R806.5 replaces IRC Section R806.5.

3.2.62 FBC-R Section R807.1 replaces IRC Section R807.1.

4 Conditions of Use

4.1 The Vertical ICF System, described in Report Number 2511-111, must comply with all of the following conditions:

4.1.1 All applicable sections in Report Number 2511-111.

4.1.2 The design, installation, and inspections are in accordance with additional requirements of FBC-B Chapter 16 and Chapter 17, as applicable.

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Notes

1 For more information, visit drjcertification.org or call us at 608-310-6748.

2 Capitalized terms and responsibilities are defined pursuant to the applicable building code, applicable reference standards, the latest edition of TPI 1, the NDS, AISI S202, US professional engineering law, Canadian building code, Canada professional engineering law, Qualtim External Appendix A: Definitions/Commentary, Qualtim External Appendix B: Project/Deliverables, Qualtim External Appendix C: Intellectual Property and Trade Secrets, definitions created within Design Drawings and/or definitions within Reference Sheets. Beyond this, terms not defined shall have ordinarily accepted meanings as the context implies. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

3 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1702

4 Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review https://www.justice.gov/atr/mission and https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3

5 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.2:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests

6 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.1:~:text=Conformance%20to%20Standards-,The%20design%20strengths%20and%20permissible%20stresses,-of%20any%20structural

7 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20make%2C%20or%20cause%20to%20be%20made%2C%20the%20necessary%20tests%20and%20investigations%3B%20or%20the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.2.3.

8 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4.2

9 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_agency

10 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_source

11 https://www.law.cornell.edu/uscode/text/18/1832 (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of $5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

12 https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

13 https://www.cbitest.com/accreditation/

14 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.1:~:text=directed%20to%20enforce%20the%20provisions%20of%20this%20code

15 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3 AND https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#105.3.1

16 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

17 https://iaf.nu/en/about-iaf-mla/#:~:text=Once%20an%20accreditation%20body%20is%20a%20signatory%20of%20the%20IAF%20MLA%2C%20it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

18 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

19 https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

20 Unless otherwise noted, the links referenced herein use un-amended versions of the 2024 International Code Council (ICC) 2024 International Code Council (ICC) model codes as foundation references. Mississippi versions of the IBC 2024 and the IRC 2024 are un-amended. This material, product, design, service and/or method of construction also complies with the 2000-2012 versions of the referenced codes and the standards referenced therein. As pertinent to this technical and code compliance evaluation, CBI and/or DrJ staff have reviewed any state or local regulatory amendments to assure this report is in compliance.

21 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by the local jurisdiction. https://up.codes/codes/general

22 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by state. https://up.codes/codes/general

23 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14

24 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

25 All references to the FBC-B and FBC-R are the same as the 2024 IBC and 2024 IRC unless otherwise noted in the Florida Supplement at the end of this report.

26 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#listed AND https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#labeled

27 2021 IRC Section R316.3

28 2021 IRC Section R316.4

29 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4

30 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

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31 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur

32 2021 IRC Section R316

33 2021 IRC Section R316.3

34 Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.

35 https://anabpd.ansi.org/Accreditation/product-certification/AllDirectoryDetails?prgID=1&orgID=2125&statusID=4#:~:text=Bill%20Payment%20Date-,Accredited%20Scopes,-13%20ENVIRONMENT.%20HEALTH

36 2021 IRC Section R316.4

37 2021 IRC Table R404.1.2(2)

38 2021 IRC Table R404.1.2(3)

39 2021 IRC Table R404.1.2(4)

40 2021 IRC Table R404.1.2(8)

41 See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition: https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

42 2021 IBC Section 104.11

43 2021 IRC Section R104.11

44 2018: https://up.codes/viewer/wyoming/ifc-2018/chapter/1/scope-and-administration#104.9 AND 2021: https://up.codes/viewer/wyoming/ibc-2021/chapter/1/scope-and-administration#104.11

45 Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 (https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#201.4) where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

46 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

47 Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.

48 2018 IBC Section 2304.10.5

49 2021 IRC Section R317.3

50 2021 IRC Section R316.4

51 2021 IBC Section 1404.16

52 2021 IBC Section 1404.16.1

53 2021 IBC Section 1404.16.2

54 2021 IRC Section R316.7

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