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PRODUCT: **SUPERFORM INSULATED CONCRETE FORMS (ICF)**

REPORT HOLDER: Superform Products, Ltd.

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CSI DIVISION: Concrete

CSI SECTION: 03 11 19 - Insulating Concrete Forming

APPLICABLE CODES: 2018, 2015 International Building Code (IBC)
2018, 2015 International Residential Code (IRC)
2018, 2015 International Energy Code (IEC)

EVALUATED: Flat Walled Insulated Concrete Forms
Foam Plastic, Surface Burning Characteristics
Foam Plastics, Use in Exterior Walls in Types I-IV Construction
Foam Plastics, Use in Attics and Crawlspace
Plastics, Ignition Temperature
Plastics, Rate of Burning
Fastener Capacity
Fire-Resistance Ratings



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CODE EVALUATION REPORT

1.0 APPROVED FOR FOLLOWING:

| | |
|---------------------------------|--|
| APPROVED TYPES OF CONSTRUCTION: | Types I-V |
| APPROVED USE: | Stay-in-place Concrete Forms |
| APPROVED INSTALLATIONS: | <ul style="list-style-type: none"> • Load Bearing and Non-load Bearing Exterior and Interior Walls • Load Bearing and Non-load Bearing Fire-Resistance Rated Walls • Foundation Walls • Retaining Walls • Attic and Crawlspace installations without Code Prescribed Ignition Barrier |

2.0 DESCRIPTION:

2.1 General:

Superform Insulated Concrete Forms (ICF) are modular concrete formworks comprised of Type II expanded polystyrene (EPS) foam plastic thermal insulation panels connected with high density plastic crossties. Superform ICF are placed onsite as stay-in-place forms for concrete placement.

Superform ICF meet *Flat Wall Insulated Concrete Forms* specifications, as defined in Section 1903.4 of the 2018 / 2015 IBC, and Sections R404.1.3.3.6.1 and R608.4.4 of the 2018 / 2015 IRC through compliance to ASTM E2634.

Superform ICF are available in the following products and sizes:

Table 1. Superform ICF Evaluated Products and Accessories

| Concrete Core Thickness | | Length | | Height | | Style |
|-------------------------|--------------------|--------|------|--------|-----|-------------------|
| inches | mm | inches | mm | inches | mm | |
| 4, 6, 6.5, 8 | 102, 152, 165, 203 | 48 | 1219 | 12 | 305 | Standard Straight |
| 6, 6.5, 8 | 102, 152, 165, 203 | 48 | 1219 | 12 | 305 | Ledge Block |
| 6, 6.5, 8 | 152, 165, 203 | 48 | 1219 | 12 | 305 | Top Block |
| 4, 6, 6.5, 8 | 102, 152, 165, 203 | 48 | 1219 | 12 | 305 | 90° Block |
| 6, 6.5, 8 | 152, 165, 203 | 48 | 1219 | 12 | 305 | 45° Block |

Examples of Superform ICF products can be found in Figure 2 of this report.

2.2 EPS Foam Plastic Panels:

Superform ICF include expanded polystyrene (EPS) *foam plastic* thermal insulation panels of 2-1/2" – 2-3/4 inches (64-70 mm) thickness on each ICF face. The EPS *foam plastic* component has a flame spread index of 25 or less, and smoke developed index of 450 or less evaluated following UL 723.

The EPS foam is listed by an *approved agency* and complies with Type II specifications per ASTM C578 for use as thermal insulation.



2.3 Crossties:

Superform ICF include polypropylene cross ties spaced at 6 inches (152 mm), molded into the EPS panels, connecting EPS panels to create the molded concrete form work. Crossties include knockouts to allow concrete flow through the crosstie during concrete placement, and are molded to include receiving channels for ease of rebar placement. Additionally, the polypropylene crossties include a flange molded into the EPS panels, providing an anchoring substrate for mechanical fasteners to connect interior finishes, exterior claddings, and decorum. Fasteners evaluated for use with Superform ICF are outlined in Table 3 of this report including fastener capacities. Locations of web flanges are outlined in Superform ICF EPS panel faces to provide direction during fastener installation.

Superform ICF crossties have spontaneous ignition temperatures > 650°F (343°C) when tested to ASTM D1929 and is classified as CC2 when tested to ASTM D635.

2.4 Concrete Core:

Concrete is placed at the jobsite. Concrete design, specifications and applications are to be in accordance with the project requirements per the applicable code(s) and are outside the scope of this report, except where specific concrete criteria are noted.

2.5 Rebar (reinforcement):

Reinforcement is applied at the jobsite. Reinforcement design, specifications and installation are to be in accordance with the project requirements and applicable code(s), and are outside the scope of this report.

3.0 DESIGN:

Superform ICF wall design including concrete and reinforcement is outside the scope of this report. See below for information regarding design criteria for use with Superform ICF.

2018 / 2015 IBC: Superform ICF construction governed by the IBC are to have concrete walls designed in accordance with Chapters 16 and 19. Where used as footings or foundations, design shall be in accordance with Chapter 18.

2018 / 2015 IRC: Superform ICF construction governed by the IRC are to have concrete walls designed in accordance with Section R308. Where used as footings or foundations, design shall be in accordance with IRC Chapter 4.

4.0 INSTALLATIONS:

4.1 General:

Installation of Superform ICF must comply with the manufacturer's published installation instructions, this report, and the applicable code(s). Where conflicts exist, this report and the applicable building code shall govern.

Superform ICF construction designed in accordance with 2018 / 2015 IBC and 2018 / 2015 IRC require special inspections as defined by Section 1705 of the IBC.

Superform ICF construction conducted following IRC prescriptive methodology does not require special inspections. The authority having jurisdiction should be consulted in case of question.



4.2 Interior:

4.2.1 General:

Superform ICF components found on the interior of the building are to be installed in accordance with section 4.2.2 and 4.2.3 of this report, as appropriate. Connecting of interior decorum, furniture and cabinetry are approved where the necessary load resistance for objects secured to Superform ICF are provided by fasteners as outlined in Table 3 of this report, with service loads not exceeding the allowable load carrying capacity of the fasteners as noted in this report.

4.2.2 Occupied Space:

4.2.2.1 Use With a Code Prescribed Thermal Barrier.

2018 / 2015 IBC: Superform ICF EPS thermal insulation exposed to occupancies of the building interior shall be covered by a thermal barrier of minimum ½ inch thick gypsum board complying with ASTM C1396, or by a material complying with NFPA 275 compatible for use with the Type II EPS insulation at thicknesses greater than 2-¾ inches (70 mm). Gypsum shall be mechanically connected to the Superform ICF crossties with fasteners outlined in Table 3 of this report, with the gypsum oriented either vertically or horizontally. The gypsum boards are to be secured with fasteners spaced at 12 inches (305 mm) on center vertically, and 16 inches (405 mm) on center horizontally, with fasteners penetrating the crosstie flanges of the underlying Superform ICF. Taping and mudding of fastener heads and joints is optional where gypsum is used.

2018 / 2015 IRC: Superform ICF EPS thermal insulation exposed to occupancies of the building shall be protected by a thermal barrier of minimum of ½ inch gypsum wall board complying with ASTM C1396, 23/32 inch thick structural wood panel, or a material complying with NFPA 275 compatible for use with the Type II EPS insulation at thicknesses greater than 2-¾ inches (70 mm). Where gypsum or structural wood panels are used, they shall be mechanically connected to the Superform ICF crossties with fasteners outlined in Table 3 of this report, with panels oriented either vertically or horizontally. The panels are to be secured with fasteners spaced at 12 inches (305 mm) on center vertically, and 16 inches (405 mm) on center horizontally, with fasteners penetrating the crosstie flanges of the underlying Superform ICF. Taping and mudding of fastener heads and joints is optional where gypsum is used.

4.2.2.2 Use Without a Code Prescribed Thermal Barrier.

No alternative coverings for use as alternative thermal barrier are approved under this current report over Superform ICF.

4.2.3 Attic and Crawlspace:

4.2.3.1 Use With a Code Prescribed Ignition Barrier:

Superform ICF EPS thermal insulation exposed in attics and crawlspaces is to be protected with a code prescribed ignition barrier as defined in the Section 2603.4.1.6 of the 2018 / 2015 IBC and Sections R316.5.3 and R316.5.4 of the 2018 / 2015 IRC. The ignition barrier is to cover all exposed foam.

4.2.3.2 Use Without a Code Prescribed Ignition Barrier:

Superform ICF EPS thermal insulation panels exposed in attics and crawlspaces can be installed without the prescribed ignition barrier as defined in the 2018 / 2015 IBC and 2018 / 2015 IRC, only when the following conditions are present:



- Entry to the attic or crawlspace is limited to service of utilities only. Storage or occupancy are not permitted.
- No interconnected areas exist to the attic or crawlspace.
- Air from the attic or crawlspace is not circulated to other areas of the building.
- Ventilation is provided as required by 2018 / 2015 IBC Chapter 12 or 2018 / 2015 IRC Section R306.
- Combustion air is provided in accordance with the IMC (International Mechanical Code) Section 701.
- Label at minimum 1 per location, or 1 label per 160 ft² exposed foam, which ever greater, is present outlining product as “*Approved for Use in Attic and Crawlspace*”. See Figure 1 of this report for an example of approved Superform ICF label.

4.3 Exterior:

4.3.1. Above Grade:

Superform ICF shall be covered by an approved exterior cladding complying with the applicable code. Connection details for anchoring of cladding must be designed to resist the dead and service loads determined in accordance with the governing building code. Fasteners including load resistance are to comply with Table 3 of this report.

4.3.2. Below Grade:

Dampproofing and waterproofing materials shall be installed in accordance with 2018 / 2015 IBC Chapter 1805 or 2018 / 2015 IRC Section R406 as applicable. The dampproofing or waterproofing material must be compatible for use with EPS thermal insulation products. For foundation walls designed as freestanding, backfill is permitted prior to floor installation. For below grade walls relying on the floor for structural support, backfill is not permitted until the floor installation is complete.

Foundation walls and footings are to be designed and installed in accordance with 2018 / 2015 IBC Chapter 18 or 2018 / 2015 IRC Section R404, as applicable. Foundation walls are approved for supporting steel and wood framed constructions, where the steel or wood elements in contact with concrete are protected as required by code.

Retaining walls are to be designed and installed in accordance with 2018 / 2015 IBC Chapter 1807. Where used as retaining walls under the IRC, the authority having jurisdiction should be consulted.

In areas of termite activity defined as very heavy, construction shall be in accordance with Section 2603.8 of the 2015 / 2018 IBC or R318.4 of the 2018 / 2015 IRC as applicable.

4.4. Fire-Resistance-Rated Construction:

Superform ICF are approved for use in applications where a loadbearing fire-resistance-rating is required for up to 4 hours from exterior or interior orientation to fire.

See Section 8.2 of this report for details of installation for use in fire-resistance-rated applications.



4.5 Type I-IV (Non-combustible) Construction:

4.5.1 General:

Superform ICF are approved for use in exterior walls of Types I-IV (non-combustible) construction.

All exterior claddings systems require a thermal barrier applied on the occupancy (interior) face, in accordance with Section 4.2.2.1 of this report.

Fire blocking is required in interior areas at maximum each floorline, to limit the spread of flames and smoke from one compartment to another.

4.5.2 Exterior Insulation Finishing Systems (EIFS):

When used with EIFS systems as outlined below where no additional EPS is included in the EIFS assembly, backwrapping and installation of the EIFS lamina are to follow the EIFS manufacturer's published installation instructions.

Where additional EPS is applied over Superform ICF, the Superform ICF exterior foam plastic component must be considered in calculating an equivalent fuel load as nominal 1.5 lbs/ft³ (24 kg/m³) density to the approved expanded polystyrene fuel load component of the approved EIFS.

Table 2. Details of EIFS systems approved for use with Superform ICF include:

| EIFS PRODUCT | EIFS MANUFACTURER | MAXIMUM EIFS EPS THICKNESS* (TYPE I @ 1.0 lb/ft ³) | SUPERFORM ICF EPS THICKNESS (TYPE II @ 1.5 lbs/ft ³) | MAXIMUM APPLIED EPS THICKNESS FINISHED EIFS** |
|--------------------|-------------------------|--|--|---|
| StoTherm Essence | Sto Corporation | 8 inches (203 mm) | 2-3/4 inches (70 mm) | 10-3/4 inches (273 mm) |
| StoTherm NExT | Sto Corporation | 5 inches (127 mm) | 2-3/4 inches (70 mm) | 7-3/4 inches (197 mm) |
| Dryvit Outsulation | Dryvit Corporation Inc. | 9 inches (229 mm) | 2-3/4 inches (70 mm) | 11.75 inches (298 mm) |

* Maximum thickness of EIFS (Type 1 @ 1.0 lb/ft³) when applied over Superform ICF.

** Maximum total thickness of EIFS and Superform ICF EPS.

EPS thickness above is provided considering combined Superform ICF EPS component with EIFS EPS component providing equivalent fuel load to above described Type I-IV approved EIFS assemblies. Manufacturer's installation instructions for application with EIFS including backwrap details are to be followed during installation, with backwrap anchoring and overlaps required, connected at competent anchor points. Anchoring of backwraps to the face of Superform ICF EPS component is not permitted.

4.5.3 Exterior Brick Veneer:

Brick veneer is to be anchored to Superform ICF cross ties with fasteners required to penetrate the cross tie flange. Anchoring schedules used shall be designed to resist the anticipated gravity and service loads based on fastener capacity values outlined in Table 3 of this report. Brick veneer used is to comply with 2018 / 2015 IBC, and shall be installed with a minimum 1 inch (25 mm) air gap between the exterior Superform ICF EPS panel face, and the brick veneer. Brick veneer is to be supported along floor lines in accordance with the applicable code.

4.5.4 Exterior Plaster:

Exterior plaster including metal lath is to comply with the applicable code, and shall be a minimum of 7/8 inch (22.2 mm) thickness. Fasteners connecting the metal lath to Superform ICF cross ties are required to penetrate the cross tie flanges. Anchoring schedules used shall be designed to resist the anticipated gravity and service loads based on fastener capacity values outlined in Table 3 of this report.

5.0 LIMITATIONS

- Superform ICF are to be protected from direct sunlight exposure to the plastic crossies.
- Superform ICF are manufactured in Pincher Creek, Alberta with inspections by QAI Laboratories.
- Superform ICF are required to be separated from interior space by an approved thermal barrier when installed in accordance with Section 4.2.2 of this report and the applicable code
- Superform ICF are approved for use in Attic and Crawlspace applications when installed in accordance with Section 4.2.3 of this report and the applicable code and where products bear a visible label outlining “*Approved for Use in Attics and Crawlspace*”.
- Superform ICF are required to be protected by a code-compliant exterior cladding when installed on the exterior of the building above grade, or code compliant dampproofing and waterproofing material when installed on the exterior below grade. Refer to section 4.3 of this report for details.
- Superform ICF when used in fire-resistance-rated construction are to be installed in accordance with Section 4.4 and Section 8.2 of this report.
- Superform ICF used in Types I-IV Construction are to be installed in accordance with Section 4.5 of this report.
- Superform ICF used below grade in termite infestation areas defined as “very heavy” require protection in accordance with IBC Section 2603.8 or IRC R318.4, as applicable.
- Superform ICF have product labels visible at minimum every 160 ft².

6.0 SUPPORTING INFORMATION:

The following data has been evaluated for Superform ICF:

- Data outlining compliance for use as Flat Wall Insulated Concrete Forms, as detailed in ASTM E2634.
- Data outlining details for use in load-bearing fire-resistance rated construction per ASTM E119.
- Data outlining details for use in exterior walls of Types I-IV construction as detailed in Chapter 26 of 2018 / 2015 IBC.

7.0 MARKING:

Superform ICF finished products example label are outlined in Figure 1 below.

| | |
|---|---|
| <p>SUPERFORM ICF Core Size: 4", 6, 6 1/2", 8"</p> <p>Manufactured By: Superform Products Ltd. Pincher Creek, AB Canada <i>Leaders in Insulated Concrete Forming</i></p> | <p>Inspected and Certified</p> |
| <p>Approval Bodies: QAI Laboratories</p> | <p>Certified To: CAN/ULC S701: Type 2 ASTM C578: Type II ASTM E84: FSI ≤ 25, SDI ≤ 450 CAN/ULC S102.2: FSI ≤ 210, SDI ≤ 450 RSI: 1.76 minimum</p> |
| <p>Refer to QAI Evaluation Report: CER_{US}. – 1001</p> | |
| <p>APPROVED FOR USE IN ATTICS AND CRAWL SPACES CAUTION: Material is combustible. A protective or thermal barrier is required per the applicable building code.</p> | |

Figure 1. Example of Superform ICF Finished Product Label

8.0 RESULTS / RATINGS:

8.1 Allowable Fastener Capacities

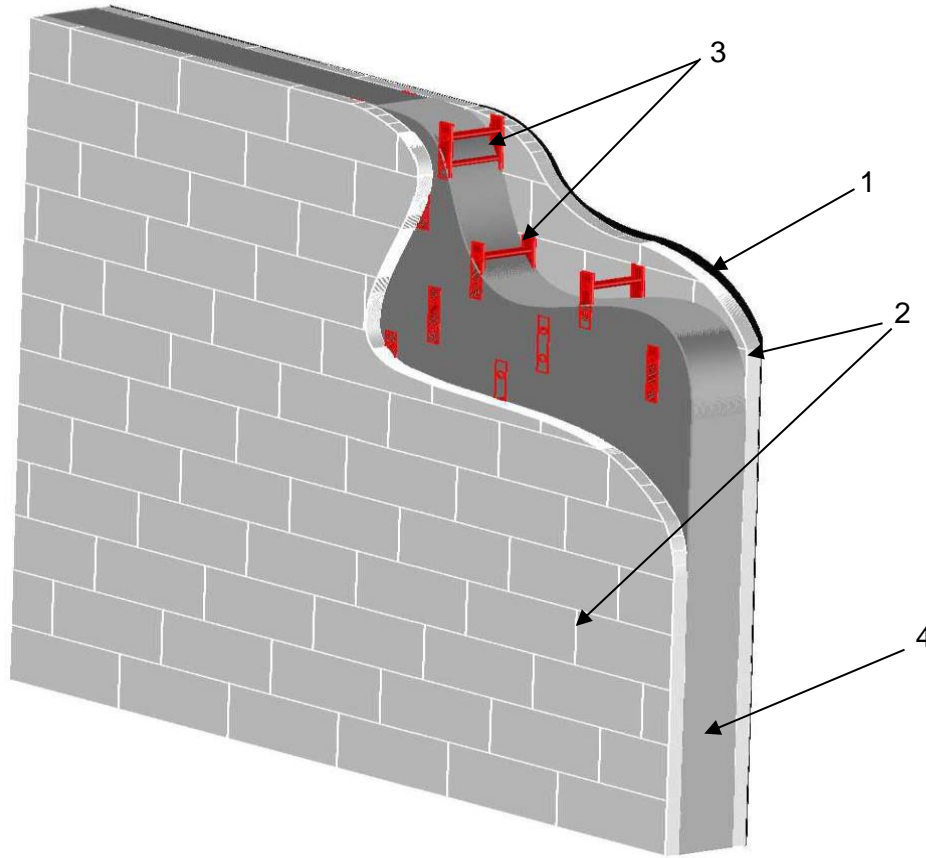
Table 3. Superform ICF Approved Fasteners Including Capacities

| FASTENER | FASTENER CAPACITY | |
|--|-------------------------------------|--|
| | Allowable Withdrawal lbs (kg) | Allowable Lateral Shear lbs (kg) |
| #6 Coarse Thread Drywall Screw, minimum penetration 3/4 inch (19 mm) into Superform ICF Crossties. | 52 (24) | 115 (52) |
| #10 Coarse Thread Wood Screw, minimum penetration 3/4 inch (19 mm) into Superform ICF Crossties. | 48 (22) | 125 (57) |
| #14 Coarse Thread Wood Screw, minimum penetration 3/4 inch (19 mm) into Superform ICF Crossties. | 57 (26) | 135 (61) |
| 16 Gauge 1/2 inch Crown Staple, minimum penetration 1 inch (25 mm) into Superform ICF Crossties. | 8.5 (4) | 12 (5.5) |

Note 1: Calculation of penetration into Superform ICF is taken as fastener length minus thickness of objects between Superform ICF face and fastener head. Fasteners must penetrate the crossties.

8.2 Fire-Resistance-Rated Assembly Details

Table 4. Superform ICF Approved 4-hour Load Bearing Fire-Resistance-Rated Assemblies.



| No. | COMPONENT | DESCRIPTION |
|-----|---------------------------------------|--|
| 1 | Interior Sheathing (Not Shown) | Any approved thermal barrier for the protection of foam plastic insulation, per the applicable building code can be used. |
| 2 | Expanded Polystyrene (EPS) Insulation | Superform ICF component 70 mm (2 ¾ inch) thickness Type 2 (CAN/ULC S701) / Type II (ASTM C578) QAI certified expanded polystyrene thermal insulation. Superform ICF EPS panels have interlocking teeth to allow stacking onsite to create the forming wall. |
| 3 | Web Ties | Superform polypropylene web tie components spaced at 153 mm (6 inches) on center spacing through Superform ICF. Web ties can be stacked or staggered vertically during installation (staggered web tie system shown). |
| 4 | Concrete Core | Minimum 165 mm (6.5 inches) thickness concrete core or greater, of minimum 21 MPa (3,000 psi) compressive strength. Steel reinforcing, while not shown, is approved for use. Rebar addition is to be designed and approved by a registered design professional, or authority having jurisdiction in accordance with the applicable code requirements. |
| 5 | Exterior Cladding (Not Shown) | Exterior claddings are approved for use with the Superform 4-hour load bearing fire-rated-resistant wall assembly without negatively impacting the fire rating. These exterior claddings include: brick veneer, stucco, fire-resistance rated exterior insulating finish systems, cultured stone, aluminum and steel products. All exterior claddings are to be installed with the applicable building code, and the manufacturer's approved installation instructions. |

Note 1: The allowable load for Superform ICF 4 Hour Load Bearing Fire-Resistance-Rated Construction is to be determined by a registered design professional, or authority having jurisdiction in accordance with the applicable codes.

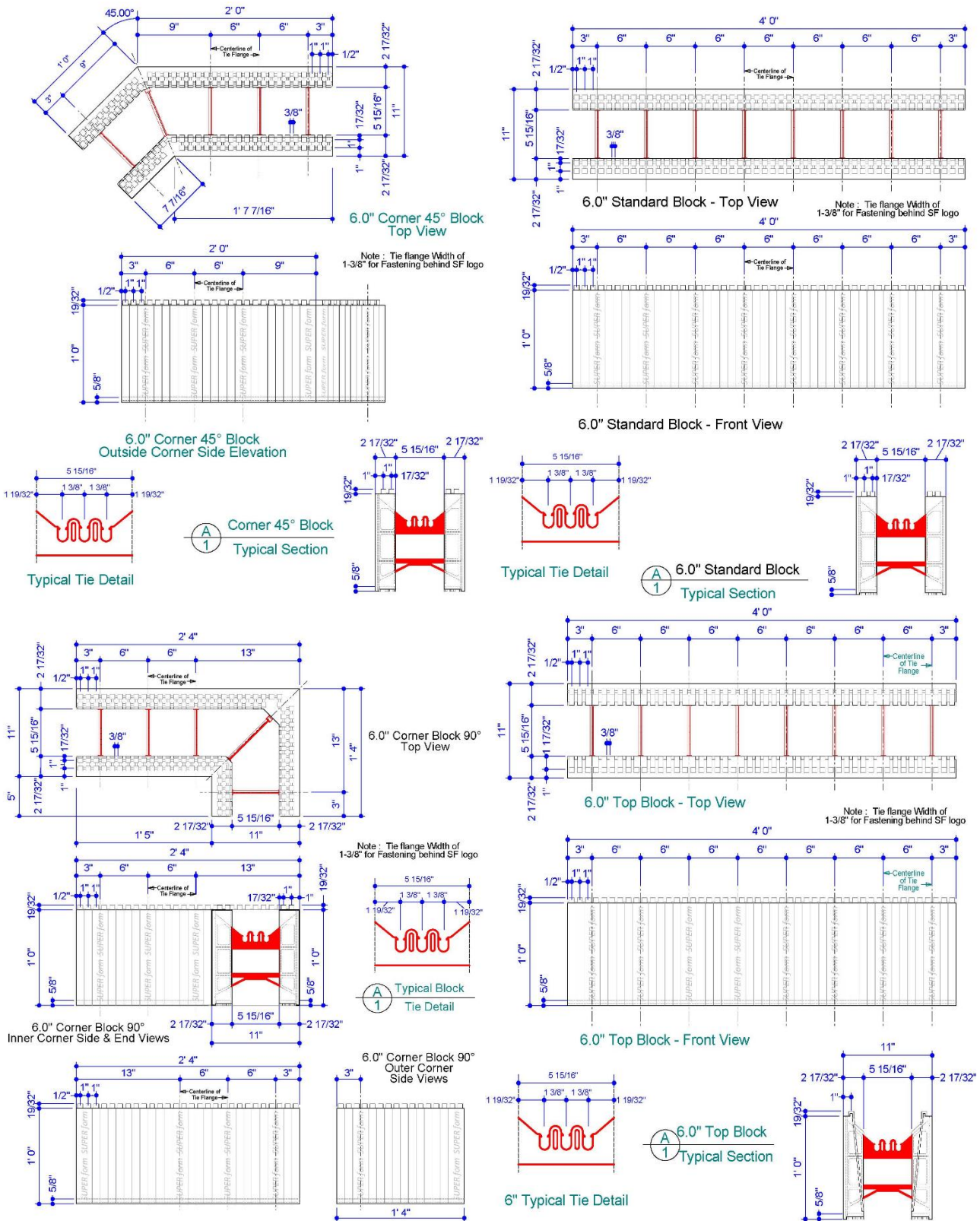


Figure 2. Example Superform ICF Product Details

9.0 ELIGIBILITY OF REPORT

The attached report has been reviewed and approved by a QAI Registered Professional Engineer approved by the specific state Board of Professional Engineers noted on the specific P.E. Stamp(s).

Per section 1703 of the 2018 / 2015 IBC, QAI is an independent third party testing, inspection and certification agency accredited by the International Accreditation Service, Inc. (IAS) for this specific scope (see IAS PCA-118, PCA-119). QAI can confirm that based on its IAS accreditation it meets 2018 / 2015 IBC Section 1703.1 on Independence, Section 1703.1.2 on Equipment and Section 1703.1 on Personnel.

This Evaluation report has been designed to meet the performance requirements of 2018 / 2015 IBC Section 1703.4 and contains the required information to show the product, material or assembly meets the applicable code requirements.

The product is labeled per section 2018 / 2015 IBC 1703, with reference to QAI CER_{US}-1001 see QAI listing B1051 for details and subject to follow-up inspection per IBC 1703.6 using QAI IAS accredited ISO 17020 inspection program (see IAS AA-635, AA-723).

For more information regarding QAI Laboratories, please visit www.qai.org.



The above is an example of the QAI registered Listing mark. The Listing mark may only be used by the Report Holder per the QAI service agreement on products defined in this report. The 'us' indicator in the lower bottom right indicates the product complies with the properties evaluated with limitations outlined in this report for use in the US market. A 'c' indicator in the lower bottom left indicates the product has been evaluated for use in the Canadian market.

10.0 REFERENCED STANDARDS

ASTM E2634-11(2015) *Standard Specification for Flat Wall Insulating Concrete Form.*

UL 723-2008 *Test for Surface Burning Characteristics of Building Materials.*

ASTM C578-15 *Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.*

ASTM D1929 *Standard Test Method for Determining Ignition temperature of Plastics.*

ASTM D635 *Test Method for Rate of Burning and/or Extent and Time of Building of Plastics in a Horizontal Position.*

ASTM C1396/C1396M-14a *Specification for Gypsum Board.*

NFPA 275-17 *Standard Method of Fire TSTS for the Evaluation of Thermal Barriers.*

ASTM E119-16 *Standard Test Methods for Fire Tests of Building Construction and Materials.*

NFPA 285-15 *Standard Fire Test Method for the Evaluation of Fire Propagation Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Compartments.*