



NATIONAL BUILDING CODE OF CANADA ENGINEERING EVALUATION REPORT

Date | November 30, 2020
File No. | 0068-5-2
For | Stronghold Insulation Systems, Inc.
Address | P.O. Box 351, Pelican Rapids, MN 56572

Subject

Stronghold Insulated Concrete Form (ICF) System

Evaluation Scope

This report is provided to assist registered design professionals and building officials in Canada with determining compliance to the performance objectives in the named building codes.

The material(s) and system(s) described herein have been evaluated to 2015 National Building Code of Canada (NBCC), Division A, Section 1.2.1.(1)(a) for compliance with applicable acceptable solutions in Division B, for buildings classified under Part 3/4/5 construction and Part 9 Housing and Small Buildings construction.

CSI DIVISION: 03 00 00 CONCRETE
SUBDIVISION: 03 11 19 Insulating Concrete Forming

CODE SECTIONS AND STANDARDS:

| <u>NBCC Section</u> | <u>Property</u> | <u>Referenced Standard or Code Section</u> | <u>Year (‘15 Ed.)</u> |
|---------------------|--|---|---------------------------|
| 3.1.4.1.(2) | Combustible Construction, Combustible Materials Permitted | 3.1.12 (<i>Flame-Spread Rating</i>) | 2015 |
| 3.1.4.2 | Protection of Foamed Plastics | 3.1.5.15.(2) | 2015 |
| 3.1.5.15.(2) | Noncombustible Construction, Foamed Plastic Insulation | 3.1.12 (<i>Flame-Spread Rating</i>), 3.1.5.15.(2).(a) | 2015 |
| 3.1.7.1.(1) | Fire Resistance Ratings | CAN/ULC S101 | 2014 |
| 3.1.7.1.(2) | Fire Resistance Ratings | NBC App D | 2015 |
| 3.1.12.1.(2) | Determination of (Flame Spread and Smoke Developed Classification) Ratings | CAN/ULC 102.2 | 2010 |
| 4.1.7.1.(5) | Wind Load, Exterior Cladding Strength Attachment | 4.1.7.3 | 2018 |
| 4.2.3.5 | Foundations, Concrete | 4.3.3 | 2015 |
| 4.3.3.1 | Design Requirements for Structural Materials, Concrete | CSA A23.3 | 2014 |
| 5.1.4.1 | Structural and Environmental Loads, Exterior Cladding Attachment | 4.1.7.1 | 2015 |



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|---------------|--|---------------|------|
| 5.3.1.1 | Required Resistance to Heat Transfer | Table 5.9.1.1 | 2015 |
| Table 5.9.1.1 | Standards Applicable to Environmental Separators | CAN/ULC S701 | 2011 |

| <u>NBCC Section</u> | <u>Property</u> | <u>Referenced Standard or Code Section</u> | <u>Year</u> |
|------------------------|---|--|-------------|
| 9.3.1.1.(4) | Concrete, Insulating Concrete Form Walls | CSA A23.1 | 2014 |
| 9.3.1.1.(4) | Reinforcing, Insulating Concrete Form Walls | CSA G30.18 | 2009 |
| 9.10.3.1.(1)(a) | Fire Resistance Ratings | CAN/ULC S101 | 2014 |
| 9.10.3.1.(1)(b) | Fire Resistance Ratings | NBC App D | 2015 |
| 9.10.3.2 | Flame-Spread Ratings | CAN/ULC S102.2 | 2010 |
| 9.10.17.10 | Protection of Foamed Plastics | 3.1.5.15.(2) | 2015 |
| 9.15.4.1 | Foundation Walls, Permanent Form Material | CAN/ULC S701 | 2011 |
| 9.15.4.2.(2),(3) | Foundation Wall Thickness and Required Lateral Support | Table 9.15.4.2.A | 2015 |
| 9.15.4.5 | Reinforcing for Flat Insulating Concrete Foundation Walls | Tables 9.15.4.5.A-C, 9.20.17 | 2015 |
| 9.20.1.1.(1)(b) | Insulating Concrete Form Walls Not In Contact with the Ground | A-9.15.1.1.(1)(c) and 9.20.1.1.(1)(b) | |
| 9.20.17 | Above-Ground Flat Insulating Concrete Form Walls | 9.23, 9.27, Tables 9.20.17.4.A-C | 2015 |
| 9.25.2.2 | Insulation Materials | CAN/ULC S701 | 2011 |
| 9.27.1.1.(6) | Exterior Cladding Strength Attachment | 5.1.4.1 | 2015 |
| Table A-9.36.2.4.(1)-D | Insulation Materials | CAN/ULC S701 | 2011 |
| Table A-9.36.2.6.(1)-A | Minimum Thermal Resistance in Above-ground Wall Assemblies | 9.36.2.6 | 2015 |
| Table A-9.36.2.8.(1)-A | Minimum Thermal Resistance in Wall Assemblies Below-Grade | 9.36.2.8 | 2015 |

Compliance Statement: Stronghold ICF, installed as described in this report, has demonstrated compliance with the listed sections of the 2015 National Building Code of Canada (NBCC), and corresponding Objectives defined in Division A, Section 2.2.1 and Functional Statements in Section 3.2.1.

Design and performance information can be found in Section 2 of this report.

This report has been prepared and reviewed on behalf of Boca Engineering Co. by:

Christopher Bowness, P.Eng., P.E.

2020-11-30

Date





Evaluation

1.0 PRODUCT DESCRIPTION:

- 1.1 **Stronghold ICF FX and KD Series** are permanent concrete forms for preparing above or below grade concrete walls, consisting of two panels of expanded polystyrene (EPS) foam plastic joined by thermoplastic cross ties, leaving an open cavity for placing reinforcing and concrete. Foam plastic panels are 1.45 pcf (23.2 kg/m³) nominal density, 2.75-in (70 mm) thick, and the concrete wall thickness is 4, 6, 8, 10 or 12 inches (100, 150, 200, 250, 300 mm).
- 1.2 **Stronghold ICF FX Series** are with fixed end cross tie webs with a fixed open cavity.
- 1.3 **Stronghold ICF KD Series** are with hinged cross tie webs where the cavity folds the EPS panels flat for shipping and at installation folds open and locks to make the open cavity for concrete.

2.0 TECHNICAL EVALUATION:

2.1 INSTALLATION

- 2.1.1 Stronghold ICF shall be installed in accordance with the jurisdictional Building Code and manufacturer's installation instructions, subject to the Limitations in Section 3, and as described in Section 4 of this report.
- 2.1.2 Materials integral to this building system as supplied on jobsites are to comply with the respective Code sections and materials and installation standards. Those materials as described in this report include concrete, reinforcing steel, interior ½-inch (12.7 mm) gypsum, and fasteners for interior and exterior finishes.
- 2.1.3 In areas of heavy termite presence, Termite Protection may be required by the local jurisdiction in accordance with NBCC Part 5 or Part 9 Section 9.3.2.9.
- 2.1.4 Footings for foundation walls are required as prepared in accordance with NBCC Part 4 or Part 9.
- 2.1.5 Foundation site preparation, dampproofing and backfill are to comply with NBCC Part 4 & 5 or Part 9.
- 2.1.6 Exterior wall water-resistive barrier, penetrations, flashings, and claddings are to comply with NBCC Part 5 or Part 9.

2.2 NBCC CODE SECTIONS REVIEW

| <u>NBCC Part</u> | <u>Description</u> |
|------------------|--|
| <u>3/4/5</u> | |
| 3.1.4.1.(2) | Combustible Construction, Combustible Materials Permitted Requires foam plastic insulation to have a flame spread rating less than 500, see this report comments to NBCC 3.1.12.1.(2). |
| 3.1.4.2 | Protection of Foamed Plastics (Thermal Barrier) Requires foam plastic insulation to have a flame spread rating less than 500, see this report comments to NBCC 3.1.12.1.(2), and, protected by a thermal barrier, see this report comments to NBCC 3.1.5.15.(2). |
| 3.1.5.15.(2) | Noncombustible Construction, Foamed Plastic Insulation Requires foam plastic insulation to have a flame spread rating less than 500, see this report comments to NBCC 3.1.12.1.(2). NBCC 3.1.5.15.(2)(a) specifies for an interior finish thermal barrier of ½ inch (12.7 mm) gypsum to be installed over foam plastics, which is met by installing on the inside of Stronghold ICF and |



fastened to the flange of the plastic web ties with minimum 1-5/8-inch (41 mm) No. 6 drywall screws at 16-inch (400 mm) o/c horizontally and 12-inch (300 mm) o/c vertically. A representative interior room assembly was tested to NFPA 286 to validate that the ½-inch gypsum thermal barrier stays in place for 15-minutes under fire conditions. Gypsum board materials and installation must adhere to NBCC 3.15.5.15.(2)(a) or 9.29.5.

3.1.7.1.(1)

Fire Resistance Ratings

See section 4 of this report.

3.1.7.1.(2)

Fire Resistance Ratings

See section 4 of this report.

3.1.12.1.(2)

Determination of (Flame Spread and Smoke Developed Classification) Ratings

Specifies that flame spread ratings are determined by testing to ULC S102.2. Stronghold ICF produced of EPS was tested and has a flame spread index of less than 500.

4.1.7.1.(5)

Wind Load, Exterior Cladding Strength Attachment

The cladding design pressures for respective building applications are determined by NBCC 4.1.7.1.5.

Cladding attachment with fasteners through the EPS into the solid concrete wall are designed by CSA A23.3.

Cladding attachments in to the ICF Plastic Cross Tie Flange have the following strength values:

| Fastener Type ¹ | Allowable Lateral Force (lbs)(N) ^{2,4} | Allowable Withdrawal Force (lbs)(N) ^{3,4} |
|--------------------------------|---|--|
| #6 coarse thread drywall screw | 53 lbs (235 N) | 40 lbs (178 N) |
| #10 Wood Screw | 76 lbs (338 N) | 43 lbs (192 N) |

1. Fasteners must be of sufficient length to pass through the cladding and any backing, and 1-inch (25 mm) past the outside surface of the EPS which provides for the tip of the fastener to penetrate a minimum ¼-inch (6 mm) through the back of the plastic web flange, with minimum edge distance of ½-inch (12.7 mm).
2. Allowable Lateral Force is the ASD design resistance force of the individual fastener after safety factor of 6 applied per ULC S717.11. Lateral forces are in the direction perpendicular to the fastener, also referred to as fastener shear forces.
3. Allowable Withdrawal Force is the ASD design resistance force of the individual fastener after safety factor of 5 applied per ULC S717.11. Withdrawal forces are in the direction parallel to the fastener, typically from wind pressure acting on the cladding.
4. Allowable force is typically compared to the design service load. Safety factor used to determine allowable values may be regarded as equal to (Load Factor / Resistance Factor) in limit states design.

4.2.3.5

Foundations, Concrete

See this report comments to NBCC 4.3.3.1.

4.3.3.1

Design Requirements for Structural Materials, Concrete

For building applications where NBCC Part 4 presides, the design, materials, and installation



provisions of CSA A23.3 are to be applied to Stronghold ICF Concrete Construction of foundation and above grade walls.

Also refer to Boca Engineering Co. report 0068-7-1 “Stronghold ICF Structural Guideline (Canada)” for recommended design and installation methods in compliance with CSA A23.3.

5.1.4.1 Structural and Environmental Loads, Exterior Cladding Attachment

See this report comments to NBCC 4.1.7.1.(5).

5.3.1.1 Required Resistance to Heat Transfer

The insulating values of the EPS insulation in Stronghold ICF can be found in standard CAN/ULC S701 referenced in NBC Table 5.9.1.1.

Table 5.9.1.1 Standards Applicable to Environmental Separators

Stronghold ICF has been tested to CAN/ULC S701 standard for polystyrene thermal insulation, as referenced in this Code section, and is classified as Type 2 EPS.

NBCC Part 9 Description

9.3.1.1.(4) Concrete, Insulating Concrete Form Walls

Concrete shall conform to CSA A23.1 and have a maximum aggregate size of ¾-inch (19 mm).

9.3.1.1.(4) Reinforcing, Insulating Concrete Form Walls

Reinforcing, when required, shall conform to CSA G30.18, have a minimum yield strength of 400 MPa, and when lapped, lapping is a minimum of 18-inch (450 mm) for 10M bars and 26-inch (650 mm) for 15M bars.

9.10.3.1.(1)(a) Fire Resistance Ratings

See section 4 of this report.

9.10.3.1.(1)(b) Fire Resistance Ratings

See section 4 of this report.

9.10.3.2 Flame-Spread Ratings

Refers to test standards in Part 3. See this report comments to NBCC 3.1.12.1.(2).

9.10.17.10 Protection of Foamed Plastics

Requires foam to be protected by a thermal barrier, see this report comments to NBCC 3.1.5.15.(2).

9.15.4.1 Foundation Walls, Permanent Form Material

Stronghold ICF meets the requirements and is manufactured of polystyrene conforming to CAN/ULC S701 Type 2.

9.15.4.2.(2),(3) Foundation Wall Thickness and Required Lateral Support

Stronghold ICF foundation walls shall be constructed with a minimum 6-inch (150 mm) form, or,



the same or greater thickness of concrete walls above. Foundation walls are to be laterally supported at the top and bottom by methods acceptable to Part 9.

Unreinforced concrete is permitted if conditions conform to Table 9.15.4.2. Otherwise, reinforcing is required, see this report comments to NBCC 9.15.4.5.

9.15.4.5 Reinforcing for Flat Insulating Concrete Foundation Walls

When conditions exceed Table 9.15.4.2 and require reinforcing, use the following tables:

6-inch (150 mm) Stronghold ICF Form: Table 9.15.4.5.-A

8-inch (200 mm) Stronghold ICF Form: Table 9.15.4.5.-B

10-inch (250 mm) or 12-inch (305 mm) Stronghold ICF Form: Table 9.15.4.5.-C

Also refer to Boca Engineering Co. report 0068-7-1 “Stronghold ICF Structural Guideline (Canada)” for recommended design and installation methods in compliance with Part 9.

9.20.1.1.(1)(b) Insulating Concrete Form Walls Not In Contact with the Ground

To use the Part 9 prescriptive details for above-ground ICF walls, buildings must be a maximum of 2 storeys with maximum floor-to-floor height of 3 m, contain only a single dwelling unit, and be in a location where seismic $S_a(0.2)$ is less than 0.4.

9.20.17 Above-Ground Flat Insulating Concrete Form Walls

Requires a minimum 6-inch (150 mm) Stronghold ICF form and constant thickness over the entire height. Reinforcing is required per Section 9.20.17.2 and Tables 9.20.17.4.A,B,C. Openings are to conform with Section 9.20.17.3&4, and framing and anchorage is to conform to Sections 9.20.17.5&6, and exterior protection is to conform to Section 9.27.

9.25.2.2 Insulation Materials

Stronghold ICF EPS insulation conforms to the reference standard shown in 9.25.2.2.(1)(d), CAN/ULC S701.

9.27.1.1.(6) Exterior Cladding Strength Attachment

Attachment of cladding to Stronghold ICF is covered by clause 9.27.1.1.(6), see this report comments to NBCC 5.1.4.1.

Tbl A- Insulation Materials

9.36.2.4.(1)-D Stronghold ICF EPS insulation conforms to the reference standard CAN/ULC S701 Type 2 listed in this table, which provides guidance for determining Thermal Resistance.

Tbl A- Minimum Thermal Resistance in Above-ground Wall Assemblies

9.36.2.6.(1)-A Effective thermal resistance of 6-inch (150 mm) ICF form concrete wall is provided in this table.

Tbl A- Minimum Thermal Resistance in Wall Assemblies Below-Grade

9.36.2.8.(1)-A Effective thermal resistance of 6-inch (150 mm) ICF form concrete wall is provided in this table.



2.3 SUPPLEMENTAL TESTING

Supplemental testing to national standards that are not directly referenced in the NBCC, where the product performance results may be useful in demonstrating objectives of the NBCC.

CAN/ULC S717.1-17

Standard Specification for ICF

Stronghold ICF has been tested to and complies with CAN/ULC S717.1, Standard for Flat Wall Insulating Concrete Form (ICF) Systems.

NFPA 286-15

Room Corner Fire test

A representative room assembly constructed with Stronghold ICF, covered with interior finish of ½" (12.7 mm) Gypsum board of materials and installation in accordance with the NBCC, was tested to NFPA 286 and found to meet the test standard with the gypsum board remaining in-place and resisting flaming for up to 15-minutes.

ASTM D1929-16

Self-Ignition Temperature

The Stronghold ICF thermoplastic web ties have been tested to ASTM D1929 and have a self-ignition temperature of greater than 343°C (650°F).

ASTM D635-14

Rate of Burn

The Stronghold ICF thermoplastic web ties have been tested to ASTM D635 and qualify as a Class CC2.

3.0 LIMITATIONS:

- 3.1 This Evaluation is for the base code requirements of the building system as addressed in this report. In some building applications, additional performance objectives may be required by Code which must be addressed in the building design for those specific cases.
- 3.2 Design calculations, drawings, and field inspections are to be furnished for building projects by registered professionals as required by the respective jurisdictional authorities and Codes.
- 3.3 Fire Blocking and draftstopping shall be installed in concealed locations as specified in NBC Section 3.1.11 and 9.10.16.

4.0 FIRE RESISTANCE RATINGS:

NBCC 3.1.7.1, 9.10.3.1: Fire Resistance Ratings

Where the construction requirements specify that walls are to be of Fire-Resistance construction (1hr, 2hr, etc.), Stronghold ICF Walls may be designed and constructed to achieve ratings by:

- a. Stronghold ICF has been tested to CAN/ULC S101 for a custom fire-resistance rating construction detail:
 - Concrete thickness: Min. 6-inch (may substitute with 8-inch, 10-inch, 12-inch ICF form)
 - Concrete Weight: Normal, Nominal 150 lb/ft³ (2400 kg/m³)
 - Concrete Compressive Strength: Min. 3000 psi (20.7 MPa)
 - Steel Reinforcing: Optional, to structural design requirements
 - Load-bearing: Applies to non-bearing and load-bearing walls
 - Duration: 3-hr rating
- b. Or, calculations in accordance with NBCC Appendix D.



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5.0 QUALITY ASSURANCE ENTITY:

The products evaluated in this report receive third-party quality assurance inspections and product certification labeling by Intertek Testing Services at the approved manufacturing locations.

6.0 MANUFACTURING PLANTS:

Manufacturing and labeling location(s): Watertown SD, Ottawa OH, Post Falls ID, Jerome ID, Edmonton AB.

7.0 LABELING:

Labeling shall be in accordance with the requirements of the Accredited Quality Assurance Agency and carry the certification mark of that agency.

8.0 EVALUATION RENEWALS: This Evaluation Report expires Dec 31, 2021. Renewals are published with applicable updates. Up to the renewal date, the report is valid until such time as the named product(s) changes, the Quality Assurance Agency changes, or provisions of the Code that relate to the product change.

9.0 REFERENCE TESTING AND EVALUATION DOCUMENTS:

| Entity | Accred. No. ¹ | Standards | Report No. | Issue Date |
|----------|--------------------------|----------------|----------------------|------------|
| Intertek | IAS TL-143 | CAN/ULC S101 | g103851054-sat-001r0 | 2020-02-19 |
| Intertek | IAS TL-274 | CAN/ULC S102.2 | 103802777COQ-008 | 2019-03-13 |
| Intertek | IAS TL-274 | CAN/ULC S701 | 103802777COQ-003AREV | 2019-05-10 |
| Intertek | IAS TL-274 | CAN/ULC S717.1 | 103802777COQ-004E | 2019-08-28 |
| Intertek | IAS TL-274 | NFPA 286 | 103802777COQ-009 | 2019-04-11 |
| Intertek | IAS TL-274 | ASTM D635 | 103802777COQ-004a | 2019-05-01 |
| Intertek | IAS TL-274 | ASTM D1929 | 103802777COQ-004b | 2019-06-11 |
| Intertek | IAS AA-647 | QA Inspections | 51355 | 2019-09-26 |
| Intertek | SCC 10014 | Certification | 51355 | 2019-09-26 |

1. Testing, certification, evaluation, and inspection agencies referenced are verified to be accredited for the applicable scope by the ICC Accreditation Service (IAS) and/or Standards Council of Canada. All technical reference documents are current as of this date.

10.0 CERTIFICATION OF INDEPENDENCE:

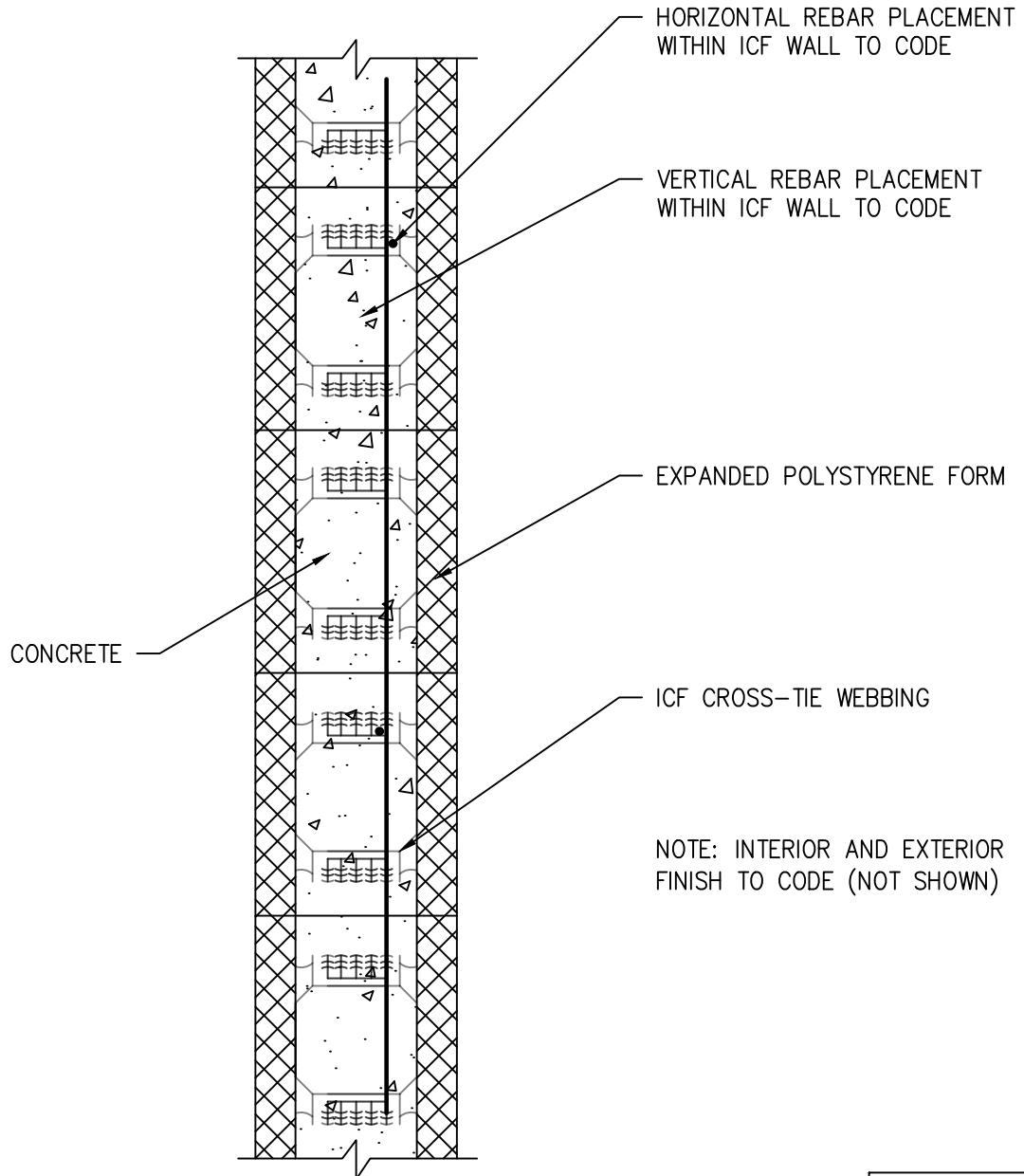
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2. Boca Engineering Co. is not owned, operated, or controlled by any company manufacturing or distributing products that they evaluate.

11.0 EVALUATION REPORT TERMS:

This report is a general evaluation of the building code section requirements as identified and applies only to the samples that were evaluated. The evaluation report, including any drawings, do not imply that the signatory Engineer is the Designer of Record of any project for which this Evaluation Report is used.

ATTACHMENTS:

1. Typical Cross Section Diagram _____ (pg 9)
2. Stronghold ICF Materials Properties _____ (pg 10)



TYPICAL CROSS SECTION OF ICF
WALL



DRAWING FOR STRONGHOLD
INSULATED CONCRETE FORMS
ENGINEERING EVALUATION
REPORT – NOT FOR USE AS
CONSTRUCTION DESIGN
DOCUMENTS

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| | | |
|---------------------------------------|---|-------------------------|
| CLIENT: | PROJECT: | TITLE: |
| STRONGHOLD INSULATION SYSTEMS INC. | STRONGHOLD INSULATED CONCRETE FORM (ICF) NBC 2015 EVALUATION REPORT | TYPICAL ICF WALL DETAIL |

| | | | |
|-------------|-------------------|-----------------|-----|
| 0 | 2020/11/23 | FOR PUBLICATION | CB |
| REV | DATE | ISSUE | APP |
| DRAWING NO. | DES CB | | |
| | 0068-05-02-S1 | | |
| DATE | DRN LI | | |
| | NOVEMBER 23, 2020 | | |
| | CHK CB | | |



ATTACHMENT 2: STRONGHOLD ICF MATERIALS PROPERTIES TESTING VALUES

| Table 1: Stronghold ICF Physical Property Values as per CAN/ULC-S701 and CAN/ULC-S717.1 | | | | |
|---|---|--------------------------------|---|------------|
| Standard | Properties | | Test Requirement ¹ | Compliance |
| ICF Block (EPS) | | | | |
| ULC S102.2 | Surface Burning Characteristics | Flame Spread Index | ≤ 500 | Pass |
| ULC S701 | Specification for Rigid, Cellular Polystyrene Thermal Insulation | | Type 2 | Pass |
| ASTM D1621 | Compressive resistance at yield or 10 % deformation (kPa) | | ≥ 110 kPa (16 psi) | Pass |
| ASTM C518 | Thermal resistance per 25.4mm (1-inch), m ² .°C/W @ 22±2°C (F·ft ² ·h/Btu @ 75 ± 2°F) | | ≥ 0.7 (R4/inch (5.5-in EPS = R22)) | Pass |
| ASTM C203 | Flexural strength (kPa) | | ≥ 240 kPa | Pass |
| ASTM E96 | Water vapor permeance of 25.4mm (1-inch) thickness, max perm (ng/Pa·s·m ²) | | ≤ 200 perm | Pass |
| ASTM D2842 | Water absorption by total immersion, max, volume % | | ≤ 4 % | Pass |
| ASTM D2126 | Dimensional stability (change in dimensions), max % | | ≤ 1.5 % | Pass |
| ASTM D2863 | Oxygen index, min volume % | | ≥ 24 % | Pass |
| ULC S717.1 | Density (kg/m ³) | | ≥ 21.6 kg/m ³ (1.35 lb/ft ³) | Pass |
| Cross Tie Web and Flange | | | | |
| ASTM D635 | Burn Rate (mm/min) | | ≤ 40 mm/min (1.57in/min) | Pass |
| ASTM D1929 | Ignition Temperature | | ≥ 343 °C (650 °F) | Pass |
| ULC S717.1 | Fastener Allowable Shear ² | #6 coarse thread drywall screw | 235 N (53 lbs) | Pass |
| | | #10 Wood Screw | 338 N (76 lbs) | Pass |
| ULC S717.1 | Fastener Allowable Withdrawal ² | #6 coarse thread drywall screw | 178 N (40 lbs) | Pass |
| | | #10 Wood Screw | 192 N (43 lbs) | Pass |
| ASTM E2634 | Gypsum Wallboard Attachment | Time to seat | ≤ 2 s | Pass |
| | | Observation | No screw spinout | Pass |
| ULC S717.1 | Cross Tie Tensile Strength | | ≥ 32.3 kN/m ² (675 psf) tributary wall area pressure | Pass |
| ULC S717.1 | Cross Tie Shear Strength | | ≥ 2.0 kN/m ² (0.29 psi) | Pass |
| ICF Concrete Wall ³ | | | | |
| NFPA 286 | Fire Test, 15-minute Room Corner | | Pass | Pass |
| ULC S101 | Fire Resistance | | 3 HR, Load-Bearing | Pass |

- Where the specification standard lists a required property value, testing has met or exceeded that value, and table lists the specification. Where the specification standard has no set value limit for a property test, the test result is shown.
- ASD allowable design values of fastener test after safety factor applied are shown. See evaluation report for further description.
- Wall assembly tests results are dependent on installation components and environmental conditions consistent with tested details. See Stronghold's document library of Engineering and Certifications reports for further details.

- END -