UL Evaluation Report

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DIVISION:	**07 00 00 - THERMAL AND MOISTURE PROTECTION**
Sub-level 2:	**07 20 00 - Thermal Protection**
Sub-level 3:	**07 21 00 - Thermal Insulation**
Sub-level 4:	**07 21 13 - Board Insulation**
Sub-level 3:	**07 22 00 - Roof and Deck Insulation**
Sub-level 4:	**07 22 16 - Roof Board Insulation**
Sub-level 3:	**07 25 00 - Weather Barriers**

COMPANY:

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SUBJECT:

FOAMULAR® 150, 250, 400, 600, AND 1000 and FOAMULAR® NGX™ 150, 250, 400, 600, AND 1000 EXTRUDED POLYSTYRENE (XPS) INSULATION BOARDS and other FOAMULAR® and FOAMULAR® NGX™ products as listed in Tables 1a and 1b.

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2. SCOPE OF EVALUATION:

- 2018 and 2015 *International Building Code*® (IBC)
- 2018 and 2015 *International Residential Code*® (IRC)
- 2018 and 2015 *International Energy Code*® (IECC)
- ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12)
- ICC-ES Acceptance Criteria for Foam Plastic Sheathing Panels used as Water Resistive Barriers (AC71)
- ICC-ES Acceptance Criteria for Quality Documentation (AC10)

The FOAMULAR® and FOAMULAR ® NGX™ XPS Insulation boards were evaluated for the following properties (Also see Table 1a):

- Surface Burning Characteristics (UL 723)
- Thermal and Physical Properties (ASTM C578)
- Roofing Systems for Exterior Fire Exposure (UL 790)
- Roof Deck Construction Material with Resistance to Internal Fire Exposure (UL 1256)
- Fire-resistance-rated construction (UL 263, ASTM E119)
- For Use in Attics and Crawl Spaces (AC12, App. A and B)
- For Use Without a Thermal Barrier – Special Approval (NFPA 286)
- Water-resistive Barrier (AC71)
- For Use on Exterior Commercial Walls (NFPA 285)
- Wind Pressure Resistance (SBCA FS100)
- Dimensional and physical properties of rigid cellular polystyrene foam (ASTM D6817)

Table 1a – FOAMULAR® and FOAMULAR® NGX™ XPS Insulation Properties Evaluated

FOAMULAR® and FOAMULAR® NGX™ Product Names	Physical Properties ASTM C578 Type	Surface Burning UL 723	Roofing Systems for Exterior Fire Exposure UL 790	Roof Deck Const. for Interior Fire Exposure UL 1256	Flammability Testing for Use in Attics and Crawl Spaces AC12	Exterior Commercial Walls NFPA 285	Special Approval NFPA 286	Fire Resistance UL 263	Air Leakage ASTM E2357	Water Penetration ASTM E331	Wind Resistance SBCA FS 100	Physical Properties ASTM D6817
150	X	●			●		●	●			●	
CI-C	X	●			●		●	●				
250	IV	●			●	●	●	●	●	●		
400	VI	●										● (Type 29)
600	VII	●										● (Type 36)
1000	V	●										● (Type 48)
Insulating Sheathing	X	●			●		●				●	
PROPINK®	X	●			●		●	●			●	
Half Inch	X	●			●		●					
INSULPINK®	X	●										
INSULPINK® Z	X	●										
CC	X	●				●						
CW15	X	●						●				
CW25	IV	●						●	●	●		
CW25 Foam Sealed	IV	●				●		●	●	●		
THERMAPINK™ 18	X	●	●	●				●				
THERMAPINK™ 25	IV	●	●	●				●				
THERMAPINK™ 40	VI	●	●	●								
THERMAPINK™ 60	VII	●	●	●								
C-200	X	●										
C-300	IV	●										
350	IV	●										
404	VI	●	●	●				●				
604	VII	●	●					●				
404RB	VI	●	●									
604RB	VII	●	●									
DURAPINK®	IV	●	●									
DURAPINK® FA	IV	●	●									
DURAPINK® Plus	IV	●	●									
LT30	IV	●										
LT40	VI	●										
Pinkcore	IV	●										
AGTEK	IV	●										
CC High R	IV	●				●		●				
High R CW Plus	IV	●				●		●				
High R CW Plus Foam Sealed	IV	●				●		●				

Table 1a – FOAMULAR® and FOAMULAR® NGX™ XPS Insulation Properties Evaluated (continued

FOAMULAR® and FOAMULAR® NGX™ Product Names	Physical Properties	Surface Burning	Roofing Systems for Exterior Fire Exposure	Roof Deck Const. for Interior Fire Exposure	Flammability Testing for Use in Attics and Crawl Spaces	Exterior Commercial Walls	Special Approval	Fire Resistance	Air Leakage	Water Penetration	Wind Resistance	Physical Properties
	ASTM C578 Type	UL 723	UL 790	UL 1256	AC12	NFPA 285	NFPA 286	UL 263	ASTM E2357	ASTM E331	SBCA FS 100	ASTM D6817
PINKCORE™ Tight Tolerance 15	X	•										
PINKCORE™ Tight Tolerance 25	IV	•										
PINKCORE™ Tight Tolerance 40	VI	•										
PINKCORE™ Tight Tolerance 60	VII	•										
Pink-Drain	X	•										
Codeboard	X	•										
CC	X	•										
Gridboard	IV	•										
Geo 400	VI	•										• (Type 29)
Geo 600	VII	•										• (Type 36)
Geo 1000	V	•										• (Type 48)

Table 1b – FOAMULAR® and FOAMULAR® NGX™ XPS Insulation Boards Applications

CONSTRUCTION APPLICATION	FOAMULAR® and FOAMULAR® NGX™ XPS PRODUCT	ASTM C578 Type	DESCRIPTION
General Purpose	150	X	Slab edge, foundation, under light slab, steel stud sheathing, masonry cavity wall, concrete tilt wall, concrete precast, attics, crawlspaces. For roofing applications use FOAMULAR THERMAPINK XPS insulation
	250	IV	
	C-200	NA	Marketed in Canada
	C-300	NA	
	350	NA	
WALL			
Sheathing	Insulating Sheathing	X	Laminated film on both sides for added strength
	Half-Inch	X	Half-inch thick, R-3
	PROPINK	X	Reinforced laminated film on both sides for added strength
Masonry Cavity Wall	CW 15	X	15 and 25 psi, 15-⅝" wide, fits between horizontal joint reinforcement and masonry veneer wire ties
	CW 25	IV	
	CW 25 Foam Sealed	IV	
	High R CW Plus	IV	15 and 25 psi, 16" wide. High R per inch.
Commercial Steel Stud	250	IV	General steel stud sheathing applications
	CC	X	Designed for commercial steel stud applications. Includes shiplap edges on the long edges for enhanced joining and watershed at horizontal joints.
	CC High R	IV	Designed for commercial steel stud applications. Provides higher R per inch. Includes shiplap edges on the long edges for enhanced joining and watershed at horizontal joints.
Furring	INSULPINK	X	Notched to accommodate 1" x 3" wood furring on inside surface of unit masonry or concrete walls
	INSULPINK Z	X	Fits between Z-furring on inside of unit masonry or concrete walls
Insulated Concrete Sandwich Panel	250	IV	Used with low conductivity, metal, or other composite grid-type wall ties
	Gridboard	IV	Used with low conductivity, metal or other composite grid-type wall ties
Exterior Insulation Finish Systems (EIFS)	250	IV	Any PM class EIFS system
	CI-C	X	Tight tolerance board for EIFS
ROOF			
Low Slope Commercial Roofing and Architectural Metal Roofing	THERMAPINK 18	X	18 and 25 psi, used in a variety of commercial roofing systems over a variety of roof deck types
	THERMAPINK 25	IV	
Recover Roofing	DURAPINK	IV	Used over existing roofing membrane and under a new mechanically attached single-ply roofing membrane
PRMA, Plaza Deck, Waterproofing (under pavers, paver/pedestals)	404	VI	40 and 60 psi, with bottom side drainage channels on four edges for use in protected roof membrane assemblies (PRMA)
	604	VII	
	404RB	VI	40 and 60 psi, with bottom side drainage channels on four edges, and top side ribbed surface for use under concrete pavers in protected roof membrane assemblies (PRMA)
	604RB	VII	
	400	VI	High load, under plaza deck slabs or pavers or pedestrian or vehicular traffic slabs
	600	VII	
	1000	V	
UNDER SLAB			
Load Bearing, High Strength, Under Industrial Slabs	400	VI	40, 60, 100 psi compressive strength. Use engineering design to match Foamular compressive strength needed to the load on the slab and slab strength design. Use ranges from light pedestrian traffic to heavy equipment and storage.
	600	VII	
	1000	V	
Under Slab, Low Temperature Storage	LT 30	IV	30 psi. Light to medium load.
	LT 40	N/A	40 psi. Light to medium load.
FOUNDATION			
Below Grade Walls	Insul-Drain	IV	Insulates and protects foundation waterproofing, and has filtration fabric faced with drainage channels in outward face of foam
	Pink-Drain	IV	Insulates and protects foundation waterproofing, with channel design in outward face of foam that prevents soil from clogging channels
	Fanfold DWB	N/A	Thinner fanfold protection board for use over foundation waterproofing
AGRICULTURE			
	AGTEK	X	Produced extra-long for use in sloped roof over purlin construction
SPECIALTY			
	Pinkcore	X, IV,VI,VII	Tight tolerance board for specialty and engineering applications

3. REFERENCED DOCUMENTS

- **ICC-ES:**
  - ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12)
  - ICC-ES Acceptance Criteria for Quality Documentation (AC10)
  - ICC-ES Acceptance Criteria for Foam Plastic Sheathing Panels Used as Water- Resistive Barriers (AC71)

- **UL:**
  - UL 723, Test for Surface Burning Characteristics of Building Materials
  - UL 790, Standard Test Methods for Fire Tests of Roof Coverings
  - UL 1256, Standard for Fire Test of Roof Deck Constructions
  - UL 263 (ASTM E119), Fire Tests of Building Construction and Materials

- **SBCA:**
  - FS 100, Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies

- **ASTM**:
  - ASTM C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
  - ASTM D6817, Standard Specification for Rigid, Cellular Polystyrene
  - ASTM E331, Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
  - ASTM E2357, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

- **NFPA:**
  - NFPA 285, Standard Fire Test for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Assemblies Containing Combustible Components
  - NFPA 286, Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
  - NFPA 259, Standard Test Method for Potential Heat of Building Materials

- **ACI:**
  - The American Concrete Institute 360, “Guide to the Design of Slabs-on-Ground”

4. USES

4.1 FOAMULAR® and FOAMULAR® NGX™ Insulation Boards (ASTM C578 Types X, IV, VI, VII, V):

FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards are extruded polystyrene foam plastic insulation used as nonstructural insulation on the exterior or interior of above grade walls, door cavities, in ceiling/floor assemblies, on the interior or exterior of below grade walls, below concrete slabs, around concrete slab edges, or as roof insulation.

Insulation Boards may be used on the exterior of above grade walls when installed in accordance with Section 6.2 of this report.

The insulation boards may be used as insulation under slabs-on-ground, slabs on decks, concrete pavers, and concrete pavers on pedestals when installation is in accordance with Section 6.8 of this report.

In areas where the probability of termite infestation is defined as “very heavy” the insulation must be installed in accordance with Section 2603.8 of the IBC or Section R318.1 of the IRC, as applicable.

The insulation boards may be used on walls in attics and crawl spaces without covering when installation is in accordance with Section 6.5 of this report.

The insulation boards may be used as an alternative to the water-resistive barrier specified in Section 1404.2 of the IBC and Section R703.2 of the IRC when installation is in accordance with Section 6.7 of this report. See Table 1b for further guidance on the intended uses of FOAMULAR® and FOAMULAR® NGX XPS insulation boards.

5. PRODUCT DESCRIPTION

The FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards are extruded polystyrene foam plastic insulation boards having a flame spread index not exceeding 25 and a smoke developed index not exceeding 450 for thicknesses up to 4 inches and at a maximum density of 3.6 pcf, when tested in accordance with UL723 as required by Section 2603.3 of the IBC or Section R316.3 of the IRC, as applicable.

FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards have been found to comply with ASTM C578. The boards are manufactured at minimum densities of 1.30, 1.45, 1.80, 2.20, and 3.00 lbs/ft^3 and have ASTM C578 designations of Type X, Type IV, Type VI, Type VII, and Type V respectively. See excerpt from ASTM C578, Table 2 below for minimum thermal resistance and compressive resistance values for each ASTM C578 type. These values apply to all FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards with the exception of thermal resistance for FOAMULAR® and FOAMULAR® NGX™ CC HIGH R and FOAMULAR® and FOAMULAR® NGX™ HIGH R CW PLUS.

Table 2 – Thermal Resistance and Compressive Resistance

ASTM TYPE	DENSITY, min., lb/ft^3	THERMAL RESISTANCE[1], min., °F-ft^2-h/Btu	COMPRESSIVE RESISTANCE[2], min., psi
Type X	1.30	5.0	15.0
Type IV	1.45	5.0	25.0
Type VI	1.80	5.0	40.0
Type VII	2.20	5.0	60.0
Type V	3.00	5.0	100.0
Type IV	1.45	5.6[3]	25.0

[1]Thermal resistance (R) values are based on tested values at 1 inch thickness and 75°F mean temperature and must be multiplied by the installed thickness for thicknesses greater than 1 inch.
[2] Compressive Resistance values are based on yield point or 10% deformation, whichever comes first.
[3] FOAMULAR® and FOAMULAR® NGX™ CC HIGH R and FOAMULAR® and FOAMULAR® NGX™ HIGH R CW PLUS Insulation boards.

6. INSTALLATION

6.1 General:

FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards are installed in accordance with the manufacturer's published installation instructions and this evaluation report. The manufacturer's published installation instructions and this report must be strictly adhered to, and a copy of the instructions shall be available on the jobsite during installation.

FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards must be attached to the structure in a manner that will hold the insulation securely in place. The insulation boards must not be used structurally to resist transverse, vertical or in-plane loads except as described in Section 6.8 of this report. The boards must not be used as exterior stud wall bracing. Wall bracing must be provided in accordance with the applicable code. All walls must be braced in accordance with Section 2308.6 of the IBC or Section R602.10 of the IRC.

The interior of the building must be separated from the FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards with a thermal barrier as required by Section 2603.4 of the IBC or Section R316.4 of the IRC, as applicable.

The code official may require an approved vapor retarder to be installed in accordance with Section 1404.3 of the 2018 IBC, Section 1405.3 of the 2015 IBC, Section R702.7 of the IRC, or the IECC, as applicable.

A water-resistive barrier in compliance with Section 1403.2 of the 2018 IBC, Section 1404.2 of the 2015 IBC, or Section R703.1.1 of the IRC, when applied over wood-based sheathing, must comply with Section 2510.6 of the IBC or Section R703.2 of the IRC. FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards with joints taped are a water-resistive barrier when installed in accordance with Section 6.7 of this report.

FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards with foam sealed joints (CW25 Foam Sealed) are a water-resistive barrier when installed in accordance with Section 6.7 of this report.

The insulation boards must not be used as a nailing base for exterior siding materials. All fastening must be made through the boards and either into the wall framing or into structural sheathing, as required by the siding manufacturer's published installation instructions, or in accordance with the applicable code.

6.2 Use on the exterior of above grade walls:

FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards are used on the exterior of above grade walls as follows:

- Exterior Walls of One- and Two-Family Dwellings in accordance with the IRC,
- Exterior walls of one story buildings of Types I, II, III, or IV construction in accordance with Section 2603.4.1.4 of the IBC,
- Exterior walls of Type V construction in accordance with Section 2603.2, Section 2603.3, and Section 2603.4 of the IBC, or
- Exterior walls of buildings of Types I, II, III, or IV construction in accordance with Section 2603.5.5 of the IBC, where indicated in Table 1a as tested in accordance with NFPA 285:
    - For Systems UL Certified in accordance with NFPA 285 incorporating FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards, see Section 7.2 for a link to UL's Product iQ™ database for systems Certified under the UL Classified Exterior Wall Systems category.
    - For CavityComplete exterior wall systems for buildings of Types I, II, III, or IV construction tested in accordance with NFPA 285, ASTM E2357 and ASTM E331, see below and see Section 7.2 of this report for a link to the UL's Product iQ™ database for systems Certified under the UL Classified Exterior Wall for Systems:
        - EWS0008 - CavityComplete for Steel Stud with Masonry Veneer
        - EWS0022 - CavityComplete for CMU with Masonry Veneer

Where indicated in Table 1a, rigid foam insulation boards may be used as an air barrier assembly with an air leakage rate of not greater than 0.04 cfm/ft2 (0.2L/s m2) @75Pa as tested in accordance with ASTM E2357 and when constructed following the conditions of Table 3 for opaque wall construction or Table 4 for penetrated wall construction.

When tested in accordance with ASTM E331, the assemblies in Table 3 and Table 4 demonstrated no leakage at 137 Pa (2.86 psf).

Table 3 – ASTM E2357 / ASTM E331 Assembly Details

Wall Component	Options
Insulation Product	1) Minimum 1-½ inch thick CW 25, CW 25 Foam Sealed, or High R CW Plus Foam Sealed
Base Wall Use 1, 2, 3, or 4	1) Cast Concrete Walls 2) CMU Cast Concrete Walls
Rigid Insulation Board Orientation	1) Horizontally or vertically over Concrete or CMU
Rigid Foam Board Fasteners or Ties[1]	1) Heckmann Building Products Hook & Ladder Joint Reinforcement & Pintle Wire Ties, maximum 16 inch o.c.
Joint and Transition Sealing Materials	1) Owens Corning Foam Seal

Table 4 – ASTM E2357 / ASTM E331 Assembly Details

Wall Component	Options
Insulation Product	1) Minimum 1-½ inch thick CW 25, CW 25 Foam Sealed, or High R CW Plus Foam Sealed
Base Wall Use 1, 2, 3, or 4	1) Cast Concrete Walls 2) CMU Cast Concrete Walls
Rigid Insulation Board Orientation	1) Horizontally or vertically over Concrete or CMU
Rigid Foam Board Fasteners or Ties[1]	1) Heckmann Building Products Hook & Ladder Joint Reinforcement & Pintle Wire Ties, maximum 16 inch o.c.
Joint and Transition Sealing Materials	1) Owens Corning Foam Seal 2) JointSealR Foam Joint Tape or FlashSealR

When constructed following the conditions of Table 5, minimum 1 inch thick FOAMULAR Type X foams may be used as sheathing in wind pressure resistant assemblies.

Table 5– SBCA FS-100 (ASTM E330) Details

Sheathing Orientation[1]	Nominal 2 X 4 SPF Stud Spacing (inch, o.c.)	Minimum Design Load (psf)[2]	Maximum Design Load (psf)[2]
Vertical	16	49.9	73.5
Horizontal	16	90.4	113.0
Vertical	24	30.2	32.5
Horizontal	24	33.4	40.9

[1]Attached with 2-½ inch x 0.113 inch ring shank nails with 1 inch plastic cap: 12 inches perimeter, 16 inches field.
[2]Pressure Equalization Factor (PEF) = 1.0

6.3 Use in Roofing:

Where indicated in Table 1a, FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards are used as a roofing insulation as follows:

- As part of a Class A, B, or C roof-covering assembly for exterior fire exposure when tested in accordance with UL 790, as specified in Section 2603.6 of the IBC. See Section 7.2 of this report for a link to the UL Product iQ™ database for Class A, B, or C roof-covering assemblies UL Classified in accordance with UL 790 incorporating FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards.

- As part of a Roof Deck Construction for interior fire exposure as specified in Section 2603.4.1.5 of the IBC. See Section 7.2 for a link to the UL Product iQ™ database for Roof Deck Constructions for assemblies UL Classified in accordance with UL 1256 incorporating FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards.

Recover and Reroofing: New roofing must not be applied over existing roof-covering systems except in compliance with Section 1510 of the IBC and Maintenance & Repair systems as referenced in UL Classified systems described in Section 7.2 of this report. The fire performance of a roof system is directly affected by the materials covering the foam plastic insulation. The components of the existing roofing that are to remain on the roof deck must be inspected in accordance with Section 1511 of the IBC or Section R908 of the IRC. Unless listed as a Maintenance and Repair system the existing roof-covering membrane and, if necessary, the cover board must be removed before new roofing materials are installed; the new roofing materials must have characteristics specifically described in this report.

6.4 Use in Fire-Resistance Rated Wall and Roof-Ceiling Construction:

Where indicated in Table 1a, FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards are used as part of fire-resistance rated wall construction and roof-ceiling construction as specified in Section 703 of the IBC or Section R302 of the IRC. See Section 7.2 of this report for a link to the UL Product iQ™ database for Fire-Resistance designs UL Classified in accordance with UL 263 incorporating FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards.

For CavityComplete fire-resistance rated wall system construction as specified in Chapter 7 of the IBC see links to the UL Product iQ™ database for Fire-Resistance designs UL Classified in accordance with UL 263:

- V317 CavityComplete Wall system for Wood Stud with Masonry Veneer
- W429 CavityComplete Wall System for Steel Stud with Masonry Veneer
- U938 CavityComplete Wall System for CMU with Masonry Veneer

6.5 Use in Attics and Crawl Spaces:

Where indicated in Table 1a, FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards may be used in the floors and walls of attics, and the walls of crawl spaces without the coverings listed in Section 2603.4.1.6 of the IBC or Section R316.5.3 and Section R316.5.4 of the IRC, as follows:

1. Entry to the attic or crawl space is limited to service of utilities, and no storage is permitted. Utilities include, but are not limited to, mechanical equipment, electrical wiring, fans, plumbing, gas or electric hot water heaters, and gas or electric furnaces.
2. There are no interconnected crawl space areas
3. Air in the attic or crawl space is not circulated to other parts of the building.
4. Under-floor (crawl space) ventilation is provided when required by Section 1202.4 of the 2018 IBC, Section 1203.4 of the 2015 IBC, or Section R408.1 of the IRC, as applicable.
5. Combustion air is provided in accordance with Section 701 of the International Mechanical Code.
6. FOAMULAR® insulation boards are limited to a maximum thickness of 2 inches (50.8mm) and a maximum density of 1.8 pcf (28.8 kg/m^3).
7. FOAMULAR® NGX™ XPS insulation boards are limited to a maximum thickness of 2 inches (50.8mm) and a maximum density of 1.5 pcf (24.0 kg/m^3).

6.6 Use Without a Thermal Barrier

FOAMULAR® insulation boards with a maximum thickness of 2 in. and a maximum density of 1.80 pcf, may be installed on any or all surfaces (wall, ceiling, floor) of a detached garage, pole barn, telecommunication shelter, concrete modular building, agricultural building, buildings under the IBC Utility and Miscellaneous Group U or other structures under the IBC or IRC, with no thermal or ignition barrier applied to the foam plastics, based on testing in accordance with NFPA 286, and Section 2603.9 of the IBC or Section R316.6 of the IRC, when all other requirements of the building code for that building are met.

FOAMULAR® NGX™ XPS insulation boards with a maximum thickness of 2 in. and a maximum density of 1.50 pcf may be installed on wall surfaces of a detached garage, pole barn, telecommunication shelter, concrete modular building, agricultural building, buildings under the IBC Utility and Miscellaneous Group U or other structures under the IBC or IRC, with no thermal or ignition barrier applied to the foam plastics, based on testing in accordance with NFPA 286, and Section 2603.9 of the IBC or Section R316.6 of the IRC, when all other requirements of the building code for that building are met.

6.7 Use as a Water-Resistive Barrier

FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards with joints sealed using JointSealR Foam Joint Tape and FlashSealR or for CMU structural walls, with ProPink ComfortSeal™ Gun Foam Sealant and FlashSealR may be used as an alternative to the water-resistive barrier required by Section 1404.2 of the IBC and Section R703.2 of the IRC when installed in accordance with this Section. The boards must be covered with an approved exterior wall covering.

FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards measuring 2 feet by 8 feet or 4 feet by 8 feet are installed horizontally or vertically with long joints and end joints in contact with one another. When installed directly on framing members, the insulation boards measuring 2 feet by 8 feet must be installed horizontally and framing members are spaced a maximum of 16 inches on center. For wood framing, the insulation boards are attached using 3/8-inch-diameter-head galvanized nails, 1-inch-crown plastic washers or equivalent fasteners long enough to penetrate framing a minimum of 3/4 inch, or through the sheathing, whichever is less. For steel framing, the insulation boards are attached using No. 6, Type S drywall screws with 1-inch minimum plastic washers long enough to penetrate the framing a minimum of 3/4 inch. Fasteners must not be over-driven. Fasteners must be spaced a minimum of 12 inches on center around the perimeter and 16 inches on center in the field. For window installations, the nailing flange is set against sealant bedding and fastened to the framing with galvanized roofing nails 3 inches from each corner and 8 inches on center. Minimum 3-inch-wide flashing is used to seal the sills of windows and minimum 2-inch-wide (50.8mm) flashing is used to seal jambs and heads. Window installation must be in accordance with the window manufacturer's instructions.

Flashing of flanged window penetrations must be installed in accordance with Section 1404.4 of the 2018 IBC and Section 1405.4 of the 2015 IBC. The flashing tape must completely cover the framing sill and extend a minimum of 8 inches (203 mm) up the sides of the opening and 6 inches (152 mm) onto the face of the insulation at the front of the window opening. Joints between boards must be covered by minimum 3-½-inch-wide JointSealR Foam Joint Tape positioned using hand pressure and finished with a roller. Penetrations in exterior walls must be sealed with a sealant complying with ASTM C920, Type S or M, Grade NS, Class 25, or with expanding spray foam sealant complying with AAMA 812 as part of the penetration flashing procedure.

When the insulation boards are applied over open framing, vertical butt joints must be over framing members. Horizontal joints of foam plastic boards must be tongue-and-groove or supported by blocking.

For cementitious exterior wall coating systems, unbacked joints are permitted only when specified in an approved cementitious exterior wall coating system.

It is important that the roof and the interior sides of walls are water-tight prior to application of the air and water barrier system. The manufacturer's installation instructions shall be followed for proper flashing of through-penetrations and fenestrations.

6.8 Use Under Slabs-on-Ground, Slabs on Decks, Concrete Pavers, and Concrete Pavers on Pedestals:

FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards may be used under slabs-on-ground, slabs on decks, concrete pavers, and concrete pavers on pedestals when designed in accordance with strength design, load and resistance factor design, allowable stress design, empirical design or conventional construction methods. ACI 360 provides guidance for the design of floor slabs installed over insulation as a slab-on-ground. The insulation modulus specified in Section 13.2.1 of ACI 360 should be determined based on data provided in Table 6.

Table 6 – FOAMULAR® and FOAMULAR® NGX™ XPS Insulation Foundation Properties

ASTM TYPE	Foundation Modulus (pci)[1,2,3]						Compressive Stress (psi)		
	1 in Thick	1.5 in Thick	2 in Thick	2.5 in Thick	3 in Thick	4 in Thick	Live[4] Recommended	Dead[4] Recommended	Ultimate[5]
Foamular 150 Type X	590	550	500	450	400	300	3	5	15
Foamular 250 Type IV	750	710	675	595	565	510	5	8.3	25
Foamular 400 Type VI	1,100	1,000	900	780	680	650	8	13.3	40
Foamular 600 Type VII	1,520	1,400	1,275	1,150	1,040	790	12	20	60
Foamular 1000 Type V	-	-	2,600	-	-	-	20	33.3	100

[1]Foundation modulus is a measure of deflection at given loads, expressed as inches deflection per inch of thickness or "pci".

[2]For insulation installed in multiple layers, assuming the layers are identical, the foundation modulus for the system equals the foundation modulus for one of the layers divided by the total number of layers.

[3]For insulation systems that utilize a variety of thicknesses, the system foundation modulus is determined by adding the reciprocal of the foundation modulus of the individual layers. The total is the reciprocal value for the foundation modulus of the entire system.

[4]Recommended stress (load) levels will limit long term compressive creep to not exceed 2% in 20 years.

[5]Ultimate compressive stress is measured at 10% deformation or yield, whichever occurs first. For thinner product (1 in.), yield typically occurs first. For thicker products (1.5 in. and thicker), yield typically occurs first with 3% to 4% deformation.

7. CONDITIONS OF USE

7.1 General:

The FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards described in this report comply with, or are suitable alternatives to what is specified in those codes listed in Section 2 of this report, subject to the following conditions. The FOAMULAR XPS insulation boards must be produced, identified, and installed in accordance with the manufacturer's published installation instructions and this report. If there is a conflict between this report and the manufacturer's instructions this report governs.

FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards must be separated from the building interior with a thermal barrier, such as ½-inch thick gypsum board, as required by Section 2603.4 of the IBC or Section R316.4 of the IRC, as applicable.

7.2 UL Certifications:

See the UL Product iQ™ database for the following categories:

- Foamed Plastic, UL Classified for Surface Burning Characteristics in accordance with UL 723 (BRYX).
- Class A, B or C roof-covering assemblies, UL Classified in accordance with UL 790 (TGFU).
- Class A, B, or C Maintenance and Repair roof-covering assemblies, UL Classified in accordance with UL 790 (TGFU)
- Roof Deck Constructions, UL Classified in accordance with UL 1256 (TJBX).
- Products evaluated as a component of fire-resistance-rated wall assemblies in accordance with UL 263, Foamed Plastic (CCVW).
- Products evaluated as a component of fire-resistance-rated roof-ceiling assemblies in accordance with UL 263, Foamed Plastic (CCVW).
- Exterior Walls for assemblies UL Classified in accordance with NFPA 285 (FWFO).
- Products evaluated for geofoam applications in accordance with ASTM D6817 (QORW).
- Foamed Plastic, UL Classified with regard to flame propagation and damageability under specified room fire conditions only in accordance with UL 1715 (OERU).

7.3 Manufacturing Locations:

The products are manufactured at the following locations described in Table 7 under the UL LLC Listing or Classification and Follow-Up Service Program, which includes audits in accordance with ICC-ES Acceptance Criteria for Quality Documentation, AC 10.

Table 7 – Manufacturing Locations

LISTEE	LOCATION	PLANT ID NO.
OWENS CORNING FOAM INSULATION, LLC	170 South Ave Tallmadge, OH 44278 USA	A
OWENS CORNING FOAM INSULATION, LLC	2710 Laude Dr. Rockford, IL 61109 USA	B
OWENS CORNING FOAM INSULATION, LLC	542 Rue Gaetan Valleyfield, Quebec, J6S 0A7 Canada	C
OWENS CORNING FOAM INSULATION, LLC	18456 NE Wilkes Rd Portland, OR 97230 USA	D
OWENS CORNING MEXICO	Carr A Villa De Garcia KM 2.5 Parque Industrial Diamante Nave 5 66350 Santa Catarina NL Mexico	E

8. SUPPORTING EVIDENCE

8.1 FOAMULAR® and FOAMULAR® NGX™ Insulation Boards:

8.1.1 Data in accordance with ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12).

8.1.2 Data in accordance with ICC-ES Acceptance Criteria for Foam Plastic Sheathing Panels used as Water Resistive Barriers (AC71).

8.1.3 Reports of fire propagation tests in accordance with NFPA 285.

8.1.4 Reports of physical and thermal properties in accordance with ASTM C578.

8.1.5 Reports of air leakage resistance in accordance with ASTM E2357.

8.1.6 Reports of water penetration resistance in accordance with ASTM E331.

8.1.7 UL Classification reports in accordance with UL 723, UL 790, UL 1256, UL 263, NFPA 285, and UL 1715. See the following UL Product Certification Categories BRYX, TGFU, TJBX, CCVW, FWFO and OERU, respectively.

8.1.8 Reports of wind resistance in accordance with SBCA FS 100.

8.1.9 Reports of physical properties in accordance with ASTM D6817.

8.1.10 Documentation of quality system elements described in AC10.

8.1.11 Reports of room corner fire tests in accordance with NFPA 286 and AC12, Appendix A and B

9. IDENTIFICATION

The FOAMULAR® and FOAMULAR® NGX™ XPS insulation boards described in this evaluation report are identified by a marking bearing the report holder's name (Owens Corning), the plant identification, the product name, the ASTM type designation, the UL Classification Mark, and the evaluation report number UL ER8811-01. The validity of the evaluation report is contingent upon this identification appearing on the product, product unit wrap, or UL Classification Mark certificate.

10. USE OF UL EVALUATION REPORT

10.1 The approval of building products, materials or systems is under the responsibility of the applicable authorities having jurisdiction.

10.2 UL Evaluation Reports shall not be used in any manner that implies an endorsement of the product, material or system by UL.

10.3 The status of this report, as well as a complete directory of UL Evaluation Reports may be found at UL.com via the Product iQ™ database.