

# UL Solutions Evaluation Report

**UL ER16529-01**

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**UL Category Code: ULEX – THERMAL PROTECTION**

**CSI MasterFormat®**

DIVISION: 06 00 00 – WOOD, PLASTICS AND COMPOSITES

Sub-level 2: 06 12 00 – Structural Panels

Sub-level 3: 06 12 19 – Shear Wall Panels

Sub-level 4: 06 16 00 – Sheathing

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

Sub-level 3: 07 27 00 – Air Barriers



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DIVISION: 31 00 00 – EARTHWORKS  
Sub-level 3: 31 23 00 – Excavation and Fill  
Sub-level 4: 31 23 23 – Fill

### Company:

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### 1. Subject

**ATLAS MOLDED POLYSTYRENE, THERMALSTAR, THERMALSTAR GPS, THERMALSTAR LCI, THERMALSTAR LWI, THERMALSTAR LRI, THERMALSTAR LCI GPS, THERMALSTAR LWI GPS, ELEVATION GEOFOAM**

### 2. Scope of evaluation

- 2021, 2018, 2015, and 2012 *International Building Code*® (IBC)
- 2021, 2018, 2015, and 2012 *International Residential Code*® (IRC)
- 2021, 2018, 2015, and 2012 *International Energy Code*® (IECC)
- 2021, 2018, 2015, and 2012 *International Mechanical Code*® (IMC)
- ICC-ES Acceptance Criteria for Quality Documentation (AC10)
- 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 Termite Resistant Foam Plastic (AC239)
- ICC-ES Acceptance Criteria for Rigid Cellular Polystyrene (RCPS) Geofoam used in Interior Floor Applications (AC452)

The products were evaluated for the following properties:

- Fire-resistance-rated construction (UL 263)
- Surface Burning Characteristics (UL 723)
- Roofing Systems for Exterior Fire Exposure (UL 790)
- Roof Deck Construction Material with Resistance to Internal Fire Exposure (UL 1256)
- Foam Plastic Special Approval (UL 1715)
- Uplift Tests for Roof Covering Systems (UL 1897)
- Physical Properties (ASTM C578)
- Physical Properties (ASTM D6817)
- Air Barrier (ASTM E2178)
- Physical Properties (ASTM E2430)
- For Use in Attics and Crawl Spaces (AC12, App. A and B)
- Water-resistive Barrier (AC71)
- Termite Resistance (AC239)
- Rigid Cellular Polystyrene Geofoam (AC452)
- Potential Heat (NFPA 259)
- For Use on Exterior Commercial Walls (NFPA 285)
- For Use Without a Thermal Barrier – Special Approval (NFPA 286)

### 3. Referenced documents

- ICC-ES Acceptance Criteria for Quality Documentation (AC10)
- 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 Termite Resistant Foam Plastic (AC239)
- ICC-ES Acceptance Criteria for Rigid Cellular Polystyrene (RCPS) Geofoam used in Interior Floor Applications (AC452)
  
- UL 263, Fire Tests of Building Construction and Materials
- UL 723, Test for Surface Burning Characteristics of Building Materials
- UL 790, Standard Test Methods for Fire Tests of Roof Coverings
- UL 1256, Fire Test of Roof Deck Constructions
- UL 1715, Fire Test of Interior Finish Material
- UL 1897, Uplift Tests for Roof Covering Systems
  
- ASTM C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
- ASTM D6817, Standard Guide for Rigid Cellular Polystyrene Geofoam
- ASTM E2178, Standard Test Method for Air Permeance of Building Materials
- ASTM E2430, Standard Specification for Expanded Polystyrene (EPS) Thermal Insulation Boards for Use in Exterior Insulation and Finish Systems (EIFS)
  
- NFPA 259, Standard Test Method for Potential Heat of Building Materials
- 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
  
- AAMA 711, Voluntary Specification for Self-Adhering Flashing Used for Installation of Exterior Wall Fenestration Products

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### 4. Uses

#### 4.1 Atlas Molded Polystyrene and ThermalStar

Atlas Molded Polystyrene and ThermalStar are insulation boards used on the interior or exterior of above grade walls, on the interior or exterior of below grade walls, below concrete slabs, around concrete slab edges, or as roof insulation. Installation shall be in accordance with Section 6.1 of this report.

The insulation boards may be used on walls in attics and crawl spaces without an ignition barrier when installation is in accordance with Section 6.1.4 of this report.

The insulation may be used without a thermal barrier on wall, ceiling, and floor surfaces of buildings and structures of an accessory character as regulated under IBC Section 312 (Utility and Miscellaneous, Group U), such as, detached garages, pole barns, telecommunication shelters, concrete modular buildings, and agricultural buildings, with no thermal or ignition barrier applied to the foam plastic, based on testing in accordance with NFPA 286, and 2021, 2018 and 2015 IBC Section 2603.9 and 2012 IBC Section 2603.10, or IRC Section R316.6, when all other requirements of the building code for that building are met, and when installed in accordance with Section 6.3 of this report.

##### 4.1.1 ThermalStar for use in Roofing

ThermalStar may be provided in flat boards, tapered boards, fan fold, or as flute fill for use as nonstructural insulation as components of a UL Classified Class A, B, or C roof-covering assembly in accordance with UL 790. The boards may also be installed directly to steel decks as components of a UL Classified roof deck construction in accordance with UL 1256. Installation shall be in accordance with Section 6.2 of this report.

##### 4.1.2 ThermalStar for use in Exterior Wall Systems

ThermalStar may be used as nonstructural insulation in buildings of any construction type as a component of a one-coat cementitious exterior wall coating system. When used for this application, ThermalStar utilizes a shiplap or tongue-and-groove (T&G) edge profile. The insulation is for use on the outside faces of exterior walls when an ASTM C578 Type I or Type II board is required to be recognized for use in a one-coat cementitious exterior wall coating system. The insulation may also be directly exposed in attic and crawl spaces without a covering when installed as described in Section 6.1.4. In areas where the probability of termite infestation is defined as "very heavy", the insulation must be installed in accordance with 2021, 2018 and 2015 IBC Section 2603.8, 2012 IBC Section 2603.9 or IRC Section R318.1, as applicable. Use below grade is limited to areas exposed to the Reticulitermes and Formosan Subterranean termite genus.

##### 4.1.3 ThermalStar for use in EIFS

ThermalStar may be used as nonstructural insulation on the outside faces of exterior walls as a component in exterior insulation and finish systems (EIFS). The boards have been found to comply with ASTM C578 Type I or Type II and ASTM E2430.

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### **4.2 ThermalStar Laminated Products**

#### **4.2.1 ThermalStar LWI and ThermalStar LCI**

ThermalStar LWI and ThermalStar LCI are laminated nonstructural insulation boards having polymeric film facers and may be used as an alternative to the water-resistive barriers specified in the codes when installed in accordance with Section 6.2.1. ThermalStar LWI is used as a wall insulation. ThermalStar LCI is used as a crawlspace insulation.

ThermalStar LWI insulation may also be installed in accordance with Section 6.1 and on the outside faces of exterior walls when an ASTM C578 Type I or Type II board is approved for a one-coat cementitious exterior wall coating system.

#### **4.2.2 ThermalStar LRI**

ThermalStar LRI are laminated nonstructural insulation boards having polymeric film facers and may be used as components of a UL Classified Class A, B, or C roof-covering assembly in accordance with UL 790. Installation shall be in accordance with Section 6.10 of this report.

### **4.3 Elevation Geofam**

Elevation Geofam is used as lightweight structural fill in floor cavities. Installation shall be in accordance with Section 6.12. Installation as insulation may also occur in accordance with Section 6.1.

### **4.4 Graphite Polystyrene (GPS)**

ThermalStar is available manufactured from graphite enhanced expanded polystyrene.

### **4.5 TalonGuard Treatment**

Atlas Molded Polystyrene, ThermalStar, and Elevation Geofam may be provided with TalonGuard treatment. TalonGuard treated products are designed for use where termites are a concern. In areas where the probability of termite infestation is defined as “very heavy”, the insulation must be installed in accordance with 2021, 2018 and 2015 IBC Section 2603.8, 2012 IBC Section 2603.9 or IRC Section R318.1, as applicable. Use is limited to areas exposed to the Reticulitermes and Formosan Subterranean termite genus.

### **4.6 Orange Treatment**

ThermalStar may be provided with an Orange treatment formulated for below grade use. Accordingly, in areas where the probability of termite infestation is defined as “very heavy”, the insulation must be installed in accordance with 2021, 2018 and 2015 IBC Section 2603.8, 2012 IBC Section 2603.9 or IRC Section R318.1, as applicable. Use below grade is limited to areas exposed to the Reticulitermes and Formosan Subterranean termite genus.

## **5. Product description**

### **5.1 General**

All Atlas Molded Products insulation boards described in this report are molded, closed-cell expanded polystyrene foam plastic having a flame spread index not exceeding 25 and a smoke developed index not exceeding 450 when tested in accordance with UL 723 as required by IBC Section 2603.3 or IRC Section 316.3, as applicable. The boards have been found to comply with ASTM C578 as described below under product descriptions. Boards may be provided with GPS, TalonGuard or orange treatment. See Table 1 for minimum R-values of the products.

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Table 1 – Thermal Resistance Values  
(For SI: 1 lb/ft<sup>3</sup> = 16.018 kg/m<sup>3</sup>, 1°F ft<sup>2</sup> h/Btu = 0.176°K m<sup>2</sup>/W, 1inch = 25.4 mm.)

| ASTM C578 Type | Minimum Density,<br>lb/ft <sup>3</sup> (kg/m <sup>3</sup> ) | Minimum Thermal Resistance <sup>1</sup> ,<br>°F ft <sup>2</sup> h/Btu (°K m <sup>2</sup> /W) |
|----------------|---|--|
| XI             | 0.70 (11.2)   | 3.1 (0.55)   |
| I              | 0.90 (14.4)   | 3.6 (0.63)   |
| VIII           | 1.15 (18.4)   | 3.8 (0.67)   |
| II             | 1.35 (21.6)   | 4.0 (0.70)   |
| IX             | 1.80 (28.8)   | 4.2 (0.74)   |
| XIV            | 2.40 (38.4)   | 4.2 (0.74)   |
| XV             | 3.00 (48.1)   | 4.3 (0.76)   |

<sup>1</sup>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.

### 5.2 Atlas Molded Polystyrene and ThermalStar

Atlas Molded Polystyrene and ThermalStar insulation boards comply with ASTM C578 and are manufactured at minimum densities of 0.70, 0.90, 1.15, 1.35, 1.80, 2.40, and 3.00 pcf (11.2, 14.4, 18.4, 21.6, 28.8, 38.4, and 48.1 kg/m<sup>3</sup>). ASTM C578 designations are Type XI, Type I, Type VIII, Type II, Type IX, Type XIV, and Type XV respectively.

The insulation boards are produced having thicknesses up to 6 inches (152 mm), and in various sizes, with square, shiplap or tongue-and-groove edge profiles.

#### 5.2.1 ThermalStar for use in Roofing

ThermalStar insulation boards for use in roofing applications comply with ASTM C578 and are manufactured at minimum densities of 0.90, 1.15, 1.35, 1.80, 2.40 and 3.00 pcf (14.4, 18.4, 21.6, 28.8, 38.4 and 48.1 kg/m<sup>3</sup>). ASTM C578 designations are Type I, Type VIII, Type II, Type XI, Type XIV and Type XV respectively. ThermalStar roofing insulation boards are used as nonstructural roofing insulation as described in 4.1.1 of this report.

The boards are produced in various sizes and may be tapered or beveled to create roof drainage or fit roof decks.

#### 5.2.2 ThermalStar for use in Exterior Wall Systems

ThermalStar insulation for use in exterior wall systems complies with ASTM C578 and is manufactured at minimum densities of 0.90 and 1.35 pcf (14.4 and 21.6 kg/m<sup>3</sup>). ASTM C578 designations are Type I and Type II, respectively.

The ThermalStar insulation consists of nominally 1-inch-thick (25 mm) boards produced in various sizes with shiplap or tongue-and-groove (T&G) edge profiles.

#### 5.2.3 ThermalStar for use in EIFS

ThermalStar insulation board for use in EIFS complies with ASTM C578 Type I and ASTM E2430. The insulation boards are manufactured at a minimum density of 0.90 pcf (14.4 kg/m<sup>3</sup>).

The insulation boards are produced having thicknesses up to 6 inches (152 mm) and in various sizes.

#### 5.2.4 Potential Heat

See Table 2 for potential heat content of insulation boards when tested in accordance with NFPA 259.

Table 2—Potential Heat of Insulation Boards

| ASTM C578 Type | Heat Potential (Btu/ft <sup>2</sup> ) <sup>1</sup> | Heat Potential (mJ/m <sup>2</sup> ) <sup>1</sup> |
|----------------|--|--|
| XI             | 1125   | 12.8   |
| I              | 1500   | 17.0   |
| VIII           | 1875   | 21.3   |
| II             | 2250   | 25.5   |
| IX             | 3000   | 34.0   |
| XIV            | 3600   | 40.8   |
| XV             | 4500   | 51.0   |

<sup>1</sup>Based on 1-inch thickness

### 5.2.5 Vapor Retarder

See Table 3 for vapor permeance of Atlas Molded Polystyrene and ThermalStar insulation boards. Vapor retarders are classified in the IBC & IRC as follows:

Class I: 0.1 perm or less      Class II: >0.1 perm to 1.0 perm      Class III: >1.0 perm to 10.0 perms

Table 3 – Water Vapor Permeance of Atlas EPS non-Faced Products

| ASTM C578 Type | Maximum Permeance (perm) <sup>1</sup> | Maximum Permeance (ng/Pa*s*m <sup>2</sup> ) <sup>1</sup> |
|----------------|---------------------------------------|--|
| XI             | 5.0                                   | 287  |
| I              | 5.0                                   | 287  |
| VIII           | 3.5                                   | 201  |
| II             | 3.5                                   | 201  |
| IX             | 2.5                                   | 143  |
| XIV            | 2.5                                   | 143  |
| XV             | 2.5                                   | 143  |

<sup>1</sup>Water vapor permeance values are based on 1-inch thickness when tested in accordance with ASTM C578 & ASTM E96 under desiccant conditions. Actual water vapor permeance values may be calculated based on insulation thickness, by dividing the perm value shown by the installed thickness in inches.

## 5.3 ThermalStar Laminated Products

### 5.3.1 ThermalStar LCI and ThermalStar LWI

ThermalStar LCI and ThermalStar LWI are insulation boards with polymeric film facers adhered to both sides of Atlas Molded Polystyrene as described in Section 5.2. The insulation boards are produced as sheets with square, shiplap, or tongue-and-groove edge profiles and as fanfold.

### 5.3.2 ThermalStar LRI

ThermalStar LRI boards are insulation boards with PVC membrane compatible polymeric film facers adhered to both sides of Atlas Molded Polystyrene as described in Section 5.2. The insulation boards are produced as sheets with square, shiplap or tongue-and-groove edge profiles and as fanfold.

### 5.3.5 ThermalStar Tape

When ThermalStar LCI and ThermalStar LWI boards are used as an alternate to the water-resistive barrier, board joints must be taped. The tape consists of a polyethylene backing with a rubber-based adhesive and has a nominal thickness of 6 mils [0.006 inch (0.15 mm)] and a minimum width of 2 inches (51 mm). The tape is supplied in rolls 36 yards (32.9 m) long. AAMA 711 approved 3-inch minimum wide flashing tapes and flashing materials 4-inch wide may also be used to seal insulation board joints, window, door, roof, and foundation transitions.

### 5.3.6 Air Permeability

At a minimum thickness of ½ inch (12mm), ThermalStar LCI and ThermalStar LWI insulation boards are considered air-impermeable in accordance with IRC Section 806.5, 2021 IECC Section C402.5.1.3, 2018 and 2015 IECC Section C402.5.1.2.1, and 2012 IECC Section C402.4.1.2.1, based on testing in accordance with ASTM E2178.

## 5.4 Elevation Geofoam

Elevation Geofoam boards and blocks comply with ASTM C578 and ASTM D6817. The product is manufactured at minimum densities of 0.70, 0.90, 1.15, 1.35, 1.80, 2.40, and 2.85 lbs/ft<sup>3</sup> and has ASTM D6817 designations of EPS12, EPS15, EPS19, EPS22, EPS29, EPS39, and EPS46 respectively. These materials also meet the requirements of ASTM C578 Type XI, Type I, Type VIII, Type II, Type IX, Type XIV, and Type XV respectively. See excerpt from ASTM D6817, Table 4 below.

Table 4 – ASTM D6817 Physical Property Requirements for RCPS Geofoam

| ASTM D6817 Type | Minimum Density, lb/ft <sup>3</sup><br>(kg/m <sup>3</sup> ) | Minimum Compressive<br>Resistance at 1% Strain,<br>psi (kPa) |
|-----------------|---|--|
| EPS12           | 0.70 (11.2)   | 2.2 (15)   |
| EPS15           | 0.90 (14.4)   | 3.6 (25)   |
| EPS19           | 1.15 (18.4)   | 5.8 (40)   |
| EPS22           | 1.35 (21.6)   | 7.3 (50)   |
| EPS29           | 1.80 (28.8)   | 10.9 (75)  |
| EPS39           | 2.40 (38.4)   | 15.0 (103)   |
| EPS46           | 2.85 (45.7)   | 18.6 (128)   |

### 5.5 Graphite Polystyrene (GPS)

Atlas Molded Polystyrene and ThermalStar products manufactured with graphite enhanced expanded polystyrene are similar to insulation described in Section 5.1 of this report and comply with ASTM C578 for Type I, Type VIII, Type II, and Type IX. See Table 5 for minimum R-values of GPS products.

Table 5 –GPS Thermal Resistance Values - 1°F ft<sup>2</sup> h/Btu (°K m<sup>2</sup>/W) <sup>1</sup>  
(For SI: 1 lb/ft<sup>3</sup> = 16.0 kg/m<sup>3</sup>, 1°F ft<sup>2</sup> h/Btu = 0.176°K m<sup>2</sup>/W, 1inch = 25.4 mm.)

| ASTM C578 Type | Minimum Density,<br>lb/ft <sup>3</sup> (kg/m <sup>3</sup> ) | Minimum Thermal Resistance <sup>1</sup> ,<br>°F ft <sup>2</sup> h/Btu (°K m <sup>2</sup> /W) |
|----------------|---|--|
| I              | 0.90 (14.4)   | 5.0 (0.88)   |
| VIII           | 1.15 (18.4)   | 5.0 (0.88)   |
| II             | 1.35 (21.6)   | 5.0 (0.88)   |
| IX             | 1.80 (28.8)   | 5.0 (0.88)   |

<sup>1</sup>Thermal resistance (R) values are based on tested values at 1.06-inch thickness and 75° F mean temperature and must be multiplied by the installed thickness for thicknesses greater than 1 inch.

### 5.6 TalonGuard Treatment

TalonGuard treated boards are treated for termite resistance and are similar to insulation described in Section 5.1. The insulation boards comply with ASTM C578 Type XI, Type I, Type VIII, Type II, Type IX, Type XIV and Type XV. The insulation boards are used as described in Section 4.1 and when installed as described in Section 6.1.7 of this report.

### 5.7 Orange Treatment

Orange treated boards are light orange and similar to insulation boards described in Section 5.1. The insulation boards comply with ASTM C578 Type I, Type VIII, Type II, Type IX, Type XIV and Type XV. The insulation boards are used as described in Section 4.4 and when installed as described in Section 6.1.9 of this report.

## 6. Installation

### 6.1 General

Installation of Atlas Molded Products foam plastic insulation must comply with this report and the manufacturer's published installation instructions. The manufacturer's published installation instructions must be available at all times on the jobsite during installation. The insulation boards must be attached to supports in a manner that will secure the insulation in place.

The interior of the building must be separated from the insulation boards with a thermal barrier as required in IBC Section 2603.4 or IRC Section R316.4, as applicable, except as described in Sections 6.6, 6.8, or 6.9 of this report.

The code official may require an approved vapor retarder to be installed in accordance with 2021 and 2018 IBC Section 1404.3, 2015 and 2012 IBC Section 1405.3, or IRC Section R702.7, or the IECC, as applicable.

A water-resistive barrier in compliance with 2021 and 2018 IBC Section 1402.2, 2015 and 2012 IBC Section 1404.2, or IRC Section R703.2 is required and, when applied over wood-based sheathing, must comply with IBC Section 2510.6, or 2021, 2018 and 2015 IRC Section R703.2, or 2012 IRC Section R703.6.3.

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The insulation boards must not be used structurally to resist transverse, vertical, or in-plane loads on the basis of this Evaluation 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 2021, 2018 and 2015 IBC Sections 2308.6 and 2308.6.2, 2012 IBC Sections 2308.9.3 and 2308.12.4 or IRC Section R602.10.3.

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 exterior cladding manufacturer's published installation instructions, or in accordance with the applicable code.

### 6.1.1 Uses on Exterior Walls

Atlas Molded Polystyrene and ThermalStar insulation boards may be 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 IBC Section 2603.4.1.4,
- Exterior walls of Type V construction in accordance with Section 2603.2, 2603.3, and 2603.4 of the IBC,
- Exterior walls of buildings of Types I, II, III, or IV construction in accordance with IBC Section 2603.5, when part of a UL Classified Exterior Wall System in accordance with NFPA 285. See Section 7.8 of this report.
- ThermalStar in NFPA 285 assemblies shown in Section 6.11 of this report for exterior walls of buildings of Types I, II, III, or IV construction in accordance with IBC Section 2603.5.

ThermalStar insulation is used as wall insulation over framing as follows:

1. When installed directly to framing spaced a maximum of 24 inches on center
2. Fasteners must be corrosion-resistant roofing nails with a minimum 3/8-inch-diameter (9.5 mm) head; 6d ring-shank nails and 15/16-inch-diameter (24 mm) plastic washers; self-drilling screws with 3/4-inch-diameter (19 mm) cap washers; or 1-inch-wide-crown (25.4 mm), No. 16 gage staples.

### 6.1.2 Fire-Resistance Rated Wall Construction

ThermalStar insulation boards have been evaluated for fire resistance when used as a part of UL Fire Resistance Design Nos. U326, U330, U425, U460, U902, V302, V303, V451, V454, V499, W307, and W456. These products are identified as ThermalStar on UL Product iQ. See Section 7.8 of this report. Fire resistance ratings are only applicable when the assemblies are constructed in accordance with the published designs.

### 6.1.3 ThermalStar for use in EIFS

ThermalStar insulation board may be installed as part of an EIFS system when evaluated for that purpose.

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### 6.1.4 Attics and Crawl Spaces – Installation Without Code Prescribed Ignition Barrier

Atlas Molded Polystyrene and ThermalStar insulation boards may be used in attics and crawl spaces without the coverings listed in IBC Section 2603.4.1.6 or IRC Sections R316.5.3 and R316.5.4, as follows:

1. Attic ventilation is provided when required by 2021 and 2018 IBC Section 1202.2, 2015 and 2012 IBC Section 1203.2 or IRC Section R806, as applicable, except when used as an air-impermeable insulation in unventilated attic assemblies as permitted under the conditions prescribed in 2021, 2018 and 2015 IRC Section R806.5.
2. Under-floor (crawl space) ventilation is provided when required by 2021 and 2018 IBC Section 1202.4; 2015 IBC Section 1203.4; 2012 IBC Section 1203.3; or IRC Section R408.1, as applicable, except when unventilated crawlspace assemblies are permitted under the conditions prescribed in 2018, 2015, and 2012 IRC Section R408.3.
3. Combustion air is provided in accordance with Section 701 of the IMC, or Section M1703.4 of the IRC, as applicable.
4. Insulation boards are limited to a maximum nominal density of 1 pcf (16 kg/m<sup>3</sup>) and maximum nominal thickness of 4 inches (102 mm); or maximum nominal density of 2 pcf (32 kg/m<sup>3</sup>) and maximum nominal thickness of 2 inches (51 mm); or maximum nominal density of 1.5 pcf (24 kg/m<sup>3</sup>) and maximum nominal thickness of 2-<sup>2</sup>/<sub>3</sub> inches (68 mm); or a maximum nominal density of 1.25 pcf (20 kg/m<sup>3</sup>) and maximum nominal thickness of 3-<sup>1</sup>/<sub>4</sub> inches (82 mm).

### 6.1.5 Residential Basements

Atlas Molded Polystyrene and ThermalStar insulation boards may be installed on wall surfaces of residential basements with a thermal barrier applied to the foam plastics when all other requirements of the building code for that building are met.

### 6.2 ThermalStar for use in Roofing

ThermalStar insulation boards are used as a roofing insulation as follows:

- As part of a UL Classified Class A, B or C roof-covering assembly in accordance with UL 790, or
- As part of a UL Classified Roof Deck Construction in accordance with UL 1256

**Reroofing:** New roofing must not be applied over existing roof-covering systems described in this report, since the fire performance of the systems 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 2021 IBC Section 1511 or 2018, 2015, 2012 IBC Section 1510 or 2021, 2018 and 2015 IRC Section R908 and 2012 IRC Section R907. 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.

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### 6.3 Other Structures

Atlas Molded Polystyrene and ThermalStar insulation boards may be installed on any or all surfaces (wall, ceiling, floor) of buildings and structures of an accessory character as regulated under IBC Section 312 (Utility and Miscellaneous, Group U), such as a detached garages, pole barns, telecommunications shelters, concrete modular buildings, or agricultural buildings, with no thermal or ignition barrier applied to the foam plastics, based on testing in accordance with NFPA 286, 2021, 2018 and 2015 IBC Section 2603.9 and 2012 IBC Section 2603.10, or IRC Section R316.6, when all other requirements of the building code for that building are met. Insulation boards are limited to:

- a maximum nominal density of 1 pcf (16 kg/m<sup>3</sup>) and maximum nominal thickness of 4 inches (102 mm) or
- A maximum nominal density of 2 pcf (32 kg/m<sup>3</sup>) and maximum nominal thickness of 2 inches (51 mm) or
- a maximum nominal density of 1.5 pcf (24 kg/m<sup>3</sup>) and maximum nominal thickness of 2-<sup>2</sup>/<sub>3</sub> inches (68 mm) or
- a maximum nominal density of 1.25 pcf (20 kg/m<sup>3</sup>) and maximum nominal thickness of 3-<sup>1</sup>/<sub>4</sub> inches (82 mm).

### 6.4 TalonGuard Treatment:

TalonGuard Treated insulation boards are allowed within 6 inches of, or below grade, in “very heavy termite infestation” areas. An approved method to protect the foam plastic from subterranean termite damage has been integrated into the products per exceptions listed in 2021, 2018 and 2015 IBC Section 2603.8, 2012 IBC Section 2603.9 or IRC Section R318.4.

### 6.5 Graphite Polystyrene (GPS)

Atlas Molded Polystyrene and ThermalStar products may be manufacturer with graphite modified expanded polystyrene.

### 6.6 Orange Treatment

Atlas Molded Polystyrene and ThermalStar insulation boards may be manufactured with orange expanded polystyrene.

### 6.7 ThermalStar LWI and ThermalStar LCI

ThermalStar LWI and ThermalStar LCI insulation boards must be installed as specified in Section 6.1 or as described in Section 6.7.1 of this report.

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### 6.7.1 Water-resistive Barrier

When installed in accordance with this section, the ThermalStar LWI and ThermalStar LCI insulation boards combined with ThermalStar Tape or other approved tape may be used as an alternative to the water-resistive barrier in 2021 and 2018 IBC Section 1402.2, 2015 and 2012 IBC Section 1404.2 or IRC Section R703.2

The 2 or 4 foot-wide (610 or 1219 mm) ThermalStar LWI insulation boards with tongue-and-groove joints on the long edges must be oriented horizontally, with tongues facing upward. The 2 or 4 foot-wide (610 or 1219 mm) boards with square edges may be oriented horizontally or vertically.

The ThermalStar LWI and ThermalStar LCI boards must be installed directly to framing spaced a maximum of 24 inches on center. Fasteners must be corrosion-resistant roofing nails with a minimum  $\frac{3}{8}$ -inch-diameter (9.5 mm) head; 6d ring-shank nails and  $\frac{1}{16}$ -inch-diameter (24 mm) plastic washers; self-drilling screws with  $\frac{3}{4}$ -inch-diameter (19 mm) cap washers; or 1-inch-wide-crown (25.4 mm), No. 16 gage staples. Fasteners must be spaced at a maximum of 24 inches (610 mm) apart and be long enough to penetrate the framing members a minimum of  $\frac{3}{4}$  inch (19 mm). Joints between boards must be tightly butted together, and corners created with the boards, must be taped with ThermalStar Tape centered over the joint.

ThermalStar LWI and ThermalStar LCI insulation boards must be installed with a weep screed when walls are cladded with stucco and require the use of self-adhering flashing around penetrations. The boards must be covered by an approved exterior wall cladding or cementitious wall coating and may be installed over structural sheathing.

### 6.7.2 Installation Around Penetrations and Openings

The system is limited to use with flange-type windows. An ICC-ES AC148, Flexible Flashing Materials, compliant flashing material must be installed completely covering the framing sill and extending a minimum of 6 inches (152 mm) up the sides of the opening and approximately 1- $\frac{1}{2}$  inches (38 mm) beyond the edge of the foam board at the front of the window opening. The sill flashing must be flush with the inside edge of the framing members on the inside of the wall. The flashing extending outside of the ThermalStar LCI board must be folded over the front face of the foam board. The flange-type window must then be installed in accordance with the window manufacturer's installation instructions. In lieu of window manufacturer instructions, the flanged window shall be installed resting on a continuous supporting sill preferably with a sloped pan to exterior per best practice. Caulking shall be used continuously on the back of the flange (except weep spaces on the sill flange) if recommended by the window manufacturer. Fasteners shall penetrate the flange holes within 4-6" of each corner and spaced every 6-8-inch around the remainder of the flange and shall penetrate structural framing a minimum of  $\frac{3}{4}$ -inch (19mm). Fasteners shall not be overdriven or otherwise deform the sealing surface of the flange. The space around the window perimeter from the interior, including the sill, shall be air sealed with backer rod, spray foam, or caulk as needed to create pressure seals that add another layer of wind driven rain penetration resistance. Jamb flashing must be installed prior to the installation of the head flashing. All jamb and head flashing must completely cover the window flanges.

Flashing of pipe penetrations must be accomplished by sealing around the pipe with flashing complying with ICC-ES AC148, Flexible Flashing Materials. Flashing of other penetrating items must be in accordance with the wall covering manufacturer's instructions.

### 6.8 TalonGuard Treatment

ThermalStar LCI and ThermalStar LWI with TalonGuard Treatment is allowed within 6 inches of, or below grade, in "very heavy termite infestation" areas. An approved method to protect the foam plastic from subterranean termite damage has been integrated into the products per exceptions listed in 2021, 2018 and 2015 IBC Section 2603.8, 2012 IBC Section 2603.9 or IRC Section R318.4.

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### 6.9 Graphite Polystyrene (GPS)

ThermalStar LCI and ThermalStar LWI may be manufacturer with graphite modified expanded polystyrene and are designated as ThermalStar LCI GPS and ThermalStar LWI GPS.

### 6.10 ThermalStar LRI

ThermalStar LRI insulation boards are used as a roofing insulation as follows:

- As part of a UL Classified Class A, B or C roof-covering assembly in accordance with UL 790, or
- As part of a UL Classified Roof Deck Construction in accordance with UL 1256

### 6.11 ThermalStar Wall Designs as per NFPA 285 Evaluation

Table 6 below outlines the list of allowable wall construction elements. Note that one element from each “Wall Component” must be selected, unless “None” is an available selection.

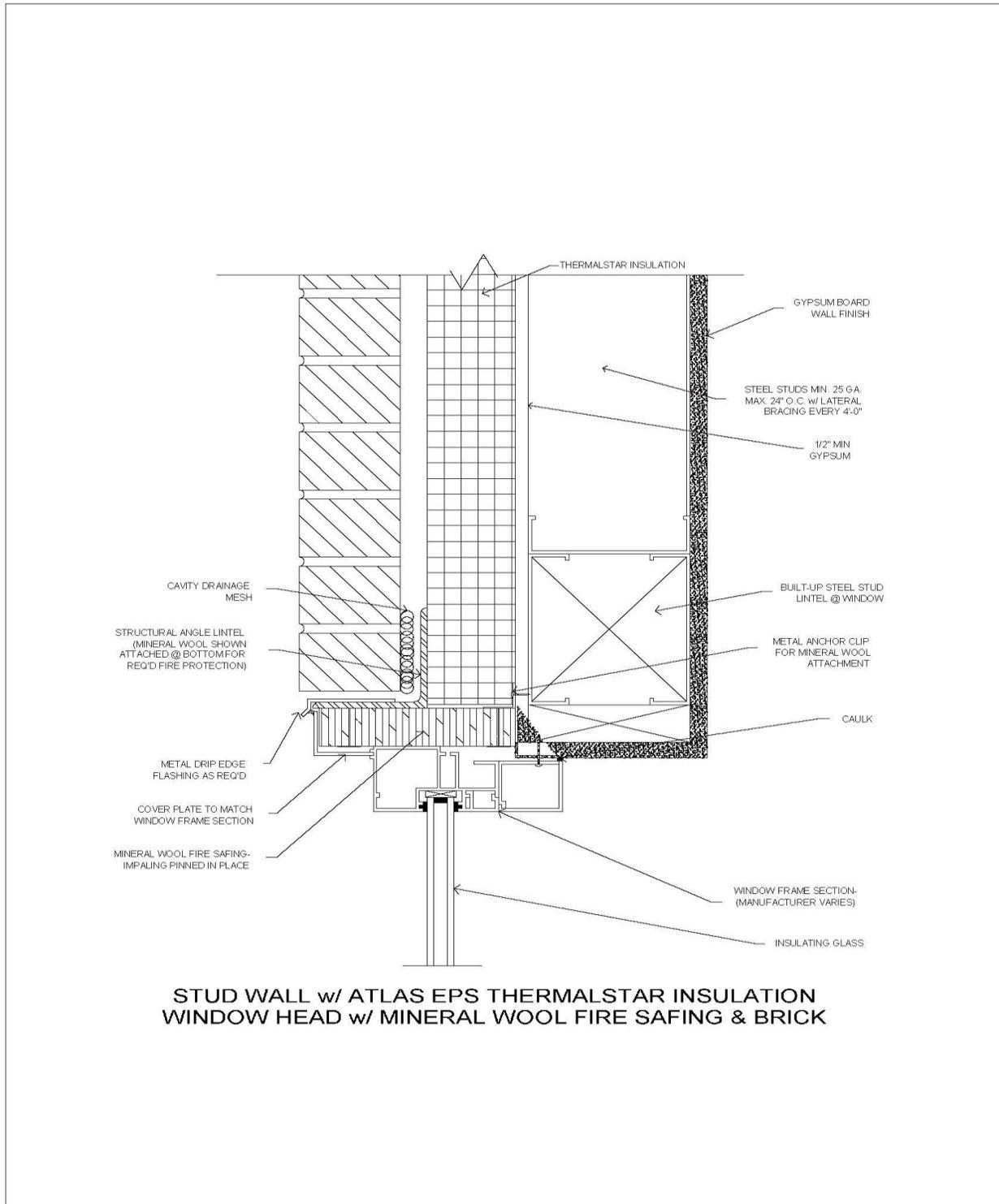
Table 6 – NFPA 285 Compliant Assembly Options

| Wall Component  | Options   |
|---|---|
| Base Wall<br>Use 1, 2, or 3   | <ol style="list-style-type: none"> <li>1) Cast Concrete Walls</li> <li>2) CMU Cast Concrete Walls</li> <li>3) 25 GA (min) 3-<sup>5</sup>/<sub>8</sub> inch thick (min) steel studs spaced 24 inches oc (max) <ol style="list-style-type: none"> <li>a. Any <sup>5</sup>/<sub>8</sub> inch Type X gypsum wallboard interior</li> <li>b. Any <sup>1</sup>/<sub>2</sub> inch Exterior gypsum sheathing</li> <li>c. Lateral bracing every 4 ft. vertically</li> </ol> </li> </ol>   |
| Fire Stopping at Floor Lines  | Any approved 4.0 pcf density mineral fiber based safig insulation in each stud cavity at floor line. Safing thickness must match stud cavity depth. Use mineral fiber insulation manufacturer instructions for installation   |
| Cavity Insulation<br>Use 1, 2, or 3   | <ol style="list-style-type: none"> <li>1) None</li> <li>2) Any Class A, B, or C Fiberglass batt insulation (faced or unfaced)</li> <li>3) Any non-combustible insulation</li> </ol>   |
| Exterior Sheathing  | <sup>1</sup> / <sub>2</sub> " or thicker exterior grade gypsum sheathing  |
| Water Resistive Barrier or Air Barrier over Base Wall Surface<br>Use 1 or 2 | <ol style="list-style-type: none"> <li>1) None</li> <li>2) Any of the following applied per individual manufacturer instruction: <ul style="list-style-type: none"> <li>Tremco EXOAir 130 or EXOAir 230</li> <li>Grace Perm-A-Barrier VPS, AWM, VPL, NPS, NPL, NPL 10, or VPL LT</li> <li>DuPont Fluid Applied WB</li> <li>DuPont Tyvek Commercialwrap (1 or 2 layers)</li> <li>CCW Barritech NP, VP, VP LT, FireResist 705VP or 705FR-A</li> <li>Prosoco R-Guard Cat-5, R-Guard VB, R-Guard MVP, R-Guard Spray Wrap, or R-Guard Spraywrap MVP</li> <li>Henry VP160, Air Bloc 21 FR, Air Bloc All Weather, or Air Bloc 17MR</li> <li>WR Meadows Air-Shield LMP (Gray)</li> <li>WR Meadows Air-Shield LMP (Black)</li> <li>WR Meadows Air-Shield TMP</li> <li>WR Meadows Air-Shield LSR</li> <li>STO Emerald Coat</li> <li>Dow Corning DefendAir 200 Low Temp</li> <li>Hohmann &amp; Barnard Enviro-Barrier VP, or Enviro-Barrier</li> </ul> </li> </ol> |

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|   |   |
|---|---|
| WRB Over Exterior Insulation  | None  |
| Exterior Insulation<br>Use 1, through 9   | <ol style="list-style-type: none"> <li>1) None</li> <li>2) ThermalStar Type I up to 10.2 inches thick</li> <li>3) ThermalStar Type II up to 7.2 inches thick</li> <li>4) ThermalStar Type IX up to 5.4 inches thick</li> <li>5) ThermalStar LWI 10 up to 10.2 inches thick</li> <li>6) ThermalStar LWI 15 up to 7.2 inches thick</li> <li>7) ThermalStar LWI 25 up to 5.4 inches thick</li> <li>8) ThermalStar LCI 10 up to 10.2 inches thick</li> <li>9) ThermalStar LCI 15 up to 7.2 inches thick</li> </ol>  |
| Exterior Cladding<br>Use any of 1 through 8   | <ol style="list-style-type: none"> <li>1) Brick – nominal 4-inch clay brick or veneer with maximum 2-inch air gap cavity behind the cladding. Brick with ties / anchors spaced 24 inches oc (max)</li> <li>2) Concrete – minimum 2-inch thick with a maximum 2-inch air gap cavity behind the cladding</li> <li>3) Concrete Masonry Units – minimum 4-inch thick with maximum 2-inch air gap cavity behind the cladding</li> <li>4) Limestone – minimum 2-inch thick with non-open joints installation technique such as shiplap</li> <li>5) Natural Stone Veneer – minimum 2-inch thick with non-open joints installation technique such as shiplap</li> <li>6) Precast Artificial Stone – minimum 1-½ inch thick complying with ICC-ES AC51 with non-open joint installation technique</li> <li>7) Terra Cotta Cladding – minimum 1-¼ inch thick (solid) with non-open joint installation technique such as shiplap</li> <li>8) Stucco – minimum ¾ inch thick exterior cement plaster and lath</li> </ol> |
| Window Header<br>Use either 1 or 2 –<br>See Figure 1 for<br>Window Header<br>Detail | <ol style="list-style-type: none"> <li>1) Flashing composed of 25 GA (min) sheet metal (steel) with 1 inch thick, 4 pcf mineral wool over the interior of the sheet metal</li> <li>2) Any header design deemed more robust than item 1 per analysis</li> </ol>  |

Figure 1 – Window Header Detail for ThermalStar NFPA 285 Wall Design Described in Table 5



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### 6.12 Elevation Geofoam

Elevation Geofoam blocks are placed loosely on a level surface or existing structural slab. The blocks may be installed in a single layer or in multiple layers.

Structural loads on Elevation Geofoam shall not exceed the compressive resistance at 1% strain in accordance with ASTM D6817. Additional design considerations are included in ASTM D7180 Standard Guide for Use of Expanded Polystyrene (EPS) Geofoam and ASTM D7557 Standard Practice for Sampling of Expanded Polystyrene Geofoam Specimens.

When Elevation Geofoam product is less than 4 inches in thickness, the interior of the building must be separated from the geofoam blocks with a thermal barrier as required by IBC Section 2603.4 or IRC Section R316.4, as applicable.

Elevation Geofoam must be separated from the building interior with a minimum 1-inch thick (25.4mm) layer of concrete or masonry on all faces as required by IBC Section 2603.4.1.1, except in buildings of Type V construction where separation may be a minimum nominal ½-inch-thick (12.7mm) wood structural panel when installation is in accordance with IBC Section 2603.4.1.14. Where the thermal barrier consists of a minimum 1-inch-thick (25.4 mm) layer of concrete or masonry, the thickness of the geofoam in the floor assembly may exceed 4-inches (102mm). The design of the concrete or masonry covering noted above is outside the scope of this report and must comply with all applicable code requirements for the occupancy and type of construction for the specific project.

The use of the geofoam is limited to use in floor applications where the uniform and localized loading does not exceed the compressive resistance of the geofoam at 1 percent strain.

Use of the geofoam is limited to applications where the geofoam will not be subject to direct exposure to hydrocarbons.

Penetrations through the thermal barrier described above shall be subject to approval by the code official. When the geofoam is used in a fire-resistance-rated floor assembly evaluated in accordance with UL 263, penetrations through the assembly must be protected in accordance with IBC Section 714.4. If used, through-penetration firestop systems must be tested in accordance with ASTM E814 or UL 1479 as required by 2021, 2018 and 2015 IBC Section 714.4.12 and 2012 IBC Section 714.4.1.1.2.

### 7. Conditions of use

The insulation boards as described in this report, complies with, or is a suitable alternative to what is specified in, those codes listed in Section 2.0 of this report, subject to the following conditions:

- 7.1** The 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.
- 7.2** The insulation must be produced, identified, and installed in accordance with the manufacturer's published installation instructions. If there is a conflict between this report and the manufacturer's instructions this report governs.
- 7.3** The boards must be separated from the building interior with a thermal barrier complying with the applicable code, such as minimum ½-inch thick (12.7 mm) gypsum wallboard installed in accordance with the applicable code, except as described in Sections 4.1, 4.1.2, 6.1.2, and 6.1.4 of this report.

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- 7.4** Atlas Molded Polystyrene and ThermalStar insulation boards, except for ThermalStar LCI and ThermalStar LWI insulation boards installed in accordance with Section 6.2.1 when applied on above grade exterior walls, walls must include a water-resistive barrier complying with 2021 and 2018 IBC Section 1402.2, 2015 and 2012 IBC Section 1404.2, or IRC Section R703.2 and by wall coverings that provide the necessary structural resistance to wind and seismic forces in spanning between wall framing members.
- 7.5** ThermalStar LCI and ThermalStar LWI board joints must be backed with a stud or sheathing when used as a water-resistive barrier.
- 7.6** Walls must be braced in accordance with the applicable code.
- 7.7** In areas where the probability of termite infestation is defined as “very heavy,” the foam plastic must be installed in accordance with 2021, 2018 and 2015 IBC Section 2603.8, 2012 IBC Section 2603.9, or IRC Section R318.4 of the, as applicable, except for TalonGuard Treated insulation boards in Sections 6.1.7 or 6.2.2.
- 7.8** For a listing of applicable UL Certifications for Atlas Molded Polystyrene and ThermalStar insulation, see Product iQ® for the following categories:
- Foamed Plastic, UL Classified for Surface Burning Characteristics in accordance with UL 723 ([BRYX](#)).
  - Polystyrene Thermal Insulation, Rigid Cellular, UL Classified in accordance with ASTM C578 and ASTM E2430 ([QORW](#)).
  - Class A, B or C roof-covering assemblies UL Classified in accordance with UL 790 ([TGFU](#)).
  - Roof Deck Construction [110](#), [155](#), [219](#), [237](#), and [687](#) for UL Classification in accordance with UL 1256 (TGKX).
  - Roof covering assemblies UL Classified for wind uplift resistance with UL 1897 ([TGIK](#)).
  - For products evaluated as a part of fire-resistance-rated assemblies U326, U330, U425, U460, U902, V302, V303, V454, V499, W307, and W456 in accordance with UL 263, Foamed Plastic ([CCVW](#)).
  - Exterior Walls for assemblies UL Classified in accordance with NFPA 285 (FWFO):
    - Exterior Wall System [EWS0001](#)
    - Exterior Wall System [EWS0002](#)
    - Exterior Wall System [EWS0003](#)
    - Exterior Wall System [EWS0011](#)
    - Exterior Wall System [EWS0016](#)
    - Exterior Wall System [EWS0017](#)
    - Exterior Wall System [EWS0018](#)
- 7.9** For ThermalStar insulation used in exterior walls of buildings of Types I, II, III, or IV construction in accordance with IBC Section 2603.5, see Section 6.11 for NFPA 285 approved wall designs not covered under the NFPA 285 UL Certifications listed in 7.8 of this report.
- 7.10** Elevation Geofoam product less than 4-inches thick must be separated from the building interior with a thermal barrier, such as ½ inch gypsum board. Elevation Geofoam product greater than 4 inches thick must be separated from the building interior with a minimum 1 inch thick concrete or masonry on all faces as required by IBC Section 2603.4.1.1.

Design loads to be resisted by Elevation Geofoam must be determined in accordance with the IBC or IRC, as applicable, and must not exceed the allowable loads noted in this report.

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All construction documents specifying Elevation Geofoam product must comply with the design limitations of this report. Design calculations and details for specific applications must be furnished to the code official, verifying compliance with this report and the applicable codes. The documents must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

For a listing of applicable UL Solutions Certifications for Elevation Geofoam products, see Product iQ® for the following categories:

- Polystyrene Thermal Insulation, Rigid Cellular, UL Classified in accordance with ASTM D6817 ([QORW](#)).
- Foamed Plastic, UL Classified for Interior Building Construction in accordance with UL 1715 ([OERU](#)).

### 7.11 Manufacturing locations

The products are manufactured at the following locations under the UL Solutions Classification and Follow-Up Service Program, which includes audits in accordance with ICC-ES Acceptance Criteria for Quality Documentation, AC 10:

| City, State       | Factory Identification |
|-------------------|------------------------|
| Arlington, TX     | EARTX                  |
| Byron Center, MI  | EGRMI                  |
| Denver, CO        | EDNCO                  |
| Fond Du Lac, WI   | EFDWI                  |
| Fredericktown, MO | EFTMO                  |
| Gainesville, GA   | EGAGA                  |
| Kansas City, KS   | EKCBL                  |
| Kingman, AZ       | EKMAZ                  |
| Murray, UT        | EMUUT                  |
| Perryville, MO    | EPVMO                  |
| Ridgeway, VA      | EMVVA                  |
| Reno, NV          | ERNNV                  |
| Tijuana, Mexico   | ELACA                  |
| Washington, IA    | EWAIA                  |

## 8. Supporting evidence

- 8.1** UL Solutions Classification reports in accordance with ASTM C578, ASTM D6817, ASTM E2430, UL 263, UL 723, UL 790, UL 1256, and UL 1897. See UL Solutions Product Certification Categories (BRYX), (CCVW), (QORW), (TGFU), and (TGKX).
- 8.2** Documentation of quality system elements described in ICC-ES Acceptance Criteria for Quality Documentation (AC10).
- 8.3** Data in accordance with ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12).
- 8.4** Data in accordance with ICC-ES Acceptance Criteria for Foam Plastic Sheathing Panels used as Water Resistant Barriers (AC71).
- 8.5** Data in accordance with ICC-ES Acceptance Criteria for Termite Resistant Foam Plastics (AC239).

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- 8.6 Data in accordance with ICC-ES Acceptance Criteria for Rigid Cellular Polystyrene Geofoam used in Interior Floor Applications (AC452)
- 8.7 Data in accordance with ASTM E2178 Standard Test Method for Air Permeance of Building Materials.
- 8.8 Reports and analysis of wall fire tests in accordance with NFPA 285.
- 8.9 Reports of room corner fire tests in accordance with NFPA 286 and AC12 Appendix A and B.

### 9. Identification

Atlas Molded Products insulation described in this evaluation report are identified by a marking bearing the report holder's name (Atlas Molded Products or AMP); the plant identification; the product name; the ASTM type designation; the UL Solutions Certification Mark, and the evaluation report number UL ER16529-01. The validity of the evaluation report is contingent upon this identification appearing on the product or UL Solutions Classification Mark certificate.

### 10. Use of UL Solutions Evaluation Report

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- 10.3 The current status of this report, as well as a complete directory of UL Solutions Evaluation Reports may be found at [UL.com/Solutions](http://UL.com/Solutions) via Product iQ®.

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