UL Evaluation Report

UL ER40266-01

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UL Category Code: ULEX

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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

Sub-level 3: 07 27 00 - Air Barriers

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:

TRU-R® INSULATION BOARDS

TRU-R® GEOFOAM BLOCK

Throughout this report, unless specifically indicated otherwise:

- The reference to Tru-R Insulation Boards will also apply to Tru-R WSG Insulation Boards and Tru-R Insulation Boards with Termite Resistance.
- The reference to Tru-R Geofoam Blocks will apply to Tru-R Geofoam Blocks with Termite Resistance.

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 Termite Resistant Foam Plastic (AC239)
- ICC-ES Acceptance Criteria for Quality Documentation (AC10)

The products were evaluated for the following properties

Tru-R Insulation Boards:

- Surface Burning Characteristics (ANSI/UL723, ASTM E84)
- Physical Properties (ASTM C578)
- Physical Properties – Tru-R WSG only (ASTM E2430)
- Roof Deck Construction Material with Resistance to Internal Fire Exposure (ANSI/UL1256)
- Roofing Systems for Exterior Fire Exposure (ANSI/UL790, ASTM E108)
- Uplift Tests For Roof Covering Systems, (ANSI/UL1897)
- Flammability Testing for Use in Attics and Crawl Spaces (AC12, App. A and B)
- Termite Resistance –Tru-R Insulation Boards with additive (ICC-ES AC239)
- For Use on Exterior Commercial Walls (NFPA 285)

Tru-R Geofoam Blocks:

- Surface Burning Characteristics (ANSI/UL723, ASTM E84)
- Physical Properties (ASTM D6817)
- Foam Plastic - Special Approval (ANSI/UL1715)
- Termite Resistance - Tru-R Geofoam Blocks with additive only, (ICC-ES AC239)

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 Termite Resistant Foam Plastic (AC239)
- UL:
  - UL723 (ASTM E84), Test for Surface Burning Characteristics of Building Materials
  - UL790 (ASTM E108), Standard Test Methods for Fire Tests of Roof Coverings
  - UL1256, Standard for Fire Test of Roof Deck Constructions
  - UL 1897, Uplift Tests for Roof Covering Systems
  - UL 1715, Fire Test of Interior Finish Material
- ASTM:
  - ASTM C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
  - ASTM D6817, Standard Specification for Rigid Cellular Polystyrene Geofoam
  - ASTM D7180, Standard Guide for Use of Expanded Polystyrene (EPS) Geofoam in Geotechnical Projects
  - ASTM D7557, Standard Practice for Sampling of Expanded Polystyrene Geofoam Specimens
  - 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:
  - NFPA 285, Standard Fire Test for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Assemblies Containing Combustible Components

4. USES

4.1 Tru-R Insulation Boards:

Tru-R Insulation Boards are used as nonstructural insulation 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 6.2 of this report.

The insulation boards may be used on walls in attics and crawl spaces when installation is in accordance with Section 6.2.2 of this report.

4.1.1 Tru-R WSG Insulation Boards:

Tru-R WSG Insulation Boards are used as a component in Exterior Insulation and Finish Systems (EIFS).

4.2 Tru-R Geofoam Blocks:

Tru-R Geofoam Blocks are used as lightweight structural fill in floor cavities. Installation shall be in accordance with Section 6.3 of this report

5. PRODUCT DESCRIPTION

5.1 General:

Tru-R Insulation Boards and Tru-R Geofoam Blocks described in 5.2 and 5.3 are molded, closed-cell expanded polystyrene having a flame spread index not exceeding 25 and a smoke developed index not exceeding 450 for thicknesses up to 5 inches, when tested in accordance with UL723 (ASTM E84) as required by Section 2603.3 of the 2018 and 2015 IBC or Section R316.3 of the 2018 and 2015 IRC, as applicable.

The following products are treated for termite resistance in accordance with Section 2603.9 of the 2018 IBC and Section 2603.8 of the 2015 IBC, or Section R318.4, of the 2018 and 2015 IRC, as applicable:

- Tru-R Insulation with Termite Resistance
- Tru-R Geofoam with Termite Resistance

5.2 Tru-R Insulation Boards:

Tru-R-50, 100, 130, 150, 250, 400, and 600 Insulation Boards are manufactured at minimum densities of 0.70, 0.90, 1.15, 1.35, 1.80, 2.40, and 3.00 lbs/ft^3 and comply with ASTM C578 designations of Type XI, Type I, Type VIII, Type II, Type IX, Type XIV, and Type XV, respectively.

See Table 1 for thermal resistance and Table 2 for potential heat.

Table 1 – Thermal Resistance of Tru-R Insulation Boards

PRODUCT	ASTM C578 Type	DENSITY, min., lb/ft^3	THERMAL RESISTANCE[1], min., °F-ft^2-h/Btu
Tru-R 50	XI	0.70	3.1
Tru-R 100	I	0.90	3.6
Tru-R 130	VIII	1.15	3.8
Tru-R 150	II	1.35	4.0
Tru-R 250	IX	1.80	4.2
Tru-R 400	XIV	2.40	4.2
Tru-R 600	XV	3.00	4.3

[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.

Table 2 – Potential Heat of Tru-R Insulation Boards

PRODUCT	ASTM C578 TYPE	HEAT POTENTIAL[1], Btu/ft^2	HEAT POTENTIAL[1], mJ/m^2
Tru-R 50	XI	1165	13.2
Tru-R 100	I	1500	17.0
Tru-R 130	VIII	1875	21.3
Tru-R 150	II	2250	25.5
Tru-R 250	IX	3000	34.0
Tru-R 400	XIV	4000	45.4
Tru-R 600	XV	5000	56.8

[1]Based on 1 in. thickness

Tru-R WSG Insulation Boards have been found to comply with ASTM C578 and ASTM E2430. The boards are manufactured at a minimum density of 0.90 lbs/ft^3 and have ASTM C578 designation of Type I.

5.3 Tru-R Geofoam Blocks:

Tru-R Geofoam EPS12, EPS15, EPS19, EPS22, EPS29, EPS39, AND EPS46 blocks are manufactured at minimum densities of 0.70, 0.90, 1.15, 1.35, 1.80, 2.40, and 2.85 lbs/ft^3 and comply with ASTM D6817 designations of EPS12, EPS15, EPS19, EPS22, EPS29, EPS39, and EPS46, respectively. See Table 3.

Table 3 – Compressive Resistance of Tru-R Geofoam Block

PRODUCT	ASTM D6817 Type	DENSITY, min., lb/ft^3	COMPRESSIVE RESISTANCE AT 1% STRAIN, min., psi
Tru-R EPS12	EPS12	0.70	2.2
Tru-R EPS15	EPS15	0.90	3.6
Tru-R EPS19	EPS19	1.15	5.8
Tru-R EPS22	EPS22	1.35	7.3
Tru-R EPS29	EPS29	1.80	10.9
Tru-R EPS39	EPS39	2.40	15.0
Tru-R EPS46	EPS46	2.85	18.6

6. INSTALLATION

6.1 General:

Tru-R Insulation Boards and Tru-R Geofoam blocks 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.

6.2 Tru-R Insulation Boards:

Tru-R 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, axial, or shear loads.

The interior of the building must be separated from the Tru-R Insulation Boards with a thermal barrier as required by Section 2603.4 of the 2018 and 2015 IBC or Section R316.4 of the 2018 and 2015 IRC, as applicable.

Tru-R Insulation Boards may be used as vapor retarders based on perm values described in Tables 4 when required in accordance with the applicable sections of the IBC, IRC, and IECC. Vapor retarders are certified as follows:

Class I: 0.1 perm or less Class II: 0.1 <perm ≤ 1.0 Class III: 1.0 <perm ≤ 10 perm

Table 4 – Water Vapor Permeance of Tru-R Insulation Boards

PRODUCT	ASTM C578 Type	DENSITY, min., lb/ft^3	PERMEANCE[1], max., perms
Tru-R 50	XI	0.70	5.0
Tru-R 100	I	0.90	5.0
Tru-R 130	VIII	1.15	3.5
Tru-R 150	II	1.35	3.5
Tru-R 250	IX	1.80	2.5
Tru-R 400	XIV	2.40	2.5
Tru-R 600	XV	3.00	2.5

[1]Water vapor permeance values are based on 1-inch thickness when tested in accordance with ASTM C578 and ASTM E96. Actual water vapor permeance values may be calculated based on insulation thickness, by dividing the perm value shown by the installed thickness in inches.

6.2.1 Tru-R Insulation Boards Used in Roofing:

Tru-R Insulation Boards are used as a roofing insulation as follows:

- As part of a UL Certified Class A, B or C roof-covering assembly in accordance with UL 790,
- As part of a UL Certified Roof Deck Construction in accordance with UL 1256, or
- As part of a UL Certified Roofing System, Uplift Resistance, in accordance with UL 1897.
- As a roofing insulation as part of a UL Certified Class A, B or C roof-covering assembly in accordance with UL790.

6.2.2 Tru-R Insulation Boards Used in Attics and Crawl Spaces:

Tru-R Insulation Boards may be used in attics and crawl spaces, without the ignition barrier listed in Section 2603.4.1.6 of the 2018 and 2015 IBC or Sections R316.5.3 and R316.5.4 of the 2018 and 2015 IRC, as follows:

1. Attic ventilation is provided when required by Section 1202.1 of the 2018 IBC, Section 1203.2 of 2015 IBC or Section R806.1 of the 2018 and 2015 IRC, as applicable.
2. Under-floor (crawl space) ventilation is provided when required by Section 1203.3 of the 2018 and 2015 IBC, or Section R408.1 or Section R408.3 of the 2018 and 2015 IRC, as applicable.
3. Combustion air is provided in accordance with Section 701.1 of the 2018 and 2015 IMC.
4. Insulation boards are limited to a maximum thickness of 4 inches (102 mm) for Tru-R 100, or a maximum thickness of 3-¼ inches (82.6 mm) for Tru-R 130, or a maximum thickness of 2-⅔ inches (67.8 mm) for Tru-R 150, or a maximum thickness of 2 inches (51 mm) for Tru-R 250.

6.2.3 Tru-R Insulation Boards Used on the exterior of above grade walls:

Tru-R Insulation Boards used on the exterior of above grade walls as follows:

- Exterior Walls of One- and Two-Family Dwellings in accordance with the 2015 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 2018 and 2015 IBC,
- Exterior walls of Type V construction in accordance with Sections 2603.2, 2603.3, and 2603.4 of the 2018 and 2015 IBC, or
- Exterior walls of buildings more than one story of Types I, II, III, or IV construction in accordance with Section 2603.5 of the 2018 and 2015 IBC, when part of
    - a UL Certified Exterior Wall System in accordance with NFPA 285. See Section 7.2.
    - an Exterior Wall System in accordance with NFPA 285. See Table 5.

Table 5 – NFPA 285 Compliant Assembly Options – See Figure 1

Base Wall Options
1) Cast Concrete Walls 2) CMU Cast Concrete Walls 3) Steel Stud Framed Wall a. 25 GA. (min.) 3-⅝" (min.) steel studs spaced 24" o.c. (max.) b. Lateral Bracing Every 4 ft. vertically c. ⅝" Type X Gypsum Wallboard Interior d. Cavity Insulation i. None ii. Any Class A, B, or C Fiberglass batt insulation (faced or unfaced) iii. Any noncombustible insulation e. Any ½" (min.) Exterior Gypsum Sheathing
Water Resistive Barrier / Air Barrier Options Over Base Wall
1) None 2) BASF Enershield HP 3) BASF Enershield I 4) Carlisle Barritech NP 5) Carlisle Barritech VP 6) Dupont Fluid Applied WB 7) Dupont Tyvek Commercialwrap (1 or 2 layers) 8) Grace Perm-A-Barrier VPS 9) Tremco EXOAir 230
Tru-R EPS Exterior Insulation Options
1) 10-¾" (max.) Tru-R 100 2) 8-¼" (max.) Tru-R 130 3) 7" (max.) Tru-R 150 4) 5-¼" (max.) Tru-R 250 5) 4" (max.) Tru-R 400 6) 3-¼" (max.) Tru-R 600
Exterior Cladding Options
1) Brick - Nominal 4" clay brick or veneer with 2" (max.) air gap behind the cladding. Brick with ties/anchors 24" o.c. (max.) 2) Concrete - 2" (min.) with 2" (max.) air gap behind the cladding 3) Concrete Masonry Units - 4" (min.) with 2" (max.) air gap behind the cladding 4) Limestone - 2" (min.) with non-open joints installation technique such as shiplap 5) Natural Stone Veneer - 2" (min.) with non-open joints installation technique such as shiplap 6) Precast Artificial Stone - 1-½" (min.) complying with ICC-ES, AC 51 with non-open joint installation technique 7) Terra Cotta Cladding - 1-¼" (min.) solid with non-open joint installation technique such as shiplap 8) Stucco - ¾" (min.) exterior cement plaster and lath

Fire Stopping at Floor Line Options
1) Mineral wool fiber fire stop in each stud cavity at floor line. Thickness equal to stud cavity depth. Follow manufacturer instruction for installation.

Window Header Detail
1) 25 GA. (min.) sheet metal (steel) flashing with 1" thick, 4 pcf mineral wool over interior of sheet steel 2) Header design equal or better than item 1

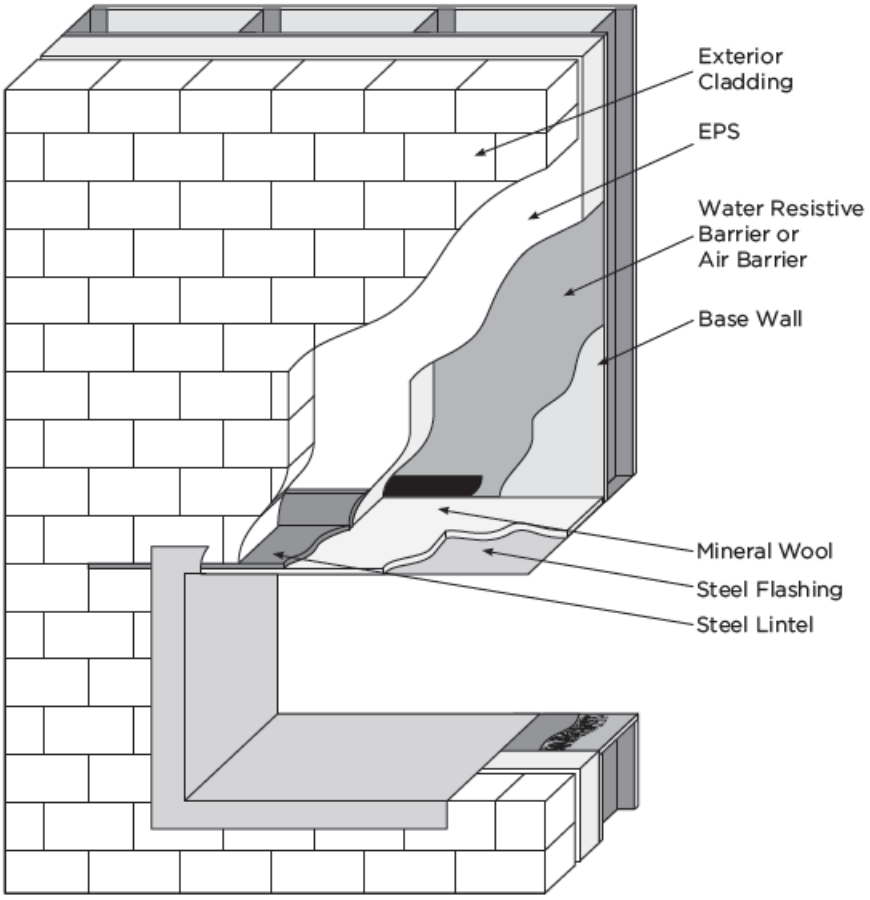

Figure 1 – NFPA 285 Wall Assembly

6.3 Tru-R Geofoam Blocks:

Tru-R 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 the Tru-R Geofoam blocks 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 Tru-R Geofoam blocks are less than 4 in. in thickness, the interior of the building must be separated from the geofoam blocks with a thermal barrier as required by Section 2603.4 of the 2018 and 2015 IBC or Section R316.4 of the 2018 and 2015 IRC, as applicable.

When Tru-R geofoam blocks are greater than 4 inches in thickness, a minimum 1 inch of concrete or masonry unit must cover the geofoam blocks on all faces.

7. CONDITIONS OF USE

7.1 General:

The Tru-R Insulation Boards and the Tru-R Geofoam blocks 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 Tru-R Insulation Boards and Tru-R Geofoam Blocks 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.

In areas where the probability of termite infestation is defined as "very heavy", Tru-R Insulation Boards and Tru-R Geofoam Blocks must be installed in accordance with Section 2603.9 of the 2018 and 2015 IBC or Section R318.4 of the IRC, as applicable.

The use of Tru-R Insulation Boards and Tru-R Geofoam Blocks with Termite Resistance are not restricted in areas where the probability of termite infestation is defined as "very heavy" in accordance with Section 2603.9 of the 2018 and 2015 IBC or Section R318.4 of the IRC, as applicable.

7.2 Tru-R Insulation Boards :

The Tru-R Insulation Boards must be separated from the building interior with a thermal barrier, such as ½ in. gypsum board, as required by Section 2603.4 of the 2018 and 2015 IBC or Section R316.4 of the 2018 and 2015 IRC, as applicable.

For a listing of applicable UL Certifications for Tru-R Insulation Boards, see the Product iQ™ database for the following categories.

- See UL Product iQ™ database for Foamed Plastic, UL Certified for Surface Burning Characteristics in accordance with UL723 (BRYX).
- See UL Product iQ™ database for Polystyrene Thermal Insulation, Rigid Cellular, UL Certified in accordance with ASTM C578 (QORW).
- See UL Product iQ™ database for Class A, B or C roof-covering assemblies UL Certified in accordance with UL 790 (TGFU).
- See UL Product iQ™ database for Roof Deck Constructions for assemblies UL Certified in accordance with UL 1256 (TJBX).
- See UL Product iQ™ database for Roof Deck Constructions for assemblies UL Certified in accordance with UL 1897 (TGIK).
- See UL Product iQ™ database for Exterior Walls for assemblies UL Certified in accordance with NFPA 285 (FWFO):

  EWS0001
  EWS0002
  EWS0003

7.3 Tru-R Geofoam Blocks:

Tru-R Geofoam Blocks less than 4 in. in thickness 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 2018 and 2015 IBC or Section R316.4 of the 2018 and 2015 IRC, as applicable. Tru-R Geofoam Blocks greater than 4 in. in thickness must be separated from the building interior with a minimum 1 in. thick concrete or masonry on all faces as required by Section 2603.4.1.1 of the 2018 and 2015 IBC.

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

All construction documents specifying the Tru-R Geofoam Blocks must comply with the design limitations of this report. Design calculations and details for the specific applications must be furnished to the code official, verifying compliance with this report and 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 Certifications for Tru-R Geofoam Blocks, see the Product iQ™ database for the following categories:

- See UL Product iQ™ database for Foamed Plastic, UL Certified for Surface Burning Characteristics in accordance with UL723 (BRYX).
- See UL Product iQ™ database for Foamed Plastic, UL Certified for Interior Building Construction in accordance with UL1715 (OERU).

7.4 Manufacturing Locations:

The products are manufactured at the following locations described in Table 6 under the UL LLC Listing or Certification and Follow-Up Service Program, which includes audits in accordance with ICC-ES Acceptance Criteria for Quality Documentation, AC 10.

Table 6 – Manufacturing Locations

LISTEE	LOCATION	PLANT ID NO.
Thermal Foams, Inc.	2101 Kenmore Ave Buffalo, NY 14207	U-26
Thermal Foams/Syracuse Inc	6173 S Bay Rd Cicero, NY 3039	U-27

8. SUPPORTING EVIDENCE

8.1 Tru-R 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 Termite Resistant Foam Plastics (AC239)

8.1.3 UL Certification reports in accordance with UL 723, ASTM C578, ASTME2430, UL 790, UL 1256, 1897 and NFPA 285. See UL Product Certification Categories (BRYX), (QORW), (TGFU), (TJBX), (TGIK), and (FWFO), respectively.

See links to UL, LLC's Product iQ™ database in Section 7.2.

8.1.4 Reports and analysis of wall fire tests in accordance with NFPA 285.

8.1.5 Documentation of quality system elements described in AC10.

8.2 Tru-R Geofoam Blocks:

8.2.1 UL Certification reports in accordance with UL 723, ASTM D6817, and UL 1715. See UL Product Certification Categories (BRYX), (QORW), and (OERU), respectively.

See links to UL, LLC's Product iQ™ database for BRYX and QORW in section 7.3.

8.2.2 Data in accordance with ICC-ES Acceptance Criteria for Termite Resistant Foam Plastics (AC239)

8.2.3 Documentation of quality system elements described in AC10.

9. IDENTIFICATION

The Tru-R Insulation Boards and Tru-R Geofoam Blocks described in this evaluation report are identified by a marking bearing the report holder's name, the plant identification, the product name, the ASTM type designation, the UL Certification Mark, and the evaluation report number UL ER40266-01. The validity of the evaluation report is contingent upon this identification appearing on the product or UL Certification Mark certificate.

10. USE OF UL EVALUATION REPORT

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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.

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