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ESR-1962

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This report is subject to renewal 07/2018.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

SECTION: 07 21 00—THERMAL INSULATION

SECTION: 07 22 00—ROOF AND DECK INSULATION

SECTION: 07 25 00—WATER-RESISTIVE BARRIERS/WEATHER BARRIERS

REPORT HOLDER:

ATLAS EPS, A DIVISION OF ATLAS ROOFING CORPORATION

**8240 BYRON CENTER SOUTHWEST
BYRON CENTER, MICHIGAN 49315**

EVALUATION SUBJECT:

INTEGRITY®, THERMALSTAR®, ECOSOLUTIONS, AND ELEVATION® EXPANDED POLYSTYRENE INSULATION BOARDS, THERMALSTAR T&G BOARD (T&G I, T&G II, T&G IIR), THERMALSTAR GX T&G II, THERMALSTAR INTER-GRADE BOARD EPS, X-GRADE® TALONGUARD EPS, EWG EIFS, THERMALSTAR D2D, AND THERMALSTAR LCI UNDERLAYMENT



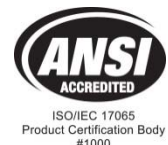
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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

Section: 07 21 00—Thermal Insulation

Section: 07 22 00—Roof and Deck Insulation

Section: 07 25 00—Water-Resistive Barriers/Weather Barriers

REPORT HOLDER:

ATLAS EPS, A DIVISION OF ATLAS ROOFING CORPORATION

8240 BYRON CENTER SOUTHWEST

BYRON CENTER, MICHIGAN 49315

(800) 917-9138

www.atlaseps.com

EVALUATION SUBJECT:

INTEGRITY® THERMALSTAR®, ECOSOLUTIONS, AND ELEVATION® EXPANDED POLYSTYRENE INSULATION BOARDS, THERMALSTAR T&G BOARD (T&G I, T&G II, T&G IIR), THERMALSTAR GX T&G II, THERMALSTAR INTER-GRADE BOARD EPS, X-GRADE® TALONGUARD EPS, EWG EIFS, THERMALSTAR D2D, AND THERMALSTAR LCI UNDERLAYMENT

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2015, 2012 and 2009 *International Residential Code*® (IRC)
- 2015, 2012 and 2009 *International Energy Conservation Code*® (IECC)

Properties evaluated:

- Surface-burning characteristics
- Thermal resistance (*R*-values)
- Physical properties
- Attic and crawl space installation
- Elimination of thermal barrier (ThermalStar Inter-Grade used on residential basement walls)
- Elimination of thermal barrier (ThermalStar D2D used in roofing)
- Termite resistance (TalonGUARD EPS)
- Water-resistive barrier (ThermalStar LCI Underlayment)

1.2 Evaluation to the following green code(s) and/or standards:

- 2016 California Green Building Standards Code (CALGreen), Title 24, Part 11
- 2015, 2012 and 2008 ICC 700 *National Green Building Standard*™ (ICC 700-2015, ICC 700-2012 and ICC 700-2008)

Attributes verified:

- See Sections 2.5 and 2.8

2.0 USES

2.1 Integrity, ThermalStar, EcoSolutions, and Elevation Expanded Polystyrene Insulation Boards:

Integrity, ThermalStar, EcoSolutions, and Elevation expanded polystyrene (EPS) insulation boards are used as nonstructural thermal insulation in buildings of any construction type, and as components of Class A, B, and C roof covering systems installed on steel decks, when installed in accordance with this report. The insulation is for use in wall cavities, ceiling assemblies, and roof covering assemblies, or on the outside faces of exterior walls. The insulation may be used as roof insulation when recognized in a current ICC-ES evaluation report on the roof covering system, or when installed as described in Section 4.2. The insulation boards may also be directly exposed in attics and crawl spaces without a covering when installed as described in Section 4.2.2. The insulation may also be used as exterior perimeter insulation around concrete slab edges, on foundation walls, or under flat concrete slab on grade construction, except in areas where the probability of termite activity is "very heavy" as noted in Section 5.5.

When installed in accordance with Section 4.2.2 or 4.2.3 of this report, the insulation boards may be used on both walls and ceilings in attics, crawl spaces, and basements, with no thermal or ignition barriers applied to the foam plastic.

2.2 ThermalStar T&G Board (T&G I, T&G II, T&G IIR):

When installed in accordance with this report, ThermalStar T&G Boards are used as nonstructural thermal insulation in buildings of any construction type, as a component of a one-coat cementitious exterior wall coating system. The insulation is for use on the outside faces of exterior walls when an ASTM C578 Type I or Type II EPS board is recognized in a current ICC-ES evaluation report for a one-coat cementitious exterior wall coating system, or when installed as described in Section 4.3. The insulation

may also be directly exposed in attic and crawl spaces without a covering when installed as described in Section 4.2.2. Additionally, the insulation may be used as exterior perimeter insulation around concrete slab edges, on concrete or masonry foundation walls, or under flat concrete slab on grade construction, except in areas where the probability of termite activity is “very heavy” as noted in Section 5.5.

2.3 ThermalStar GX T&G II Board:

When installed in accordance with Section 4.4 of this report, ThermalStar GX T&G II Boards are used as nonstructural

thermal insulation in buildings of any construction type, as a component of a one-coat cementitious exterior wall coating system. The insulation is for use on the outside faces of exterior walls when an ASTM C578 Type II EPS board is recognized in a current ICC-ES evaluation report for a one-coat cementitious exterior wall coating system.

2.4 ThermalStar Inter-Grade Board EPS:

ThermalStar Inter-Grade Board EPS, in thicknesses up to 4 inches (101.4 mm), is recognized for use when installed as described in Section 4.2.3 on the interior walls of residential basements without a code-prescribed 15-minute thermal barrier based on testing in accordance with NFPA 286, as required by IRC Section R316.6 with acceptance criteria of IRC Section R302.9.4.

2.5 X-Grade TalonGUARD Expanded Polystyrene:

X-Grade TalonGUARD boards are recognized for the same uses as Integrity, ThermalStar, EcoSolutions, and Elevation EPS insulation boards and are recognized for use on the exterior face of foundation walls, under interior or exterior foundation walls or slab foundations below grade, or where located within 6 inches (152 mm) of exposed earth. When installed in areas where the probability of termite infestations is very heavy as described in 2015 IBC Section 2603.8, 2012 IBC Section 2603.9; 2009 IBC Section 2603.8; or 2015, 2012 and 2009 IRC Section R318.4, use is limited to areas exposed to the *Reticulitermes* species.

The attributes of the X-Grade TalonGUARD boards have been verified as conforming to the provisions of (i) ICC 700-2012 Sections 602.1.6 and 11.602.1.6; and (ii) ICC 700-2008 Section 602.8. Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. These standards often provide supplemental information as guidance.

2.6 EWG EIFS:

When installed in accordance with this report, EWG EIFS is an EPS foam plastic insulation board used as nonstructural thermal insulation as a component in exterior insulation and finish systems (EIFS). The insulation may be used on the outside faces of exterior walls when an ASTM C578 Type I EPS board is recognized in a current ICC-ES evaluation report for an EIFS.

2.7 ThermalStar D2D:

ThermalStar D2D insulation boards are EPS foam plastic insulation used as nonstructural thermal insulation as components of a Class A, B, or C roof covering system installed directly to steel decks when recognized in a current ICC-ES evaluation report, or when installed as described in Section 4.7 of this report.

2.8 ThermalStar LCI Underlayment:

ThermalStar LCI Underlayment insulation board is an EPS foam plastic insulation board used as nonstructural thermal insulation as components of a Class A, B, or C roof covering system, when recognized in a current ICC-ES evaluation report for the roof covering system, or when installed in accordance with Section 4.2.1 of this report. Also, the insulation is for use on the outside faces of exterior walls when an ASTM C578 Type I or Type II EPS board is recognized in a current ICC-ES evaluation report for a one-coat cementitious exterior wall coating system, or when installed as described in Section 4.2.1 of this report.

The ThermalStar LCI Underlayment boards may be used as an alternative to the water-resistive barriers specified in the codes when installed in accordance with Section 4.8.1.

The attributes of the ThermalStar LCI Underlayment boards used as a water-resistive barrier have been verified as conforming to the provisions of (i) CALGreen Section 5.407.1 and (ii) ICC 700-2012 Section 602.1.8, 11.602.1.8 and 12.5.602.1.8; and (iii) ICC 700-2008 Section 602.9 for water-resistive barriers. Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. These codes or standards often provide supplemental information as guidance.

3.0 DESCRIPTION

3.1 General:

The Atlas EPS insulation boards, at a maximum thickness of 4 inches (102 mm) and a nominal density of 2.0 pcf (32 kg/m³), have a flame-spread index not exceeding 25 and a smoke-developed index not exceeding 450 when tested in accordance with ASTM E84. Boards are alternately white or light orange color. See Table 1 for applicable use of the products.

3.2 Integrity, ThermalStar, EcoSolutions, and Elevation Expanded Polystyrene Insulation Boards:

Integrity, ThermalStar, EcoSolutions, and Elevation Expanded Polystyrene (EPS) insulation boards comply with ASTM C578 and are molded, closed-cell boards manufactured at minimum densities of 0.90, 1.15, 1.35, 1.80 and 2.40 pcf (14.4, 18.4, 21.6, 28.8 and 38.4 kg/m³). The designations for the four densities are Type I, Type VIII, Type II, Type IX, and Type XIV, respectively. For thermal resistance (*R*-values), see Table 2.

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

3.3 ThermalStar T&G Board (T&G I, T&G II, T&G IIR):

ThermalStar T&G Board insulation is molded, closed-cell, EPS foam plastic insulation board complying with the Type I and Type II requirements of ASTM C578. The board insulation is molded at minimum densities of 0.90 pcf (14.4 kg/m³) for T&G I and 1.35 pcf (21.6 kg/m³) for T&G II and T&G IIR. For thermal resistance (*R*-values), see Table 2.

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

3.4 ThermalStar GX T&G II Board:

ThermalStar GX T&G II Board insulation is black, closed-cell, EPS graphite enhanced foam plastic insulation board complying with the Type II requirements of ASTM C578.

The board insulation is molded at minimum density of 1.35 pcf (21.6 kg/m³). For thermal resistance (*R*-values), see Table 2.

The ThermalStar GX T&G II Board insulation consists of nominally 1.06-inch-thick (27 mm) boards produced in various sizes, with shiplap or tongue-and-groove edge profiles.

3.5 ThermalStar Inter-Grade Board EPS:

ThermalStar Inter-Grade Board EPS insulation is white or orange molded, closed-cell, foam plastic insulation board complying with the Type I requirements of ASTM C578. The board insulation is molded at minimum density of 0.90 pcf (14.4 kg/m³). For thermal resistance (*R*-values), see Table 2.

The ThermalStar Inter-Grade Board EPS insulation consists of maximum 4-inch-thick (101.4 mm) boards produced in various sizes, with shiplap or tongue-and-groove edge profiles.

3.6 X-Grade TalonGUARD Expanded Polystyrene Boards:

X-Grade TalonGUARD boards are similar to EPS insulation boards described in Section 3.2 of this report, and comply with ASTM C578. The insulation boards are used as described in Section 2.5 of this report when installed as described in Section 4.5.

3.7 EWG EIFS:

EWG EIFS is molded, closed-cell, EPS insulation board complying with the Type I requirements of ASTM C578 and ASTM E2430. The EPS insulation board is manufactured at a minimum density of 0.90 pcf (14.4 kg/m³). For thermal resistance (*R*-values), see Table 2.

The EWG EIFS is produced in various thicknesses up to 6 inches (152 mm), and in various sizes, with square, shiplap or tongue-and-groove edge profiles.

3.8 ThermalStar D2D:

ThermalStar D2D insulation boards comply with ASTM C578 and are molded, closed-cell, EPS boards manufactured at minimum densities of 0.90, 1.15, 1.35 and 1.80 pcf (14.4, 18.4, 21.6 and 28.8 kg/m³). The designations for the four densities are, respectively, ThermalStar D2D (Type I), ThermalStar D2D (Type VIII), ThermalStar D2D (Type II) and ThermalStar D2D (Type IX). For thermal resistance (*R*-values), see Table 2.

The ThermalStar D2D insulation boards are produced in flat or tapered boards, up to a thickness of 9 inches (229 mm) for ThermalStar D2D (Type I), 7.2 inches (183 mm) for ThermalStar D2D (Type VIII), 6.0 inches (152 mm) for ThermalStar D2D (Type II), and 4.5 inches (114 mm) for ThermalStar D2D (Type IX). The boards are produced in various sizes, with square, shiplap or tongue-and-groove edge profiles.

3.9 ThermalStar LCI Underlayment:

ThermalStar LCI Underlayment insulation boards are molded, closed-cell, EPS boards with polyethylene or polypropylene film facers adhered to both sides. The core material is a Type I EPS manufactured at a minimum density of 0.9 pcf (14.4 kg/m³). The facing is bonded to the EPS core with adhesive and is cured under factory-controlled conditions.

The ThermalStar LCI Underlayment insulation boards are nominally 1 inch (25 mm) thick and are produced in various sizes, with square, shiplap or tongue-and-groove edge

profiles. For thermal resistance (*R*-values), see Table 2. For minimum density, compressive strength and flexural strength see Table 3.

3.10 ThermalStar 007 Tape:

ThermalStar 007 tape must be used with ThermalStar LCI Underlayment insulation boards when the board is used as an alternate to the water-resistive barrier as described in Section 4.8.1. 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 width of 2 inches (51 mm). The tape is supplied in rolls 36 yards (32.9 m) long.

3.11 Potential Heat:

See Table 4 for potential heat content of insulation boards when tested in accordance with NFPA 259.

4.0 INSTALLATION

4.1 General:

Installation of the 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 EPS insulation boards must be attached to supports in a manner that will secure the insulation in place.

4.2 Integrity, ThermalStar, EcoSolutions, and Elevation EPS Insulation Boards:

4.2.1 General: The interior of the building must be separated from the insulation boards with a thermal barrier as required in IBC Section 2603.4, or 2015, 2012 and 2009 IRC Section R316.4, , as applicable, except as described in Section 4.2.2 or 4.2.3 of this report. Under the 2015, 2012 and 2009 IBC, protection against condensation must be provided in accordance with Section 1403.2. A vapor retarder must be provided in accordance with 2015 and 2012 IRC Section R702.7 or 2009 IRC Section R601.3. A water-resistive barrier in compliance with IBC Section 1404.2 and IRC Section R703.2, is required and, when applied over wood-based sheathing, must comply with IBC Section 2510.6 or IRC Section R703.6.3. The insulation board is permitted to be applied to exterior faces of walls, to a maximum thickness of 1½ inches (38 mm), except insulation board thicknesses greater than 1½ inches (38 mm) may be permitted if such installation is recognized in an ICC-ES evaluation report on wall coverings or when attachment of claddings is in accordance with the prescriptive requirements of 2015 IBC Sections 2603.11 or 2603.12 or 2015 IRC Sections R703.15, R703.16 or R703.17. The attachment of finish materials over the insulation board must provide a minimum 1-inch (25.4 mm) penetration of the fasteners into wood framing members. Exterior wall assembly, exterior finish or a wall covering over the insulation boards must be structurally adequate to resist the required horizontal forces perpendicular to the wall.

The insulation boards must not be used structurally to resist transverse, vertical or in-plane loads. 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 2015 IBC Section 2308.6, 2012 and 2009 IBC Sections 2308.9.3 and 2308.12.4, IRC Section R602.10, as applicable.

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.

4.2.2 Attics and Crawl Spaces:

4.2.2.1 Where EWG EIFS; Integrity, ThermalStar, EcoSolutions, and Elevation Type I, II, VIII and IX EPS insulation boards; X-Grade TalonGUARD Type I, II, VIII and IX; ThermalStar T&G Boards (T&G I, T&G II, T&G IIR) and ThermalStar LCI Underlayment insulation boards, with a maximum nominal thickness of 2 inches (50.8 mm) and a maximum density of 2.0 pcf (32 kg/m³), are installed with mechanical fasteners on vertical walls and the underside of the surface above in attics and crawl spaces, the prescriptive ignition barrier required by IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4 may be omitted, where the following conditions apply:

- a. Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, as applicable, except unvented attic assemblies are permitted under the conditions prescribed in 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4).
- b. Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable, except unvented crawl spaces are permitted under the conditions prescribed in 2015 and 2012 IRC Section R408.3.
- c. Combustion air is provided in accordance with IMC (*International Mechanical Code*[®]) Section 701.

4.2.2.2 Where Inter-Grade insulation boards, with a maximum nominal thickness of 4 inches (101.6 mm) and a maximum density of 1.0 pcf (16 kg/m³), are installed with mechanical fasteners only on vertical walls in attics and crawl spaces, the prescriptive ignition barrier required by IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4 may be omitted, where the following conditions apply:

- a. Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, as applicable, except unvented attic assemblies are permitted under the conditions prescribed in 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4).
- b. Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable, except unvented crawl spaces are permitted under the conditions prescribed in 2015 and 2012 IRC Section R408.3.
- c. Combustion air is provided in accordance with IMC (*International Mechanical Code*[®]) Section 701.

4.2.3 Application without a Prescriptive Thermal Barrier in Residential Basements:

ThermalStar Inter-Grade insulation boards, with a maximum nominal thickness of 4 inches (101.4 mm) and maximum nominal density of 1 pcf (16 kg/m³), may be installed on walls of residential basements without the prescriptive 15-minute thermal barrier required by the applicable code.

EWG EIFS; Integrity, ThermalStar, EcoSolutions, and Elevation Type I, II, VIII and IX EPS insulation boards; X-Grade TalonGUARD Type I, II, VIII and IX; XTR T&G I, T&G II, and T&G IIR insulation boards, with a maximum nominal thickness of 2 inches (50.8 mm) and maximum nominal density of 2 pcf (32 kg/m³), may be installed on both walls and ceilings of residential basements without the prescriptive 15-minute thermal barrier required by the applicable code.

4.3 ThermalStar T&G Board (T&G I, T&G II, T&G IIR):

ThermalStar T&G Board must be installed in accordance with a current ICC-ES evaluation report on a one-coat cementitious exterior wall coating system. The insulation may also be installed in attic and crawl spaces without a covering as described in Section 4.2.2 of this report. The insulation boards may also be installed as exterior perimeter insulation around concrete slab edges, on concrete or masonry foundation walls, or under flat concrete slab on grade construction, except in areas where the probability of termite activity is "very heavy" as noted in Section 5.5.

4.4 ThermalStar GX T&G Board:

ThermalStar GX T&G Board must be installed in accordance with a current ICC-ES evaluation report on a one-coat cementitious exterior wall coating system.

4.5 X-Grade TalonGUARD Expanded Polystyrene:

X-Grade TalonGUARD insulation boards must be installed in the same manner as described for Integrity, ThermalStar, EcoSolutions, and Elevation EPS insulation boards in Section 4.2.

4.6 EWG EIFS:

EWG EIFS insulation must be installed as part of an EIFS system in accordance with the current ICC-ES evaluation report on the EIFS.

4.7 ThermalStar D2D:

4.7.1 Application Directly to Steel Roof Decks without a Thermal Barrier: ThermalStar D2D roof insulation boards may be used as a component of a Class A, B or C roof covering installed on steel decks without a thermal barrier, when installed in accordance with this section (Section 4.7) of this report.

4.7.2 Materials:

4.7.2.1 Steel Deck: Steel roof decking must be minimum No. 22 gage [0.030 inch (0.76 mm)], 1¹/₂-inch-deep (38 mm), unperforated, galvanized steel decking, with flutes spaced a maximum of 6 inches (152 mm) on center. The deck must be welded or mechanically fastened to structural supports in accordance with the applicable code.

4.7.2.2 Foam Plastic Insulation: The ThermalStar D2D insulation boards are recognized for use on steel decks without a thermal barrier. The ThermalStar D2D insulation boards are limited to have maximum thicknesses as follows: up to 9 inches (229 mm) for ThermalStar D2D (Type I), 7.2 inches (183 mm) for ThermalStar D2D (Type VIII), 6.0 inches (152 mm) for ThermalStar D2D (Type II), and 4.5 inches (114 mm) for ThermalStar D2D (Type IX).

4.7.2.3 Cover Board: When used, the cover board in the roof-covering system must be either 1/4-inch-thick (6.4 mm) Dens-Deck[®] Roof Board manufactured by Georgia-Pacific Corporation, or 1/2-inch-thick (12.7 mm) wood-fiber board complying with ASTM C208.

4.7.2.4 Slip Sheet: The slip sheet must be one layer of FR10 or FR50 manufactured by Atlas Roofing Corporation, and may be used as an alternative to the cover board specified for the membrane roof systems noted in Section 4.7.2.3 of this report.

4.7.2.5 Roof Covering: The roof covering membrane must be either an EPDM or a thermoplastic membrane, recognized in a current ICC-ES evaluation report as part of a Class A, B or C roofing covering system. The membrane must be either mechanically attached, fully adhered, or ballasted. Thermoplastic membranes include polyvinyl

chloride (PVC), modified PVC, chloro-sulphonated polyethylene (CSPE), and thermoplastic polyolefin (TPO). The membrane must be limited to a maximum nominal thickness of 0.045 inch (1.1 mm) for use under the IBC. The evaluation report on the roof-covering system must specify one of the following systems as the only components of the classified roof-covering system permitted under the conditions of this report:

- a. A generic EPS insulation board, having the same density and installed thickness as the ThermalStar D2D roof insulation boards recognized in Section 4.7.2.2 of this report; the cover board described in Section 4.7.2.3 or the slip sheet described in Section 4.7.2.4; and the mechanically attached roof-covering membrane described in this section, installed over a steel deck described in Section 4.7.2.1.
- b. A generic EPS insulation board, having the same density and installed thickness as the ThermalStar D2D roof insulation recognized in Section 4.7.2.2 of this report; the roof covering membrane described in this section; and stone ballast installed over a steel deck described in Section 4.7.2.1.

4.7.3 Installation: The ThermalStar D2D roof insulation boards must be loosely laid directly over the steel deck in single or multiple layers, to a maximum total thickness as described in Section 4.7.2.2. The top layer of insulation must be placed so that the wording required in item 1 of Section 7.0 is facing up. The optional cover board described in Section 4.7.2.3, or the slip sheet described in Section 4.7.2.4, must be laid over the insulation. The cover board is optional, depending on system requirements, when the method of attaching the roof membrane is either mechanical fastening or adhesion. A cover board is not permitted in the system when the roof membrane is ballasted.

The method of attaching the roof covering, cover board, slip sheet or ballast, and insulation boards to the steel roof deck must be in accordance with the ICC-ES evaluation report on the roof-covering membrane, and as described in Section 4.7.2.5.

4.7.4 Reroofing: New roofing must not be applied over existing roof-covering systems as 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 2015 IBC Section 1511 or 2012 and 2009 IBC Section 1510. The existing roof-covering membrane and, if necessary, the slip sheet or cover board must be removed before new roofing materials are installed; the new roofing materials must have characteristics specifically described in this report.

4.8 ThermalStar LCI Underlayment:

ThermalStar LCI Underlayment wall insulation boards must be installed as specified for Integrity, ThermalStar, and Elevation EPS in Sections 4.2.1 or as described in Section 4.8.1 of this report.

4.8.1 Water-resistive Barrier:

4.8.1.1 General: When installed in accordance with this section, the ThermalStar LCI Underlayment boards combined with ThermalStar 007 tape may be used as an alternative to the water-resistive barrier in IBC Section 1404.2 and IRC Section R703.2 when installed on exterior walls as described in this section.

The 2- or 4-foot-wide (610 or 1219 mm) ThermalStar LCI Underlayment 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 LCI Underlayment boards must be installed directly to framing spaced a maximum of 24 inches on center, except where further limited by the requirements for a wall covering. Fasteners used to attach the boards to framing must be corrosion-resistant roofing nails with a minimum $\frac{3}{8}$ -inch-diameter (9.5 mm) head; 6d ring-shank nails and $\frac{15}{16}$ -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 007 polyethylene tape centered over the joint. ThermalStar LCI Underlayment boards must be installed with a weep screed, and require the use of self-adhering flashing complying with the ICC-ES Acceptance Criteria for Flashing Materials (AC148), around penetrations. The boards must be covered by an approved exterior wall cladding or cementitious wall coating recognized in a current ICC-ES evaluation report.

4.8.1.2 Installation Around Penetrations and Openings:

The system is limited to use with flange-type windows. An AC148-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 Underlayment 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. 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 AC148. Flashing of other penetrating items must be in accordance with the wall covering manufacturer's instructions.

5.0 CONDITIONS OF USE

The EPS insulation boards described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The EPS insulation boards must be installed in accordance with this report, the manufacturer's published installation instructions and the applicable code. In the event of a conflict between the installation instructions and this report, this report governs.
- 5.2 The boards must be separated from the building interior with a thermal barrier complying with the applicable code, such as minimum $\frac{1}{2}$ -inch-thick (12.7 mm) gypsum wallboard installed in accordance with the applicable code, except as described in Sections 4.2.2, 4.2.3, 4.7.1 and 5.8 of this report.
- 5.3 Except for ThermalStar LCI Underlayment boards installed in accordance with Section 4.8.1, when

applied on exterior walls, the boards must be protected by a water-resistive barrier complying with 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. When used as a water-resistive barrier, all ThermalStar LCI Underlayment joints must be backed with a stud or sheathing.

- 5.4 Use of the insulation boards to structurally resist transverse, racking-shear or vertical loading is outside the scope of this report. Walls must be braced in accordance with the applicable code.
- 5.5 In areas where the probability of termite infestation is defined as "very heavy," the foam plastic must be installed in accordance with 2015 IBC Section 2603.8, 2012 IBC Section 2603.9; 2009 IBC Section 2603.8; or 2012 and 2009 IRC Section R318.4, except as allowed for X-Grade TalonGUARD EPS in Section 4.5 of this report.
- 5.6 Jobsite certification and labeling of the insulation must comply with 2015 IRC Section N1101.10.11, 2015 IECC Section C303.1.1.1 or R303.1.1.1, 2012 IRC Section N1101.12.11, 2012 IECC Section C303.1.1.1 or R303.1.1.1, 2009 IRC Section N1101.4 and 2009 IECC Section 303.1.1, as applicable.
- 5.7 ThermalStar 007 Tape has not been evaluated by ICC-ES for use as flashing under IBC Section 1405.4 or IRC Section R703.8.
- 5.8 ThermalStar D2D insulation boards are installed directly to a steel roof deck without a thermal barrier, the following conditions apply:
 - 5.8.1 The insulation boards must be part of a Class A, B or C roof covering system described in Section 4.7 of this report. The boards are permitted to be installed without the thermal barrier addressed in IBC Section 2603.4.1.5. The system is not permitted under the IRC.
 - 5.8.2 Reroofing must be in accordance with Section 4.7.4.
- 5.9 Boards are manufactured in Perryville, Missouri, Tijuana, Baja California, Mexico, Byron Center, Michigan and Martinsville, Virginia, under a quality-control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated June 2015 (editorially revised May 2016).
- 6.2 Test report in accordance with UL1256.
- 6.3 Test reports in accordance with ASTM E84.
- 6.4 Test reports in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Sheathing Panels Used as Weather-resistive Barriers (AC71), dated February 2003 (editorially revised January 2016).

6.5 Test reports in accordance with the ICC-ES Acceptance Criteria for Termite-resistant Foam Plastics (AC239), dated October 2008 (editorially revised February 2014).

6.6 Test reports in accordance with NFPA 286.

6.7 Test report in accordance with NFPA 259.

7.0 IDENTIFICATION

The Integrity, ThermalStar, EcoSolutions, and Elevation insulation boards must be packaged in bundles that are labeled with the manufacturer's name (Atlas EPS) and address; the date of manufacture; the product type (including TalonGUARD where applicable); the density; the flame-spread and smoke-developed indices; the thermal-resistance *R*-value (when applicable); and the evaluation report number (ESR-1962).

In addition to the labeling noted above, the following additional labeling is required:

1. When ThermalStar D2D roof insulation boards are used in roof-covering assemblies attached directly to steel roof decks under Section 4.7 of this report, in addition to the labeling noted above, the boards must bear the designation "D2D" and the wording "When used in rebooting applications, limits exist for cover board and membrane. See ICC-ES evaluation report ESR-1962 before reroofing"; and the words "THIS SIDE UP" printed on, or included on a permanent label affixed to, one face of each insulation board.
2. The ThermalStar T&G (T&G I, T&G II, T&G IIR) and ThermalStar GX T&G II insulation boards are individually identified with the Atlas EPS name, the product type, the density, the evaluation report number (ESR-1962), and the name of the inspection agency (ICC-ES).
3. ThermalStar T&G (T&G I, T&G II, T&G IIR), ThermalStar GX T&G II, and ThermalStar LCI Underlayment insulation boards intended for use on walls required to be of noncombustible construction are also identified along one edge, and on the face of one board in each bundle, with the name of the exterior coating company and the company's respective ICC-ES evaluation report number.
4. EWG EIFS insulation boards are individually identified by a label appearing on the edge of each insulation board, and on both faces of one board in each bundle, identifying the product type, the manufacturing plant designation, and the ICC-ES evaluation report number (ESR-1962).
5. The ThermalStar 007 polyethylene tape is identified with the product name and the ICC-ES evaluation report number (ESR-1962).
6. Insulation boards used for installations in attics and crawl spaces as described in Section 4.2.2 must be identified as being produced from Styropek, Flint Hills Resources LP, Nova, or Styrochem beads.

TABLE 1—PRODUCT NAMES AND APPLICABLE USES

PRODUCT NAMES	SURFACE BURNING PERFORMANCE	THERMAL PERFORMANCE (R-VALUE)	ATTIC & CRAWL SPACE WITHOUT AN IGNITION BARRIER	RESIDENTIAL BASEMENT WALLS WITHOUT A THERMAL BARRIER	ROOFING APPLICATIONS WITHOUT A THERMAL BARRIER	TERMITE RESISTANCE	WATER RESISTIVE BARRIER
ThermalStar T&G, ThermalStar Inter-Grade Board EPS, EWG EIFS Board	✓	✓	✓	✓	—	—	—
ThermalStar GX T&G II	✓	✓	—	—	—	—	—
Integrity, ThermalStar, EcoSolutions, and Elevation Expanded Polystyrene	✓	✓	✓	✓	—	—	—
ThermalStar D2D	✓	✓	—	—	✓	—	—
X-Grade TalonGUARD EPS	✓	✓	✓	✓	—	✓	—
ThermalStar LCi Underlayment	✓	✓	✓	—	—	—	✓

TABLE 2—MINIMUM R-VALUE (°F ft² h/Btu) AT 75°F MEAN TEMPERATURE

PROPERTY	TYPE I, T&G I, X-GRADE (TYPE I), EWG EIFS, D2D (TYPE I), THERMALSTAR INTER-GRADE BOARD EPS, THERMALSTAR LCi UNDERLAYMENT	TYPE VIII, X-GRADE (TYPE VIII), D2D (TYPE VIII)	ThermalStar TYPE II, T&G II, T&G IIR, ThermalStar GX T&G II, X-GRADE (TYPE II), D2D (TYPE II)	TYPE IX, X-GRADE (TYPE IX), D2D (TYPE IX)	TYPE XIV, X-GRADE (TYPE XIV)
Density, min., lb/ft ³ (kg/m ³)	0.90 (14.4)	1.15 (18.4)	1.35 (21.6)	1.80 (28.8)	2.40 (38.4)
Thermal resistance value, Per inch of thickness at 75EF. EF ft ² h/Btu (°K m ² /W)	3.60 (0.63)	3.80 (0.67)	4.00 (0.70)	4.20 (0.74)	4.20 (0.74)

For SI: 1 lb/ft³ = 16.018 kg/m³, 1°F ft² h/Btu = 0.176°K m²/W, 1inch = 25.4 mm.

TABLE 3—PHYSICAL PROPERTIES OF THERMALSTAR LCi UNDERLAYMENT EPS BOARDS

PROPERTY	THERMALSTAR LCi UNDERLAYMENT
Minimum density, lb/ft ³ (kg/m ³)	0.9 (14.4)
Compressive strength @ 10% def., psi (kPa)	10 (69)
Flexural strength, psi (kPa)	38.9 (268)

For SI: 1 lb/ft³ = 16.018 kg/m³, 1°F ft² h/Btu = 0.176°K m²/W, 1 psi = 6.895 kPa.

TABLE 4—POTENTIAL HEAT OF INSULATION BOARD

C578 TYPE ATLAS EPS	HEAT POTENTIAL (ENGLISH)	HEAT POTENTIAL (METRIC)
I	1500 Btu/ft ²	17.0 mJ/m ²
VIII	1875 Btu/ft ²	21.3 mJ/m ²
II	2250 Btu/ft ²	25.5 mJ/m ²
IX	3000 Btu/ft ²	34.0 mJ/m ²