X-Grade®
Rigid Insulation

Substitution Request Packet

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IT'S ORANGE
OR IT'S ORDINARY®

For more information, please visit our website at:
www.ThermalStar.com/Products/X-Grade

ATLAS®

X-Grade®

Rigid Insulation

When expectations exceed ordinary, X-Grade® rigid insulation is the only choice.

It's the proven XPS replacement for both commercial and residential projects including:

- Below grade insulation
- Perimeter foundation insulation
- Passivhaus footing isolation
- Radiant flooring insulation
- Freezers & cold storage

EPSX® TECHNOLOGY ADVANTAGE

- Termite Resistant
- Moisture Resistant
- Stable R-value
- Environmentally Friendly
- Limited Lifetime Warranty

Property	ASTM Test Method	STANDARD			
		X-Grade 15	X-Grade 25	X-Grade 40	X-Grade 60
Compressive Strength (minimum psi) at 10% Deformation[1]	D1621	15	25	40	60
R-value per inch (minimum) at 75°F Mean Temperature	C518	4.2	4.2	4.2	4.4
ASTM Classification	C578	Type II	Type II	Type XIV	Type XV
R-value per inch (minimum) at 40°F Mean Temperature	C518	4.6	4.7	4.7	4.7
R-value per inch (minimum) at 25°F Mean Temperature	C518	4.8	4.9	5.0	5.0
Compressive Strength (minimum psi) at 1% Deformation[1]	D1621	9	10	15	20
Flexural Strength (minimum psi)	C203	42	50	75	95
Water Absorption Percent (%) by Volume, Maximum After 24 Hour Immersion	C272	1.5	1.25	1.25	1.0
Water Vapor Permeance at 1" Thick (perms)	Typical E96, desiccant method	2.5	2.5	2.5	2.5
Surface Burning - Flame Spread and Smoked Developed	E84	FS 20, SD 400 (meets code)			
Maximum Use Temperature	-	Short Term (10–15 minutes) 180°F, Long term 165°F			

[1] *ThermalStar X-Grade is elastic within 1–2% deformation. To prevent long term creep, 3:1 design safety factors for static loads of the 10% deformation values are recommended, or use the tested 1% deformation values for design, whichever is greater.*

Advantages of X-Grade:

STABLE R-VALUE

While XPS products degrade from initial R5 per inch as insulating gases escape, X-Grade's thermal performance is stable over time, assuring R-value meets design requirements over the life of the structure.

LONG TERM MOISTURE RESISTANCE:

The *coefficient of water absorption* is a property used to define a building material's likeliness to soak up water, with a sponge having a value of 1.0. In comparison, X-Grade has a coefficient of zero.

INTEGRATED TERMITICIDE:

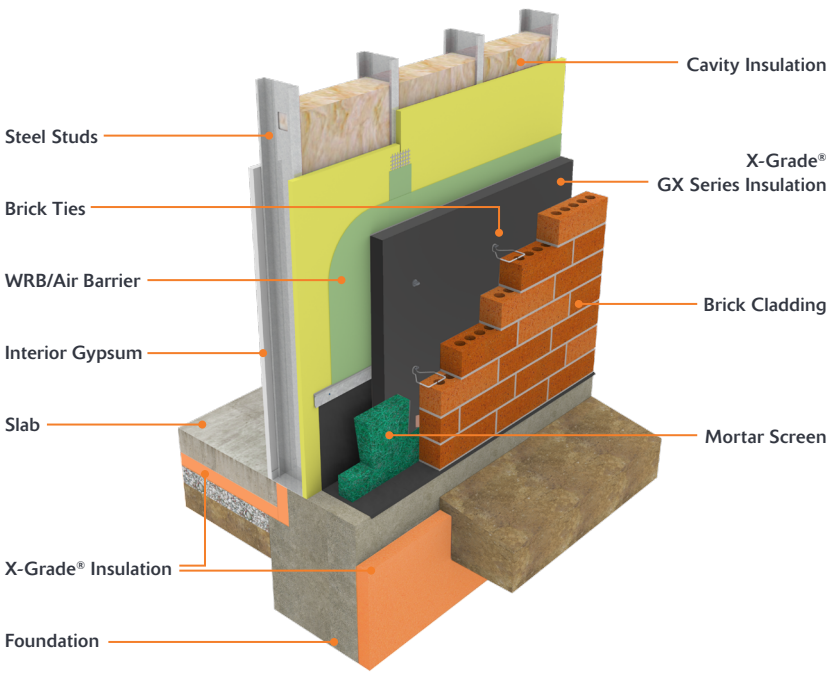
X-Grade has an integrated termiticide to prevent any termite damage or infestation.

ENVIRONMENTALLY FRIENDLY:

XPS utilizes HCFC gases in its insulating cells to achieve an initial higher R-value and has an extremely high global warming potential (GWP) of 1430, whereas the insulating cells of X-Grade simply contain air, providing an environmentally friendly solution with a GWP of zero.

RECYCLABLE:

X-Grade is readily accepted for recycle. Visit epspackaging.org to locate a drop-off location nearest you.



INSTALLATION AND HANDLING

X-Grade can be handled much the same as any other foam or wood sheathing, using similar tools or a simple utility knife to customize panels to fit the application.

SAFETY

SDS for this product are available at atlaseps.com. Dust generated from sanding or cutting X-Grade should be avoided using a dust mask. X-Grade insulation is combustible and the product should be protected from ignition sources such as open flames or welder's torch. Applications not specifically listed in UL ER16529.1 require permanent separation of X-Grade insulation from the interior of the building by a thermal barrier such as drywall or concrete for fire safety.

WARRANTY

X-Grade Insulation is backed by a limited lifetime warranty for physical and thermal performance, and termite resistance.

CODE COMPLIANCE

ThermalStar X-Grade insulation complies with the model building codes when properly installed:

- Surface Burning – UL BRYX.R16529
- Physical Properties – UL QORW.R16529
- CAN/ULC S102.2, S701 – ULC BOZCC.R16529
- International Energy Conservation Code
- International Residential Code (IRC) – ICC-ES ESR-1962, ULEX R16529-01
- International Building Code (IBC) – ICC-ES ESR-1962, ULEX R16529-01
- ASTM C578 – *(See product marking for type)*

ThermalStar®
BY ATLAS EPS

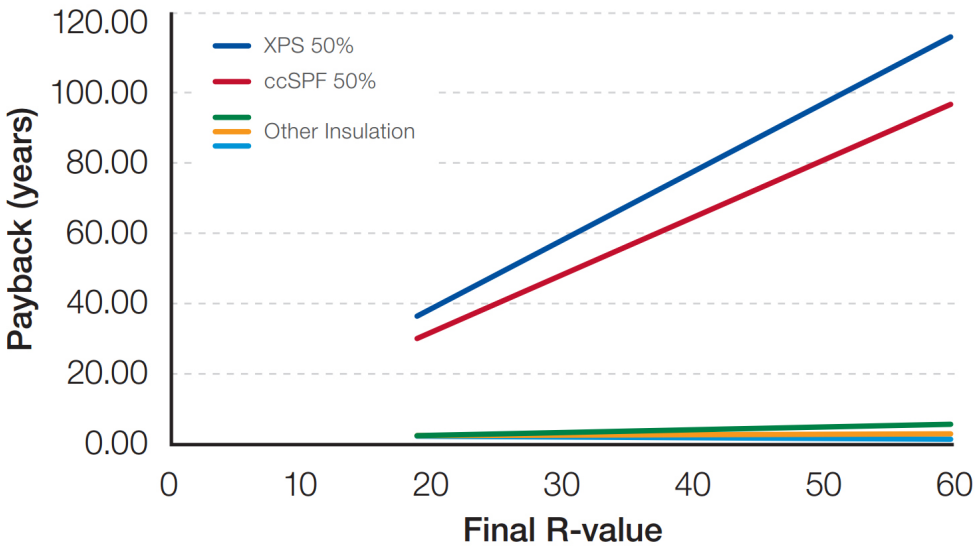
Global Warming Potential Comparison

X-Grade®
Rigid Insulation

ThermalStar® X-Grade® rigid insulation has been specifically designed as a low global warming potential (GWP) alternative to extruded polystyrene (XPS) rigid insulation. GWP is an index of the overall climate impacts of a product. It relates to the impact of a gas' emission to the emission of equivalent mass of CO^2. (For reference, CO^2 has a GWP of one.) Since X-Grade only contains air in closed insulating cells, it has zero ozone depletion and zero GWP. Additionally, X-Grade provides a stable, long term R-value that will remain the same throughout the life of the building and is backed by a limited lifetime warranty for thermal performance. Due to the blowing agent, R134a, that XPS uses in their product to achieve an initial higher R-value value, XPS has an extremely high GWP exceeding 1400. As the R134a escapes from the insulating cells over time, the R-value degrades, which is why the XPS industry often publishes a fresh R-value and a 180 day R-value.

Since R134a has such a high GWP, the EPA had issued a final rule on July 20th, 2015, mandating end dates for R134a for several products. Despite the fact that other industries, such as refrigeration, removed R134a from their product chemistry, XPS manufacturers continue to utilize this blowing agent, regardless of its harmful environmental effects.

The diagrams below from Building Science Corporation show the number of years of energy savings that will be required to neutralize the GWP of each insulation. Note that XPS will take a minimum of 30 years, while EPS will be covered after 3 years. If applied in large quantities, the greenhouse payback period for extruded polystyrene and standard closed cell spray polyurethane foam could exceed 100 years.



As the thickness of each insulation increases, the R-value also increases. Note that the payback period for EPS, shown in yellow, has a very minimal payback period, even at higher R-values.

Source: Building Science Corporation at NESEA Building Energy Conference, 2010

VOC Emission Declaration

September 15, 2014

ThermalStar® X-Grade® rigid insulation is an expanded polystyrene (EPS) foam plastic enhanced with EPSx® Technology for distinct orange color, moisture resistance and termite resistance. As the finished product relies on microcells filled with air to create insulating properties, it is not subject to thermal drift, nor out-gassing over time. VOC emissions would therefore be expected to be low.

To verify the actual emissions of the product, testing via CDPH Standard Method V1.1 "Standard Method for Testing and Evaluation of VOC Emissions" was conducted. The sample was selected from high density material with orange color and termiticide to present a worse case of all possible ingredients and mass which could contribute emissions. This is the testing conducted for "GreenGuard" certification, and was conducted by UL Environment for comparison against the criteria. The complete report from UL Environment is summarized in Table 1.

Table 1: Test Results and Modeling of ThermalStar® EPS

UL Environment Designation	Environment Modeled	Total VOC	Formaldehyde	Total Aldehydes	CREL/TLV Issues
GREENGUARD	Office	•	•	•	None
GREENGUARD	Office	•	•	•	None
GREENGUARD Gold	Classroom	•	•	•	None

• *Predicted to meet criteria based on modeling*

CDPH Standard Method V1.1 "Standard Method for Testing and Evaluation of VOC Emissions" chapter 8 titled "Guidelines for Use of Standard Method as Basis for a Building Product Claim" provides a path for self declaration of VOC emission performance. The following are requirements as met by Atlas EPS.

- Method used to test product declared - see CDPH method referenced
- 3rd party quality assurance and follow up audits - UL 3rd party listed and inspected
- Use accredited lab - UL Environment is ISO 17025 accredited for this test method
- Extension of tested products results to other models - high density EPS tested, highest VOC potential
- QC Manual for product - AC10 complaint QA Manual filed with UL
- Sample selection from typical production, "worse potential results" product - ThermalStar 25
- Grouping of product models based on similar formulation - all ThermalStar products are EPS
- Changes in formulation require retesting - EPS resin is controlled by 3rd party follow up, no changes

ThermalStar EPS easily meets the quality assurance requirements presented in the guidelines for manufacturer self declaration. This bulletin is current as of the date above. Please visit our website at www.AtlasEPS.com for the most recent technical information.

VOC = volatile organic compounds
CDPH = California Department of Public Health
UL = Underwriters Laboratories
CREL = chronic reference exposure level
TLV = threshold limit value
AC= Acceptance criterion
ISO = International Organization for Standardization
QC = quality control

X-Grade®
Rigid Insulation

Rigid Insulation R-10 Comparison

Property & Test Method	Dow Styrofoam®	Owens Corning Foamular®	Atlas EPS X-Grade®
Product R-value at 75°F Mean Temperature	R10	R10	**R10**
Compressive Strength, ASTM D1621 psi, min.	25 psi	25 psi	**25 psi**
Size	16 x 96	16 x 96	**48 x 96 scored**
Material	Polystyrene	Polystyrene	**Polystyrene**
Flexural Strength ASTM C203 psi, min. per ASTM C578	50	50	**50**
Water Absorption ASTM C272 % by volume, max.	0.3	0.1	**1.25**
Water Vapor Permeance, ASTM E96, at R10 thickness	0.7	0.5	**1.5**
Long-term Maximum Use Temp °F, max.	165°F	165°F	**165°F**
Water Affinity	Hydrophobic	Hydrophobic	**Hydrophobic**
Preserved Against Termite Degradation per Code Requirements in SC, GA, FL, AL, MS, LA, TX & CA***	Not Available	Not Available	**Standard**
Gas Inside Insulating Cells (per SDS)	Proprietary Blend (HFC 134a)	Proprietary Blend (HFC 134a)	**Air**
GreenGuard Schools & Children	No	Certified	**Tested = 0**
Global Warming Potential (GWP)	1430	1430	**0**
Burning Characteristics			
ASTM E84 Flame Spread and Smoke Developed	<25*, <450**	<25*, <450**	**<25*, <450****
NFPA 285 Approval—Cementitous Claddings	Yes	Yes	**Yes**
Warranties			
Thermal Warranty	50 Years	Limited Lifetime	**Limited Lifetime**
Physical Warranty	50 Years	Limited Lifetime	**Limited Lifetime**
Termite Resistance Warranty	None	None	**Limited Lifetime**
ASTM C578 Type	IV	IV	**II**
Alternate 15 psi Compressive ASTM C578 TYPE	X	X	**II**

* Code requires flame spread rating of 75 maximum
** Code requires smoke development rating of 450 maximum
*** IBC 2603.8, IRC R318.4 requires foam plastic below grade or underslab be protected from termite attack in very heavy infestation areas

X-Grade®
Rigid Insulation

ThermalStar® X-Grade®
Limited Lifetime Product Warranty

Atlas EPS, A DIVISION OF ATLAS ROOFING CORPORATION, ("Atlas EPS"), warrants ThermalStar® X-Grade® for the life of the home or building on which it originally installed the following:

- The representative thermal insulation value will not vary more than ten (10) percent from the published R-value
- The product will meet the physical performance requirements within ten (10) percent of the minimum requirements per published Type of ASTM C578-12
- The product will maintain a termite resistance of seven (7) or greater per AWPA E7.

If the product fails to perform as defined in these warranty limits as determined by the samples and testing set forth below, Atlas EPS will, subject to the terms and conditions below, refund to the owner of the building ("Owner") the original purchase price of the nonperforming product. The total expense for Atlas EPS for the duration of this Limited Lifetime Warranty shall be limited to the original purchase price of the product.

TERMS AND CONDITIONS

PROOF OF PURCHASE: As a condition precedent to recovery under this Limited Lifetime Warranty, Owner agrees to retain documentary proof of purchase(s)... (sales receipts, purchase orders, etc.) and to submit these documents to Atlas EPS in the event of a claim under this Limited Lifetime Warranty.

HANDLING AND INSTALLATIONS: Atlas EPS product(s) must be handled and installed according to the instruction outlined in its product literature. Atlas EPS will not be liable for any breach of this Limited Lifetime Warranty if the product is improperly installed or is abused, misused, or damaged due to the failure of any other building component. This Limited Lifetime Warranty is effective only if the product is used for the particular purposes recommended in the Atlas EPS product literature. This Limited Lifetime Warranty shall be void if in the judgment of Atlas EPS, the product's performance has been compromised by abuse, misuse, damage or by alteration without prior written consent by Atlas EPS.

SOLE WARRANTY: THIS LIMITED LIFETIME WARRANTY IS IN LIEU OF ALL OTHER GUARANTEES AND WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND SHALL NOT BE EXTENDED OR ALTERED EXCEPT BY WRITTEN INSTRUMENT SIGNED BY ATLAS EPS AND THE OWNER. THERE ARE NO WARRANTIES OR GUARANTEES WHICH EXTEND BEYOND THE DESCRIPTION SET FORTH IN THIS LIMITED LIFETIME WARRANTY. This Limited Lifetime Warranty contains all of the provisions of your remedies from Atlas EPS. Atlas EPS' liability is limited to the provisions of this Limited Lifetime Warranty, whether any claim against Atlas EPS is based upon strict liability, negligence, breach of warranty or any other theory or cause of action. No agent, salesperson, employee or representative of Atlas EPS is empowered to change, alter or amend this Limited Lifetime Warranty either orally or in writing.

LIMITATION OF ATLAS EPS LIABILITY: Obligations under this Limited Lifetime Warranty are applicable to product(s) manufactured by Atlas EPS after December 31st, 2013. This Limited Lifetime Warranty shall only apply if the product is installed in strict accordance with all Atlas EPS specifications, recommendations and guidelines which were in effect at the time of such installation. TOTAL ATLAS EPS EXPENSE FOR THE DURATION OF THIS LIMITED LIFETIME WARRANTY SHALL BE LIMITED TO THE ORIGINAL PURCHASE PRICE OF THE PRODUCT. IN NO INSTANCE SHALL ATLAS EPS BE RESPONSIBLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, AND IN NO EVENT SHALL ATLAS EPS BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES TO THE STRUCTURE OR BUILDING UPON WHICH THE ATLAS EPS PRODUCT IS APPLIED, ITS CONTENTS, OR OCCUPANTS. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THIS LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

INSULATION TESTING: If at any time within this Limited Lifetime Warranty period, the Owner detects a decline in the product's performance, (s)he shall notify Atlas EPS in writing within sixty (60) days. Owner agrees at Owner's expense to take samples of the insulation in accordance with Atlas EPS' sampling procedures and to test the product to determine the performance of interest for the product. Testing of the product samples shall be in accordance with the applicable ASTM or AWPA standard. All sampling related costs (including, but not limited to costs of product, its removal and repair costs) shall be at the Owner's expense. Procurement of samples must be witnessed by an Atlas EPS representative. All testing of the product samples will be conducted at a NVLAP certified independent testing laboratory, approved by Atlas EPS. Results of the testing will be final and binding on all parties concerned.

COMPLETE AGREEMENT: This Limited Lifetime Warranty includes the complete and exclusive agreement between the Buyer/Owner and Atlas EPS, and supersedes any and all prior, oral or written, agreements or representations, made by or between them.

*NOTE TO SPECIFIER: Bracket **BOLD [ ]** denotes either (1) a choice between bracketed alternatives or (2) a choice to either include or omit the single bracketed language.*

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Rigid cellular insulation used in [perimeter foundation], [below-grade] and [below-slab] applications.
B. Rigid cellular insulation used in [above-grade] and [cavity wall] applications.
C. Rigid cellular insulation used in continuous wall insulation for [new construction] or [retrofit] applications.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete slabs and foundations.
B. Section 04 2723 - Cavity Wall Unit Masonry: Masonry walls enclosing insulation.
C. Section 05 4000 – Cold-Formed Metal Framing: Board insulation as wall sheathing.
D. Section 06 1000 – Rough Carpentry: Board insulation as wall insulation.
E. Section 07 2500 - Weather Barriers: Separate air barrier and vapor retarder materials.

1.03 REFERENCE STANDARDS

A. ASTM International - American Society for Testing and Materials; www.astm.org:
   1. ASTM C203 – Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation; 2005a (2012).
   2. ASTM C272 - Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions; 2016.
   3. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2017.
   4. ASTM C1512 - Standard Test Method for Characterizing the Effect of Exposure to Environmental Cycling on Thermal Performance of Insulation Products; 2010(2015e1).
   5. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016.
   6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
   7. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Material; 2016.
B. AWPA – American Wood Protection Association; www.awpa.com:
   1. AWPA E7 - Standard Field Test for Evaluation of Wood Preservatives to be Used in Ground Contact (UC4A, UC4B, UC4C); Stake Test; 2015.
C. CAN/ULC - Underwriters Laboratories of Canada; www.ulc.ca:
   1. ULC S701 – Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering; 2011.
D. ICC - International Code Council, Acceptance Criteria (AC); www.shop.iccsafe.org:
   1. AC239 - Termite-Resistant Foam Plastics; 2008(Revised 2014).
E. NFPA - National Fire Protection Association; www.nfpa.org:
   1. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.
   2. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth 2015.

1.04 SUBMITTALS

A. See Section 01 3000 – Administrative Requirements, for submittal procedures.
B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
C. Shop Drawings: Provide drawings indicating typical installation.
D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
E. Test and Evaluation Reports:
   1. ICC-ES or UL report for building code compliance.
   2. Manufacturer's test report for ASTM C1512.
   3. [Copy of Approval Report for use in "very heavy termite infestation" areas].
F. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.
G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.
I. Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturers Qualifications: Company specializing in manufacturing products specified in this section, with not less than [ten] years documented experience.
B. Installer Qualifications: Company specializing in performing work of the type specified and with at least [three] years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original, unopened, undamaged containers with identification labels intact.
B. Store materials protected from exposure to harmful environmental conditions as recommended by manufacturer.
   1. Avoid exposure of insulation to temperatures exceeding 165°F (74°C).
   2. Avoid exposure of insulation to heated asphalt or coal tar.
C. Handling: Rigid foam insulation may be cut, drilled, sawn, rasped or otherwise handled similar to other construction materials, such as wood.
   1. Field test compatibility with waterproofing mastics or other materials prior to use; examples of non-compatible compounds include products containing ketones, gasoline or diesel solvents.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
B. Manufacturer shall warrant rigid foam insulation for the life of installation it is originally installed for the following:
   1. Thermal insulation value will not vary more than ten (10) percent from the published R-value
   2. Insulation will meet the physical performance requirements within ten (10) percent of the minimum requirements for Types as indicated in compliance with ASTM C578, or CAN/ULC S701.
   3. [Insulation will retain a termite resistance of seven (7) or greater in compliance with AWPA E7].

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Atlas EPS, a Division of Atlas Roofing Corporation:
   1. Address: 8240 Byron Center Ave SW, Byron Center, Michigan 49315
   2. Phone: (800) 917-9138; Fax: (616) 878-9942.
   3. Websites: www.AtlasEPS.com & www.ThermalStar.com.
B. Products:
   1. ThermalStar X-Grade Rigid Insulation for Below Grade Applications.
   2. ThermalStar X-Grade Rigid Insulation for Cavity Wall and Above Grade Applications.

2.02 PERFORMANCE REQUIREMENTS

A. Flame Spread Index (FSI): Class A – 25 or less, when tested in accordance with ASTM E84.
B. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
C. Complies with fire resistance requirements shown on the drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
D. Comply with criteria or NFPA 286 local building code for use of foam plastic insulation in interior wall, ceiling, and floor locations, without thermal or ignition barriers applied over the foam plastic.
E. Maximum Use Temperature: Short term of 10 to 15 minutes, maximum temperature of 180 degrees F (82 degrees C); long term maximum temperature of 165 degrees F (74 degrees C).
F. Provide termite resistant insulation materials, when applicable, in accordance with ICC-AC239 acceptance criteria.
G. Insulation materials containing formaldehyde, chlorofluorocarbon (CFCs), hydro chlorofluorocarbons (HCFCs), or other volatile organic compounds (VOCs) are not permitted.

2.03 RIGID EXPANDED POLYSTYRENE (EPS) INSULATION [FOR BELOW GRADE] [AND] [FOR CAVITY WALL AND ABOVE GRADE] APPLICATIONS

A. Description: Expanded polystyrene (EPS) insulation without any facing material.
B. Classification "Types" in compliance with ASTM C578 and the following characteristics:
   1. Type and Compressive Resistance: At 10 percent deformation in accordance with ASTM D1621.
      a. Type II, 15 psi (104 kPa), X-Grade 15.
      b. Type II, 25 psi (172 kPa), X-Grade 25.
      c. Type XIV, 40 psi (276 kPa), X-Grade 40.
      d. Type XV, 60 psi (414 kPa), X-Grade 60.
   2. Type and Thermal Resistance: Rated per inch at 75 degrees F (24 degrees C) in accordance with ASTM C518.
      a. Type II, R-value of 4.2 per inch, X-Grade 15.
      b. Type II, R-value of 4.2 per inch, X-Grade 25.
      c. Type XIV, R-value of 4.2 per inch, X-Grade 40.
      d. Type XV, R-value of 4.4 per inch, X-Grade 60.
   3. Type and Flexural Strength: Tested in accordance with ASTM C203 at 1 inch (25.4 mm) or less in thickness.
      a. Type II, 42 psi (290 kPa), X-Grade 15.
      b. Type II, 50 psi (345 kPa), X-Grade 25.
      c. Type XIV, 75 psi (517 kPa), X-Grade 40.
      d. Type XV, 95 psi (655 kPa), X-Grade 60.
   4. Type and Water Absorption Percentage by Volume after Immersion for 24 Hours: Tested in accordance with ASTM C272 on 12 inch by 12 inch by 1 inch thick (305 mm by 305 mm by 25.4 mm thick) test specimen.
      a. Type II, 1.5 percent, X-Grade 15.
      b. Type II, 1.25 percent, X-Grade 25.
      c. Type XIV, 1.25 percent, X-Grade 40.
      d. Type XV, 1.0 percent, X-Grade 60.
   5. Type and Water Vapor Permeance: Tested in accordance with ASTM E96/E96M on 1 inch (24.5 mm) test specimen at 75 degrees F (24 degrees C) using desiccant method.
      a. Type II, 2.5 perms, X-Grade 15.
      b. Type II, 2.5 perms, X-Grade 25.
      c. Type XIV, 2.5 perms, X-Grade 40.
      d. Type XV, 2.5 perms, X-Grade 60.
C. Board Thickness: [1/2 inch (13 mm)] [3/4 inch (19 mm)] [1 inch (25 mm)] [1-3/16 inch (30 mm)] [1-1/2 inch (38 mm)] [2 inch (51 mm)] [2-3/8 inch (60 mm)] [3-5/8 inch (92 mm)] [4 inch (102 mm)] [4-7/8 inch (124 mm)] or [6 inch (152 mm)].
D. Board Width and Length: 48 inch (1219 mm) wide by 96 inch (2438 mm) long.
E. Board Edges: Square edge.

2.04 Accessories

A. Insulation Fasteners: Provide corrosion resistant mechanical fasteners with large heads or washers as recommended by insulation manufacturers.
B. Cover exposed insulation above grade with wall cladding, or coating system such as stucco or EIFS specifically manufactured for use on rigid foam insulation.
C. Sealing Tape: Provide at least 3 inch (76 mm) wide, solvent acrylic adhesive backed sheathing tape.
   1. Products:
      a. Atlas EPS - ThermalStar 007.
      b. 3M - 8087.
      c. Dow – Weathermate.
D. Flashing Tape: Provide flashing tape to flash windows, doorways, pipes, or transitions as necessary.
   1. Products:
      a. Grace – Vycor.
      b. Protectowrap – BTXL20.
      c. 3M – 8067.
E. Edge Covering: Provide J-channel edge protection for exposed insulation.

F. Adhesives: Provide adhesive compatible with rigid insulation board.
   1. Products:
      a. Liquid Nails - Ultra Quik Grip.
      b. Locktite - PL Premium.

PART 3 — EXECUTION

3.01 PREPARATION

A. Prepare concrete floor slab to be well drained and fully tamped.
B. Prepare [concrete] [concrete masonry unit (CMU)] foundation walls to be flat and free of protrusions to properly adhere or mechanically fasten rigid insulation board.
C. Ensure that backfill and surrounding grade is free of wood construction waste or other non-preserved wood that would serve as nest sites in "very heavy termite infestation" areas.

3.02 INSTALLATION

A. Install insulation in accordance with manufacturers written installation instructions.
B. Install insulation in a [single] or [double] layer as required to achieve thermal transmittance required, or as indicated on drawings.
C. Cut and fit insulation tightly around substrate projections and penetrations.
D. Joints: Stagger insulation board joints in one direction for each course, and abut edges and ends tightly to adjacent boards.
E. Secure insulation to substrate with [mechanical fasteners] or [spot adhesive applied to back side of board] in compliance with manufacturer's requirements.
F. Sheathing and Underlayment Installation:
   1. Install on exterior side of stud framing with long dimension positioned [vertically] or [horizontally].
   2. Fasten insulation to stud framing at 12 inch (305 mm) on center, maximum, using mechanical fasteners as recommended by insulation manufacturer.
   3. Seal joints with approved tape at corners, transitions to adjacent walls, floors, ceilings, or foundation as applicable to insulated areas.
      a. Gravity lap the tape, starting at the bottom and working up the wall.
      b. In coastal zone applications, tape seal fastener penetrations.
   4. Install thermal barrier on interior side of insulation board as indicated on drawings; use minimum of 1/2 inch (12.7 mm) thick gypsum wallboard.
G. Cavity Wall Installation:
   1. Install on exterior face or interior width of cavity wall, fitting insulation boards between wall ties and other projections and penetrations.
   2. Install thermal barrier on interior side of insulation board as indicated on drawings; use minimum of 1/2 inch (12.7 mm) thick gypsum wallboard.
H. Perimeter Foundation Installation:
   1. Install insulation board on exterior surface of perimeter foundation walls.
      a. Secure board with spot adhesive applied to back of board.
      b. Fasten board with mechanical fasteners, using quantity and pattern as recommended by insulation manufacturer.
      c. Insulation board may be held against the foundation wall using backfill soil.
I. Slab-On-Grade Installation:
   1. Install insulation board under slab-on-grade and over properly prepared subgrade of compacted fill and vapor retarder, and abut edges and ends tightly to adjacent boards.

3.03 CLEANING

A. Remove and legally dispose of waste materials and other construction debris.
B. Clean EPS insulation may be recycled through a national program; http://www.epsrecycling.org/.

3.04 PROTECTION

A. Protect installed products from damage during subsequent construction.

END OF SECTION

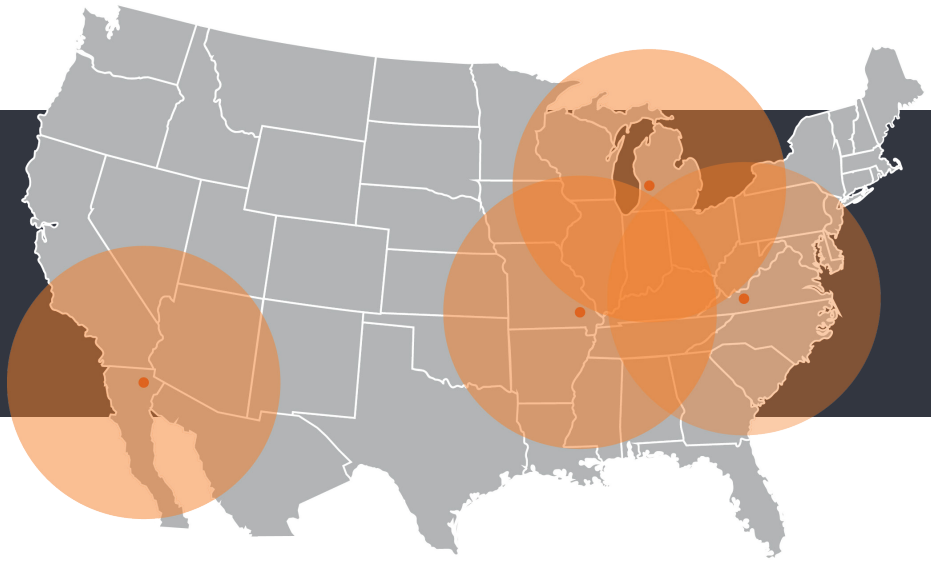
ThermalStar®
Rigid Insulation

LEED Information for ThermalStar X-Grade

Material Declarations		
Primary Composition	Polystyrene	98%
Flame Retardant	Polymeric FR (Emerald 3000)	<2%
Termiticide	Preventol	<0.05%
Does NOT contain HBCD	---	0%
Blowing Agent	Air	GWP = 0
Pre-Consumer Recycle Content	None	0%
Post-Consumer Recycle Content	None	0%
VOCs	None	0%

Manufacturing Location	Component	Source Location
8240 Byron Center Ave SW Byron Center, MI 49315	Steam expandable polystyrene resin polymerized with flame retardant	Peru, IL 61354
911 Industrial Drive Perryville, MO 63775	Steam expandable polystyrene resin polymerized with flame retardant	Peru, IL 61354
445 Industrial Park Drive Ridgeway, VA 24148	Steam expandable polystyrene resin polymerized with flame retardant	Monaca, PA 15061
Privada Misiones No. 1108 Tijuana, MX 22500	Steam expandable polystyrene resin polymerized with flame retardant	Altamira Tamaulipas, Mexico

*Oil is the raw material for polystyrene and is largely extracted in North America and Middle East.



Atlas EPS Plant Locations:

Byron Center, MI
Fredericktown, MO
Perryville, MO
Ridgeway, VA
Tijuana, MX

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LIT1013 Rev 10-17-2018