



SECTION 07 21 29.03 Sprayed Insulation –Polyurethane Foam
THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Spray-in-place rigid closed-cell polyurethane foam insulation in assemblies indicated on the Drawings, to provide an air barrier and improved thermal resistance. (HEATLOK HFO High-Lift).
- B. Water based intumescent coating. (BLAZELOK IB4) (BLAZELOK TBX) (DC315).

1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 03 41 16 - Precast Concrete Slabs.
- C. Section 04 20 00 - Unit Masonry.
- D. Section 05 30 00 - Metal Decking.
- E. Section 05 40 00 - Cold-Formed Metal Framing.
- F. Section 06 10 00 - Rough Carpentry.
- G. Section 07 10 00 - Dampproofing and Waterproofing.
- H. Section 07 26 00 - Vapor Retarders.
- I. Section 07 40 00 - Roofing and Siding Panels.
- J. Section 07 65 26 - Self-Adhering Sheet Flashing.
- K. Section 07 80 00 - Fire and Smoke Protection.
- L. Section 07 84 53 - Building Perimeter Firestopping.
- M. Section 09 22 16.13 - Non-Structural Metal Stud Framing.
- N. Section 09 29 00 - Gypsum Board.

1.3 REFERENCES

- A. ASTM International (ASTM):
 1. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 2. ASTM C 1338 – Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
 3. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
 4. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
 5. ASTM D 1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.

6. ASTM D 2126 Standard Test Method for Dimensional Stability of Rigid Cellular Plastics
 7. ASTM D 2842 Standard Test Method for Water Absorption of Rigid Cellular Plastics
 8. ASTM D 2856 - Standard Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer.
 9. ASTM D 6226 Standard Test Method for Open Cell Content of Rigid Cellular Plastics
 10. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 11. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
 12. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- B. Canadian General Standards Board (CGSB) 51.23 - Spray Applied Rigid Polyurethane Cellular Plastic Thermal Insulation.
- C. International Code Council - International Residential Code:
1. Section 104.11 - Alternate Materials and Methods.
 2. 2006 IRC Section - Foam Plastic Insulation.
 3. 2009, 2012, 2015 and 2018 IRC Section R316 - Foam Plastic Insulation.
 4. Section 806.4 - Unvented Attic Assemblies.
- D. International Code Council - International Building Code:
1. 2009, 2012, 2015 and 2018 Section 104.11 Alternative materials, design and methods of construction and equipment.
 2. Section 2603 Foam Plastic Insulation.
- E. International Energy Conservation Code (IECC)
1. 2009, 2012, 2015 and 2018

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Before commencing work, submit in accordance with local code:
1. Technical data sheet from the manufacturer showing the test results from the ASTM E84 (Surface Burning Characteristics).
 2. Other technical data sheets and samples as required by local code officials.
- C. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
1. Contractor performing work under this section shall be approved by Demilec in applying spray polyurethane foam insulation.
 2. Provide current Demilec Authorized Contractor Certification.
- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish areas designated by Architect.
 2. Do not proceed with remaining work until installation is approved by Architect.
 3. Rework mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered in manufacturer's original containers clearly labeled with manufacturer's name, product identification, safety information, net weight of contents and expiration date.
- B. Material shall be stored in a safe manner and where the temperatures are in the limits specified by the material manufacturer.
- C. Empty containers shall be removed from site on a daily basis.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
- B. Ventilate area to receive insulation to maintain safe working conditions.
- C. Protect workers as recommended by standards and manufacturer's recommendations.
- D. Protect adjacent surfaces, windows, equipment and site areas from damage of overspray.

1.8 WARRANTY

- A. Manufacturer's Warranty: Demilec warrants spray-in-place urethane foam insulation, when installed by authorized contractors using factory-trained applicators and applied in accordance to the Installation Instructions, will perform as stated in the Product Technical Data Sheet.
 - 1. This warranty is in effect throughout the life of the building provided the original purchaser registers with the Warranty Department of the Manufacturer within thirty days of occupancy.
 - 2. Manufacturer's sole responsibility under this Limited Lifetime Warranty shall be to repair or replace any defective Product at the cost of the material only.
 - 3. Manufacturer shall not be responsible for labor cost or any other costs whatsoever related to, or in connection with the removal or installation of either the original or replacement product.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Demilec, which is located at: 3315 E. Division St.; Arlington, TX 76011; Toll Free Tel: (888) 261-7705; Tel: (817) 640-4900; Email: buildingscience@demilec.com; Web: <https://www.demilec.com>
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 SPRAY FOAM INSULATION

- A. Spray Applied Rigid Polyurethane Closed Cell Foam Insulation System:
 - 1. Product: HEATLOK® HFO High Lift manufactured by Demilec, Arlington, TX
 - 2. Product Approval:
 - a. Code Compliance Research Report, (CCRR) designed by Deer Ridge Consulting, Inc.

- b. Approved for use in building types I, II, III, IV, and V construction under IBC and dwellings for IRC.
 - c. Approved for use in wall cavities, floor assemblies, ceiling assemblies, and attics and crawl spaces in Type VB construction under IBC and dwellings under IRC.
 - d. Passed AC 377 Appendix X compliant NFPA 286.
3. Installation:
- a. Application with a prescriptive Thermal Barrier:
 - 1) There is no thickness limit when installed in floors or ceilings behind 1/2 inch gypsum wall board or equivalent 15 minute thermal barrier in accordance with IBC 2603.4 or IRC R316.4.
 - b. Application without a Thermal Barrier:
 - 1) Up to 11-1/2 inches (292 mm) on the underside of the roof sheathing or in floor assemblies and 7-1/2 inches (191 mm) on vertical surfaces with all foam surfaces covered with a minimum of 12 mils DFT of DC-315 Fireproof Paint or a minimum of 12 mils DFT of Blazelok TBX.
 - c. Attics and Crawlspace: Passed AC 377 Appendix X compliant NFPA 286.
 - 1) Up to 11-1/2 inches (292 mm) on the underside of the roof sheathing or in floor assemblies and 7-1/2 inches (191 mm) on vertical surfaces, the insulation may be left exposed without a thermal barrier, ignition barrier or intumescent coating.
 - d. Use on Attic Floors:
 - 1) Up to 11-1/2 inches (190.5mm) between and over the joists in attic floors.
 - e. Use as Vapor Retarder:
 - 1) Class II vapor retarder at less than 1.0 perm, HEATLOK HFO High Lift minimum thickness of 0.7 inches.
4. Physical Properties:
- a. R-Value/in at 4 inch (ASTM C518): 7.5 ft²hdegreesF/BTU.
 - b. R-Value/in at 1 inch (ASTM C518): 6.3 ft²hdegreesF/BTU.
 - c. R-Value at 6.5 inches (ASTM C518): 48 ft²hdegreesF/BTU.
 - d. R-Value at 4 inches (ASTM C518): 30 ft²hdegreesF/BTU.
 - e. R-Value at 2 inches (ASTM C518): 14 ft²hdegreesF/BTU.
 - f. Core Density (ASTM D 1622): 2.2 lb/ft³
 - g. Water Vapor Permeance (ASTM E 96): Less than 1 perm at 0.7 inches.
 - h. Air Permeance at 75 Pa at 1inch (ASTM E 2178): Less than 0.02 L/sm².
 - i. Air Leakage at 75 Pa at 1 inch (ASTM E 283): Less than 0.02 L/sm².
 - j. Compressive Strength (ASTM D 1621): 34.8 lb/in² (240 kPa).
 - k. Tensile Strength (ASTM D 1623): 101.3 lb/in² (699 kPa).
 - l. Dimensional Stability (ASTM D 2126): 11.4 (% volume change) at 158 degrees F (70 degrees C) 97% R.H.
 - m. VOC Content, Greenguard Gold: PASS, Meets Criteria/
 - n. Flame Spread (ASTM E84): Class I, 0-15.
 - o. Smoke Developed (ASTM E84): Class I, 350 - 400.
 - p. Recycled Content, Finished Foam Renewable & Recycled Content: 12%.
 - q. Recycled Content, Polyol Renewable Content: 6%
 - r. Recycled Content, Polyol Recycled Content: 19%.
 - s. Fungi Resistance (ASTM C 1338): No Fungal Growth.

- t. Closed Cell Content (ASTM D 2856): 91%.
5. Equipment used to apply the foam insulation shall have fixed ratio positive displacement pumps and approved by foam manufacturer.

2.3 ACCESSORY PRODUCTS

- A. Water Based Intumescent Coating:
 1. Product: BLAZELOK® IB4, Distributed by Demilec, Manufactured by TPR2.
 2. Approval: Complies with 2006 IRC 314.6, 2009 IRC 316.6, IBC 2603.9 and AC 377 over all surfaces of SELECTION 500 for use without a prescriptive ignition barrier in attics and crawlspaces.
 3. Application: Follow manufacturer's application recommendations.
 4. Physical Properties:
 - a. Surface Burning Characteristics (ASTM E 84): Class I. Flame Spread Index 0, Smoke Developed Index 20.
 - b. Expands up to 2000 percent.
 - c. Flash Point: None.
 - d. Volatility/VOC: 0.
 - e. Flexible, ductile, elastomeric.
 - f. Non-toxic, drain safe, water based, non-fuming.
 - g. Can be latex or oil base top coated.
 5. Color: Gray.
- B. Water Based Intumescent Coating:
 1. Product: BLAZELOK® TBX, Distributed by Demilec, Manufactured by TPR2.
 2. Approval: Complies with 2009 IBC 2603.9 and 803.2; 2009 IRC 302.9.4 and 316.6; 2006 IRC 314.6 and 315.4 and the NFPA 101 paragraph 10.2.3.7.2 for use without a prescriptive thermal barrier.
 3. Application: Follow manufacturer's application recommendations.
 4. Physical Properties:
 - a. Surface Burning Characteristics (ASTM E 84): Class I. Flame Spread Index less than 25, Smoke Developed Index less than 50.
 - b. Expands up to 2000 percent.
 - c. Flash Point: None.
 - d. Volatility/VOC: Less than 50 g/L.
 - e. Non-toxic, drain safe, water based, non-fuming.
 - f. Can be latex or oil base top coated.
 5. Color: Dull flat white / gray.
 - a. Do not add tint.
 - b. Wait minimum 24 hours prior to top coating with quality latex paint. Verify dryness with moisture meter.
- C. Water Based Intumescent Coating:
 1. Product: DC315 Intumescent Coating, Distributed by Demilec, Manufactured by International Fireproof Technologies, Inc. (IFTI).
 2. Application: Follow manufacturer's application recommendations.
 3. Physical Properties:
 - a. Surface Burning Characteristics (ASTM E 84): Class I. Flame Spread Index of 0, Smoke Developed Index less than 25
 - b. Expands up to 2000 percent.
 - c. Flash Point: None.
 - d. Volatility/VOC: Less than 50 g/L.
 - e. Non-toxic, drain safe, water based, non-fuming.
 4. Color: Dull flat / ice gray.
 - a. Do not add tint.
 - b. Wait minimum 24 hours prior to top coating with quality latex paint.

Verify dryness with moisture meter.

5. Refer to products International Code Council Evaluation Services Report for additional Intumescent Coating information.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Commencement of work outlined in this section shall be deemed as acceptance of existing work and conditions.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Apply only when surfaces and environmental conditions are within limits prescribed by the material manufacturer.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Apply as recommended by manufacturer to thickness as indicated on drawings.
- B. Apply thermal barrier as required by applicable codes noting the following:
 1. Except as provided in Section 314.5 and Section 314.6 of the 2006 International Residential Code, Section 316.5 and Section 316.6 of the 2009 International Residential Code and Section 2603.4.1 and Section 2603.9 of the International Building Code, all plastic insulation shall be separated from the interior of the building by an approved thermal barrier of 1/2 inch (13 mm) gypsum wallboard or equivalent thermal barrier material.
 2. Code compliant fire protection may be achieved with the use of BLAZELOK IB4 and BLAZELOK TBX depending on the details of the application.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION