

SECTION 07210

THERMAL INSULATION

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Spray-in-place semi-rigid urethane foam insulation in exterior assemblies, to provide an air barrier and improved thermal resistance.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast in Place Concrete.
- B. Section 03400 - Structural Pre-cast Concrete.
- C. Section 04200 - Unit Masonry.
- D. Section 05300 - Metal Decking.
- E. Section 05400 - Cold Formed Metal Framing.
- F. Section 06100 - Rough Carpentry.
- G. Section 07100 - Waterproofing.
- H. Section 07260 - Vapor Barrier.
- I. Section 07400 - Preformed Roofing and Cladding/Siding.
- J. Section 07800 - Fireproofing.
- K. Section 07840 - Thermal Barrier.
- L. Section 07650 - Flexible Flashing.
- M. Section 09110 - Metal Support Systems.
- N. Section 09250 - Gypsum Board.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - 2. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 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 2856 - Standard Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer.
 - 7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 8. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
 - 9. 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.
 - 10. ASTM E 413 - Classification for Rating Sound Insulation.

- 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 103.7 - Alternate Materials and Methods.
 - 2. 2006 IRC Section R314 - Foam Plastic Insulation.
 - 3. 2009 IRC Section R316 - Foam Plastic Insulation.
 - 4. Section 806.4 – Unvented Attic Assemblies.

- D. International Code Council – International Building Code:
 - 1. Section 104.11 Alternative materials, design and methods of construction and equipment.
 - 2. Section 2603 Foam Plastic Insulation.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.

- B. Before commencing work, submit in accordance with local code.
 - 1. Submit technical data sheets and samples as required by local code officials.
 - 2. Submit the technical data sheet from the manufacturer showing the test results from the ASTM E84 (Surface Burning Characteristics).

- 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 trained by DEMILEC (USA) LLC[®] in the art of applying spray polyurethane foam insulation.
 - 2. Provide current DEMILEC (USA) LLC[®] Authorized Contractor Certification.
 - 3. Provide InSeal Right[®] Quality Assurance Program Certificate of Compliance
- 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 labelled 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.
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

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 absolute 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 (USA) LLC[®] warrants spray-in-place urethane foam insulation, when installed by certified contractors using factory-trained applicators and applied in accordance to the Product Specification, 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 (USA) LLC[®]; 2925 Galleria Dr, Arlington, TX 76011. ASD. Toll Free Tel: (877) DEMILEC. Tel: (817) 640-4900. Fax: (817) 633-2000. Email: specs@demilecusa.com. Web: <http://www.demilecusa.com>
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 SPRAY FOAM INSULATION

- A. Spray Applied Semi Rigid Polyurethane Foam Insulation System:
 - 1. Product: *SEALECTION*[®] 500 Manufactured by DEMILEC (USA) LLC[®], Arlington, TX.
 - 2. Product Approval:
 - a. International Code Council Evaluation Services Report #1172.
 - b. Interior Finish: Passed NFPA 286 in accordance with IBC 803.2.
 - 1) Up to 10 inches (254 mm) in floors or ceilings and 5-1/2 inches (140 mm) in walls.
 - 2) All foam covered with 14 dry mils (0.36 mm) of BLAZELOK[™] TB (see 2.3 ACCESSORY PRODUCTS for product details).
 - 3) Thermal barrier and ignition barrier can be omitted.
 - c. Attics and Crawlspace: Passed AC 377 compliant NFPA 286.
 - 1) Up to 11-1/2 inches (292 mm) exposed on underside roof deck.
 - 2) Up to 10 inches (254 mm) on vertical surfaces with 10 mils of BLAZELOK[™] IB (see 2.3 ACCESSORY PRODUCTS for product details).

- d. Warnock Hersey Evaluation # 193-7081.
- e. CCMC Evaluation # 12697-R.
- 3. Physical Properties:
 - a. Density (ASTM D 1622): 0.45 – 0.5 lb/cf (0.007 to 0.008 gm/cu. cm).
 - b. Thermal Resistance (ASTM C 518): 2 days at 76 degree F (24.4 degree C), per inch - 3.81 sf.h degree F/BTU.
 - c. Thermal Resistance (ASTM C 518): 90 days at 76 degree F (24.4 degree C), per inch - 3.81 sf.h degree F/BTU.
 - d. Air Leakage (ASTM E 283-04):
 - 1) 3.5 inches (89 mm) At 75 Pa (25 mph wind): 0.001 L/s•m².
 - 2) 5.5 inches (140 mm) At 75 Pa (25 mph wind): 0.001 L/s•m².
 - 3) 10 inches (254 mm) At 75 Pa (25 mph wind): 0.002 L/s•m².
 - 4) Sustained Wind Load for 60 minutes At 1000 Pa (90 miles/hr. wind): No Damage.
 - 5) Gust Wind Load Test at 3000 Pa (160 miles/hr.): No Damage.
 - e. Compressive Strength (ASTM D 1621): 0.7 psi (4.83 kPa).
 - f. Tensile Strength (ASTM D 1623): 5.6 lbf/sq. inch (38.6 kPa).
 - g. Sound Transmission Class (STC) (ASTM E 413-87 1999): 49-51. Based on Specific wall design.
 - h. Noise Reduction Coefficient (NRC) (ASTM C 423): 75.
 - i. Water Vapor Transmission (ASTM E 96):
 - 1) 3.5 inches (89 mm): 6.6 Perms.
 - 2) 5.5 inches (140 mm): 4.2 Perms.
 - 3) 7 inches (178 mm): 3.3 Perms.
 - 4) 10 inches (254 mm): 2.3 Perms.
 - j. Off Gassing Tests (VOC Emissions) CGSB 51.23-92: Pass (No toxic vapors).
 - k. Surface Burning Characteristics (ASTM E 84) 6 inches (152 mm): Class I. Flame Spread Index 21, Smoke Developed Index 216.
- 4. Equipment used to apply the foam insulation shall have fixed ratio positive displacement pumps and approved by foam manufacturer.

B. Spray Applied Semi Rigid Polyurethane Foam Insulation System:

- 1. Product: *SEALECTION* Agribalance[®] Manufactured by DEMILEC (USA) LLC[®], Arlington, TX.
- 2. Product Approval:
 - a. International Code Council Evaluation Services Report #2600.
 - b. Attics and Crawlspace: Passed AC 377 compliant NFPA 286.
 - 1) Up to 11-1/2 inches (292 mm) exposed on underside roof deck.
 - 2) Up to 10 inches (254 mm) on vertical surfaces with 10 mils of BLAZELOK[™] IB (see 2.3 ACCESSORY PRODUCTS for product details).
- 3. Physical Properties:
 - a. Density (ASTM D 1622): 0.60 – 0.80 lb/cf (0.0096 to 0.013 gm/cu. cm).
 - b. Thermal Resistance (ASTM C 518): R value per inch – 4.45 sf.h degree F/BTU.
 - c. Air Permeance (ASTM E 283): 3.5 inches (89 mm) thick.
 - 1) At 500 Pa: 0.003 L/s•m².

- 2) At 1000 Pa: 0.006 L/s•m².
- 3) At 1500 Pa: 0.011 L/s•m².
- 4) At 2000 Pa: 0.018 L/s•m².
- d. Compressive Strength (ASTM D 1621): 1.86 psi (12.9 kPa).
- e. Tensile Strength (ASTM D 1623): 3.87 psi (26.7 kPa).
- f. Vapor Permeance (ASTM E 96):
 - 1) 5 inches (127 mm): 4.95 Perms.
- g. Surface Burning Characteristics (ASTM E 84) 6 inches (152 mm): Class I. Flame Spread Index 15 to 20, Smoke Developed Index 400.
- h. Bio-based Solid Content (ASTM D 6866): 10%
- 4. Equipment used to apply the foam insulation shall have fixed ratio positive displacement pumps and approved by foam manufacturer.

C. Spray Applied Rigid Polyurethane Foam Insulation System:

- 1. Product: HEATLOK SOY[®] Manufactured by DEMILEC (USA) LLC[®], Arlington, TX
- 2. Product Approval:
 - a. Attics and Crawlspace: Passed AC 377 compliant NFPA 286.
 - 1) Up to 11-1/2 inches (292 mm) exposed on underside roof deck.
 - 2) Up to 10 inches (254 mm) on vertical surfaces with 10 mils of BLAZELOK[™] IB (see 2.3 ACCESSORY PRODUCTS for product details).
- 3. Physical Properties:
 - a. Density (ASTM D 1622): 2.1 – 2.3 lb/cf (0.034 to 0.037 gm/cu. cm).
 - b. Thermal Resistance (ASTM C 518):
 - 1) Initial R value per inch – 7.2 sf.h degree F/BTU.
 - 2) Aged R value per inch (180 days at 76 degrees F (23 degrees C) – 6.6 sf.h degree F/BTU.
 - c. Air Permeance (ASTM E 283): 1 inch (25 mm) thick.
 - 1) At 75 Pa: 0.00004 L/s•m².
 - d. Compressive Strength (ASTM D 1621): 28.3 psi (195 kPa).
 - e. Tensile Strength (ASTM D 1623): 51.5 psi (355 kPa).
 - f. Water Vapor Transmission (ASTM E 96):
 - 1) 1 inch (25 mm): 1.2 Perms.
 - 2) Vapor barrier (<1 perm) At 1-1/4 inches (32 mm).
 - g. Off Gassing Test (VOC Emissions) (CGSB 51.23-92): Pass (no toxic vapor).
 - h. Surface Burning Characteristics (ASTM E 84) 3 inches: Class I. Flame Spread Index 20, Smoke Developed Index 450.
 - i. Closed Cell Content (ASTM D2856): 92%.
 - j. Bio-based Solid Content (ASTM D 6866): 5%
- 4. Equipment used to apply the foam insulation shall have fixed ratio positive displacement pumps and approved by foam manufacturer.

D. Spray Applied Rigid Polyurethane Foam Insulation System:

- 1. Product: HEATLOK SOY[®] 200 Manufactured by DEMILEC (USA) LLC[®], Arlington, TX
- 2. Product Approval:

- a. Attics and Crawlspace: Passed AC 377 Appendix X compliant NFPA 286.
 - 1) Up to 11-1/2 inches (292 mm) exposed on underside roof deck.
 - 2) Up to 7-1/2 inches (191 mm) exposed on vertical surfaces
- 3. Physical Properties:
 - a. Density (ASTM D 1622): 2.1 lb/cf (0.034 gm/cu. cm).
 - b. Thermal Resistance (ASTM C 518):
 - 1) Initial R value per inch – 7.3 sf.h degree F/BTU.
 - 2) Aged R value per inch (180 days at 76 degrees F (23 degrees C) – 7.0 sf.h degree F/BTU
 - c. Water Vapor Permeance @ 1.5”(ASTME 96-05): 0.79 perms (is a vapor barrier per IBC Section 202 definitions at 1.2”)
 - d. Air Permeance @ 75 Pa @ 1” (ASTME 2178-03): 0.004 L/sm²
 - e. Air Leakage of Air Barrier Assembly (static loading to 600 Pa and gust loading to 1,200 PA) Complies with ABAA requirements (ASTME 2357-05): <0.0022L/sm²
 - f. Compressive Strength (ASTM D 1621): 20.6 psi (142 kPa).
 - g. Tensile Strength (ASTM D 1623): 45.4 psi (313 kPa)
 - h. Off Gassing Test (VOC Emissions) (CGSB 51.23-92): Pass (no toxic vapor).
 - i. Surface Burning Characteristics (ASTM E 84) 4 inches: Class I. Flame Spread Index 20, Smoke Developed Index 450.
 - j. Closed Cell Content (ASTM D2856) : >92%.
 - k. Bio-based Solid Content (ASTM D 6866): 3%
 - l. Oxygen Index (ASTM D 2863): 23%
 - m. Water Absorption % by Volume (ASTM D 2842): 0.3%
 - n. Bio-based Content (ASTMD 6866-08): 3%
- 4. Equipment used to apply the foam insulation shall have fixed ratio positive displacement pumps and approved by foam manufacturer.

A. Water Based Fire Protection:

- 1. Product: BLAZELOK™ IB, Distributed by DEMILEC (USA) LLC®, Manufactured by TPR².
- 2. Approval: Complies with 2006 IRC 314.6, 2009 IRC 316.6, IBC 2603.9 and AC 377 over vertical surfaces of SEALECTION® 500, SEALECTION Agribalance® and HEATLOK SOY® for use without a prescriptive ignition barrier in attics and crawlspaces.
- 3. Physical Properties:
 - a. Surface Burning Characteristics (ASTM E 84): Class I. Flame Spread Index 0, Smoke Developed Index 0.
 - 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.
- 4. Color: Gray.

- B. Water Based Fire Protection:
 - 1. Product: BLAZELOK™ TB, Distributed by DEMILEC (USA) LLC®, Manufactured by TPR².
 - 2. Approval: Complies with 2006 IRC 314.6, 2009 IRC 316.6, IBC 2603.9 and IBC 803.2 over *SEALECTION* 500® for use without a prescriptive thermal barrier.
 - 3. Physical Properties:
 - a. Surface Burning Characteristics (ASTM E 84): Class I. Flame Spread Index 5, Smoke Developed Index 20.
 - b. Expands up to 2000 percent.
 - c. Flash Point: None
 - d. Volatility/VOC: < 50 g/L
 - e. Non-toxic, drain safe, water based, non-fuming.
 - f. Can be latex or oil base top coated.
 - 4. Color: Dull grayish white.

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. Protection: 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. Code compliant fire protection may be achieved with the use of BLAZELOK™ IB and/or BLAZELOK™ TB, depending on the details of the application. Refer to 2.3 ACCESSORY PRODUCTS for more information or contact DEMILEC (USA) LLC®'s Engineering Department for assistance, 817-640-4900.

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