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BELOW GRADE GAS RETARDER

SECTION 07 26 23

Foamed-in-Place Insulation

**ICYNENE® HFO Max**

This specification utilizes the Construction Specifications Institute’s (CSI) 3-Part formatting. The specification is a manufacturer-specific product specification to be used by design professionals as a guide specification. Editing notes are indicated in *red italics* and precede specification text. Delete editing notes in final specification.

This specification specifies medium density spray foam insulation by HUNTSMAN BUILDING SOLUTIONS. Revise section number and title below to suit project requirements.

The specified product may contribute to the following credits/points for the respective rating system:

LEED V.4.1

National Green Building Standard (NGBS, ICC-700)

ERI (Energy Rating Index)

1. **GENERAL**
   1. **SECTION INCLUDES**

*\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.*

* + 1. Spray-in-place rigid closed cell 2-pound polyurethane foam insulation in various

assemblies, to provide an air barrier, improved thermal resistance and Radon

barrier.

* 1. **RELATED SECTIONS**

*\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.*

* + 1. Section 03 30 00 – Cast in Place Concrete.
    2. Section 03 39 00 – Concrete Curing
    3. Section 06 10 00 – Rough Carpentry.
    4. Section 07 11 13 – Bituminous Damp Proofing
    5. Section 07 13 52 – Modified Bituminous Sheet Waterproofing
    6. Section 07 26 00 – Vapor Retarders
    7. Section 07 27 00 – Air barrier.
    8. Section 07 27 09 – Air Barrier System.
    9. Section 31 23 23 – Backfilling.
  1. **REFERENCES**

*\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.*

* + 1. American Society for Testing and Materials (ASTM):
       1. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
       2. ASTM C1029 Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
       3. ASTM C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
       4. ASTM D1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics
       5. ASTM D1622 Standard Test Method for Apparent Density of Rigid Cellular Plastics
       6. ASTM D1623 Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
       7. ASTM D1929 Standard Test Method for Determining Ignition Temperature of Plastics
       8. ASTM D2126 Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
       9. ASTM D2842 Standard Test Method for Water Absorption of Rigid Cellular Plastics
       10. ASTM D2856 Standard Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer
       11. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
       12. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials
       13. ASTM E283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
       14. ASTM E2178 Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials
    2. Other standards:
       1. AC71 Acceptance Criteria for Foam Plastic Sheathing Panels Used as Weather-resistive Barriers
       2. AC377 Acceptance Criteria for Spray-Applied Foam Plastic Insulation
       3. ISO/TS 11665-13 (K124/02/95) Measurement of radioactivity in the environment – Air: radon-222-Part 10: Determination of diffusion coefficient in waterproof materials using activity concentration measurement.
    3. International Code Council – International Residential Code:
       1. Section 103.7 – Alternate Materials and Methods.
       2. Section R316 – Foam Plastic Insulation.
       3. Appendix F – Radon Control Methods.
    4. International Code Council – International Building Code:
       1. Section 104.11 Alternative materials, design and methods of construction and

equipment.

* + - 1. Section 2603 Foam Plastic Insulation.
  1. **PEREFORMANCE REQUIREMENTS**
     1. Capable of containing and, if applicable, venting Radon gas to exterior via collector and sealed pipe stack above roof.
     2. Capable of containing and, if applicable, venting methane gas to exterior via collector and sealed pipe stack above roof.
     3. Spray Foam: Capable of preventing moisture migration to interior.
     4. Spray Foam: Capable of preventing Radon gas diffusion to the interior.
  2. **SUBMITTALS**
     1. Submit under provisions of Section 01 30 00.
     2. 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).

* + - 1. Submit AC377 Appendix X Compliance
      2. Submit test results in accordance with ASTM E2178 and ASTM E 2357
      3. Submit test results by independent recognized laboratory for Radon gas diffusion in accordance with ISO/TS 11665-13 (K124/02/95).
    1. 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. **QUALITY ASSURANCE**
     1. Installer Qualifications:
        1. Contractor performing work under this section shall be authorized by Huntsman Building Solutions in the art of applying spray polyurethane foam insulation.
        2. Provide current HUNTSMAN BUILDING SOLUTIONS Authorized Contractor

Certificate.

*\*\* NOTE TO SPECIFIER \*\* Include a mock-up if the project size and/or quality warrant taking such a precaution. The following is one example of how a mock-up on a large project might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.*

* + 1. 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. Provide mock-up of insulation that includes perimeter foundation walls, footings, columns and a corner of the building in junction with the prepared depressurization zone.
  1. **DELIVERY, STORAGE, AND HANDLING**
     1. 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.

* + 1. Material shall be stored in a safe manner and where the temperatures are in the

limits specified by the material manufacturer.

* + 1. Empty containers shall be removed from site on a daily basis.
    2. Store and dispose of solvent-based materials, and materials used with solvent-

based materials, in accordance with requirements of local authorities having

jurisdiction.

* 1. **PROJECT CONDITIONS**
     1. 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.

* + 1. Ventilate insulation application area in accordance with the Spray Foam Coalition’s

Guidance on best practices for the installation of Spray Polyurethane Foam.

* + 1. Protect workers as recommended by the Spray Foam Coalition’s Guidance on best

practices for the installation of Spray Polyurethane Foam.

* + 1. Protect adjacent surfaces, windows, equipment and site areas from damage of overspray.
  1. **WARRANTY**
     1. Manufacturer’s Warranty: HUNTSMAN BUILDING SOLUTIONS warrants spray-in-

place polyurethane foam insulation, when installed by certified contractors using factory-trained applicators and applied in accordance with 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.
      4. Refer to [www.huntsmanbuildingsolutions.com](http://www.huntsmanbuildingsolutions.com) for full warranty terms.

1. **PRODUCTS**
   1. **ENVIRONNEMENTAL REQUIREMENTS**
      1. The product shall have a product specific Environmental Product Declaration (EPD).
      2. The product shall have a minimum of 20% of renewable and recycled content.
      3. The product shall be UL Greenguard Gold certified.
   2. **MANUFACTURERS**
      1. Acceptable Manufacturer: HUNTSMAN BUILDING SOLUTIONS

3315 East Division Street, Arlington, TX 76011.

(855) 942-7273.

[architect@huntsmanbuilds.com](mailto:architect@huntsmanbuilds.com)

<http://www.huntsmanbuildingsolutions.com>

*\*\* NOTE TO SPECIFIER \*\* Delete two of the following three paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.*

* + 1. Substitutions: Equivalent as judged by Architect
       1. Contact HUNTSMAN BUILDING SOLUTIONS Building Science and Engineering Department for product comparison data.
          1. 855-742-7227
          2. [architect@huntsmanbuilds.com](mailto:architect@huntsmanbuilds.com)
    2. Requests for substitutions will be considered in accordance with provisions of

Section 01600.

* 1. **SPRAY FOAM INSULATION**
     1. Spray Applied Rigid Polyurethane Foam Insulation System: ICYNENE® HFO Max
        1. Manufacturer: HUNTSMAN BUILDING SOLUTIONS, Arlington, TX
        2. Product Approval:
           1. ICC-ES Evaluation Report – ESR-5496
           2. Approved for use in building types I, II, III, IV, and V construction under IBC and dwellings for IRC.
           3. AC377 Appendix X Compliant
           4. Class II vapor retarder @ < 1.0 perm, ICYNENE® HFO Max minimum thickness of 1.875 inches.
        3. Physical Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| Density | ASTM D 1622 | 2.0 – 2.4 lb/ft³ | 32 – 38.4 Kg/m³ |
| Thermal Resistance | ASTM C 518 | 1’’ = R-6.3  3.5’’ = R-26 | 25.4 mm = 1.1 RSI  88.9 mm = 4.57 RSI |
| Dimensional Stability | ASTM D 2126  (% of change in volume at 28 days)  158°F (70°C) 97% R.H. | -3.7 % | |
| Surface burning characteristics | ASTM E 84 | Class 1 | |
| Flame spread index | ASTM E 84 | 10-15 | |
| Smoke development | ASTM E 84 | 350 - 400 | |
| Air Permeance | ASTM E 2178  at 75 Pa at 1’’ | <0.02 L/s· m² | |
| Air Permeance | ASTM E 283  at 75 Pa at 1’’ | <0.02 L/s· m² | |
| Water Absorption | ASTM D 2842 | 0.87% | |
| Water vapor permeance | ASTM E 96 (1’’)  Class III Vapor Retarder | 1.56 perms | 89.25 ng/Pa s.m² |
| Water vapor permeance | ASTM E 96 (1.875’’)  Class II Vapor Retarder | <1 perms | <57.21 ng/Pa s.m² |
| Ignition Properties | ASTM D 1929 | 932°F | 500°C |
| Compressive Strength | ASTM D 1621 | 34.8 psi | 240 kPa |
| Tensile Strength | ASTM D 1623 | 101.3 psi | 698 kPa |
| Fungi Resistance | ASTM C 1338 | No fungal growth | |
| Closed Cell Content | ASTM D 2856 | 91% | |
| Standard Specification for spray applied rigid cellular polyurethane thermal  insulation | ASTM C 1029 | Type II Compliant | |
| Radon Diffusion Coefficient | ISO/TS 11665-13 (method C K124/02/95) | 1.3 x 10-10 m2/S | |
| Radon Resistance  Coefficient  50mm | ISO/TS 11665-13 (method C K124/02/95) | 17410 x 106 s/m | |

* 1. **ACCESSORY PRODUCTS**
     1. Primers:
        1. Product: Adbond manufactured by Adfast or Thermo-Prime by HUNTSMAN

BUILDING SOLUTIONS

* + - * 1. Application: Follow manufacturer’s application recommendations.
        2. Recommended for oily surfaces and galvanized steel like Z-bar, PVC, curtain walls and steel decks

1. **EXECUTION**
   1. **EXAMINATION**
      1. Do not begin installation until substrates have been properly prepared.
      2. If substrate preparation is the responsibility of another installer, notify General

Contractor, Architect or other point of contact of unsatisfactory preparation before

proceeding.

* + 1. Commencement of work outlined in this section shall be deemed as acceptance of

existing work and conditions.

* 1. **PREPARATION**
     1. Clean surfaces thoroughly prior to installation.
     2. Apply only when surfaces and environmental conditions are within limits prescribed

by the material manufacturer.

* + 1. Prepare surfaces using the methods recommended by the manufacturer for

achieving the best result for the substrate under the project conditions.

* + 1. It is recommended to install primer on oily surfaces and galvanized steel
    2. Ensure any/all work which needs to be performed prior to the application of spray foam insulation is completed. Including but not limited to:

1. Backfilling
2. Structure, columns
3. Mechanical and electrical works;
4. Vent stack piping
5. Coatings, membranes, flashings, mechanical fastening
   1. **INSTALLATION**
      1. Install in accordance with manufacturer's instructions.
      2. Apply as recommended by manufacturer to thickness as indicated on drawings.
      3. Equipment used to apply the foam insulation shall have fixed ratio positive

displacement pumps approved by foam manufacturer.

* 1. **PROTECTION**
     1. Protect installed products until completion of project.
     2. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 07 26 23