



## SECTION 07211

### FOAMED-IN-PLACE CLOSED CELL POLYURETHANE BUILDING INSULATION

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#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Spray Polyurethane Foam (SPF).

##### 1.2 RELATED SECTIONS

- A. Section 04800 - Unit Masonry assemblies: Cavity wall assemblies.
- B. Section 06100 - Rough Carpentry: Wood framing.
- C. Section 07210 - Fiberglass Building Insulation: Supplemental blanket, batt and roll insulation.
- D. Section 07260 - Vapor Retarders: Vapor retarder materials to adjacent insulation.
- E. Section 07270 - Air Barriers: Air seal materials to adjacent insulation.
- F. Section 07620 - Sheet Metal Flashing and Trim: Requirements for flashings.
- G. Section 07900 - Joint Sealers: Rod and sealant at control and expansion joints.
- H. Section 07810 - Fire and Smoke Protection: Insulation installed in conjunction with fire stopping or smoke containment systems.
- I. Section 09200 - Plaster and Gypsum Board: Insulation installed in conjunction with interior wall and ceiling finish systems.

##### 1.3 REFERENCES

- A. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
- D. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials
- E. 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
- F. ASTM E 2178 – Standard Test Method for Air Permeance of Building Materials

- G. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- H. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- I. ASTM D 6226 - Standard Test Method for Open-Cell Content of Rigid Cellular Plastics.
- J. ASTM E 331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- K. AATCC 127 - Water Resistance: Hydrostatic Pressure Test.
- L. NFPA 285 – Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus
- M. UL 263 - Fire Tests of Building Construction and Materials

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Conform to applicable code for flame and smoke, concealment, and over coat requirements.
- B. Fire Resistive Wall assembly (as required by Type construction) per NFPA 285, UL 263 or ASTM E119 as appropriate per the wall design.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. 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.
  4. Appropriate Fire Resistance Assembly approval per Type Building Construction and Wall design. (NFPA 285, ASTM E119, UL 263)
- C. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing polyurethane foam products and systems of this section with minimum ten years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years documented experience.
  1. Installer must be an Profoam certified insulation contractor or have manufacturer's certification for the application.
  2. Installer shall provide the equipment required by the manufacturer for proper installation including high pressure plural component proportioning pump, heated hoses of suitable length, spray gun, drum pumps or other material feeding system, and other ancillary equipment required for the Work.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products under cover in manufacturer's unopened and labeled packaging until ready for installation.
- B. Storage temperatures should not exceed 90 degrees F (32.22 degrees C). Do not store in direct sunlight.
- C. Keep the temperature of the chemicals above 70 degrees F (21.66 degrees C) for several days prior to use. Cold chemicals can cause pump cavitation and incorrect metering. Keep drums tightly closed when not in use and under dry gas pressure of 2-3 psi after they have been opened.
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

#### 1.8 PRE-INSTALLATION MEETINGS

- A. Convene pre-installation meeting a minimum of two weeks prior to commencing work of this section.
- B. Attendance: Architect, Contractor, framer, wall finish applicator and SPF applicator.
- C. Agenda: Review installation sequence, safety requirements and scheduling.

#### 1.9 COORDINATION

- A. Ensure that the installation of products of this section is coordinated with affected trades to prevent interruption of construction progress.

#### 1.10 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. Do not install spray polyurethane foam during precipitation or when precipitation is imminent. Do not install when the ambient temperature is less than 50 degrees F (10 degrees C) without specific authorization of the manufacturer. Do not install when the ambient humidity exceeds the manufacturer's limits.
- C. Cordon off area for spray foam application and post warning signs as necessary to prevent entry to the area by other persons not wearing appropriate Personal Protective Equipment (PPE).

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Acceptable Material: Proseal CC-2000W, from Profoam, Rutledge GA Toll Free Tel: 866-644-3626; Email: [request info \(ted@profoam.com\)](mailto:ted@profoam.com); Web: [www.profoam.com](http://www.profoam.com)
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

#### 2.2 MATERIALS

- A. Spray Polyurethane Foam (SPF): Profoam Proseal CC-2000W high-performance, closed cell spray polyurethane foam (SPF) insulation:
  - 1. Physical Properties:
    - a. Core Density: 1.8 to 2.0 lbs/ft<sup>3</sup> when tested in accordance with ASTM D 1622.
    - b. Compressive Strength: 20 psi minimum when tested in accordance with ASTM D 1621.
    - c. Water Vapor Transmission: Less than or equal to 1.8 perms at 1 inch thick when tested in accordance with ASTM E 96.
    - d. Closed Cell content: Greater than 90 percent when tested in accordance with ASTM D 6226.
    - e. Maximum Service Temperature: 180 degrees F (82 degrees C).
    - f. Air Leakage: Infiltration/exfiltration, 0.004 CF/min/SF at 1.57 psf when tested in accordance with ASTM E 283 or ASTM 2178.
    - g. Water Resistance: No Failure when tested in accordance with AATCC 127 and ASTM E 331.
    - h. Flame Spread: Less than 25 when tested in accordance with ASTM E 84 for 4 inch (102 mm) thickness.
    - i. Smoke Developed: Less than 450 when tested in accordance with ASTM E 84 at 4 inch (102 mm) thickness.
  - 2. R-Value: R-Value when tested in accordance with ASTM C 518.
    - a. R-Value: 6.8. Average Thickness 1 inch (25 mm).
    - b. R-Value: 13. Average Thickness 2 inches (51 mm).
    - c. R-Value: 19. Average Thickness 3 inches (76 mm).
    - d. R-Value: 22. Average Thickness 3-1/2 inches (89 mm).

### 2.3 MISCELLANEOUS MATERIALS

- A. Joint Filler Foam: Hilti CF 124 Filler Foam or equivalent.
- B. Sealant: Sikaflex 1a: Single component polyurethane or equivalent.
- C. Foam Repair Kit: Handi-Foam two part kits from Fomo Products, or Touchn'Seal 2 component systems from Convenience Products, or other equivalent kits.
- D. Moisture Detection Paper (MDP) Strips: MDP Strips manufactured by NCFI Polyurethanes, Mount Airy, NC.
- E. Butyl Seam Tape by NCFI Polyurethanes, Mount Airy, NC
- F. Blueskin TWF by Henry.
- G. R-Guard FastFlash liquid-applied flashing membrane by Prosoco.

## 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.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for

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

- C. Proceed with spray polyurethane foam application only after substrate construction, substrate penetration work, and related electrical and plumbing work has been completed.
- D. Remove sawdust and other debris from areas to be sprayed by blowing with compressed air or vacuuming with a shop vacuum.
- E. All metal to which foam is to be applied must be free of oil, grease, rust, etc. Primers should be used where necessary. Test for proper spray foam adhesion or check with spray foam manufacturer for additional application guidance.
- F. Verify that substrate is dry by checking surface for moisture with Moisture Detection Paper (MDP) strips.
- G. At junctions of dissimilar materials tape over the junction seam with butyl seam tape or R-Guard FlashFlash or Blueskin TWF.
- H. Fill voids between masonry and structural steel greater than 2 inches (51 mm), with mineral wool or a backer gypsum board cut to fit in the void, and then spray over the backer material.
- I. For exterior sheathing boards attached to metal studs, at openings such as windows and doors, wrap the corners with seam tape prior to the spray foam application.
- J. Mask off all areas not to receive spray foam with masking tape and plastic sheeting. Apply release agent to stud facing to facilitate removal of foam.
- K. Review Profoam Product Stewardship Manual for ventilation and Personal Protective Equipment requirements and ensure unauthorized workers are not in the area during the spray foam application.
- L. At the start of work, spray-apply SPF to an area of approximately 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) at the specified thickness. Proceed with work only after ensuring proper foam thickness and full adhesion to the substrate.

### 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. All surfaces to be sprayed with SPF must be free of all moisture and ice.
- C. Do not apply SPF during inclement weather or when ambient temperature and humidity are outside the ranges prescribed by the manufacturer.
- D. Apply the SPF to an average thickness indicated on the Drawings or specified in the schedule at the end of this section.
- E. Apply SPF into stud wall cavities using a "picture framing" technique: apply a cant of foam between the exterior sheathing and the inner stud surface. Then spray apply the required thickness of foam against the sheathing. For a nominal thickness of 1/2 inch (12.5 mm), apply in one pass. For partial filling the stud wall cavity, apply the foam in 1-1/2 inches or less for each pass, using multiple passes to achieve the desired thickness.
- F. Do not apply SPF to fill voids around doors and windows. Use non-expanding foam for those applications.

- G. Apply SPF to fill voids around accessible service and equipment penetrations.
- H. Apply SPF to seal voids at truss ends to prevent wind scouring of ceiling insulation.
- I. Seal plumbing stacks, electrical wiring and other penetrations into attic to control air leakage.
- J. Remove overspray from adjacent surfaces.
- K. Where damage occurs which violates the spray foam's air seal and moisture seal, repair as needed using the specified spray polyurethane material or the specified foam repair kit material.

#### 3.4 ACCESSORY APPLICATION

- A. Joint Filler Foam and Caulk: Use joint filler foam and/or caulk to seal around windows, doors, chimneys, electrical raceways, sill plates, multiple studs, etc. Note that the expansion of joint filler foam in a confined space can tighten window frames and door jambs to the point that they will not open or close properly. Care must be used in these areas to avoid distortion of these members.
- B. Supplemental Insulation: If the stud wall cavity is not completely filled with spray polyurethane foam, supplemental insulation may be installed to achieve desired R-values. Supplemental insulation is specified in Section 07210.
- C. Vapor retarders are specified in Section 07260.
- D. Air barriers are specified in Section 07270.

#### 3.5 PROTECTION

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

#### 3.6 CLEANING

- A. Remove excess SPF.
- B. Replace defective SPF.
- C. Clean soiled surfaces with cleaning solution.

#### 3.7 SCHEDULES

- A. For the following locations, apply the average cured SPF thickness indicated.:
  1. Interior surface of exterior basement walls: \_\_\_\_\_ inches.
  2. Garage ceiling between joists and over air ducts: \_\_\_\_\_ inches.
  3. Cathedral ceilings: \_\_\_\_\_ inches.
  4. Unvented roof spaces: \_\_\_\_\_ inches.
  5. Voids in overhangs such as bay windows and cantilevered floors: \_\_\_\_\_ inches.
  6. Exterior above grade walls: \_\_\_\_\_ inches.
  7. Floor headers: \_\_\_\_\_ inches.

END OF SECTION