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Spray Foam Insulation for Residential Building Envelope Insulation

PART 1 - GENERAL

1.1 SUMMARY

This document discusses the application of seamless sprayed in place polyurethane foam for use as a building envelope insulation system.

- A. Spray foam insulation for residential buildings is a spray-applied polyurethane foam designed to provide thermal and moisture insulation for residential buildings.
- B. The spray applicator will furnish all labor, materials, tools and equipment necessary for the application of insulation products, including accessory items, subject to the general provisions of the contract.

1.2 SUBMITTALS

- A. Lapolla Industries to provide published datasheets that include safety and handling instructions for material application and storage.
- B. Spray Applicator to provide and install Insulation Certificate and R-value Markers as required by the Federal Trade Commission **16 CFR Part 460-Labeling and Advertising of Home-Insulation: Trade Regulation Rule; Final Rule**
- C. Approvals and credentials which show material and application compliance with local or national building codes.

1.3 QUALITY ASSURANCE

- A. Applicator Qualifications: The applicator should provide information concerning projects similar in nature to the one proposed, including location and person to be contacted.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered in tightly sealed containers or unopened package, all clearly labeled with the Lapolla Foam-LOK or AirTight brand names, product identification, safety information, manufacture date, and lot numbers where appropriate.
- B. Containers shall be stored at 65° to 85°F in a dry and well-ventilated area out of the weather and direct sunlight.
- C. All materials shall be stored in compliance with local safety requirements.

1.5 SITE CONDITIONS

- A. Closed-cell and open-cell spray polyurethane foam should be spray-applied to substrates when ambient air and surface temperatures fall within a range of 50°F to 120°F. Closed-cell for cold weather climates should be spray-applied to substrates when ambient air and surface temperatures fall within a range of 50°F to 120°F.
- B. The substrates to which the insulation is applied must be clean, dry, and free of frost, ice, loose debris, or contaminants that will interfere with adhesion of the spray foam insulation. The insulation must not be applied in electrical boxes.

1.6 SAFETY REQUIREMENTS

- A. API Bulletin AX-119, “MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal.”
- B. Proper disposal of waste materials and containers must be done in compliance with federal, state and local regulatory agencies.
- C. For protection against exposure to higher levels of MDI (greater than 1ppm) or for entry into confined spaces, workers must wear either a self-contained breathing apparatus, with full face piece, operated in a pressure-demand or other positive-pressure mode, or a combination respirator,

including a Type C air-supplied respirator, with full face piece, operated in a pressure-demand or other positive-pressure mode, or an auxiliary self-contained breathing apparatus, operated in a pressure-demand or other positive-pressure mode.

D. Personal protective clothing should be worn according to OSHA standards.

PART 2 - PRODUCTS

2.1 OWNER-SUPPLIED PRODUCTS

A. Provide Foam-LOK or AirTight branded Spray Polyurethane Foam Insulation manufactured by Lapolla Industries, Inc., 15402 Vantage Parkway East, Suite 322, Houston, Texas 77032. Tel: (888) 4-LAPOLLA Fax: (281) 219-4106.

B. Provide Thermo-Flex 9000 ignition barrier by Lapolla Industries, Inc. 15402 Vantage Parkway East St. 322 Houston, TX 77032 Telephone 281.219.4100 Fax 281.219.4106

C. Submit requests for substitutions in accordance with provisions of Section 01600.

2.2 POLYURETHANE FOAM

A. Closed-cell and open-cell spray polyurethane foam insulation systems are spray-applied cellular polyurethane foam plastic products that are most commonly installed in stud wall assemblies, ceilings, floors, vented/unvented crawlspaces, vented/unvented attics, and below grade foundation applications. The foam plastic insulation is a two-component, one-to-one by volume, spray foam system. Spray polyurethane foam insulation systems shall conform to the following minimum physical properties:

OPEN CELL PHYSICAL PROPERTIES

Properties	Test Method/Requirements	Value
Aged "R" Value:	ASTM C-518	3.8 per inch

Core Density:	ASTM D-1622	.4-.6 lbs./ft3
Open Cell Content:	ASTM D-2856	>94%
Tensile Strength:	ASTM D-1623	3 psi
Dimensional Stability: 28 days at 160°F, 100%RH	ASTM D-2126 15% max by volume change	3%
Sound Transmission Coefficient	ASTM E-90-85/E413 Sound Transmission Loss in dB	41

Foam-LOK OC/AirTight OC is a **Class I** formulation, as set forth under Underwriters Laboratories (UL 723, ASTM E84), and possess the flammability characteristics shown:

ASTM Method E84	Class I	Class II	Class III
Flame Spread	≤25	≤75	Non Rated
Smoke Development	≤450	≤450	Non Rated

CLOSED CELL PHYSICAL PROPERTIES

Properties	Test Method/Requirements	Value
Aged "R" Value:	ASTM C-518	6 per inch
Compressive Strength:	ASTM D-1621	25-30 psi
Core Density:	ASTM D-1622	2.0-2.3 lbs./ft3
Closed Cell Content:	ASTM D-2856	>90%

Tensile Strength:	ASTM D-1623 15 minimum	40-48 psi
Water Vapor Transmission @ 74°F, perm inch	ASTM E-96 2.5 max	1.98 perms @ 1"
Dimensional Stability: 28 days at 160°F, 100%RH	ASTM D-2126 15% max by volume change	4%
Sound Transmission Co-Efficient	ASTM E-90-85/E413 Sound Transmission Loss in dB	38

Foam-LOK CC/AirTight CC is a **Class I** formulation, as set forth under Underwriters Laboratories (UL 723, ASTM E84), and possess the flammability characteristics shown:

ASTM Method E84	Class I	Class II	Class III
Flame Spread	≤25 Foam-LOK/AirTight CC ≤10	≤75	Non Rated
Smoke Development	≤450	≤450	Non Rated

2.3 RELATED PRODUCTS

A. 15-Minute Rated Thermal Barriers.

1. Sprayed-in-place cementitious
2. Sprayed-in-place fiber
3. Minimum 1/2-inch gypsum board

B. IGNITION BARRIER

Thermo-Flex 9000 ignition barrier for attic and crawlspace applications, as manufactured by Lapolla Industries, where required by code.

C. VAPOR RETARDER.

A vapor retarder may be required in accordance with IRC Section R318 and IECC Sections 402.5 and 502.5.

PART 3 - EXECUTION

3.1 SUBSTRATE PREPARATION

The substrates to which the insulation is applied must be clean, dry, and free of frost, ice, loose debris, or contaminants that will interfere with adhesion of the spray foam insulation. The insulation must not be applied in electrical boxes.

A. WOOD

1. Plywood shall contain no more than 18% water, as measured in accordance with ASTM D-4449 and 4444-84.
2. Most untreated and unpainted wood surfaces need not be primed. The spray polyurethane foam can be applied directly to the dry wood. Priming may be required in certain instances. Contact a Lapolla representative for specific details.

B. STEEL

1. Primed: If the primed metal surface is free of loose scale, rust, weathered or chalking paint. It can be cleaned using vacuum equipment and hand or power tools to remove loose dirt. Grease, oil, or other contaminants shall be removed with proper cleaning solutions.

C. CONCRETE AND MASONRY.

Must be cured, and loose dirt and any other contaminants, such as asphaltic materials, removed. If a primer is required, prime with Thermo Prime, at the rate of one gallon per 200 square feet.

D. SHEATHING BOARD.

Most sheathing boards need not be primed prior to the application of sprayed-in-place polyurethane foam.

3.2 PRIMER APPLICATION

- A. When required, the primer shall be applied to the properly prepared substrate in accordance with the Lapolla guidelines to achieve a minimum thickness of dry mils. Many primers require a curing time of 24 hours prior to application of spray polyurethane foam or other products. Refer to the appropriate Lapolla primer datasheet for application procedures.

3.3 SPRAY POLYURETHANE FOAM APPLICATION

- A. The spray polyurethane foam components (A) and (B) shall be processed in accordance with instructions found on the appropriate product datasheet.
- B. Applicators must recognize and anticipate climatic conditions prior to application to ensure highest quality foam and to maximize yield. Ambient air and substrate temperatures, moisture, and wind velocity are all critical determinants of foam quality. Variations in ambient air and substrate temperature will influence the chemical reaction of the two components, directly affecting the expansion rate, amount of rise, yield, adhesion, and the resultant physical properties of the foam insulation. To obtain optimum results, closed-cell and open-cell spray polyurethane foam should be spray-applied to substrates when ambient air and surface temperatures fall within a range of 50°F to 120°F. Closed-cell for cold weather climates should be spray-applied to substrates when ambient air and surface temperatures fall within a range of 50°F to 120°F.
- C. The open-cell spray insulation at a maximum thickness of 6 inches (102 mm) and a nominal density of .5 pcf, has a flame-spread index of 25 or less and smoke developed index of 450 or less when tested in accordance with ASTM E84. Applicators should limit open-cell thickness to 6 inches per pass for optimal processing and physical properties. Second passes if necessary should be applied after 10 minutes of cure time. If additional passes are needed, applicators should wait 30 minutes between passes for optimal foam processing.

The closed-cell spray foam insulation at a maximum thickness of 4 inches (102 mm) and a nominal density of 2.0 pcf (32kg/m³), has a flame-spread index of 25 or less and smoke-developed index of 450 or less when tested in accordance with ASTM E84. Thicknesses up to 12 inches (305 mm) in wall cavities and 12 inches (305 mm) in ceiling cavities are recognized based on room corner testing in accordance with NFPA 286. Thicknesses up to 7 inches (178mm) for wall cavities and 15 inches (381mm) for ceiling cavities in attics and crawl spaces are recognized based on diversified fire tests. Applicators should limit closed-cell foam thickness to 2" per pass for optimal processing and physical properties. Second passes if necessary should be applied after 10 minutes of cure time. If additional passes are needed, applicators should wait 30 minutes between passes for optimal foam processing.

- D. Spray Foam Application with a Prescriptive Ignition Barrier. When spray foam systems are installed within attics or crawl spaces where entry is made only for service of utilities, an ignition barrier must

be installed in accordance with IBC Section 2603.4.1.6 and IRC Section R314.5.4, as applicable. The ignition barrier must be consistent with the requirements for the type of construction required by the applicable code, and must be installed in a manner so that the foam plastic insulation is not exposed. Spray foam insulation, as described in these sections, may be installed in unvented attics in accordance with IRC Section R806.4.

- E. Application with Thermo-Flex Ignition Barrier in Attics. In attics, spray foam insulation may be spray-applied to the underside of roof sheathing and roof rafters. The foam plastic must be covered with a minimum nominal 7 dry mil thickness of Thermo-Flex 9000. The Thermo-Flex 9000 coating must be applied over the spray foam insulation in accordance with the manufacturer's instructions. Surfaces to be coated must be dry, clean, and free of dirt, loose debris, and any other substances that could interfere with the adhesion of the coating. The Thermo-Flex coating is applied with a medium size nap roller, soft brush, or conventional airless spray equipment at a rate of 1 gallon per 100 square feet to achieve the required minimum thickness of 7 dry mils (0.25 mm) dry film thickness is reached. The coating must be applied when ambient and substrate temperatures are above 50°F and the coating requires a 4-hour curing time after application. Spray foam insulation, as described in this section, may be installed in unvented conditioned attics in accordance with IRC Section R806.4.
- F. Application with Minimum ½" Gypsum Board in Attics. In attics, spray foam insulation may be spray-applied to the underside of roof sheathing and roof rafters. In crawlspaces, closed-cell spray foam insulation may be spray-applied to the underside of floors as described in this section.
- G. Use on Attic Floors: Spray foam insulation must be separated from the area beneath the attic by an approved thermal barrier in accordance with IBC Section 2603.4.1.6 and IRC Section R314.5.3.

3.4 VAPOR RETARDER APPLICATION

- A. When required, a vapor retarder shall be applied to the substrate to be insulated or to the finished spray polyurethane foam insulation. The predominant direction of the vapor drive determines the location of the vapor retarder relative to the spray polyurethane foam. A minimum of two inches of closed-cell foam constitutes a vapor retarder – where permitted by code.
- B. Apply thermal barriers and vapor retarder (if required) according to ICC recommendations.

3.5 THERMAL BARRIER APPLICATION

A. IRC and IBC codes require that SPF be separated from the interior of a building by a thermal barrier, which is applied over the SPF to slow thermal rise during a fire, and delay its involvement in a fire. A building code definition of an approved thermal barrier is one that is equal in fire resistance to 1/2 inch gypsum board. Thermal barriers limit the temperature rise of the underlying SPF to not more than 121°C (250°F) after 15 minutes of fire exposure in compliance with ASTM-E119 (Test Methods for Fire Tests of Building Construction Materials). Thermal barriers meeting this criterion are termed a “15 minute thermal barrier” or classified as having an “index of 15”. Lapolla recommends that an approved thermal barrier separate spray polyurethane foam from the building interior unless waived by a local building code official. There are exceptions to the thermal barrier requirement: (1) Code authorities may approve coverings based on fire tests specific to the SPF application. For example, covering systems that successfully pass large scale tests may be approved by code authorities in lieu of a thermal barrier; (2) SPF protected by 1” thick masonry does not need a thermal barrier. Certain materials that offer protection from ignition, called “ignition barriers,” may not be considered as thermal barrier alternatives unless they comply with ASTM E-119. Just because a material is advertised as a “thermal barrier” or “ignition barrier” does not mean that it has been tested in conjunction with SPF and approved by a code agency or a local code official. Applicators should request test data and code body approvals or other written indications of acceptability under the code to be sure that the product selected offers code-compliant protection.

3.6 CLEANING

A. At the end of each work day, remove rubbish, empty containers, rags, and other discarded items from the site. After completing work, clean glass and spattered surfaces.

END OF SECTION