



SPFA-149

Architectural Specification for Spray Polyurethane Foam Insulation

Spray Polyurethane Foam Alliance

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ABOUT SPRAY POLYURETHANE FOAM ALLIANCE (SPFA)

Founded in 1987, the Spray Polyurethane Foam Alliance (SPFA) is the voice, and educational and technical resource, for the spray polyurethane foam industry. A 501(c)6 trade association, the alliance is composed of contractors, manufacturers, and distributors of polyurethane foam, related equipment, and protective coatings; and who provide inspections, surface preparations, and other services. The organization supports the best practices and the growth of the industry through a number of core initiatives, which include educational programs and events, the SPFA Professional Installer Certification Program, technical literature and guidelines, legislative advocacy, research, and networking opportunities. For more information, please use the contact information and links provided in this document.

DISCLAIMER

This document was developed to aid building construction and design professionals in choosing spray-applied polyurethane foam systems. The information provided herein, based on current customs and practices of the trade, is offered in good faith and believed to be true to the best of SPFA’s knowledge and belief.

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Individual manufacturers and contractors should be consulted for specific information. Nominal values which may be provided herein are believed to be representative but are not to be used as specifications nor assumed to be identical to finished products. SPFA does not endorse the proprietary products or processes of any individual manufacturer, or the services of any individual contractor.

DOCUMENT HISTORY

Date	Sections Modified	Description of Changes
August 2015	All	Administrative changes
January 2021	Cover and Header	New SPFA Logo

BUILDING ENVELOPE COMMITTEE

MISSION STATEMENT

The mission of the Building Envelope Committee is to:

1. To identify, explore, develop, and communicate an understanding of technical issues, including building codes and other standards, for the SPF industry.
2. Provide a wide range of technical information for members and building design professionals to properly specify and install spray foam insulation.
3. Maintain current and develop new SPFA TechDocs and TechTips applicable to application of spray foam insulation.

TABLE OF CONTENTS

ABOUT SPRAY POLYURETHANE FOAM ALLIANCE (SPFA) **Error! Bookmark not defined.**

DISCLAIMER..... **Error! Bookmark not defined.**

DOCUMENT HISTORY 1

TECHNICAL OVERSIGHT COMMITTEE **Error! Bookmark not defined.**

Mission Statement **Error! Bookmark not defined.**

TABLE OF CONTENTS..... 3

PART 1—GENERAL 5

 1.1 SECTION INCLUDES..... 5

 1.2 RELATED SECTIONS..... 5

 1.3 REFERENCES 5

 1.4 SUBMITTALS 6

 1.5 QUALITY ASSURANCE 7

 1.6 REGULATORY REQUIREMENTS..... 8

 1.7 DELIVERY, STORAGE, AND HANDLING 8

PART 2—PRODUCTS..... 8

 2.1 Manufacturers and Suppliers..... 8

 2.2 MATERIALS 9

PART 3—EXECUTION..... 12

 3.1 PREPARATION..... 12

 3.2 APPLICATION 12

 3.3 FIELD QUALITY CONTROL 13

 3.4 PROTECTION..... 13

 3.5 CONSTRUCTION WASTE MANAGEMENT 13

 3.6 SCHEDULES..... 14

PART 1—GENERAL

1.1 SECTION INCLUDES

NOTE TO SPECIFIER:

Delete types from the following list that are not applicable to this project.

- (1) Low-density (LD), open-cell SPF (spray polyurethane foam) insulation with a density range between 0.4 and 1.4 lb/ft³
- (2) Medium-density (MD), closed-cell spray polyurethane foam insulation with a density range between 1.5 and 2.5 lb/ft³

1.2 RELATED SECTIONS

NOTE TO SPECIFIER:

Delete sections from the following list that are not relevant to this project. Add others, as required.

- (1) Section 03300 – Cast-In-Place Concrete
- (2) Section 04200 – Masonry Units
- (3) Section 06100 – Rough Carpentry
- (4) Section 07260 – Vapor Retarders
- (5) Section 07840 – Fire-stopping
- (6) Section 07920 – Joint Sealants
- (7) Section 09960 – High Performance Coatings
- (8) Section 05 31 00 – Metal Decking
- (9) Section 07 14 00 – Fluid-Applied Waterproofing
- (10) Section 07 27 36 – Sprayed Foam Air Barrier
- (11) Section 07 81 00 – Fireproofing
- (12) Section 09 29 00 – Gypsum Board

Additional Sections:

1.3 REFERENCES

NOTE TO SPECIFIER:

Delete references from the following list that are not required by the text of the edited sections.

- (1) American Society for Testing and Materials (ASTM):
 - a. C168 Terminology Relating to Thermal Insulation
 - b. C390 Practice for Sampling Lots of Thermal Insulation
 - c. C518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

- d. C1338 Test Method for Determining Fungi Resistance of Insulation Materials and Facings
 - e. C1363 Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
 - f. D883 Terminology Relating to Plastics
 - g. D1621 Test Method for Compressive Properties of Rigid Cellular Plastics
 - h. D1622 Test Method for Apparent Density of Rigid Cellular Plastics
 - i. D1623 Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
 - j. D2126 Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
 - k. D2842 Test Method for Water Absorption of Rigid Cellular Plastics
 - l. D6226 Test Method for Open Cell Content of Rigid Cellular Plastics
 - m. E84 Test Method for Surface Burning Characteristics of Building Materials
 - n. E96/E96M Test Methods for Water Vapor Transmission of Materials
 - o. E 283 Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 - p. E 2178 Test Method for Air Permeance of Building Materials
- (2) National Fire Protection Association
- a. NFPA 275: Standard Method of Fire Tests for the Evaluation of Thermal Barriers
 - b. NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components
 - c. NFPA 286: Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
- (3) FM Global
- a. FM 4880: Approval Standard for Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings and Exterior Wall Systems
- (4) Underwriters Laboratories
- a. UL 1040: Fire Test of Insulated Wall Construction
 - b. UL 1715: Fire Test of Interior Finish Material
- (5) International Code Council Evaluation Services
- a. AC-377 Acceptance Criteria for Spray-Applied Foam Plastic Insulation

1.4 SUBMITTALS

- (1) Submit under provisions of Section 01 30 00 – Administrative Requirements.
- (2) Product Data: Manufacturer's data sheets and installation instructions on each product

to be used, including:

- a. Preparation instructions and recommendations
- b. Storage and handling requirements and recommendations
- c. Evidence of compliance for insulation products with specified requirements
- d. Installation methods (Indicate special procedures, substrate and perimeter conditions requiring special treatment.)

(3) Evaluation Reports

- a. Include an evaluation report from one or more of the following organizations acceptable to the code official or authority having jurisdiction:
 - i. ICC-ES (International Code Council Evaluation Service)
 - ii. IAPMO-ES (International Association of Plumbing and Mechanical Officials)
 - iii. Intertek
 - iv. QAI (Quality Auditing Institute, Ltd.)
 - v. UL (Underwriter’s Laboratories, Inc.)
 - vi. [Other]

(4) Certification and Accreditation Credentials

- a. Center for the Polyurethanes Industry (CPI) Chemical Health and Safety Course: Submit current cards or certificates for all workers on the jobsite.
- b. SPFA/PCP Individual Certification: Submit copies of current SPFA/PCP individual certification cards for:
 - i. Sprayer: Insulation Master Installer (open-cell, closed-cell, or both) or Insulation Installer and Insulation Project Manager.
 - ii. Other workers: Assistant, Insulation Installer, Insulation Master Installer, or Insulation Project Manager.
- c. SPFA/PCP Contractor Company Accreditation: Submit a copy of the current SPFA/PCP Contractor Company Accreditation Certificate.
- d. SPFA/PCP Supplier Company Accreditation: Submit a copy of the current SPFA/PCP Supplier Company Accreditation Certificate for each supplier used.

(5) Environmental Product Declaration (EPD): An industry-level, ISO 14025-compliant EPD shall be derived from an ISO-14040/14044-compliant LCA (life cycle assessment).

1.5 QUALITY ASSURANCE

(1) SPFA (Spray Polyurethane Foam Alliance) PCP (Professional Certification Program) Individual Certification:

- a. The SPF insulation shall be installed (sprayed) by an:
 - i. Insulation Master Installer (specify certification for open-cell or closed-cell, or both, based on the product types being installed) certified by SPFA/PCP
OR
 - ii. Insulation Installer under the direct supervision of an Insulation Project Manager, both certified by SPFA/PCP

- b. All other SPF work shall be performed by an:
 - i. Assistant, Insulation Installer, Insulation Master Installer, or Insulation Project Manager certified by SPFA/PCP

(2) SPFA/PCP Contractor Company Accreditation:

- a. The SPF insulation shall be installed by a Contractor Company that is accredited by SPFA/PCP.

(3) SPFA/PCP Supplier Company Accreditation:

- a. The SPF insulation material shall be provided by a Supplier Company that is accredited by SPFA/PCP.

1.6 REGULATORY REQUIREMENTS

- (1) Conform to applicable code requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- (1) Comply with the manufacturer’s written instructions for the storage, handling, and protection of products, both prior to and during installation.
- (2) Store both components in a temperature controlled area within the manufacturer’s range of storage temperatures. Do not allow products to freeze.
- (3) Do not expose products to sunlight, except to the extent necessary for the period of installation and concealment.
- (4) Use only those components that are supplied by the manufacturer for the specified product.

PART 2—PRODUCTS

2.1 MANUFACTURERS AND SUPPLIERS

- (1) Subject to compliance with requirements:
 - a. Provide products by one or more of the following:
OR
 - b. Available manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

MANUFACTURER #1
 Company: _____
 Street Address 1: _____
 Street Address 2: _____
 City: _____
 State/Province: _____

ZIP/Postal Code: _____
 Country: _____
 Phone: _____
 Fax: _____
 E-mail: _____
 Website: _____

MANUFACTURER #2

Company: _____
 Street Address 1: _____
 Street Address 2: _____
 City: _____
 State/Province: _____
 ZIP/Postal Code: _____
 Country: _____
 Phone: _____
 Fax: _____
 E-mail: _____
 Website: _____

MANUFACTURER #3

Company: _____
 Street Address 1: _____
 Street Address 2: _____
 City: _____
 State/Province: _____
 ZIP/Postal Code: _____
 Country: _____
 Phone: _____
 Fax: _____
 E-mail: _____
 Website: _____

- (2) Substitutions: Substitutions are not permitted.
- (3) Requests for substitutions will be considered in accordance with the provisions of Section 01600.

2.2 MATERIALS

NOTE TO SPECIFIER:

The following properties are typically reported for SPF insulations, and are available from technical data sheets and/or evaluation reports. Add material properties, or delete or modify the following material properties, as appropriate.

- (1) Low-density (LD), open-cell spray polyurethane foam (SPF) insulation with a density range between 0.4 and 1.4 lb/ft³:
- a. Thermal Resistance (R-Value/inch at 75 °F mean temperature aged 180 days @ 50% RH):
ASTM C 518, C 177 or C 1363 As reported **OR** >3.6 h/ft²/°F/BTU
 - b. Open-Cell Content:
ASTM D6226 >80%
 - c. Nominal Core Density:
ASTM D 1622 0.4 to 1.4 lb/ft³
 - d. Air Permeance:
ASTM E283 or ASTM E2178 As reported at a specified thickness
 - e. Water Vapor Transmission
ASTM E 96 - Desiccant Method As reported in perms at a specified thickness
 - f. Flame Spread and Smoke Developed Rating:
ASTM E 84 Flame Spread: ≤ 25 or ≤ 75
Smoke Development: ≤ 450
 - g. Dimensional Stability: Thermal and Humid Aging (158°F, 97% RH for 7 days):
ASTM D 2126 Maximum linear change ≤ 15%.
- (2) Medium-density (MD), closed-cell SPF insulation with a density range between 1.5 and 2.5 lb/ ft³:
- a. Thermal Resistance (R-Value/inch at 75 °F mean temperature aged 180 days @ 50% RH):
ASTM C 518, C 177 or C 1363 As reported
 - b. Closed-Cell Content:
ASTM D6226 >90%
 - c. Nominal Core Density:
ASTM D 1622 1.5 to 2.5 lb/ft³
 - d. Air Permeance:
ASTM E283 or ASTM E2178 As reported at a specified thickness
 - e. Water Vapor Transmission
ASTM E 96 - Desiccant Method As reported in perms at a specified thickness
 - f. Flame Spread and Smoke Developed Rating:
ASTM E 84 Flame Spread: ≤ 25 or ≤ 75
Smoke Development: ≤ 450
 - g. Dimensional Stability: Thermal and Humid Aging (158 °F, 97% RH for 7 days):
ASTM D 2126 maximum linear change ≤ 15%.

- h. Compressive Strength:
ASTM D 1621 ≥ 15 psi
- i. Tensile Strength:
ASTM D 1623 ≥ 15 psi
- j. Water Absorption:
ASTM D 2842 ≤ 5%

(3) Thermal Barriers:

- a. One-half inch minimum thickness gypsum board
OR
- b. A 15-minute thermal barrier qualified in accordance with NFPA 275:
Manufacturer: _____
Product Description: _____
OR
- c. Assemblies tested in accordance with NFPA 286, FM 4880, UL 1040 or UL 1715:
Manufacturer: _____
Product Description: _____
OR
- d. Other thermal barriers or assemblies approved by the authority having jurisdiction

(4) Ignition Barriers:

- a. Prescriptive ignition barrier to be installed:
Manufacturer: _____
Product Description: _____
OR
- b. Assemblies tested in accordance with Appendix X of ICC-ES AC 377:
Manufacturer: _____
Product Description: _____
OR
- c. Other ignition barriers or assemblies approved by the authority having jurisdiction

NOTE TO SPECIFIER:

Insert the specific type and manufacturer of vapor retarder, if applicable.

- (5) Vapor Retarder: Vapor retarder recommended by insulation manufacturer where indicated or scheduled:

- a. Type: _____.

PART 3—EXECUTION

3.1 PREPARATION

- (1) Do not proceed with the installation until the substrates have been properly prepared and deviations from the manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.
- (2) Cordon off the 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).
- (3) Ensure that the installation of products of this section is coordinated with affected trades to prevent interruption of construction progress.
- (4) Maintain environmental and substrate conditions (temperature, humidity, and ventilation) within the limits recommended by the manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer's absolute limits.
- (5) Prepare substrates by using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions:
 - a. Review the placement area to determine that the final location will not be within 3 inches (76 mm) of any heat source where the temperature will exceed 200 °F (93 °C) per ASTM C 411, or in accordance with authorities having jurisdiction.
 - b. Mask and protect adjacent surfaces from overspray or damage.
 - c. Remove foreign materials, dirt, dust, grease, oil, paint, laitance, efflorescence, and other substances that will affect the application.
 - d. Comply with the manufacturer's written installation instructions for preparing cavities that are indicated to receive insulation to make sure they are free of any foreign material that will impede application.
 - e. Verify that other work on and within spaces to be insulated is complete prior to the application.
- (6) If preparation is the responsibility of another installer, notify the architect in writing of deviations from the manufacturer's recommended installation tolerances and conditions.

3.2 APPLICATION

- (1) Apply insulation in accordance with the manufacturer's written installation instructions. Apply insulation to the specified thickness without voids, but do not exceed the manufacturer's thickness per pass limits.
- (2) Apply insulation to the specified thickness as indicated on the drawings or as scheduled at the end of this section.
- (3) Apply insulation to fill voids around doors and windows. Apply insulation to fill voids around accessible service and equipment penetrations.

- (4) Apply insulation to seal voids at truss ends to prevent wind scouring of ceiling insulation.
- (5) Seal plumbing stacks, electrical wiring, and other penetrations into the attic to control air leakage.
- (6) Apply insulation to fill voids around bathtubs to the point of accessibility.
- (7) Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate the location of the piping to ensure that it is placed on warm side of the insulation and that the insulation encapsulates the piping.
- (8) Apply insulation in unvented roof spaces and cathedral ceiling areas.

3.3 FIELD QUALITY CONTROL

- (1) Inspect the application for the correct insulation thickness.
- (2) The installer shall complete an installation certificate documenting the foam type, manufacturer, and product name and lot/batch number, as well as any fire protective products that have been used. An example of a suitable installation certificate is provided by SPFA Document SPFA-148. Include the total thickness and R-Value installed according to the Schedule of Section 3.6, as well as thermal and/or ignition barrier coatings or coverings used per Section 3.4. The Installation Certificate shall be signed by the Insulation Contractor representative, and delivered to the building owner or general contractor.

3.4 PROTECTION

- (1) Do not permit subsequent work to disturb applied insulation.
- (2) Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings in places where insulation is subject to abuse.
- (3) Install all required fire protective coatings or coverings over the foam as soon as practicable.
- (4) Touch-up, repair, or replace damaged products before the Substantial Completion phase is reached.

3.5 CONSTRUCTION WASTE MANAGEMENT

- (1) Plan and coordinate the insulation work to minimize the generation of offcuts and waste.
- (2) Separate and recycle waste materials in accordance with the Waste Management Plan, and to the extent economically feasible.

3.6 SCHEDULES

(1) For the following locations, apply the specified foam to the thickness indicated.

Insulated Area	Spray Foam Type (LD or MD)	Average Foam Thickness (inches)	Minimum Foam Thickness (inches)
Attic Floor			
Underside of Roof Deck			
Attic Walls (vertical surfaces, knee walls, etc.)			
Sloped (Cathedral) Ceilings			
Above-Grade Walls Location: _____			
Above-Grade Walls Location: _____			
Below-Grade Walls (interior)			
Below-Grade Walls (exterior)			
Floors (over unheated crawlspaces, garage, etc.)			
Crawlspace Perimeter			
Below Slab			
Other (describe) _____			
Other (describe) _____			