



## SPFA-146

# Spray Polyurethane Foam Insulation for Hybrid Insulation Systems – Part 1: Warm Climates

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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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**While proper installation of SPF will dramatically reduce air leakage through the building envelope, following these guidelines will not guarantee that the building assembly or building itself will meet the specific performance requirements for air leakage.**

## DOCUMENT HISTORY

Date	Sections Modified	Description of Changes
2011		
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.

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\*SPFA would like to acknowledge the voluntary contributions of these individual members of the Technical Oversight Committee in the development of this document. **In addition, SPFA would like to recognize the contributions of two non-members who were instrumental in the creation of this document: Mr. Steve Loftis of NCFI Polyurethanes, and Ms. Kelly Frauenkron, who served as the Task Group leader for this project.**

**TABLE OF CONTENTS**

ABOUT SPRAY POLYURETHANE FOAM ALLIANCE (SPFA) ..... 2

DISCLAIMER..... 2

DOCUMENT HISTORY ..... 2

BUILDING ENVELOPE COMMITTEE ..... 3

    MISSION STATEMENT ..... 3

TABLE OF CONTENTS..... 5

Section 1—Definition, Scope, and Component Overview ..... 6

    Definition ..... 6

    Scope..... 6

    Spray Polyurethane Foam Hybrid Insulation Systems Component Overview ..... 6

Section 2—General Considerations and Building Code Requirements ..... 7

    Building Codes and Fire Protection Guidelines..... 7

Section 3—Application Areas and Guidelines ..... 8

    Walls..... 8

    Attic Applications ..... 8

    Flat Ceilings ..... 8

    Special Considerations ..... 8

    Unvented Attic Assemblies and Unvented ..... 9

    Enclosed Rafter Assemblies (Cathedral Ceilings)..... 9

    Knee Walls..... 9

    Bonus Room Floors (Garage Ceilings)..... 10

    Crawl Spaces ..... 11

Appendix A: Recommended Guide Specification for Hybrid Building Envelope Insulation Systems with SPF in Climate Zones 1–3 ..... 12

    PART 1—GENERAL ..... 12

    PART 2—PRODUCTS..... 16

    PART 3—EXECUTION..... 17

Appendix B: Detail Drawings..... 18

    DETAIL DRAWING 1: Recessed Lighting ..... 18

## Section 1—Definition, Scope, and Component Overview

### DEFINITION

For the purpose of this document, a hybrid insulation system is a thermally insulating system using a combination of SPF and another type of insulation, usually fibrous, layered in series wherein heat must sequentially transfer through both layers of insulation.

### SCOPE

The scope of this document is to give guidance for proper design and assembly of a site-installed, new-construction hybrid insulation system within the building envelope, to achieve required R-Values and minimize the potential for condensation and air leakage in Climate Zones 1–3 (as defined by the International Code Council)\*. Note: Pre-manufactured buildings and components and retrofit or remodel projects may require special considerations that are beyond the scope of this document.

**\*This guideline is intended for use ONLY for Climate Zones 1, 2, and 3, and is not appropriate for colder climate zones where greater consideration of condensation and other moisture-related conditions must be addressed. A moisture and thermal analysis is highly recommended in any climate zone to ensure appropriate performance of the design.**

For the purpose of this document, the following terms are relevant to the materials used in this guideline:

- Low-Density Spray Foam: an SPF material with an in-place density of 0.4–1.4 lb/cu ft
- Medium-Density Spray Foam: an SPF material with a in-place density of 1.5–3.0 lb/cu ft
- Air-Impermeable Insulation: an insulation having an air permeance equal to or less than 0.02 L/s-m<sup>2</sup> at 75 pa pressure differential tested according to ASTM E2178 or ASTM E283

### SPRAY POLYURETHANE FOAM HYBRID INSULATION SYSTEMS COMPONENT OVERVIEW

(1) SPF

(2) Types of insulation in the balance of the stud or rafter cavity (examples):

- a. Fiberglass batt insulations
- b. Fiberglass blown-in insulations
- c. Other fibrous insulation products (e.g., rock wool, polyester, cotton, etc.)
- d. Cellulose—wet-spray or dense pack
- e. Low-density foam insulations
- f. Reflective insulations

## Section 2—General Considerations and Building Code Requirements

This document discusses best practices for this application. All applicable building codes must be followed, and those codes specific to foam plastic in the International Codes are included in this section.

Some general concerns to be addressed when specifying and using hybrid insulation systems are as follows:

- Insulation Placement:
  - Exterior thermal envelope insulation in framed walls should be installed in substantial contact and continuous alignment with the building envelope air barrier.
- Vapor Retarder Placement:
  - Interior vapor retarders shall not be used in Climate Zones 1–3 (between the gypsum board and insulation, per International Code).
- Foam Thickness:
  - The foam thickness is to be determined by the designer, based upon the total R-Value need.
- Special Application Designs—high humidity rooms (e.g., spas and pool areas, greenhouse additions) and cold rooms\* (e.g., wine cellars, cold storage) have the following requirements:
  - Additional consideration should be given to foam and insulation types, and thickness and vapor retarders in these designs.
  - Please consult with the design professional and/or foam supplier to discuss applications with high relative humidity levels or high vapor drive.

\*See the SPFA-111 Cold Storage Guide for further guidance on these types of structures.

### BUILDING CODES AND FIRE PROTECTION GUIDELINES

All foam plastics must be separate from the interior of the building for fire protection purposes\*, by thermal or ignition barriers, dependent on definition and use of the space. Please refer to your local building code for further requirements. Check with your SPF/insulation manufacturer for fire resistance performance and testing requirements. All non-SPF insulation materials must meet all building code requirements as installed.

Refer to the following International Code sections for Foam Plastics:

- IRC (International Residential Code)—Chapter 3 Building Planning (Foam Plastics)
- IBC (International Building Code)—Chapter 26 Foam Plastics

\*Unless specifically approved on the basis of full-scale fire testing related to actual end-use configurations.

## Section 3—Application Areas and Guidelines

### WALLS

Follow this general guideline for hybrid insulation systems installed in exterior wall cavities:

- The spray foam insulation is in direct contact with the exterior sheathing, unless other design considerations have been made.

Design Option 1 with medium-density SPF:

- Use 1/2 inch or greater thickness of medium-density SPF.
- The balance of the cavity is filled with other insulations.

Design Option 2 with low-density SPF:

- Use 2 inch or greater thickness of low-density SPF.
- The balance of the cavity is filled with other insulations.

### ATTIC APPLICATIONS

#### FLAT CEILINGS

Follow these general guidelines for hybrid insulation systems installed down onto the flat or low-slope ceiling in an attic:

- In this application, SPF will be installed down onto the gypsum board to limit air leakage at the ceiling plane, before the balance of the R-value is achieved with other insulations. Other orientations should be separately evaluated for acceptable performance.
- Use caution with SPF installed onto gypsum board to avoid distortion of the ceiling—thinner initial passes (1/2 inch to 1.5 inch) will reduce heat generation and create a tight bond onto the surface without creating voids or excessive stresses.
- Check with your local building official and SPF manufacturer to determine if the hybrid system requires additional fire protection.

Design Option 1 with medium-density SPF:

- Use one-half inch or greater thickness of medium-density SPF.
- The balance of the R-Value requirement is fulfilled with other insulations.

Design Option 2 with low-density SPF:

- Use 2 inch or greater thickness of low-density SPF.
- The balance of the R-Value requirement is fulfilled with other insulations.

### SPECIAL CONSIDERATIONS

Note the following special considerations:

- Vapor Retardance: To avoid condensation within the ceiling assembly, install the appropriate relative thicknesses of SPF and other insulations. Unusual occupancies maintaining high humidity or low temperatures will require site-specific designs.
- Recessed Lighting\*: Maintain separation of SPF from all recessed lighting and other



electrical fixtures to allow for heat dissipation.

- Hot Air Flues/Chimney Shafts: Maintain a 3-inch minimum separation of SPF from all hot air flues and chimney shafts with an air space or with another material (e.g., fiber glass, protective box, etc.).

\*See the detail drawing on Recessed Lights in Appendix B.

## **UNVENTED ATTIC ASSEMBLIES AND UNVENTED ENCLOSED RAFTER ASSEMBLIES (CATHEDRAL CEILINGS)**

Note: The International Residential Code permits the use of hybrid insulation systems in unvented attic and cathedral ceiling assemblies. The code differentiates the use of air-impermeable and air-permeable insulations. SPF may be air-impermeable, but this is dependent both on its **properties** and **thickness**. Always check with the SPF manufacturer when using SPF as part of a hybrid system in an unvented attic or cathedral ceiling to determine how thick the SPF must be applied to be considered air-impermeable.

Follow the requirements of the appropriate building code section as it relates to the use of SPF in a hybrid insulation system. In general, the following requirements apply:

- Air-impermeable, spray foam insulation shall be in direct contact with the roof deck.
- The unvented attic space is completely contained within the thermal envelope.
- No interior vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly.
- R-5 minimum SPF is required in hybrid insulation systems in Climate Zones 1–3.
- Check with your local building official and SPF manufacturer to determine if the hybrid system requires additional fire protection.

Design Option 1 with medium-density SPF:

- Medium-density SPF should be installed at a minimum thickness to achieve R-5 or air-impermeability, whichever is greater.
- The balance of the R-Value requirement is fulfilled with other insulations, in direct contact with the SPF insulation.

Design Option 2 with low-density SPF:

- Low-density SPF should be installed at a minimum thickness to achieve R-5 or air-impermeability, whichever is greater.
- The balance of the R-Value requirement is fulfilled with other insulations, in direct contact with the SPF insulation.

## **KNEE WALLS**

Follow these general guidelines for hybrid insulation systems installed into knee walls in an attic:

- Special attention should be given to knee walls in attics, as this is a common thermal bypass area in homes. SPF can offer excellent air sealing in this area.
- Vapor Retardance: To avoid condensation within the wall assembly, install the

appropriate relative thicknesses of SPF and other insulations. Unusual occupancies maintaining high humidity or low temperatures will require site-specific designs.

- A solid backer material should be provided to spray foam into this framed cavity.

Design Option 1 with medium-density SPF:

- Use 1/2 inch or greater thickness of medium-density SPF applied to backer material installed to the interior or exterior of the knee walls.
- The balance of the cavity is to be filled with other insulations.
- The added insulation material must be installed to ensure long-term alignment with the air barrier—the full insulation system shall be aligned with both the thermal and pressure boundaries within the building envelope.

Design Option 2 with low-density SPF:

- Use 2 inch or greater thickness of low-density SPF applied to backer material installed to the interior or exterior of the knee walls.
- The balance of the cavity is to be filled with other insulations.
- The added insulation material must be installed to ensure long-term alignment with the air barrier—the full insulation system shall be aligned with both the thermal and pressure boundaries within the building envelope.

### **BONUS ROOM FLOORS (GARAGE CEILINGS)**

Note the following general considerations for bonus room floors (above garages):

- In this application, SPF will be installed directly to the underside of the floor system.
- Special attention should be given to proper sealing and insulating of rim joist, as this is a common thermal bypass area in homes. SPF can offer excellent air sealing in this area.
- The added insulation material must be installed to ensure long-term alignment with the air barrier—the full insulation system shall be aligned with both the thermal and pressure boundaries within the building envelope.
- Follow specific code provisions in IRC Chapter 16 for insulation installed over ductwork existing in this space:
  - Avoid hybrid systems over ductwork unless specific design considerations have been made.
  - When SPF is installed over cooling supply ducts, the minimum thickness must be installed to meet 3 perms.

Design Option 1 with medium density SPF:

- Use 1/2 inch or greater thickness of medium-density SPF.
- The balance of the R-Value requirement is fulfilled with other insulations, in direct contact with the SPF insulation.

Design Option 2 with low density SPF:

- Use 2 inch or greater thickness of low-density SPF.
- The balance of the R-Value requirement is fulfilled with other insulations, in direct contact with the SPF insulation.

## CRAWL SPACES

Crawl spaces may be designed to be either vented or unvented. Control of heat and moisture transfer will vary between these designs (i.e., the location and use of thermal insulation and vapor retardant components will be different in each design). Check with your local building codes to determine requirements based upon the design in your structure.

Crawl-space applications for hybrid insulation systems include the following:

- Underside of the floor or ceiling of the crawl space
- Band joist

**Note 1:** Walls of crawlspaces in Climate Zones 1–3 generally do not require insulation values that are sufficient to justify the application of hybrid insulation systems.

Follow these general guidelines for hybrid insulation systems installed into crawlspaces:

- Check with your SPF manufacturer and local building official to determine if the hybrid system requires additional fire protection.
- In vented crawl spaces where the underside of the floor or crawlspace ceiling is insulated, consider insulation of pipes and ductwork:
  - Follow specific code provisions in IRC Chapter 16 for insulation installed over ductwork existing in this space.
- Install a continuous Class 1 or Class 2 (0–1 perms) vapor retarder, such as 6 mil plastic, over exposed soil. Check local code requirements to determine if or how far the vapor retarder should extend up the vertical wall.
- Where combustion appliances are present, ensure that proper venting is supplied to eliminate back drafts.
- In regions where termite infestation potential is defined by the building code as “very heavy,” local code officials may require a continuous 6 inch high “inspection strip” between the top edge of SPF and the wood building elements. This may also be required at the bottom of insulated exterior walls where there is no finished floor (i.e., soil, stone, etc.). Check with your local building code requirements.

Design options for the hybrid insulation system are as follows:

- Use 1/2 inch or greater thickness of medium-density SPF. For below-grade applications, medium-density SPF is recommended.
- The balance of the cavity is to be filled with other insulations.
- The added insulation material must be installed to ensure long-term alignment with the air barrier.

## Appendix A:

### Recommended Guide Specification for Hybrid Building Envelope Insulation Systems with SPF in Climate Zones 1–3

#### PART 1—GENERAL

This guide discusses the application of seamless spray polyurethane foam (SPF) as a component of a hybrid building envelope insulation system. Your contractor, selected systems manufacturer, and local code agencies can assist you, as each project must be assessed individually.

##### (1) SCOPE OF WORK

- a. Furnish all labor, materials, tools, and equipment necessary for the application of a hybrid building envelope insulation system with SPF, including accessory items, subject to the general provisions of the contract.
- b. Section Includes: High-performance, hybrid insulation system for stud cavity assemblies in walls, ceilings, and floors of residential structures, consisting of the following components:
  - i. SPF insulation
  - ii. Additional insulation for balance of cavity

##### (2) RELATED WORK SPECIFIED ELSEWHERE

- |                      |               |
|----------------------|---------------|
| a. Rough Carpentry   | Section 06100 |
| b. Insulation, Other | Section 07200 |
| c. Thermal Barrier   | Section 07220 |
| d. Vapor Retarder    | Section 06100 |
| e. Mechanical        | Division 15   |
| f. Electrical        | Division 16   |

##### (3) REFERENCE STANDARDS

- a. ASTM C518 - Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- b. ASTM C665 - Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- c. ASTM C764 - Mineral Fiber Loose-Fill Thermal Insulation.
- d. ASTM C1104 - Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
- e. ASTM C1338 - Determining Fungi Resistance of Insulation Materials and Facings.
- f. ASTM D1621 - Compressive Properties of Rigid Cellular Plastics.
- g. ASTM D1622 - Apparent Density of Rigid Cellular Plastics.
- h. ASTM D1623 - Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
- i. ASTM D2126 - Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- j. ASTM D6226 - Open Cell Content of Rigid Cellular Plastics.
- k. ASTM E84 - Surface Burning Characteristics of Building Materials.
- l. ASTM E96 / E96M - Water Vapor Transmission of Materials.

- m. ASTM E136 - Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.
- n. ASTM E283 - Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- o. ASTM E970 - Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source.
- p. ASTM E2178 - Air Permeance of Building Materials.
- q. ASTM C1363 - Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
- r. ASTM C236 - Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box

#### (4) QUALITY ASSURANCE

- a. Qualifications/Certification:
  - i. SPF Contractor: Provide information concerning projects similar in nature to the one proposed, including location and person to be contacted. Some manufacturers of SPF systems have approval programs and/or licensing methods that could be required.
  - ii. SPF Installer: The SPF installer must be certified or approved by the SPF manufacturer or approved designee.
  - iii. Other insulation contractor/installer
- b. Field Sample: Complete the field sample area for evaluation of surface preparation techniques and application workmanship:
  - i. Install the system in a 4-foot wide by full height section of the exterior wall at a location designated by the Architect.
  - ii. The exterior sheathing and stud framing of the sample area shall be complete before the installation of the field sample.
  - iii. Include all components of the system assembly. Do not install interior gypsum board.
  - iv. Do not proceed with remaining work until the field sample is approved by the Architect.
  - v. Accepted Sample Areas: These areas may remain part of completed Project.

#### (5) SUBMITTALS

- a. Procedures: Submit all procedures for review, acceptance, and return in accordance with Section 01 33 00. [01330.]
- b. Product Data: Include the manufacturer's technical data sheets for all system components to be installed, including:
  - i. Spray Polyurethane Foam insulation
    - 1. Include the current Code Compliance Research Report or Evaluation Service Report, if available. This is recommended, but not required.
  - ii. Other insulations for balance of cavity (one of the following materials):
    - 1. Fiberglass batt insulations
    - 2. Fiberglass blown-in insulation

3. Other fibrous insulation products (e.g., rock wool, polyester, cotton, etc.)
  4. Cellulose—wet-spray or dense pack
  5. Low-density foam insulations
  6. Reflective insulations
- iii. Vapor retarder, if applicable per design requirements.
- c. Contractor Certification: Include the contractor/applicator certification from the SPF supplier and other insulation manufacturers and experience.
  - d. Manufacturer's Instructions: Submit and maintain additional copies of the following on-site until the installation of the insulation system is complete:
    - i. Preparation instructions and recommendations
    - ii. Storage and handling requirements and recommendations
    - iii. Installation methods
    - iv. MSDS (Material Safety Data Sheets)
  - e. Include the safety and handling instructions for the storage, handling, and use of the materials, including but not limited to, the MSDS.
  - f. Include the Field Quality Control Procedures to be utilized by the contractor/applicator to ensure proper preparation and installation of SPF, other insulations, vapor retarders (if applicable), detail work, and follow-up inspection.

#### (6) DELIVERY, STORAGE, AND HANDLING

- a. Materials shall be delivered in the manufacturer's original, tightly sealed containers or unopened package, all clearly labeled with the manufacturer's name, product identification, safety information, and hatch or lot numbers, where appropriate. Where materials are covered by a referenced specification, the labels shall bear the specification number, type and class, as applicable.
- b. Storage: All materials shall be stored in compliance with local fire and safety requirements, as follows:
  - i. Protect material and installation equipment while it is stored at the site to prevent damage.
  - ii. Store products in the manufacturer's unopened packaging until they are ready for installation.
  - iii. Comply with the protection requirements of each product manufacturer. Store materials under cover in a secure, dry area protected from weather, and where the temperature is within the limits specified by product manufacturer.
- c. Handling: Strictly adhere to detailed safety requirements and all health, environmental, handling and processing precautions published by the insulation manufacturer, including, but not limited to, MSDS.

(7) SEQUENCE AND SCHEDULING

- a. In new construction projects, the hybrid insulation system including SPF is installed when the preparation of the perimeter wall/roof is in place, and in coordination with other building trades and after the inspection requirements have been met.

(8) SAFETY REQUIREMENTS

- a. Refer to [www.spraypolyurethane.org](http://www.spraypolyurethane.org) for all other relevant and up-to-date chemical safety documents for SPF insulation.
- b. Refer to appropriate SDS for additional safety information.
- c. Proper disposal of waste materials and containers must be done in compliance with the manufacturer's guidelines and/or federal, state, and local regulatory agencies.
- d. For protection against exposure to airborne MDI, workers must wear either a self-contained breathing apparatus, with a 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 a 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. Personal protective clothing should be worn. This includes wearing the appropriate protective clothing, including eye protection (e.g., face shield or chemical worker's goggles), gloves, and coveralls. This is essential to preventing skin exposure for individuals who work with MDI.

**PART 2—PRODUCTS**

(1) SPRAY POLYURETHANE FOAM

- a. The SPF to be applied shall be a two-component system made by combining an isocyanate (A-component) with a polyol (B-component), and shall possess the following physical characteristics:

Product	Tests Required	Value Required
Low-Density SPF (0.4–1.4 pcf Nominal Core Density)	Thermal Resistance in accordance with one of the following methods: ASTM C 177 ASTM C 236 ASTM C 518 ASTM C 1363	As reported
	Core Density, in accordance with D1622	As reported
	Dimensional Stability, in accordance with D2126	15% maximum total change
	Surface Burning Characteristics in accordance with ASTM E-84 /UL 723 or UBC Standard 8-1	75 or less flame spread index 450 or less smoke developed index
	Vapor Permeance in accordance with ASTM E96, Method A (Desiccant/Dry Cup)	As reported
	Air Permeance in accordance with ASTM E2178 / E283	As reported
	Medium Density SPF (1.5–3.0 pcf Nominal Core Density)	Thermal Resistance in accordance with one of the following methods: ASTM C 177 ASTM C 236 ASTM C 518 ASTM C 1363
Core Density, in accordance with D1622		As reported
Dimensional Stability, in accordance with D2126		15% maximum total change
Surface Burning Characteristics in accordance with ASTM E-84 / UL 723 or UBC Standard 8-1		75 or less flame spread index 450 or less smoke developed index
Vapor Permeance in accordance with ASTM E96, Method A (Desiccant/Dry Cup)		As reported
Air Permeance in accordance with ASTM E2178 / E283		As reported

(2) OTHER INSULATION FOR BALANCE OF CAVITY/R-VALUE

- a. Fiberglass blown insulation
  - i. ASTM C764 Type 1
- b. Fiberglass batt insulations
  - i. ASTM C665 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing



- c. Other fibrous insulation products (e.g., rock wool, polyester)
- d. Cellulose—wet-spray or dense pack
  - i. ASTM C739 Standard Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal insulation
- e. Low-density foam insulations
- f. Reflective insulations
  - i. ASTM C1224 Standard Specification for Reflective Insulation for Building Applications

### **PART 3—EXECUTION**

#### **(1) APPLICATION OF PRODUCTS**

- a. The products intended for use in the hybrid insulation system must be applied within the manufacturer’s guidelines for temperature, humidity, and other atmospheric conditions. In addition, they must be sequenced so as to take into consideration substrate preparation, proper cure times, and inter-coat adhesion.

#### **(2) SUBSTRATE CONSIDERATION AND PREPARATION**

- a. The surface preparation for those substrates that are to be insulated, and statements regarding the selection of materials related to the successful performance of the SPF insulation, are outlined in this section. The general condition of surfaces to receive SPF application shall be clean, dry, and secure.
- b. WOOD SUBSTRATES
  - i. Wood substrates shall contain 19% or less water.
  - ii. Most untreated and unpainted wood surfaces need not be primed. The SPF can be applied directly to the dry wood. Priming may be required in certain instances. Contact the SPF manufacturer for specific details.
  - iii. Most sheathing boards need not be primed prior to the application of sprayed-in-place polyurethane foam.
- c. CONCRETE AND MASONRY
  - i. The concrete and masonry must be dry and free of surface moisture, with loose dirt and any other contaminants removed, to ensure proper adhesion.

#### **(3) SPRAY POLYURETHANE FOAM APPLICATION**

- a. The SPF A- and B-components shall be processed in accordance with the manufacturer’s instructions.
- b. The polyurethane foam shall be sprayed in minimum 1/2 inch thick passes (lifts), with the overall thickness to be a minimum of \_\_\_ inches. The full thickness of SPF to be applied within any given area should be completed in one day.

#### **(4) OTHER INSULATION PRODUCT FOR BALANCE OF CAVITY**

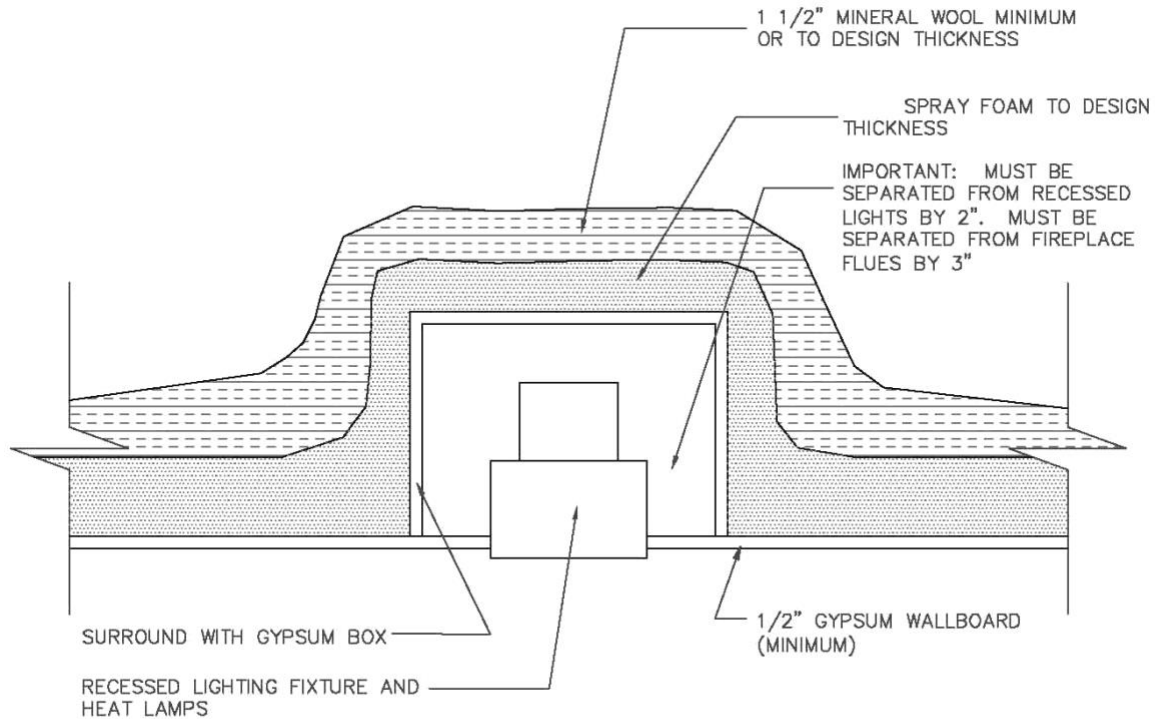
- a. The other insulation materials shall be installed in accordance with the manufacturer’s instructions and local building code provisions.

(5) THERMAL OR IGNITION BARRIER

- a. The interior surface of the SPF must be covered with a thermal barrier or ignition barrier, depending on the use of the space. A thermal or ignition barrier must be applied in accordance with the manufacturer’s guidelines. Follow the guidance of the local building code provisions.

**Appendix B:  
Detail Drawings**

**DETAIL DRAWING 1: RECESSED LIGHTING**



Note: Check with your local building official and SPF manufacturer to determine if the hybrid system requires additional fire protection.