



Standard Guide for Sampling Spray Polyurethane Foam and Coating in Roofing¹

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1. Scope

1.1 This guide covers the removal of test specimens from spray polyurethane foam (SPF) roofing systems in the field for the purpose of examination of an existing system and/or quality assurance for new installations. It describes the types and purposes of sample cuts, visual inspection techniques, laboratory physical property tests, and repair of the core and slit sample holes.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- C1029** Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
- D1079** Terminology Relating to Roofing and Waterproofing
- D1621** Test Method for Compressive Properties of Rigid Cellular Plastics
- D1622** Test Method for Apparent Density of Rigid Cellular Plastics
- D4442** Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials
- D6705** Guide for Repair and Recoat of Spray Polyurethane

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

Foam Roofing Systems

3. Terminology

3.1 **Definitions**—Definitions are in accordance with Terminology **D1079**.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 **core samples, n**—cylindrical sections of approximately 50 to 75 mm [2 to 3 in.] in diameter. They shall be cut using a round metal template or coring tool, and they shall extend from surface down to but not through the substrate.

3.2.2 **slit samples, n**—crescent-shaped samples approximately 13 mm [$\frac{1}{2}$ in.] wide, 19 mm [$\frac{3}{4}$ in.] deep, and 50 to 75 mm [2 to 3 in.] long, cut with a sharp knife. Slit samples are used to examine the uppermost polyurethane foam layers and the coating system.

3.3 **lift, n**—an individual layer of polyurethane foam that results from a single pass of the spray gun.

4. Significance and Use

4.1 Adequate coating thickness (mil thickness) is necessary to protect polyurethane foam from the effects of ultraviolet degradation. This guide outlines general procedures for sampling and measuring the coating thickness by using slit or core samples.

4.2 Thickness of individual lifts of sprayed foam will have a bearing upon foam stability. Core samples are used to determine foam thickness. Compressive strength and core density affect resistance to foot traffic and impact. Specimens from core samples are used to determine these properties using Test Methods **D1621** and **D1622**. Visual examinations of core specimens also indicate the quality of adhesion of the coating and the foam, between foam lifts, and between foam and substrate.

4.3 Slit samples are used to visually examine the foam's cell structure, the number of coating layers applied, dry film thickness of the coating, and coating adhesion.

5. Sampling for Quality Assurance of Recently Completed Sprayed Polyurethane Roof Systems

5.1 When specified, samples shall be taken from the SPF roofing system for quality assurance. The sampling frequency

shall be according to 5.2 and 5.3 unless another sampling frequency has been specified.

5.2 Two core samples shall be taken from the first 900 m² [10 000 ft²] of roof area and one for each additional 900 m² [10 000 ft²] or fraction thereof.

5.3 When specified, six slit samples shall be taken for every 900 m² [10 000 ft²].

6. Sampling Existing Spray Polyurethane Roof Systems

6.1 Core or slit samples, or both, shall be taken as needed to establish the general condition of the spray polyurethane foam and coating.

6.2 Core samples are used to determine adhesion, moisture content, and general conditions in order to determine whether reapplication of polyurethane foam or coating is appropriate, in accordance with Guide D6705.

7. Inspection

7.1 In locations where a slit sample is to be removed, a measuring probe can first be inserted through the coating and foam to measure the foam depth.

7.2 Measure the coating thickness on the slit sample with an optical comparator and record the coating thickness.

7.3 Visually inspect core specimens for cell structure and condition of foam, adhesion of coating to foam and adhesion between polyurethane foam layers.

7.4 Compressive strength is determined using Test Method D1621. Density is determined by Test Method D1622. Moisture content is determined using Test Method D4442.

8. Repair of Holes Made by Removal of Core or Slit Samples

8.1 Holes left by removal of core samples shall be filled with polyurethane foam or a polyisocyanurate foam plug set in compatible sealant. Before filling the holes, the SPF roof surface surrounding the hole shall be cleaned (per sealant

manufacturer's instructions) to ensure adequate adhesion of the sealant to the SPF roof surface. Use silicone sealant for repairing silicone-coated systems, polyurethane sealant for polyurethane coated systems, and acrylic sealant for acrylic-coated roof systems. The density and compressive strength of replacement polyurethane foam shall be equal to or slightly greater in than that prescribed in Specification C1029, Type III.

8.2 After filling the hole where the core was removed with polyurethane foam or a close fitting polyurethane plug, the surface shall be sealed. Apply sufficient compatible sealant to completely cover the plug and to extend onto the coated surface, or apply a coating system that is compatible in type to the existing coating system and is applied according to the manufacturer's recommendations. Reapply roofing granules when needed to better match the roof surface.

8.3 Holes left by removal of slit samples shall be filled with compatible sealant (and slightly overfilled to compensate for shrinkage). The sealant shall be carried approximately 25 mm [1.0 in.] onto the adjacent, intact coating.

9. Report

9.1 The report should include the following:

9.1.1 Description of the coating system, noting granules if present; number of base and topcoats and color of topcoat.

9.1.2 Minimum and average thickness of base and topcoats.

9.1.3 Location of core and slit samples on a roof plan.

9.1.4 Number of foam passes and average thickness of each pass.

9.1.5 Compressive strength and density of foam, if determined.

9.1.6 Comments on adhesion between sample components, foam layers, blisters, friable foam, and other visual defects.

9.1.7 Moisture content of foam if determined.

10. Keywords

10.1 coating thickness; core samples, roofing; polyurethane foam lifts; slit samples; sprayed polyurethane foam

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