~~Designation:D7425–08~~ Designation: D7425/D7425M – 11

Standard Specification for Spray Polyurethane Foam Used for Roofing Applications[1]

This standard is issued under the fixed designation D7425/D7425M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the types and physical properties of spray polyurethane foam (SPF) for use in SPF roofing applications.

1.2 This specification does not provide guidance for application.

~~1.3The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.~~

1.3 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.

1.4 *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]

C165 Test Method for Measuring Compressive Properties of Thermal Insulations

C168 Terminology Relating to Thermal Insulation

C177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

C518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

C1363 Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

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

D1623 Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics

D2126 Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging

D2842 Test Method for Water Absorption of Rigid Cellular Plastics

D6226 Test Method for Open Cell Content of Rigid Cellular Plastics

E96/E96M Test Methods for Water Vapor Transmission of Materials

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminologies D1079 and C168.

3.1.1 *knit line*—also called lift line. They are interchangeable terms describing the adhesion plane where one pass is sprayed over another.

4. Significance and Use

4.1 This specification covers spray polyurethane foam (SPF) that is used as part of a SPF roofing system.

---

[1] This specification is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.06 on Spray Polyurethane Foam Roof Systems.

~~Current edition approved April 1, 2008. Published May 2008. DOI: 10.1520/D7425-08.~~

Current edition approved Jan. 1, 2011. Published February 2011. Originally approved in 2008. Last previous edition approved in 2008 as D7425 – 08. DOI: 10.1520/D7425_D7425M-11.

[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.

5. Classification

5.1 This specification covers SPF currently commercially available as described by the physical property requirements in Table 1.

5.2 SPF shall be manufactured with HFC, hydrocarbon or/and water blowing agents. It is classified into two types as follows:

5.2.1 *Type I*—Thermal resistance, R value, is equal to or greater than 0.98 K·m^2/W ~~(5.6°F·ft^2·h/Btu) per 25.4 mm (1in.) thickness.~~ [5.6°F·ft^2·h/Btu] per 25.4 mm [1 in.] thickness.

5.2.2 *Type II*—Thermal resistance, R value, is between 0.72 and 0.98 K·m^2/W ~~(4.1~~[4.1 and 5.6°F·ft^2·h/Btu) per 25.4 mm (1in.) thickness.~~ ·h/Btu] per 25.4 mm [1 in.] thickness.

6. Ordering Information

6.1 Orders for materials purchased under this specification shall include the following:

6.1.1 ASTM designation, year of issue, and title.

6.1.2 Type (see 5.2).

6.1.3 Sampling, if different (see Section 9).

6.1.4 If packaging is other than specified (see 13.1).

6.1.5 If marking is other than specified (see 13.4).

7. Materials and Manufacture

7.1 SPF is produced by the catalyzed polymerization of polyisocyanates in the presence of polyhydroxyl compounds, with the addition of other compounds such as stabilizers and blowing agents.

7.2 The materials shall be capable of being mixed and applied using commercially available polyurethane spray equipment.

8. Physical Requirements

8.1 SPF used in roofing applications shall meet the minimum physical property values as shown in Table 1.

8.2 Other physical properties may be required, as agreed upon by the purchaser and the manufacturer.

9. Sampling

9.1 Sampling for inspection tests, if required, shall be for properties agreed upon between the manufacturer and the purchaser.

10. Test Specimen Preparation

10.1 Finished SPF test panels shall be made by spray application consistent with the manufacturer's recommendations including temperatures of the liquid components, ambient temperature, temperature and type of substrate, type and operation settings of spray equipment, and thickness of SPF per pass. Unless otherwise specified and reported, the ambient and substrate temperature shall be 24 ± 3ºC ~~(75~~[75 ± ~~5ºF)~~5ºF] and relative humidity must not exceed 80 %. The test panels shall be of a sufficient quantity and size to satisfy test requirements.

10.2 The test panels shall be allowed to cure for at least 72 h at 24 ± 3ºC ~~(75~~[75 ± ~~5ºF)~~5ºF] and 50 ± 5 % relative humidity before cutting or testing for additional physical properties.

TABLE 1 Physical Properties~~y~~

Property	~~Requirements~~ Type I	Type II
Property	Units	Requirements
~~Thermal resistance of 25 mm (1.0 in.) thickness, aged at mean temperature 24°C [75°F] and 180 days~~	~~K·m^2/W (°F·ft^2·h/Btu) at mean temperature 24°C (75°F), 180 days~~	~~0.98 (5.6) min~~~~0.72 to 0.98 (4.1 to 5.6)~~
Thermal resistance of 25 mm [1.0 in.] thickness aged at mean temperature 24°C [75°F] and 180 days	K·m^2/W [°F·ft^2·h/Btu]	0.98 [5.6], min
~~Compressive strength, min, KPa (psi) at yield or 10 % deformation~~	~~276 (40)~~	~~276 (40)~~
Compressive strength, at yield or 10 % deformation	KPa [psi]	276 [40], min
~~Density, min,~~	~~Kg/m^3 (lb/ft^3)~~	~~40 (2.5)~~ ~~40 (2.5)~~
Density	Kg/m^3 [lb/ft^3]	40 [2.5~~)~~ ~~40 (2.5)~~], r
~~Water absorption, max, volume %~~	~~5~~	~~5~~
Water absorption	volume %	5, max
~~Tensile strength, min, KPa (psi)~~	~~276 (40)~~	~~276 (40)~~
Tensile strength	KPa [psi]	276 [40], min
~~Dimensional stability, max, linear change %, 70°C, 97 % RH, 2 weeks~~	~~+6~~	~~+6~~
Dimensional stability, 70°C, 97 % RH, 2 weeks	linear change %	+6, max
~~Closed cell content, min, %~~	~~90~~	~~50~~
Closed cell content	%	90, min
~~Water vapor permeability, max, ng/Pa·s·(perm in.)~~	~~4.47 (3.02)~~	~~4.47 (3.02)~~
Water vapor permeability	ng/Pa·s·[perm-in.]	4.47 [3.02], max