



Designation: D4811/D4811M – 16 (Reapproved 2023)

Standard Specification for Nonvulcanized (Uncured) Rubber Sheet Used as Roof Flashing¹

This standard is issued under the fixed designation D4811/D4811M; 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 nonvulcanized (uncured) rubber sheet made of EPDM (ethylene-propylene-diene terpolymer) or CR (polychloroprene) intended for use as watertight roof flashing exposed to the weather.

1.2 The tests and property limits used to characterize these flashing materials are specific for each classification and are minimum values to make the product fit for its intended purpose.

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 nonconformance with the standard.

1.4 In-place roof system design criteria, such as fire resistance, field seaming strength, material compatibility, and uplift resistance, among others, are beyond the scope of this specification.

1.5 The following precautionary caveat pertains to the test methods portion only, Section 8, of this specification: *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This specification is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.18 on Nonbituminous Organic Roof Coverings.

Current edition approved Jan. 1, 2023. Published January 2023. Originally approved in 1990. Last previous edition approved in 2016 as D4811/D4811M – 16. DOI: 10.1520/D4811_D4811M-16R23.

2. Referenced Documents

2.1 ASTM Standards:²

- D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
- D471 Test Method for Rubber Property—Effect of Liquids
- D518 Test Method for Rubber Deterioration—Surface Cracking (Withdrawn 2007)³
- D573 Test Method for Rubber—Deterioration in an Air Oven
- D624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
- D1079 Terminology Relating to Roofing and Waterproofing
- D1149 Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment
- D1204 Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheet or Film at Elevated Temperature
- D1418 Practice for Rubber and Rubber Latices—Nomenclature
- D2137 Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics
- D3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets
- G151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources
- G154 Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials
- G155 Practice for Operating Xenon Arc Lamp Apparatus for Exposure of Materials

3. Classification

3.1 The following types are used to identify the principal polymer components of the flashing material (see Note 1):

3.1.1 *Type I*—Ethylene-Propylene-Diene Terpolymer (EPDM).

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.

³ The last approved version of this historical standard is referenced on www.astm.org.

3.1.2 Type II—Chloroprene Polymer (CR).

NOTE 1—For definitions of polymer types, see Practice D1418. For definitions of terms related to roofing, see Terminology D1079.

3.2 The following classes describe the ability to vulcanize on the roof:

3.2.1 Class V—Vulcanizing.

3.2.2 Class NV—Nonvulcanizing.

NOTE 2—Class V compounds continue to vulcanize (that is, cure) after emplacement on the roof. Class NV indicates non-vulcanizable compounds.

4. Materials and Manufacture

4.1 The flashing material shall be formulated from the appropriate polymer type and other compounding ingredients. The principal polymer in the flashing material shall be one of those listed in 3.1 and greater than 95 % of the total polymer.

4.2 The flashing material shall be capable of being bonded to itself, to the roofing membrane, and to substrate for making watertight field splices and repairs. The manufacturer or fabricator shall recommend suitable bonding methods and materials.

5. Physical Property Requirements

5.1 Class V flashing material shall conform to the physical property requirements prescribed in Tables 1 and 2. Class NV flashing material shall conform to the physical property requirements prescribed in Table 1.

5.2 Other requirements shall be agreed upon between the purchaser and the supplier as part of the purchase contract.

6. Dimensions and Permissible Variations

6.1 The width and length shall be agreed upon between the purchaser and the supplier as part of the purchase contract.

6.1.1 The width and length tolerance shall be +3 % and –0 %.

TABLE 1 Property Requirements for Flashing Before Vulcanization

	Type I, Class V	Type I, Class NV	Type II, Class V
Thickness, min, mm [in.]	1.4 [0.055]	1.4 [0.055]	1.4 [0.055]
Green Strength Modulus 100 % at 23 °C [73 °F] kPa [psi]	172–1725 [25–250]	172–1725 [25–250]	172–517 [25–75]
Elongation (Ultimate), min, %	400	400	400
Modulus 100 % at 50 °C [122 °F] kPa [psi]	83 [12]	83 [12]	83 [12]
Elongation (Ultimate), min, %	200	200	200
Shelf Stability: Modulus 100 % at 23 °C [73 °F], max, kPa [psi]	1725 [250]	n/a	1725 [250]
Elongation, min, %	400	n/a	400
Vulcanizability: Tensile Strength, min, kPa [psi]	2800 [406]	n/a	2800 [406]
Elongation, min, %	400	n/a	400
Tensile Set: min, %	80	80	80
Dimensional Stability, max, %	±10	±10	±10
Weatherability, no cracks or crazing	pass	pass	pass

TABLE 2 Property Requirements for Flashing After Vulcanization

	Type I, Class V	Type II, Class V
Vulcanization, at 160 °C [320 °F], min	20 ± 2	20 ± 2
Tensile Strength, min, MPa [psi]	9.0 [1305]	8.3 [1205]
Elongation, min, %	300	250
Tear Resistance, min, kN/m [lb/in.]	22 [125]	22 [125]
Brittle Point, max, °C [°F]	–45 [–49] pass	–35 [–31] pass
Tensile Set, max, %	10	10
Ozone Resistance, (7×)	no cracks	no cracks
Heat Aging, Air Oven		
Tensile Strength, min, MPa [psi]	8.3 [1205]	8.3 [1205]
Elongation, min, %	200	200
Tear Resistance (Die C), kN/m [lb/in.], min	22 [125]	22 [125]
Water Absorption, weight change, range, %	+8, –2	+8, –2
Linear Dimension Change, max, %	±2	±2
Weatherability, no cracks or crazing	pass	pass

6.2 Sheet thicknesses greater than minimum shall be agreed upon between the purchaser and the supplier as part of the purchase contract.

6.2.1 The thickness tolerance shall be +15 % and –10 % of the specified thickness, but in no case shall the thickness be less than the minimum listed in Table 1.

7. Workmanship, Finish, and Appearance

7.1 The flashing material shall be visually free of pinholes, particles of foreign matter, undispersed raw materials, or other manufacturing defects that might affect serviceability.

7.2 If the number of irregularities appear excessive on a sheet (or portion thereof), then its rejection should be negotiated between involved parties.

7.3 Edges of the sheet shall be capable of being seamed to one another and to other roofing components without fish-mouthing.

8. Test Methods

8.1 *Thickness*—Test Methods D412.

8.2 *Green Strength*:

8.2.1 Test a fresh sample manufactured within one week.

8.2.2 Condition Type I material at 23 ± 2 °C [73 ± 4 °F] for a minimum of 1 h and a maximum of 8 h before proceeding with the testing.

8.2.3 Decrystallize Type II material by placing in a circulating air oven at 70 ± 2 °C [158 ± 4 °F] for 15 min. After removal from the oven, condition at 23 ± 2 °C [73 ± 4 °F] for a minimum of 1 h and a maximum of 8 h before proceeding with the testing.

8.2.4 After conditioning, die out a 13 mm [0.5 in.] dumbbell (Die A) and determine the modulus at 100 % extension and the ultimate elongation at 23 ± 2 °C [73 ± 4 °F] in accordance with Test Methods D412.

8.2.5 After conditioning, die out a 13 mm [0.5 in.] dumbbell (Die A), condition in a circulating air oven at 50 ± 2 °C [122 ± 4 °F] for 15 min minimum and 30 min maximum, and determine the modulus at 100 % extension and the ultimate elongation at 50 ± 2 °C [122 ± 4 °F] in accordance with Test Methods D412.

8.3 *Shelf Stability*—Determine green strength in accordance with 8.2 after aging in a circulating air oven for 46 h at 70 ± 2 °C [158 ± 4 °F].

8.4 *Vulcanizability*:

8.4.1 For Type I and Type II, oven age for 166 h at 70 ± 2 °C [158 ± 4 °F].

8.4.2 After removal from the oven, condition the samples at 23 ± 2 °C [73 ± 4 °F] for a minimum of 1 h and a maximum of 8 h before proceeding with testing.

8.4.3 Test for ultimate tensile and elongation in accordance with Test Methods D412 using a 13 mm [0.5 in.] dumbbell (Die A).

8.5 *Tensile Set* (see Test Methods D412):

8.5.1 Decrystallize Type II material in accordance with 8.2.3.

8.5.2 Hold for 10 min at 23 ± 2 °C [73 ± 4 °F] and 200 % elongation for Table 1.

8.5.3 Hold for 10 min at 23 ± 2 °C [73 ± 4 °F] and 50 % elongation for Table 2.

8.6 *Dimensional Stability* (see Test Method D1204):

8.6.1 Obtain a flat specimen of 150 by 150 mm [6 by 6 in.] and age in an air circulating oven at 100 ± 2 °C [212 ± 4 °F] for 1 h. Cool to 23 ± 2 °C [73 ± 4 °F] for 1 h and measure the side of the specimen in both directions.

8.7 *Vulcanization*—Practice D3182.

8.8 *Tensile Strength*—Test Methods D412, Die C.

8.9 *Ultimate Elongation*—Test Methods D412, Die C.

8.10 *Tear Resistance*—Test Method D624, Die C.

8.11 *Brittle Point*—Test Methods D2137.

8.12 *Ozone Resistance*—Test Method D1149.

8.12.1 *Type I Material*—Test at 50 % extension, 100 MPa, 166 h at 40 ± 2 °C [104 ± 4 °F].

8.12.2 *Type II Material*—Test at 20 % extension, 100 MPa, 100 h at 40 ± 2 °C [104 ± 4 °F].

8.13 *Heat Aging* (see Test Method D573):

8.13.1 *Type I Material*—Age 670 h at 115 ± 2 °C [240 ± 4 °F].

8.13.2 *Type II Material*—Age 70 ± 0.7 h at 100 ± 2 °C [212 ± 4 °F].

8.14 *Water Absorption* (see Test Method D471):

8.14.1 *Type I Material*—Age vulcanized specimen in water for 166 h at 70 ± 2 °C [158 ± 4 °F].

8.14.2 *Type II Material*—Age vulcanized specimen in water for 46 h at 70 ± 2 °C [158 ± 4 °F].

8.15 *Linear Dimensional Changes* (see Test Method D1204):

8.15.1 *Type I Material*—Age 670 h at 115 ± 2 °C [239 ± 4 °F].

8.15.2 *Type II Material*—Age 70 h at 100 ± 2 °C [212 ± 4 °F].

8.16 *Weather Resistance*—The two different types of exposures may produce different test results. Therefore, they cannot be used interchangeably without supporting data that demonstrates equivalency of the procedures for the materials tested.

Choice of apparatus and exposure conditions selected shall be by mutual agreement among the interested parties.

8.16.1 *Xenon Arc Light Exposure Apparatus Operation Conditions* (see Practices G155 and G151):

Filter Type	Daylight filter
Irradiance	0.35 to 0.70 W/(m ² ·nm) at 340 nm. The maximum allowable operational fluctuation of the irradiance setting is ±0.02 W/(m ² ·nm). (42 to 84 W/m ² at 300 to 400 nm. The maximum allowable operational fluctuation of the irradiance setting is ±2.5 W/m ² .)
Cycle	690 ± 15 min light, 30 min light, plus water spray on the front surface.
Uninsulated Black Panel Temperature	80 °C [176 °F] during the dry period. The maximum allowable operational fluctuation is ±2.5 °C [±5 °F].
Relative Humidity	50 %. The maximum allowable operational fluctuation is ±5 %.
Chamber Air Temperature (where applicable)	50 °C. The maximum allowable operational fluctuation is ±2 °C.
Spray Water	Refer to Practice G155, Section 6.6.1. Typical water temperature used for specimen spray is 21 ± 5 °C, but if ambient temperature is low and a holding tank is not used to store purified water, the water temperature can be below the typical range.

Recommended specimen size is 75 mm [2.75 in.] wide by 200 mm [8.0 in.] long.

Specimen Repositioning Refer to Practice G155, Section 9.5. Every 315 KJ/(m²·nm) at 340 nm (37.8 MJ/m² at 300 to 400 nm.) See Note 3.

Radiant Exposure 5040 KJ/(m²·nm) at 340 nm (604.8 MJ/m² at 300 to 400 nm.) See Note 4.

NOTE 3—Repositioning ranging from every 250 h at 0.35 W/(m²·nm) at 340 nm to 125 h at 0.70 W/(m²·nm) at 340 nm.

NOTE 4—The duration in terms of time ranges from 2000 h at 0.70 W/(m²·nm) at 340 nm to 4000 h at 0.35 W/(m²·nm) at 340 nm.

8.16.2 *UV/Condensation Exposure Apparatus Conditions Fluorescent UVA 340* (See Practices G154 and G151):

Lamp Type: (Fluorescent UVA 340 with irradiance of 0.89 W/(m²·nm) at 340 nm. The maximum allowable operational fluctuation of the irradiance setting is ±0.02 W/(m²·nm).

Test Cycle: 8 h UV at 80 °C [176 °F], 4 h condensation at 50 °C [122 °F] (uninsulated black panel temperatures). The maximum allowable operational fluctuation is ±2.5 °C [±5 °F].

Exposure Duration: 4000 h

NOTE 5—The fluorescent UVB 313 lamps had previously been the radiation source used for fluorescent UV exposure, but because it can produce unrealistic test results, it has been replaced by the fluorescent UVA 340 lamps in most ASTM standards. The fluorescent UVB 313 lamps can be used for comparisons with historic data, if necessary.

NOTE 6—If the operational fluctuations in 8.16.1 and 8.16.2 are greater than the maximum allowable after the equipment has stabilized, discontinue the test and correct the cause of the problem before continuing.

8.16.3 The specimens for exposure shall be mounted under no strain. After exposure, remove the specimens and inspect