



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 non-conformance 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 may involve hazardous materials, operations, and equipment. This standard does not purport to address the safety concerns 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

D412 Test Methods for Vulcanized Rubber and Thermoplastic

tic 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D518 Test Method for Rubber Deterioration—Surface Cracking (Withdrawn 2007)³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 Light Apparatus for Exposure of Non-Metallic 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).

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.

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 Aug. 1, 2016. Published August 2016. Originally approved in 1990. Last previous edition approved in 2013 as D4811/D4811M – 06 (2013)^{ε1}. DOI: 10.1520/D4811_D4811M-16.

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.



3.2.2 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 Table 1 and Table 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 %.

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.

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

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.] dumb-bell (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.] dumb-bell (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 after 8.2 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 $23 \pm 2^\circ\text{C}$ [$73 \pm 4^\circ\text{F}$] 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 $23 \pm 2^\circ\text{C}$ [$73 \pm 4^\circ\text{F}$] and 200 % elongation for **Table 1**.

8.5.3 Hold for 10 min at $23 \pm 2^\circ\text{C}$ [$73 \pm 4^\circ\text{F}$] 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 $100 \pm 2^\circ\text{C}$ [$212 \pm 4^\circ\text{F}$] for 1 h. Cool to $23 \pm 2^\circ\text{C}$ [$73 \pm 4^\circ\text{F}$] 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 $40 \pm 2^\circ\text{C}$ [$104 \pm 4^\circ\text{F}$].

8.12.2 *Type II Material*—Test at 20 % extension, 100 MPa, 100 h at $40 \pm 2^\circ\text{C}$ [$104 \pm 4^\circ\text{F}$].

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

8.13.1 *Type I Material*—Age 670 h at $115 \pm 2^\circ\text{C}$ [$240 \pm 4^\circ\text{F}$].

8.13.2 *Type II Material*—Age 70 ± 0.7 h at $100 \pm 2^\circ\text{C}$ [$212 \pm 4^\circ\text{F}$].

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

8.14.1 *Type I Material*—Age vulcanized specimen in water for 166 h at $70 \pm 2^\circ\text{C}$ [$158 \pm 4^\circ\text{F}$].

8.14.2 *Type II Material*—Age vulcanized specimen in water for 46 h at $70 \pm 2^\circ\text{C}$ [$158 \pm 4^\circ\text{F}$].

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

8.15.1 *Type I Material*—Age 670 h at $115 \pm 2^\circ\text{C}$ [$239 \pm 4^\circ\text{F}$].

8.15.2 *Type II Material*—Age 70 h at $100 \pm 2^\circ\text{C}$ [$212 \pm 4^\circ\text{F}$].

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 \pm 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 $\pm 2.5^\circ\text{C}$ [$\pm 5^\circ\text{F}$].
Relative Humidity	50 %. The maximum allowable operational fluctuation is ± 5 %.
Chamber Air Temperature (where applicable)	50°C. The maximum allowable operational fluctuation is $\pm 2^\circ\text{C}$.
Spray Water	Refer to Practice G155 , Section 6.6.1. Typical water temperature used for specimen spray is $21 \pm 5^\circ\text{C}$, 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/(m ² ·nm) at 340 nm (37.8 MJ/m ² at 300 to 400 nm.) See Note 3 .
Radiant Exposure	5040 KJ/(m ² ·nm) at 340 nm (604.8 MJ/m ² 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/(m ² ·nm) at 340 nm. The maximum allowable operational fluctuation of the irradiance setting is ±0.02 W/(m ² · 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 immediately. Strain specimens 10 % in the bent loop configuration in accordance with Test Method **D518** and visually inspect for cracks and crazing under 7× magnification. A specimen is rated PASS if no cracks or crazing are observed.

9. Inspection

9.1 Inspection of the material shall be agreed upon between the involved parties.

9.2 The purchaser shall, in the contract, order special tests which the supplier shall be required to make beyond those in Section 8.

10. Rejection and Rehearing

10.1 Failure to conform to any of the requirements prescribed in this specification shall constitute grounds for rejection. Rejection shall be reported to the producer or supplier promptly and in writing. The seller shall then have the right to reinspect the rejected shipment material and resubmit the lot after removal of those packages not conforming to the specified requirements.

11. Certification

11.1 Upon request of the purchaser, a manufacturer's certification that the material was manufactured in accordance with the requirements outlined in this specification, together with a report of test results, will be provided.

12. Packaging and Package Marking

12.1 The material shall be wound on a release liner, rolled on a substantial core, and packaged in a standard commercial manner unless otherwise specified so as to be acceptable by commercial or other carriers for safe transportation to the point of delivery.

12.2 Shipping containers shall be marked with:

- 12.2.1 The name of the material,
- 12.2.2 Product code,
- 12.2.3 ASTM number and type,
- 12.2.4 Size or quantity, and
- 12.2.5 Name of manufacturer or supplier.

13. Keywords

13.1 chloroprene; EPDM; flashing; nonvulcanized; roofing; vulcanized

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: (978) 646-2600; <http://www.copyright.com/>