



Designation: C 1483 – 00

## Standard Specification for Exterior Solar Radiation Control Coatings on Buildings<sup>1</sup>

This standard is issued under the fixed designation C 1483; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 1. Scope

1.1 The purpose of this specification is to provide general requirements for products used to reduce thermal loads on buildings by reflecting solar radiation from roofs and walls. Radiation control coating (RCC) is a liquid applied coating having a solar reflectance of 0.8 and an ambient temperature total hemispherical emittance of at least .08.

1.2 This specification covers the physical and mechanical properties of liquid-applied radiation control coatings (RCCs) designed for exterior application on buildings or other structures, where ambient air temperatures range from -34 to 54°C (-30 to 130°F). The specification also includes the testing procedures by which the acceptability of the material may be determined.

1.3 The products that comply with this specification may be used for other applications and have other properties not covered by this specification. In such cases, it is advisable to check other specifications that address the applications of interest.

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:

- C 168 Terminology Relating to Thermal Insulation Materials<sup>2</sup>
- C 419 Practice for Making and Curing Test Specimens of Mastic Thermal Insulation Coatings<sup>2</sup>
- C 461 Test Methods for Mastics and Coatings Used With Thermal Insulation<sup>2</sup>
- C 1371 Test Method for Determination of Emittance of Materials Near Room Temperatures Using Portable Emismeters<sup>2</sup>
- D 471 Test Method for Rubber Property—Effect of Liquids<sup>3</sup>

- D 903 Test Method for Peel or Stripping Strength of Adhesive Bonds<sup>4</sup>
- D 2370 Test Method for Tensile Properties of Organic Coatings<sup>5</sup>
- D 2697 Test Method for Volume of Nonvolatile Matter in Clear or Pigmented Coatings<sup>5</sup>
- D 3274 Method for Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation<sup>5</sup>
- E 84 Test Method for Surface Burning Characteristics of Building Materials<sup>6</sup>
- E 96 Test Methods for Water Vapor Transmission of Materials<sup>6</sup>
- E 903 Test Method for Solar Absorptance, Reflectance and Transmission of Materials Using Integrating Spheres<sup>7</sup>
- E 1175 Test Method for Determining Solar and Photopic Reflectance, Transmittance and Absorptance of Materials Using Large Diameter Integrating Spheres<sup>7</sup>
- G 26 Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials<sup>8</sup>

### 3. Terminology

3.1 *Definitions*—Terminology C 168 shall apply to this specification.

#### 3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *radiation control coating (RCC), n*— a radiation control coating is a material that is designed to have a high solar reflectance (above 0.8) and a high hemispherical emittance (above .08) for long wavelength radiation.

3.2.2 *solar reflectance, n*—solar reflectance is the fraction of incident solar radiation that is reflected.

### 4. Significance and Use

4.1 It is recognized that the solar reflectance of RCCs may be reduced by accumulations of dirt, dust, and other surface contaminants and that the characteristics of such dirt accumulations can vary for different locations. At this time there is no data to predict the effects of such accumulations, nor have any

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.06.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 09.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 15.06.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 06.01.

<sup>6</sup> *Annual Book of ASTM Standards*, Vol 04.07.

<sup>7</sup> *Annual Book of ASTM Standards*, Vol 12.02.

<sup>8</sup> *Annual Book of ASTM Standards*, Vol 14.04.

test procedures been developed to evaluate the ability of different RCCs to be cleaned for restoration of the solar reflectance values. It is suggested that users consider the potential for surface contaminations at their application site, and as necessary, evaluate the “cleanability” of the RCC product and use cleaning methods recommended by the manufacturer.

## 5. Materials and Manufacture

5.1 *Composition*—The manufactured product shall be in liquid form, suitable for application to exterior surfaces by brushing, rolling, or spraying. The product shall be a elastomeric or resinous material, to which various pigments, diluents, and other additives have been added to give the desired properties.

## 6. Physical and Mechanical Properties

6.1 *Total Solids*—The total solids of the liquid product shall not be less than 25 %, by weight, and shall be determined in accordance with 8.1.

6.2 *Solids Volume*—The total solids in the liquid product shall not be less than 25 %, by volume, as determined in accordance with 8.2.

6.3 *Solar Reflectance*—The solar reflectance of the cured coating shall be determined in accordance with 8.3. The solar reflectance of the cured coating shall be no less than 0.8.

6.4 *Total Hemispherical Emittance*— Total hemispherical emittance, at ambient temperature, shall be determined in accordance with 8.4. The ambient temperature emittance of the cured coating shall be no less than 0.8.

6.5 *Elongation*—The elongation of the cured coating shall be determined in accordance with 8.5.

6.5.1 The elongation of the cured coating shall be greater than 200 % and 100 % at testing temperatures of 25 and -18°C (77 and 0°F) respectively.

6.5.2 The elongation of the coating after UV exposure shall not be less than 80 % of the values obtained at 25 and -18°C (77 and 0°F) on the cured coating.

6.6 *Adhesion*—The adhesion of the coating shall be determined in accordance with 8.6. The adhesion of the cured coating shall be reported for each of the substrates tested.

6.7 *Water Vapor Permeance*—The water vapor permeance of the cured coating shall be determined in accordance with 8.7. The water vapor permeance values shall be reported for the thickness tested but in no case shall be greater than 20 perms.

6.8 *Flame Retardancy*—The flame retardancy of the cured coating shall be determined in accordance with 8.8 and shall be tested on a substrate typical of final installation. Flame spread and smoke development shall be no greater than that required by local code requirement.

6.9 *Fungi Resistance*—The fungi resistance of the cured coating shall be determined and found acceptable in accordance with 8.9.

6.10 *Water Absorption*—Water absorption of the cured coating shall be determined in accordance with 8.10.

6.11 *Cured Sample Thickness*—The cured sample thickness shall be determined in accordance with 8.11.

6.12 *Outdoor Durability*—The outdoor durability shall be determined in accordance with 8.12.

## 7. Sample Preparation

7.1 *Sampling*—Samples for testing shall be taken from the original containers immediately after stirring the material to a uniform condition.

7.2 *Cured Sample Preparation*—For tests to be performed on specimen of cured (dry) product, the thickness of the specimen will be no less than the manufacturer’s recommended cured coating thickness. The cured coating specimen shall be prepared on a substrate suitable for the intended test. Example of these substrates are metal, stucco or black asphalt.

7.3 Cured values shall be determined in accordance with 8.11.

## 8. Test Methods

8.1 *Total Solids (by Weight)*—Determine the total solids of the wet product in accordance with Test Methods C 461, Section 8.

8.2 *Solids Volume*—Determine the solids volume of the wet product in accordance with Test Method D 2697.

8.3 *Solar Reflectance*—The solar reflectance shall be determined on samples in the cured condition placed on low solar reflectance substrates in accordance with either Test Method E 903 or E 1175. This may be done with a solar reflectometer.

8.4 *Total Hemispherical Emittance*— Total hemispherical emittance, at ambient temperature, shall be determined on cured samples placed on low emittance substrates in accordance with Test Method C 1371.

8.5 *Elongation*—Elongation tests shall be performed on cured samples before and after 3000-h exposure to ultraviolet (UV) radiation in accordance with Test Method D 2370 and Practice G 26 (without water).

8.6 *Adhesion*—Adhesion tests shall be performed on cured samples in accordance with Test Method D 903.

8.7 *Water Vapor Permeance*—Determine the water vapor permeance on cured samples in accordance with Test Methods E 96, desiccant method.

8.8 *Flammability*—Determine the flammability of cured samples in accordance with Test Method E 84.

8.9 *Fungi Resistance*—Determine the fungi resistance of the cured material in accordance with Test Method D 3274.

8.10 *Water Absorption*—Determine the water absorption of the cured product in accordance with Test Method D 471.

8.11 *Cured Samples Thickness*—Determine cured sample thickness in accordance with Practice C 419.

8.12 *Outdoor Durability*—Determine the outdoor durability in accordance with Practice G 26.

## 9. Inspection and Rejection

9.1 Inspection and rejection of material shall be agreed upon between the purchaser and the seller as part of the purchase contract.

## 10. Packaging and Package Marking

10.1 *Packaging*—Unless otherwise agreed or specified, materials shall be packaged in the manufacturers standard commercial containers.

10.2 *Marking*—The marking shall be clear and legible. Unless otherwise specified, each container shall be marked

with the date of manufacture, material name, ASTM designation, manufacturer's name or trademark, and coverage of material in container.

## 11. Keywords

11.1 emittance; radiation control coating; solar reflectance; solids volume; total solids

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