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Standard Specification for Interior Radiation Control Coating (IRCC) for Building Applications[1]

This standard is issued under the fixed designation C1841; 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 classification, composition, and physical properties of an Interior Radiation Control Coating (IRCC) for use in building applications to reduce radiant heat transfer. The IRCC is sprayed, roller applied, or brushed onto interior building surfaces.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C168 Terminology Relating to Thermal Insulation
C1186 Specification for Flat Fiber-Cement Sheets
C1321 Practice for Installation and Use of Interior Radiation Control Coating Systems (IRCCS) in Building Construction
C1371 Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
C1396 Specification for Gypsum Board
D16 Terminology for Paint, Related Coatings, Materials, and Applications
D1653 Test Methods for Water Vapor Transmission of Organic Coating Films
D3273 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
D3274 Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation
D3925 Practice for Sampling Liquid Paints and Related Pigmented Coatings
D4708 Practice for Preparation of Uniform Free Films of Organic Coatings
E84 Test Method for Surface Burning Characteristics of Building Materials
E96 Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials

[1] This specification is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.21 on Reflective Insulation.

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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.

2.2 *CSA Standard:*[3]
CSA O121 Douglas Fir Plywood
2.3 *NIST Standard:*[4]
Voluntary Product Standard PS 1-07 Structural Plywood

3. Terminology

3.1 Refer to the Terminology C168 for definitions of general terms related to thermal insulation used in this specification.

3.2 Refer to the Terminology D16 for definitions of general terms for paint, related coatings, materials, and applications used in this specification.

3.3 *Definitions of Terms Specific to This Standard:*

3.3.1 *interior radiation control coating (IRCC), n*—a low-emittance liquid applied material, adjacent to an air space within a structure.

3.3.2 *premixed coating, n*—a liquid product that requires all ingredients be combined and blended during manufacture and require only stirring before application.

3.3.3 *field mixed coating, n*—a liquid product that requires two or more components be combined in the field before application.

3.3.4 *film (as related to IRCC coatings), n*—a dried coat of an IRCC.

3.3.5 *binder, n*—the coating ingredient that holds the particles together.

4. Classification

4.1 *Type 1*—emittance less than or equal to 0.15.

4.2 *Type 2*—emittance greater than 0.15 and less than or equal to 0.25.

5. Ordering Information

5.1 Material order shall specify premixed coating or field mixed coating.

5.2 Material order shall specify Type 1 or Type 2.

6. Materials and Manufacture

6.1 *Composition*—The manufactured product shall be in liquid form, suitable for application to interior surfaces by spraying, roller applying, or brushing. The product shall use suitable binders, to which various pigments, dilutants, and other additives have been combined to give the desired properties.

6.2 *Product Testing*—The IRCC shall be applied and tested per the manufacturer's recommended dry film coating thickness.

7. Physical Properties

7.1 *Emittance*—Shall be determined in accordance with 11.1 and meet the relevant performance requirements from Table 1.

7.2 *Water Vapor Permeance*—Shall be determined in accordance with 11.2 and meet the relevant performance requirements from Table 1.

[3] Available from Canadian Standards Association (CSA), 178 Rexdale Blvd., Toronto, ON M9W 1R3, Canada, http://www.csagroup.org.
[4] Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, http://www.nist.gov.

TABLE 1 Physical Property Requirements for Interior Radiation Control Coating Films

Property	Value
Emittance	Type 1 less than or equal to 0.15. Type 2 greater than 0.15 and less than or equal to 0.25
Water Vapor Permeance	Shall be greater than 10 perms (5.72×10^{-7} gram/Pa·s·m^2)
Surface Burning Characteristics	The surface burning characteristics class rating of an IRCC system, as coated on a specific substrate, shall be reported and its class rating shall not degrade the class rating of the substrate. See Table 2 for surface burning characteristics class ratings.
Mold Resistance	Report the results for the coated and uncoated substrate using the rating scale in Test Method D3274.

TABLE 2 Surface Burning Characteristic Class Ratings

Class	Value
A	Flame spread index 25 or less Smoke developed index 450 or less
B	Flame spread index 26 to 75 Smoke developed index 450 or less
C	Flame spread index 76 to 200 Smoke developed index 450 or less

7.3 *Surface Burning Characteristics*—The surface burning characteristics of the cured coating shall be determined in accordance with 11.3 and shall comply with the relevant performance requirements from Table 1.

7.4 *Mold Resistance*—Shall be determined in accordance with 11.4. Report the mold resistance for the coated and uncoated substrate and meet the relevant performance requirements from Table 1.

8. Workmanship, Finish, and Appearance

8.1 An IRCC shall be manufactured, packaged and shipped in such a manner that, when received by the customer, they are suitable for installation or field mixing in accordance with Practice C1321.

9. Significance and Use – Applications

9.1 This specification recognizes that the effectiveness of an IRCC is dependent on proper installation. Practice C1321 addresses the use and installation of an IRCC.

9.2 Table 1 in this specification identifies the important film properties for IRCC products.

9.3 When specific material properties are required for a particular application the user shall consult the manufacturer.

9.4 A key component of the effectiveness of an IRCC is the maintenance of the surface emittance. Contamination of surfaces generally impacts the surface emittance and the effectiveness of the coating. Contamination can be soot, organic material, dirt, fly ash or similar material in the environment.

10. Sampling

10.1 Sampling shall be performed in accordance with Practice D3925.

11. Test Methods

11.1 *Emittance*—The surface emittance of the product shall be tested in accordance with Test Method C1371.

11.2 *Water Vapor Permeance*—Utilize either 11.2.1 or 11.2.2.

11.2.1 *Release Substrate*—Prepare free films in accordance with Practice D4708. The permeance of the free film IRCC product shall be tested in accordance with either: Test Method E96 Test Method A (Dry Cup/Desiccant) or Test Method D1653 Test Method A (Dry Cup/Desiccant).

11.2.2 *Film Support*—Prepare films utilizing a high permeance film support substrate if no free film of the IRCC product can be created. The permeance of the film support IRCC product shall be tested in accordance with Test Method D1653 Test Method A (Dry Cup/Desiccant). Recommended support materials can be found in Test Method D1653 Section 7.5. Tests shall be run on the film support with and without the IRCC product to determine the net effect of the IRCC product.

11.3 *Surface Burning Characteristics*—Determine in accordance with Test Method E84. The IRCC shall be applied and tested per the manufacturer's recommended dry film coating thickness.

11.3.1 If the IRCC is intended to be applied over a wood substrate, the test specimens shall consist of the IRCC mounted on the "A" face of nominal 15⁄32 in. untreated plywood with a face veneer of Douglas fir. The plywood shall comply with NIST Voluntary Product Standard PS 1-07. The plywood shall carry the grade stamp of either APA-The Engineered Wood Association or TECO, indicating that the plywood has been graded PS 1-07 A-C and is for exterior exposure. Alternatively, the plywood shall be permitted to be stamped as conforming to CSA O121.

11.3.2 If the IRCC is intended to be applied over gypsum board, the test specimens shall consist of the IRCC mounted on a 5⁄8 in. (15.9 mm) thick Type X gypsum board, complying with Specification C1396. The gypsum board shall not be required to be mounted on studs.

11.3.3 If the IRCC is intended to be applied directly to a noncombustible wall or ceiling surface, the test specimens shall consist of the IRCC mounted on a ¼ in. (6.3 mm) thick fiber-cement board, complying with Specification C1186 (Grade II) and the requirements contained in the Annex on Fiber-Cement Board Requirements of Test Method E84.

11.3.4 If the IRCC is intended to be applied over a substrate other than wood, gypsum board, or a noncombustible substrate, the test specimens shall consist of the IRCC mounted on the substrate to be used in field practice.

11.4 *Mold Resistance*—Test in accordance with Test Method D3273 and determine the surface disfigurement in accordance with Test Method D3274.

11.5 *Reporting Requirements:*

11.5.1 Description of the material being tested, include:

11.5.1.1 Composition or generic identification, and

11.5.1.2 Coating type (premixed or field mixed).

11.5.2 Report test results as determined in 11.1 for Emittance and include:

11.5.2.1 Substrate tested, and

11.5.2.2 Dry film coating thickness.

11.5.3 Report test results as determined in 11.2 for Water Vapor Permeance, including the relevant performance requirements from Table 1 and include:

11.5.3.1 Substrate tested, and

11.5.3.2 Dry film coating thickness.