Designation: E 2240 – 02

Standard Test Method for Assessing the Current-Voltage Cycling Stability at 90°C (194°F) of Absorptive Electrochromic Coatings on Sealed Insulating Glass Units[1]

This standard is issued under the fixed designation E 2240; 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 The test described is a method for the accelerated aging and monitoring of the time-dependent performance of electrochromic windows (ECW). Cross sections of typical electrochromic windows have three to five-layers of coatings that include one to three active layers sandwiched between two transparent conducting electrodes (TCEs, see Section 3). Examples of the cross-sectional arrangements can be found in "Evaluation Criteria and Test Methods for Electrochromic Windows."[2] (For acronyms used in this standard, see Appendix X1, section X1.1).

1.2 The test method is applicable only for layered (one or more active coatings between the TCEs) absorptive electrochromic coatings on sealed insulating glass (IG) units fabricated for vision glass (superstrate and substrate) areas for use in buildings, such as glass doors, windows, skylights, and exterior wall systems. The layers used for electrochromically changing the optical properties may be inorganic or organic materials between the superstrate and substrate.

1.3 The electrochromic coatings used in this test method will be subsequently exposed (see Test Methods E 2141) to solar radiation and deployed to control the amount of radiation by absorption and reflection and thus, limit the solar heat gain and amount of solar radiation that is transmitted into the building.

1.4 The test method is not applicable to other chromogenic devices, for example, photochromic and thermochromic devices.

1.5 The test method is not applicable to electrochromic windows that are constructed from superstrate or substrate materials other than glass.

1.6 The test method referenced herein is a laboratory test conducted under specified conditions. This test is intended to simulate and, possibly, to also accelerate actual in-service use of the electrochromic windows. Results from this test cannot be used to predict the performance with time of in-service units unless actual corresponding in-service tests have been conducted and appropriate analyses have been conducted to show how performance can be predicted from the accelerated aging tests.

1.7 The values stated in metric (SI) units are to be regarded as the standard.

1.8 *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:*

2.1.1 For additional useful standards related to this standard, see Appendix X1, section X1.2.

C 168 Terminology Relating to Building Materials[3]

C 1048 Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass[4]

C 1199 Test Method for Measuring the Steady State Thermal Transmittance of Fenestration Systems Using Hot Box Methods[3]

E 632 Practice to Aid Prediction of Service Life of Building Components and Materials[5]

E 903 Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres[6]

E 1423 Practice for Determining the Steady State Thermal Transmittance of Fenestration Systems[7]

E 2094 Practice for Evaluating the Service Lifetime of Chromogenic Glazings[8]

E 2141 Test Methods for Assessing the Durability of Absorptive Electrochromic Coatings on Sealed Insulating Glass Units[8]

[1] This test method is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.22 on Durability Performance of Building Constructions.

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[2] Czanderna, A. W., and Lampert, C. M., "Evaluation Criteria and Test Methods for Electrochromic Windows," SERI/PR-255-3537, July 1990, Golden, CO; Solar Energy Research Institute.

[3] *Annual Book of ASTM Standards*, Vol 04.06.

[4] *Annual Book of ASTM Standards*, Vol 15.02.

[5] *Annual Book of ASTM Standards*, Vol 14.04.

[6] *Annual Book of ASTM Standards*, Vol 12.02.

[7] *Annual Book of ASTM Standards*, Vol 04.11.

[8] *Annual Book of ASTM Standards*, Vol 04.12.

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