Designation: ~~D4350 – 13~~ D4350 – 15

Standard Test Method for Corrosivity Index of Plastics and Fillers[1]

This standard is issued under the fixed designation D4350; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This test method is designed for use in obtaining the specific conductance of a water extract of plastics and fillers. The magnitude of this ~~conductance may be taken as~~ conductance, called the corrosivity index, is an index of the likelihood that, in a humid atmosphere, metal surfaces in contact with these materials ~~may become~~can be corroded due to galvanic action or direct chemical ~~attack; this is called the corrosivity index.~~ attack.

NOTE 1—There is no known ISO equivalent to this standard.

1.2 The values stated in SI units are to be regarded as 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 and health practices and determine the applicability of regulatory limitations prior to use.* Specific precautionary statements are given in Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D618 Practice for Conditioning Plastics for Testing
D883 Terminology Relating to Plastics
D1193 Specification for Reagent Water
E1 Specification for ASTM Liquid-in-Glass Thermometers
E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves
E145 Specification for Gravity-Convection and Forced-Ventilation Ovens
E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method
E2251 Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

~~3. Summary of Test Method~~

~~3.1 Specimens of plastics or fillers are immersed in distilled water and exposed to specified conditions of temperature and time. The specific resistance of each of the solutions extracted from the test specimens is measured by using the specified conductivity cell. The specific conductance is calculated from the data and is called the corrosivity index of the material.~~

3. Terminology

3.1 *Definitions of Terms*—For definitions of terms used in this test method associated with plastics issues refer to the terminology contained in Terminology D883.

4. Significance and Use

4.1 This test method provides a means for comparing the corrosive potential of plastics and fillers in humid atmospheres.

4.2 This test method is intended for use in research and evaluation.

[1] This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.16 on Thermosetting Materials.
Current edition approved ~~Dec. 15, 2013~~June 1, 2015. Published ~~December 2013~~June 2015. Originally approved in 1984. Last previous edition approved in ~~2005~~2013 as ~~D4350 - 00 (2005).~~D4350 - 13. DOI: ~~10.1520/D4350-13.~~10.1520/D4350-15.

[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.

***A Summary of Changes section appears at the end of this standard**

5. Apparatus

5.1 *Conductance Bridge,* Wheatstone type, with a range from 1 to 250 000-Ω measured resistance, a built-in potentiometer, a 1000 ± 50-cycles per second oscillator, and a sensitive null point indicator. The bridge shall be capable of measuring resistance with an accuracy of ±2 %.

5.2 *Conductivity Cell,* dip-type, micro, for solutions of medium conductance. The cell ~~should~~ needs to have a cell constant of approximately 1.0 cm^{-1}. The borosilicate glass shall have a maximum outside tube diameter of 12.7 mm, overall length of 177.8 mm, chamber inside diameter of 9.5 mm, and chamber depth of 50.8 mm.[3]

5.3 *Drill,* electric, capable of holding a 10.54-mm drill bit, and rotating at 500-r/min maximum speed.

5.4 *Mill,* such as laboratory Wiley cutting mill or equivalent.

5.5 *Sieves,* standard (alternative) sieve designations 425 µm (No. 40), and 250 µm (No. 60) in accordance with Specification E11.

5.6 *Analytical Balance,* capable of determining mass to the nearest 1.0 mg.

5.7 *Oven,* forced-ventilation type, with uniformity of temperature within ±1 % of the differential between oven and ambient temperature, with a rate of ventilation of 100 to 200 air changes per hour, in accordance with Specification E145, Type IIA.

5.8 *Thermometer,* solid-stem, precision, ASTM No. 63C, in accordance with Specification E1. Temperature measuring devices with equivalent accuracy and characteristics, such as RTDs and thermistors, ~~may be used. In addition,~~ are permitted. Additionally, use of ASTM No. S63C in accordance with Specification ~~E2251~~ E2251 ~~may be used.~~ is acceptable.

5.9 *Chemical Glassware:*

5.9.1 *Borosilicate Glass Flask,* nominally 1000-mL size, with ground glass stopper.

5.9.2 *Borosilicate Glass Erlenmeyer Flask,* 65-mL actual capacity to bottom of stopper (nominally 50-mL size), with ground glass stopper No. 19.

5.9.3 *Pipet,* volumetric, 50-mL capacity, calibrated "to deliver."

6. Reagents and Materials

6.1 *Distilled Water,* Type III, reagent water as defined in Specification D1193. When stored in borosilicate glass bottles at 23 ± 2°C, the water shall have a calculated specific conductance of less than 2.0×10^{-6}, ohm^{-1}, cm^{-1}.

6.2 *Potassium Chloride Solution,* consisting of 0.7453 g of reagent grade potassium chloride, previously dried at 105 ± 3°C for at least 24 h, dissolved in 1000 g of distilled water. The solution shall be stored in a borosilicate glass stoppered bottle. The specific conductance of this 0.0100 Demal KCl solution is 0.0007736 ohm^{-1}, cm^{-1} at 0°C, 0.0012205 ohm^{-1}, cm^{-1} at 18°C, and 0.0014087 ohm^{-1}, cm^{-1} at 25°C.[4] This specific conductance versus temperature is plotted in Fig. 1.

6.3 *Grease,* silicone, not soluble in water nor containing any water-soluble constituents. In the control specimens, water exposed to the grease on the stopper shall have a specific conductance less than 7×10^{-6}, ohm^{-1}, cm^{-1}.

7. Safety Hazards

7.1 Some plastics and fillers are known to contain toxic components and special precautions are required in handling. ~~The manufacturer's~~ Diligently follow the manufacturer's precautionary instructions and sound laboratory safety ~~practices should be diligently followed.~~ practices.

8. Sampling

8.1 Because of the diverse nature of plastics and fillers, and the various forms and packages commercially available, no standard methods of sampling have been established. An adequate amount of material, representative of each ingredient, shall be selected from each lot to permit preparation of specimens as agreed upon between the buyer and the seller.

9. Specimen Preparation

9.1 *Plastics,* either prepared in accordance with the ~~manufacturer's~~ manufacturer's directions, or as received from the manufacturer, shall be drilled with a sharp drill at a rate not exceeding 27.5 mm/s (10.54-mm diameter drill at 500 r/min), and the drillings shall be ground in a mill. Care shall be exercised so as not to overheat the material when drilling or grinding, as overheating shall cause changes in the characteristics of the material. That fraction of ground plastics that passes a 425-µm sieve, but is retained by a 250-µm sieve, is used for the test.

---

[3] The sole source of supply of the conductivity cell (Model No. 3403) known to the committee at this time is Yellow Springs Instrument Co., Inc., P.O. Box 279, Yellow Springs, OH 45387. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.

[4] Specific conductance values are based on the work of Jones, G., and Bradshaw, B. C., *J. Amer. Chem. Soc.*, 55 (1933) 1780. For more detailed information on the use of Demal KCl, see" Electrolyte Solutions," by Robinson, R. A., and Stokes, R. H., Academic Press, Inc., New York, 1955, pp. 94–96.