



Standard Practice for Determination of Contamination in Recycled Poly(Ethylene Terephthalate) (PET) Flakes and Chips Using a Plaque Test¹

This standard is issued under the fixed designation D 5814; 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 practice covers an indication of the quality of recycled transparent poly(ethylene terephthalate) by examination of a wafer or plaque formed by melting a representative sample and quenching it to prevent crystallization.

1.2 Specific contaminants and impurities such as aluminum particles, dirt particles, paper, and fibers are identified in the transparent wafer.

1.3 The overall color of the plaque is indicative of oxidizable contaminants such as ethylene-vinyl acetate (EVA) glue residue and the number of bubbles present in the plaque gives an indication of the moisture content of the sample.

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.* Specific precautionary statements are given in Section 8.

NOTE 1—There is no equivalent ISO standard.

2. Referenced Documents

2.1 ASTM Standards:

D 1600 Terminology for Abbreviated Terms Relating to Plastics²

D 5033 Guide for the Development of Standards Relating to the Proper Use of Recycled Plastics²

E 380 Practice for Use of the International System of Units (SI)³

3. Terminology

3.1 *Definitions:* The terminology used in this practice is in accordance with Terminology D 1600 and Guide D 5033. Units and symbols are in accordance with Practice E 380.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *plaque*—a transparent wafer resulting from melting and rapid quenching of the polymer.

4. Summary of Test Method

4.1 Transparent poly(ethylene terephthalate) flakes are melted in an aluminum pan, then the molten sample is rapidly quenched in ice water to prevent crystallization. The resulting clear plaque is examined for color indicative of oxidizable contaminants, bubbles indicative of moisture, and solid contaminant particles.

5. Significance and Use

5.1 Presence of paper, metal, or incompatible polymer contamination in poly(ethylene terephthalate) renders the recycled polymer unfit for use in secondary product manufacturing operations. This procedure is useful for identifying different types of contamination in recycled PET flakes.

6. Apparatus

6.1 *Oven*, forced convection type capable of heating samples to 300°C.

6.2 *Tongs*, long arm.

6.3 *Stopwatch*, 0.1-s accuracy.

6.4 *Bucket*, 1 L, stainless steel.

6.5 *Aluminum Weighing Dishes*.⁴

6.6 *Thermally Insulated Gloves*.

7. Materials

7.1 *Virgin Poly(ethylene terephthalate)*.

7.2 *Ice*.

7.3 *Paper Towels*.

8. Hazards

8.1 Always wear thermally insulated gloves when introducing or removing the polymer sample from the oven.

9. Procedure

9.1 Preheat the oven to $275 \pm 5^\circ\text{C}$ and equilibrate for 30 min.

NOTE 2—Accuracy of both time and temperature is critical to valid sample-to-sample comparisons using this test.

9.2 Obtain three aluminum pans and label them “A,” “B,” and “C.” Weigh 5.5 ± 0.1 g of sample into each of the pans.

¹ This practice is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.70 on Analytical Methods. Current edition approved Oct. 10, 1995. Published December 1995.

² *Annual Book of ASTM Standards*, Vol 08.03.

³ *Annual Book of ASTM Standards*, Vol 14.02.

⁴ Aluminum weighing dishes, available from Fisher Scientific, or exact equivalents, have been found suitable for this purpose.