



Designation: D 3596 – 92 (Reapproved 2001)

## Standard Practice for Determination of Gels (Fisheyes) In General-Purpose Poly(Vinyl Chloride) (PVC) Resins<sup>1</sup>

This standard is issued under the fixed designation D 3596; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This practice provides a quantitative measure of the gels remaining in a flexible vinyl compound processed from general-purpose poly(vinyl chloride) (PVC) resins under a prescribed set of working conditions.

1.2 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety problems, 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.*

NOTE 1—There are no ISO standards covering the primary subject of this practice.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

D 883 Terminology Relating to Plastics<sup>2</sup>

D 1249 Specification for Octyl Ortho-Phthalate Ester Plasticizers<sup>2</sup>

D 1600 Terminology for Abbreviated Terms Relating to Plastics<sup>2</sup>

### 3. Terminology

3.1 *General*—Definitions are in accordance with Terminology D 883 and abbreviations with Terminology D 1600, unless otherwise indicated.

### 4. Summary of Practice

4.1 A sample of PVC resin is mixed with calcium stearate and di-2-ethylhexyl phthalate plasticizer (DOP) in a laboratory mixer. After mixing, the dry blend is milled on a two-roll laboratory mill; carbon black dispersion is added during the milling.

4.2 The milled sheet is press-polished and the gels counted using a bottom-lighted viewing box and a magnifying comparator.

### 5. Significance and Use

5.1 The gel (fisheye) in PVC resins is generally recognized as a hard particle of resin which will not fuse when the plastic mass is subjected to set conditions of hot processing. The number of unfused particles present is related to the conditions used. The presence of an excess of such particles is detrimental to many applications.

### 6. Apparatus

6.1 *Laboratory Mixer*,<sup>3</sup> with stainless steel mixing bowl.

6.2 *Two-Roll Mill*, 152.4 by 304.8 mm (6 by 12 in.), 263.55 mm (10.5 in.) between guides, differential speed ratio  $1.40 \pm 0.04$ , fast roll speed  $34 \pm 2$  rpm, suitably heated to maintain roll temperature of  $154 \pm 3^\circ\text{C}$  ( $310 \pm 5^\circ\text{F}$ ).

NOTE 2—If the mill available does not meet these criteria, the specifications of the mill used should be included in the report.

6.3 *Surface Pyrometer* calibrated in the range of  $154^\circ\text{C}$  ( $310^\circ\text{F}$ ) and a leaf pyrometer calibrated in the range of  $163^\circ\text{C}$  ( $325^\circ\text{F}$ ).

6.4 *Balance*, 0.1-g sensitivity.

6.5 *Hydraulic Press* having platens at least 203 by 203 mm (8 by 8 in.), rated at a minimum of 140 MPa (20 000 psi) ram pressure on a 100-mm (4-in.) ram, which may be heated to  $163 \pm 3^\circ\text{C}$  ( $325 \pm 5^\circ\text{F}$ ) on the pressing surfaces and equipped with cooling water.

6.6 *Timer*, capable of being read in seconds.

6.7 *Cotton Gloves*.

6.8 *Mill Knife*.

6.9 *Plates or Mold*, two 203 by 203-mm (8 by 8-in.) chrome-plated ferro plates, or a chrome-plated mold with a 152 by 152 by 6.4-mm (6 by 6 by 0.25-in.) cavity.

6.10 *Backing Plates*, two 203 by 203 by 6.4 mm (8 by 8 by 0.250 in.).

6.11 *Brass Shims*, four, 0.51 by 13 by 203 mm (0.020 by 0.5 by 8.0 in.).

6.12 *Magnifying Comparator*,<sup>4</sup> equipped with a transparent reticule (scale) showing circles from 0.03 to 1.27 mm (0.001 to 0.050 in.) in diameter.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.15 on Thermoplastic Materials.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 08.01.

<sup>3</sup> The Hobart Model N-50 is satisfactory.

<sup>4</sup> A Comparator supplied by Finescale Co. of Los Angeles, CA, equipped with a No. 128 reticle has been found suitable for this application.