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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Gel Time of Thermosetting Coating Powder¹

This standard is issued under the fixed designation D 4217; 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.

^{ε1} NOTE—Editorial changes were made throughout in November 1995.

1. Scope

1.1 This test method determines the length of time a thermosetting coating powder remains liquified at a specified elevated temperature. The test method provides a means for estimating thermal gel time of coatings. This test method is intended for gel times of less than 90 s.

1.2 *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.* A specific hazard statement is given in Section 8.

2. Referenced Documents

- 2.1 *ASTM Standards:*
D 1898 Practice for Sampling of Plastics²

3. Terminology

3.1 Definitions:

3.1.1 *coating powder, n*—a heat fusible, finely divided, solid, resinous material used to form electrical insulating coatings.

3.1.1.1 *Discussion*—The coating powder may contain fillers, colorants, curing agents, etc., consistent with producing the desired coating. The powder is applied by various methods such as spraying, sprinkling, or dipping. Usually hot parts are used. Heat causes the powder to melt and flow into a dense coating.

3.1.2 *gel time, n*—of powder coating, the time required at a specified temperature for a coating powder to be transformed into a fused, nonflowable mass.

4. Significance and Use

4.1 This test method is useful for selecting coating powders that gel in the desired time at the specified temperature. The method is not useful for determination of cure time or temperature.

¹ This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.51 on Powder Coatings.

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² *Annual Book of ASTM Standards*, Vol 08.01.

5. Apparatus

5.1 *Hot Plate*,³ having a 10 mm ($\frac{3}{8}$ in.) thick metal surface capable of maintaining temperatures of 150–250°C (300–480°F) within $\pm 1^\circ\text{C}$ ($\pm 2^\circ\text{F}$) of set point.

5.2 *Stopwatch or Timer*, accurate to 0.1 s.

5.3 *Wood Stirrer*, with approximate dimensions of 2 by 6 by 130 mm or ($\frac{1}{16}$ by $\frac{1}{4}$ by 5 in.).

5.4 *Surface Pyrometer*, suitable for use at 150–250°C (300–480°F).

5.5 *Measuring Spoon*, of 1.25 cc ($\frac{1}{4}$ tsp) capacity.

5.6 *Mold Release Agent*.

5.7 *Brass Die Scraper*, or suitable substitute.

6. Selection of Specimens

6.1 Sample in accordance with Method A of Practice D 1898 from one lot of coating powder.

6.2 Store the sample of coating powder in an airtight sealed container prior to testing.

6.3 A specimen shall consist of approximately 1.25 cm³ ($\frac{1}{4}$ tsp) of powdered resin taken from the airtight container.

7. Calibration

7.1 Place the hot plate in a draft-free location or use a three-sided draft shield constructed to eliminate drafts.

7.2 Allow a minimum of 30 min for the hot plate to reach the temperature at which calibration is made.

7.3 Calibrate the hot plate with the surface pyrometer at 204 $\pm 1^\circ\text{C}$ (400 $\pm 2^\circ\text{F}$) or at a temperature as agreed between buyer and seller.

7.4 Coat the plate with a thin coat of mold release. Wipe off excess with a clean towel.

8. Procedure

8.1 **Warning**—Provide adequate ventilation, and avoid breathing the dust or fumes and contact with the skin since many of the reactive materials used in coating powders have been reported to be toxic or cause irritation to sensitive skin.

8.2 Measure 1.25 cm³ level ($\frac{1}{4}$ tsp) of loose powder from a sealed container and placed in a pile onto the surface near the center of the hot plate.

³ Model SS-200 hot plate, available from Thermo-Electric Co., 1948 Columbus Rd., Cleveland, OH 44113, or equivalent, has been found suitable.