



Standard Test Method for Gel Time of Thermosetting Coating Powder¹

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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.

5. Apparatus

5.1 *Hot Plate*,³ having a 10 mm (3/8 in.) thick metal surface capable of maintaining temperatures of 150–250°C (300–480°F) within ±1°C (±2°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 (1/16 by 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 (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 (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 ± 1°C (400 ± 2°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 (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.

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

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

8.3 Spread the powder quickly into a 5-cm (2-in.) diameter circle using the stirrer.

8.4 Start the stopwatch immediately when the powder becomes molten.

8.5 Rub the molten resin in a circular motion with the tip of the stirrer until it forms an immovable gel; immediately stop the watch and record the elapsed time.

8.6 Clean the gelled material from the surface of the plate with the brass die scraper. If the plate surface becomes pitted, polish smooth or replace it.

8.7 Perform the test four times. Discard the first value and record the three gel times and their average. If individual gel times differ more than $\pm 5\%$ of the average time, repeat the test.

9. Report

9.1 Report the following information:

9.1.1 Description of coating powder tested,

9.1.2 Date of test,

9.1.3 Temperature of hot plate if other than $204 \pm 1^\circ\text{C}$ ($400 \pm 2^\circ\text{F}$), and

9.1.4 Report the arithmetic average of the three time readings as the gel time for the coating powder.

10. Precision and Bias

10.1 *Precision*—This test method has been in use for many years but no statement of precision has been made and no activity is planned to develop such a statement.

10.2 *Bias*—This test method has no bias because the value for gel time is defined solely in terms of this test method.

11. Keywords

11.1 coating powder; gel time of coating powder

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