Designation: D4217 – 07 (Reapproved 2013)

Standard Test Method for Gel Time of Thermosetting Coating Powder[1]

This standard is issued under the fixed designation D4217; 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 test method determines the length of time a thermosetting coating powder takes to gel on a polished metal surface at a specified temperature, such as 204°C (400°F). The determination of the gel time is a very simple method for the characterization and quality control of coating powders. However, the gel time determined by this method is not directly related to the time for the coating powder to cure in practical applications.

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.*

2. Referenced Documents

2.1 *ISO Standards:*

ISO 8130–6:1992 Coating powders—Part 6: Determination of gel time of thermosetting coating powders at a given temperature[2]

3. Terminology

3.1 *Definitions:*

3.1.1 *coating powder, n*—finely divided particles of resin, either thermoplastic or thermosetting, generally incorporating pigments, fillers, and additives and remaining finely divided during storage under suitable conditions, which, after fusing and possibly curing, give a continuous film.

3.1.2 *cure time of a coating powder*—the time required for a thermosetting coating powder to sufficiently chemically crosslink at a given temperature to provide the required coating properties.

3.1.3 *gel time of a coating powder*—the interval required at a given temperature for a coating powder to be transformed from a dry solid to a gel-like state.

3.1.4 *powder coating, n*—coatings which are protective or decorative, or both, formed by the application of a coating powder to a substrate and fused in a continuous film by the application of heat or radiant energy.

3.1.5 *thermosetting, adj*—describing a material that, when heated per a minimum recommended cure condition, undergoes a chemical reaction and a permanent change to a more durable state capable of specific properties as designed for substrate protection or decoration, or both.

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.

5. Apparatus

5.1 *Hot Plate,*[3] having an electrically heated metal block with a polished surface capable of being maintained at temperatures between range 130 to 230°C (266 to 466°F) to within ±2°C (±4°F). The temperature should be controlled by means of a thermoregulator.

NOTE 1—There are expected differences in results between this method and ISO 8130–6 which requires a heating block with small depressions.

5.2 *Stopwatch or Timer,* accurate to at least 1 s.

5.3 *Stirrer,* of very low heat capacity and of suitable size. Wooden stirrers with dimensions of 2 mm by 6 mm by 130 mm or (1⁄16 in. by 1⁄4 in. by 5 in.) have been found suitable.

5.4 *Surface Contact Thermocouple,* suitable for use at 150 to 250°C (300 to 480°F) and reading no greater than 1°C (2°F).

5.5 *Measuring Spoon,* of 1.25 cc (1⁄4 tsp) capacity.

5.6 *Scraper,* made of material softer than that of the heating block, for removing the test material from the heating block without scratching its surface.

6. Selection of Specimens

6.1 Obtain a representative sample of the coating powder.

[1] This test method is under the jurisdiction of ASTM Committee D01 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] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[3] The sole source of supply of the Model SS-200 hot plate known to the committee at this time is Thermo-Electric Co., 455 Route 30, Imperial, PA 15126. 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.

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