



Designation: D4242 – 07

# Standard Test Method for Inclined Plate Flow for Thermosetting Coating Powders<sup>1</sup>

This standard is issued under the fixed designation D4242; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

## 1. Scope\*

1.1 This test method specifies a method for determining the flow characteristics of a fused thermosetting coating powder down a plane inclined at a set angle to the horizontal. The test gives an indication of the degree of melt flow that may occur during the curing of the coating powder. This characteristic contributes to the coherence of the coating, to its surface appearance and to the degree of coverage over sharp edges (see Test Method D2967), however, it should not be used as the sole factor for judgment. The test acts as a useful method for checking for batch to batch variation in the behavior of a given coating powder. Correlation between the results from coating powders of differing composition is not to be expected. This method is unlikely to yield meaningful results with coating powders which have gel times of less than one minute at the test temperature (see Test Method D4217). Oven drafts, angle of inclination and pellet variations significantly affect results making inter-lab reproducibility somewhat difficult to correlate.

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

1.3 *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 to determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

D2967 Test Method for Corner Coverage of Powder Coatings

D4217 Test Method for Gel Time of Thermosetting Coating Powder

D5965 Test Methods for Specific Gravity of Coating Powders

### 2.2 Other Documents:

ISO 8130-2 Coating powders—Part 2: Determination of density by gas comparison pycnometer<sup>3</sup>

ISO 8130-3 Coating powders—Part 3: Determination of density by liquid displacement pycnometer<sup>3</sup>

ISO 8130-11:1997 Coating powders—Part 11: Inclined-plane flow test<sup>3</sup>

## 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 *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.

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

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. Summary of Test Method

4.1 The thermosetting coating powder is pressed into a pellet of standard size which is allowed to melt and flow down a heated inclined plate. The extent of flow is measured.

<sup>3</sup> Available from International Organization for Standardization (ISO), 1 rue de Varembé, Case postale 56, CH-1211, Geneva 20, Switzerland, <http://www.iso.ch>.

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