



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

This standard is issued under the fixed designation D 4242; 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.

ε<sup>1</sup> NOTE—Editorial changes were made throughout in November 1995.

### 1. Scope

1.1 This test method measures the molten flow of thermosetting coating powders used for electrical insulation.

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 to determine the applicability of regulatory limitations prior to use.* A specific hazard statement is given in Section 7.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing<sup>2</sup>

D 792 Test Methods for Specific Gravity (Relative Density) and Density of Plastics by Displacement<sup>2</sup>

D 1898 Practice for Sampling of Plastics<sup>2</sup>

D 2436 Specification for Forced-Convection Laboratory Ovens for Electrical Insulation<sup>3</sup>

#### 2.2 Other Document:

AISI C1018<sup>4</sup>

### 3. Terminology

#### 3.1 Definition:

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 powders are 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.

### 4. Summary of Test Method

4.1 A pellet of specified size and weight is pressed from the

test powder and placed upon a preheated glass plate in an oven. The plate is kept in a horizontal position for a short time and then tilted to a 60° angle from horizontal. After flow has stopped, the plate is removed from the oven, allowed to cool, and the distance of flow is measured.

### 5. Significance and Use

5.1 This test method is used to determine the molten flow of coating powders when heated to specified elevated temperatures. This test method determines flow characteristics under minimal shear stress and without regard to time. This test method is useful for specification and quality-control purposes.

### 6. Apparatus

6.1 *Glass Plate*, single-thickness clean glass microscope slides 50 by 150 by 1 mm (2 by 6 by 0.040 in.).

6.2 *Scale*, calibrated in millimetres.

6.3 *Oven*, with forced convection capable of maintaining 135 to 176 ± 1°C (275 to 350 ± 2°F) as described in Specification to D2436.

6.4 *Balance*, accurate to ± 0.01 g.

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

6.6 *Pellet Mold*, as shown in Fig. 1.

6.7 *Hydraulic Press*, having a load capacity of 5 kN (1000 lbf) and a load indicator having an accuracy of ± 0.2 kN (± 40 lbf).

6.8 *Glass Plate Holder*, as shown in Fig. 2.

6.9 *Flexible Wire*, about 1 m (1 yd) long and about 0.35 mm (0.014 in.) in diameter for tripping the apparatus.

### 7. Hazards

7.1 **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 to cause irritation to sensitive skin.

### 8. Sampling

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

### 9. Specimen Preparation

9.1 Weigh two powder samples each equal in grams (to the nearest 10 mg) to one half the specific gravity of the solid

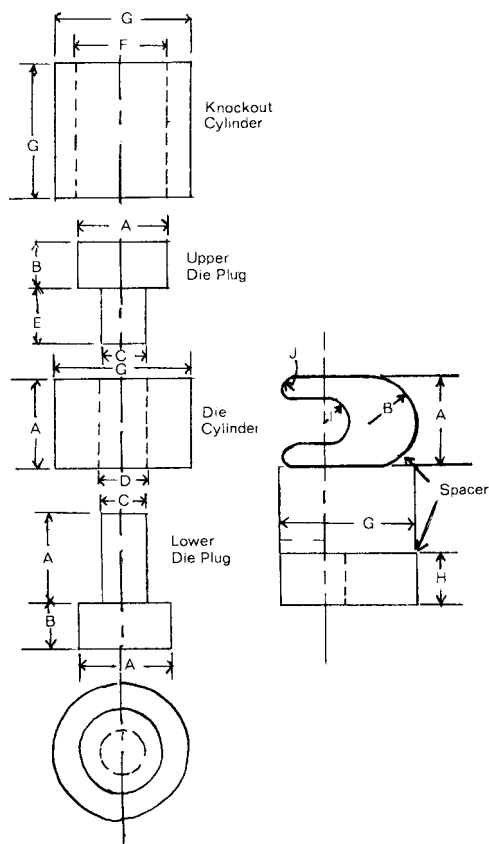
<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.51 on Powder Coatings.

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

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 10.01.

<sup>4</sup> Available from American Iron & Steel Inst., Box 311, Matawan, NJ 07747.



Dimension Table

	in.	mm
A	1.0	25.4
B	0.5	12.7
C	0.471 to 0.472	11.96 to 11.99
D	0.475	12.06
E	6.2	15.7
F	1.06	26.9
G	1.5	38.1
H	0.562	14.27
I	0.250	6.35
J	0.125	3.17

Use cold-drawn steel, AISI C1018.

FIG. 1 Pellet Mold and Spacer

material as determined in accordance with Test Methods D 792.

9.2 Place the spacer over the lower die plug, then the die as shown in Fig. 1.

9.3 Pour the weighed sample into the die cavity and lower the upper die plug slowly onto the sample.

9.4 Using the hydraulic press, apply a load of  $3.9 \pm 0.2$  kN ( $880 \pm 40$  lbf) for  $20 \pm 1$  s.

9.5 Release the hydraulic plunger and remove upper die plug and spacer. Place knock-out spacer on top of the die and recompress the hydraulic press so as to remove the pellet specimen.

## 10. Conditioning

10.1 Condition samples in accordance with Practice D 618 at  $23 \pm 2^\circ\text{C}$ ,  $50 \pm 2\%$  relative humidity for  $4 \pm 0.25$  h prior to pelletizing.

10.2 Preheat the leveled glass plate holder in a  $149 \pm 1^\circ\text{C}$  ( $300 \pm 2^\circ\text{F}$ ) oven (or other temperature as mutually agreed upon by supplier and customer) for  $30 \pm 5$  min.

10.3 Preheat the clean glass plates for a minimum of 5 min.

## 11. Procedure

11.1 Secure the glass plate holder to the oven shelf in a level position. Adjust the counterbalance so that the glass plate holder tips at a slow, continuous rate and the stop is not abrupt. Hard bumping of the stop can contribute significantly to test error.

11.2 Open the oven and place two pellets on the top edge of the horizontal glass plate. Close the oven door on the trip wire so that a sufficient length to grasp extends beyond the door, and start the stopwatch.

11.3 After  $60 \pm 1$  s, pull the trip wire to tilt the slide to the  $60^\circ$  inclined position. Allow slide to remain in this position for 10 min (or until flow stops, if longer than 10 min).

11.4 Remove the glass plate from the oven and allow it to cool to room temperature.

11.5 Using the reverse side of the glass plate, measure the length of the wetted surfaces in millimetres.

## 12. Calculation

12.1 Average the two pellet flow lengths measured in 11.5. Record this length as the glass plate flow.

## 13. Report

13.1 Report the following information:

13.1.1 Powder designation including name, number, lot number, and date of manufacture,

13.1.2 Date of test,

13.1.3 Oven temperature, in degrees Celsius,

13.1.4 Length of time the pellet was allowed to flow in oven, and

13.1.5 Glass plate flow length in millimetres.

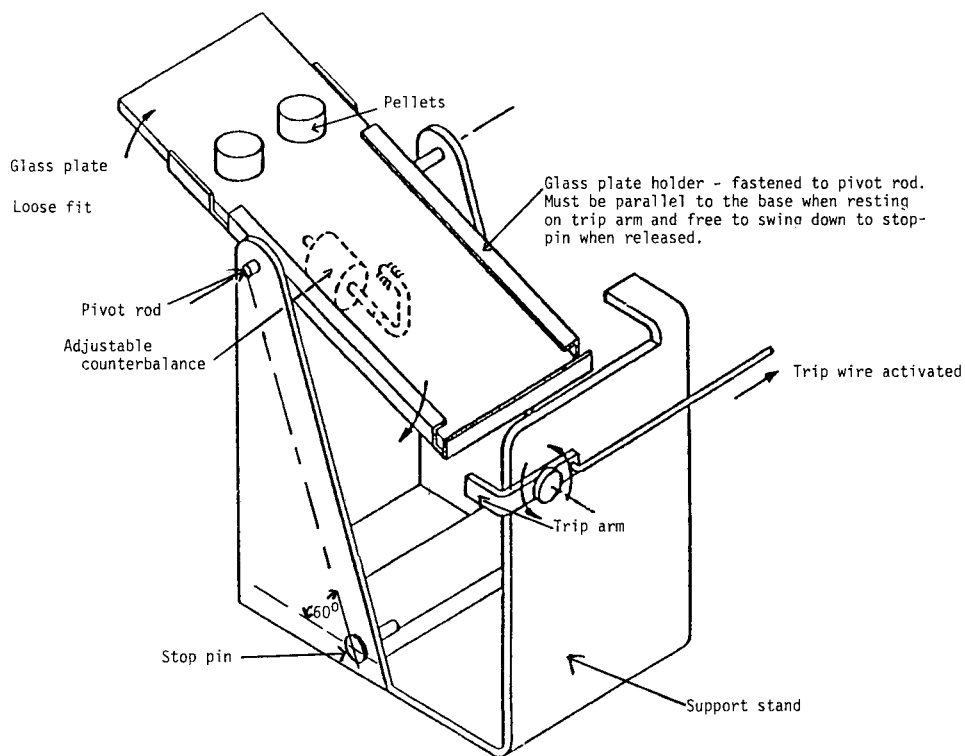
## 14. Precision and Bias

14.1 *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.

14.2 *Bias*—This test method has no bias because the value for glass plate flow is defined solely in terms of this test method.

## 15. Keywords

15.1 coating powder; glass plate flow; powder coating



**FIG. 2 Glass Plate Holder and Support Stand**

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