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Plastics — Determination of pourability

Plastiques — Détermination de l'aptitude à l'écoulement

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 6186 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This second edition cancels and replaces the first edition (ISO 6186:1980), which has been technically revised.

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Plastics — Determination of pourability

1 Scope

This International Standard specifies two methods, A and B, for determining the pourability of plastics in powdered and granular form by measuring the flow time through a funnel.

From method A, information concerning the processability can be derived, whilst method B is especially designed for process control during manufacture.

NOTE — The methods described are not applicable to all plastics in powdered and granular form.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 291:1997, *Plastics — Standard atmospheres for conditioning and testing*.

3 Definition

For the purposes of this International Standard, the following definition applies:

3.1 flow time: The time taken for a defined mass or volume of test material to flow through a funnel of specified dimensions. It is indicated in seconds (s).

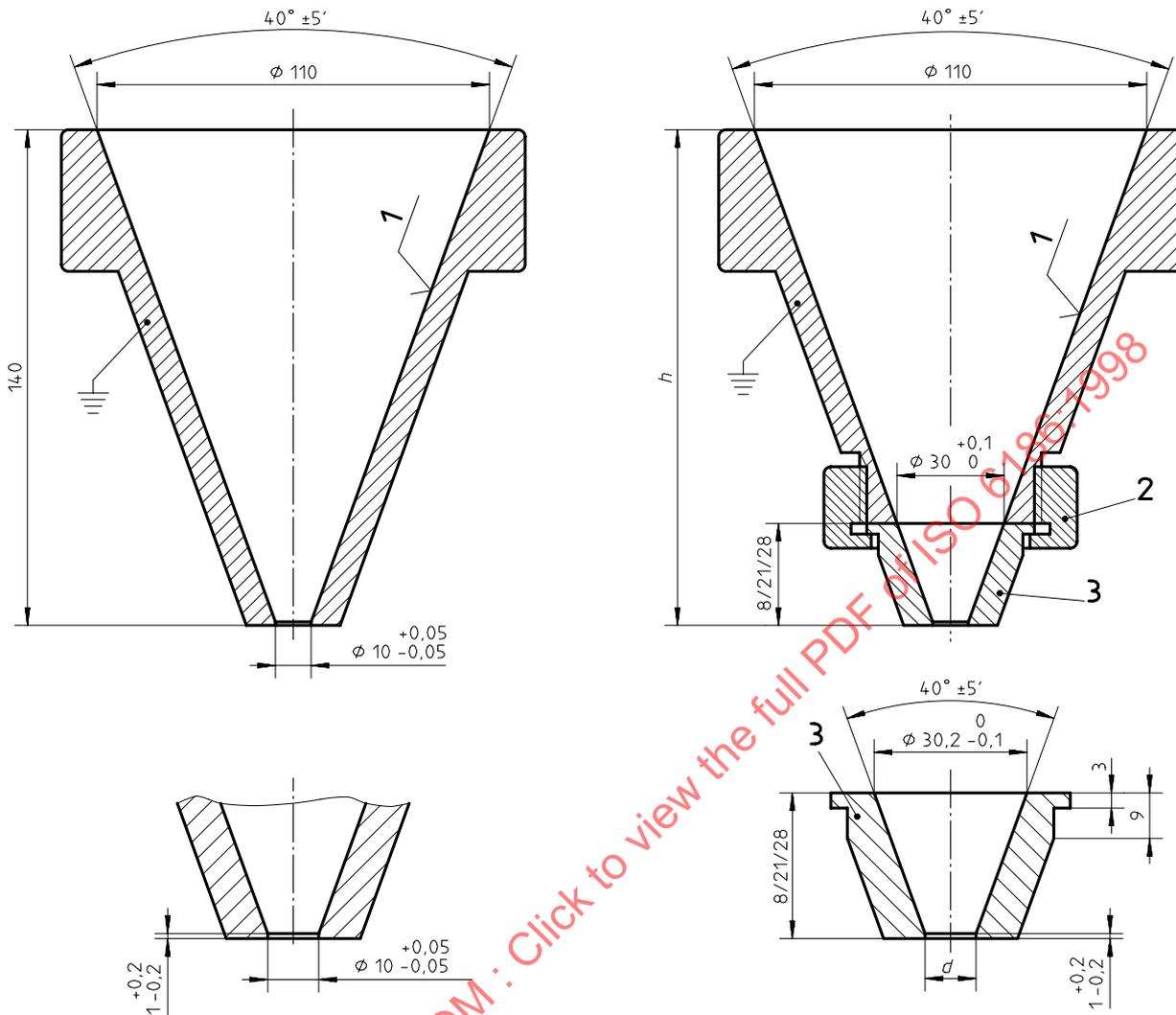
4 Principle

The time taken for a defined mass or volume of the test material to flow through a funnel of specified dimensions is measured.

5 Apparatus

5.1 Funnel, of the shape and dimensions shown in figure 1 and in table 1. Simple test funnels or test funnels with exchangeable nozzles may be used. The funnel shall be made of metal, for example stainless steel, and have the inside surface carefully polished. It shall be fitted with a device for closing the outlet (for example a metal plate). The funnel shall be earthed to discharge electrostatic charges.

Dimensions in millimetres



a) Simple test funnel

b) Test funnel with exchangeable nozzle

Key

- 1 Polished
- 2 Union nut
- 3 Nozzle

For values of *d* and *h*, see table 1.

Figure 1 — Test funnel

Table 1 — Funnel dimensions

Dimensions in millimetres

Diameter of outlet <i>d</i>	Height of funnel <i>h</i>
10,00 ± 0,05	140
15,00 ± 0,05	133
25,00 ± 0,05	120

5.2 Funnel support, to hold the axis of the funnel vertically, for example a metal ring fixed to a vertical stand.

5.3 Stopwatch, accurate to 0,1 s, or an alternative means of measuring time with the same accuracy.

5.4 Balance, accurate to 0,1 g.

6 Conditioning

Unless otherwise specified, materials shall be tested as received under ambient atmospheric conditions. If the test atmosphere can affect the results, it may be specified that the sample be conditioned for 24 h at a temperature of $23\text{ °C} \pm 1\text{ °C}$ and $(50 \pm 5)\%$ relative humidity, as specified in ISO 291, and tested in the same atmosphere.

7 Procedure

7.1 General

When using either method A or method B, start with $d = 10\text{ mm}$. If the sample does not flow through completely or does not flow at all, repeat the determination with $d = 15\text{ mm}$ or $d = 25\text{ mm}$ as necessary.

7.2 Method A

Close the funnel outlet with the closing device. Pour $150\text{ g} \pm 1\text{ g}$ of the sample into the funnel, pouring it on to the inside wall in order to prevent compaction.

Remove the closing device rapidly, but without causing vibration, and simultaneously start the stopwatch. Stop the stopwatch when the funnel is empty, i.e. as soon as the funnel exit becomes visible when viewed from the top of the funnel. Read the flow time to the nearest 0,1 s.

Make three determinations under the same conditions, using a fresh test portion each time. After each determination, clean off any residue adhering to the inner surface of the funnel.

If the material does not flow because of electrostatic charges, repeat the test with the addition of a suitable amount of an antistatic agent agreed between the interested parties and record in the test report that antistatic agent was added.

7.3 Method B

Close the funnel outlet with the closing device. Pour sample into the funnel, pouring it on to the inside wall in order to prevent compaction, until the funnel is overfull and then level off with a straight blade.

Remove the closing device rapidly, but without causing vibration, and simultaneously start the stopwatch. Stop the stopwatch when the funnel is empty, i.e. as soon as the funnel exit becomes visible when viewed from the top of the funnel. Read the flow time to the nearest 0,1 s.

Make three determinations under the same conditions, using a fresh test portion each time. After each determination, clean off any residue adhering to the inner surface of the funnel.

If the material does not flow because of electrostatic charges, repeat the test with the addition of a suitable amount of an antistatic agent agreed between the interested parties and record in the test report that antistatic agent was added.

8 Expression of results

Calculate the mean of the three determinations, expressing the flow time t , to the nearest whole second, in the way indicated by the following examples:

$$t_{A10} = 22 \text{ s}$$

or

$$t_{B15} = 22 \text{ s}$$

where

A = method A

B = method B

10 = 10 mm nozzle

15 = 15 mm nozzle

Indicate the manner in which the material flows, using the following terms:

- flows uniformly;
- flows intermittently;
- does not flow under the test conditions.

9 Precision

The precision of test method A has been established by inter-laboratory testing, as follows:

t_{A10} for a standard suspension PVC resin

Within laboratory: coefficient of variation = 3,5 %

Between laboratories: coefficient of variation = 5,0 %

t_{A15} for a standard emulsion PVC resin

Within laboratory: coefficient of variation = 2,5 %

Between laboratories: coefficient of variation = 11,5 %

t_{A25} for a standard emulsion PVC resin

Within laboratory: coefficient of variation = 4,0 %

Between laboratories: coefficient of variation = 25 %

The precision of test method B should be similar, based on the fact that the procedure is similar in principle to that of method A and uses the same equipment.