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## Plastics — Determination of apparent density of material that can be poured from a specified funnel

*Plastiques — Détermination de la masse volumique apparente des matières susceptibles de s'écouler à travers un entonnoir donné*

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ISO 60

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## Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 12, *Thermosetting materials*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 249, *Plastics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 60:1977), which has been technically revised.

The main changes are as follows:

- added the mandatory [Clause 2](#) (Normative reference) and renumbered subsequent clauses;
- added the mandatory [Clause 3](#) (Terms and definitions) and renumbered subsequent clauses;
- added the requirement, “Tested samples shall not be reused”, in the procedure;
- added the requirement, “Take two significant digits”, in the expression of results;
- added information to be included in the test report, i.e. “a reference to this document”, “standard deviation, and/or coefficient of variation, and/or confidence limits of mean, if required”, “any other observations”, “date of test”.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Apparent density refers to the ratio of mass to apparent volume of a material in its natural state (dry state stored in air for a long time).

A knowledge of apparent density is of limited value in estimating the relative fluffiness or bulk of moulding materials, unless their densities in the moulded condition are approximately the same.

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# Plastics — Determination of apparent density of material that can be poured from a specified funnel

## 1 Scope

This document specifies a method of determining the apparent density, i.e. the mass per unit of volume, of loose material (powder or granular material) that can be poured from a funnel of specified design.

NOTE For a method of determining the apparent density of loose moulding material that cannot be poured from a specified funnel, see ISO 61.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

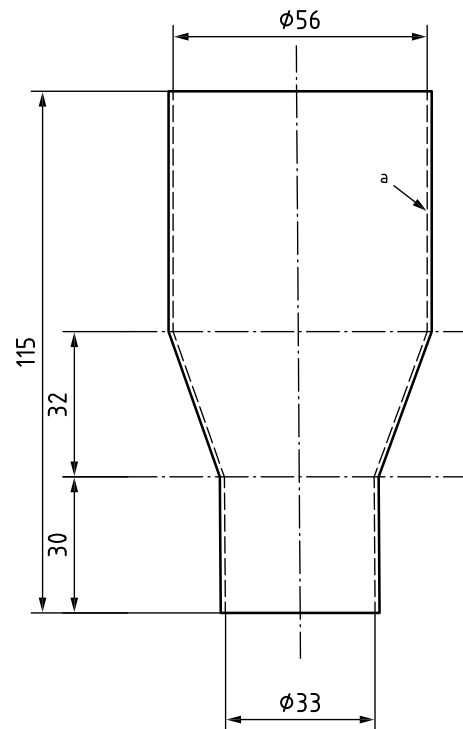
- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

## 4 Apparatus

**4.1 Balance**, accurate to 0,1 g.

**4.2 Measuring cylinder**, smoothly finished inside, which may be constructed of metal, of capacity of  $(100 \pm 0,5)$  ml, and internal diameter  $(45 \pm 5)$  mm.

**4.3 Funnel**, of the form and dimension shown in the figure, with a cover for the lower orifice (for example metal plate).



a Metal with smooth inner surfaces.

Figure 1 — Funnel

4.4 **Blade**, with a straight edge, a 60 mm minimum length, sufficiently rigid not to deform when it is drawn across the top of the cylinder.

## 5 Procedure

5.1 Support the funnel (4.3) vertically with lower orifice 20 mm to 30 mm above the measuring cylinder (4.2) or granular material before test. With the lower orifice of the funnel closed by means of cover, place a quantity of 110 ml to 120 ml of the powder or granular material in the funnel. Level off the material exceeding the measuring cylinder with a straightedge blade (4.4).

5.2 Remove the cover quickly and allow the material to flow into the cylinder. If necessary, thermosetting moulding material may be assisted to flow by loosening the material with a rod. If the material will not flow owing to electrostatic charges, another test should be carried out with the addition of a small amount of gamma alumina<sup>1)</sup> or carbon black (a few per cent) or ethanol (a few millilitres).

5.3 Make two determinations on the sample of moulding material under test. Test samples shall not be reused.

NOTE When the method is applied to relatively coarse materials, variable results can be obtained, owing to the error introduced when a straightedge blade is drawn across the top of the cylinder.

1) Degussa aluminiumoxid P 100 C 1 is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.



## 6 Expression of results

The apparent density,  $d$ , of the material under test is given, in grams per millilitre, by [Formula \(1\)](#):

$$d = \frac{m}{V} \quad (1)$$

where

$d$  is the apparent density;

$m$  is the mass, in grams, of the contents of the measuring cylinder;

$V$  is the volume, in millilitres, of the measuring cylinder (i.e. 100).

Take, as the result, the arithmetic mean of the results of the two determinations. Take two significant digits.

## 7 Test report

The test report shall include the following information:

- a) a reference to this document, i.e. ISO 60:2023;
- b) complete identification of the material tested;
- c) the individual results and mean;
- d) type and amount of antistatic agent added, if applicable;
- e) standard deviation, and/or coefficient of variation, and/or confidence limits of mean, if required;
- f) any other observations;
- g) date of test.

## Bibliography

- [1] ISO 61, *Plastics — Determination of apparent density of material that cannot be poured from a specified funnel*

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