

## Methods of testing

# Plastics —

## Part 6: Dimensional properties —

### Methods 620A to 620D: Determination of density and relative density of non-cellular plastics

IMPORTANT NOTE. Before reading this method it is essential to read BS 2782-0, Introduction, issued separately.

ICS 83.080.01

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Plastics and Rubber Standards Policy Committee (PRI/-) to Technical Committee PRI/21, upon which the following bodies were represented:

- British Plastics Federation
- British Steel Industry
- British Telecommunications plc
- Department of Trade and Industry (National Physical Laboratory)
- EEA (the Association of Electronics, Telecommunications and Business Equipment Industries)
- Electrical and Electronic Insulation Association (BEAMA Ltd.)
- Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
- GAMBICA (BEAMA Ltd.)
- Man-made Fibres Producers' Committee
- Ministry of Defence
- Packaging and Industrial Films Association
- PIRA
- Plastic Industrial Containers Association
- Plastics and Rubber Institute
- RAPRA Technology Ltd.
- Standards Association of Australia
- Yarsley Technical Centre Ltd.

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## Amendments issued since publication

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| 10747    | 26 September 2001 | Methods A and B deleted    |
| 14474    | 26 September 2003 | Methods A and B reinserted |
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## National foreword

This British Standard has been prepared under the direction of the Plastics and Rubber Standards Policy Committee. BS 2782-6:Methods 620A to 620D:1991 was identical with ISO 1183:1987.

### Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

**Textual error.** When adopting the text of the International Standard, the textual error given below was discovered. It has been marked in the text and has been reported to ISO in a proposal to amend the text of the International Standard.

In the table in the Annex, the density range for methanol/benzyl alcohol should read “0,80 to 0,92”.

NOTE There is a typographical error in the table in the Annex. Under “System”, the eighth entry should read “Water/aqueous solution of calcium nitrate”.

**WARNING NOTE.** This British Standard, which is identical with ISO 1183, does not necessarily detail all the precautions necessary to meet the requirements of the Health and Safety at Work etc. Act 1974. Attention should be paid to any appropriate safety precautions and the methods should be operated only by trained personnel.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 11 and a back cover.

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## 1 Scope and field of application

**1.1** This International Standard specifies four methods for the determination of the density and relative density of non-cellular plastics in the form of sheet, film, tube, moulded objects, and moulding powders, granules and pellets.

— Method A

Immersion method for plastics in a finished condition, whether machined or otherwise formed (see **5.1.3**), but not powders.

— Method B

Pyknometer method for plastics in the form of powder, granules, pellets, flake or moulded articles reduced to small particles.

— Method C

Titration method for plastics in forms similar to those required for method A, including pellets.

— Method D

Density gradient column method for plastics in forms similar to those required for method A, and including pellets. Density gradient columns are columns of liquid, the densities of which increase uniformly from top to bottom. They are particularly suited to measurement of small samples of products and to comparison of densities.

**1.2** Density and relative density are used frequently, both to follow the variations in the physical structures of specimens and in calculation of the amount of material necessary to fill a given volume. Density is the preferred property relating the mass and volume of an object, specimen or material. These properties may also be useful in assessing uniformity among samples or specimens. These methods are designed to yield results accurate to at least 0,2 % without applying corrections for weighings in air, and to 0,05 % with such corrections.

**1.3** Often the density of plastics will depend upon the methods employed in the preparation of test specimens. When this is the case, precise details of the methods of preparation shall be given; these are ordinarily included in the specifications for the material.

## 2 References

ISO 31-3, *Quantities and units of mechanics*.

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

## 3 Definitions

### 3.1

**density,  $\rho_t$**

the ratio of the mass of the sample to its volume  $V_t$  (at the temperature  $t$ ), expressed in kilograms per cubic metre, grams per cubic centimetre or grams per millilitre

ordinarily,  $t$  will be one of the standard laboratory temperatures specified in ISO 291 (23 or 27 °C)

### 3.2

**relative density**

the ratio of the mass of a given volume of material at the temperature  $t_1$  to that of an equal volume of a reference material at the temperature  $t_2$ ; it is expressed as relative density, at  $t_1$  and  $t_2$  (symbol:  $d_{t_2}^{t_1}$ ) where  $t$  is the temperature, in degrees Celsius

ordinarily,  $t$  will be one of the standard laboratory temperatures specified in ISO 291 (23 or 27 °C)

relative density may also be defined as the ratio of the density of a substance to the density of a reference substance under conditions that are specified for both substances