

Acquisition and presentation of comparable data for basic properties of plastics —

Part 2: Method for multipoint data

UDC 678.5.01:001.4:620.1:614.8

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- British Plastics Federation
- British Steel Industry
- British Telecommunications plc
- Department of Trade and Industry (National Physical Laboratory)
- Electrical and Electronic Insulation Association (BEAMA Ltd.)
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- Ministry of Defence
- PIRA
- Plastic Industrial Containers Association
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This British Standard, having been prepared under the direction of the Plastics Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 June 1988

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The following BSI references relate to the work on this standard:
Committee reference PLM/17
Draft for comment 87/37079 DC

ISBN 0 580 16580 9

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
1 Scope	1
2 Definition	1
3 Specimen preparation and conditioning	1
4 Test requirements	1
5 Presentation of results	2
Appendix A Guidance concerning test methods	15
Appendix B Properties excluded	16
Appendix C Bibliography	16
Table 1 — Test conditions and format for the presentation of multipoint data	3
Publications referred to	Inside back cover

Foreword

This Part of BS 7008 has been prepared under the direction of the Plastics Standards Committee.

Its purpose, like that of Part 1 for single-point data, is to identify a range of basic properties of plastics which are to be determined in accordance with specified test procedures, thus enabling all manufacturers to present data to a common base and thereby overcoming the present problem of comparing results from different sources where different methods or conditions have been employed. It also specifies how these properties are to be presented.

The multipoint format of presentation in this Part provides a much fuller evaluation of the characteristics of materials than the simpler procedures of Part 1, and will assist the selection and comparison of materials for particular applications. It strongly recommended, however, that this Part of BS 7008 be read in conjunction with Part 1.

Data are presented in tabulations defined by this standard (see Table 1). In addition, graphical presentation may be employed where it would help in the understanding or use of the data.

Test temperatures specified are selected from the list of preferred test temperatures given in Appendix B of BS 2782-0:1982, except for those used in determining electrical properties, where other temperatures are used if necessary to be consistent with BS 2844. Where it is considered necessary for adequately displaying a property, tests at additional temperatures may be reported. These should also be taken from the preferred lists as far as possible. Tests at additional values of other variables may similarly be reported.

It is not intended that all tests and conditions prescribed in Table 1 should necessarily be applied to each material, but that in each case an appropriate selection should be used. For example, for property **15.4**, tensile strength, the higher rates of straining would normally be used for flexible materials, the lower ones for rigid materials.

The tests and conditions specified in this standard have been selected because of their importance combined with the existence of well-established methods and the objective of presenting comparable data; hence they are often but not necessarily those adopted in standards applicable to specific materials which are the principal documents in their own context and which, for example, may use alternative procedures for optimum quality control or assess other properties of particular relevance to the capabilities of the material. Appendix B lists tests which have been considered but not selected for the reasons given. However, it is intended to keep the selection under review and to add further methods if appropriate.

For the determination and presentation of data for design purposes in the application of plastics, including engineering design of components and articles, attention is drawn to BS 4618.

During the preparation of this standard, materials manufacturers from outside the UK were consulted in order that its content might reflect international opinion and thus be considered as a basis for an International Standard. Consequently the Technical Committee has considered and approved reference to selected International Standards, specifically ISO 537, ISO 899, ISO 3167, ISO 4599, ISO 6252, ISO 6602 and IEC 250, and one national standard, specifically ASTM D 3835, published by the American Society for Testing and Materials (ASTM), pending the availability of corresponding British Standards. In the absence of standards for methods of thermomechanical analysis for the measurement of linear thermal expansion (property **12.1**) and specific heat capacity (property **12.2**), a bibliography is provided (see Appendix C) for background information, which may be helpful in conjunction with the use of instruments capable of such measurements. Numerical references to this bibliography are given in square brackets in the text.

The terminology and the format of units and symbols used are in accordance with BS 1755-1 and with BS 5555 or BS 5775, as applicable.

Attention is drawn to the provisions of the Health and Safety at Work etc. Act 1974 and the need to ensure that appropriate precautions are taken to ensure the safety of personnel when carrying out the methods of test required by this standard.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their 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 to iv, pages 1 to 16, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 7008 is a method for the acquisition and presentation of selected basic properties of plastics materials as multipoint data, but excludes specialized methods of test for films, cellular materials or composites such as fibre-reinforced resins. Such materials may be included however where the methods of test specified in this standard are applicable.

These multipoint data are for use in the selection and comparison of materials for particular applications.

NOTE 1 Guidance on the use of specific test methods is given in Appendix A.

NOTE 2 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 7008, the following definitions apply.

2.1

multipoint data

data comprising a number of test results for a property measured at stated points within a range of values of variables such as time, temperature, stress and frequency

2.2

single-point data

data comprising a group of single value results or classifications for a corresponding number of individual properties or performance assessments of a plastics material

3 Specimen preparation and conditioning

Test specimens shall be prepared in accordance with the applicable procedures from the methods published under Part 9 of BS 2782 and, until their use, be conditioned in accordance with the applicable procedures given in BS 2782-0 and selected, where applicable, by the method tabled in this Part of BS 7008 for which the test specimens are required. Where this results in options for the conditioning atmosphere which includes $23 \pm 2^\circ\text{C}$ and/or $(50 \pm 5)\%$ relative humidity, that option shall be used. Key details of the material and specimen preparation and history shall be recorded and presented in accordance with clause 5.

NOTE Specimen preparation is extremely important, and it might be thought that preparative conditions should and could be rigidly defined, but this is not possible, as the processing of any grade of polymer in a given machine/mould combination demands settings which even at this stage are not unique because they also depend upon the ultimate application. It is quite impracticable to anticipate all contingencies when only a restricted range of simple geometries (bars, plaques, etc.) is considered. The methods published under Part 9 of BS 2782 spell out good practices that should be observed in specimen preparation, but they cannot give the essential details (the pressures, temperatures and times) that together contribute to a successful product. These have to be based on the manufacturer's recommendations, and it is assumed that these are always followed. The less common forming methods can also be accommodated in this way; rotational moulding grades should be moulded into hollow cubes, for example, and appropriate specimens machined from the flat faces. This approach tries to simulate conditions which at least approximate to those expected in normal usage, and contrasts with those in some material specifications. In BS 3412 for polyethylene, for example, the density is determined on very slowly cooled (5°C/h) material. There are excellent reasons for this (specimens are more homogeneous) but the resultant answer is higher than anything that will be met under normal conditions and will affect creep properties, for example, accordingly. It could be argued that all tests should be made on annealed samples, and the data reduced by means of experimentally determined normalizing factors to values typical of materials as manufactured products. However, it is not considered practical to use a test procedure which would require an excessive time for its completion or lacks consensus on normalizing factors.

4 Test requirements

In determining a particular property, use the applicable test method, conditions and units specified in columns 1, 2, 3 and 4 of Table 1. For the method of test, use the issue of the standard current at the time of testing and quote its date of publication (see clause 5).

If the test method provides a choice of test conditions that includes $23 \pm 2^\circ\text{C}$ and/or $(50 \pm 5)\%$ relative humidity, then use that/those option(s).

NOTE For many British Standards there are corresponding International Standards on the same subject, in varying degrees of agreement. In such cases, a reference to the corresponding International Standard or Standards, including a symbol to indicate the extent of agreement, is given in the current *BSI Standards Catalogue*.

5 Presentation of results

The presentation shall be in the form of Table 1, the scale and proportions of which can be varied, and shall include the following particulars:

heading: the material description/designation/identification, as applicable;

column 1: the property measured and, unless located in column 3, the test method as shown, together with a record of its date of publication;

column 2: the units, where applicable;

column 3: the test variables, numerical values and, unless located in column 1, the test method as shown, together with a record of its date of publication;

column 4: supplementary instructions concerning the procedures used;

column 5: supporting records of information as required by the procedures used, e.g. moulding conditions, post moulding treatment, storage history, as applicable to the material and/or property for which the data are relevant.