

Methods of testing plastics —

Part 0: Introduction

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Committees responsible for this British Standard

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BEAMA Ltd
British Plastics Federation
British Society of Rheology
IEE — Institution of Electrical Engineers
Institute of Materials
National Physical Laboratory
Packaging and Industrial Films Assn.
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Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
<hr/>	
1 Scope	1
2 Informative references	1
3 Content and usage of BS 2782	1
4 Units	1
5 Apparatus and reagents	1
6 Sampling	1
7 Number of test pieces	1
8 Preparation of test pieces	1
9 Direction of testing	2
10 Test report	2
11 Standard atmospheres for conditioning and testing	2
<hr/>	
Annex A (informative) List of methods in BS 2782 published separately and degree of equivalence to international standards	3
Annex B (informative) Method 508A: Rate of burning, laboratory method (obsolescent)	27
<hr/>	
Bibliography	29
<hr/>	
Figure B.1 — Specimen under test for rate of burning	28
<hr/>	
Table A.1 — Methods in BS 2782 and corresponding international standards	4
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Foreword

This part of BS 2782 has been prepared by Technical Committee PRI/21 and is a new edition of BS 2782-0:1995, which is withdrawn.

BS 2782 formerly described almost all the test methods used by the plastics industry for determining the quality of its products. Currently, the majority of these test methods are identical with the methods standardized by Technical Committee ISO/TC 61, Plastics, and where this is so, they have taken the ISO number (designated BS ISO xxxx) or are dual numbered with the ISO and BS 2782 numbers. Additionally, many methods have been adopted as European Standards by CEN/TC 249, Plastics (designated BS EN ISO xxxx). As methods are revised, the policy is to discontinue dual numbering and to adopt the ISO number only. Some methods for which there is no ISO equivalent or where the British Standard differs from the ISO standard continue as methods within BS 2782.

It is intended that the appropriate test methods, however numbered, be specified in all British Standards for plastics materials and products.

Annex A lists the methods in numerical order of the original BS 2782 methods and shows the equivalent ISO standard when appropriate.

WARNING. The methods in BS 2782 do 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 British Standard calls for the use of substances and/or procedures that may be injurious to health. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any time.

This document 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 29 and a back cover.

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1 Scope

This part of BS 2782 gives a general introduction to the methods of test for plastics some of which are presented in the other Parts. Annex A lists the individual methods and Annex B describes an obsolescent method (508A), formerly given in BS 2782:1970 and still referred to by the Building Regulations [1].

2 Informative references

This part of BS 2782 refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed in the Bibliography, but reference should be made to the latest editions.

3 Content and usage of BS 2782

The ISO test methods adopted as British Standards together with the methods in BS 2782 provide a rationalized collection of methods for testing plastics materials and includes tests that are applied to moulding and extrusion compounds, synthetic resins, reinforced plastics, semi-fabricated products such as sheet, film, rod and tube, and finished articles in the form of mouldings and extrusions. Many of the methods are restricted to one set of conditions, and are not necessarily adequate for the production of design data; attention is therefore drawn to BS 4618. The acquisition and presentation of comparable data for properties of plastics is given in BS EN ISO 10350 and BS EN ISO 11403. Many of the methods are not suitable for cellular plastics.

4 Units

Numerical values in BS 2782 are normally expressed in the units of the *Système International d'Unités* (SI units), described in ISO 1000.

5 Apparatus and reagents

Apparatus used should comply with the requirements of the appropriate British Standard. Reagents should be of recognized analytical reagent quality unless otherwise stated, and distilled or demineralized water should be used wherever water is specified (see BS EN ISO 3696).

6 Sampling

In cases where special precautions are needed to ensure that the test pieces adequately represent the properties of the material in bulk, a sampling procedure is given in the specification for the material.

7 Number of test pieces

It is recognized that specifications for test programmes sometimes require use of different numbers of test pieces from those given in the test method standard. For example, in production, a more informative and accurate result can be obtained if fewer test pieces are taken from one article but more articles are tested. It should be noted, however, that in general, the use of fewer test pieces yields less reliable results.

8 Preparation of test pieces

Preparation of test pieces is often one of the most critical stages of the test procedure, and the specified conditions of preparation should be adhered to. In general the procedure adopted enables a test piece representative of the material under test to be obtained with minimal effect on the properties of the material. Test piece preparation is normally referred to in each test method standard, usually by reference to general methods of preparation (see Annex A) or by reference to standards for the materials or products. It should be noted that, where no British Standard or other recognized specification exists, the procedure should be as agreed between the interested parties.

9 Direction of testing

The properties of certain types of sheet material can vary with direction in the plane of the sheet. In practice it is usual to cut two groups of test pieces with their major axes respectively parallel and perpendicular to the direction of some feature of the sheet that is either visible or inferred from knowledge of the method of its manufacture. For a particular test, the direction of testing is the direction of the long axis of the test pieces, unless otherwise stated.

10 Test report

When referring to a test procedure, the full reference should be quoted by giving the number of this British Standard, the method number and the date of publication, e.g. BS 2782:Method 360A:1991, or BS EN ISO 75-1:1996.

11 Standard atmospheres for conditioning and testing

The properties of plastics can alter considerably with changes in temperature and relative humidity. It is usually necessary to condition test pieces before testing, in addition to controlling the atmosphere during testing, in order to improve the reproducibility of test results. As large a surface as possible of each test piece should be exposed to the conditioning atmosphere.

Where appropriate, the test method specifies the conditioning procedure. The standard atmospheres for conditioning and testing given in BS EN ISO 291 should be used whenever possible.

Annex A (informative)**List of methods in BS 2782 published separately and degree of equivalence to international standards****A.1 Parts**

BS 2782 comprises the following 12 parts:

- *Part 1: Thermal properties;*
- *Part 2: Electrical properties;*
- *Part 3: Mechanical properties;*
- *Part 4: Chemical properties;*
- *Part 5: Optical and colour properties, weathering;*
- *Part 6: Dimensional properties;*
- *Part 7: Rheological properties;*
- *Part 8: Other properties;*
- *Part 9: Sampling and test specimen preparation;*
- *Part 10: Glass reinforced plastics;*
- *Part 11: Thermoplastics pipes, fittings and valves;*
- *Part 12: Reinforced plastics pipes, fittings and valves.*

A.2 Correspondence between BS 2782 and international standards

The relationship between the individual methods of BS 2782 and international standards is given in Table A.1. The equivalent ISO numbers are given.

Table A.1 — Methods in BS 2782 and corresponding international standards

BS 2782 method unless otherwise stated	Formally designated BS 2782 method	Title	Date of publication ^a	Equivalent international standard
120C	—	<i>Part 1: Thermal properties — Determination of the 1/10 Vicat softening temperature of thermoplastics</i>	1990	—
BS EN ISO 75-1	121	<i>Plastics — Determination of temperature of deflection under load — Part 1: General test method</i>	1996	ISO 75-1
BS EN ISO 75-2	121A to 121C	<i>Plastics — Determination of temperature of deflection under load — Part 2: Plastics and Ebonite</i>	1996	ISO 75-2
BS EN ISO 75-3	121D	<i>Plastics — Determination of temperature of deflection under load — Part 3: High-strength thermosetting laminates and long-fibre-reinforced plastics</i>	1996	ISO 75-3
BS EN ISO 3146	125A to 125C2	<i>Plastics — Determination of melting behaviour (melting temperature or melting range) of semi-crystalline polymers by capillary tube and polarizing-microscope methods</i>	2000	ISO 3146
130A	—	<i>Part 1: Thermal properties — Determination of the thermal stability of polyvinyl chloride by the Congo red method</i>	1991 (2002)	ISO 182-1
BS EN ISO 182-2	130B	<i>Plastics — Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures — Part 2: pH method</i>	2000	ISO 182-2
BS EN ISO 182-3	130C	<i>Plastics — Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures — Part 3: Conductometric method</i>	2001	ISO 182-3
BS EN ISO 182-4	130D	<i>Plastics — Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures — Part 4: Potentiometric method</i>	2000	ISO 182-4
131B	—	<i>Part 1: Thermal properties — Determination of extensibility after heat ageing of flexible polyvinyl chloride sheet</i>	1983 (1994)	—

^a A date in brackets is when confirmation of the validity of the standard was agreed.

Table A.1 — Methods in BS 2782 and corresponding international standards (continued)

BS 2782 method unless otherwise stated	Formally designated BS 2782 method	Title	Date of publication ^a	Equivalent international standard
131C and 131D	—	<i>Part 1: Thermal properties — Crushing strength after heating (heat resistance) of thermosetting moulding material. Crushing strength after heating (heat resistance) of thermosetting laminated sheet or mouldings</i>	1978 (2002)	—
134A and 134B	—	<i>Part 1: Thermal properties — Determination of the oxidation induction time of thermoplastics</i>	1992 (1999)	—
BS EN ISO 2578	135	<i>Plastics — Determination of the time-temperature limits after prolonged exposure to heat</i>	1999	ISO 2578
BS EN ISO 11248	136	<i>Plastics — Thermosetting moulding materials — Evaluation of short-term performance at elevated temperatures</i>	2000	ISO 11248
140A ^b	—	<i>Part 1: Thermal properties — Determination of the burning behaviour of horizontal and vertical specimens in contact with a small-flame ignition source</i>	1992	ISO 1210
BS EN ISO 9773	140B	<i>Plastics — Determination of burning behaviour of thin flexible vertical specimens in contact with a small-flame ignition source</i>	1999	ISO 9773
BS EN 60695-11-20	140C	<i>Fire hazard testing — Part 11: Test flames — 500W flame test methods</i>	1999	—
140D	—	<i>Part 1: Thermal properties — Flammability of a test piece 550 mm × 35 mm of thin polyvinyl chloride sheeting (laboratory method)</i>	1997	—
140E	—	<i>Part 1: Thermal properties — Flammability of a small, inclined test piece exposed to an alcohol flame (laboratory method) (obsolescent)</i>	1982 (1988)	—
BS EN ISO 4589-2	141	<i>Plastics — Determination of burning behaviour by oxygen index — Part 2: Ambient temperature test</i>	1999	ISO 4589-2
BS EN ISO 4589-3	143A and 143B	<i>Plastics — Determination of burning behaviour by oxygen index — Part 3: Elevated temperature test</i>	1996	ISO 4589-3
150B	—	<i>Part 1: Thermal properties — Determination of cold flex temperature of flexible polyvinyl compound</i>	1976 (2002)	—
150C	—	<i>Part 1: Thermal properties — Determination of low temperature extensibility of flexible polyvinyl chloride sheet</i>	1983 (1994)	—
150D	—	<i>Part 1: Thermal properties — Cold crack temperature of film and thin sheeting</i>	1976 (1993)	—

^a A date in brackets is when confirmation of the validity of the standard was agreed.
^b See also Annex B.

Table A.1 — Methods in BS 2782 and corresponding international standards (continued)

BS 2782 method unless otherwise stated	Formally designated BS 2782 method	Title	Date of publication ^a	Equivalent international standard
151A	—	<i>Part 1: Thermal properties — Determination of cold bend temperature of flexible polyvinyl chloride extrusion compound</i>	1984 (1992)	—
153A	—	<i>Part 1: Thermal properties — Determination of stiffness in torsion of flexible materials (general method)</i>	1991 (2002)	ISO 458-1
153B	—	<i>Part 1: Thermal properties — Determination of stiffness in torsion of flexible materials (method for vinyl chloride compounds)</i>	1991 (2002)	ISO 458-2
220/221	—	<i>Part 2: Electrical properties — Determination of electric strength: rapidly applied voltage method. Determination of electric strength: step-by-step method</i>	1983	—
230A	—	<i>Part 2: Electrical properties — Determination of volume resistivity</i>	1982	—
231A	—	<i>Part 2: Electrical properties — Determination of surface resistivity</i>	1981	—
232	—	<i>Part 2: Electrical properties — Determination of insulation resistance</i>	1992	—
240A/B	—	<i>Part 2: Electrical properties — Determination of loss tangent and permittivity at power and audio frequencies</i>	1982	—
241A	—	<i>Part 2: Electrical properties — Determination of effect of polyvinyl chloride compound on the loss tangent of polyethylene</i>	1984 (1992)	—
BS 7506-2	250A	<i>Methods for measurement in electrostatics — Part 2: Test methods</i>	1996	—
BS 7506-2	250B and 250C	<i>Methods for measurement in electrostatics — Part 2: Test methods</i>	1996	—
320A to 320F	—	<i>Part 3: Mechanical properties — Tensile strength, elongation and elastic modulus (Amendment 1993)</i>	1976 (1996)	—
BS EN ISO 527-1	321	<i>Plastics — Determination of tensile properties — Part 1: General principles</i>	1996	ISO 527-1
BS EN ISO 527-2	322	<i>Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics</i>	1996	ISO 527-2
323A	—	<i>Part 3: Mechanical properties — Tensile vibration — Non-resonance method</i>	1996 (2001)	ISO 6721-4
323B	—	<i>Part 3: Mechanical properties — Flexural vibration — Non-resonance method</i>	1996 (2002)	ISO 6721-5
323C	—	<i>Part 3: Mechanical properties — Shear vibration — Non-resonance method</i>	1996 (2002)	ISO 6721-6

^a A date in brackets is when confirmation of the validity of the standard was agreed.

Table A.1 — Methods in BS 2782 and corresponding international standards (*continued*)

BS 2782 method unless otherwise stated	Formally designated BS 2782 method	Title	Date of publication ^a	Equivalent international standard
323D	—	<i>Part 3: Mechanical properties — Torsional vibration — Non-resonance method</i>	1996 (2002)	ISO 6721-7
323E	—	<i>Part 3: Mechanical properties — Longitudinal and shear vibration — Wave-propagation method</i>	1997	ISO 6721-8
323F	—	<i>Part 3: Mechanical properties — Tensile vibration — Sonic-pulse propagation method</i>	1997	ISO 6721-9
BS ISO 6721-10	323G	<i>Plastics — Determination of dynamic mechanical properties — Part 10: Complex shear viscosity using a parallel-plate oscillatory rheometer</i>	1999	ISO 6721-10
BS EN ISO 899-1	324A	<i>Plastics — Determination of creep behaviour — Part 1: Tensile creep</i>	2003	ISO 899-1
BS EN ISO 899-2	324B	<i>Plastics — Determination of creep behaviour — Part 2: Flexural creep by three-point loading</i>	2003	ISO 899-2
BS EN ISO 527-3	326A to 326C, 326E	<i>Plastics — Determination of tensile properties — Part 3: Test conditions for films and sheets</i>	1996	ISO 527-3
BS EN ISO 527-4	326F	<i>Plastics — Determination of tensile properties — Part 4: Test conditions for isotropic and orthotropic fibre reinforced plastic composites</i>	1997	ISO 527-4
BS EN ISO 527-5	326G	<i>Plastics — Determination of tensile properties — Part 5: Test conditions for unidirectional fibre-reinforced composites</i>	1997	ISO 527-5
327A	—	<i>Part 3: Mechanical properties — Determination of tensile strength and elongation at break polytetrafluoroethylene (PTFE) products</i>	1993 (2002)	—
332A	—	<i>Part 3: Mechanical properties — Stiffness of plastics film (obsolescent)</i>	1976 (1983)	—
BS EN ISO 178	335A	<i>Plastics — Determination of flexural properties</i>	2003	—
BS EN ISO 6721-3	338A	<i>Plastics — Determination of dynamic mechanical properties — Part 3: Flexural vibration — Resonance-curve method</i>	1996	—
340A/B	—	<i>Mechanical properties — Part 3: Determination of shear strength of moulding material — Determination of shear strength of sheet material</i>	1978 (2002)	—
341A	—	<i>Mechanical properties — Part 3: Determination of apparent interlaminar shear strength of reinforced plastics</i>	1977 (1999)	—

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