BRITISH STANDARD

BS 6319-9: 1987

Testing of resin compositions for use in construction —

Part 9: Method for measurement and classification of peak exotherm temperature

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Civil Engineering and Building Structures Standards Committee (CSB/-) to Technical Committee CSB/20, upon which the following bodies were represented:

British Adhesives and Sealants Association
British Plastics Federation
Concrete Society
Construction Industry Research and Information Association
County Surveyors' Society
Department of the Environment (Building Research Establishment)
Department of Transport (Highways)
Federation of Epoxy Resin Formulators and Applicators Ltd.
Institution of Civil Engineers
Institution of Highways and Transportation
Institution of Structural Engineers
Plastics and Rubber Institute
Society of Chemical Industry

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Amendments issued since publication

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Contents

Foreword

This Part of BS 6319 has been prepared under the direction of the Civil Engineering and Building Structures Standards Committee. It describes a method for the measurement and classification of the peak exotherm temperature reached during the curing of a sample of a resin composition under standardized, not adiabatic conditions.

The precision of this test method has not been considered in detail. Experience indicates that there is appropriate reproducibility in the test method for the classification.

The significance and interpretation of peak exotherm temperature are described in Appendix A.

This Part of BS 6319 should be read in conjunction with Part 1 which provides general information and describes a method for preparing test specimens.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 and 2, 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 6319 describes a method of measurement for the peak exotherm temperature for resin based materials for use in the construction industry. A general guide-line for the classification of systems as "high, medium or low" exotherm is given in Appendix A.

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

2 Principle

The principle of this method is the determination of the temperature that a resin composition reaches after mixing the component parts together. The maximum temperature reached under standardized but not adiabatic laboratory conditions is recorded and reported as the peak exotherm temperature.

3 Apparatus

3.1 *Temperature measuring devices* with a resolution of 1 °C and calibrated in accordance with BS 4937.

NOTE Two temperature recorders or indicators utilizing thermocouples are most convenient for this method. They should be accurate to within ± 1 % of the scale.

3.2 *Two plastics beakers* each of 600 mL nominal capacity with a wall and base thickness of 2.5 ± 0.75 mm, made from suitable plastics such as polypropylene, polyethylene or polymethylpentene (PMP) depending on the anticipated temperature. Typical dimensions are indicated in Figure 1.

NOTE 600 mL beakers with dimensions varying from those given in Figure 1 may be used, provided that the ratio of the internal diameters at the top and bottom of the beaker is not greater than 1 : 2, the bottom diameter is between 78 mm and 95 mm inclusive.

3.3 *Expanded polystyrene slab* of minimum thickness 25 mm.

4 Test specimens

The preparation of test specimens, including the conditioning, proportioning and mixing of materials, shall be in accordance with BS 6319-1. Calculate quantities of components, as applicable, to give a mixed volume of at least 500 mL.

Place the mixed material in the tared beakers (**3.2**) to give two different thicknesses after placing and compaction (if appropriate) of:

a) 20 ± 1 mm in one beaker; and

b) 50 ± 1 mm in the other beaker.

Weigh the filled beakers to the nearest 1 g and determine and record the mass of the test specimens.

Carry out no further mixing or stirring in the test beakers. Place the beakers on the polystyrene slab (**3.3**) in a draught-free room or laboratory maintained at the test temperature.

5 Procedure

Carry out the test at an air temperature of 20 ± 1 °C unless for a specific purpose an alternative temperature is deemed more appropriate. Maintain whatever test temperature is chosen, at ± 1 °C throughout the test.

For each beaker (**3.2**), take the temperature by inserting the thermocouple end of the temperature measuring device (**3.1**) into the centre of the mixed material. Position the end of the temperature recording device within 5 mm of the radial centre of the beaker and immersed to half the depth of the layer ± 1 mm.

Record the temperature autographically or by observation with careful monitoring such that the maximum temperature reached shall be identified to the nearest 1 °C. Continue the test until a drop in temperature clearly indicates that the maximum temperature has been passed.

5.6 Classification

Classify the composition as "low", "medium" or "high" exotherm, at the temperature tested, as described in Appendix A.

6 Test report

The following information shall be included in the test report:

a) date of test;

b) complete identification of the material tested including type, source, manufacturer's codes, numbers, history, etc.;

c) ambient conditions during the preparation and testing of specimens;

d) the mass of each test portion;

e) the maximum temperature recorded to the nearest 1 °C for each test portion during the test, i.e. the peak exotherm temperatures;

f) classification of the resin composition in accordance with Appendix A.

Appendix A Classification

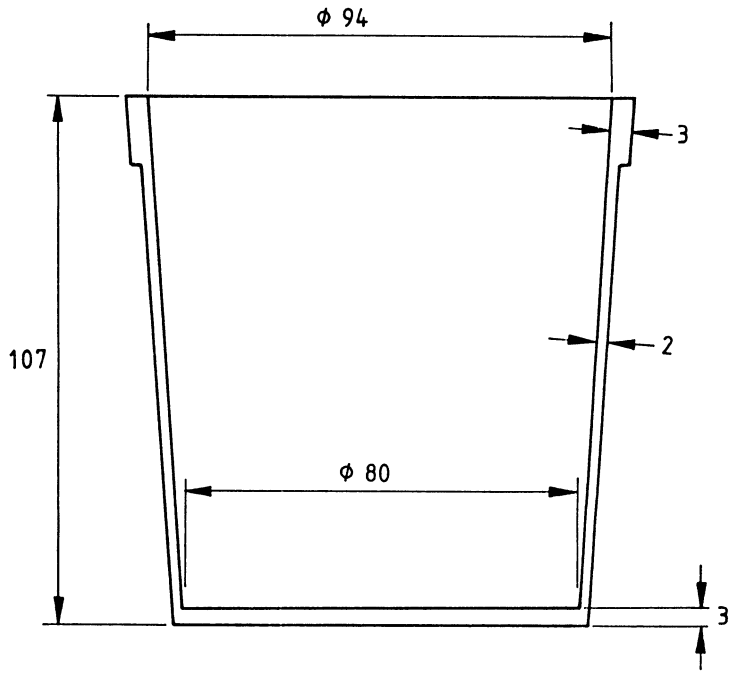
The peak exotherm temperature is a function of the reactivity of a resin composition and the practical significance of this property is that high exotherm systems may be unacceptable if the material is to be used to fill a large void, possibly due to stresses arising when the composition cools from a relatively high temperature. Reactive, high exotherm systems may, however, be quite acceptable when used in small bulk quantities and indeed, may be necessary for some specific low ambient temperature cure situations.

The peak exotherm temperature is, therefore, of practical use in obtaining a relative assessment of the heat that might be generated when using the material on site. A classification based on this method to quantify this relative assessment in general terms (high, medium, low) is given in Table 1.

It should not be assumed that the temperature reached during this test will be reached on site and, in general, temperatures generated on site will be lower due to heat-sink effects.

Table 1 — Classification

Classification	Peak exotherm temperature
Low	Less than 10 °C above ambient for a 20 mm specimen *and* less than 20 °C above ambient for a 50 mm specimen
Medium	Less than 15 °C above ambient for a 20 mm specimen *and* less than 30 °C above ambient for a 50 mm specimen
High	More than 15 °C above ambient for a 20 mm specimen *or* more than 30 °C above ambient for a 50 mm specimen



All dimensions are in millimetres.

Figure 1 — Typical beaker for exotherm measurements

Publications referred to

BS 4937, *International thermocouple reference tables.*
BS 6319, *Testing of resin compositions for use in construction.*
BS 6319-1, *Method for preparation of test specimens.*

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W4 4AL