BRITISH STANDARD

BS 6319-7: 1985

Testing of resin compositions for use in construction —

Part 7: Method for measurement of tensile strength

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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 Surveyor's Society
Department of the Environment (Building Research Establishment)
Department of the Environment (Property Services Agency)
Department of the Environment (Transport and Road Research Laboratory)
Federation Epoxy Resin Formulators and Applicators Ltd.
Institution of Civil Engineers
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Plastics and Rubber Institute
Society of Chemical Industry
Coopted member

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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. This Part describes a method for measurement of tensile strength and is one of a series of Parts describing methods for measuring basic physical properties of resin based materials.

This method of test was adapted from ASTM C190 and ASTM C307, and is similar to the optional test for tensile strength previously given in BS 12 "Specification for Portland cement (ordinary and rapid-hardening)" Part 2:1971 "Metric units" (now withdrawn), from which the size and form of specimen and jaws is taken. This method is best suited to relatively brittle material but can nevertheless be used for materials that have a tendency to "neck" in the central portion of the specimen. The test is suitable for quality control and comparative purposes but it does not alone provide sufficient information for direct use in structural design.

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.

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. In particular, attention is drawn to the Health and Safety at Work etc. Act 1974.

Summary of pages

This document comprises of front cover, an inside front cover, pages i and ii, pages 1 to 4, 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 for measurement of the tensile strength of resin based mortars and concretes cast in the form of dumb-bell shaped briquette test specimens.

This method is not applicable to unfilled systems (see note 1), or to materials having fibrous constituents (see note 2) or to materials containing a filler that will not pass through a 3.35 mm test sieve as specified in BS 410.

NOTE 1 The procedure described in Method 320D of BS 2782:Methods 320A to BS 2782:Methods 320F:1976 is suitable for unfilled systems.

NOTE 2 Materials having fibrous constituents often give inconsistent results when tested for tensile strength and should not be assessed using the procedure described in this standard.

NOTE 3 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 6319 the definitions in BS 6319-1 apply together with the following.

2.1
tensile stress

the tensile force carried by the test specimen per unit area of the original cross-sectional area of the central portion of the specimen

2.2
tensile strength

the maximum tensile stress which the test specimen is capable of supporting

3 Principle

The principle of the test is the subjection of test specimens of a defined geometry to a tensile force until failure of the specimen occurs. Measurement of the tensile stress is carried out to determine the tensile strength.

4 Apparatus

4.1 *Tensile testing machine,* power driven and capable of maintaining a jaw separation rate of 1 ± 0.5 mm/min. A continuous indication shall be provided of the force applied to the test specimen, preferably recorded autographically with a permanent indication of the maximum force. The force scale shall be calibrated by a method that ensures that the error does not exceed the requirements for grade A of BS 5214-1. The machine shall be provided with jaws of fixed profile, as detailed in Figure 1, to hold and apply force to the specimens.

4.2 *Moulds*. Moulds shall comply with BS 6319-1 so far as it applies and shall be of a size and shape to produce specimens in accordance with **5.2**.

5 Test specimens

5.1 Preparation of specimens

The preparation of dumb-bell briquette test specimens, including the conditioning, proportioning and mixing of the materials and the conditioning and filling of the mould shall be in accordance with BS 6319-1. The filler when sampled in accordance with BS 812-102 shall pass through a 3.35 mm sieve as specified in BS 410.

5.2 Dimensions of specimens

Test specimens shall be as detailed in Figure 2.

6 Procedure

6.1 Sample

Cast and test a minimum of four test specimens at a time for each prescribed set of conditions.

6.2 Testing

6.2.1 *Temperature.* Carry out the test at 20 ± 1 °C unless, for a specific purpose, an alternative temperature is deemed more appropriate. Maintain the test specimens at the test temperature conditions for not less than 16 h before testing commences.

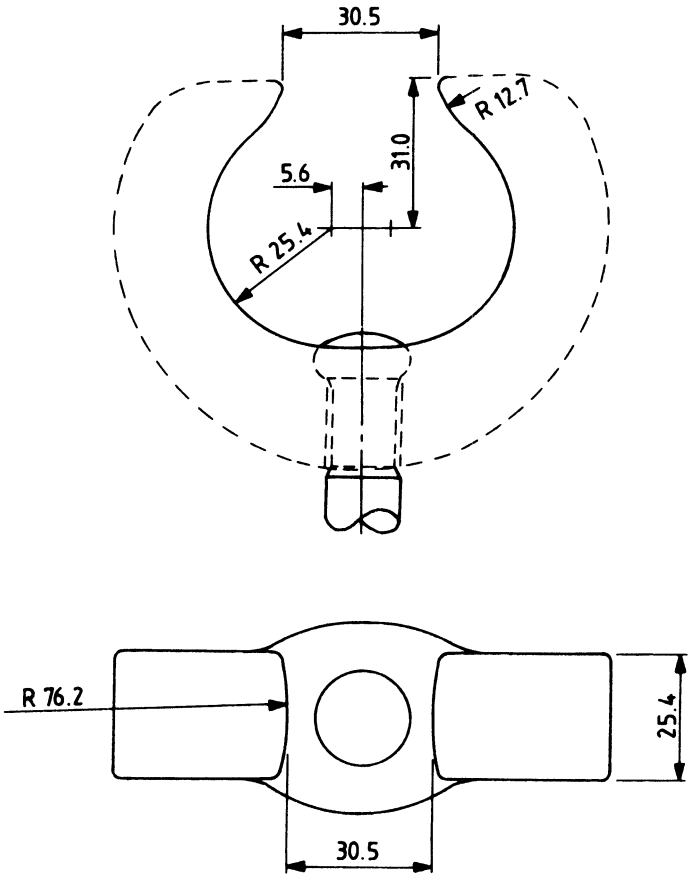
6.2.2 *Measurement and mass.* Measure the width and thickness of the central portion of the dumb-bell briquette test specimens to the nearest 0.1 mm after cleaning off any loosely adhered particles. Weigh each test specimen to determine its mass to the nearest 0.1 g.

6.2.3 *Placing the specimen in the testing machine.* Place the test specimen in the testing machine in axial alignment with the direction of pull and with the specimen positioned symmetrically in the jaws.

NOTE Some inconsistency of results has been attributed to specimens being incorrectly positioned in the jaws.

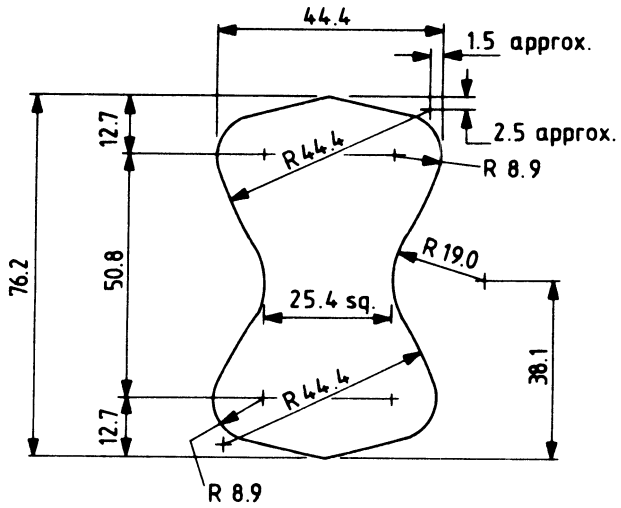
6.2.4 *Loading*. Apply a tensile force to the test specimen such that the jaws separate at a rate of 1 ± 0.5 mm/min until failure occurs. Record the force at break.

Conduct repeat tests at the same rate of loading. If the line of fracture occurs outside the middle-third of the specimen, do not use the result for calculating the tensile strength but declare the result in the test report. Use all other values in the calculations. If less than three valid results are obtained, declare the test to be void. Note the maximum load applied.



NOTE The jaws specified were previously described in BS 12-2:1971 (now withdrawn).

Figure 1 — Jaws for briquette testing machine



NOTE The test specimens specified were previously described in BS 12-2:1971 (now withdrawn).
All dimensions are in millimetres.

Figure 2 — Dimensions of briquette test specimens

7 Calculations

Calculate the tensile strength by dividing the load at failure by the original cross-sectional area. Also calculate the mean tensile strength for a minimum of three test specimens, originating from the same mix. Express the values of tensile strength to the nearest 0.1 N/mm^2.

8 Test report

The following information shall be included in the test report:

a) date and site of sample preparation;

b) date of test;

c) age of test specimen when tested (to the nearest hour, if less than 3 days old);

d) ambient conditions during the preparation and testing of the test specimens, and the curing regime adopted;

e) a complete identification of the material tested including type, source, manufacturer's code numbers and history;

f) mean cross-sectional area of central portion of each test specimen;

g) mass of each test specimen to the nearest 0.1 g;

h) tensile strength of each valid test specimen;

i) arithmetic mean tensile strength;

j) breaking loads, including those results excluded from the calculations because of the location of the fracture;

k) visible defects on the surface of the test specimen and in the failure plane.

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Publications referred to

BS 410, *Specification for test sieves.*
BS 812, *Testing aggregates.*
BS 812-102, *Methods for sampling.*
BS 2782, *Methods of testing plastics.*
BS 2782:Methods 320A to 320F, *Determination of tensile strength, elongation and elastic modulus.*
BS 5214, *Testing machines for rubbers and plastics.*
BS 5214-1, *Constant rate of traverse machines.*
BS 6319, *Testing of resin compositions for use in construction.*
BS 6319-1, *Method for preparation of test specimens.*
ASTM C190, *Standard test method for tensile strength of hydraulic cement mortars*[1)].
ASTM C307, *Standard test method for tensile strength of chemical-resistant mortars*[1)].

[1)] Referred to in the foreword only.

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