METHODS OF TESTING VULCANIZED RUBBER

PART D4. DETERMINATION OF CROSS-BREAKING STRENGTH OF EBONITE

B.S. 903 : Part D4 : 1965

£1.

Price [illegible]/- net

BRITISH STANDARDS INSTITUTION

INCORPORATED BY ROYAL CHARTER

BRITISH STANDARDS HOUSE, 2 PARK ST., LONDON, W.1

TELEGRAMS: STANDARDS LONDON W1 TELEPHONE: MAYFAIR 9000

THIS BRITISH STANDARD, having been approved by the Rubber Industry Standards Committee and endorsed by the Chairman of the Chemical Divisional Council, was published under the authority of the General Council on 2nd August, 1965.

B.S. 903, first published, June, 1940.
B.S. 903, first revision, October, 1950.
First published as B.S. 903 : Part D4, July, 1957.
First revision, August, 1965.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 4000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook, price 15s. The B.S. Yearbook may be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standard:

B.S. 1610. Methods for the load verification of testing machines.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following B.S.I. references relate to the work on this standard:
Committee references RUC/10 and RUC/10/6
Draft for comment D63/8875

CO-OPERATING ORGANIZATIONS

The Rubber Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government department and scientific and industrial organizations:

*Federation of British Rubber and Allied Manufacturers
*Institution of the Rubber Industry
*Ministry of Aviation
Natural Rubber Bureau
*Natural Rubber Producers' Research Association
Rubber Growers' Association
*Rubber and Plastics Research Association of Great Britain
*Society of Motor Manufacturers and Traders Ltd.

The Government department and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Association of British Chemical Manufacturers
Association of British Ebonite Manufacturers
British Cellular Rubber Manufacturers' Association
British Chemical Plant Manufacturers' Association
British Railways Board
British Rubber and Resin Adhesive Manufacturers' Association
Electrical Research Association
Institution of Chemical Engineers
Institution of Mechanical Engineers
Institution of Mechanical Engineers (Automobile Division)
Institution of Municipal Engineers
Institution of Water Engineers
Ministry of Defence, Air Force Department
Ministry of Defence, Army Department
Ministry of Defence, Navy Department
Ministry of Housing and Local Government
National College of Rubber Technology
Post Office
Royal Institute of Chemistry
Rubber Trade Association of London

BRITISH STANDARD

METHODS OF TESTING VULCANIZED RUBBER

Part D4. Determination of Cross-breaking Strength of Ebonite

FOREWORD

This British Standard has been published under the authority of the Rubber Industry Standards Committee. In deciding to issue a revision of the 1950 edition, the committee considered it desirable to publish B.S. 903 in separate parts and Part 35 of 1950 was replaced by Part D4 of 1957.

The method of Part D4 has been in use for many years in the industry but it has some practical disadvantages and is subject to appreciable error as a measure of cross-breaking strength. Consequently the results of tests cannot be compared accurately with those obtained by the methods applied to other materials. The method of this part is essentially the same as method 304A of B.S. 2782, ' Methods of testing plastics ', and has also been submitted for consideration to the International Organization for Standardization (ISO).

The group of parts to which this part belongs covers methods of testing ebonite and is marked with the prefix letter D.

SECTION 1. SUMMARY AND EXPLANATORY NOTE

1.1 This method is for measuring the maximum calculated surface stress in bend when the test piece is subjected to three-point loading.

SECTION 2. TEST PIECE

2.1 The test piece shall be a rectangular bar of minimum length 120 mm, of width $15 \pm 0{\cdot}2$ mm and of thickness $9 \pm 0{\cdot}1$ mm.

The variation in width and thickness of an individual test piece shall be not greater than 0·1 mm.

Any test piece falling outside these limits or exhibiting any flaws or defects shall be discarded.

All significant surfaces of the test piece shall have a fine ground finish.

SECTION 3. NUMBER OF TEST PIECES

3.1 Three test pieces shall be tested.

SECTION 4. APPARATUS

4.1 The test piece supports shall consist of two V-shaped hard metal supports placed 100 ± 0·2 mm apart. The bearing edges of these supports shall be rounded to a radius 3 ± 0·2 mm and shall be wider than the width of the test pieces.

4.2 The loading foot shall be similar to the fixed supports and shall be positioned within 0·2 mm of the midpoint between the supporting edges and parallel to them.

4.3 The loading foot shall be attached to the moving clamp of a machine capable of applying normally to the test piece a steadily increasing force up to the breaking point of the test piece, and of indicating the maximum force reached. The instrument shall meet the requirements of Grade B of B.S. 1610*.

SECTION 5. PROCEDURE

5.1 Measurement of test pieces. The width and thickness of the test piece shall be measured to the nearest 0·1 mm.

5.2 Conditioning of samples and test pieces. Tests should not be carried out less than 24 hours after vulcanization, and for accurate comparison between different ebonites it may be necessary that these are tested at substantially the same interval after vulcanization. Samples and test pieces shall be protected from light as completely as possible during the interval between vulcanization and testing.

The test pieces shall be conditioned at a temperature of 20 ± 5°C for not less than 18 hours immediately before test.

NOTE. A temperature of 20 ± 5°C for conditioning and testing is not practicable for all countries. In tropical countries an alternative temperature of 27 ± 5°C is permitted.

5.3 Determination of cross-breaking strength. The test piece shall be placed symmetrically across the fixed supports with one of the 15 mm wide faces in contact with the supports.

The force shall be applied uniformly across the width of the test piece and shall be increased steadily at such a rate that the maximum force is reached in 30 ± 15 s. This shall be recorded.

SECTION 6. TEMPERATURE OF TEST

6.1 The test shall be carried out at a temperature of 20 ± 5°C.

NOTE. A temperature of 20 ± 5°C for conditioning and testing is not practicable for all countries. In tropical countries an alternative temperature of 27 ± 5°C is permitted.

* B.S. 1610, ' Methods for the load verification of testing machines '.

SECTION 7. CALCULATION OF RESULTS

7.1 The cross-breaking strength of the test piece shall be calculated as follows:

$$\text{Cross-breaking strength (kgf/cm}^2\text{)} = \frac{1{\cdot}5FL}{BD^2}$$

where F = maximum force in kg force,
L = distance between supports in cm,
B = width of test piece in cm,
D = thickness of test piece in cm.

The cross-breaking strength of the material under test shall be deemed to be the median of the cross-breaking strengths of the test pieces.

SECTION 8. REPORT

8.1 The report shall state:

(1) The cross-breaking strength of the material in kgf/cm^2.
(2) The temperature of test, if other than 20 $\pm$ 5°C.
(3) The individual test results.

BRITISH STANDARDS INSTITUTION

The British Standards Institution was founded in 1901 and incorporated by Royal Charter in 1929.

The principal objects of the Institution as set out in the charter are to co-ordinate the efforts of producers and users for the improvement, standardization and simplification of engineering and industrial materials; to simplify production and distribution; to eliminate the waste of time and material involved in the production of an unnecessary variety of patterns and sizes of articles for one and the same purpose; to set up standards of quality and dimensions, and to promote the general adoption of British Standards.

In carrying out its work the Institution endeavours to ensure adequate representation of all viewpoints. Before embarking on any project it must be satisfied that there is a strong body of opinion in favour of proceeding and that there is a recognized need to be met.

The Institution is a non-profit-making concern. It is financed by subscriptions from firms, trade associations, professional institutions and other bodies interested in its work, by a Government grant and by the sale of its publications. The demands on the services of the Institution are steadily increasing and can only be met if continuing and increased financial support is provided.

Membership of the Institution is open to British subjects, companies, technical and trade associations, and local and public authorities.

*Printed in England by Gaylard & Son Ltd, London, S.E.*14