BRITISH STANDARD

METHODS OF TESTING VULCANIZED RUBBER

PART D 6. DETERMINATION OF INDENTATION & RECOVERY NUMBER OF EBONITE

B.S. 903 : Part D 6 : 1958

£1.

Price 1/- net

BRITISH STANDARDS INSTITUTION

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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 31st January, 1958.

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.

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This standard makes reference to the following British Standard:

B.S. 891 Direct reading hardness testing (Rockwell principle).

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 reference RUC/10 Draft for comment CX(RUC) 7682

CO-OPERATING ORGANIZATIONS

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

Board of Trade
*British Rubber Producers' Research Association
*Federation of British Rubber and Allied Manufacturers
*Institution of the Rubber Industry
*Ministry of Supply
Natural Rubber Development Board
*Research Association of British Rubber Manufacturers
*Rubber Growers' Association

The Government departments 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:—

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BRITISH STANDARD

METHODS OF TESTING VULCANIZED RUBBER

Part D 6. Determination of Indentation and Recovery Number of Ebonite

FOREWORD

This British Standard has been prepared under the authority of the Rubber Industry Standards Committee.

In deciding to issue a revision of the 1950 edition it has been considered desirable to publish B.S. 903 in separate parts and the present part is a new method.

The group of parts in which prefix letter D is used covers methods of testing the physical properties of ebonite.

SECTION 1. SUMMARY AND EXPLANATORY NOTE

In this test, a minor load is applied to a hardened steel ball penetrator and causes an indentation in the test piece. While the minor load is still operating, it is augmented by a major load with resulting increase in the depth of indentation. This increase in indentation, measured in units of 0·002 mm whilst the total load is still operating, is the indentation number of the material.

The major load is then removed, leaving the minor load still operating. The resulting decrease in indentation, measured in units of 0·002 mm, is the recovery number of the material.

The method is not suitable for materials of which the indentation number exceeds 200.

SECTION 2. TEST PIECE

The test piece shall have its upper and lower surfaces flat, smooth and parallel to each other. It shall be not less than 3 mm thick and at least 12 mm square or 12 mm in diameter.

SECTION 3. APPARATUS

The apparatus shall be a direct reading hardness testing machine complying with the requirements of B.S. 891,* except that a ball penetrator of

* B.S. 891, 'Method for direct reading hardness testing (Rockwell principle)'.

¼ in. (6.35 mm) diameter shall be used. The minor load shall be 10 kg and the major load 50 kg, giving in a total load of 60 kg.

SECTION 4. PROCEDURE

4.1 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 to ensure 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.

If the test is to be carried out at a temperature other than 20°C the test pieces shall finally be conditioned for one hour at the test temperature immediately before the test.

NOTE. See Note under Section Five, Temperature of test.

4.2 Determination of indentation number. The test piece shall be placed on the flat anvil of the machine in such a manner that it is adequately supported. The minor load shall be applied gradually and progressively to the test piece and the scale of the depth indicator shall then be set to zero.

With the minor load still operating and without disturbing the position of the test piece, the major load shall then be applied gradually and progressively during 4 to 5 seconds. The total load shall be maintained for 15 seconds and the reading of the needle of the depth indicator shall be recorded as the indentation number.

4.3 Determination of recovery number. The major load shall then be gently removed, leaving the minor load still operating, and after 15 seconds the reading of the needle shall be noted.

The difference between the indentation number and this reading shall be recorded as the recovery number.

4.4 Number of tests. Four measurements of indentation number and recovery number shall be made at different points on the surface of the test piece or test pieces, care being taken that no measurement is within 5 mm of an edge of the test piece or of any other impression.

The average of the four measurements shall be reported.

SECTION 5. TEMPERATURE OF TEST

The determination shall normally be made 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 therefore permitted.

SECTION 6. REPORT

The report shall state:

1. Indentation number.
2. Recovery number
3. Number of test pieces.
4. Thickness of test piece.
5. Temperature of test if other than 20 ± 5°C.

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

PD 3076

Amendment No. 1, published 12 June, 1958

to B.S. 903 : 1958

Methods of testing vulcanized rubber

Part D 6 : 1958 Indentation and recovery number of ebonite

Revision

Title. Amend to read: ' Determination of indentation number and recovery number of ebonite.'

Section 1. Add further paragraphs as follows:

For some purposes recovery number is more discriminating and informative than indentation number. In such cases the latter, although determined in the course of the test, may be discarded.

Indentation number is more sensitive than recovery number to certain variations of conditioning and test procedure. For this reason alternatives are given in Sections 4 and 5 for *(a)* the minimum period after vulcanisation at which the test is carried out and *(b)* the tolerances on the temperatures of conditioning and test. When the indentation number is to be discarded it may be convenient to adopt the less restricted conditions.

Section 2. Last line. In each case amend ' 12 mm ' to ' 20 mm.'

Section 4. Clause 4.1. Amend paragraph 1 to read:

' Indentation tests should not be carried out less than 10 days after vulcanization or recovery tests less than 24 hours after vulcanization. For accurate comparison . . . '

Amend paragraph 3 to read:
' . . . 20 ± 2°C for indentation tests and 20 ± 5°C for recovery tests . . . '

Clause 4.2 Amend paragraph 1 to read: ' The test piece shall be placed on the anvil in such a manner that it is adequately supported immediately below the point at which the load is applied.'

Section 5. Amend this to read:

'. . . 20 ± 2°C for indentation tests and 20 ± 5°C for recovery tests.'

In the note delete ' ± 5° ' in both cases.

Section 6. Item 5. Delete ' ± 5°.'