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Rubber, unvulcanized — Determination of plasticity — Rapid plastimeter method

Caoutchouc non vulcanisé — Détermination de l'indice rapide de plasticité — Méthode au plastomètre

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2007 was developed by Technical Committee ISO/TC 45, *Rubber and rubber products.*

This second edition was submitted directly to the ISO Council, in accordance with clause 5.10.1 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 2007-1975), which had been approved by the member bodies of the following countries :

Australia	Israel	Sweden
Austria	Italy	Switzerland
Egypt, Arab Rep. of	Malaysia	Turkey
France	Netherlands	United Kingdom
Germany, F. R.	New Zealand	USA
Greece	South Africa, Rep. of	USSR
Hungary	Spain	
India	Sri Lanka	

No member body had expressed disapproval of the document.

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Rubber, unvulcanized — Determination of plasticity — Rapid plastimeter method

1 Scope and field of application

This International Standard specifies a method for the rapid determination of the plasticity of raw rubber and unvulcanized compounded rubber.

2 Reference

ISO 1796, *Rubber, raw — Sample preparation.*

3 Principle

Rapid compression of a disk-shaped test piece between small parallel platens to a fixed thickness of 1 mm. Maintenance of the compression for 15 s to enable the test piece to reach approximate temperature equilibrium with the platens. Subjection of the test piece to a constant compressive force for 15 s; its thickness at the end of this period is taken as the measure of plasticity.

4 Apparatus

4.1 Parallel plate plastimeter, consisting of the following elements :

4.1.1 Two parallel circular platens, having smooth flat surfaces, movable in relation to each other, both provided with a suitable means of heating, and a jacket so that the material being tested and the area surrounding it may be maintained at the specified test temperature.

One of the two platens shall be a right cylinder of stainless steel and shall have one of the following diameters : 7,3, 10,0 or 14,0 mm (tolerance ± 0,02 mm); its effective depth shall be 3,2 ± 0,25 mm. The diameter shall be selected so that the measured plasticity (see clause 9) lies between 20 and 85. The other platen may be of chromium-plated bronze and shall be of a larger diameter than the first platen.

4.1.2 Means for moving one or other of the two platens normal to its surface, to compress the test piece to a thickness of 1,00 ± 0,01 mm.

The mode of movement of the platen and the forces applied in this operation shall be such that, with or without the test piece in place, the movement is always completed within a period of 2 s. A force of at least 300 N is required and may be conveniently provided by springs.

4.1.3 Means of applying to one or other platen a test force of 100 ± 1 N normal to its surface to compress the test piece.

4.1.4 Means for indicating the thickness of the test piece to the nearest 0,01 mm when it is between the platens.

4.1.5 Timing device, so that the test may be timed in seconds to an accuracy of 0,2 s.

4.2 Punch, for preparation of the test pieces.

The purpose of the punch is to produce test pieces of approximately constant volume quickly and without difficulty. The punch shall consist of a flat-ended cylindrical anvil and a coaxial tubular knife moving independently of one another; a single action of the handle shall compress a portion of the material to a thickness of approximately 3 mm and shall cut out a disk of approximately 13 mm diameter. The test piece need only be approximately constant in volume because the final shaping to exact dimensions is carried out in the instrument during the pre-heating period.

5 Test piece

Raw rubber shall be homogenized when comparative tests are to be carried out.

The preparation and homogenization of the sample shall be effected in accordance with the provisions of ISO 1796.

The test piece shall be a disk of rubber approximately 13 mm in diameter and approximately 3 mm thick, having a volume of 0,40 ± 0,04 cm^3.

If the specified thickness is attained by compressing an initially thicker sheet, the latter shall be not more than 4 mm thick.

6 Calibration

The settings of the rapid plastimeter shall be checked against the maker's instructions. The loading spring shall be recalibrated (100 ± 1 N) every 6 weeks, and the timing unit (pre-heating time $15\ ^{+1}_{\ 0}$ s, and test period 15 ± 0,2 s) every 4 weeks. The position of the top platen shall be checked before each test.

7 Procedure

Place two pieces of bleached, unglazed, acid-free tissue paper (about 17 g/m^2) between the heated platens and set the thickness measuring device to zero when the platens are closed. Then insert the test piece (clause 5) between the two pieces of tissue paper, and place the whole between the heated platens. Compress the test piece to a thickness of 1,00 ± 0,01 mm, holding it in the compressed state for a pre-heating period of 15 $^{+1}_{0}$ s.

On completion of the pre-heating period, apply a test force of 100 ± 1 N to the movable platen for a period of 15 ± 0,2 s. At the end of this time, measure the thickness of the test piece. Take the reading of the gauge pointer at the end of the test period, immediately before the locking mechanism operates.

8 Temperature of test

Unless otherwise stated, the test shall be carried out at 100 ± 1 °C.

9 Expression of results

The median value of the thickness of three test pieces at the end of the 15 s compression period, expressed in hundredths of a millimetre, shall be taken as the rapid plasticity number.

10 Test report

The test report shall include the following particulars :

a) a reference to this International Standard;

b) the rapid plasticity number, expressed as specified in clause 9;

c) the size of platen used (as given in 4.1.1);

d) the temperature of test.