International Standard

ISO 2930

Raw, natural rubber — Determination of the plasticity retention index (PRI)

Caoutchouc naturel brut — Détermination de l'indice de rétention de plasticité (PRI)

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Foreword

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This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 3, *Raw materials (including latex) for use in the rubber industry*.

This sixth edition cancels and replaces the fifth edition (ISO 2930:2017), which has been technically revised.

The main changes are as follows:

— subclause 5.4, “Laboratory mixing mill”, has been updated;

— subclause 5.7 has been updated, replacing “Tissue paper, as described in ISO 2007” by “Bleached, acid-free tissue paper, of approximately 27 g/m^2”.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Raw, natural rubber — Determination of the plasticity retention index (PRI)

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to determine any national regulatory conditions applicable before use.

1 Scope

This document specifies a method to determine the plasticity retention index (PRI) of raw natural rubber.

The PRI is a measure of the resistance of raw natural rubber to thermal oxidation. A high resistance to thermal oxidation is shown as a high value of the index. PRI is not an absolute value and cannot give an absolute classification of plasticity number of different natural rubber after oxidation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1795, *Rubber, raw natural and raw synthetic — Sampling and further preparative procedures*

ISO 2007, *Rubber, unvulcanized — Determination of plasticity — Rapid-plastimeter method*

ISO 2393, *Rubber test mixes — Preparation, mixing and vulcanization — Equipment and procedures*

ISO 23529:2016, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
plasticity number
measure of plasticity, based upon the height of a test piece after being subjected to deformation under specified conditions of compressive force, time and temperature

[SOURCE: ISO 1382:2020, 3.359]

3.2
plasticity retention index
PRI
ratio of the *plasticity number* (3.1) measured after air-oven ageing for 30 min at 140 °C to the plasticity number before oven ageing

[SOURCE: ISO 1382:2020, 3.360]

4 Principle

The rapid plasticity numbers of unaged test pieces and test pieces aged by heating in an oven at 140 °C for 30 min are determined using a parallel-plate plastimeter with a platen of diameter 10 mm, following the procedure specified in ISO 2007.

The PRI is the ratio of the rapid plasticity numbers before and after the heating multiplied by 100.

5 Apparatus

The usual laboratory apparatus and, in particular, the following shall be used.

5.1 Parallel-plate plastimeter, with a platen of 10 mm diameter, as specified in ISO 2007.

5.2 Punch, capable of compressing a portion of the material being tested to a thickness of approximately 3 mm and cutting out a disc of approximately 13 mm in diameter for the preparation of test pieces, as specified in ISO 2007.

5.3 Thickness gauge, having a scale graduated in unit divisions of 0,01 mm, fitted with a flat contact of 10 mm diameter and operating with a pressure of (20 ± 3) kPa.

5.4 Laboratory mixing mill, priority to the following characteristics, or minimally in conformity with the requirements of ISO 2393.

— roll diameter: 150 mm to 250 mm;

— linear speed of back (fast) roll: (14,6 ± 0,5) m/min;

— roll speed ratio: 1:1,4;

— temperature: (27 ± 3) °C;

— roll length between guides: (265 ± 15) mm.

5.5 Oven, meeting the following requirements at 140 °C.

— The temperature in the vicinity of the test pieces shall be controllable to within ±0,5 °C over a period of 30 min.

— Following insertion of the tray plus dishes into the oven, the temperature of the oven shall recover, and that of the tray plus dishes increase, to within 1 °C of the set temperature within 5 min.

— The air shall be changed 10 times per hour. Alternatively, the air flap of the oven should be set as semi-open.

NOTE Additional information on the air change in an oven is given in Annex A.

5.6 Lightweight aluminium dishes and tray, with a low thermal capacity.

A suitable size of either a tray or dishes, or both, should be used depending on the size of the oven.

5.7 Bleached, acid-free tissue paper, of approximately 27 g/m^2, or **cigarette paper** of 22 g/m^2 to 26 g/m^2 cut into two equal pieces (approximately 30 mm × 45 mm).