



**International
Standard**

ISO 7681

**Natural rubber field latex —
Determination of dry rubber content**

*Latex de plantation de caoutchouc naturel — Détermination de
la teneur en caoutchouc sec*

**First edition
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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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*.

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.

Natural rubber field latex — Determination of dry rubber content

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 applicable national regulatory conditions prior to use.

1 Scope

This document specifies a method for the determination of the dry rubber content of natural rubber field latex. The method is not suitable for latices from natural sources other than *Hevea brasiliensis*, or for compounded latex, vulcanized latex or artificial dispersions of rubber.

2 Normative references

There are no normative references in this document.

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 field latex

natural rubber latex with or without a preservative and prior to concentration or any other processing

Note 1 to entry: The preservative is added to maintain the original state of the latex as it came from the tree.

[SOURCE: ISO 1382:2020, 3.195]

3.2 dry rubber content DRC

(rubber latex) concentration of rubber in a latex or latex compound, usually expressed as a percentage by mass

[SOURCE: ISO 1382:2020, 3.156]

4 Principle

A sample of natural rubber field latex is coagulated, the non-rubber matter is removed and the rubber is dried. The dry rubber content is obtained by expressing the mass of dried coagulum as a percentage of the mass of latex.

5 Apparatus

Ordinary laboratory apparatus and the following.

5.1 Dish, preferably made of glass, porcelain or aluminium approximately 100 mm in diameter and 50 mm deep.

NOTE Dishes made of aluminium are unsuitable for use with field latex containing potassium hydroxide.

5.2 Oven, capable of being maintained at $70\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

5.3 Desiccator.

5.4 Steam-bath, or water bath.

5.5 Analytical balance, capable of being read to 1 mg.

5.6 Suitable roller, such as stainless-steel roller.

5.7 Thickness gauge.

6 Reagent

Use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

6.1 Acetic acid, with a volume fraction of 2,0 %.

6.2 Ethanol, with a volume fraction of 95 %.

7 Procedure

7.1 General

Into the dish, weigh by difference, to the nearest 1 mg, approximately 15 g of the sample. Rotate the dish slowly so that the latex covers the bottom of the dish.

Slowly add sufficient acetic acid down the inside edge of the dish, to bring about complete coagulation of the latex. While adding the acid, slowly rotate the dish and at frequent intervals, gently swirl its content.

Allow the content of the dish to stand until the coagulum becomes sufficiently firm for handling.

Place a watch-glass on the dish and heat on a water bath, heated not exceeding $70\text{ }^{\circ}\text{C}$ for 15 min to 30 min. If the serum remains milky, add 5 cm^3 of the ethanol.

When the serum is clear, collect any small particles of coagulated rubber by rubbing with the main bulk. Then, proceed in accordance with either method A (7.2) or method B (7.3).

7.2 Method A: Sheetting by hand

Press the coagulated rubber to expel water and obtain a uniform sheet not exceeding about 2 mm in thickness by pressing with suitable roller. A suitable method is to place the coagulated rubber carefully on a glass plate and with a glass stopper about 45 mm in diameter, or any suitable roller made of an inert material, to press first around the circumference and then work towards the centre. Another suitable method is by passing the rubber between rolls.

Wash the sheet thoroughly with water and then allow it to drip for a few minutes before hanging in an oven set at $70\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ to dry until the sheet becomes translucent.

NOTE Thorough washing is achieved by immersing the sheet in a container of water placed under a running tap for 15 min.

Cool the dried sheet in a desiccator and weigh. Repeat the drying until the loss in mass is less than 1 mg after heating for 30 min.

If the sheet becomes excessively sticky and it is suspected that significant oxidation is taking place at 70 °C, repeat the procedure at a lower drying temperature, such as 55 °C.

7.3 Method B: Mechanical sheeting

Where a suitable laboratory mill is available, sheeting can be carried out mechanically rather than by hand. The mill should be provided with two smooth stainless steel even speed rolls, rotating at between 40 rev/min and 50 rev/min, nip control and a continuous spray of water. The mill should be fitted with a stainless-steel tray with a stainless-steel wire mesh of 180 µm average size over the outlet to entrap particles of coagulum that become detached from the bulk. These should be returned to the bulk of the coagulum.

Squeeze the coagulated rubber between the fingers and then pass it several times through the mill, gradually tightening the mill after every few passes, and making sure that no pieces of rubber remain on the tray or the mesh. Continue until a uniform fine crepe of about 2 mm in thickness is obtained.

Allow the crepe to drip for a few minutes before hanging in an oven, set at 70 °C ± 5 °C to dry until the sheet becomes translucent.

Cool the dried sheet in a desiccator and weigh. Repeat the drying until the loss in mass is less than 1 mg after heating for 30 min.

If the sheet becomes excessively sticky and it is suspected that significant oxidation is taking place at 70 °C, repeat the procedure at a lower drying temperature, such as 55 °C.

8 Expression of results

The dry rubber content, *DRC*, is expressed as a mass fraction percentage, and is calculated with [Formula \(1\)](#).

$$DRC = \frac{m_1}{m_0} \times 100 \quad (1)$$

where

m_0 is the mass of the test portion, expressed in grams;

m_1 is the mass of the dry rubber, expressed in grams.

The results of duplicate determinations shall not differ by more than 0,2 %.

9 Precision

See [Annex A](#).

10 Test report

The test report shall include the following:

- a reference to this document, i.e. ISO 7681:2024;
- all details necessary for identification of the test sample;
- the average value of the results and the units in which they have been expressed;
- details of any unusual features noted during the determination;

- e) details of any operation not included in this document to which reference is made, as well as any operation regarded as optional.
- f) the date of the test.

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Annex A (informative)

Precision data

A.1 General

The following interlaboratory testing programme (ITP) was organized in July 2022. All calculations to provide day-to-day repeatability and reproducibility values were performed according to ISO 19983:2022, Method B. Precision concepts and nomenclature are also given in ISO 19983.

A.2 Precision details

A.2.1 General

Six laboratories participated in the ITP organized in July 2022 by the Malaysian Rubber Board (MRB). Homogenized samples of field latex were sent to each laboratory. The bulk latex was filtered and homogenized (thorough blending and stirring), and subsequently sub-sampled into 11 bottles for each participant.

A “type 1” precision was evaluated based on the method of preparation of the latex samples used for the ITP. The time period for day-to-day repeatability and reproducibility was on a scale of days.

The precision data are given in [Table A.1](#). The precision parameters are not used for acceptance or rejection of any group of materials without documentation stating that the parameters are applicable to those particular materials and specific test protocols that include these test methods. The precision is expressed on the basis of a 95 % confidence level for the values established for day-to-day repeatability, r_{DB} , and reproducibility, R .

Table A.1 — Precision data for the determination of dry rubber content in field latex

Average result %	Within laboratory			Between laboratories			Number of laboratories
	s_D	r_{DB}	(r_{DB})	s_R	R	(R)	
31,95	0,021 2	0,060 1	0,188 1	0,079 3	0,224 4	0,702 3	6
Key s_D day-to-day repeatability standard deviation r_{DB} day-to-day repeatability (r_{DB}) relative day-to-day repeatability s_R reproducibility standard deviation R reproducibility (R) relative reproducibility							

A.2.2 Day-to-day repeatability

The day-to-day repeatability, r_{DB} (in measurement units), conditions are where independent test results are obtained with the same method or identical test items in the same laboratory by the same operator using the same equipment.

A.2.3 Reproducibility

The reproducibility, R (in measurement units), conditions are where independent test results are obtained with the same method or identical test items in different laboratories by different operators using different equipment.