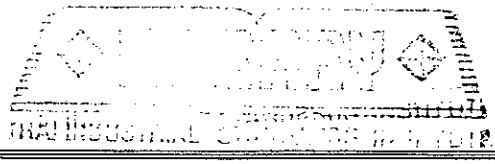
INTERNATIONAL STANDARD

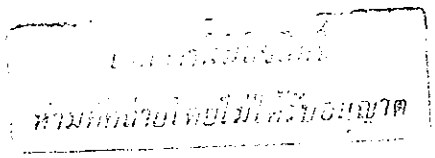
ISO 35

Fifth edition
2004-02-15



Natural rubber latex concentrate — Determination of mechanical stability

Concentré de latex de caoutchouc naturel — Détermination de la stabilité mécanique



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 35 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 fifth edition cancels and replaces the fourth edition (ISO 35:1995), Clauses 8 and 9 of which have been technically revised. The principal changes are the removal of a number of options for the method of assessing the end-point and clarification of the manner in which the result is reported.

Natural rubber latex concentrate — Determination of mechanical stability

WARNING — Persons using this International Standard should be familiar with normal laboratory practice. This standard 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 ensure compliance with any national regulatory conditions.

1 Scope

This International Standard specifies a method for the determination of the mechanical stability of natural rubber latex concentrate. It is also applicable to prevulcanized natural rubber latex concentrate.

The method is not necessarily suitable for latices or prevulcanized latex preserved with potassium hydroxide, latices from natural sources other than *Hevea brasiliensis*, or for compounded latex or artificial dispersions of rubber, and it is not applicable to synthetic rubber latices.

2 Normative references

The following referenced documents are indispensable for the application 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 123, *Rubber latex — Sampling*

ISO 124, *Latex, rubber — Determination of total solids content*

ISO 125, *Natural rubber latex concentrate — Determination of alkalinity*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

3 Terms and definitions

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

3.1

natural rubber latex concentrate

natural rubber latex containing ammonia and/or other preservatives, with the exception of potassium hydroxide, and which has been subjected to some process of concentration

3.2

mechanical stability

time, in seconds, required to initiate visible flocculation under the specified test conditions

4 Principle

A test portion of the latex concentrate is diluted to 55 % by mass total solids content and stirred at high speed. The time required to initiate visible flocculation is recorded, this being regarded as a measure of the mechanical stability.

5 Reagents

The ammonia solutions (5.1 and 5.2) shall be prepared from ammonium hydroxide of recognized analytical reagent quality and shall be stored in closed containers.

Carbonate-free distilled water or water of equivalent purity shall be used for dilution of the latex. Deionized water may be used for the detection of the end-point.

5.1 Ammonia solution containing 1,6 % by mass of ammonia (NH_3), for use with latex concentrate having an alkalinity of at least 0,30 % (with respect to the latex concentrate).

5.2 Ammonia solution containing 0,6 % by mass of ammonia (NH_3), for use with latex concentrate having an alkalinity of less than 0,30 % (with respect to the latex concentrate).

6 Apparatus

Standard laboratory apparatus, plus the following:

6.1 Mechanical stability measuring apparatus,[1] consisting of the items described in 6.1.1 to 6.1.3.

6.1.1 Latex container: A flat-bottomed, cylindrical container at least 90 mm high, with an internal diameter of 58 mm ± 1 mm and a wall thickness of approximately 2,5 mm. The inner surface shall be smooth.

A poly(methyl methylacrylate) or glass container is suitable.

6.1.2 Stirring apparatus, consisting of a vertical stainless-steel shaft of sufficient length to reach the bottom of the latex container (6.1.1) and tapering to approximately 6,3 mm in diameter at its lower end, where an exactly centred, horizontal, smooth, stainless-steel disc, 20,83 mm ± 0,03 mm in diameter and 1,57 mm ± 0,05 mm thick, is attached. The apparatus shall be capable of maintaining a stirring rate of 14 000 rev/min ± 200 rev/min throughout a test, at which frequency the shaft shall not run out of true by more than 0,25 mm.

6.1.3 Holder, for the latex container (6.1.1). The holding arrangement shall ensure that the latex container is held securely, that the axis of the rotating shaft is concentric with that of the container and that the bottom of the stirring disc is 13 mm ± 1 mm from the inner surface of the bottom of the latex container.

6.2 Large Petri dish, with a diameter not less than 150 mm and depth not less than 20 mm. The size of the Petri dish will permit several tests to be carried out in the same dish.

6.3 Pointed rods: Thin rods, of glass or an inert material such as stainless steel, which have been drawn out or machined to a point. The precise dimensions are not important since the function of the rod is to pick up a small droplet of latex.

1) Suitable instruments are available commercially, e.g. from Klaxon Signals Ltd., Honey Pot Lane, Stanmore, HA7 1BE, U.K., Telefax +44 (208) 952 6983. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.

6.4 Means of heating: Use either

— a water bath, capable of maintaining a temperature of 70 °C ± 10 °C;

or

— a glass tube, bent to a shape suitable for insertion in the latex concentrate. together with a means of circulating water at a temperature of 70 °C ± 10 °C through the tube.

6.5 Wire cloth, of stainless steel, complying with the requirements of ISO 3310-1, with an average aperture width of 180 µm ± 7,6 µm.

7 Sampling

Carry out sampling in accordance with one of the methods specified in ISO 123.

NOTE Mechanical stability may be adversely affected by the duration and temperature of storage of the sample.

8 Procedure

8.1 General

Carry out the determination in duplicate within 24 h of first opening the sample bottle. If the total solids content and alkalinity of the latex concentrate are not known, determine them in accordance with ISO 124 and ISO 125, respectively.

NOTE If the concentration of the carbon dioxide in the atmosphere in the vicinity of the mechanical stability measuring apparatus (6.1) is above normal (about 0,03 % by volume), the mechanical stability of the latex will be reduced. This effect may be pronounced at carbon dioxide concentrations as low as 0,05 % by volume. High concentrations of carbon dioxide in the atmosphere may be caused by the proximity of any apparatus which generates carbon dioxide, such as certain types of gas or oil heater.

8.2 Dilution and stirring

Dilute 100 g of latex concentrate, in a glass beaker, to 55,0 % ± 0,2 % by mass with the appropriate ammonia solution (5.1 or 5.2). Without delay, warm the diluted latex with gentle stirring to 35 °C to 37 °C (i.e. slightly above the intended test temperature) by one of the means of heating (6.4). Immediately filter the diluted and warmed latex through the wire cloth (6.5) and weigh 80,0 g ± 0,5 g of the filtered latex into the container (6.1.1). Check the temperature of the latex is 35 °C ± 1 °C. Place the container in the holder (6.1.3) and stir the latex, ensuring that the rotational frequency of the stirrer is 14 000 rev/min ± 200 rev/min throughout the test, until the end-point is passed.

8.3 Determination of end-point

The arrival of the end-point is preceded by a marked decrease in the depth of the vortex around the stirring shaft, accompanied by loss of turbulence and a change in the sound of the stirring action.

Two methods are permitted for the determination of the end-point. Inexperienced operators should have the method of determining the end-point demonstrated to them.

a) **Palm-of-the-hand method:** Determine the end-point by removing a drop of the latex with a clean glass rod at intervals of 15 s and gently spreading the sample on the palm of the hand. Take the end-point as the first appearance of flocculum. Confirm the end-point by the presence of an increased amount of flocculum in a sample taken after stirring the latex for an additional 15 s.

b) **Dispersibility-in-water method**: Take a large Petri dish (6.2) and introduce 100 cm^3 to 150 cm^3 of water. It will facilitate observation of the end-point if the Petri dish is standing on a dark surface such as black paper. Using a pointed rod (6.3), pick up a small drop of latex and immediately touch the surface of the water with it. If the latex has not started to flocculate, it will disperse within a few seconds to give a milky cloud. If flocculation has commenced, the droplet will generally remain on the surface of the water without dispersing. If it should start to disperse, then particles of flocculum will be readily apparent to the naked eye.

9 Expression of results

Express the mechanical stability time of the latex concentrate as the number of seconds between the start of stirring and the end-point.

Calculate the mean of the two determinations. If the results of the duplicate determinations do not agree to within 5 % of their mean value, the test shall be repeated.

10 Test report

The test report shall include the following particulars:

a) a reference to this International Standard;

b) all details necessary for the identification of the test sample;

c) the method used for determining the end point [8.3 a) or 8.3 b)];

d) the mean mechanical stability time of the latex concentrate, quoted to the nearest 15 s;

e) any unusual features noted during the determination;

f) details of any operation not included in this International Standard or in the International Standards to which reference is made, as well as details of any procedure regarded as optional;

g) the date of the test.

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AMENDMENT 1
2006-02-01

Natural rubber latex concentrate — Determination of mechanical stability

AMENDMENT 1: Precision data

Concentré de latex de caoutchouc naturel — Détermination de la stabilité mécanique

AMENDEMENT 1: Données de fidélité

Reference number
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Natural rubber latex concentrate — Determination of mechanical stability

AMENDMENT 1: Precision data

Page 1, Clause 2

Add the following reference:

ISO/TR 9272, *Rubber and rubber products — Determination of precision for test method standards*

Page 4

Add the following new clause, renumbering the test report as Clause 11:

10 Precision statement

10.1 The precision of this method was determined in accordance with ISO/TR 9272. Refer to this document for terminology and explanations of statistical concepts.

10.2 The precision details in this precision statement give an estimate of the precision of this test method with the materials used in the particular interlaboratory programme as described below. The precision parameters should not be used for acceptance/rejection testing of any group of materials without documentation that the parameters are applicable to those particular materials and the specific test protocol of this test method.

10.3 The precision results are given in Table 1. The precision is expressed on the basis of a 95 % confidence level for the values established for repeatability r and reproducibility R.

10.4 The results contained in Table 1 are mean values and give an estimate of the precision of this test method as determined in an interlaboratory test programme (ITP) conducted in 2001. Thirteen laboratories performed triplicate analyses, using the dispersibility-in-water method of end-point determination [see 8.3 b)], on two samples, A and B, which were prepared from highly ammoniated latex. The bulk latex was strained and then homogenized by thorough blending and stirring prior to being sub-sampled into 1-litre bottles labelled A and B. Thus, essentially, samples A and B were the same and were treated as such in the statistical computations. Each participating laboratory was required to carry out the test using these two samples on the dates which had been given to the participants in the ITP.

10.5 A type 1 precision was determined, based on the sampling method used for the latex samples in the ITP.

10.6 Repeatability: The repeatability r (in measurement units) of this test method has been established as the appropriate value tabulated in Table 1. Two single test results, obtained in the same laboratory under normal test conditions, that differ by more than the tabulated value of r (for any given level) shall be considered to have come from different (non-identical) sample populations.

10.7 Reproducibility: The reproducibility R (in measurement units) of this test method has been established as the appropriate value tabulated in Table 1. Two single test results, obtained under normal test conditions, that differ by more than the tabulated value of R (for any given level) shall be considered to have come from different (non-identical) sample populations.

10.8 Bias: In test method terminology, bias is the difference between an average test value and the reference (or true) test property value.

Reference values do not exist for this test method since the value (of the test property) is exclusively defined by the test method. Bias, therefore, cannot be determined for this particular test method.

Table 1 — Estimate of precision of determination of mechanical stability time

Mean	Within laboratory		Between laboratories	
s	s_r	r	s_R	R
1 023	15	43	94	265

$r = 2{,}83 \times s_r$

where r is the repeatability (in measurement units) and s_r is the within-laboratory standard deviation.

$R = 2{,}83 \times s_R$

where R is the reproducibility (in measurement units) and s_R is the between-laboratory standard deviation.