International Standard 2006

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Rubber latex, synthetic — Determination of high-speed mechanical stability

Latex de caoutchouc synthétique — Détermination de la stabilité mécanique à vitesse élevée

Second edition — 1985-12-15

UDC 678.031 : 678.7 : 620.1 : 678.021.122 **Ref. No. ISO 2006-1985 (E)**

Descriptors : rubber, synthetic rubber, latex, tests, physical tests, determination, stability.

Price based on 2 pages

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 2006 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*.

ISO 2006 was first published in 1974. This second edition cancels and replaces the first edition, of which it constitutes a minor revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Printed in Switzerland

Rubber latex, synthetic — Determination of high-speed mechanical stability

1 Scope and field of application

This International Standard specifies a method for the determination of the high-speed mechanical stability of synthetic rubber latex.

The stirring disk which is specified has a greater diameter than that specified for natural rubber latex concentrate in ISO 35, *Rubber latex, natural — Determination of mechanical stability*.

The test is applicable to synthetic rubber latices which have a viscosity, determined with the L instrument in accordance with ISO 1652, of up to 200 mPa·s (200 cP). Latices of higher viscosity shall be tested after dilution to a viscosity of 200 mPa·s (200 cP) or less, provided that such dilution[1] does not reduce the concentration of the latex by more than 10 % (*m*/*m*) total solids.

The duration of stirring shall be so selected that the latex does not increase in temperature to more than 60 °C and does not exceed a height of 100 mm in the latex container. The duration of stirring shall be agreed between the interested parties and shall not be longer than 30 min or less than 1 min. In the case of a latex which contains ammonia, the duration of stirring shall be limited, since loss of ammonia by evaporation during the test may cause additional destabilization.

The test does not necessarily indicate the stability of a synthetic rubber latex to high shear stress, for which a rubbing test may be more applicable.

2 References

ISO 123, *Ruber latex — Sampling.*

ISO 124, *Rubber latices — Determination of total solids content.*

ISO 1652, *Rubber latex — Determination of viscosity.*

3 Principle

A test portion is stirred at high speed.

The amount of coagulum formed is regarded as an inverse measure of the mechanical stability of the latex.

4 Reagent

During the analysis, use only distilled water or water of equivalent purity.

Soap solution, 5 % (*m*/*m*) solution of potassium oleate of pH value 10, or, for use with a latex which is coagulated by potassium oleate solution, 5 % (*m*/*m*) solution of a synthetic anionic or non-ionic surfactant.

5 Apparatus

Ordinary laboratory apparatus and

5.1 Mechanical stability measuring apparatus[2], consisting of the following items:

5.1.1 Latex container, flat-bottomed, cylindrical, at least 100 mm high, with an internal diameter of 58 ± 2 mm and a wall thickness of about 2,5 mm. The inner surface shall be smooth, and a glass container is preferred.

5.1.2 Stirring apparatus, consisting of a vertical stainless steel shaft of sufficient length to reach to the bottom of the latex container (5.1.1) and tapering to approximately 6,3 mm diameter at its lower end, where is attached a horizontal, smooth, stainless steel disk 36,12 ± 0,03 mm in diameter and 1,57 ± 0,05 mm thick by means of a threaded stud at the exact centre of the disk. The apparatus shall maintain stirring at a rotational frequency of 14 000 ± 200 min^{-1} (233 ± 3 s^{-1})[3] throughout the test, at which frequency the shaft shall not run out of the true by more than 0,25 mm.

1) Dilution of the latex decreases its stability because the balance of free and absorbed soap is changed.

2) Suitable instruments are commercially available. Details may be obtained from the secretariat of ISO/TC 45 (BSI).

3) 1 s^{-1} = 1 Hz [= 1 revolution per second (r/s)].

5.1.3 Holder for the latex container (5.1.1). The holding arrangement shall ensure that the axis of the rotating shaft is concentric with that of the latex container and that the bottom of the stirring disk is 13 ± 1 mm from the inner surface of the bottom of the latex container.

5.2 Preliminary filter, of stainless steel wire cloth with an average aperture width of 180 ± 15 µm.

5.3 Test filter, consisting of a disk of stainless steel wire cloth with an average aperture width of 180 ± 15 µm, dried to constant mass and weighed to the nearest 1 mg, firmly clamped between two stainless steel rings of equal internal diameter between 25 and 50 mm.

6 Sampling

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

7 Procedure

If the total solids content of the latex is not known, determine it in accordance with ISO 124.

If the viscosity of the latex determined with the L instrument (according to ISO 1652) exceeds 200 mPa·s (200 cP), dilute it to this or a lower value, with an amount of water which reduces the concentration of the latex by not more than 10 % (m/m) total solids.

Adjust the temperature of the latex to 25 ± 3 °C, pass it through the preliminary filter (5.2) and transfer 50 ± 0,5 g to the latex container (5.1.1).

Place the container in position, and stir the latex, ensuring that the rotational frequency of the stirrer (5.1.2) is 14 000 ± 200 min^{-1} (233 ± 3 s^{-1}) for the agreed time, between 1 and 30 min, and of such duration that the latex does not increase in temperature to more than 60 °C and does not exceed a height of 100 mm in the container. If it is necessary to limit foaming, a paste of a silicone defoamer shall be smeared around the upper portion of the inner surface of the container.

Immediately after the termination of stirring, remove the latex container and wash the stirrer shaft and disk free from latex deposits with the soap solution (clause 4). Wet the test filter (5.3) with the soap solution and pour the latex and washings into the test filter. Use the soap solution to ensure quantitative transfer of all latex and deposits including skin. Wash the residue on the test filter with the soap solution until it is free from latex and then with water until the washings are neutral to litmus. Carefully remove the test filter containing the wet solid matter and swab the underside with filter paper. Dry the test filter and coagulum at 100 ± 5 °C until the change in mass is less than 1 mg after 15 min drying.

8 Expression of results

The high-speed mechanical stability of the latex shall be reported as the percentage of coagulum which is formed. Calculate it as a percentage by mass of the latex, using the formula

$$\frac{m \times 100}{50}$$

where m is the mass, in grams, of coagulum.

9 Test report

The test report shall include the following particulars:

a) reference to this International Standard;

b) identification of the test sample;

c) the results and the manner in which they are expressed;

d) whether the latex required dilution, and the total solids content at which the latex was tested;

e) the duration of stirring, in minutes;

f) the name of the silicone defoamer, if used;

g) any unusual features noted during the determination;

h) any operation not included in this International Standard or in the International Standards to which reference is made, or regarded as optional.