BS 6057 : Part 3 : Section 3.11 : 1984
ISO 1652-1974
UDC 678.031 : 532.133

British Standard

Rubber latices

Part 3. Methods of test
Section 3.11 Determination of viscosity of rubber latices

[ISO title: Rubber latex — Determination of viscosity]

Latex de caoutchouc
Partie 3. Méthodes d'essai
Section 3.11 Détermination de la viscosité du latex de caoutchouc

Kautschuklatex
Teil 3. Prüfverfahren
Abschnitt 3.11 Bestimmung der Viskosität von Kautschuklatex

NOTE. Attention is drawn to BS 6057 : Part 0 'General introduction', issued separately.

National foreword

This Section of BS 6057 is identical with ISO 1652-1974 'Rubber latex — Determination of viscosity', published by the International Organization for Standardization (ISO) and confirmed in 1979. It supersedes BS 4252 : 1967 'Method for the determination of the viscosity of rubber latices' with is withdrawn.

The main change incorporated in this standard is the inclusion of the warning, in the first paragraph of clause **7**, against trapping air when inserting the spindle and guard into the latex.

Terminology and conventions. The text of the international standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Wherever the words 'International Standard' appear, referring to this standard, they should be read as 'British Standard'.

In clause **7** 'rev/min' should be read as 'r/min'.

Cross-reference

International standard	Corresponding British Standard
ISO 124-1974	BS 6057 Rubber latices Section 3.2 : 1981 Determination of total solids content of rubber latices (Identical)

The Technical Committee has reviewed the provisions of ISO 123-1974, to which reference is made in clauses **2** and **5**, and has decided that they are acceptable for use in conjunction with this standard. Method 2 of BS 1672 : 1972 is related to ISO 123-1974, and will eventually be replaced by BS 6057 : Part 2 'Sampling' (in course of preparation); it is intended that BS 6057 : Part 2 will be identical with a revision of ISO 123 (also in course of preparation).

Additional information. Water complying with BS 3978 'Water for laboratory use' is suitable for any dilution that may be required during the preparation of the sample (see clause **6**).

Textual error. When adopting the text of the international standard, the textual error given below was discovered. It has been marked in the text and has been reported to ISO in a proposal to amend the text of the international standard.

In the heading of table 2, the word 'to' should be inserted before 'millipascal'.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

British Standards Institution

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for the determination of the viscosity of both natural and synthetic rubber latices.

Two instruments are specified :

1) The *L instrument* is applicable for viscosities of up to 2 000 m Pa·s (2 000 cP).

2) The *R instrument* is applicable for viscosities of above 200 m Pa·s (200 cP).

2 REFERENCES

ISO 123, *Rubber latex — Sampling.*

ISO 124, *Rubber latex — Determination of total solids content.*[1)]

3 PRINCIPLE

Determination of the viscosity by means of a viscometer which measures the torque produced on a specified spindle rotating at constant speed and at a low rate of shear while immersed to a known depth in the latex.

Measurements may be made on the undiluted latex or on the latex after dilution to a required total solids content.

4 APPARATUS

4.1 Viscometer[2)], consisting of an electric synchronous motor which drives, at a constant speed of rotation, a shaft to which spindles of different shapes and dimensions may be attached. The spindle is partially immersed in latex and the drag on the spindle rotating in the latex causes a torque to be developed on the spindle shaft. The equilibrium torque developed is indicated by means of a pointer and scale which is calibrated in units from 0 to 100.

The *L instrument* uses a spring torque of 67,37 ± 0,07 μN·m (673,7 ± 0,7 dyn·cm) at full-scale deflection.

The *R instrument* uses a spring torque of 718,7 ± 0,7 μN·m (7 187 ± 7 dyn·cm) at full-scale deflection.

The spindles shall be accurately made in accordance with the figure, and to the dimensions given in table 1.

A spirit level or bubble level shall be incorporated in the motor housing to indicate, with the spindle attached to the motor shaft, when the spindle is vertical.

A guard shall be used to protect the spindle in operation. This shall consist of a rectangular bar of section approximately 9,5 mm × 3 mm, with the corners rounded, bent into a U.

The upper ends of the vertical legs of the guard shall be securely attached to the motor housing but in such a way that the guard is removable for cleaning. The horizontal portion of the guard shall join the vertical legs of the guard through internal radii of approximately 6 mm.

The perpendicular distance between the inner faces of the two vertical legs of the guard when the guard is securely attached to the motor housing shall be 31,8 ± 0,8 mm with the *L instrument* and 76,2 ± 0,8 mm with the *R instrument.* The perpendicular distance between the upper face of the horizontal portion of the guard and the bottom of the spindle shaft, when the guard is securely attached to the motor housing and when the spindle is attached to the motor shaft, shall be not less than 10 mm with the *L instrument* and not less than 4,5 mm with the *R instrument.*

1) At present at the stage of draft (revision of ISO/R 124).

2) Suitable instruments are obtainable from Brookfield Engineering Laboratories Inc. Models LVF and LVT meet the requirements for the *L instrument,* and models RVF and RVT meet the requirements for the *R instrument.*

TABLE 1 – **Spindle dimensions**

Values in millimetres

Spindle No.	*A* ± 1,3	*B* ± 0,03	*C* ± 0,03	*D* ± 0,06	*E* ± 1,3	*F* ± 0,15
L 1	115,1	3,18	18,84	65,10	–	81,0
L 2	115,1	3,18	18,72	6,86	25,4	50,0
L 3	115,1	3,18	12,70	1,65	25,4	50,0
R 1	133,3	3,18	56,26*	22,48**	27,0	61,1
R 2	133,3	3,18	46,93	1,57	27,0	49,2
R 3	133,3	3,18	34,69	1,65	27,0	49,2

* Wall thickness approximately 0,6 mm.

** Wall thickness approximately 1,0 mm.

4.2 Beaker, glass, of internal diameter at least 85 mm and capacity at least 600 ml.

4.3 Water-bath, controlled at 25 °C.

5 SAMPLING

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

6 PREPARATION OF SAMPLE

Determine the total solids content of the latex according to ISO 124, and then, if necessary, accurately adjust to the required value by the addition of distilled water or water of equivalent purity. Add the water slowly to the latex and stir the mixture gently for 5 min, taking care to avoid inclusion of air.

If the latex contains occluded air and has a viscosity of less than about 200 mPa·s (200 cP), remove the air by allowing the latex to stand for 24 h.

If the latex contains occluded air and no other volatile component, and has a viscosity greater than about 200 mPa·s (200 cP), remove the air by allowing the latex to stand under vacuum until foaming ceases.

Should the presence of coagulum be noted, carefully strain the latex through a screen having square apertures with sides of approximately 500 µm.

7 PROCEDURE

Pour the latex into the beaker (4.2). Place the beaker in the water bath (4.3) at 25 °C and stir the latex gently until its temperature is 25 ± 2 °C. Immediately attach the spindle securely to the motor shaft and attach the guard securely to the motor housing of the viscometer. Carefully insert the spindle and guard into the latex, in such a way as to avoid air being trapped, until the surface of the latex is at the mid-point of the groove on the spindle shaft. The spindle shall be placed vertically in the latex and in the centre of the beaker.

Select the speed of rotation of the instrument as follows :

L instrument : 60 ± 0,2 rev/min

R instrument : 20 ± 0,2 rev/min

Switch on the viscometer motor and take the equilibrium reading to the nearest unit scale division, in accordance with the manufacturer's operating instructions. 20 to 30 s may elapse before the equilibrium reading is attained.

Use the lowest numbered spindle able to record the viscosity.

8 EXPRESSION OF RESULTS

When the reading has been obtained, calculate the viscosity of the latex in millipascal seconds (centipoises), using the appropriate factor obtained from table 2.

TABLE 2 – **Factors necessary to convert reading on scale 0 to 100 millipascal seconds (centipoises)** †

Spindle No.	Factor
L 1	×1
L 2 or R 1	×5
L 3 or R 2	×20
R 3	×50

9 TEST REPORT

The test report shall include the following particulars :

a) the reference of the method used;

b) the results and the method of expression used;

c) the instrument used (L or R);

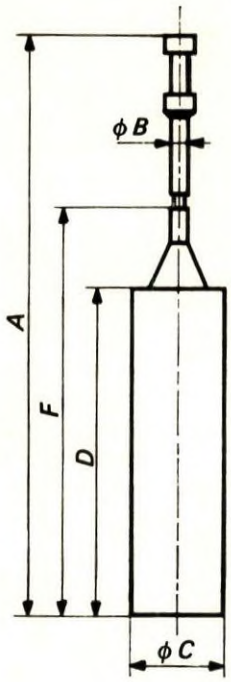
d) the spindle number;

e) the total solids content of the latex (diluted if required);

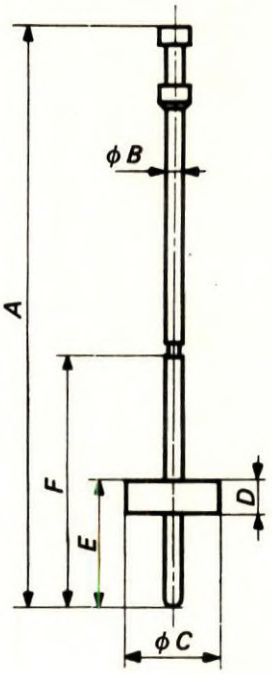
f) any unusual features noted during the determination;

g) any operation not included in this International Standard, or regarded as optional.

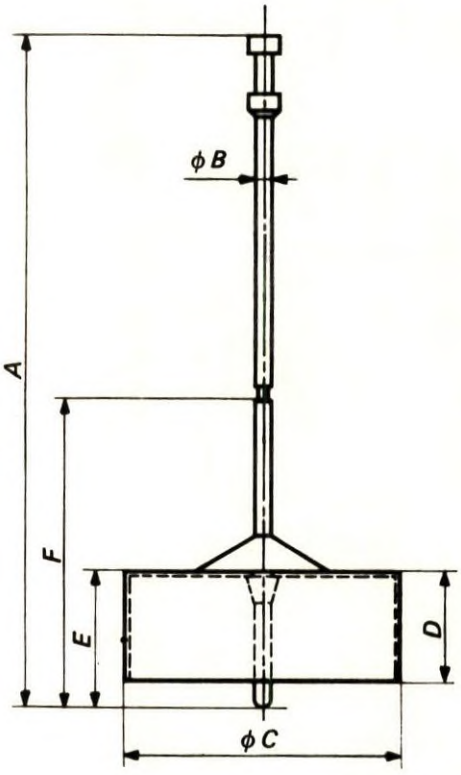
†See national foreword for details of textual error.



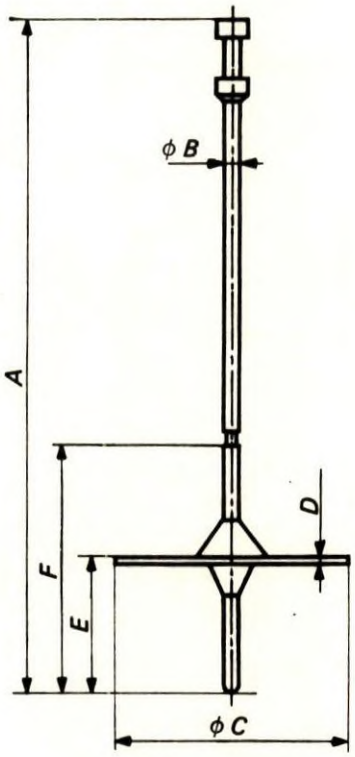
No. L1



Nos. L2 and L3



No. R1



Nos. R2 and R3

FIGURE – **Spindles**

Publications referred to

See national foreword.

BS 6057 : Part 3 : Section 3.11 : 1984
ISO 1652-1974

This British Standard, having been prepared under the direction of the Rubber Standards Committee, was published under the authority of the Board of BSI and comes into effect on

31 January 1984.

ISBN 0 580 13591 8

The Committees responsible for this British Standard are shown in Part 0.

The following BSI references relate to the work on this standard:
Committee reference RUC/38
Draft (ref. 81/55701) announced in *BSI News* October 1981

Amendments issued since publication

Amd. No.	Date of issue	Text affected

British Standards Institution · 2 Park Street London W1A 2BS · Telephone 01-629 9000 · Telex 266933

RUC/38

8401–3–1.3k–B

BS 6057 : Part 3 : Section 3.11 : 1984
ISO 1652-1974