INTERNATIONAL STANDARD 1652

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Rubber latex — Determination of viscosity

Latex d'élastomère — Détermination de la viscosité

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

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.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 45 has reviewed ISO Recommendation R 1652 and found it suitable for transformation. International Standard ISO 1652 therefore replaces ISO Recommendation R 1652-1970.

ISO Recommendation R 1652 was approved by the Member Bodies of the following countries :

Australia	Greece	New Zealand
Austria	Hungary	Poland
Brazil	India	Spain
Canada	Iran	Sweden
Colombia	Israel	Switzerland
Czechoslovakia	Italy	Thailand
France	Japan	United Kingdom
Egypt, Arab Rep. of	Korea, Rep. of	U.S.A.
Germany	Netherlands	U.S.S.R.

The Member Body of the following country has subsequently approved this Recommendation :

South Africa, Rep. of

No Member Body expressed disapproval of the Recommendation.

No Member Body disapproved the transformation of ISO/R 1652 into an International Standard.

Printed in Switzerland

Rubber latex — Determination of viscosity

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;

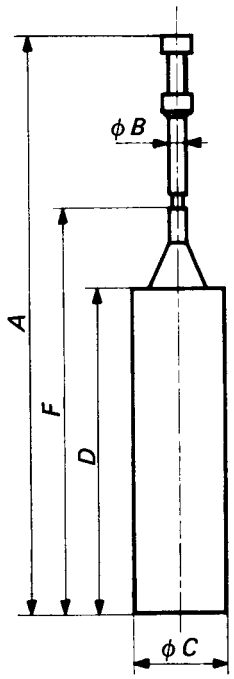
c) the instrument used (L or R);

d) the spindle number;

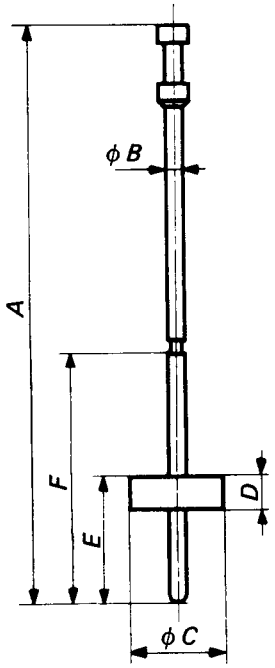
e) the total solids content of the latex (diluted if required);

f) any unusual features noted during the determination;

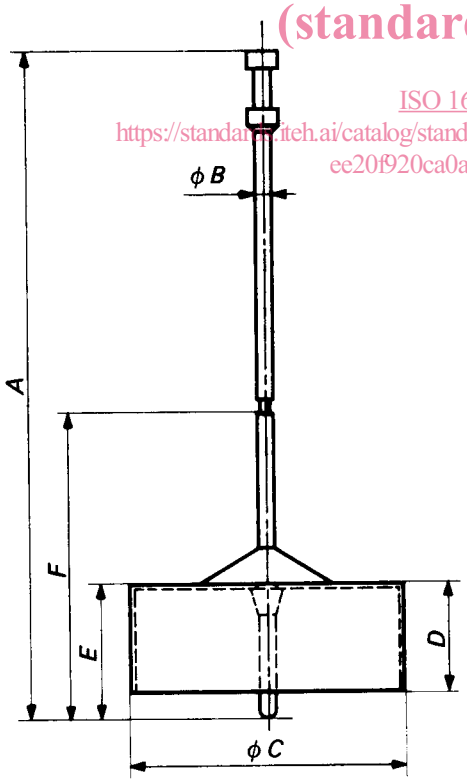
g) any operation not included in this International Standard, or regarded as optional.



No. L1



Nos. L2 and L3



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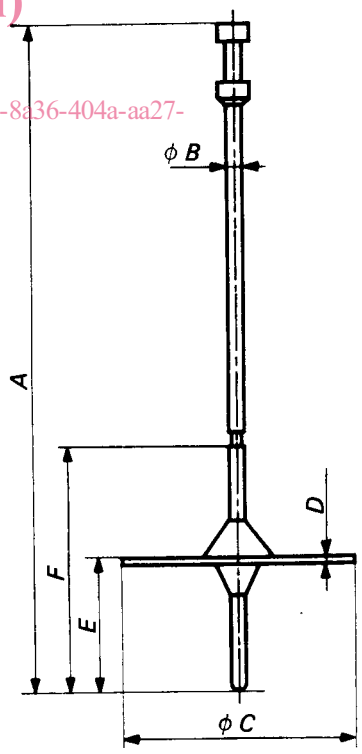

Nos. R2 and R3

FIGURE – **Spindles**