

International Standard



289

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Rubber, unvulcanized — Determination of Mooney viscosity

Caoutchouc non vulcanisé — Détermination de la viscosité Mooney

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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.

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

It cancels and replaces ISO Recommendation R 289-1963, of which it constitutes a technical revision.

Rubber, unvulcanized — Determination of Mooney viscosity

1 Scope and field of application

This International Standard specifies a method of use of the shearing disk viscometer for measuring the Mooney viscosity of uncompounded or compounded rubbers.

2 References

ISO 471, *Rubber — Standard temperatures, humidities and times for the conditioning and testing of test pieces.*

ISO 1796, *Rubber, raw — Sample preparation.*

ISO 2393, *Rubber test mixes — Preparation, mixing and vulcanization — Equipment and procedures.*

3 Principle

The torque which has to be applied under specified conditions in order to rotate a metal disk in a cylindrical chamber formed from mating dies filled with rubber is measured. The resistance to this rotation, offered by the rubber, is expressed in arbitrary units as the Mooney viscosity of the test piece.

4 Apparatus

The essential parts of the apparatus (see figure 1) are:

- a) two dies to form a cylindrical cavity;
- b) a rotor;
- c) a means for maintaining the dies at a constant temperature;
- d) a means of maintaining a specified closure pressure;
- e) a means for rotating the rotor at constant angular velocity;
- f) a means for indicating the torque required to rotate the rotor.

The rotor and die cavity have the dimensions shown in table 1.

Table 1 — Dimensions of essential parts of the apparatus

Dimensions	Millimetres
Rotor diameter	38,10 ± 0,03
Rotor thickness	5,54 ± 0,03
Die cavity diameter	50,9 ± 0,1
Die cavity depth	10,59 ± 0,03

NOTE — Normally this rotor is called the large rotor.

It is permissible to use a smaller rotor where high viscosity makes this necessary. This small rotor should have the same dimensions as the large rotor except that the diameter should be 30,48 ± 0,03 mm. Results obtained with the small rotor are not identical with those obtained using the large rotor.

4.1 Dies

The two dies forming the cavity shall be formed from non-deforming unplated hardened steel of minimum Rockwell hardness HRC 60. The dimensions of the cavity are given in figure 1 and shall be measured from the highest surfaces.

For good heat transfer each die should preferably be made from only one piece of steel. The surfaces shall have radial V-grooves on the flat surfaces to prevent slipping. The grooves shall be spaced radially at 20° intervals and shall extend from an outer circle of diameter 47 mm to an inner circle of diameter 7 mm for the upper die and to within 1,5 mm of the hole in the lower die; each groove shall form a 90° angle in the die surface with the bisector of the angle perpendicular to the surface and shall be 1,0 ± 0,1 mm wide at the surface (see figure 2).

Alternatively, each die may be formed from two pieces of steel with rectangular section grooves on the surfaces to prevent slipping. The grooves shall be 0,80 ± 0,02 mm wide, of uniform depth 0,30 ± 0,05 mm and spaced on 1,60 ± 0,04 mm centres. The flat surfaces of the dies have two sets of these grooves at right angles to each other (see figure 3).

NOTE — The two types of die may not give the same results.