

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard Methods of Test**for****RUBBER****METHOD 16. NATURAL AND
SYNTHETIC RUBBERS—DETERMINATION
OF VISCOSITY AND SCORCH
CHARACTERISTICS BY SHEARING DISC
(MOONEY) VISCOMETER***

1 SCOPE. This standard sets out the method for the use of a shearing disc viscometer when applied to rubber or other elastomeric materials. It may be used as a means for determining the viscosity of such materials in the raw or compounded state and for determining the scorch characteristics of vulcanizable compounds.

NOTE: Viscosity as measured in this method is not a true viscosity and should be interpreted as Mooney viscosity, a measure of shearing torque averaged over a range of shearing rates.

2 PRINCIPLE. The resistance to a rotating disc under standardized conditions is measured and provides a means of determining the apparent viscosity of rubbers, their compounded mixtures (either vulcanizable or unvulcanizable) using a wide range of temperatures.

For vulcanizable compounds, apparent viscosity is recorded during heating at a specified temperature.

The minimum apparent viscosity and the times required for the viscosity to change by specified amounts are used as arbitrary measures of the start of cure (scorch).

NOTES:

1. Viscosity values determined by this method depend upon the size and configuration of the rubber molecule and upon non-rubber constituents that may be present. Since rubber behaves as a non-Newtonian fluid, no simple relationship exists between the molecular weight and the viscosity.

Therefore, caution must be exercised in interpreting viscosity values of rubber, particularly in cases where relative molecular mass is very high. For example, as the relative molecular mass increases the viscosity values for isobutylene-isoprene (IIR) polymers (butyl rubbers) reach an upper limit of about 80 viscosity units at 100°C at a rotor speed of 2 r/min and may then decrease to considerably lower values. For these higher relative molecular mass rubbers, better correlation between viscosity and relative molecular mass is obtained if the temperature of the test is increased.

2. For scorch characteristics, the onset of vulcanization can be detected with this instrument as evidenced by an increase in viscosity.

* Derived from and essentially the method described in ASTM D 1646-74, Rubber from Natural or Synthetic Sources—Viscosity and Vulcanization Characteristics (Mooney Viscometer).