



Designation: D 3346 – 00

Standard Test Methods for Rubber Property—Processability of SBR (Styrene-Butadiene Rubber) With the Mooney Viscometer¹

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1. Scope

1.1 These test methods² explain the use of the shearing disk viscometer to obtain an indication of the processability of non-pigmented emulsion styrene-butadiene rubbers (SBR). They may also be used to separate those polymers that are easy to process from those that are difficult to process within a group of polymers of the same type.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 1646 Test Methods for Rubber—Viscosity, Stress Relaxation, and Pre-Vulcanization Characteristics (Mooney Viscometer)³
- D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets³
- D 3896 Practice for Rubber from Synthetic Sources—Sampling³
- D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries³

3. Terminology

3.1 Definitions:

3.1.1 Δ Mooney—the difference in Mooney viscosity recorded for a rubber at specified times during a test.

3.1.2 Mooney Viscosity—arbitrary measure of the viscosity of a rubber determined in a Mooney shearing disk viscometer, indicated by the torque required to rotate the disk embedded in

a rubber specimen and enclosed in the die cavity under specified conditions.

4. Summary of Test Methods

4.1 In Test Method A, the difference in Mooney viscosity at 100°C (212°F) is determined at two specified times. Either massed or unmassed samples may be used.

4.2 In Test Method B, the Mooney viscosity difference for unmassed samples is determined between the minimum recorded directly after starting the rotor and the subsequent maximum (see Fig. 1).

5. Significance and Use

5.1 These empirical tests have been found to be suitable for ranking a series of unpigmented emulsion SBR in order of processability. They may also be used for comparing a production lot with a standard of known processability characteristics. The difference between Mooney viscosities at two specified times will rank those emulsion SBR polymers that differ appreciably in this property according to their processability. The actual values obtained for a given polymer depend on whether or not the sample was massed, and may vary between laboratories or with the type of machine used, and with the specified times at which Mooney viscosity values were taken.

6. Apparatus

6.1 The apparatus shall be in accordance with the Apparatus section of Test Methods D 1646.

6.2 The large rotor shall be used.

7. Sample Preparation

7.1 For sampling procedure, refer to Practice D 3896.

7.2 Condition the sample until it has reached room temperature of $23 \pm 3^\circ\text{C}$ ($73 \pm 5.4^\circ\text{F}$) throughout.

7.3 The tests can be performed using specimens taken from either massed or unmassed samples.

7.3.1 To mass a sample, pass 250 ± 5 g of the sample between the rolls of the standard laboratory mill described in Practice D 3182. The mill shall have a roll temperature of $50 \pm 5^\circ\text{C}$ ($122 \pm 9^\circ\text{F}$) and a distance between the rolls of 1.4 ± 0.1 mm (0.055 ± 0.005 in.) as determined by a lead slug. Immediately fold the sample in half and insert the folded end into the mill for a second pass. Repeat this procedure until a total of nine passes have been completed. Immediately insert

¹ These test methods are under the jurisdiction of ASTM Committee D11 on Rubber and are the direct responsibility of Subcommittee D11.12 on Processability Tests.

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² ASTM Research Report RR: D-11-1005 available from ASTM Headquarters, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

³ Annual Book of ASTM Standards, Vol 09.01.