STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

METHODS OF TEST FOR RUBBER

AS 1683.22
RUBBER—DETERMINATION OF VULCANIZATION CHARACTERISTICS USING THE OSCILLATING DISC CUREMETER*

PREFACE

This standard provides a further method of test to those already published in AS 1683, Methods of Test for Rubber, and has been prepared in response to a requirement received through Committee RU/-, Advisory Committee on Standards for the Rubber Industry, which had conducted a comprehensive review of standards required for use in the rubber industry. It was prepared by the Association's Committee on Rubber Testing and Analysis.

During the preparation of a draft method for viscosity and vulcanization characteristics of natural or synthetic rubbers by shearing disc (Mooney) viscometer, it was decided that the method should be divided into two separate methods to be entitled as follows:

(a) Natural and Synthetic Rubbers—Determination of Viscosity and Scorch Characteristics by Shearing Disc (Mooney) Viscometer.

(b) Rubber—Determination of Vulcanization Characteristics using the Oscillating Disc Curemeter (the subject of this standard).

* Derived from and technically identical with ISO 3417—1977.

METHOD

1 SCOPE. This standard sets out a method for determining selected vulcanization characteristics of rubber compounds.

2 APPLICATION. The method is applicable to all vulcanizable rubber compounds.

3 PRINCIPLE. A test piece of rubber is contained in a sealed test cavity under a positive pressure and maintained at an elevated temperature. A biconical disc is embedded in the test piece and is oscillated through a small rotary amplitude. This action exerts a shear strain on the test piece and the force (torque) required to oscillate the disc depends on the stiffness (shear modulus) of the rubber. The torque is recorded autographically as a function of time.

NOTE: Direct proportionality between torque and stiffness cannot be expected under all test conditions because, particularly in higher torque ranges, an elastic deformation of disc shaft and driving device must be taken into account. Moreover, in cases of small amplitudes of deformation, the strain can be expected to have a considerable elastic component. For routine control purposes, corrections are not necessary.

The stiffness of the rubber test piece increases as vulcanization begins. A complete curve is obtained when the recorder torque either rises to an equilibrium value or to a maximum value (see Fig. 1). The time required to obtain a vulcanization curve is a function of the test temperature and the characteristics of the rubber compound.

The following measurements may be taken from the curve:

(a) Minimum torque.

(b) Time to incipient cure (scorch time).

(c) Time to a percentage of full cure.

(d) Maximum, plateau or highest torque attained within a specified period of time.

The minimum torque depends on the stiffness and the viscosity at low shear rate of the unvulcanized compound. The time of incipient cure is a measure of processing safety. The time to optimum cure is measured at some percentage of the highest torque and the highest torque is a measure of the stiffness of

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