Australian Standard™

Methods of test for elastomers

Method 18: Determination of flex cracking and crack growth of vulcanized or thermoplastic rubber (De Mattia)

PREFACE

This Standard was prepared by the Standards Australia Committee RU-003, Analysis and Testing of Elastomers to supersede AS 1683.18—1990, *Methods of test for rubber,* Method 18: *Vulcanized rubbers—Determination of resistance to cracking (De Mattia type machine).*

The objective of this Standard is to provide manufacturers and users of elastomeric materials with a method of comparing the resistance of rubbers to the formatting and the growth of cracks by repeated flexing on the De Mattia type machine.

Repeated bending or flexing of rubber causes cracks to develop in that part of the surface where tension stress is set up during flexing or, if this part of the surface contains a crack, causes this crack to extend in a direction perpendicular to the stress. Certain soft vulcanizates, for instance those prepared from styrene-butadiene rubber, show marked resistance to crack initiation, but it is possible for those vulcanizates to have a low resistance to growth (propagation) of cracks. It is important, therefore, to measure both the resistance to crack initiation by flexing and the resistance to crack propagation.

The method is suitable for rubbers that have reasonably stable stress-strain properties, at least after a period of cycling, and do not show under stress softening or set, or highly viscous behaviour. The results obtained for some thermoplastic rubbers should be treated with caution if the elongation at yield is below, or close to, the maximum strain imposed during the test.

This Standard is identical with and has been reproduced from ISO 132:1999, *Rubber, vulcanized or thermoplastic—Determination of flex cracking and crack growth (De Mattia).*

As this Standard is reproduced from an international Standard, the following applies:

(a) Its number appears on the cover and title page while the International Standard number appears only on the cover.

(b) In the source text, 'this International Standard' should read 'this Australian Standard'.

(c) A full point substitutes for a comma when referring to a decimal marker.

References to international Standards should be replaced by equivalent Australian Standards as follows:

Reference to International Standard		*Australian Standard*	
ISO		AS	
471	Rubber—Temperatures, humidities and times for conditioning and testing	1683 1683.20	Methods of test for elstomers Method 20: Standard temperatures, humidities and times for conditioning and testing

Standards Australia

ISO		AS
3383	Rubber—General directions for achieving elevated or subnormal temperatures for test purposes	—
4661	Rubber, vulcanized or thermoplastic—Preparation of samples and test pieces	—
4661-1	Part 1: Physical tests	

WARNING — Persons using this International Standard should be familiar with normal laboratory practice. This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

1 Scope

This International Standard specifies a method of test intended for use in comparing the resistance of rubbers to the formation and growth of cracks, when subjected to repeated flexing on the De Mattia type machine. For determination of crack growth, an artificial cut is made in the test piece to initiate cut growth.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 471:1995, *Rubber — Temperatures, humidities and times for conditioning and testing.*

ISO 3383:1985, *Rubber — General directions for achieving elevated or subnormal temperatures for test purposes.*

ISO 4661-1:1993, *Rubber, vulcanized or thermoplastic — Preparation of samples and test pieces — Part 1: Physical tests.*

3 Apparatus

3.1 De Mattia type machine.

The essential features of the De Mattia type machine are as follows:

Stationary parts, provided with grips for holding one end of each of the test pieces in a fixed position, and similar but reciprocating parts for holding the other end of each of the test pieces. The travel is $(57\ ^{+0,5}_{0})$ mm and is such that the maximum distance between each set of opposing grips is $(75\ ^{+1}_{0})$ mm (see figure 1).

The reciprocating parts are so arranged that their motion is straight and in the direction of, and in the same plane as, the common centreline of each opposing pair of grips. The planes of the gripping surfaces of each opposing pair of grips remain parallel throughout the motion.

The eccentric which actuates the reciprocating parts is driven by a constant-speed motor to give 5,00 Hz ± 0,17 Hz, with sufficient power to flex at least six, and preferably twelve, test pieces at one test. The grips hold the test pieces firmly, without undue compression, and enable individual adjustment to be made to the test pieces to ensure accurate insertion.