Australian Standard™

AS 4878.9

Methods of test for coated fabrics

Method 9: Determination of resistance to damage by flexing

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TX-005, Coated Fabrics as an Australian Standard.

The Standard is identical with and has been reproduced from ISO 7854:1995, *Rubber- or plastics-coated fabrics—Determination of resistance to damage by flexing*.

The objective of this Standard is to provide manufacturers and testing bodies with a suitable method for the determination of resistance to damage by flexing of rubber- or plastic-coated fabrics.

The term 'informative' has been used in this Standard to define the application of the annex to which it applies. An 'informative' annex is only for information and guidance.

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

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

(b) A full point should be substituted for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian Standards, as follows:

Reference to International Standard		*Australian Standard*	
ISO		AS	
132	Rubber- or vulcanized—Determination of flex cracking (De Mattia)	1683 1683.18	Methods of test for rubber Method 18: Determination of flex cracking and crack growth of vulcanized thermoplastic rubber (De Mattia)
1420	Rubber- or plastics-coated fabrics—Determination of resistance to penetration by water	—	
2231	Rubber- or plastics-coated fabrics—Standard atmospheres for conditioning and testing	—	
2286	Rubber- or plastics-coated fabrics—Determination of roll characteristics	4878 4978.2 4878.3 4878.4	Methods of test for coated fabrics Part 2: Determination of length, width and net mass Part 3: Determination of total mass per unit area, mass per unit area of coating and mass per unit area of substrate Part 4: Determination of thickness

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INTRODUCTION

Investigation of dynamic-flex fatigue properties of coated fabrics has for a number of years suffered from poor repeatability (due in part to the unknown but inevitable variability of the material tested) and worse reproducibility. Nevertheless, dynamic-flex performance of coated fabrics has been long and widely used as a measure of the product quality.

The methods traditionally used suffered from the common deficiency of testing only a small test piece. The De Mattia test is unsuitable for materials that exhibit "set", such as thermoplastics, and the Schildknecht method has disadvantages when testing the heavier industrial fabrics and also tends to require very high geometric ratios and consequently time-consuming tests to verify results. In addition, the mounting of Schildknecht test pieces can seriously affect test results and repeatability.

Both the De Mattia and Schildknecht methods are also uni-directional, which in some cases is advantageous, but in many cases is not appropriate, e.g. where bi-directional stresses are exerted during use.

This revised edition of ISO 7854 attempts to standardize the mounting difficulties associated with the Schildknecht apparatus (method B) and introduces a bi-directional flex fatigue test that provides a large test piece, enabling post-flexing investigations, such as hydrostatic-head tests, to be conducted. The apparatus is described in ISO 8096-3:1988, *Rubber- or plastics-coated fabrics for water-resistant clothing — Specification — Part 3: Natural rubber- and synthetic rubber-coated fabrics*. The apparatus outlined there in illustrative form (see the note to F.1 in annex F of ISO 8096-3:1988) has been developed in more detail and is now widely available commercially from a number of sources.

Flex testing can provide a useful indication of the durability of coated fabrics. However, for most applications, flexing conditions induced by these test methods are dissimilar to the conditions met in practice. In particular, the micro-climate induced around the test piece and the thermal stresses induced in the molecular structure of the coating during flexing are unlikely to be representative of practical situations. It is important therefore that these effects be kept to a minimum and their effect be given due consideration when test results are being considered. Consequently, it is important to ensure that the air temperature around the test pieces is kept constant during the test. This can be achieved either by maintaining adequate non-forced, open ventilation around the test pieces or by controlling the air temperature within any closed container in which the test apparatus may be mounted.

Three methods are described. Method A (De Mattia) may be found suitable for flex testing coated fabrics which cannot be constrained into the configuration required by method B or where the amount of material available for testing is too small to permit the other methods to be employed. Method B (Schildknecht) will be found useful for flex testing coated fabrics of relatively lightweight construction or whose practical

usage would be in the light to medium range in terms of severity of flexing.

Method C (crumple/flex test) has been found useful in testing coated fabrics which will be subject to severe usage in terms of their flexing capability under arduous conditions. The method requires a large test piece but this provides certain advantages for selecting test pieces for related testing after flexing, e.g. hydrostatic-head testing.

Some coated fabrics are more susceptible to delamination when flexed in the wet state and attention is drawn to the information given in annex A.

Because of the differences in the nature of the flexing in the three methods, no true correlation of results between the different methods is possible.

NOTES

AUSTRALIAN STANDARD

1 Scope

This International Standard describes three methods of assessing the resistance of coated fabrics to damage by repeated flexing.

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 132:1983, *Rubber, vulcanized — Determination of flex cracking (De Mattia).*

ISO 1420:1987, *Rubber- or plastics-coated fabrics — Determination of resistance to penetration by water.*

ISO 2231:1989, *Rubber- or plastics-coated fabrics — Standard atmospheres for conditioning and testing.*

ISO 2286:1986, *Rubber- or plastics-coated fabrics — Determination of roll characteristics.*

3 Method A — De Mattia method

3.1 Principle

A rectangular strip of coated fabric is folded twice so that its long edges meet forming a strip measuring 125 mm × 12,5 mm. This folded strip is mounted between a pair of flat grips, one of which reciprocates, causing the folded test piece to be bent outwards five times per second. This high-speed folding of the test piece is continued for either a pre-set number of cycles or until damage to the test piece is apparent.

3.2 Apparatus

3.2.1 Flex-testing machine, as specified in ISO 132, with pairs of flat grips. One of the grips of each pair is capable of a reciprocating motion in a vertical plane with a stroke length of (57 $^{+0,5}_{0}$) mm and a frequency of 5,0 Hz ± 0,2 Hz.

Each pair of grips is positioned so that they are 70 mm ± 1 mm apart when in the open position and 13 mm ± 0,5 mm apart when in the closed position.

3.3 Preparation of test pieces

Select six test pieces each 37,5 mm ± 1 mm wide × 125 mm long from the usable width of the roll as defined in ISO 2286. Three test pieces shall be selected with their longer dimension in the longitudinal direction of the roll of coated fabric and three test pieces with the longer dimension in the transverse direction of the roll of coated fabric. Test pieces shall be selected from positions evenly spaced across the full width and length of the sample.

NOTES

1 In the case of woven-fabric substrates, as far as possible no two test pieces should contain the same threads of the fabric in the direction to be tested.

2 Together with suitable increases in the width of grips, the test piece size may be increased so as to permit subsequent hydrostatic-head tests to be conducted.