Australian Standard®

Methods of test for textiles

Method 2.25: Physical tests— Determination of flat abrasion resistance of textile fabrics (Martindale abrasion method)

PREFACE

This Standard was prepared by the Standards Australia Committee on Testing of Textiles, under the direction of the Textile Standards Board.

FOREWORD

The Martindale abrasion machine was developed primarily to assess abrasion resistance of woven worsted wool fabrics. It was designed to give a controlled amount of multidirectional abrasion, between the fabric surface and a crossbred wool abradant fabric, at comparatively low pressures until thread breakdown, or unacceptable change in colour or appearance occurs.

Abrasion of the fabric surface does not necessarily cover all aspects of strains which are important in determining service life, however there are occasions when an abrasion test gives useful information.

The manner in which textile fabrics abrade is a complex process and is caused primarily by mechanical actions, such as rubbing, shearing, stretching, twisting and flexing, under a wide range of end use conditions. Fabric abrasion resistance can be influenced by such properties as fibre type, yarn properties, fabric construction, finishing and, in the case of fabrics containing hydrophilic fibres, moisture content.

Test result reproducibility can depend on such factors as the condition of the test apparatus, the removal of pills from the test specimen during testing, test specimen and abradant tension, the type of fabric under test and the consistency of abradant quality.

The Martindale abrasion test method is considered suitable for some knitted fabrics, but due to the inability of the test apparatus to maintain constant tension on the test specimen during testing, unstable knit structures can give highly variable test results unless a suitable backing is placed behind the test specimen.

The apparatus is not appropriate for the testing of long pile fabrics, because the pile tends to lie in one direction and they are therefore abraded in a manner inconsistent with normal use.

This test should not be used indiscriminately, and particularly not for comparing fabrics of widely different fibre composition or construction, without preliminary test correlation to the service life by the user laboratory.

METHOD

1 SCOPE. This Standard sets out a method for the determination of the resistance to abrasion of textile fabrics using the Martindale abrasion machine. This method is applicable to flat woven and some knitted fabrics. It is not applicable to fabrics having a long pile or a surface coating.

CC

COPYRIGHT

2 REFERENCED DOCUMENTS. The following documents are referred to in this Standard:

AS
1199 Sampling procedures and tables for inspection by attributes
2001 Methods of test for textiles
2001.1 Method 1: Conditioning procedures
2001.4.1 Method 4.1: Definitions and general requirements

BS
5690 Determination of the abrasion resistance of fabrics

3 PRINCIPLE. Circular test specimens of a fabric are abraded under a known pressure against a standard abradant fabric. Abrasion resistance is expressed as the number of rubs required to cause mechanical breakdown, an unacceptable appearance or colour change of the test specimens.

4 DEFINITIONS. For the purpose of this Standard, the following definition applies.

4.1 Mechanical end point—the point at which two threads have broken on a woven fabric, or one thread has broken on a knitted fabric.

5 APPARATUS.

5.1 Conditioning facility. A conditioning facility with a means of providing and maintaining a standard atmosphere, as specified in AS 2001.1 shall be used.

5.2 Martindale abrasion machine.* A Martindale abrasion machine, which is electrically driven and capable of rubbing the test specimen under a known pressure against a standard abradant fabric, shall be used. The rubbing motion shall be in the form of a Lissajous figure. The machine shall be fitted with a pre-setting stop switch. The pressure to be applied to each test specimen shall be 9 ±0.2 kPa for apparel fabrics, and 12 ±0.2 kPa for upholstery fabrics.

NOTE: On a working area of 6.45 cm^2, a specimen holder, spindle and weight of combined mass of 595 g will provide a pressure of 9 kPa. A pressure of 12 kPa requires that this mass be increased to 795 g.

5.3 Standard abradant fabric. A standard abradant fabric SM25†, consisting of a plain weave, crossbred, worsted fabric, having characteristics in the finished state as set out in Table 1, shall be used.

TABLE 1
STANDARD ABRADANT FABRIC CHARACTERISTICS

	Warp	Weft
Yarn linear density	R 63 tex/2	R 74 tex/2
Threads per centimetre	17	12
Singles twist (turns/m)	540 ±20 Z	500 ±20 Z
Twofold twist (turns/m)	450 ±20 S	350 ±20 S
Mean fibre diameter (μm)	27.5 ±2.0	29.0 ±2.0
Minimum mass/unit area	195 (g/m^2)	

5. Standard felt, SM26†—felt of mass 750 ± 50 g/m^2 and 3 ± 0.5 mm in thickness.

5.5 Polyurethane foam—a backing for the test specimen consisting of polyurethane foam, SM28†, 3 ± 1 mm in thickness, and having a density of 30 ± 1.0 kg/m^3 and hardness of 190 ± 20 newtons.

NOTE: It is preferable to store the foam away from any UV source. The foam disks should be discarded if inspection reveals any sign of degradation.

5.6 Fabric punch or press cutter. A fabric punch or press cutter with a diameter 38 mm shall be used.

5.7 Stabilizing weight—a 2 kg mass with a base diameter of 115 mm.

5.8 Grey Scale—for assessing change in colour (see AS 2001.4.1).

6 SAMPLE AND TEST SPECIMENS.

6.1 General. Care should be taken to ensure that the operator's hands are dry. Excessive handling of the sample and test specimen should be avoided.

---

* Suitable machines are available from Chemtex Pty Ltd, Kilpa Road, Moorabbin, Victoria and Maytex Pty Ltd, St Peters, N.S.W.

† IWS standard fabrics are available from AWTA, 24 Robertson Street, Kensington, Victoria.

COPYRIGHT