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Method of test for

Determination of the abrasion resistance of fabrics

Méthode d'essai afin de déterminer la résistance à l'abrasion des textiles

Prüfverfahren zur Bestimmung der Scheuerfestigkeit von Textilien

L34 2909

British Standards Institution

Gr 3

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Foreword

It has been apparent for some time that the lack of a standard method of test for the determination of abrasion resistance of fabrics has been a source of difficulty for the industry. This standard has been prepared with the aim of removing some of the problems and uncertainties associated with this particularly difficult area.

It is difficult to achieve reproducible results on all machines used for testing textiles for abrasion resistance. The shortcomings of this method are well known, but the test has been used for 30 years. In the development of the standard, considerable attention has been given to detail in order to improve reproducibility of the test results. Fundamentally, the test can be used to monitor differences between batches of a particular fabric or even between fabrics of a similar construction for the same end use. It may not necessarily be appropriate in comparing fabrics of widely different structure or composition.

Much has also been written concerning correlation with wear (see *Textile Institute and Industry*, March 1968: 69., and *Journal of the Textile Institute*, 1971, no.6, 304.), and it is stressed that direct correlation is not always obtained with wear trials. Such lack of correlation may reflect the different types of abrasion in the wear trial and the method of test or it may be due to an inherent variability of the

wear trial rather than variability of the test. Abrasion in wear is a difficult property to define because of the variation between wearers. Therefore in assessing correlation it is necessary to take account of this variability. It has been reported (*British Knitting Industry*, March 1973: 8.) that some wearers can 'wear out' a 'good' fabric in 100 h, whereas at the other extreme a minority of wearers do not cause abrasion wear even on a 'poor' fabric after 1000 h or more.

The committee responsible for preparing the standard stresses that great care and attention to detail is necessary both in the performance of the test and in the interpretation of the results of the test. Because of this, the standard has been divided into two sections. Section one deals with the method of test and includes two established uses, i.e. quantitative measurement of abrasion resistance based on end-point or loss in mass, and the qualitative assessment of visual appearance changes such as wearing away of pile and colour changes. Section two gives advice on the detailed procedure to be followed in conducting the test, as well as advice on the possible meaning of results obtained in a practical situation. *It is essential that section two be studied prior to carrying out the test procedure.*

British Standard Method of test for Determination of the abrasion resistance of fabrics

Section one. Method of test

1. Scope

This British Standard specifies a method of test for the determination of the abrasion resistance of flat woven fabrics, knitted fabrics and certain nonwoven fabrics. It is not generally applicable to fabrics having a pile longer than 2 mm.

2. Reference

The title of the standards publication referred to in this standard is given on the inside back cover.

3. Principle

Circular specimens of fabric are abraded on a standard abrasant under known pressure with a cyclic planar motion in the form of a Lissajous figure which is the resultant of two simple harmonic motions at right angles to each other. The resistance to abrasion is estimated by the number of cycles to breakdown or by loss in mass of the specimens.

4. Apparatus

The following apparatus is required.

4.1 Abrasion machine

4.1.1 The apparatus shall be of the type described by Martindale (*J. Text. Inst.* 1942: 33, T151), but fulfilling the following requirements:

Rotational speed of each of the outer pegs	47.5 ± 2.5 r/min
Ratio of speeds outer pegs : inner peg	32:30
Total stroke of outer pegs	60.5 mm
Total stroke of inner peg	60.5 mm
Working area of specimen holder	6.45 cm ²
Pressure on specimen	9 ± 0.2 kPa* or 12 ± 0.3 kPa

4.1.2 The specimen holders and abrading tables shall be plane and parallel over their entire surfaces. The drive from the motor to the machine shall be connected to a counter and switch so that the revolutions of the outer pegs are indicated and the machine is stopped after a predetermined number of cycles is measured by the counter. Attention is drawn to the information on design, setting up and maintenance of the machine given in section two.

4.2 Standard abrasant

4.2.1 The standard abrasant shall consist of a crossbred worsted spun, plain woven fabric having the following particulars in the finished state†.

	Warp	Weft
Yarn linear density	R55, tex/2	R74, tex/2
Threads per unit length	19/cm	12/cm
Singles twist	490 ± 20 turns/m Z	550 ± 20 turns/m Z
Twofold twist	470 ± 20 turns/m S	410 ± 20 turns/m S
Mean fibre diameter	31 ± 2 µm	31 ± 2 µm
Minimum mass per unit area of fabric		185 g/m ²

4.2.2 The standard abrasant is mounted on the four abrasant tables of the machine over a piece of felt. The felt shall be of mass per unit area 576 g/m² to 678 g/m² and approximately 2 mm thick, and need not be renewed until damaged or soiled on both sides or until approximately 100 h testing has been completed‡.

4.3 *Backing for specimens.* Polyurethane foam approximately 3 mm thick and of density approximately 0.04 g/cm³, cut to the same size as the specimen. These are renewed with every test§.

4.4 *Fabric punch or press cutter.* Circle of 38 mm diameter.

4.5 *Balance,* accurate to 1 mg.

* On a working area of 6.45 cm² a specimen holder, spindle (if used on the particular machine in use) and weight of combined total mass 595 g will provide a pressure of 9 kPa. A pressure of 12 kPa requires that this mass be increased to 795 g.

† A fabric to this specification is manufactured by Myers & Robinson (Fine Worsted) Ltd., Lumb Lane Mills, Lumb Lane, Bradford, Yorkshire. (Quality 6786)

‡ A fabric to this specification is obtainable from Bury & Masco Industries Ltd., Hudcar Mills, Bury (quality M31); or James H. Heal & Co. Ltd., Lake View, Halifax, West Yorkshire.

§ A polyurethane foam to this specification is available from James H. Heal & Co. Ltd., Lake View, Halifax, West Yorkshire.