SLOVENSKI STANDARD
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Ugotavljanje odpornosti proti obrabi - 2.del: Frick - Taberjev preskus

Resilient floor coverings - Determination of wear resistance - Part 2: Frick-Taber test

Elastische Bodenbeläge - Ermittlung des Verschleißverhaltens - Teil 2: Frick-Taber-Prüfung

Revetements de sol résilients - Détermination de la résistance à l'usure - Partie 2: Essai de Frick-Taber

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EUROPEAN STANDARD
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English version

Resilient floor coverings - Determination of wear resistance - Part 2: Frick-Taber test

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

FOREWORD

This European Standard has been prepared by Technical Committee CEN/TC 134 "Resilient and textile floor coverings", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 1999, and conflicting national standards shall be withdrawn at the latest by October 1999.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1. Scope

This European Standard describes the Frick-Taber method for determining the wear resistance of the wear layer of polyvinyl chloride floor coverings under laboratory conditions.

The test method is applicable to floor coverings with smooth surfaces. It can be used to determine the wear resistance of surfaces against abrasion and particularly for ranking different wear layer types within one type of product. It is not appropriate for comparing the wear resistance of different materials, e.g. rubber and polyvinyl chloride.

2 Normative references

This standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate place in the text and the publications are listed hereafter. For dated references subsequent amendments, to or revisions of any of the publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 436, *Resilient floor coverings - Determination of density*

3 Principle

A specimen resting on a horizontal, rotating holder table is sprinkled with abrasive grains and loaded with a pair of leather-clad abrading wheels, each of which is freely rolling round a horizontal axis.

4 Definition

For the purposes of this standard, the following definition applies:

wear
loss of material from the surface of a floor covering.

5. Apparatus and materials

5.1 Abrader machine (figure 1), consisting of the following.

5.1.1 Horizontal circular rotating holder table, having a diameter greater than 105 mm. The upper surface shall be horizontal and adapted for covering with the specimen. The table is equipped with a cylindrical threaded stub and fixing device in the centre of the table and a clamping ring around the edges to hold the specimen in position (see figure 2). Deflection under load during the test shall not exceed 0,01 mm.

5.1.2 Motor, capable of rotating the holder table with a velocity of (60 ± 2) revolutions/minute.

5.1.3 Two cylindrical abrading wheels, made of metal or hard plastic and fitted with a leather surface, of diameter (without leather) 42 mm and width 12,7 mm with a hub hole for fixing on to a freely rotating axle.

When the test specimen is rotating in a test the two wheels roll on it, forming a circular path with an area of approximately 3 000 mm².

5.1.4 Revolution counter, which automatically stops the rotating specimen holder table after a selected number of revolutions.

5.1.5 Container, open at the top, capable of containing approximately 200 g of abrasive. The bottom of the container, located (10 ± 3) mm above the specimen surface, has an opening of length 16 mm and adjustable width, which it is possible to close quickly e.g. with a pivoting shutter. The length of the opening is aligned so that it is parallel with the radius of the specimen holder table (see figure 2).

The container is equipped with a grit feeder which enables the abrasive to fall on to the specimen at a steady rate.

5.1.6 Vacuum device, capable of removing abrasive and abraded material from the test specimen. For the purpose of this test the integral suction mechanism of the abrader is disconnected and the suction mechanism of the grit feeder is used.

5.2 Balance, enabling weighing with an accuracy of ± 0,1 mg.

5.3 Leather strip, approximately 13 mm wide and 4 mm to 5 mm thick, of hardness such that a polished steel ball with 10 mm diameter placed on the flesh side and loaded with (10 ± 0,1) N, gives an indentation of (0,3 to 0,5) mm depth after 30 s.

5.4 Dry, loose, abrasive corundum, free of dust and with 98 % of the grain size between 45 µm and 75 µm.

6 Preparation and mounting of the abrading wheels

Fix the leather strip around the wheel with solvent-free epoxy adhesive so that the grain side is turned inwards and the gap between the ends of the strip is less than 0,5 mm. When the adhesive has cured adjust the width of the strip to (12,7 ± 0,1) mm. Turn the wheel in a lathe and finally trim in the test apparatus running for 500 revolutions with an abrasive paper of grain size 240 mesh, fixed on the specimen holder table.

Attach each of the abrading wheels to an arm which is easy to lift and to lower round its centre of gravity. Locate each wheel on the axle with a rotating bearing support. At the other end of the arm hang a counterweight to balance the wheel (see figure 3).

Load each wheel with a weight of (1 ± 0,01) kg. Ensure that the arms are close to horizontal when the wheels are resting on the test specimen and that the distance between the common centre line of the wheels and the rotation axis (the threaded stub) of the holder table is approximately 19 mm.

> **NOTE:** A leather-clad abrading wheel can be used until the diameter is less than 46 mm or the thickness of leather surface is less than 2 mm at any point. Repeated turning or finishing is carried out only if the tester finds it necessary.

7 Sampling and preparation of specimens

Take a representative sample from the available material.

Take three specimens, of approximately (100 x 100) mm, at equal distances across the sample, the distance between the outer edge of the sample and the nearest edge of the specimen being at least 50 mm. Cut a circular hole in the centre of each specimen to adjust the specimen in the centre of the rotating table.

NOTE: Specimens liable to take up or lose material on the underside, e.g. felt backed vinyl carpets, can be glued to glass plates.

8 Conditioning

Condition the specimens and the leather-clad abrading wheels before testing to constant mass, in air at a temperature of (23 ± 2) °C and (50 ± 5) % relative humidity. Constant mass is considered as reached when the change of mass is less than 0,002 g per day.

Maintain these conditions when carrying out the test.

9 Procedure

9.1 For heterogeneous floor coverings separate the wear layer from the sample by abrading the underside until only the wear layer is left. Determine the density of the wear layer according to EN 436 method A or B.

For homogeneous floor coverings, if the sample is smooth on top and on the underside, the density may be determined using a rectangular specimen. Weigh the specimen to an accuracy of ± 0,1 mg and measure the length and width to ± 0,1 mm and the thickness to ± 0,01 mm accuracy. Otherwise follow EN 436 method A or B.

NOTE: If the density cannot be determined the loss of volume cannot be reported.

9.2 Weigh the specimens to an accuracy of ± 0,1 mg after conditioning.

9.3 Fix the specimen on the holder table and locate the vacuum nozzle and the abrasive container in their operating positions. Fill the container with abrasive and start the grit feeder, regulating the bottom opening of the abrasive container so that the flow of abrasive is (21 ± 3) g/min.

9.4 Start the rotating table and when an even string of abrasive is distributed on the surface of the test specimen close the shutter and stop the rotation.

9.5 Carefully move the abrading wheels down towards the test specimen until they rest on abrasive. Start the vacuum cleaner. Open the shutter once more and immediately after that, set the holder table with the test specimen into rotation.

9.6 Abrade one specimen during 5 000 revolutions, with a break for weighing after each cycle of 1 000 revolutions, and then test the two remaining specimens. If, however, the first specimen is abraded through before 5 000 revolutions, discard it and test the two remaining specimens in cycles of 200 revolutions stopping the test after 2 000 revolutions or when the specimen is abraded through.

Each time the rotation is interrupted (by the counter) close the shutter of the container and shut off the grit feeder and the vacuum cleaner. Remove the container and the vacuum nozzle and lift the arms with the abrading wheels.

9.7 Take the abrading wheels away from the test surface and carefully sweep off the remaining loose particles with a soft brush. Loosen the test specimen from the holder table and wipe with dry, soft cloth, pressing lightly against the surface.

9.8 Weigh the clean specimen to an accuracy of ± 0,1 mg.

9.9 Note the mass loss for each cycle of 200 or 1 000 revolutions. Inspect the specimen and note changes of appearance. If the product has an embossed pattern (or hollows, grooves, indentation etc) estimate the proportion of the embossed pattern that is abraded away by comparison against the original.

9.10 When test specimen has been abraded during 5 000 revolutions, (or 2 000 revolutions), clean it thoroughly with a white cotton cloth moistened with distilled water containing 0,1 % wetting agent. After conditioning according to clause 8, weigh the test specimen a last time with an accuracy of ± 0,1 mg to obtain the total mass loss, F_{tot}.

Abrasive grains can stick to the abraded path. Clean these away with a white cloth until the white cloth is no longer coloured by abrasive or abraded material.

10 Calculation and expression of results

10.1 Calculate the average mass loss, F_m, in mg per 100 revolutions for each specimen as follows:

$$F_m = \frac{F_{tot}}{n} \times 100$$

Where F_m is the average mass loss in milligrammes per 100 revolutions
F_{tot} is the total mass loss in milligrammes
n is the total number of revolutions

10.2 The wear loss in mm^3 is equal to the quotient of the final mass loss in mg and the density of the wear layer in g cm^{-3}

10.3 Calculate the loss of volume for each specimen for 100 revolutions as follows:

$$F_v = \frac{F_m}{\rho}$$

Where F_v is the loss of volume in cubic millimetres
F_m is the average mass loss in milligrammes
ρ is the density in grams per cubic centimetre

The result is expressed as average abrasion loss in mm^3 per 100 revolutions rounded to one decimal place.

11 Test report

The report shall contain the following information,

a) a reference to this standard i.e EN 660-2;

b) a complete identification of the product tested, including type, source, colour and manufacturer's reference number;

c) the method of sampling;

d) previous history of the sample;

e) nominal thickness of homogeneous floor coverings or wear layer thickness of floor coverings with a separate wear layer;

f) density in grams per cubic millimetre;

g) for each specimen, the loss of mass per cycle of 200 or 1 000 revolutions, in mg to one decimal place;

h) for an embossed floor covering specimen, the proportion of the embossed pattern that is abraded for each cycle of 200 or 1 000 revolutions;

i) average loss of mass (in milligrams) and average loss of volume (in cubic millimetres) for each specimen per 100 revolutions, in both cases to one decimal place;

j) mean value of the average losses of volume of the three specimens in cubic millimetres to one decimal place;

k) any deviations from this standard which may have affected the results;

NOTE: Comparisons between different test reports will be facilitated if the above results g), i) and j) are set out in a table as shown in annex A. The example given applies to an homogeneous material and 5 000 revolutions without abrading through the test specimen. The loss of thickness per 100 revolutions can be calculated approximately as loss of volume divided by abraded area, i.e. F_v in mm^3 per 3 000 mm^2.