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Laminate floor coverings — Determination of abrasion resistance

Revêtements de sol stratifiés — Détermination de la résistance à l'abrasion

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Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 24338 was prepared by Technical Committee ISO/TC 219, *Floor coverings*.

Laminate floor coverings — Determination of abrasion resistance

1 Scope

This International Standard specifies a method for measuring abrasion of laminate floor covering elements. The test described measures the ability of the surface layer to resist abrasive wear-through. Abrasion is achieved by rotating a test specimen in contact with a pair of loaded cylindrical wheels covered with specified abrasive paper. The number of revolutions of the test specimen required to cause a defined degree of abrasion is measured.

The precision of the method is not known. When interlaboratory data becomes available, the precision statement will be added in subsequent revisions.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method*

ISO 7267-2, *Rubber-covered rollers — Determination of apparent hardness — Part 2: Shore-type durometer method*

3 Apparatus

3.1 Calibration plates

Taber S-34[1)] or equivalent of rolled zinc sheet, having a thickness of 0,8 mm ± 0,1 mm and a Brinell hardness of (48 ± 2) when tested in accordance with ISO 6506-1, except that the ball diameter shall be 5 mm and the load 360 N. For type approval or verification purposes, the zinc plate shall not be used for more than 10 calibrations per side.

1) Taber S-34 is an example of a suitable product available commercially. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.

3.2 Abrasive paper strips

Taber S-42[2)] or equivalent, (12,7 ± 0,1) mm wide in the machine direction by approximately 160 mm long, and having the following composition:

a) grammage of 70 g/m^2 to 100 g/m^2;

b) open coated 180 grit Al_2O_3 (aluminium oxide), having a particle size that will pass through a sieve of aperture 100 µm and remain on a sieve of aperture 63 µm;

c) glue bond;

d) adhesive backing.

3.3 Testing machine

The testing machine shall consist of the following items (see Figure 1).

3.3.1 Test specimen holder in the form of a disc (7) which rotates in a horizontal plane at a frequency of 58 r/min to 62 r/min and to which the test specimen (6) can be clamped with a clamping screw (5).

3.3.2 Abrasive wheels (3), two cylindrical rubber-covered wheels of width (12,7 ± 0,1) mm and diameter 50 mm which rotate freely about a common axis. The curved surface of the wheels, to a depth of 6 mm, shall be of rubber (2) of hardness (65 ± 3) IRHD when tested according to ISO 48 or (65 ± 3) Shore A when tested according to ISO 7267-2. The inside faces of the wheels shall be (52,5 ± 0,2) mm apart and equally spaced (26,25 ± 0,10) mm from the centre-line of the abrader head and their common axis of the wheels shall be 20 mm from the vertical axis of the test specimen holder.

3.3.3 Holding and lifting device (8), for the abrasive wheels, so constructed that each wheel exerts a force of (5,4 ± 0,2) N on the test specimen.

3.3.4 Revolution-counter.

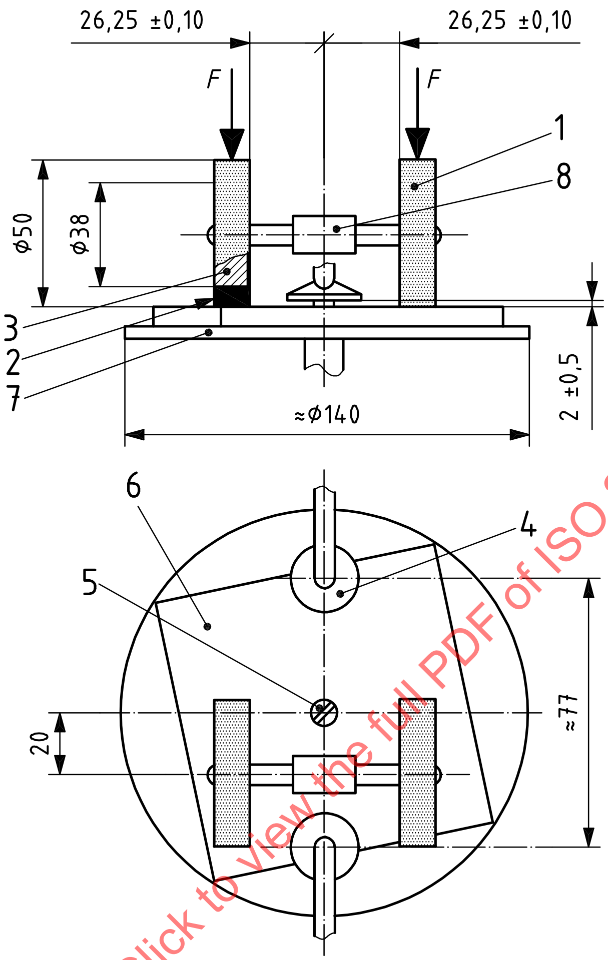
3.3.5 Suction device so fitted that two nozzles (4) are over the abraded area of the test specimen. One nozzle shall be situated between the wheels, the other diametrically opposite. The centres of the nozzles shall be 77 mm apart and (2 ± 0,5) mm from the surface of the test specimen. When the nozzles are closed, there shall be a vacuum of (1,5 to 1,6) kPa.

NOTE 1 It is important to ensure that the abrasive wheels are in good condition, as variations in flatness, hardness, regularity, roundness and width can significantly affect the test result.

NOTE 2 It is important that dimensions listed above and in Figure 1 are followed as deviations can lead to errors exceeding 100%. See Annex A for more information.

2) Taber S-42 is an example of a suitable product available commercially. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.

Dimensions in millimetres



Key

1 abrasive paper
2 rubber
3 abrasive wheel
4 suction nozzle
5 clamping screw
6 specimen
7 specimen holder disc
8 holding and lifting device

Figure 1 — Abrasion resistance testing machine

3.4 Conditioning chamber

The conditioning chamber shall be able to maintain a standard climate of 23 °C ± 2 °C and 50 % ± 5 % relative humidity.

4 Test specimens

Take one laminate floor covering element. Take from this element three test specimens, measuring approximately 100 mm × 100 mm:

— two centered 10 mm in from the short edges; and

— one exactly in the centre of the element (see Figure 2).

Machined edges and machined surfaces shall be avoided in the specimens.

If the dimension of the elements makes the above sampling impossible, then the test specimens shall be sampled from the nearest available area. If the elements measure less than 100 mm, then a joint is necessary. The joint shall be positioned in the middle of the 100 mm × 100 mm specimen.

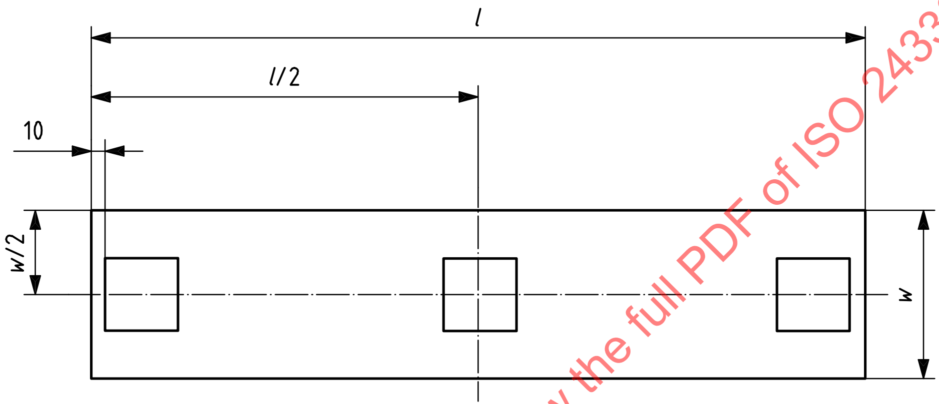


Figure 2 — Sampling from one floor covering element

5 Preparation of test specimens and abrasive papers

Clean the surface of the test specimens with an organic solvent which is immiscible with water. Using a marker pen, mark the surface of each test specimen with two lines mutually at right angles so that the surface area is divided into quadrants (See Figure 3).

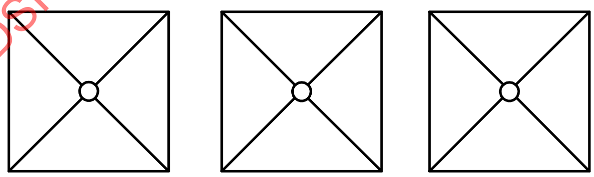


Figure 3 — Division of the three test specimens into quadrants

Precondition the test specimens and the abrasive papers for at least 24 h in the conditioning chamber. After preconditioning, seal the paper strips in polythene bags (maximum 10 strips per bag) until required for immediate use.

6 Procedure

6.1 Preparation of abrasive wheels

Bond a strip of preconditioned unused abrasive paper to each of the rubber covered wheels. Ensure that the cylindrical surface is completely covered without any overlapping of the paper. The outside diameter of the finished assembled wheel shall be (50,90 ± 0,65) mm.

6.2 Calibration of abrasive paper

Prepare two wheels with preconditioned unused abrasive paper according to 6.1 from the same batch to be reserved for testing. Clamp a zinc plate in the test specimen holder, start the suction device, reset the revolution counter to zero, lower the wheels and abrade the zinc plate for 500 revolutions. Wipe the zinc plate clean and weigh to the nearest 1 mg. Renew the abrasive papers with preconditioned unused strips from the same batch, and abrade the zinc plate for a further 500 revolutions. Wipe the zinc plate clean and weigh it again to the nearest 1 mg. The loss in mass shall be (120 ± 20) mg. Any lot of abrasive paper which causes a loss in mass outside this range shall not be used for testing.

6.3 Abrasion of test specimen

Perform the test immediately after the calibration. Prepare two wheels with preconditioned unused abrasive paper from the same batch previously approved by calibration. Fit the wheels to the machine and reset the revolution-counter to zero. Clamp the first test specimen in the holder. Ensure that the surface of the test specimen is flat. Lower the wheels, start the suction device and abrade the test specimen.

Examine the test specimen for abrasion after each 100 revolutions and renew the abrasive papers after every 200 revolutions. Continue the test in this way until the initial wear point (IP) is reached.

The initial wear point (IP) is that point at which the first clearly recognizable wear-through of the print appears and the sub-layer becomes exposed in three quadrants. The initial wear point is reached when there are areas of at least 0,60 mm^2 wear-through in two quadrants and an area of 0,60 mm^2 wear-through becomes visible in a third quadrant. The sub-layer for printed patterns is the background on which the pattern is printed. For plain colours, it is the first layer of different colour.

Wear-through within 10 mm of the centre of a joint shall be disregarded.

Record the number of revolutions as the IP-value. Repeat the test immediately using the two remaining test specimens.

To determine the initial wear point (IP), the “IP-poster” [3] can be used. This is a full-colour photographic visual aid in the three CEN languages to assist correct interpretation, and increase repeatability and reproducibility in the determination of the initial wear point (IP). The poster was developed by CEN/TC 134 and is recommended by both CEN/TC 134 and ISO/TC 219.

To precisely determine the size of the wear-through area, the “Dirt size estimation chart” [4] can be used. The chart is recommended by both ISO/TC 219 and CEN/TC 134.

3) “IP poster” is the trade name of a product supplied by SIS Förlag AB, Box 118 80, Stockholm, Sweden, tel. +46 8 555 52 310, fax + 46 8 555 52 311. Email sis.sales@sis.se. The article number is: 21990 IP-Poster 1.

4) “Dirt size estimation chart” is the trade name of a product supplied by TAPPI, Technology Park, P.O. Box 105113, Atlanta, GA 30348-5113, USA, tel. +1 770 446 1400, fax +1 770 446 6947. The article reference is: TAPPI - Dirt size estimation chart.

7 Expression of results

Calculate the average of the IP-values obtained from the three test specimens to the nearest 100 revolutions.

8 Test report

The test report shall include the following information:

a) a reference to this International Standard (ISO 24338:2006);

b) the name and type of product;

c) the average initial point, in revolutions, of the three samples rounded to the nearest 100 cycles;

d) any deviation from the specified procedure;

e) the date of the test.

Annex A
(informative)

Calibration and maintenance of abrasion equipment

A.1 General

This annex is an example of a procedure for calibration and maintenance of equipment utilized for abrasion resistance testing. The information contained in it has been developed for specific equipment. Other manufacturers of similar equipment may have other calibration procedures and methods.

The procedures outlined below do not necessarily address all potential sources of variance. The schedule for use of described procedures has not been established. Good laboratory practice and experience will indicate required intervals in each laboratory.

Improper alignment of the abrasive wheels can lead to each wheel abrading a different path from its complementary wheel across the sample as well as the wheels on other machines. Path surface area can differ by as much as 20 % and the area abraded by both wheels on a sample could be less than 50 % of the total abraded area for that sample, hence the source of potential error.

Three parts have been identified as potential sources of error. Each is addressed separately; however, each is dependent upon the other. The first is bearing wear (looseness), the second is shaft wear and the third is alignment of the arms. They are addressed without any order of priority below.

A.2 Apparatus

A.2.1 Calibration block of preferably steel measuring (77,9 × 77,9 × 25) mm with a hole drilled and threaded with UNF ¼ inch in the centre (38,95 ± 0,02) mm of the (77,9 × 77,9) mm face such that the block can be threaded onto the holder disc of the abrader.

All edges shall be made with a radius of 1 mm.

A.2.2 Feeler gauges of various thickness.

A.2.3 Shim washers of various thickness ranging from 0,05 mm and up.

The inside diameter shall be 8 mm and the outside diameter shall be 13 mm.

A.3 Procedure

A.3.1 Bearing wear

A.3.1.1 Examine each arm of the abrader visually and by hand for any bearing wear. Specific areas to examine are the pivot areas of the abrader arm and the shaft on which the wheel revolve. This includes, but is not limited to, any sideways, twisting, or other motion outside the specific rotation of the arm or the shaft. Any movement noted, other than the pivoting of the arm or shaft, requires that further examination be made to determine the cause of the excess movement.

A.3.1.2 Specific repairs shall be completed before attempting subsequent portions of the procedure.

A.3.2 Shaft wear

In certain instances, the shaft for the abrader wheel may slide end to end. This movement shall be eliminated by placing shim washers of appropriate thickness between the bearing face and the shaft keeper ring on the end of the shaft opposite the abrader wheel mounting. This can be measured using the feeler gauges to measure the gap prior to disassembly and the appropriate thickness of shim washers placed on the shaft.

A.3.3 Alignment

A.3.3.1 Remove the rubber wheels from their respective shaft mounting and set aside. Remove the rubber mat on the sample table (if used).

A.3.3.2 Attach the calibration block to the table by the threaded mount (Figure A.1).

A.3.3.3 Gently lower the arms with the exposed shaft ends onto the block. Rotate the block to square the block with the shaft face of each arm. The face of each shaft shall squarely meet the adjacent face of the calibration block without force and without any gap. If the arm does not seat squarely onto the block or leaves a gap between the face and block, then that arm shall be aligned.

A.3.3.4 If the alignment does not allow the wheel shaft to rest against the shaft hub and face, the arm shall be moved away from the block by loosening the two set screws on the top of the machine toward the back that holds the shaft on which the arm pivots and moving the entire arm assembly away from the block enough so that the shaft face and hub rest squarely against the calibration block. Retighten the set screws and recheck.

A.3.3.5 If the alignment leaves a gap between the shaft hub/face and the calibration block, the arm shall be moved toward the block by loosening the two set screws on the top of the machine toward the back that holds the shaft on which the arm pivots and moving the entire arm assembly towards the block enough so that the shaft face and hub rest squarely against the calibration block. Retighten the set screws and recheck.

A.3.4 Alignment — Dual head abrader

A.3.4.1 In the case of a dual head abrader, the alignment is more complex due to the common mount utilized by the shaft holding the interior arms for each side of the abrader. In the case of a dual head abrader, the following order of alignment adjustments is made.

A.3.4.2 Remove rubber wheels and table mats from both heads and attach the calibration block to the left head.

A.3.4.3 Check Arm 1 for correct alignment (Figure A.2). If adjustment is required, loosen SS1 and SS2 and move the arm assembly in or out to squarely align the shaft face/hub to the calibration block. Retighten the set screws and recheck.

A.3.4.4 Check Arm 2 for correct alignment. If adjustment is required, loosen SS3, SS4 and SS5 and move the arm assembly in or out to squarely align the shaft face/hub to the calibration block. Retighten the set screws SS3 and SS4 and recheck.

A.3.4.5 Remove the calibration block from the left head and attach it to the right head.

A.3.4.6 Check Arm 3 for correct alignment. SS5 is loose. Seat the shaft beneath SS5 fully to the left and check the Arm 3 alignment. If the shaft face/hub is too tight to the calibration block, shims shall be removed from Arm 3 assembly at the point the shaft seats into the arm at Point X. Part the assembly by moving the Arm 3 and shaft under SS5 fully to the right and remove the shims as needed to squarely place the shaft face/hub against the calibration block. Retighten the set screw SS5 and recheck. If the shaft face/hub is loose against the calibration block, shims shall be added to the Arm 3 at the point the shaft seats into the arm at Point X. Measure the gap between the block and the shaft face/hub with the feeler gauge to determine the thickness of shim washers to add. Part the assembly by moving the Arm 3 and shaft under SS5 fully to the right and add the shims as needed to squarely place the shaft face/hub against the calibration block. Retighten the set screw SS5 and recheck.

