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Laminate flooring — Topical moisture resistance — Assembled joint

Sol stratifié — Résistance à l'humidité superficielle – joint assemblé

Reference number
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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The purpose of this document is to evaluate small occasional topical moisture spill resistance properties of a laminate flooring such as e.g. a glass of water falling and spilling then cleaned immediately after. A laminate floor plank/tile is cut into pieces then connected using the profiled locking edges and fastened into an assembled floating “T joint” configuration. The assembled specimen or elements are exposed to surface water, evaluated for surface swell effect, after removing the water as well as after a recovery time period. Evaluation criteria is qualitative, as well as quantitative. The method can also be utilized to evaluate joint leakage, when exposed to surface water.

This document describes how to evaluate and rate the test specimens. It also provides an annex work sheet to log and help assess specimen rating and measurement scores.

Some of the content of this document was already published in NALFA Surface Water Test_08-01-2019 [1].

Laminate flooring — Topical moisture resistance — Assembled joint

1 Scope

This document specifies a test method to evaluate moisture resistance to surface water exposure of a joined, floating, laminate flooring assembly/element**.** This document also establishes criteria for rating and assessing performance.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
surface swell
evaluation of visible and measurable raised edges of an assembled Laminate flooring panel/element joint when exposed to water on the surface

3.2
assembled flooring joint
portions of a Laminate floor plank/tiles held together by their profiled edges that lock together

3.3
qualitative rating
visual and tactile assessment of the assembled flooring joints after exposure to the surface water swell test

3.4
quantitative rating
measures assessment of the thickness swelling of the assembled flooring joints after the surface water swell test

3.5
wet swell
quantitative rating of the specimen joint for surface water swell test, measured immediately after 24 h of exposure and removal of the surface water

3.6
recovery swell
quantitative rating of the specimen flooring joint for surface water swell test, measured after 24 h exposure, followed by 24 h recovery (re-drying)

4 Materials needed

4.1 Planks

Three planks with undamaged profiled edges. The test is to be run in triplicate. Each test requires one plank.

4.2 Plastic ring

The plastic ring shall be PVC Pipe, or equivalent having (100 ± 5) mm (4 inch) inner diameter, minimum 25,4 mm (1 inch) tall.

4.3 Beaker

Beaker capable of measuring (100 ± 5) ml (3,4 fl. oz.) of water, should give approximately 9 mm (0,375 inch) deep water height in the plastic ring.

4.4 Distilled or de-ionized water

Distilled or de-ionized water, room temperature; (23 ± 3) °C [(73 ± 5) °F].

4.5 Dye colour

The dye colours shall be red or blue.

4.6 Sealant

Vaseline, silicone caulk or plumbers' putty shall be used to seal the ring to the laminate plank.

4.7 Measuring device

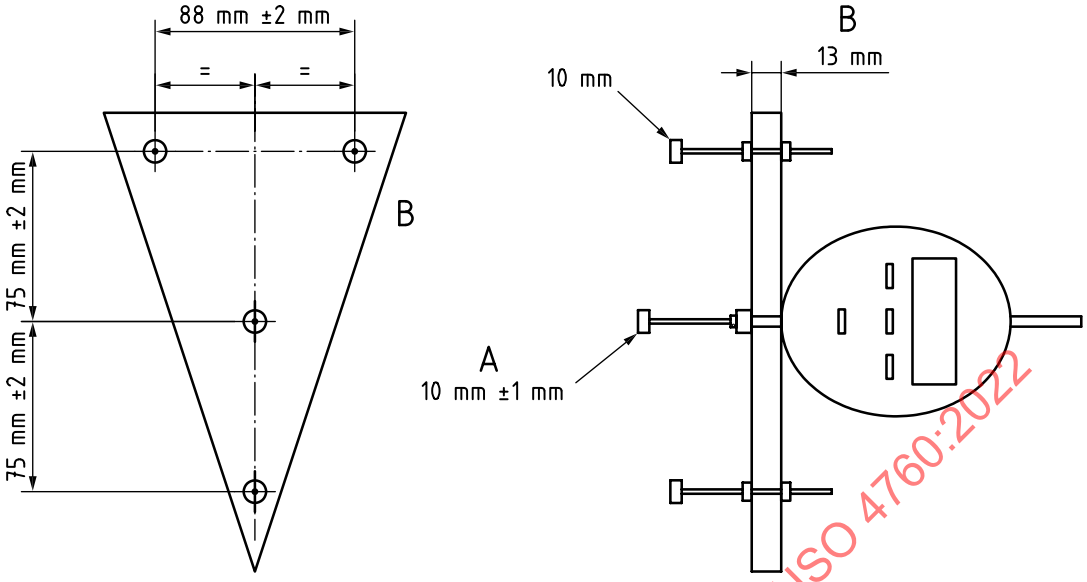
The measuring device shall consist of a three footed flat support frame with dial indicator comparator that can measure changes in surface height at a specified position (see Figure 1). A different device may be used on condition that equivalence to the three footed device is proven.

The unit shall be equipped with a micrometer gauge capable of measuring up to nominal 25 mm (1 inch) graduated to 0,02 mm (0,001 inches). The foot/anvil of the indicator shall have a diameter of (10 ± 1) mm [(0,394 ± 0,039) inches] with an exerted force of 1 N (0,22 lb-force).

Other suitable devices may be utilized, provided they offer at least equivalent measurement capability.

The same calibrated measurement gauge shall be used for before and after testing measurements.

Dimensions in millimetres



Key

A micrometer with nominal 10 mm feet (3/8 inch)

B rigid acrylic plate or equivalent

Figure 1 — Example measuring device

5 Conditioning

Prior to testing for surface swell properties, specimens are to be conditioned per manufacturer's pre-installation acclimation recommendations and if acclimation conditions are not specified then acclimate specimens at (23 ± 3) °C [(73 ± 5) °F] and (50 ± 5) % relative humidity for 24 h.

6 Procedure

6.1 Assembling the test specimen

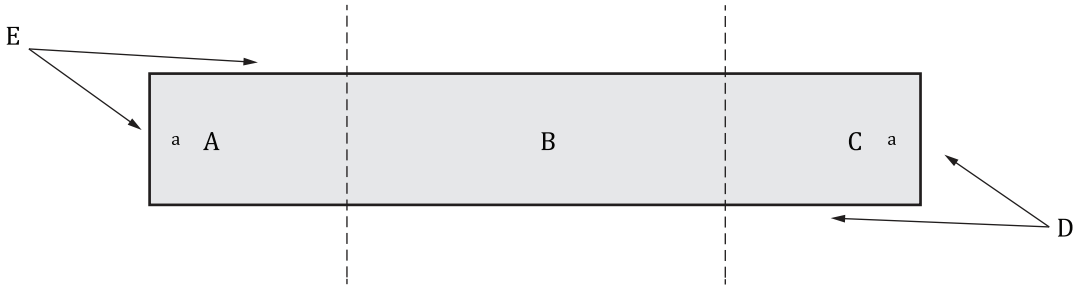
6.1.1 Inspection

Inspect each test plank and ensure they are free of damage on all 4 sides.

6.1.2 Cutting

Cut a minimum of (152,4 ± 0,5) mm (6 inch) off of both ends (Part A and C) of the laminate plank and use a minimum (304,8 ± 5) mm (12 inch) from the center (Part B). See Figure 2.

It should be noted that cutting wood products can generate wood dust. Wear suitable dust mask or use with adequate vacuum exhaust to avoid dust inhalation exposure.



Key

a	reference for assembling planks	D	tongue side/end
A	left end of the laminate plank, refer to 6.2	E	groove side/end
B	middle part of the laminate plank, refer to 6.2		
C	right end of the laminate plank, refer to 6.2		

Figure 2 — Plank layout (x 3 test assemblies)

6.1.3 Cleaning

Prior to assembly, make sure to thoroughly clean profiled edges of each specimen part (A, B and C). Preference is to use an air gun and blow the profiled edges clean, followed by cleaning with a small brush, suited to the task.

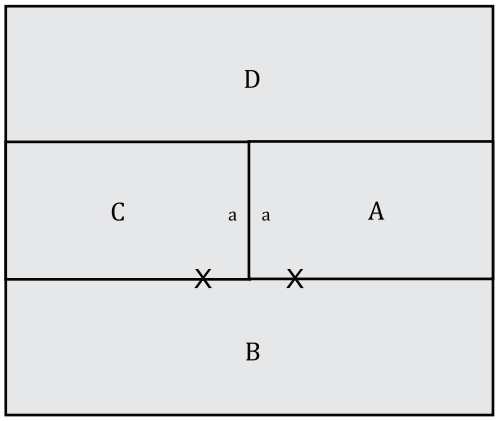
6.1.4 Assembly

Assemble parts A and C according to the manufacturer's recommended installation instructions, making sure the tongue and groove sections are properly engaged. Join part B (Groove side) to the assembled parts C and A (Tongue side) according to the manufacturer's recommended installation instructions, to create the inverted "T" joint. Finally join part D on the other side of A and C used to help ensure the assembly remains flat during testing, see Figure 3.

NOTE Review assembly to ensure no visible gaps between the elements. Assembling, testing, viewing and rating should be in a well-lighted area with specimens placed on a sturdy, flat bench or table, with good viewing access at typical countertop or table top height.

6.1.5 Gaps

When assembling test specimen, if any gaps are noticed, the test specimen should be disassembled, according to manufacturer recommended disassembly instructions, recleaned then reassembled, according to manufacturer recommended installation instructions, prior to testing.



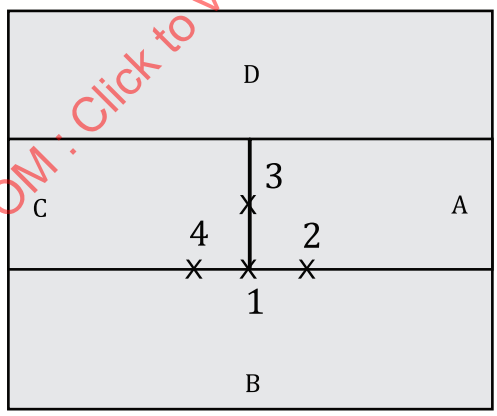
Key

A refer to 6.1.2
B refer to 6.1.2
C refer to 6.1.2
D a bridge or joint support brace
a reference for assembling planks refer to Figure 2

Figure 3 — Assembled Plank Layout with bridge or joint support

6.1.6 Test positions

Mark test positions as denoted in Figure 4.



Key

A refer to 6.2
B refer to 6.2
C refer to 6.2
D refer to 6.2 bridge or joint support brace
1 test position 1 – Intersect point of inverted “T” Joint
2 test position 2 – 38,1 mm (1,5 inch) from test position 1 to right
3 test position 3 – 38,1 mm (1,5 inch) above test position 1
4 test position 4 – 38,1 mm (1,5 inch) from test position 1 to left

Figure 4 — Test Positions on Assembled Planks (x 3 test assemblies)

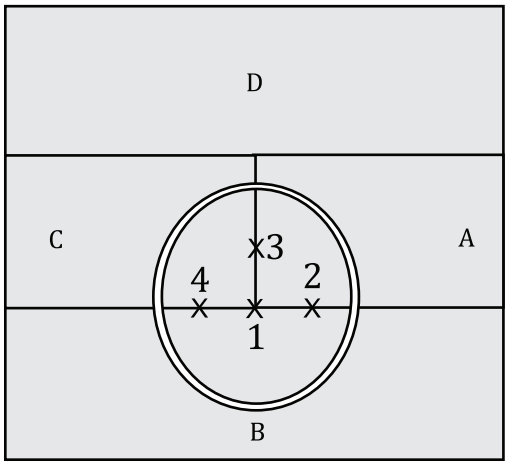
6.1.7 Sealant

Apply a bead of sealant (i.e. petroleum jelly, silicone caulk or plumbers' putty) to one edge of the (100 ± 5) mm (4 inch) diameter ring using a syringe or other suitable method, see Figure 5. The bead shall be continuous and approximately 3 mm in thickness (nominal 0,125 inch).

Figure 5 — Example application of Sealant to Bottom of Plastic Ring

6.1.8 Ring placement

Place the (100 ± 5) mm (4 inch) ring over the inverted "T" joint as shown in Figure 6 with the sealant side down. Press down firmly and wiggle the ring slightly (without shifting its position) to help seal it to the surface of the Laminate planks. On both inside and outside of the ring, make sure to take extra care when sealing the ring to the laminate surface, especially at the joint position points. Make sure assembled pieces are flat and joints fully engaged.



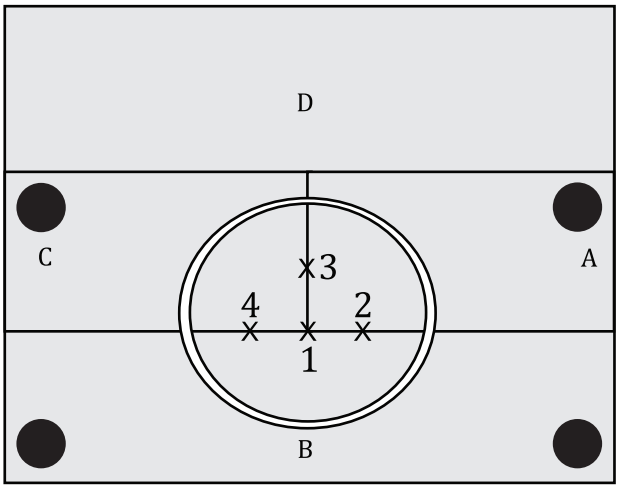
Key

A refer to 6.1.2
B refer to 6.1.2
C refer to 6.1.2
D refer to 6.1.2 bridge or joint support brace
1 test position 1 – Intersect point of inverted "T" Joint
2 test position 2 – 38,1 mm (1,5 inch) from test position 1 to right
3 test position 3 – 38,1 mm (1,5 inch) above test position 1
4 test position 4 – 38,1 mm (1,5 inch) from test position 1 to left

Figure 6 — Assembled Laminate Planks with Plastic Ring seal

6.1.9 Weights

Put a weight of 1 kg ± 50 g (2,2 lbs ± 0,11 lbs) with a sample surface contact area of approx. 2 000 mm^2 and a height of approximately 65 mm on each of the corners of the test area. The weights shall be put in the free area between the corner and the area needed to put the measuring equipment on (see 4.7). The weights are necessary to keep the test area flat and level on the bench or table, see Figure 7.



Key

A refer to 6.1.2
B refer to 6.1.2
C refer to 6.1.2
D refer to 6.1.2 bridge or joint support brace
1 test position 1 – Intersect point of inverted "T" Joint
2 test position 2 – 38,1 mm (1,5 inch) from test position 1 to right
3 test position 3 – 38,1 mm (1,5 inch) above test position 1
4 test position 4 – 38,1 mm (1,5 inch) from test position 1 to left

[a] Circle: 1 kg ± 50 gm (2,2 lbs ± 0,11 lbs) "hold down weights".

Figure 7 — Example of test specimen including four hold-down weights in each corner

6.1.10 Zeroing gauge

Zero measuring device on granite block or equivalent flat surface.

6.1.11 Initial height measurement

Measure height, in mm, with a precision of 2 decimals, at each test position and record data in worksheet.

NOTE Make sure the measurement device feet do not sit on any joint. When taking each test position initial measurement, mark the foot positions of the measuring device so that it can be located back in the exact same position when taking the follow up measurements for wet swell and recovery height readings (optional). For any subsequent measurements make sure measurement device feet are in the exact marked positions. Make sure the measurement device feet fall outside of the plastic ring position and sit flat and level on the surface, when measuring joint height of test positions – See Figure 8.

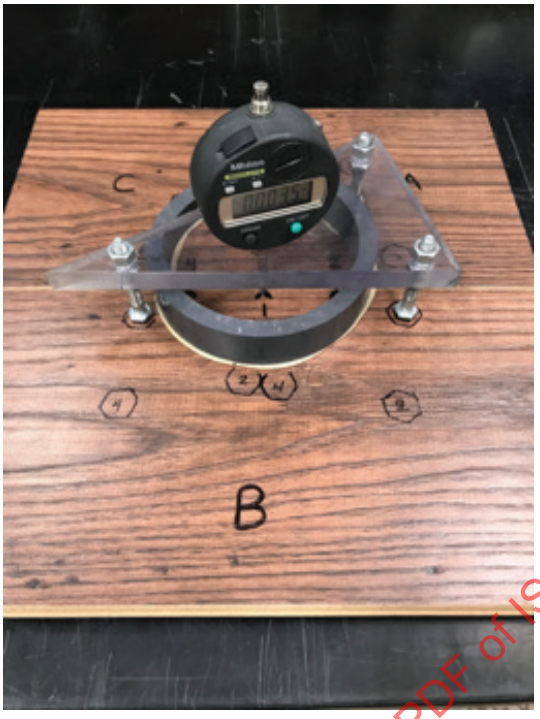


Figure 8 — Example of marked foot positions of measurement device

6.1.12 Water

Using a clean beaker add 100 ml ± 5 ml (3,4 fl. oz.) of room-temperature distilled or de-ionized water plus 5 drops of dye colour. Stir or swirl beaker until colour is uniformly dispersed. Pour the water into the ring sealed to the laminate floor surface. Water level should be approximately 9 mm (0,375 inch) deep (see Figure 9).

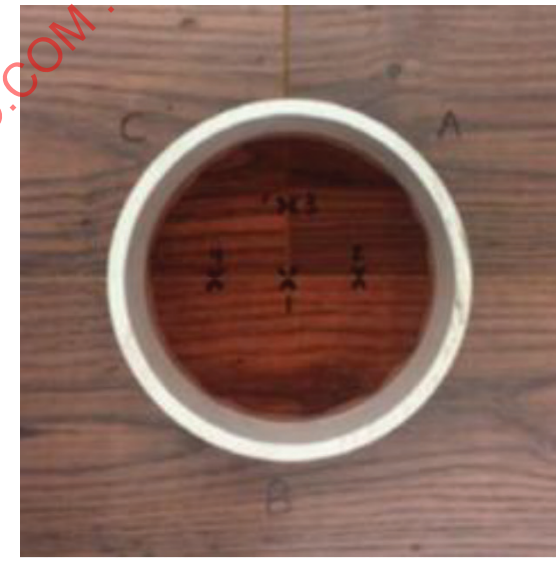


Figure 9 — Assembled plank surface water exposure test set up

NOTE For the first 5 min to 10 min after filling, watch the test assembly closely to make sure no leaks develop around the outer edge of the ring. If a leak is found, apply additional vaseline or plumbers' putty to the base of the ring along the outer perimeter.

6.1.13 Wet swell exposure

Allow the test assembly to stand for 24 h. Within 15 min after the 24 h mark, remove the water (pipet out or use a clean sponge and discard water) then pat dry using paper towel. Leave the test assembly intact throughout the water removal process and evaluation process. Complete qualitative rating (see 7.1) and quantitative rating (see 7.2).

6.2 Qualitative rating for wet swell

See 7.1, Table 1 and Annex B. Complete within 15 min following the 24 h surface water exposure and removal of the water, see 6.1.12.

6.3 Quantitative rating for wet swell

See 7.2. Complete within 15 min following the 24 h surface water exposure and removal of the water. The preferred way would be to do the qualitative rating first followed by measuring quantitatively for joint swell, in order to minimize sample handling that might influence qualitative evaluation of the specimens.

6.4 Qualitative rating for recovery swell

See 7.1, Table 1 and Annex B. Complete within 15 min after the 48 h time test period exposure (24 h exposure plus 24 h recovery).

6.5 Quantitative rating for recovery swell

See 7.2. Complete within 15 min after 48 h exposure (24 h exposure plus 24 h recovery).

7 Rating

7.1 Qualitative rating

For qualitative rating evaluate the joints for apparent differences, in visual swell and feel (light touch can be helpful in discerning differences) within the circle compared to unexposed portions of the specimen and grade the test assembly. Visual inspection should be made in a well-lighted area with the ability to view the specimens from a multi angle perspective. Qualitative criteria descriptions are listed below, along with pictorial examples in Annex B.

Table 1 — Description of Grades (Qualitative)

Grade	Name	Description
1	No change	Little to no noticeable change in edge swell or panel surface lift
2	Slight swelling	Slight swelling, small ridge along one or more joints, very little if any panel surface lift
3	Moderate	Noticeable edge swelling and some panel surface lift extending away from joint
4	Objectionable	Severely raised edge and swelling extending noticeably under the panel surface
5	Failed test	Water leaked out of the ring, leaving no continuous film of water inside the ring (this grade is given even if there is no swell of the edge joint)

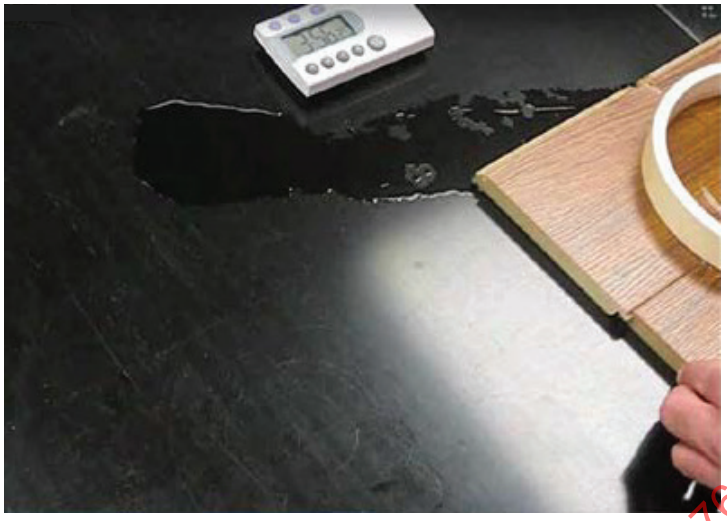
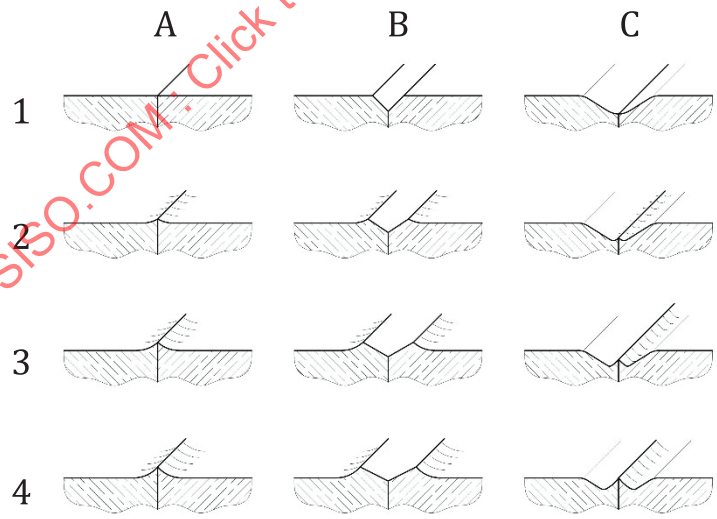


Figure 10 — Example of joint failure – Water through leakage

Make a note if there is no longer a continuous film of water in the ring, because the water leaked out. The type of leak that would cause a score of "5" (failure) is one where the water has entered the joint and ran through and or out along the joint onto the surface upon which the test specimen(s) is sitting (see Figure 10).

Even though some water may leak out, provided there is a continuous layer of water remaining in the plastic ring on the laminate surface, the test is considered valid.

For a better understanding of the qualitative grading described in Table 1, Figure 11 shows a drawing on how the different grades may look on different types of edges.



Key

A without bevel – straight edge
B cut/coated bevel
C pressed bevel

1 without swelling
2 slight swelling
3 moderate swelling
4 objectionable swelling

Figure 11 — Different swelling grades on different types of edges

7.2 Quantitative wet swell

Measure the height at positions 1 to 4 for swell after the 24 h standing surface water exposure period following the steps in Clauses 7 and 8. Record values in the worksheet and refer to Clause 8 regarding calculations to determine the wet swell values.

7.3 Qualitative rating and quantitative recovery swell

Within 15 min after the 24 h recovery time, follow 7.1 for determining the qualitative rating; follow 7.2 for quantitative measurements. Record values in the worksheet and refer to Clause 8 to determine the recovery swell values. Annex C provides a useful worksheet for collection of measured swell values and ratings when evaluating product swell performance when exposed to surface moisture.

8 Calculations

8.1 Surface swell calculation

8.1.1 General

The following calculations shall be made for each position, to determine the wet swell value, calculated by subtracting the initial height from the wet swell height.:

$$P_{1ws} = P_{1wh} - P_{1ih}$$

where

P_{ws} is the calculated wet swell value at the particular position;

P_{wh} is the wet swell height at the particular position;

P_{ih} is the the initial height at the particular position.

Repeat for positions 2, 3, and 4.

8.1.2 Wet swell sample average

Expressed as the average of position 2 to 4 wet swell values in mm units, with a precision of 2 decimals. Position 1 readings, the inverted “T” joint wet swell value shall be recorded separately, also reported in mm units.

8.1.3 Wet swell final average

Value equals the average from the number of measurements taken in mm with a precision of 2 decimals. If one test fails (due to excess leakage), report data along with notation that reported values represents two (2) sets of data. If two specimens fail due to excess leakage, report the wet swell values for that one remaining set and note that the other two (2) test specimens had excessive leakage through the assembled joint and note that the test should be repeated. If all three samples fail due to excess leakage, no wet swell values are reported, and test is reported as a “failure”.

8.1.4 Qualitative wet swell rating final average

Calculate the average of the wet swell ratings and round to the whole integer. In case of 2 failed tests, the final qualitative average is set to 5.

8.2 Recovery swell measurements

8.2.1 General

Recovery swell measurements are to be taken within 15 min of 24 h after the wet swell measurements were determined to see if there is recovery (less swelling after drying) of the swelled joint.

8.2.2 Recovery swell calculation

The position 1(inverted "T") recovery swell is equal to the position 1 recovery height minus the position 1 initial height:

$$P_{1rs}(\text{inverted "T" position}) = P_{1rh} - P_{1ih}$$

where

P_{1rs} is the recovery swell value for the particular position;

P_{1rh} is the recovered height for the particular position;

P_{1ih} is the initial height for the particular position.

Repeat for positions 2, 3, and 4. Values can be reported in a table such as Table A.1 in Annex A.

8.2.3 Recovery swell sample average

The recovery swell sample average is the average of Positions 2 to 4 $\text{Recovery}_{\text{swell values}}$ in mm. Position 1 readings, the inverted "T" $\text{Joint}_{\text{Recovery swell value}}$ shall be recorded separately, also reported in mm.

8.2.4 Recovery swell final average

The recovery swell final average is the average of the recovered swell measurements. If one test fails (due to excess leakage), report the data along with a notation that the reported values represents two (2) sets of measurement data. If two specimens fail due to excess leakage, report the recovered swell values for that one remaining set and note that the other two (2) test specimens had excessive leakage through the assembled joint and note that the test should be repeated. If all three samples fail due to excess leakage, no wet swell values or recovered swell values are reported and the test is reported as a "failure".

8.2.5 Qualitative recovery swell rating final average

Calculate the average of the recovery swell ratings and round to the whole integer.

9 Statistics – Precision and bias – Interlaboratory studies

Table 2 is based on interlaboratory studies involving four materials of commercially available laminate flooring representing both water resistant and non-water-resistant products, using three replicate tests and six laboratories. Statistics are provided for recovered surface swell tests for Positions 2 to 4; values in mm.

Table 2 — Statistics

Dimensions in millimetres

Material	Mean	S_r	S_R	I_r	I_R
A	0,27	0,05	0,10	0,14	0,27
B	0,06	0,04	0,23	0,13	0,66
C	0,22	0,09	0,09	0,24	0,25
D	0,14	0,05	0,16	0,14	0,45

NOTE In Table 2, for the materials indicated:

Mean is the average of test results for all replicates from all labs.

S_r is the intralaboratory standard deviation of the mean and $I_r = 2{,}83\ S_r$

S_R is the interlaboratory standard deviation of the mean and $I_R = 2{,}83\ S_R$

Repeatability: In comparing two mean values for the same material obtained by the same operator using the same equipment on the same day, the means should be judged not equivalent if they differ by more than the I_r value for that material and condition.

Reproducibility: In comparing two mean values for the same material obtained by different operators using different equipment on different days, the means should be judged not equivalent if they differ by more than the I_R value for that material and condition.

(This applies between different laboratories or between different equipment within the same laboratory.)

The judgments based on the repeatability and reproducibility will have an approximate 95 % (0,95) probability of being correct. Other materials may give somewhat different results.

10 Report

Laminate topical moisture resistance – Assembled joint

Product ID:	**Date: .....**	
	Wet swell	**Recovered swell**
Final Average (Positions 2 to 4)	.....	.....
Final Average (Position 1)	.....	.....
Qualitative Rating Average	.....	.....
Observations:		
Disassembly observations:		
NOTE See **Annex D**.		

Annex A
(informative)

Seam/joint swell – Table of individual results

Table A.1 — Table of individual results

		Specimen 1 mm	Specimen 2 mm	Specimen 3 mm
Test Position 1	(inverted “T” joint) Initial measurement			
Test Position 2	Initial measurement			
Test Position 3	Initial measurement			
Test Position 4	Initial measurement			
Test Position. 1	(inverted “T” joint) Wet swell measurement			
Test Position 2	Wet swell measurement			
Test Position 3	Wet swell measurement			
Test Position 4	Wet swell measurement			
Test Position 1	(inverted “T” joint) Recovery measurement			
Test Position 2	Recovery measurement			
Test Position 3	Recovery measurement			
Test Position 4	Recovery measurement			
Comments				

NOTE

a) See Clause 8.

b) Post-test analysis:

After all measurements are complete, disassemble assembled joints, observe and report the location of the dye solution in the joint relative to the ring position (optional step).

Annex B
(informative)

Example of photos to match with subjective ratings

B.1 No change

Little to no noticeable change in edge swell or panel surface, see Figure B.1:

Figure B.1 — Examples of little to no noticeable change in edge swell or panel surface

B.2 Slight swelling

Slight swelling: small ridge along one or more joints, very little, if any panel surface lift, see Figure B.2:

Figure B.2 — Example of slight swelling, small ridge along one or more joints