



Hesse Lignal
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ABRASION RESISTANCE

in the flooring industry

Flooring should be durable - that's what the end customer wants. Whether it's carpeting, tiles or wooden flooring, this aspiration is the same for all materials. On the one hand, customers want the floor covering to look good for a long time, and on the other, resistant materials save the customer renovation costs. Last but not least, durable products also contribute to a more sustainable world.

This article explains the importance of abrasion resistance in the flooring industry, and provides information on applicable standards and procedures used to determine the abrasion resistance of wooden parquet flooring, laminate and designer flooring. The ability of floors to withstand everyday wear and tear is of crucial importance. The details set out below offer an insight into the various aspects of abrasion resistance.

Test procedure:

The most commonly used procedure is the Taber test. Various versions of it are carried out:

1 Falling Sand procedure:
"Falling Sand" is a method of assessing the abrasion resistance of flooring materials. Fine sand is scattered on the surface of the test piece, and the Taber Tester wheel rubs it over the surface to simulate abrasion. The test sand is precisely defined. One commonly used sand is the "Treibacher Sand ALODUR ESK 240" made of aluminium oxide. The friction wheel is equipped with leather. This test makes it possible to assess how well a flooring material performs in dealing with sand and abrasive particles.

2 Test with sanding paper
The Taber test with sanding paper is another test to assess the abrasion resistance of flooring materials. In this test, a rotating wheel is pressed onto the surface of the material. The friction wheels have a defined sanding paper glued to them. The most commonly used abrasion material is the S-42 sanding agent (aluminium oxide in corundum quality 180).

3 Friction wheel made of rubber
This is a test used in the textile industry, and in comparison to the other procedures is a little less abrasive. This test (friction wheel CS-10) is therefore frequently used to test non-layer-forming systems such as oiled parquet flooring. A cylindrical test piece with a defined weight and specific configuration is rolled over the surface. The friction rollers are made of rubber, into which abrasive grits are mixed.

Each of these test types offers a specific approach to assessing the abrasion resistance of flooring materials, and may be chosen according to the requirements and conditions of the material. It is not possible to establish comparability between the abrasion values determined.

The testing device

The three procedures described above are carried out with the Taber abrasion test device. With the Falling Sand procedure, a grit feed is also required.





Evaluation of abrasion

In most standards, abrasion is determined visually. The test devices are often divided into sectors using templates, in order to establish the initial point (IP) of wear in the surface. There may be 4, 8 or 16 sectors. Many standards specify that the initial point (IP) has been reached when a defined quantity of the

surface has been worn through in 3/4 of the sectors. The number of revolutions of the test device until this point is then used as the abrasion value.

In order to better determine the initial point on real wood, the running surface of the friction wheel is wetted and wiped with a dye. This makes areas of abrasion easy to see. On printed substrates, the initial point can easily be determined visually, as the print is destroyed.

Other evaluation procedures document weight loss of the test piece or the depth of abrasion marks, depending on the standard in question.

Classifications

Resistance classes are often quoted in flooring sector standards. They differ by intensity of usage and the wear rating (domestic use, commercial use)

Usage	Domestic	Commercial	Industrial
Light			
Moderate			
Heavy			
Intensive			

For each class, the necessary resistance and test procedures to be used are specified. In NALFA LF01-2018, by contrast, usage classes 1 to 4 are described.

Relevant norms and standards

A multitude of standards address this topic worldwide. The standards describe flooring types, explain the concepts and list resistance classes. Some standards describe how the abrasion tests are carried out, others are dedicated to the requirements and classification.

In the areas of laminate flooring, designer floor coverings and wooden floors some procedures and standards have been established, the most common of which are described in brief below. Consult the corresponding standards for details.

ASTM D4060-19: The American Society for Testing and Materials (ASTM) describes the procedure for determining the abrasion resistance of surface materials using the Taber Test. This test is in widespread use and serves to assess resistance to wear and tear in various industries including the flooring industry.

NALFA Standards LF 01-2019: This is a standard issued by the North American Laminate Flooring Association and describes laminate and its properties including the abrasion test with sanding paper S-42.

ISO 24338:2022 (International standard): ISO 24338 is an international standard that describes test methods for laminate floorings in order to evaluate their resistance to abrasion and suitability for particular applications. Procedure A: S-42; Procedure B: Falling Sand.

EN 13329:2008: This standard concerns laminate floorings and specifies requirements for performance characteristics, fire behaviour and procedures for determining S-42 abrasion resistance of laminate floorings. Details of abrasion classes AC1 to AC5.

EN 14354:2017: This standard was developed for veneer flooring, but is also used in practice for other floor coverings such as prefabricated parquet. It concerns, amongst other things, abrasion resistance test methods in accordance with Falling Sand and S-42, and classification into usage classes. Depending on the thickness of the veneer, different wear and tear limits apply. The abrasion classes WR0 to WR3 described in the previous version are omitted from the current one.

EN 15468:2021: Specification, requirements and test procedures for laminate flooring. Abrasion values classified to S-42 and Falling Sand procedures

EN 16511:2023: This standard stipulates the requirements for modular, mechanically locked floor coverings (MMF). It deals with various aspects such as resistance to wear and tear, stability and other performance characteristics. Abrasion classes are assigned in accordance with S-42 and Falling Sand with reference to ISO 24338.



Comparison between abrasion values in the standards

Class		Domestic			Commercial		
		21	22	23	31	32	33
Standard	Procedure	Abrasion values in rotations up to initial point (IP). Differences between individual standards not taken into account					
EN 14354:2017 Cover layer 1.0 - 2.5 mm	Falling Sand Annex D	800			1500	3000	
EN 14354:2017 Cover layer ≤ 1.0mm	Falling Sand Annex D	1000		2000		4000	6000
EN 14354:2005 out-of-date	Falling Sand	1000 WR0	3000 WR1		5000 WR2	7000 WR3	
EN 15468:2021	Falling Sand Annex A	1000 AC1	1000 AC2	2000 AC3		4000 AC4	6000 AC5
EN 16511:2023	Falling Sand in acc. with ISO 24338, procedure B	500		1000	3000	5000	7000
EN 13329:2008	S-42	900 AC1	1500 AC2	2000 AC3		4000 AC4	6000 AC5
EN 14354:2017	S-42 Annex E	900	1500		2000	4000	6000
EN 15468:2021	S-42 in acc. with EN 13229 Annex E	900 AC1	1500 AC2	2000 AC3		4000 AC4	6000 AC5
EN 16511:2023 (in brackets: for PVC wear layer)	S-42 in acc. with ISO 24338, procedure A	200 (500)	200 (1000)	400 (1500)	600 (2000)	1200 (2000)	2000 (5000)

Usage		Living area (1)	Light commercial (2)	Commercial (3)	Heavy commercial (4)
NALFA Standards LF 01-2019	S-42	1500	2000	4000	6000

Apart from the particular features of each standard, which are not detailed here, the table shows that for the purpose of classification the correct standard should be consulted and the most suitable procedure selected. There can be differences even between different versions of a standard (see for example EN 14354).

Which standard should be used?

- The choice of standard depends on the type of flooring material or product. Certain standards are designed specifically for wooden parquet flooring, laminate or flexible surfaces. It is therefore important to choose the standard that best corresponds to your area of application.
- In a few cases, country-specific standards or regulations may apply. Ensure that the standard chosen corresponds to the respective regional requirements.
- Certain sectors or associations may have developed their own norms and standards that are widely used in their sector. These should also be taken into account.
- The choice of a standard may also depend on the preferred test methods or specific preferences of your company or sector. Some test methods are more specialised or precise than others.
- If your products are marketed internationally, it may be sensible to take international standards into account to ensure that your products meet the same quality standards in different countries.



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What lacquers are necessary to meet standards?

If using the sanding paper test method (S-42), a lacquer system in which corundum is incorporated will generally be used. This makes it possible to achieve good abrasion values. If surfaces are to be particularly resistant when tested with Falling Sand, the use of additives containing corundum in the lacquer formulation has little to offer. In this case, making the right choice of binding agent and layer thickness is a significant criterion for achieving good usage classes. Flooring that has to pass both the S-42 and Falling Sand tests can achieve this by clever choice of the various lacquer layers.

CONCLUSION

Abrasion resistance is of crucial importance in the flooring industry, as it influences the service life and performance of floor coverings. The various standards and test methods offer clear guidelines for assessing and comparing materials to ensure that they meet requirements. Manufacturers and consumers can use these standards to make the right choice of floor coverings.

The Taber test is a valuable tool for assessing abrasion resistance in the flooring industry. Manufacturers can benefit from the results to maximise the durability and performance of wooden parquet, laminate and designer flooring. It is, however, important to distinguish between the various different procedures.

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