
DLW FLOORING

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Technical Information

Product Technology

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Description, Testing and Classification of Fibrebonded Floor coverings according to EN 1307

1 Application

The European standard DIN EN 1307 (issued July 2014) specifies the requirements for fibrebonded floor coverings in usage classes in relation to wear, changes in appearance and a luxury rating. It applies among other textile floor coverings to fibrebonded sheet floorings and tiles. Classification into levels of use for fibrebonded floor coverings are now identical with that of resilient floor coverings according to EN ISO 10874.

2 Terms and definitions

Based on ISO 2424, a distinction is made between

- 2.1 unboned loose tiles
- 2.2 fixed redetachable tiles
- 2.3 adhesive tiles.

3 Categories of fibrebonded floor coverings

Type A1: a visible layer - single layer

Type A2: more than one visible layer whose binder does not reach the upper use surface (back coated).

Type A3: more than one layer whose binder is present throughout the entire thickness (fully impregnated).

3.1 Description of classifications and levels of use

Textile floor coverings are categorised into various classes of use: Domestic and Commercial. The levels of use are shown in Table 1.

The symbols and examples of usage are listed in EN ISO 10874. See also Table 2.



FLOORING

Table 1:

Domestic		Commercial	
Class	Level of use	Class	Level of use
21	moderate / light		
22	general / medium		
23	heavy	31	moderate
		32	general
		33	heavy*

In the case of highly specific applications such as at airports, in theatres or industry, the technical requirements need to be agreed between the parties involved.

* Class 33 should be taken as the basis here, with the necessity of agreeing additional requirements in order to establish an individual specification.

Table 2:

Intensity of use		
Domestic	Commercial	Examples of usage
		Domestic: Bedrooms
		Domestic: Living rooms, entrance halls
		Domestic: Living rooms, entrance halls Commercial: Classrooms, individual offices, hotels, boutiques
		Domestic: Living rooms, entrance halls Commercial: Corridors, doctors' surgeries, schools
		Commercial: Department stores, hospitals, large offices

4 Characteristic features

Fibrebonded floor coverings are manufactured in a wide range of constructions with different use surfaces. To compare products a standardised description of the goods is thus required. This is governed by DIN EN 1307. The relevant terms and definitions are explained in DIN ISO 2424.

4.1 Fibre composition of use surface

The fibre composition is determined according to the European directive 96/73 and 96/74. This is specified e.g.

PA 6 = polyamide

PP = polypropylene
PES = polyester

4.2 Width/ Dimensions

The length and width are determined according to ISO 3018.

The tolerance in terms of length and width is $\pm 1\%$ according to EN 14159. The width must not exceed the maximum deviation value of 3 cm.

4.3 Total thickness

The thickness is measured according to ISO 1765 to an accuracy of 0.1 mm using a measuring pressure of 20 g/cm². It is only relevant in installation terms (connection to other floor coverings, profiles und door rabbets). The tolerance from the nominal value is + 15% / -10%.

4.4 Total mass per unit area

The total mass per unit area is tested according to ISO 8543 and is the weight per square metre of the entire floor covering construction. The total mass per unit area has no relevance to the behaviour in use. The required weight is specified rounded off to 50 g. Tolerance: $\pm 15\%$ of the nominal value.

4.5 Mass of use surface (Mass per unit area of use surface)

Regarding to EN 1307 there is no more tolerance for mass of use surface – Following is the demand of the old EN 1740 described. In the case of multilayer fibrebonded floor coverings (type 2 and 3) the weight is determined above the carrier according to EN 984. Here a band knife machine is used to shear off the use surface above the carrier until 50% of the carrier becomes visible. The shorn weight then determined. The required weight is specified rounded off to 10 g/m². The tolerance for fibrebonded floor coverings is + 15% / - 10% of the nominal value.

5 Basic requirements

Fibrebonded floor coverings must satisfy the following basic requirements.

5.1 Dimensional stability

This is determined according to ISO 2551. The tolerance in every direction is $\leq 0.5\%$ in the case of stretching and $\leq 1.2\%$ for shrinkage.

5.2 Assessment of impregnations

The backing materials in fibrebonded floor coverings have to be assessed in terms of resistance to soiling according to EN 1269. Here standardised dirt is applied to the floor covering and tested using the drum or castor method according to EN 985 and then vacuumed off. The result is assessed with the grey scale. The specification is level $\geq 2-3$. For fibrebonded floor coverings which are only categorised as class 21, level ≥ 2 is acceptable.

5.3 Fastness

To assess changes in colour the grey scale according to EN 20105 is used.



FLOORING

Grade 1 is awarded for a high level of colour transfer or change in colour and grade 5 where the change is imperceptible.

5.3.1 Colour fastness to light

Fibrebonded floor coverings must attain a colour fastness rating of at least 5 according to ISO 105-B02. For pastel shades only the rating ≥ 4 is required.

Samples are exposed to a so-called Xenotest device, using artificial light from a xenon lamp that more or less corresponds to daylight. As there is no ultraviolet (UV) radiation in an enclosed room behind window glass, filters are also used in the test device to withhold this band of radiation of the light from the sample as far as possible. The samples are thus exposed to light under specific temperature and humidity conditions. A light fastness scale (blue wool scale) is also tested along with the samples.

5.3.2 Colour fastness to rubbing

Every fibrebonded floor covering must attain the rubbing fastness grade $\geq 3 - 4$ (dry) and ≥ 3 (wet) according to EN ISO 105-X12.

Testing of rubbing fastness was originally developed to assess clothing textiles. According to the result of the test it is possible to state whether the floor covering will cause an unacceptable level of staining when rubbed against other textiles. To test this, the sample is placed in a "Crockmeter" and rubbed lightly against white test fabrics. The procedure is carried out with wet and dry test fabrics.

5.3.3 Colour fastness to water

Every fibrebonded floor covering must attain at least the water fastness grade ≥ 2 to 3 according to EN ISO 105-E01. In the case of multifibre products it is the poorest result that is graded.

Fibrebonded floor coverings with unpatterned designs must attain a water fastness grade of $\geq 3 - 4$ and a water fastness grade of ≥ 4 for other floor coverings.

To test water fastness samples of fibrebonded floor coverings are soaked with water. White test fabric is then placed on the upper surface and subjected to pressure. The colour changes in the sample and the staining of the fabric are then graded. When rating floor coverings for general applications (excluding wetrooms) only the colour change in the upper surface of the sample is graded. No significant changes should be detectable here.

5.4 Surface fuzzing (Pilling)

Fibrebonded floor coverings must attain the grade ≥ 2.5 according to EN 1963 – test D. Testing is performed to determine the fibre retention of fibrebonded floor coverings. The floor covering is rated after 100 and 200 double cycles according to the photo standards.

6 Classification into levels of use

Fibrebonded floor coverings are categorised into different application levels according to their use characteristics.

Classification depends on three main characteristics: wear, general resistance and changes in colour. These characteristics are used to describe the behaviour in use as a function of the intensity of use (classes 21 to 33 in ascending order of the intensity of use).

The class categorised for the level of use is the lowest obtained by the fibrebonded floor covering during the tests involving wear, general resistance and changes in appearance.

6.1 Classification of wear resistance

Fibrebonded floor coverings have to be tested in terms of the basic requirements for use surface and loss of total mass per unit area. The lowest class from both tests should be specified.

6.1.1 Mass loss (m_v) (Total mass loss per unit area) abrasion resistance – Lisson test

The total mass loss per unit area is determined using the Lisson pedal wheel.

Fibrebonded floor coverings for classification into classes for the level of use must not exceed the following total mass loss per unit area m_v in g/m^2 . The value is calculated according to EN 1963, test A.

For class 21 – no requirements

For class 22 the value m_v must be
 $\leq 80g/m^2$,

for classes 31
 $\leq 50 g/m^2$,

for classes 23 and 32
 $\leq 40 g/m^2$, and

for class 33
 $\leq 30 g/m^2$

6.2 General resistance

In the case of fibrebonded floor coverings the general resistance is determined with the chair castor method according to EN 985, with test C of this standard using 10,000 revolutions for classes 21 to 23 and 25,000 revolutions for classes 31 to 33. Here no damage should occur (such as delamination, cracks, bulging etc.).

During testing the occurrence and extent of any deterioration in the sample must be ascertained.

6.3 Changes in appearance

Fibrebonded floor coverings are tested with the chair castor method according to EN 985, test A and C using the revolutions specified in the following table, followed by assessment.

The discolouration is evaluated by comparing the contrast of the samples of floor covering tested and the original samples with the contrast of the standard grey scale. The discolouration (brightening, lightening) is evaluated using ratings from 1-5 (with 5 being the lowest level of change). Precise graduations of 0.5 should be used here. With every class for the level of use the discolouration median must satisfy the requirements of the following table.

Table 3:

Class	EN 985 test B 750 revolutions	EN 985 test A 5,000 revolutions	EN 985 test A 25,000 revolutions
Domestic			
21	—	—	—
22	2.0	—	—
23	2 - 3	2 - 3	—
Commercial			
31	2 - 3	2.0	—
32	2 - 3	2 - 3	—
33	3.0	2 - 3	2.0

7 Classification into luxury ratings

Fibrebonded floor coverings are classified into the luxury rating LC 1 without testing.

8 Additional use characteristics

Besides the basic requirements of item 6 which must be satisfied, fibrebonded floor coverings can also be characterised by the following additional properties.

8.1 Castor chair suitability

Fibrebonded floor coverings are suitable for castor chairs if they achieve an R value of ≥ 2.4 with continuous use and ≥ 2.0 with occasional use during testing according to EN 985, test A. The prerequisite is usage with castors complying with EN 12529, type H (hard).

A holder with three castors revolves excentrically on a rotating sample. The castors are subjected to a total load of 90 kg. Wear of the use surface does not occur during this test. The change in appearance is assessed in grades from 1 - 5 (with 5 being the lowest level of change). The assessment grades after 5,000 and 25,000 revolutions are used to calculate the R value.

8.2 Electrostatic properties

8.2.1 Antistatic

Fibrebonded floor coverings are antistatic if they achieve a value of ≤ 2.0 kV in the walking test according to ISO 6356. The static electrical charge is specified in kV (kilovolt).

Testing is carried out in a climatic chamber at 23° C and a relative humidity of 25%. The test measures the static electrical charge of a test person while walking on the fibrebonded floor covering with the specified footwear. The static electrical charge is measure before and after the floor covering is cleaned. The higher value from both tests must be specified.

8.2.2 Conductivity

For fibrebonded floor coverings the vertical and/or horizontal resistance can be specified. They are tested according to ISO 10965.

8.3 Acoustic properties

8.3.1 Noise reduction

While impact sound absorption refers to the reduction in noise from one room to another, the reduction in noise in a single room is known as noise reduction. This is determined according to ISO 354 and is specified as the calculated value α_s or the calculated average α_w .

An echo effect often occurs in large empty rooms: when a sound is produced, is rever

berates for some time afterwards. This reverberation time is measured in special echo chambers. The noise reduction level α_s can be calculated from the reverberation times with and without sound-absorbing material.

This is a measure of how much sound energy is absorbed by the area of any material in comparison with an area that is 100% absorbent. One square metre of a fibrebonded floor covering with $\alpha_s = 0.20$ thus absorbs 20% of the sound energy that would escape for example through an open window of identical size (100%).

8.3.2 Sound insulation

The impact sound is the difference between the evaluated standard impact sound levels of the reference floor without and with ceiling support (e.g. soft flooring). The assessed impact sound reduction is tested according to EN ISO 10140-3, rated according to EN ISO 717-2 and marked as ΔL_w .

8.4 Thermal resistance

The thermal resistance of floor coverings is measured according to ISO 8302, with the value calculated being specified in m^2K/W .

The sample to be measured is placed over a hotplate whose heating output can be precisely controlled. A heating protection system encircling the hotplate is used to avoid any heat loss at the sides. Cooling plates, whose temperature is maintained at a constant level, are positioned at the outer sections of the sample. The thermal resistance is calculated from the flow of heat passing vertically through the samples, the temperature difference between the hotplate and cooling plate and the geometrical dimensions of the area of the sample involved in measurement.

The thermal resistance of textile floor coverings is not generally very important for heat insulation in buildings due to its relatively low values, 0.05 - 0.25 $m^2 K/W$. It is only when installing under floor heating that the thermal resistance of floor coverings needs to be taken into account in order to avoid a build-up of heat.

8.5 Suitability for underfloor heating

A fibrebonded floor covering is suitable for underfloor heating if

- the thermal resistance is $\leq 0.17 m^2 K/W$ according to item 8.4
- No ageing should occur under conditions of heat.

8.6 Suitability for wetrooms

A fibrebonded floor covering is suitable for wetrooms if the dimensional stability of the floor covering as described in item 5.1 is tested according to ISO 2551 and the following limit values are not exceeded

- extension $\leq 0.4\%$ in every direction
- shrinkage $\leq 0.8\%$ in every direction.
- it achieves at least the rubbing fastness grade 4 dry and wet according to item 5.3.2.
- the fibres are rot-resistant (no natural or cellulose-based fibres).

8.7 Stair suitability

Stair suitability is assessed according to EN 1963, test B (Lisson pedal wheel) and EN 1963, Annex A. The result can be specified as stair suitability either with occasional or continuous use.

9 GuT environmental label

DLW sets great store by protecting both the environment and consumers when it comes to the use of raw materials and manufacture of its flooring qualities. The German organisation Deutsches Teppichforschungsinstitut (TFI) carries out regular checks and measurements to check comply with our obligation.

DLW fibrebonded floor coverings are subjected to a rigorous three-stage test at regular intervals. This includes the following individual elements:

- checking for harmful substances
- checking for the emission of components causing
- odours
- odour testing.



FLOORING

Such analyses ensure that consumers are not exposed to harmful substances such as pentachlorophenol, formaldehyde, pesticides harmful to health, butadiene etc. when using our fibrebonded floor coverings. Only when these stringent pollutant and emission tests have been passed are a label and approval number issued for manufacture and the finished product, whereby this is solely available from the German institute, called Deutsches Teppich-Forschungsinstitut (TFI) in Aachen. The GuT-label is awarded for a limited period of time. Continued use of the approval number and label are only permitted if no complaints/objections are submitted to the manufacturers or the trade during the annual checks. At DLW Flooring it is guaranteed that the latest findings from production engineering and ecology are implemented in terms of environmental protection.

10 Additional requirements for tiles

Fibrebonded tiles must offer the properties listed under item 10.2, Table 5.

10.1 Definitions

Loose tiles:

Loose tiles are laid without using an adhesive system.

Fixed detachable tiles:

These tiles are laid on a nonslip system. They are thus fixed in place to prevent them from slipping yet can still be taken up again easily and relaid.

Adhesive tiles:

These tiles are permanently bonded to the ground with an adhesive system recommended by the manufacturer.

10.2 Additional requirements for tiles

Table 4:

Properties	Test method	Non adhered tiles loose laid	Adhered tiles	
			Removable	Permanent
Total mass per unit area/tile	ISO 8543	≥ 0.875 kg	≥ 0.625 kg	-
Total mass per unit area/m ²	ISO 8543	≥ 3.5 kg/m ²	≥ 2.5 kg/m ²	-
Width / Dimensions	EN 994	$\pm 0.30\%$ on nominal dimensions and $\pm 0.20\%$ in the same batch		
Squareness and straightness of edges	EN 994	$\pm 0.15\%$ in both directions		
Dimensional stability	EN 986	Shrinkage and extension $\leq 0.2\%$ in both directions	Shrinkage and extension $\leq 0.2\%$ in both directions	Shrinkage $\leq 0.4\%$ in both directions Extension $\leq 0.2\%$ in both directions
Curling / doming	EN 986	Maximum deviation of plane ≤ 2 mm	Maximum deviation of plane ≤ 2 mm	

11 Requirements not listed in EN 1307

11.1 Classification of flammability Floor coverings

The familiar "B1" (fire-retardant) building materials fire class according to DIN 4102 for floor coverings no longer exists since 2007. This German fire classification has been superseded by the Euro classes B_{fl}-s1 and C_{fl}-s1 (fire-retardant) according to EN 13501-1, which are now binding in the European Union. This European standard for the fire classification of construction products according to their reaction to fire tests lays down these new classes for the flammability of floor coverings, which are now applicable throughout Europe for the first time.

The classification of floor coverings in this new standard is based mainly on test procedures which are similar to the old B1 and B2 tests already known to us. In this case the abbreviation "fl" added to the fire class stands for "floorings", i.e. floor coverings. See Technical Information Construction Technology No.1.3; Fire Safety, Flammability of Floor coverings.