



DLW FLOORING

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Technical Information

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Testing and Classification of Resilient DLW Commercial floor coverings

1 Requirements of standards on resilient floor coverings

EN 14041, the European standard relevant to the CE mark for floor coverings, is legally binding. To apply the CE mark to floor coverings it is necessary to satisfy the requirements of this standard. The obligation to use the CE mark on floor coverings is automatically being transposed into national law in the member states of the European Union and the CEN member states (Iceland, Norway, Switzerland). In Germany this is the Construction Products Directive / Construction Products Act.

From January 2007 all floor coverings sold in the European Union and the CEN member states must bear the CE mark. This is however conditional on such floor coverings satisfying the essential requirements of EN 14041 (see item 5 "Safety-relevant characteristics"... of this document) and the requirements of the individual product standards, as listed in the following table.

DLW Flooring GmbH has adopted further internal restrictions in addition to the existing requirements of the standards for award of the CE mark for floor coverings to ensure that our company in fact only markets floor coverings that are environmentally friendly and safe to health.

Table 1: General requirements and tolerances

		EN ISO 10581 (Homogeneous PVC floor coverings)	EN ISO 10582 (Heterogeneous PVC floor coverings)	EN 651 (PVC floor coverings with foam layer)	DIN EN ISO 24011 (Linoleum without patterning)	EN 687 (Linoleum with a corkment backing)	EN 686 (Linoleum with foam layer)
1.1	Width/dimensions, permissible deviation from nominal measurements (EN ISO 24341, EN ISO 24342)	Sheet flooring: No deviation below the nominal values Tiles: ≤ 0.13%, max. 0.5 mm	Sheet flooring: No deviation below the nominal values Tiles: ≤ 0.15%, max. 0.5 mm	Sheet flooring: No deviation below the nominal values Tiles: ≤ 0.13%, max. 0.5 mm	Sheet flooring: No deviation below the nominal values Tiles: ≤ 0.15%, max. 0.5 mm	Sheet flooring: No deviation below the nominal values	Sheet flooring: No deviation below the nominal values
1.2	Tile squareness (EN ISO 24342) Side length ≤ 400 mm Side length > 400 mm Side length > 400 mm for welding	≤ 0.25 mm ≤ 0.35 mm ≤ 0.5 mm	≤ 0.25 mm ≤ 0.35 mm ≤ 0.5 mm	≤ 0.25 mm ≤ 0.35 mm ≤ 0.5 mm	≤ 0.25 mm ≤ 0.35 mm ≤ 0.5 mm	-	≤ 0.25 mm ≤ 0.35 mm
1.3	Total thickness Permissible deviation from nominal thickness (EN ISO 24346)	- 0.10 / + 0.15 mm (average) and ± 0.15 mm (single value)	- 0.10 / + 0.13 mm (average) and ± 0.15 mm (single value)	- 0.15 / + 0.18 mm (average) and ± 0.20 mm (single value)	± 0.15 mm (average) and ± 0.20 mm (single value)	≥ 4.0 mm ± 0.20 mm (average) and ± 0.25 mm (single value)	± 0.20 mm (average) and ± 0.25 mm (single value)



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		EN ISO 10581 (Homogeneous PVC floor coverings)	EN ISO 10582 (Heterogeneous PVC floor coverings)	EN 651 (PVC floor coverings with foam layer)	DIN EN ISO 24011 (Linoleum without patterning)	EN 687 (Linoleum with a corkment backing)	EN 686 (Linoleum with foam layer)
1.4	Thickness of layers (EN ISO 24340)	-	-	Wear layer: - 10 / + 13% max. 0.1 mm (average) max. 0.05 mm or 15% below average (single value) Foam layer: nominal thickness shall be indicated	Top layer: +0.07 mm (average) ± 0.10 mm (single value)	± 0.15 mm (average) ± 0.20 mm (single value)	Linoleum: ± 0.15 mm (average) ± 0.20 mm (single value) Fibre backing: ≤ 0.80 mm (average) Foam layer: ± 0.10 mm (average)
1.5	Total mass (EN ISO 23997)	- 10% / + 13%	- 10% / + 13%	- 10% / + 13%	± 10 %	± 10%	± 10 %
1.6	Residual indentation after continuous loading (EN ISO 24343)	≤ 0.1 mm (average)	≤ 0.1 mm (average)	Class 21-23 + 31 ≤ 0.35 mm Class 32-34 + 41-42 ≤ 0.20 mm	thickness ≤ 3,2 mm ≤ 0,15 mm thickness ≥ 4,0 mm ≤ 0,20 mm	≤ 0.40 mm (average)	± 0,30 m (average)
1.7	Dimensional stability after exposure to heat (EN ISO 23999) Sheet flooring and tiles for welding Tiles, dry joining	≤ 0.4 % ≤ 0.25%	≤ 0.4 % ≤ 0.25%	≤ 0.4 % ≤ 0.25%	- -	- -	- -
1.8	Curling after exposure to heat (EN ISO 23999) Sheet flooring and tiles for welding Tiles, dry joining	- -	≤ 8 mm ≤ 2 mm	≤ 8 mm ≤ 2 mm	-	-	-
1.9	Flexibility (EN ISO 24344) Mandrel dia. 15 mm Mandrel dia. 20 mm Mandrel dia. 30 mm Mandrel dia. 40 mm Mandrel dia. 50 mm Mandrel dia. 60 mm	Method A No cracking, otherwise 40 No cracking	Method A No cracking, otherwise 50 No cracking	-	Method A No cracking, by nominal thickness 2.0 mm 2.5 mm 3.2 mm 4.0 mm	Method A No cracking	Method A No cracking, by nom. thickness: 2.0 mm 2.5 mm
1.10	Seam strength (EN 684)	Class 31-34 + 41-43 Average ≥ 240 N/50mm Single values ≥ 180 N/50mm	Class 31-34 + 41-43 Average ≥ 240 N/50mm Single values ≥ 180 N/50mm	Class 32-34 + 41-42 Average ≥ 240 N/50mm Single values ≥ 180 N/50mm	-	-	-
1.11	Colour fastness (ISO105-B02)	Rating ≥ 6	Rating ≥ 6	Rating ≥ 6	Rating ≥ 6	Rating ≥ 6	Rating ≥ 6
1.12	Chair castors (EN 425)	Only minor changes in surface, no delamination	Only minor changes in surface, no delamination	Class 32-34 + 41- 42 Only minor changes in surface, no delamination	Only minor changes in surface, no delamination	No damage should be visible	No damage should be visible
1.13	PVC floor coverings for use in special wet areas (EN 13553)	Identity code W1 or W2 See explanation 1.13	Identity code W1 or W2 See explanation 1.13	Identity code W3 See explanation 1.13	-	-	-



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		EN ISO 10581 (Homogeneous PVC floor coverings)	EN ISO 10582 (Heterogeneous PVC floor coverings)	EN 651 (PVC floor coverings with foam layer)	DIN EN ISO 24011 (Linoleum without patterning)	EN 687 (Linoleum with a corkment backing)	EN 686 (Linoleum with foam layer)
1.14	Binder content Typ 1 Typ 2 Typ3	Min. / Max. >55 % / - 35 % / 55 % 25 % / < 35 %	In wear layer Minimum 80% Minimum 30%	-	-	-	-

Re 1.1 Width/ Dimensions

The width / dimensions for sheet floorings are merely data for supply. In the case of tiles however tolerances also apply to the floor covering fitted ready for use and thus additionally to carpet fitting using specific grid dimensions.

Re 1.2 Tile Squareness

This is necessary if tiles are to be laid using grid dimensions.

Re 1.3 Total thickness

Thickness is first and foremost a constructional feature and is required if the technical specifications and planning of the screed height are to be clear and unambiguous.

Re 1.4 Thickness of layers

These are likewise merely constructional features

Re 1.5 Total mass (Total mass per unit area)

The total mass per unit area is not a quality feature. However, with homogeneous PVC floor coverings the total mass per unit area allows conclusions to be drawn regarding the composition. The higher the total mass per unit area with the same thickness, the higher the content of fillers will generally be.

Re 1.6 Residual indentation

Indentation under load and recovery after removal of the load are basic characteristics of all resilient floor coverings. Testing according to EN ISO 23999 is carried out to evaluate this property, resilience. The relevant standard applicable to floor coverings lays down minimum requirements for residual indentation. With DLW floor coverings we ensure that we not only observe but also keep below these requirements by subjecting the finished product to stringent testing.

Static loading:

In practice, when loading is imposed by furniture, shelving or similar items a contact pressure per unit area of max. 250 N/cm² (approx. 25 kg/cm²) should be observed (1 Newton [N] corresponds to approx. 100 g).

Dynamic loading:

When loads are imposed e.g. by lifting trucks, the contact pressure per unit area is calculated according to the Hertz formula. The following data are required to make the calculation



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- total weight (including max. payload)
- number of wheels
- wheel dimensions (diameter and width)
- material used for tyres (Shore hardness).

No generally applicable limit value can be given. Experience has however shown that DLW Linodur and our homogeneous PVC floor coverings will withstand pressures of up to 300 N/cm² (approx. 30 kg/cm²). Here the floor needs to be sufficiently resistant to indentation, subject to its pre-treatment and appropriate bonding of floor coverings.

In the case of floor coverings with PVC as a binding agent, abrupt braking of motor-driven industrial trucks may cause burns. When providing for such loads, we recommend always consulting the Product Information department of DLW Flooring.

Re 1.7 Dimensional stability

Re 1.8 Curling

The dimensional stability (change in dimensions) and curling (curling-up of edges) are determined by exposing the un-bonded floor covering to heat (80° C, 6 hours). The limit values specified refer to a measured length of 200 mm and have been determined so that in practice no visible shrinkage or curling will occur in the fitted floor covering on exposure to heat, e.g. solar radiation.

Re 1.9 Flexibility

Flexibility is a measure for the resilience of the un-bonded floor covering.

Re 1.10 Seam strength

The floor covering is welded according to the manufacturer's instructions and then tested in terms of seam strength in N/50mm according to EN 684.

Re 1.11 Colour fastness

It is possible to compare various floor coverings or types of flooring in terms of visual changes caused by light using the rating for colour fastness.

A special feature here is the appearance of a **yellowing** with linoleum: As linoleum matures, a natural veiling is produced, manifesting itself as yellow discolouration/yellowing of the linoleum. This will recede after a short period if the product is exposed to direct sunlight although it may take several days or weeks with artificial or weak sunlight. Colour fastness is not impaired by this natural yellowing!

Re 1.12 Castor chair suitability

According to EN 12529 castors of the type W (soft) should be used for office chairs on resilient floor coverings and castors of the type H (hard) on textile floor coverings.

Re 1.13 Suitability for wet areas

The following properties have to be satisfied if a homogeneous / heterogeneous PVC floor covering according to EN ISO 10581 and EN ISO 10582 as well as a PVC floor covering with a foam layer according to EN 651 is to be suitable for use in special wet areas.



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Floor coverings according to **EN ISO 10581, 10582:**

Identity code W1

Floor class A – normal intensity of use

Total thickness according to EN ISO 24346 min. 1.5 mm

Seam strength according to EN 684 min. 250 N/50mm

Flexibility according to EN ISO 24344: no cracks with a mandrel 10 mm in diameter.

The welded product can be classified as waterproof.

Identity code W2

Floor class B – increased intensity of use

Total thickness according to EN ISO 24346 min. 2.0 mm

Seam strength according to EN 684 min. 400 N/50mm

Flexibility according to EN ISO 24344: no cracks with a mandrel 10 mm in diameter.

The welded product can be classified as waterproof.

Floor coverings according to **EN 651:**

Identity code W3

Floor class A – normal intensity of use

Thickness of compact layer according to EN ISO 24340 min. 1.0 mm

Spreading of water according to EN 661 min. 7 days

Seam strength according to EN 684 min. 250 N/50mm

Flexibility according to EN ISO 24344: no cracks with a mandrel 10 mm in diameter.

The welded product can be classified as waterproof.





Re 1.14 Mass content of binder in the wear layer

The proportion of the floor covering, consisting of polyvinyl chloride (PVC), resin, plasticizers and stabilizers

2 EN ISO 10874, classification of resilient, textile and laminate floor coverings





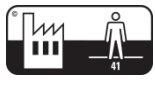


EN ISO 10874 is the sole binding classification standard for floor coverings within the European Community. It supersedes all other classifications since initial publication in December 1995. The classification standard provides architects and developers throughout Europe with a basis for making objective comparisons between floor coverings. The classes and associated examples of usage now make it possible to compare floor coverings with different compositions. Class 22+ only applies to textile floor coverings. Other properties should be taken into account independently of the classification in terms of the intensity of use and described in the product specifications.

Table2: EN ISO 10874 provides for the following classes of usage:

Symbol	Class	Usage	Description	Examples of usage
Domestic – Areas intended for private usage				
	21	moderate/ light	Areas with low or occasional usage	Bedrooms
	22	general/ medium	Areas with medium usage	Living rooms, entrance halls
	22+	general	Areas with medium to heavy usage	Living rooms, entrance halls, dining rooms and corridors
	23	heavy	Areas with high usage	Living rooms, entrance halls, dining rooms and corridors



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COMMERCIAL - AREAS INTENDED FOR PUBLIC AND COMMERCIAL USAGE				
	31	moderate	Areas with low or occasional usage	Hotels, bedrooms, conference rooms, small offices
	32	general	Areas with medium traffic	Classrooms, small offices, hotels, boutiques
	33	heavy	Areas with heavy traffic	Corridors, department stores, lobbies, schools, large /open plan offices
	34	very heavy	Areas with intense usage	Multipurpose halls, counter halls, department stores
Industrial – Areas intended for usage by light industry				
	41	moderate	Areas where work is mainly sedentary with occasional usage of light vehicles.	Electronic assembly, precision / light engineering
	42	general	Areas in where work is mainly standing and/or with vehicle traffic.	Storage rooms, electronic assembly
	43	heavy	Other industrial areas	Storage rooms, production halls

2.1 Classification of resilient floor coverings

2.1.1 EN ISO 10581 and EN ISO 10582, classification of homogeneous and heterogeneous PVC floor coverings

The first step will fix (table 3 and 4), which content of binder (see 1.14) the floor covering contains.

Table 3: Homogeneous floor coverings

Typ	Binder content, minimum %	Binder content, maximum %
I	> 55	-
II	35	55
III	25	< 35

Table 4: Heterogeneous floor coverings

Typ	Mass content of binder in Wear layer
I	Minimum 80 %
II	Minimum 30 %

In the second step will determined the using areas (table 5) with using of the total thickness (homogeneous / heterogeneous) and the thickness of the wear layer (heterogeneous).



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Table 5: Using areas

		Total thickness (required, minimum)				Thickness of wear layer (required, minimum)		Seam strength	
		ISO 24346				ISO 24340		EN 684	
		homogeneous			heterogeneous	heterogeneous		homogeneous	heterogeneous
		Typ I	Typ II	Typ III	Alle Typen	Typ I	Typ II		
Using areas		mm	mm	mm	mm	mm	mm	N/50mm	N/50mm
Domestic	Class								
Light	21	1,0	1,0	1,0	1,0	0,15	0,40	No requirements	No requirements
General/Normal	22	1,5	1,5	1,5	1,5	0,20	0,50		
Normal	22+	1,5	1,5	1,5	1,5	0,20	0,50		
Heavy	23	1,5	1,5	1,5	1,5	0,30	0,65		
Commercial									
Light	31	1,5	1,5	1,5	2,0	0,30	0,65	If welded: average ≥ 240 single value ≥ 180	If welded: average ≥ 240 single value ≥ 180
Normal	32	1,5	1,5	2,0	2,0	0,40	0,80		
Heavy	33	2,0	2,0	2,0	2,0	0,55	1,00		
Very Heavy	34	2,0	2,0	2,5	2,0	0,70	1,50		
Industrial									
Light	41	1,5	1,5	2,0	2,0	0,40	0,40		
Normal	42	2,0	2,0	2,0	2,0	0,55	0,55		
Heavy	43	2,0	2,0	2,5	2,0	0,70	0,70		

2.1.2 EN 651, Classification of polyvinyl floor coverings with a foam layer

In the first step will determined (table 6), which abrasion group the floor covering will assigned.

Table 6: Abrasion group

			T	P	M	F
Thickness loss	mm	EN 660-1	$\leq 0,08$	$\leq 0,15$	$\leq 0,30$	$\leq 0,60$
Volume loss	mm ³	EN 660-2	$\leq 2,0$	$\leq 4,0$	$\leq 7,5$	$\leq 15,0$

Floor coverings with transparent wear layer belongs to abrasion group T – without testing!

Table 7: Classification requirements

Classification requirements				Light	Gene ral	Heavy	Light	Gene ral	Mode rate	Heavy	Gene ral	Very heavy	Heavy
				21	22	23	31	32	41	33	42	34	43
Wear layer thickness	EN ISO 24340	mm	T	0.15	0.20	0.25	0.25	0.35	0.35	0.50	0.50	0.65	-
		mm	P	0.20	0.30	0.40	0.40	0.50	0.50	0.65	0.65	1.00	-
		mm	M	0.30	0.45	0.60	0.60	0.75	0.75	1.00	1.00	1.50	-
Simulated movement of a furniture leg	EN 424			-	Foot type 3: No damage			Foot type 2: No damage Foot type 0: No damage to seam					



2.1.3 DIN EN ISO 24011, Classification of plain and decorative linoleum floor coverings

Linoleum floor coverings are mainly classified according to the floor covering thickness:

Table 8: Classification requirements

Classification requirements			Light	General	Heavy	Light	General	Moderate	Heavy	General	Very heavy	Heavy
			21	22	23	31	32	41	33	42	34	43
Total thickness	ISO 24346	mm	2.0	2.0	2.0	2.0	2.0	2.0*	2.5*	2.5*	2.5*	2.5**
Minimum thickness wear layer	ISO 24340	mm	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.3	1.3	1.3
* When selecting the floor covering thickness in classes 33/34 and 41/42 the expected type and intensity of usage should be taken into account; this may possibly call for a thicker linoleum floor covering.												
** The requirements on Class 43 floor coverings should always be agreed between the user, consultant, fitter and manufacturer.												

2.1.4 EN 687, Classification of plain and decorative linoleum floor coverings with corkment backing

Table 9: Classification requirements

Classification requirements			Light	General	normal	Heavy	Light	General	Moderate	Heavy	General	Very heavy	Heavy
			21	22	22+	23	31	32	41	33	42	34	43
Nominal thickness of linoleum layer	EN 429	mm	1.5	1.5	1.5	1.5	1.5	1.5	2.0	2.0	-	-	-

Linoleum floor coverings with a corkment underlayer are only classified using the Linoleum layer thickness. Greater Linoleum layer thicknesses suitable for heavy use have not been included. If necessary, a similar procedure as for linoleum floor coverings without corkment must be used for classes from 33 or 41.

2.1.5 EN 686, Classification of plain and decorative linoleum floor coverings with foam layer

Table 10:

Klassifizierungserfordernisse			Light	General	Normal	Heavy	Light	Normal	Moderate	Heavy	General	Very Heavy	Heavy
			21	22	22+	23	31	32	41	33	42	34	43
Nominal thickness of Linoleum-layer	EN ISO 24340	mm	2,0	2,0	2,0	2,0	2,0	2,0	2,5	2,5	-	-	-



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3 Additional properties

3.1 Optional properties

Table 11: These properties should be tested and available when required for special applications:

Floor coverings according to EN ISO 10 581, EN ISO 10582, EN 651, EN ISO 24011, EN 687												
Electrical resistance	EN 1081	The resistance between the upper and lower face of the unlaid floor covering is measured with a so-called Tripod-Electrode (vertical resistance R_1). A floor covering is according to EN 14041 conductive if the vertical resistance is max. $1 \times 10^9 \Omega$. For further details see DLW Technical Information No. 2.1 "Electrostatic Behaviour of Floor coverings".										
Antistatic	EN 1815	According to EN 14041 during the walking test a static electrical charge of max. 2.0 kV is permitted for the body voltage.										
Resistance to staining	EN ISO 26987	The floor covering is exposed to defined liquids and paste-like substances for 2 hours, cleaned and then evaluated:										
		<table border="1"> <thead> <tr> <th>Index</th> <th>Test result after cleaning/scrubbing</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Not affected</td> </tr> <tr> <td>1</td> <td>slightly affected</td> </tr> <tr> <td>2</td> <td>moderately affected</td> </tr> <tr> <td>3</td> <td>severely affected</td> </tr> </tbody> </table>	Index	Test result after cleaning/scrubbing	0	Not affected	1	slightly affected	2	moderately affected	3	severely affected
		Index	Test result after cleaning/scrubbing									
		0	Not affected									
		1	slightly affected									
2	moderately affected											
3	severely affected											
Floor coverings according to EN ISO 10 581, EN ISO 10582, EN ISO 24011												
Loaded heavy-duty castor test	EN 1818	The floor covering (with one or more sealed seams) is subjected to the simulated movement of a heavy-duty castor with a load of $1250 \pm 10 \text{ N}$. The profile curves before and after 10,000 cycles are compared and evaluated, in addition to the type of damage occurring and the resistance to breaking from adhesion tests.										

3.2 Optional properties, additional

Table 12:

Floor coverings according to EN ISO 24011, EN 687														
Resistance to burning cigarettes	EN 1399	A test simulating the effect of a burning cigarette and a cigarette being stubbed out is performed on the floor covering. The following ratings are possible:												
		<table border="1"> <thead> <tr> <th>Level</th> <th>Effect on surface of sample:</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>No visible change</td> </tr> <tr> <td>4</td> <td>Slight change of gloss only visible at certain angles and/or slight brown stain</td> </tr> <tr> <td>3</td> <td>Moderate change of gloss and/or moderate brown stain</td> </tr> <tr> <td>2</td> <td>Severe brown mark but no destruction of surface</td> </tr> <tr> <td>1</td> <td>Blistering and/or destruction of surface</td> </tr> </tbody> </table>	Level	Effect on surface of sample:	5	No visible change	4	Slight change of gloss only visible at certain angles and/or slight brown stain	3	Moderate change of gloss and/or moderate brown stain	2	Severe brown mark but no destruction of surface	1	Blistering and/or destruction of surface
		Level	Effect on surface of sample:											
		5	No visible change											
		4	Slight change of gloss only visible at certain angles and/or slight brown stain											
		3	Moderate change of gloss and/or moderate brown stain											
		2	Severe brown mark but no destruction of surface											
1	Blistering and/or destruction of surface													
		Note: Method A (cigarette stubbed out): Level 4 or higher, Method B (burning cigarette): Level 3 or higher, fulfilled in general usage.												



4 Additional test methods (for information only), not forming part of floor covering specification

The standards include other test methods which are neither relevant to either classification or otherwise for the evaluation of a floor covering. They only apply to floor coverings according to EN ISO 10 581, EN ISO 10 582 and EN 13845, marked with (*) for floor coverings according to EN 651, and with (#) for floor coverings according to EN 654:

Table 13:

Movement of a furniture leg	DIN EN 424	A foot which is used to simulate a furniture leg is dragged over the floor covering. The damage to the floor covering is ascertained.
Peel resistance	EN ISO 24345	The level of force required to peel off layers of a resilient floor covering is determined.
Shear force	EN 432 (*)	A floor covering sample is glued between two plates which are then pulled apart. The shear force between or within the layers of a floor covering is determined.
Spreading of water	EN 661 (*)	It is ascertained how long it takes water to spread horizontally over a section of 100 mm <u>in</u> the floor covering.
Curling	EN 662 (*)	See explanation for item 1.8.
Exudation of plasticisers	EN 665 (*), (#)	Three pairs of samples are stored each with absorbent paper inserted in-between at 80° C for 24 h. The marking of the paper is described in terms of type and colour.
Pattern depth	EN 663 (*)	The pattern depth can be determined by means of the change in appearance using three methods. The test result specifies the abrasion depth and assessment of the change in appearance with "barely visible", "visible" or "clearly visible, immediately obvious".
Loss of volatile matter	EN 664 (*), (#)	Samples are stored at 100° C for 6 h. The average value of the loss of volatile matter is determined.
Gelling	EN 666 (*), (#)	The method is primarily intended for production control.
Determination of mass per unit area of a reinforcement or a backing of PVC floor coverings	EN 718	The PVC content is dissolved with tetrahydrofuran and the mass of the remaining reinforcement or backing specified in g/m ² using an average, maximum and minimum value.









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5 Safety-relevant characteristics EN 14041 – CE mark

The standard EN 14041 relevant to the CE mark for floor coverings lists requirements for floor coverings in terms of the essential properties, see Table 14. They must be tested by the manufacturers of the floor coverings and confirmed by means of declarations of conformity.

Table 14:

Flammability	EN 13501-1 Pictographs 	All our commercial floor coverings have the European classification Bfl-s1 and Cfl-s1 (flame-retardant). The classifications Bfl-s1 and Cfl-s1 according to EN 13501-1 correspond to the former German classification B1 (flame-retardant) according to the German standard DIN 4102. Floor coverings which have not undergone testing are classified as Ffl. See also our Technical Information 1.3. "Flammability".
PCP content	BS 5666-6	Not applicable to DLW floor coverings as it is not used in the manufacture of our floor coverings.
Formaldehyde	ENV 717	Not applicable to DLW floor coverings as it is not used in the manufacture of our floor coverings.
Waterproofing	EN 13553-A Pictograph 	Resilient floor coverings intended for use in special wet areas must satisfy the requirements of EN 13553. See also item 1.13.
Slip resistance	EN 13893 Pictographs 	Floor coverings intended for use in general application areas must have a dynamic coefficient of friction of $\mu \geq 0.3$ on supply and are then declared as corresponding to the technical class DS. Floor coverings for which no coefficient of friction has been determined are declared as corresponding to the technical class NPD. Enhanced slip resistance is specified for floor coverings according to EN 13845. They must be categorised as class ES. See also item 1.15.
Electrical resistance	EN 1081 Pictographs 	If the floor covering is marked as being conductive / antistatic, it must achieve the following values. Electrostatic dissipative floor coverings: Vertical resistance max. $1 \times 10^9 \Omega$ Electrostatic conductive floor coverings: Vertical resistance max. $1 \times 10^6 \Omega$
Static electrical charge	EN 1815 Pictograph 	During the walking test a static electrical charge of max. 2.0 kV is permitted for the body voltage.
Thermal conductivity	EN 12524 Pictograph 	If floor coverings are to be laid over underfloor heating systems, the typical values for thermal conductivity according to EN 12524 should be used for dimensioning calculations.



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6 Other safety-relevant characteristics

The characteristics listed in Table 15 have been generally specified for many years in the invitations to tender for public and commercial areas although they are not included in the specifications of the European floor covering standards. These characteristics, which are intended in specific areas to protect human health and even life, are currently still governed by national standards.

Table 15:

Slip resistance Work rooms and areas with a risk of slipping	German rule BGR 181	Slip resistance is tested on a slope according to the German standard DIN 51130 Classification is carried out using groups indicating the risk of slipping ranging from R 9 to max. R 13. Resilient floor coverings normally attain ratings of R 9 or R 10.
Slip resistance Wet barefoot areas	German rule GUV 26.17	The German association "Säurefließner-Vereinigung e.V." in Burgwedel / Germany is responsible for testing and classification. The classes A, B, and C are possible here. Besides this classification, the general suitability of the floor covering/type of flooring should also be taken into account.
Electrical insulation to ground R_{ST}	VDE 0100-410	Personnel may be exposed to supply voltage, for example in testing areas for electrical or electronic equipment or at electrical repair workshops. To protect personnel from contact with mains voltage the insulation to ground R _{ST} (insulation capability) of the floor covering must attain the following values: <ul style="list-style-type: none"> • 50 kΩ for installations with mains voltages under 500 V • 100 kΩ for installations with mains voltages up to 1000 V (See also our Technical Information 2.1 "Electrostatics".)

7 Resistance to chemicals

The resistance to chemicals offered by resilient DLW floor coverings is tested according to EN 423 "Resistance to staining" (see section 3.1 of this Technical Information) with a main action time of 2 hours. In order to remain in line with actual practice, the type of chemicals to be used for testing is not specified.

Selection of a floor covering may depend on its reaction to different chemicals where certain types of usage are concerned. Here it is not normally sufficient to test the resistance to staining. In general terms the following applies to resilient floor coverings:

Table 16:

Type of flooring	Acids	Alkalis	Solvents	Oxidants (H ₂ O ₂)
Linoleum	✓, briefly	∅	✓	✓
Linoleum PUR	✓	✓	✓	✓
PVC floor coverings	✓	✓	✓	✓
PVC floor coverings PUR	✓	✓	✓	✓
Polyvinyl Flex tiles	✓	✓	✓	✓

✓ = resistant

∅ = not resistant



FLOORING

DLW **Linoleum** is resistant to weak acids with a short action time as well as to greases, mineral oils, solvent naphtha and alcohols. Linoleum is not resistant to the action of alkalis. This reaction is specific to linoleum and thus applies to all linoleum floor coverings.

Thanks to its high-quality surface protection, DLW **Linoleum PUR** is highly resistant to all acids and alkalis, even at high concentrations.

All DLW **PVC** floor coverings, including the floor coverings with **PUR** Eco System reinforcement, are highly resistant to acids and alkalis, even at high concentrations. Major benefits for PVC floor coverings are apparent when compared with other types of flooring.

A number of aqueous solutions and solvents, e. g. aliphatic hydrocarbons (petrol, solvent naphtha), alcohols and mineral oils do not affect **Linoleum PUR** or **PVC floor coverings** while ketone-based solvents, e.g. acetone, esters e.g. ethyl acetate and aromatic and chlorinated hydrocarbons, cause swelling.

For **safety reasons** it is necessary to immediately take up any spilt chemicals which might involve a risk of explosion or fire, be highly or easily flammable, toxic, harmful to health, caustic, irritant or carcinogenic or increase the risk of slipping. This also minimises the risk of damage to the floor covering.

In specific cases it is recommended requesting information beforehand from the Product Information department of DLW Flooring GmbH, specifying the chemicals used and their concentration.

8 Resistance to disinfectants

All resilient DLW floor coverings are resistant to the surface disinfectants included in the list of disinfectants issued by the German association VAH (Disinfectant Commission in the Association for Applied Hygiene). See also the Technical Information 4.3 "Disinfection of Resilient DLW floor coverings".