



EUROPEAN PRODUCERS OF LAMINATE FLOORING  
FEDERATION EUROPEENNE DES FABRICANTS DE REVERTEMENTS DE SOL STRATIFIES  
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Technical bulletin

## Installation of Laminate Floor Coverings

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## Contents

1. Introduction.....	3
1.1. Scope.....	3
1.2. Standards/Guidelines.....	3
2. Types of Laminate floor coverings .....	3
2.1. Definition.....	3
2.2. Wood-based core material for laminate floor coverings.....	4
2.3. Moisture content of wood-based core material for laminate floor coverinings .....	4
3. Finished product characteristics .....	5
3.1. Categories of use EN 685 / Symbols.....	5
3.2. Typical properties.....	6
4. Storage and Transportation .....	6
5. Preparatory work .....	6
5.1. Inspection of the sub-floor .....	6
5.2. Minimum requirements for sub-floors .....	6
5.3. Types of sub-floors.....	6
5.4. General requirements for sub-floors.....	7
5.5. Underlay material.....	10
6. Installation .....	10
6.1. Conditioning of laminate floor coverings.....	11
6.2. Installation direction .....	11
6.3. Lay-out for installation start .....	11
6.4. Edge gaps.....	12
6.5. Expansion joint profiles .....	12
6.6. Tongue-and-groove glue joints.....	12
6.7. Installation patterns .....	13
6.8 Full-surface bond of adhesive .....	13
6.9. Miscellaneous .....	13
7. Inspection and Approval .....	13
7.1. Special notes on the final inspection test.....	14
ANNEX A:.....	15

## **1. Introduction**

### **1.1. Scope**

This Technical bulletin provides general information on the installation of laminate floor coverings.

**The installation instructions provided by the laminate flooring manufacturer or supplier should be considered to be of a binding nature**

The data and instructions contained in this technical bulletin reflect the state of the art, the general level of development and current trends at the time of going to print.

### **1.2. Standards/Guidelines**

The standards and guidelines pertain to the installation of laminate flooring are listed in annex A.

## **2. Types of Laminate floor coverings**

### **2.1. Definition**

Laminate floor covering: Floor covering as described in EN 13329, EN 15468 and EN 14978.

The decorative top layer is generally based on a printed décor which is either directly pressed or printed as such on a substrate (generally wood based materials) or bonded to a substrate. The product is usually finished with a backing or backing coating, primarily used as a balancing material.

## **2.2. Wood-based core material for laminate floor coverings**

For the most part, laminate flooring planks feature a wood-based material as core ply. Wood is a natural product and construction material. A property of laminate floor coverings which is of particular significance when laid as a floating floor as is typically the case is the inherent tendency of wood to expand and contract. This is due to the hygroscopic property of wood, i.e. its natural ability to absorb and release moisture. As is the case with all other construction materials, the dimensional stability of laminate flooring is also influenced by the application of heat from above and/or below.

## **2.3. Moisture content of wood-based core material for laminate floor coverings**

Mean moisture content at 65% relative ambient humidity and an ambient temperature of 20°C:








- Medium-density fibreboard 6 +/- 2 weight per cent
- High-density fibreboard 5 +/- 2 weight per cent
- Fine-grain particle board with PF resin bond 6 +/- 2 weight per cent
- Particle board with PF resin bond 9 +/- 2 weight per cent

The moisture content of wood-based core material products may vary greatly prior to processing as not only the climatic conditions but also the type of wood used to produce the particles or fibres (bulk density), the shape and size of the fibres or particles, the cross-sectional density profile, the mean bulk density and the bonding agent and bonding agent distribution, etc. are of significance in respect to the hygroscopic properties of the material.

The expert manner and using appropriate materials in installation (glued tongue- and groove and glue less systems respectively) is no guarantee for perfect and durable sealed joints and does not therefore afford absolute protection against moisture ingress. In other words, laminate floor coverings should not be mopped or scrubbed using a large amount of water or a regular wet cleaning.

### 3. Finished product characteristics

#### 3.1. Categories of use EN 685 / Symbols

Symbol	Category of use	Usage	Area
	21	Moderate	Domestic
	22	General	
	23	Heavy	
	31	Moderate	Commercial
	32	General	
	33	Heavy	
	34	Very heavy	

Requirements regarding laminate floor covering surfaces in domestic or commercial premises depend largely on the type and frequency of the traffic to which the floor is subjected.

When selecting the appropriate type of laminate floor covering product, necessary attention must be paid to the requirements resulting from the specific characteristics of the installation site.

Before installing laminate floor covering in premises likely to be subjected to a degree of use over and above that encountered in the applications described above (e.g. industrially used premises), all relevant instructions and recommendations issued by the laminate floor covering manufacturer must be heeded.

Laminate floor coverings are unsuitable for installation in rooms in which wet or damp conditions prevail, such as bathrooms, shower rooms, washrooms, etc.

### **3.2. Typical properties**

Expansion and contraction of the substrate material used in laminate floor covering caused by an increase or a decrease in the moisture content is a property typical and intrinsic to the product.

In the event of persistent, prolonged extreme climatic conditions (air humidity < 30% or > 90%) dimensional changes and distortion in keeping with the typical and intrinsic properties of the product are to be expected.

## **4. Storage and Transportation**

Laminate floor coverings are generally unit-packed and edge-protected using ribbed cardboard and shrink-wrapped in foil.

The product should always be stored in a horizontal position in a heated, draught-free and dry room at a minimum temperature of 18°C and a maximum relative humidity of no more than 75%.

During storing and transportation, it is important that the packing units are not exposed to wet conditions (rain) and avoid unnecessarily exposed to wind and weather.

## **5. Preparatory work**

### **5.1. Inspection of the sub-floor**

The onus of inspection and the relevant checking measures are described CEN/TS 14472-1 and/or in DIN 18 356 "Parquet flooring" and DIN 18 365 "Floor coverings", Section 3.1.1.

### **5.2. Minimum requirements for sub-floors**

The state and condition of the sub-floor must be conducive to the proper processing and installation of laminate floor coverings.

The preparatory measures required to comply with the relevant regulations and to ensure expert and competent installation must be carefully selected, giving full consideration to the type and composition of the sub-floor.

### **5.3. Types of sub-floors**

Generally speaking, all sub-floor surfaces suitable for the laying of floor coverings are suitable for the installation of floating laminate floor coverings.

These include:

- all types of screed or cast plaster floor including heated sub-floors
- particle board substructures
- slab-type constructions
- wooden flooring
- existing hard floorings such as tile, stone slab or plastic floor coverings, etc.

## **5.4. General requirements for sub-floors**

### **5.4.1. Inspection of surface evenness**

The evenness of the installation surface should be determined by resting a straightedge on surface elevations and measuring the extent of the largest depression in the surface (vertical deviation). The result of this measurement is expressed with respect to the distance between the elevations on which the straightedge rests (reference points).

Typical tolerances provided by manufacturer's instructions for systems glued in tongue and groove are:

- for two reference points 1,00 m apart, max. permissible vertical deviation is 3 mm
- for two reference points 2,00 m apart, max. permissible vertical deviation is 4 mm.

Typical tolerances provided by manufacturer's instructions for systems with mechanically assembled panels (without glue) are:

- for two reference points 1,00 m apart, max. permissible vertical deviation is 2 mm
- for two reference points 2,00 m apart, max. permissible vertical deviation is 3 mm

Individual sharp vertical height differences larger than 1,2 mm are not permitted

Note: If these requirements are not fulfilled a sufficient evenness can be made with a self leveling compound.

### **5.4.2. Mechanical stability of the sub floor**

The basic requirements regarding the stability and solidity of the installation surface are the same as for other types of floor covering, i.e. the floor surface should be inspected with respect to its strength and load-bearing capacity.

Cracks, hairline fractures and damaged areas should be properly repaired.

### **5.4.3. Moisture content of the sub-floor**

It is particularly important to ascertain the moisture content of mineral sub-floors (cement screed floor, anhydrite cast plaster floor, etc.) in both existing and newly installed floors and floors already covered (ceramic tiling, natural stone, plastic, etc.).

The moisture content of mineral sub-floors is to be measured using the magnesium moisture (CM) test or test equipment for measuring relative humidity.

The following maximum moisture contents in mineral sub-floors must be kept:

- Cement screed floor < 2.0 CM %
  - Anhydrite (cast) plaster floor < 0.5 CM %
- Ideally, a value of <0.3 CM should be aimed at

Relative humidity in mineral sub-floors shall not exceed 60% RH.

In order to protect laminate floors by minimizing the risk of possible damage caused by rising damp, a water vapour control layer with a minimum sd-value of 75 m shall be installed directly onto the surface of the mineral screed floor (or tile or slab floor, etc.) in accordance with good working practices. Particular care should be exercised to ensure that individual sheets of the water vapour control layer overlap by at least 20 cm to 30 cm and are taped vapour tight. Also the water vapour control layer has to be fixed vapour tight 3-4cm above the underlay with the wall. If an underlay with integrated water vapour control layer is used particular care should be exercised to ensure that individual sheets of the underlay are taped vapour tight or the water vapour control layer overlap by at least 20 cm to 30 cm and is taped vapour tight. Also the water vapour control layer has to be fixed vapour tight 3-4cm above the underlay with the wall.

#### **5.4.4. Sub-floors of chipboard, fibreboard and wooden floorboards**

Notwithstanding good working practices regarding the preparation of the sub-floor, it is also important to ensure proper ventilation and aeration of the wooden sub-floor. As a general rule, sub-floors made from wood or wood-based products (e.g. particle board) should not be hermetically sealed by the installation of further layers of material. As the use of levelling courses and insulation material, etc. impedes air access, compensatory measures are required to ensure proper insulation.

The following measures should be implemented:

Rear-ventilated skirting boards with routed air ducts should be used or apertures should be created through the sub-floor and the laminate flooring, closed on the surface with appropriate grilles.

Precautions must be taken to ensure that the cavity below the sub-floor is well aerated and permanently dry at all times in order to guarantee that the equilibrium moisture content of the particle board, fibreboard or wooden subfloor remains balanced throughout all four seasons. This method requires the omission of the water vapour control layer.

#### **5.4.5. Existing floor coverings**

In the case of existing ceramic or stone tiling, the surface should, if required, be levelled and a water vapour control layer with a minimum sd-value of 75 m shall be installed directly onto the surface of the existing floor covering. Particular care should be exercised to ensure that individual sheets of the water vapour control layer overlap by at least 20 cm to 30 cm and are taped vapour tight. Also the water vapour control layer has to be fixed vapour tight about 3-4cm above the underlay with the wall. If an underlay with integrated water vapour control layer is used particular care should be exercised to ensure that individual sheets of the underlay are taped vapour tight or the water vapour control layer overlap by at least 20



cm to 30 cm and is taped vapour tight. Also the water vapour control layer has to be fixed vapour tight about 3-4cm above the underlay with the wall.

Existing linoleum or synthetic floor coverings are sufficiently impermeable to provide a vapour barrier so that the use of a water vapour control layer is not required.

Existing carpets should be removed.

#### **5.4.6. Underfloor heating**

With heated floors, the underlay must not affect the heating function, i.e. the transfer of heat from the floor heating in the room must not be excessively impeded by a heat insulating floor layer. Thus the thermal resistance of the underlay must not be too high.

Please refer to the technical bulletin “Underlay Materials under Laminate Floor Coverings - Test Standards and Performance Indicators”

When installing laminate floor coverings in rooms with underfloor water heating, irrespective of whether the screed floor involved is old or newly installed, a temperature curve should be recorded for both the heat-up and cool-down phase in accordance with the Info leaflet FBH-D4 from the federation BVF before laying a water vapour control layer.

The written report, submitted by a qualified installer, should contain the following heating system data:

- Heat-up data including precise flow temperatures
- Max. peak flow temperature reached on intake side
- Operating conditions and outside temperature at time of commissioning
- Date and signature of proprietor/architect and installer

Please contact your qualified heating specialist if there is any question open before installation of the laminate flooring Designated areas for the collection of chiselled samples for moisture content measurements should be clearly marked.

If such areas are not clearly identified, measurements during the heat-up and cool-down phases should be repeated and the scope of measurements extended in order to minimize risks.

Any misgivings on the part of the heating specialist consulted should be expressed in writing, stating the risk and extent of damage possible. A written report should be handed to the client.

Before commencing installation work, a water vapour control layer should be laid out in the manner previously described. The floor surface temperature before, during and for at least three days after the installation of laminate flooring should be maintained at approx. 18° C. After the course of 3 days, the temperature should be slowly raised to the required operating temperature, whereby the surface temperature of the heated sub-floor should not exceed 28°C.

Note:

In order to precipitate the drying of an underfloorheated screed floor, a two-stage drying cycle in accordance with the technical bulletin issued by the Association of Parquet and Flooring Technology under the title "Preparatory measures to be taken prior to the installation of parquet and textile floor coverings in conjunction with underfloor heating systems" is recommended.

#### **5.4.7. Indoor climatic conditions**

The following climatic conditions should prevail at the place of installation before, during and after installation:

- Floor surface temperature min. 15° C
- Ambient air temperature min. 18° C
- Relative humidity max. 75 %

That means, that windows and doors are installed and in function and also a heating system is available if needed.

Warning: Room climate conditions in new buildings.

The increasing speed with which new solid-construction buildings are erected and the use of building and construction materials with a high water content invariably leads to excessive relative humidity levels in new buildings.

Signs indicative of this are water and condensation on wall surfaces, glazing and window frames, etc. Frequently, signs along the lowered edge rebates of door and window frames point to the fact that condensation 24 occurs sporadically at certain times of the day or night, depending on ventilation times and patterns.

If these or similar situations are encountered, efforts should be made to induce room air drying through forced heating and ventilation.

### **5.5. Underlay material**

Underlay material is needed when installing laminate floor coverings.

Please refer to the technical bulletin "Underlay Materials under Laminate Floor Coverings - Test Standards and Performance Indicators"

## **6. Installation**

The sub-floor, PE sheeting, insulation, laminate floor covering, including the glue for the tongue-and-groove joints, profiled skirting boards and the tools used should be seen as being constituent components of one and the same comprehensive system.

The installation instructions provided by the laminate floor covering manufacturer or supplier should be considered to be of a binding nature.

## **6.1. Conditioning of laminate floor coverings**

Depending on the season, laminate flooring are subject to the influences of climate and temperature. In view of this, conditioning of the product prior to installation is of vital importance.

The packaged and foil-wrapped units of laminate planks should be stored and conditioned in the room in which installation is to take place for at least 48 hours.

The following micro-climatic conditions should prevail before, during and for at least 3 days after installation:

- Floor surface temperature    min. 15° C
- Ambient air temperature     min. 18° C
- Relative humidity             max. 75 %

Particular care should be taken to ensure that the stored laminate flooring are not subjected to draughts and that the packaging units are not stood or leaned against walls during the conditioning period. Ideally, panels should be stored flat on the floor or on four wide battens at least 0.5 m away from adjacent walls.

## **6.2. Installation direction**

The overall appearance of the finished surface consisting of individual laminate planks is highly dependent on the installation direction in conjunction with the incidence of light and the main line of sight.

The installation direction can have a significant influence on the perceived size and perspective of a room.

Generally speaking, it is sound practice to determine the installation direction and installation pattern together with the client or tenant. It has proved advisable to install laminate floor covering planks on a wooden board floor perpendicular to the existing layer of boards.

## **6.3. Lay-out for installation start**

Before commencing installation, it is important to establish the perpendicularity of the room layout by taking the squaring in order to determine which side of the room to start laying panels on, starting with the groove side of the first panel.

Measuring the distance to be covered and taking the squaring also provide the opportunity to ensure that the last panels to be installed on the opposite side of the room have a minimum width of 5 cm. Similarly, the length of the shortest panel abutting the wall at right angles to the direction of travel should not be shorter than 20 cm.

In the event that the walls of a room are neither at right angles nor parallel, a decision should be taken before commencing installation as to which side of the room is to accommodate the taper-cut panels.

## **6.4. Edge gaps**

Laminate floor coverings expand and contract laterally when subjected to changes in room climate.

To accommodate such changes, a edge spacing should be observed on all sides. A free space of 8-12 mm is recommended.

Clearance must be provided between the finished laminate floor consisting of individual laminate floor covering planks and any solid part of the fabric of the building structure (walls, door frames, supply lines, pillars, etc.) to allow for lateral movement. There should be no physical edge contact between the finished floor and vertical solid structures.

## **6.5. Expansion joint profiles**

Expansion joint profiles should be installed as follows in consideration of the size and geometry of the floor surface:

- On surfaces greater than 12 m in the direction of the length of the individual laminate floor covering planks
- On surfaces greater than 8 m in the direction of installation travel
- In doorways between rooms
- In porch areas
- Between offset adjoining rooms
- Along the course of expansion joints in the sub-floor
- Manufacturers recommendations regarding maximum uninterrupted flooring sizes vary greatly. The installation instructions relating to the product in question should be carefully heeded

## **6.6. Tongue-and-groove glue joints**

The application of glue to the tongue-and-groove joints of individual planks must comply with the instructions provided by the laminate floor covering manufacturer or supplier.

Whereas the application of glue varies between a liberal bead in the groove of particle board panels and/or a thinner bead along the top of the tongue or the top of the edge of the groove on MDF and HDF core panels, it is important in both cases that glue is released along the top of the joint when two boards are firmly pushed together under force. Excessive glue should be wiped off with a damp cloth immediately.

This ensures the necessary seal to prevent against the ingress of moisture through the joints.

The new glued tongue and groove glued laminate floor covering should not be subjected to heavy loads or frequent traffic for at least 12h after installation to prevent any disturbance during the setting time for the adhesive. This does not apply to mechanically assembled (glue less) elements.

By using glue for the joints of so called “glue- free-system”, which are normally installed without any additional glue at the job-side, glue type and general approval must be requested from manufacturer.

## **6.7. Installation patterns**

Laminate floor covering planks can be installed according to either a regular or an irregular pattern. Especially for products with a four side bevel, the pattern should be checked prior to the installation due to the more visual aspect of the joints.

Care should be taken to ensure that the minimum staggered overlap or offset is 20 cm or 1/3 of the product length. The installation pattern for squared elements should be checked with the manufacturer.

## **6.8 Full-surface bond of adhesive**

Under special circumstances, for example at the specific request of the client, it may be necessary to install laminate floor coverings using a fullsurface adhesive bond, despite the fact that by conception laminate floor coverings are intended for floating installation. Before installing laminate floor coverings on a fullsurface bed of adhesive, flooring installers are urged to contact the manufacturer or supplier with a view to ascertaining whether the product is suitable or approved for this type of installation and how it should be done in detail.

## **6.9. Miscellaneous**

Laminate floor coverings are mostly produced on modern new modern high-speed profiling lines. To protect the surface of the laminate tiles surface friction reducing agents can be used which may leave arrears on the surface and sometimes are still partially visible. These harmless materials can be easily removed from the surface within the construction cleaning and are no cause for complaint

## **7. Inspection and Approval**

After installation the floor surface should be carefully inspected and cleaned. In regards of tongue and groove glue joints particular care should be any glue residue.

Depending on the type and nature of the glue used to bond the tongue-and-groove joints, dried-on glue residue may prove stubborn and difficult to remove from the surface of the laminate floor covering.

In the event that installation work is performed on the behalf of a client, it is important that the finished floor is inspected in the presence of the client and that the report form is completed and signed.

At the same time, the client/tenant should be handed a copy of instructions on the cleaning and care of laminate floor covering surfaces. A note to this effect should be made on the report form accordingly.

General remarks for cleaning of laminate floor coverings are available as a leaflet from the EPLF.

## **7.1. Special notes on the final inspection test**

The inspection of the floor should take place with the persons involved standing upright.

An angled source of light, false light or counter light should not be used for the evaluation or to locate blemishes or gloss variations in the panelled surface. As organic wood-based products are used as the core material in the majority of laminate flooring there is a natural tendency for the wood to swell and contract as a result of its hygroscopic properties. This may lead to dimensional changes in both individual planks and the floor as a whole.

The following tolerances may occur:

### **7.1.1. Uneven joints**

Irregularities and tolerances between individual planks may become apparent along the sides and ends. Maximum height differences of 0.10 mm are tolerable, whereby individual incidents of up to 0.15 mm are acceptable.

### **7.1.2. Convex / Concave warping**

The maximum acceptable tolerance for convex and concave, measured across the full width of the installed plank, is 0.25 mm.

### **7.1.3. Openings**

Openings within the floor surface with a maximum width of 0.2 mm are acceptable.

Providing that manufacturing tolerances are within the specified limits, there should be no further need for adjustment of joints to ensure alignment. The above-mentioned tolerances include such irregularities as are inherent in the manufacturing process and the joint gaps which may be the result thereof.

The above-mentioned irregularities and tolerances can be deemed to be natural properties of the product and do not therefore constitute a fault.

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#### **Note:**

The provisions and figures contained in this technical bulletin do not in any way lay claim to completeness. They reflect as far as reasonably possible the current state of the art. They are meant to serve as nonbinding guidelines in conjunction with the installation instructions which apply specifically to the product in question. Warranty claims cannot be derived from the provisions of this text. If any doubt exists as to any of the provisions contained herein, the manufacturer/supplier of the respective laminate flooring product should be consulted.

## **ANNEX A:**

EN 13 329 2006	Laminate Floor Covering, Elements with surface layer based on aminoplastic, thermosetting resins; Specifications, requirements and test methods
EN 14978 2005	Laminate floor covering, Elements with Acrylic Based surface layer; Specifications, requirements and test methods
EN 312-1 2003-11	Particle boards- Requirements
EN 438 Part 1 2004	Decorative high pressure laminates Introduction and general requirements.
DIN EN 438 Part 2 2004	Decorative high pressure laminates Determination of properties
EN 438 part 5 2004	Decorative high pressure laminates Classifications and specifications for flooring grade laminates less than 2 mm thick
EN 622 Part 1 2003 -09	Fibreboards, Requirements, Part 1: General requirements
EN 685 2005	Resilient floor coverings; Classification
DIN 1960 2002	Contract Procedures for Building Works Part A General specifications for the award of building contracts
DIN 1961 2002	Contract Procedures for Building Works Part B General specifications for the performance of building works
DIN 4725 2001-03	Hot water underfloor heating: Design principles
DIN 18 032 Part 2 2001-04	Sports centres; Gymnasiums; Sports flooring; Requirements and inspection tests
DIN 18 202 2005-10	Tolerances in building construction work
DIN 18 299 2002-12	Contract procedures for Building Works, Part C General Technical Terms of Contract for all types of building construction work
DIN 18 356 2002-12	Contract procedures for Building Works, Part C
DIN 18 365 2002-12	Parquet flooring. Contract procedures for Building Works, Part C Floor coverings
EN12529 1999 -05	Castors for swivel chairs
CEN/TS 14472- 1 2003 -10	Resilient, textile and laminate floor coverings Design preparation and installation Part 1: general Part 3: laminate floor coverings
TKB-8	Measurement of moisture content (CM%)