

TKB-Technical Briefing Note 10

Wood Particle Boards used as Laying Substrate

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1. Scope and Introduction

This technical briefing note advises the installer on installation of wood particle boards and subsequent floor covering or parquet work in private and commercial projects. This applies for new construction as well as for renovation/refurbishment. The scope includes loads by foot traffic and chair castors. Use of wood particle boards as substructures for sports floors is not covered by this briefing note.

The information contained in this technical briefing note is based on state-of-the-art and general knowledge at time of publication, based on general technical data.

Based on material-specific characteristics, installers must pay particular attention when using wood particle boards as laying substrate for parquet and floor coverings.

Careful planning and execution are required when installing wood particle boards on account of their expansion behaviour when coming in contact with moisture, their deformation characteristics under loads and different surface finishes.

For these reasons, wood particle boards used as laying substrates which are assembled on site from pre-fabricated elements, need special consideration.

2. Material Definition and Characteristics

Wood particle boards are mainly fabricated from wood shavings and wood scraps of different size. Depending on method of fabrication and manufacturer, different binding agents are used. Determination of moisture content is done with the Darr method. Electric moisture measurement normally used for parquet work is not admissible on account of the different binding agents and the heterogeneous construction and can only be used to show a general trend.

2.1 Wood Particle Boards

Wood particle boards consist of 90 % wood and/or other wood-based fibrous materials. According to the German Gefahrstoffverordnung (GefStoffV) (Ordinance on Hazardous Substances), these raw materials are not subject to labelling.

Binding materials used for wood chippings are:

- urea formaldehyde resins,
- formaldehyde tannin resins,
- phenolic resins,
- isocyanates;
- melamine-urea-phenolic-formaldehyde resins (MUPF resins).

DIN EN 312 classifies wood particle boards into types P 1 to P 7 according to their intended use. For floor covering and parquet work, only panels with tongue and groove type P 4 to P 7 shall be used.

EN 13986 governs emission behaviour by classification into classes E1 and E2. In Germany, only wood materials low in formaldehyde with emission class E1 are admissible.

Moisture content of wood particle boards at delivery ex works is between 5% and 13 % (DIN EN 312). Moisture content is checked using the Darr method according to DIN EN 322. For floor covering and parquet work, TKB recommends to order and install wood particle boards with a defined board moisture of 9 % if common ambient conditions (average 21 °C and 50 % relative air humidity) prevail in rooms during later use. If room climate deviates, board moisture shall be adjusted accordingly. This minimizes effects caused by unfavourable climatic conditions, such as cupping, warping, marking of individual butt joints or showing of individual boards on covering.

Wood particle boards can be installed in one layer, but preferably two layer installation shall be used. When using the one layer method, use boards with a minimum thickness of 25 mm. For subsequent parquet installation, a two layer construction is recommended. This requires to fully glue together two boards with a nominal thickness of 13 mm each, preferably 16 mm.

2.2 OSB Boards

For OSB boards (“oriented strand boards”), larger shaving are used than for wood particle boards. The shavings/strands of the surface layers are oriented in a right angle to the ones of the middle layer. On account of the larger strands, the amount of binding agents required is lower than with wood particle boards.

Compared to wood particle boards, the mechanical properties are better and the surface rougher, on account of larger wood strands used for OSB boards. One distinct disadvantage of OSB boards however is the higher risk of strands coming loose on the board surface. Based on shape and arrangement of the strands, OSB boards offer a variety of decorative uses (always observe instructions of the OSB manufacturer regarding surface treatment/sealing of the boards).

DIN EN 300 classifies OSB boards according to their use into types OSB/1 to OSB/4. For floor covering and parquet work, only use OSB boards type OSB/2 to OSB/4 with surfaces free of adhesion impairing layers. Always observe instructions of the OSB manufacturer regarding surface treatment of the boards. Regarding installation moisture content, board thickness and installing construction the same specifications as for wood particle boards apply (see section 2.1).

2.3 Cement-bound Wood Particle Boards

Cement-bound particle boards mainly consist of softwood shavings, Portland cement and aggregates mineralizing the shavings. Compared to organic bound wood particle boards and OSB, they offer higher moisture resistance and good fire and sound protection.

When used as floor installation panels, the boards are polished and come with tongue and grooves. Moisture at delivery ex works is 6 % - 12 % according to DIN EN 634-1. For floor covering work, a minimum thickness of 20 mm and 25 mm for parquet work is recommended (observe manufacturer's instructions).

Cement-bound wood particle boards are not to be confused with cement fibre boards. These boards are fabricated from cement, mineral fillers and reinforcement fibres and are not dealt with in this technical briefing note.

2.4 Other Panels

Dry floor elements such as plasterboard or gypsum fiber board are not described in this technical briefing note.

Wood particle boards with other binding agents, e.g. micro strand boards (MSB), do not have a relevant market share at time of publication of this technical briefing note. Always contact the respective manufacturer for floor construction and instructions.

3. Installation of Wood Particle Boards

Wood particle boards always need a steady connection to ambient air to ensure their moisture balance. If wood particle boards are enclosed in an airtight construction or moistened by subfloor dampness, this may lead to dimensional changes and degradation of the board strength and even to complete deterioration of the material.

Support structures made from wood particle boards always require ventilation from below and adequate moisture protection of the substructure. In order to ensure sufficient air exchange even after installation, always make sure there is an adequate expansion gap to vertical building sections and provide borders with vent slots.

For rooms without basement and substrates where rising damp may occur, always install adequate moisture barriers.

3.1 Floating Installation

For this type of installation, the wood particle boards are installed on an insulating layer parallel to the longest wall in an interlocking network. Clearance to the walls shall be 2 - 3 mm per meter room depth, however clearance must have a minimum of 10 - 15 mm. Offset of head joints must be at least 40 cm. The wood particle boards are glued together using ample amounts of PVAc glue, water resistance category D3, so that white glue exits from connection joint. Try to avoid imperfect joints to prevent moisture from entering which might result in joints opening up.

Glue shall be applied to the lower groove as well as to upper tongue to fill entire cross section of joint, since on account of foot traffic and the resulting deflection of the floating construction strong tensile and compressive forces are applied to the joint which must be compensated for between tongue and groove.

As an alternative, water-free 1 component PUR adhesives are available which are used for seam glueing of dry screed elements.

Until the joint adhesives have thoroughly hardened, the panels need to be secured mechanically (e.g. using wedges).

To execute a floating installation, the wood particle boards are placed on the properly prepared substrate (e.g. on compressed loose dry insulation layers or on thermal or impact sound insulation elements).

With two-layer construction, the two panels need to be fully bonded. The first layer shall be transversely offset to the first layer.

3.2 Installation on Supporting Beams/ Equalization of existing Wood Floors

Supporting beams and existing wood floors shall be sufficiently dry conforming to the respective climatic and ambient conditions during use. If, based on type of use in rooms which are on top of each other, there is the risk of moisture penetrating into the floor on account of vapour diffusion, vapour permeability on underside of ceiling must be reduced or a ventilated hollow space must be created under the floor to remedy the situation. Level differences in existing floors must be compensated. The maximum support widths of the beams depend on panel thickness and traffic loads.

The wood particle boards must be bolted continuously to the existing floor along the joints using appropriate screws with a clearance of 20 - 30 cm and clearance of 40 - 50 cm in centre of boards. The bolts shall be countersunk. Before floor covering is installed, the bolt holes might have to be closed with dispersion levelling compound if required (risk of showing in top layer).

4 Pre-Treatment for Floor Covering and Parquet Work

4.1 General Information

If required, overhangs from installation shall be sanded off or levelled with appropriate dispersion or cement-based levelling compound. Bolt holes shall also be closed using appropriate dispersion or cement-based levelling compounds. In the event that during visual inspection of the installed boards joints are found which are not completely bonded or closed, these areas need to be protected from moisture penetration from primers or levelling compounds, preferably using water-free reaction resin systems. The surface of the wood particle boards shall be clean and free of dust.

TKB technical Briefing Note 8 "Assessment and Preparation of Substrates for Installation of Floor Coverings and Parquet" contains detailed instructions and a description of required tests. If floor covering work is not performed directly after

installation of the boards, adequate measures for the protection of the boards need to be taken (e.g. cover with suitable sheeting).

4.2 Priming

Before mineral levelling compounds are applied, the surface of the prepared wood particle boards shall be primed. This protects boards from penetrating moisture from installation materials, binds residual dust and at the same time serves as bonding bridge. Suitable primers are water-based products specifically formulated for this particular substrate as well as water-free reaction resin products.

4.3 Levelling

For large-area levelling of wood particle boards, tension-reduced systems, in particular calcium sulfate, reaction resin and dispersion based compounds as well as fibre-reinforced, cement-based levelling compounds are to be used. By bolting down the wood particle boards or by using two-layer installation with floating constructions, tension related deformations are minimized.

For irregular edges, it is recommended to use a dispersion-based levelling compound.

Always observe specifications regarding minimum layer thicknesses according to TKB Technical Briefing Note 9 "Floor levelling compounds" or instructions issued by manufacturer.

5 Floor Covering and Parquet Work

Installation materials shall be suited for the intended use and selected with industrial safety and consumer protection aspects in mind. Technical guidelines (TRGS 610, TRGS 613, TRGS 430, TRGS 440, TRGS 540, TRGS 900) as well as GISCODE and EMICODE classifications assist with selection process.

Always observe processing instructions issued by the installation material manufacturers in their technical information and safety data sheets.

5.1 Bonding on Wood Particle Boards levelled with Mineral Compounds

Wood particle boards levelled with calcium sulfate and fibre-reinforced cement levelling compounds are prepared substrates ready for the professional installation of floor covering and parquet.

5.2 Direct Bonding on Wood Particle Boards

When bonding floor coverings or parquet directly on wood particle boards, always keep in mind that this type of substrate has reduced water absorption capabilities. When installing coverings which are impermeable to water vapour, water-free adhesives shall be used. When floor coverings with plain surfaces are installed on wood particle boards, there is always a risk that butt joints might show on covering. Consequently, before installing PVC, CV, design, elastomer and rubber floor coverings, it is recommended to first level the substrate – as described in section 4.3.

5.2.1 Direct Bonding of Textile Floor Coverings

When installing textile floor coverings, always consider the permeability to water vapour of the covering and preferably use adhesives for textile floor coverings with longer open times and/or fast setting properties which allow for maximum airing and evaporation of water contained in the adhesive.

5.2.2 Direct Bonding of Cork

Cork floor coverings can be installed directly using water-based latex contact adhesives with contact bonding method. One-side adhesives for cork coverings with longer open time and/or fast setting properties can also be used according to instructions issued by the manufacturer if they allow for maximum airing and/or fast strength build-up.

5.2.3 Direct Bonding of Parquet

When installing parquet directly on wood particle boards, always take into consideration the type of parquet, formats and timber type when selecting bonding materials.

For installations where the swelling capacity of the parquet is classified as high or very high (TKB Technical Briefing Note 1 "Installation of Parquet", table 4), preferably use water-free reaction resin adhesives. For certain parquet formats and timber types, dispersion parquet adhesives have proven to be the adhesives of choice. Always consult the manufacturers of the installation materials for instructions.

6. Relevant Standards and Technical Briefing Notes

In the following, please find the relevant applicable standards and technical briefing notes. The latest version always applies.

6.1 Industrial Safety

Gefahrstoffverordnung (GefStoffV), Published December 23, 2004 (BGBl. I S 3758), amended by article 2 of the ordinance of December 18, 2008 (BGBl. I S 2768)

TRGS 430
Isocyanate – Gefährdungsbeurteilung und Schutzmaßnahmen (March 2009); Ausschuss für Gefahrstoffe (AGS); GMBI No. 18/19 (04.05.2009)

TRGS 610
Ersatzstoffe und Ersatzverfahren für stark lösemittelhaltige Vorstriche und Klebstoffe für den Bodenbereich (March 1998); Ausschuss für Gefahrstoffe (AGS); BArbBl. issue 3/1998

TRGS 900
Arbeitsplatzgrenzwerte (January 2006); Ausschuss für Gefahrstoffe (AGS); BArbBl. issue 1/2006 last supplemented and amended GMBI No. 12 - 14 (27.03.2009)

TRGS 907
Verzeichnis sensibilisierender Stoffe (Notification BMA according to § 52 Abs. 3 Gefahrstoffverordnung (October 2002); Ausschuss für Gefahrstoffe (AGS); BArbBl. issue 10/2002

GISCODE für Verlegewerkstoffe
Gefahrstoffinformationssystem der Berufsgenossenschaften der Bauindustrie, Frankfurt

EMICODE
Gemeinschaft Emissionskontrollierte Verlegewerkstoffe, Klebstoffe und Bauprodukte e. V. (GEV), Düsseldorf

6.2 Standards for Wood Particle Boards

DIN EN 300
Oriented strand boards (OSB) – definitions, classification and specifications
September 2006

DIN EN 312
Particleboards – specifications
November 2003

DIN EN 309
Particleboards – definition and classification
April 2005

DIN EN 322
Wood-based panels; determination of moisture content
August 1993

EN 634-01
Cement-bonded particleboards – specifications
Part 1: General requirements
April 1995

6.3 Standards for Floor Installation Work

DIN 18365

VOB Vergabe- und Vertragsordnung für Bauleistungen – Teil C: Allgemeine Technische Vertragsbedingungen für Bauleistungen (ATV) – Allgemeine Regelungen für Bauarbeiten aller Art - Bodenbelagsarbeiten
October 2006

DIN 18356

VOB Vergabe- und Vertragsordnung für Bauleistungen – Teil C: Allgemeine Technische Vertragsbedingungen für Bauleistungen (ATV) – Parkettarbeiten
October 2006

6.4 Technical Briefing Notes

TKB-1

Installation of Parquet

TKB-2

Installation of Laminate Flooring

TKB-3

Installation of Elastomer Flooring

TKB-4

Installation of Linoleum Flooring

TKB-5

Installation of Cork Flooring

TKB-6

Trowel Notch Sizes for Floor Coverings, Wood Flooring and Tiles

TKB-7

Installation of PVC Flooring

TKB-8

Assessment and Preparation of Substrates for Installation of Floor Coverings and Parquet

TKB-9

Technical Specification and Installation of Levelling Compounds

TKB-11

Installation of self-laying Carpet Tiles and Sheets

TKB-12

Installation of Floor Coverings with Dry Adhesives

6.5 Other Standards

DIN 18299

VOB Vergabe- und Vertragsordnung für Bauleistungen, - Teil C: Allgemeine Technische Vertragsbedingungen für Bauleistungen (ATV) - Allgemeine Regelungen für Bauarbeiten aller Art
October 2006

DIN 1960

VOB Vergabe- und Vertragsordnung für Bauleistungen - Teil A: Allgemeine Bestimmungen für die Vergabe von Bauleistungen
May 2006

DIN 1961

VOB Vergabe- und Vertragsordnung für Bauleistungen - Teil B: Allgemeine Vertragsbedingungen für die Ausführung von Bauleistungen
October 2006

6.6 Literature and Commentaries

Harald Kaulen, Günter Hahn, Ortwin Baumann
Erläuterungen zur DIN 18365 – Bodenbelagsarbeiten und DIN 18299, Ausgabe 2002, 6. Auflage 2004

Arbeitskreis Bodenbeläge im Bundesverband Estrich und Belag e. V.
Kommentar zur DIN 18365 - Bodenbelagsarbeiten
1. Edition, 2006