Interreg Alpine Space CaSCo

EUROPEAN UNION

EUROPEAN REGIONAL DEVELOPMENT FUND

CaSCo - Carbon.Smart.Communities

PRODUCT GROUP PROFILES

Wooden Floors

compiled by

HOLZ VON HIER

www.holz-von-hier.de

IMPRESSUM

Deliverable D.T. 1.2.1 - module 4

Date of delivery: September 2018

Contact: info@holz-von-hier.de

Conception and realisation: HOLZ VON HIER gGmbH
Content, design, layout: Gabriele Bruckner, Philipp Strohmeier for HOLZ VON HIER

HOLZ VON HIER wants to thanks all CaSCo partners, the European Union and the Interreg Alpine Space programm.

HOLZ VON HIER
www.holz-von-hier.de

HOLZ VON HIER: non-profit initiative with stakeholder board, advisory boards, expert panel and open partner network.
HOLZ VON HIER: Climate and Environment Label / HvH Environment Footprint.

1 / Introduction

Health-conscious customers live very well with local hardwood floors. „Scrimpers" opt for real wood flooring because they are optimally hard-wearing and durable. Environmentally conscious customers with a pronounced understanding of optimal cost-quality performance comparisons are even more in favor of genuine hardwood floors made of local woods, since both the price and the environmental balance are very good.

Floor types and their market shares: (1) Textile floors made of synthetic fibers, (2) PVC coverings, (3) ceramics, (4) wooden floors such as floorboards and parquet, (5) laminate, (6) linoleum, (7) cork, (8) elastomers and (9) Other such as Textile floors made of natural fibers (cotton, jute, flax, coconut, hemp, sisal, wool, hair, silk). Textile plastic floors have a market share of 50% (about 240 million m2, tendency: falling). PVC coverings: market share 10% (about 48 million m2, tendency: falling sharply). Ceramics: market share 15% (about 72 million m^2, tendency: rising). Wooden floors (floorboards, solid parquet, engineered parquet): market share 4% (about 20 million m^2, tendency: rising sharply). Laminate: market shares 16% (about 80 million m^2, tendency: very strong increase). Linoleum: market shares 2% (about 9 million m^2, tendency: constant). Cork: market shares 1% (around 6.5 million m^2, with a very strong upward trend). Elastomers: market shares 2% (about 6.5 million m^2, tendency: rising). Other: market shares 1% (about 6 million m^2, tendency: rising).

For **wooden floors**, there are: wooden floors, solid wood parquet and finished parquet. The German parquet production amounts to approx. 11 million m^2, the German parquet consumption is estimated at approx. 20 million m^2 (HvH). That means the parquet imports are high. This is often import parquet made of tropical wood, mostly even of uncertain origin, or from overexploitation. The German parquet manufacturers could significantly increase their production if more parquet from domestic woods instead of imported parquet or parquet from tropical woods would be demanded. Here it would be particularly important to ask for a proof of origin, like the label HOLZ VON HIER, because also domestic wood species can often originate from long distance imports, e.g. Larch from Siberia, maple from Canada, oak from the USA, beech from Romania and others).

Laminate is a material which consists of two or more layers adhesively bonded to one another. These layers can consist of the same or different materials. Laminate flooring consists of a backing layer of wood panels decorated with a thin decorative layer and sealed. Laminates are available in different panel thicknesses and with different abrasion resistance. Inexpensive laminates are thin and more sensitive to abrasion and moisture, especially at the edges. High-quality laminates, on the other hand, partly imitate the wood surfaces of a real parquet floor with textured embossing. All laminate floors, however, have the disadvantage over solid wood floors that they can not be abraded in the event of damage or wear. There are also laminates of fiber-reinforced plastics, they are used in aerospace, marine and automotive, and other applications where high strength and lightweight materials are needed. HPL (High Pressure Laminate) and CPL (Continuous Pressure Laminate) are laminates in which paper, paperboard or textile fibers are pressed by means of glue into flat sheets which can be further processed with glue, into thicker laminates (for example brand name boards such as „formica plates"). As glues melamine or phenolic resins are used. Such plastic laminates are also used for the production of furniture, doors and floors. When buying floor coverings from laminate you should therefore ask exactly. However, laminates have little to do with wood.

For comparison - plastic floors

Most plastic floors are made of PVC (polyvinyl chloride). Health risks in daily use are already inherent in the plastic of some plastics. For example, PVC is often described as carcinogenic and mutagenic. In addition, plastic products sometimes contain high concentrations of plasticizers, stabilizers, pigments, flame retardants and other additives. However, unlike imported goods, plastic products made in Germany must comply with the thresholds, required for formaldehydes, VOCs and carcinogenic substances. In the case of imported products, the regulations in the producing countries are often not comparable with the high standards within the EU.

Plastic products can potentially contain one or more REACH-relevant substances, such as 5 substances of the REACH Prohibited List and 41 substances of the REACH Candidate List. The REACH candidate list includes substances that are not yet subject to prohibitions or limits but that are suspected to be hazardous to health. According to the REACH regulation, 2 substances are already subject to threshold values within the EU for plasticizers and 13 are on the REACH candidate list, for flame retardants they are 5 substances, for stabilizers 2 and for propellants 1 on the REACH candidate list. Greenpeace classifies polyvinyl chloride (PVC), polycarbonate and polystyrene (EPS) as the three most toxic plastics and strongly recommends not to use them for health and environmental reasons (http://www.greenpeace.de).

2 / Prechains

Basic raw material

The basic raw material of **wooden floors** is the natural material wood. **Solid planks** are made from planed and profiled lumber. Solid wood parquet consists of planed parquet bars. **Straight boards** and **solid wood parquets** are in demand again today and are still being produced by German manufacturers. Imported goods are usually almost finished wood. The German parquet production today amounts to approx. 11 million m^2, above all high-quality multi-layer parquet and solid parquet, the German parquet consumption is estimated by market experts far more than 20 million m^2. Floorboards and parquet floors are available in all conceivable types of wood. In imported products often wood from „unsafe sources" or tropical wood is used.

Parquet made of tropical wood, which is classified as endangered in the IUCN Red List, should generally not be used. Examples are: Abachi (Obeche), Afromosia (Kokrodua), Amaranth, Aningré, Apa (Doussie, Afzelia), Bilinga (Opepe), Bongossi (Azobe), Bubinga (Kevazingo), Cumaru (Amburana), Dibétou (African Walnut) , Iroko (Kambala), Jatobá (Brazilian cherry), Red Khaya (Benin), Mahogany (Lagos M.), Kingwood (Zebrawood, Tigerwood, Urunday), Makoré, Merbau, Missanda (Tali), Padouk (Coralwood, Brawood, Camwood Rosewood Rosewood), Peroba Rose (Amarello), Sirari, Sonokeling, Sucupira (Aramatta), Wenge (Panga Panga).

On the other hand, wood floors with wood from proven local sources are preferable and harmless. Wood species such as maple, birch, beech, Douglas fir, oak, alder, ash, spruce, hornbeam, cherry, pine, larch, walnut, robinia, marmoset, fir, stone pine, smoked wood of all species and other native woods are very well suited for wooden floors. However, allthough all these types of wood originate in Germany, they are as well imported either in the form of raw material for parquet production or as finished parquet. Therefore, it is important to ask for evidence of close production with short paths, e.g. in the form of a certificate of HOLZ VON HIER.

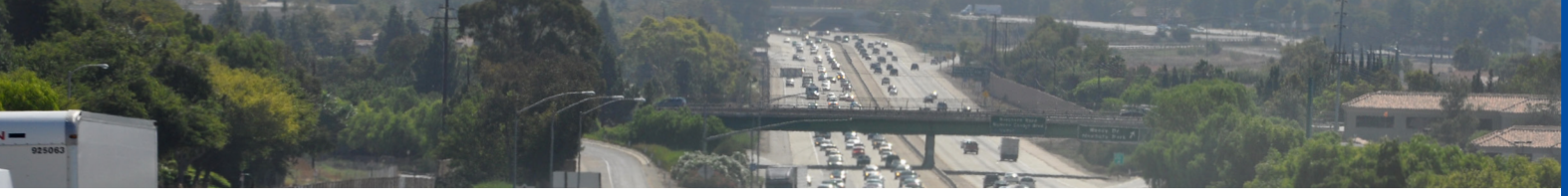
Laminate consists of 60-70% of wood panels (HDF), 8-18% of paper and 16-21% of synthetic resin and is therefore not actually a wooden floor in the strict sense. The wood panels are made of wood fibers, which are produced as a by-product in solid wood production or are also obtained from raw wood. Thus, they are ultimately made of wood, but the market here is now global.

For comparison: floors made of plastics and ceramics

PVC Floors. Components of PVC flooring are: PolyVinyl Chloride 34,4%, filler 54,3%, plasticizer 10,5%, stabilizer 0,3%, pigment 0,2%, additives 0,1%, PUR (polyurethane) coating 0,2%. Basic raw material is petroleum, from which the precursor PVC granulate is produced.

Textile Floors from PE, PES. Polyamide plastic flooring (PP and PES) is also called „tufted floor" and consists of: wear layer material 100% polyamide fibers, backing material 100% polypropylene (PP) or polyester (PES), backslip: fabric backs made of PP or PES. Also for textile plastic floors, the basic raw material is crude oil.

Ceramic floors of tiles, plates. Basic raw materials ceramic tiles are: clays 60%, feldspar 22%, kaolin 8%, limestone 4%, sand 3%, glazes approx. 4%.



Raw material extraction (A1)

Extraction of raw materials from wooden floors. Raw material for all solid wooden floors is round wood from the forest. Crucial here is the production of roundwood or the extraction or harvest. Only if the cultivation takes place sustainably, i.e. not more wood is removed than is recovering and can regrow in natural species composition, the wood is to be considered as renewable and thus in principle unlimited available raw material.

German forests have been sustainably managed for centuries and are additionally certified with sustainability labels for the forest (FSC and PEFC). That's not the case everywhere in the world. In Asia, Latin America and Africa, only 1-5% of forest land is certified. For imports without such a forest label the risk of depletion is high. Sustainability is also guaranteed for wood products with HOLZ VON HIER certificate, as the requirement for the entry of roundwood in the certification process is an FM certificate from FSC, PEFC or comparable.

For comparison: extraction of raw materials and availability of plastic and ceramic floors.

Plastic products. Oil reserves deposit in about 78 countries (USGS), most of them with very low incidence. The main oil deposits that can be economically exploited in Saudi Arabia are 13.2%, Russia 12.5%, USA 10.4% and China 5% (Germany 0.1% of world reserves). (2) PREPARED PRODUCTS: Petroleum is processed in the worldwide trade in goods through numerous intermediate steps to various plastic precursors.

PVC floors. The basic raw material of every plastic floor is petroleum. In the case of the PVC soil, petroleum becomes naphtha (or ethane, propene, liquefied petroleum gas), which is converted into ethene and the addition of chlorine to vinyl chloride. This is polymerized to polyvinyl chloride (PVC) and then processed to the precursor PVC granules (in EPD usually the input product for production).

Textile plastic floors. Even with textile plastic coverings, the basic raw material is petroleum. In this case, the oil is converted to naphtha and this to propene. This is polymerized to polypropylene and processed into PP granules. For petroleum, oil is processed via petroleum cracking and ethylene glycol plus terephthalic acid into polyethylene terephthalate (PET) or polyethylene terephthalate (MPET) and various stages of processing into virgin polyester sheets (yarns, etc.).

Ceramic floors. Basic raw materials are clay, feldspar, kaolin and lime.

Extraction and range of the basic raw materials of plastic and ceramic floors.

CLAY: Clay or bentonite is mined in 42 countries of the world (USGS), the three main mining countries are the USA 33,7%, China 23,7% and Greece 8,4%. Germany accounts for 2,5% of world production of bentonite. But Germany also imports around 22.000 tons of bentonite every year.

FELDSPAR: Fieldspar is mined in 44 countries of the world (USGS), the three main mining countries are Italy 25,7%, Turkey 19,1%, China 11,5%. Germany gains 1,1% of world production of feldspar.

KAOLIN: Kaolin is mined in 53 countries of the world (USGS), the main mining countries are Uzbekistan 18,3%, USA 16% and Germany 12%. Every year about 4,6 million tonnes of kaolin are mined in Germany, but also 0,63 million tonnes are imported from Belgium, the Czech Republic, the USA, the UK and the Netherlands.

LIME: Lime is mined in 46 countries around the world (USGS), the main mining countries are China 63,4%, US 5,4% and India 4,3%. Germany gains 1,9% of world production of lime, about 6,7 million tonnes (BGR, 2012). However, Germany also imports around 1,9 million t of lime per annum, mainly from Austria, Belgium, Poland and France.

The outreach of oil reserves as basic raw material of all plastic products is estimated > 100 years (USGS). The outreach of clay, feldspar, kaolin, lime, as basic raw materials for ceramic floors, is >> 100 years (USGS).

Transports „cradle to gate“ (A2) „gate to customer“ (A4)

Standard data sets from life cycle assessments (EPD) expect product independent 50 to 350 km for the upstream chains. Even scientific studies estimate, for example, only 396 km for sawn timber (Thünen Institute), 97 km to 200 km for chipboard, e.g. as a basic raw material for laminate. However, even 500 to 600 km underestimate the real transport distances in the material flows of floor production. If one also considers the imports of intermediates to Europe or individual countries in Europe, it becomes clear that these modeled transport figures seriously underestimate the reality.

The transports to the customer or the construction site (A4) are generally not recorded in EPD but can account for a large part of the life cycle assessment of a building material.

Wood floors without guarantees of origin such as „HOLZ VON HIER“ can therefore have covered many transport kilometers in the processing chain, even though the raw material itself would be very regional.

For comparison: plastic floors (PVC, PE, PES)

The importance of transports for the life cycle assessment of products is today systematically underestimated for all products, including plastic floors and kermaik floors. Standard data sets from life cycle assessments (EPD) expect product independent 50 to 350 km for the upstream chains. Without material flow certificates, plastic products used in construction and interior design can have covered thousands of transport kilometers. This should be demonstrated by means of material flow indices.

Basic raw materal Oil. Germany has only 0.1% of world oil reserves and imports the largest part. The transport of this basic raw material of all plastic products (for example from Saudi Arabia, Russia, USA) is correspondingly high.

PVC precursors. Not only crude oil as a basic raw material but also the various plastic precursors for the production of synthetic flooring are traded worldwide. To Germany every year, for example, synthetic staple fibers (0,34 million tonnes), polymers of vinyl acetate (0,14 million tonnes), vinyl chloride (0,73 million tonnes), styrene (0,77 million tonnes), propylene (1,6 million tonnes) and ethylene (2,5 million tonnes) (mainly from Asia) are imported.

The floors themselves are not only produced in Germany but also traded internationally and can therefore also come from imports over long distances.

For comparison: ceramic floors

Ceramic products consist of clay, feldspar, kaolin and various glazes.

The basic raw material clay can still be classified as regional, since in Germany 6,7 million tons of clay are mined annually and only 0,02 million tons are imported (for example from the USA, China, Greece). In the case of feldspar, however, the transport volume is significantly higher. Germany annually extracts about 0,2 million t of feldspar (1,1% of world production), but imports twice as much with 0,43 million t of feldspar (eg Italy, Turkey, China). Kaolin also has a high foreign trade share. Every year about 4,6 million tons of kaolin are mined in Germany but also 0,63 million tons are imported (for example from Belgium, the Czech Republic, the USA, the UK and the Netherlands). Even with lime, the flow of goods is very pronounced. Germany produces 6,7 million t of lime per year and imports about 2 million t (mainly from Austria, Belgium, Poland and France, up to >1.100 km). Thus, on average, easily half of the product weight can have covered several thousand kilometers, even in a production in Germany itself.

In addition, of course, the finished ceramic tiles are not only produced in Germany but also imported, namely 0,84 million t of tiles annually (for example, from China, Mexico, Turkey).

3 / Use phase and After use

Production (A3)

Wood floors consume more energy in production (390 - 543 MJ/m² at ~ 1.6 cm thickness) than, for example, plastic floors (112 - 287 MJ/m², usually 0.3 - 0.7 cm thickness). Unbeatable on all floors, however, are wooden floorboards (60 MJ/m²).

The balance for wood floors per ton is considerably better (see also Chapter 5).

However, a comparison must always include the service life. Since textile and plastic floors usually have a lifespan of only 10 years, but wooden floors more than 50 years, the values for wooden floors must be divided by 5 for comparison, thus ranking well below the plastic floors at 78 - 109 MJ/m².

Use phase (B)

Inertness of the building material. Wood floors and other types of soil are inert in the use phase and consume as a building material itself neither energy, water nor raw materials. Their climate and environmental parameters are set to zero (GWP, AP, EP, ODO, POCP, PERE, PENRE, water = 0). Resource consumption through care and maintenance is less a material issue than determined by user behavior (see also chapter ‚Care')..

After use (D)

Wooden floors such as **floorboards** or **parquet**, especially solid parquet, last for generations, because they are e.g. very good and easy abradable and can be repaired very well. In principle, these floors can be removed and reused (if they have not been glued to the ground). However, massive wooden floors are so in demand and so valuable that they are not removed when renovating old houses, but sanded off and repaired. **Laminate**, however, can usually not be recycled, it is used in cascade use in waste wood plants as a substitute fuel for oil and gas energetically, whereby heat and electricity are generated.

After their use, wooden floors are today divided into waste wood categories AI (unencumbered) to AIV (charged) and thermally reused in Germany or the waste wood is exported. AI and AII waste wood are already valuable substitute fuels for oil and gas throughout Europe and are widely used in regional biomass heating (power) plants. Wood waste is also used worldwide, e.g. in wood panels. Technically common ways of recycling waste wood in recycling, which are extensively used in other countries, are excluded in Germany by the German Waste Wood regulation. However, the regulation does not prohibit wood boards with up to 100% waste wood from being imported into Germany and used here in construction.

For comparison: plastic floors and ceramic floors in the after use

Plastic floors (PVC, PE/PES Textile). The disposal as hazardous waste in waste incineration plants (MVA) is the quantity usual way of disposal for PVC. The hydrogen chloride produced during combustion and the dioxins are largely retained in German waste incineration plants due to the high demands on exhaust air purification. This high cleaning performance costs a lot. As a result, waste streams are increasingly being transported to countries that are less stringent. Landfilling of PVC was the common disposal method until 1989, even today certain parts of PVC are deposited in unsorted rubble. Especially with plasticized PVC, it comes here but due to their plasticizer share to considerable loads of leachate. A reuse of plastic insulation is usually not given today. For PVC, reuse is difficult to impossible, although there are some industry return systems for PVC building products such as pipes and windows. However, only in the rarest of cases are the products used unchanged. As a rule, thermoplastics can only be recycled in downcycling with considerable quality losses. The recycling of non-varietal waste, e.g. in household waste, is still difficult and it will probably remain because it is very labor-intensive and associated with high use of water and energy, so that both the cost-benefit calculation and the life cycle assessment often turn out negative. For this reason, mechanical recycling is currently used almost exclusively where large quantities of a single-grade material are available, for example the waste residues in the production itself, but this does not represent subsequent use in the narrower sense.

Ceramic floors (Tiles, plates). The usual way of re-use for ceramic floors is landfill, as the tiles and panels are usually stuck firmly to the ground and can be replaced hardly break free at demolition. There is no reuse or recycling and no combustion possible. Disposal is therefore increasingly difficult due to the increasing closure of landfills.

4 / Product features

Health aspects

Wood floors manufactured in Germany comply with the legal requirements for formaldehyde, VOC and eluates. See also info sheet „Formaldehyde, VOC, PCP and CO - what is relevant for wood products". The natural material wood is optimally healthy. Even according to the product database WECOBIS of the Federal Ministry of Transport, Building and Urban Development and the Bavarian Chamber of Architects, natural materials such as wood and stone are optimally compatible with health, both during use and in case of fire. For other floors, such as elastomers, linoleum, polyolefins, PVC or textile man-made fibers, there are major differences in terms of health protection and it should be ensured by purchasing evidence that no harmful gases are emitted (VOCs, nitrosamines, formaldehyde, etc.). see WECOBIS).

Laminate flooring produced in Germany also complies with the legal requirements for formaldehydes, VOCs and eluates (in the analyzed product EPD, the measured values for VOC are well below the legal threshold values e.g. for TVOC 300 µg / m^3, VOC without NIK: 100 µg / m^3, SVOC 30 µg / m^3 No information is given on the concentration of formaldehydes, carcinogens and eluates.

In contrast, health risks in the use of some plastic floors are already given by the plastic itself. Plastic products sometimes contain high concentrations of plasticizers, stabilizers, pigments, flame retardants and others. However, unlike imported goods, plastic products made in Germany must comply with the limits that we apply to formaldehydes, VOCs and carcinogenic substances. For imported products, the regulations in the producing countries are often not comparable with the high EU standards.

For comparison - health aspects of plastic floors and ceramic floors

PVC floors. Plastic floors manufactured in the European Union comply with the legal requirements for formaldehyde, VOC and eluates. Values from EPD: (1) formaldehyde / carcinogens: k.a .; (2) VOC: TVOC-28 days: <50 - 100 µg / m^3, SVOC-28 days: <5 - 10 µg / m^3, VOC or NIK-28 days <5 - 10 µg / m^3; (3) For eluates, there are usually no measurements, they are sometimes classified as „not relevant", presumably because it is assumed that the material is disposed of in the waste incineration.

Textile floors (PE, PES). Textile plastic floors manufactured in the European Union comply with the legal requirements for formaldehydes, VOCs and eluates (measured values from EPD are eg (1) formaldehyde and carcinogens: ka; (2) VOC: TVOC-28-days: 300 µg / m^3, SVOC -28 days: 30 µg / m^3, VOC or NIK-28 days 100 µg / m^3; (3) there are usually no measurements of eluates, they are sometimes classified as „not relevant", presumably because it is believed that the material is disposed of in waste incineration.

Ceramic floors. Ceramic tiles and slabs produced in the European Union comply with the legal requirements for formaldehydes, VOCs and eluates (there are no measured values, in EPD it says that „no evidence of health risks is required")..

REACH-RISK in wooden floors. The risk for highly dangerous substances in wooden floors itself is not given. Solid wooden floors are healthy floors. But it depends on how the floor is installed or laid, so whether with or without or with which adhesive.

For comparison: REACH Risk (risk for health-hazardous substances according to REACH) in plastic and ceramic floors

Plastic floors (PVC, PE/PES Textile). Plastic floors could potentially contain harmful substances because plastic products potentially contain one or more REACH-relevant substances. Thus, 5 substances are on the REACH prohibition list, i.e. those whose use is prohibited or subject to certain thresholds. 41 other substances are on the REACH candidate list. These are substances whose use is not yet prohibited, but where there is a suspicion of significant health hazards. For plasticisers, 2 substances are subject to REACH regulation within the EU and 13 substances are on the REACH candidate list, for flame retardants it is 5 substances, for stabilizers 2 and for propellants 1, which are on the REACH candidate list.

Comments on PVC. (1) Health risks in daily use are already in the starting material PVC, for vinyl chloride is often described as carcinogenic and mutagenic. Plastic floors contain not only the fillers (54,3%) but also high concentrations of plasticizers (10,5%) as well as stabilizers, pigments, flame retardants and other additives. (2) Plasticizers in PVC (soils, food packaging, children's toys, etc.) are generally of physiological concern because, despite the low vapor pressure, they can be absorbed through saliva, skin contact or the respiratory tract. Plasticizers such as phthalates are liver and kidney-damaging, can have a development-inhibiting effect on children and are suspected of being carcinogenic. Some phthalates (e.g., DEHP) are considered harmful to fertility and fertility. (3) In plastics, the flame retardant hexabromocyclododecane (HBCD) is still used today. HBCD is considered to be highly carcinogenic and is prohibited by the REACH Regulation in the EU above 1 mg / kg in the product. Brominated flame retardants such as HBCD are unlikely to be released into the environment from undamaged plastics in small quantities, yet even in very low doses HBCD can hardly be degraded in the environment and accumulates in breast milk and blood. It is considered to be „very toxic to aquatic life with long-term effects" with a high bioaccumulatoin potential as it also accumulates in groundwater and thus in drinking water. The Federal environmental agency recommends to refrain from products containing HBCD or the generally critical flame retardants.

Comments on textile synthetic floors. (1) Textile plastic floors contain high concentrations of „equipment" (additives), including „antistatic agents" (eg metal fibers or ammonium compounds), „antisoilings" are intended to protect the carpet fibers from contamination for a longer period of time (the fibers are eg coated with CFCs or glycol ethers) , „Flame retardants" and other. [Note: at v.a. mothproof carpets, mostly permithrin, are used mainly in order to ensure the quality assurance of the goods during storage and transport]. (2) The textile flame retardant HBCD may also be present in textile synthetic floors. For health hazards, see notes on PVC.

Ceramic floors. Due to the fire, ceramic tiles generally contain no degassing substances, especially for products made in Europe. Nevertheless there are 11 substances on the REACH candidate list that could potentially be found in ceramic products. Notes: (1) a health hazard is or was formerly mainly due to the glazes. This is subject to stricter controls on German production than on production in less demanding parts of the world. Of course, this aspect is also less relevant in floors than, for example, glazes for eating utensils or drinking vessels. (2) Microbiological, allergenic substances such as mites, house dust, fungi, etc. can hardly hold or develop on the tiles themselves, but very well in the laying joints. (3) When laying with a lime or cement mortar, the room air is no longer loaded when the mixing water has evaporated. When laying with adhesives, there is both a higher risk of evaporation and a higher risk of microbiological colonization.

Floorboards and **solid parquet** contain no glue in the product itself and are usually not glued to the floor today, but laid with tongue-and-groove systems or simply installable click-fix systems. The surfaces of wood products are either oiled, waxed, lapped or sealed with paints. The surfaces of planks can also be treated individually according to customer requirements. Today, in German production, mostly healthier products are used in surface treatment than prescribed by the legal standards. For floors, too, it makes sense always to pay attention to the German or European origin, or to a proof of origin such as HOLZ VON HIER, because in Germany and Europe very strict health requirements apply to production in comparison to other regions of the world.

Laminate. The health risk of laminate flooring is mainly due to its wood panel materials and the glues used. Adhesives containing PAHs are banned in Germany but not yet in other countries of the world. One thing to watch out for with imports.

Safety Aspects

Safety and behavior in case of fire of wood panels. Solid wooden floors such as floorboards and solid parquet have considerable advantages in case of fire. Even according to the EN 14342 standard, wooden floors with at least 5 mm top layer are considered to be „fire-proof". A charring layer prevents fast burning in the case of massive wooden floors in case of fire and the charring around the source of the fire greatly reduces the burning rate. Wood floors under 5 mm cover layer, including laminates, are considered „non-fire-proof". According to the project database wecobis of the Federal Ministry of Transport, Building and Urban Development and the Bavarian Chamber of Architects, natural materials such as wood and stone are optimally compatible with health, both during use and in case of fire. In case of fire, although the usual combustion gases. however, without highly toxic substances such as e.g. in plastic fires.

For comparison - Safety / Behavior in case of fire

PVC floors and Textile plastic floors (PE, PES). In case of fire plastic products and drops may also burn off. Dripping burning plastics are difficult to extinguish. Soils made of plastics can therefore result in a significant increase in the relevant fire load. This is also the case although today almost all plastic products in the construction sector are provided with flame retardants. In the case of fire, very dense smoldering smoke is created, which can clearly hamper the orientation and thus the escape velocity, especially in public buildings with groups of people who find themselves difficult to organize and organize (eg schools, kindergardens, retirement homes, hospitals, etc.). In the combustion of plastic products, poisonous carbon monoxide, nitrogen oxides and hydrogen chloride as well as highly toxic and carcinogenic dioxins, furans and optionally also polycondensed aromatics such as pyrenes and chrysene are formed. Brominated flame retardants (e.g., HBCD) in plastic products release highly toxic dibenzodioxins / furans upon combustion. Another hazard is derived from heavy metal containing stabilizers (e.g., lead). There are no measured values in EPD for these values. According to fire protection experts, most of the deaths from house fires are not caused by falling parts but by toxic combustion gases.

Ceramic floors. Stone and ceramic floors are considered non-combustible floors.

Lifetime

Lifetime. Solid wood floors are „multi-generational floors", they do not go out of fashion and are timelessly beautiful. The durability of hardwood floors, solid parquet is classified by the BBSR in the category of 50 years (the highest awarded category), but in reality the durability is significantly longer due to the possibilities of sanding and good renovability. Prefabricated parquet is less durable than solid wood flooring due to the lower wood top layer.

Laminate is less durable compared to wood floors, and the lifespan is significantly lower because the product can not be refurbished. The BBSR rates the life span at 20, which is probably an optimistic assumption in practice.

For comparison: durability of plastic and ceramic floors

The durability of **PVC floors** is rated by the BBSR at 20 years and the floors made from **textile synthetic fibers** at 8-10 years. The durability of **ceramic floors** is classified as> 50 years.

Durability, care, reparability

Durability, care, reparability of wooden floors. Solid wood floors such as floorboards and solid hardwood floors are durable, long-lasting and easy-care floors. Multilayer parquet of higher qualities is just as easy to repair and easy to care for, but multi-layer parquet with a thin upper deck can not be abraded and therefore can not be repaired. Laminate is once again much less durable than wooden floors.

For comparison: durability, care, repair-friendliness of plastic and ceramic floors

Durability, care, repair-friendliness of plastic floors. The basic cleaning of **plastic floors** is usually simple, but it is different for heavily soiled plastic floors, for example in public areas. Specialist personnel are often used by cleaning companies, often using strong chemical cleaning agents. Especially with heavily soiled textile floors, cleaning is difficult and is feasible only with professional steam cleaning machines. The ease of repair is very low, especially if the floors are glued to the ground.

The durability, care and repairability of **ceramic floors** is good, because ceramic and stone floors are very robust and easy-care floors.

5 / Environmentla Labels

Environmental / quality labels

HOLZ VON HIER

The HOLZ VON HIER label particularly distinguishes climate-friendly and environmentally friendly wood products with wood from the short routes of sustainable forest management, with proof of origin and life cycle assessment data. In addition, products manufactured in their entire material flow in Germany or Europe comply with the strict environmental and health regulations. HOLZ VON HIER is a climate and environmental label and therefore has not developed its own criteria for sustainable forestry, but requires evidence such as FM certificates to FSC or PEFC or similar. HOLZ VON HIER is particularly important for hardwood floors.

FSC

FSC-FM certification certifies sustainable forest management worldwide according to the criteria of FSC. The wood in products with an FSC-CoC certificate can exhibit long distance transports.

PEFC

PEFC-FM certification certifies sustainable forest management worldwide according to the criteria of PEFC. The wood in products with a PEFC-CoC certificate can exhibit long distance transports.

Natureplus

Natureplus identifies formaldehyde-free and low-emission products that go far beyond European limit values and also verify that the product does not contain any REACH-relevant substances (including substances from the REACH candidate list).

Blue Angel

The Blue Angel is characterized by formaldehyde-free, low-emission products that go far beyond European threshold values with their specifications. Relevant for prefaricated parquet and laminate.

EU Flower

Not yet awarded for wood products.

ETG

Commitment of the industry. Limits pentachlorophenol, formaldehyde.

GUT

(Community of Eco-Friendly Carpeting): Industry Commitment to (a) Avoid Asbestos, CFCs, Azo Dyes, Vinyl Chloride, Pesticides, Formaldehyde and Pentachlorophenol (PCP) in Manufacturing. (b) Adherence to self-imposed limit values for toluene, styrene, vinylcyclohexene and 4-phenylcyclohexene, determination of sum parameters for hydrocarbons and volatile organic compounds.

IWS

Protection or treatment of wool carpets with mothproofing agents (pyrethroids).

IBU

IBU quality seal tile manufacturer.

EPD

EPD are not environmental or quality labels and can not be used and evaluated as such. In addition to methodological problems such as comparability and system-immanent neglect of transports, an EPD without a comparative framework says nothing about the environmental friendliness of a product.