SENTINEL HOLDING
INSTITUT

SHI PRODUCT PASSPORT

Find products. Certify buildings.

SHI Product Passport No.:

15118-10-1003

Kingdom LVT Flooring /Luxury Vinyl Tile

Product group: Vinyl

Zhejiang Kingdom New Material Group Co. , Ltd
No. 38 Desheng Road, Heshan Town
Tongxiang City, Zhejiang Province, 314512, China

Product qualities:

- SHI Product Assessment 2024
- QNG Qualitätssiegel Nachhaltiges Gebäude
- DGNB NEW CONSTRUCTION 2023.2
- DGNB NEW CONSTRUCTION 2023
- DGNB NEW CONSTRUCTION 2018
- BNB-BN NEUBAU V2015
- EU TAXONOMY
- BREEAM DE NEUBAU 2018
- LEED v4.1 (outside US)

CERTIFIED SUSTAINABLE PRODUCT
SHI PRODUCT PASSPORT
SENTINEL HOLDING INSTITUT
www.sentinel-holding.eu

Köttner

Helmut Köttner
Scientific Director
Freiburg, 17 August 2026

SENTINEL HOLDING
INSTITUT

Product:
Kingdom LVT Flooring /Luxury Vinyl Tile

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The SHI Database is the first and only database for construction products whose comprehensive processes and data accuracy are regularly verified by the independent auditing company SGS-TÜV Saar

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SHI Product Assessment 2024

Since 2008, Sentinel Holding Institut GmbH (SHI) has been establishing a unique standard for products that support healthy indoor air. Experts carry out independent product assessments based on clear and transparent criteria. In addition, the independent testing company SGS regularly audits the processes and data accuracy.

Criteria	Product category	Harmful substance limit	Assessment
SHI Product Assessment	Other floor coverings	TVOC ≤ 160 µg/m^3 Formaldehyd ≤ 10 µg/m^3	Indoor Air Quality Certified
Valid untill: 15 November 2026			

SENTINEL HOLDING
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QNG - Qualitätssiegel Nachhaltiges Gebäude

The Qualitätssiegel Nachhaltiges Gebäude (Quality Seal for Sustainable Buildings), developed by the German Federal Ministry for Housing, Urban Development and Building (BMWSB), defines requirements for the ecological, socio-cultural, and economic quality of buildings. The Sentinel Holding Institut evaluates construction products in accordance with QNG requirements for certification and awards the QNG ready label. Compliance with the QNG standard is a prerequisite for eligibility for the KfW funding programme. For certain product groups, the QNG currently has no specific requirements defined. Although classified as not assessment-relevant, these products remain suitable for QNG-certified projects.

Criteria	Pos. / product group	Considered substances	QNG assessment
3.1.3 Schadstoffvermeidung in Baumaterialien	2.2 Resilient floor coverings – including multilayer systems	VOC / Emissions / hazardous substances / polycyclic aromatic hydrocarbons (PAH) / SVHC / heavy metals	QNG ready
Verification: Zertifikat TÜV PROFiCERT-product Interior PREMIUM vom 10.08.2023 / Zertifikats Nr. 707205828-1			

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Kingdom LVT Flooring /Luxury Vinyl Tile

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DGNB New Construction 2023.2

Criteria	No. / Relevant building components / construction materials / surfaces	Considered substances / aspects	Quality level
ENV 1.2 Local environmental impact			Not relevant for assessment

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Kingdom LVT Flooring /Luxury Vinyl Tile

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DGNB New Construction 2023

The DGNB System (German Sustainable Building Council) assesses the sustainability of various types of buildings. It can be applied to both large-scale private and commercial projects as well as smaller residential buildings. The 2023 version sets high standards for ecological, economic, socio-cultural, and functional aspects throughout the entire life cycle of a building.

Criteria	No. / Relevant building components / construction materials / surfaces	Considered substances / aspects	Quality level
ENV 1.2 Local environmental impact, 03.05.2024 (3rd edition)	7 Floor coverings (Resilient floor coverings)	VVOCs, VOC, SVOC emissions and content of hazardous substances	Quality level 3
Verification: Zertifikat TÜV PROFiCERT-product Interior PREMIUM vom 10.08.2023 / Zertifikats Nr. 707205828-1			

Criteria	Assessment
SOC1.2 Indoor air quality (*)	May positively contribute to the overall building score
Verification: SHI-Schadstoffgeprüft	

Criteria	Assessment
ECO1.1 Life cycle cost (*)	May positively contribute to the overall building score
Verification: siehe EPD, technisches Datenblatt, Verlegeanleitung	

Criteria	Assessment
ECO2.6 Climate resilience (*)	May positively contribute to the overall building score
Verification: siehe technisches Datenblatt	

Criteria	Assessment
ENV1.1 Climate action and energy (*)	May positively contribute to the overall building score
Verification: siehe EPD, SDB und technisches Datenblatt	

Criteria	Assessment
SOC1.1 Thermal comfort (*)	May positively contribute to the overall building score
Verification: siehe technisches Datenblatt	

Criteria	Assessment
SOC1.3 Sound insulation and acoustic comfort (*)	May positively contribute to the overall building score
Verification: siehe technisches Datenblatt	

Criteria	No. / Relevant building components / construction materials / surfaces	Considered substances / aspects	Quality level
ENV 1.2 Local environmental impact, 29.05.2025 (4th edition)	7 Floor coverings for indoor use (elastic floor coverings)	VVOCs, VOC, SVOC emissions and content of hazardous substances	Quality level 3
Verification: Zertifikat TÜV PROFiCERT-product Interior PREMIUM vom 10.08.2023 / Zertifikats Nr. 707205828-1			

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DGNB New Construction 2018

The DGNB System (German Sustainable Building Council) assesses the sustainability of various types of buildings. It can be applied to both large-scale private and commercial projects as well as smaller residential buildings.

Criteria	No. / Relevant building components / construction materials / surfaces	Considered substances / aspects	Quality level
ENV 1.2 Local environmental impact	7 Floor coverings (Resilient floor coverings)	VOC / SVOC / hazardous substances	Quality level 4
Verification: Zertifikat TÜV PROFiCERT-product Interior PREMIUM vom 10.08.2023 / Zertifikats Nr. 707205828-1			

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BNB-BN Neubau V2015

The Bewertungssystem Nachhaltiges Bauen (Assessment System for Sustainable Building) is a tool for evaluating public office and administrative buildings, educational facilities, laboratory buildings, and outdoor areas in Germany. The BNB was developed by the former Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and is now overseen by the Federal Ministry for Housing, Urban Development and Building (BMWSB).

Criteria	Pos. / product type	Considered substance group	Quality level
1.1.6 Risiken für die lokale Umwelt	2a Elastic floor coverings – with and without bonded underlay or insulation layer	VOC / hazardous substances / heavy metals	Quality level 3
Verification: Zertifikat TÜV PROFiCERT-product Interior PREMIUM vom 10.08.2023 / Zertifikats Nr. 707205828-1			

SENTINEL HOLDING
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EU taxonomy

The EU Taxonomy classifies economic activities and products according to their environmental impact. At the product level, the EU regulation defines clear requirements for harmful substances, formaldehyde and volatile organic compounds (VOCs). The Sentinel Holding Institut GmbH labels qualified products that meet this standard.

Criteria	Product type	Considered substances	Assessment
DNSH - Pollution prevention and control	Floor coverings (including associated adhesives and sealants)	Stoffe nach Anlage C, Formaldehyd, Karzinogene VOC Kategorie 1A/1B	compliant
Verification: Zertifikat TÜV PROFiCERT-product Interior PREMIUM vom 10.08.2023 / Zertifikats Nr. 707205828-1			

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BREEAM DE Neubau 2018

BREEAM (Building Research Establishment Environmental Assessment Methodology) is a UK-based building assessment system that evaluates the sustainability of new constructions, refurbishments, and conversions. Developed by the Building Research Establishment (BRE), the system aims to assess and improve the environmental, economic, and social performance of buildings.

Criteria	Product category	Considered substances	Quality level
Hea 02 Indoor Air Quality	Flooring materials (including floor levelling compounds and resin flooring)	Emissions: Formaldehyde, TVOC, TSVOC, carcinogens	Exemplary quality
Verification: Zertifikat TÜV PROFiCERT-product Interior PREMIUM vom 10.08.2023 / Zertifikats Nr. 707205828-1			

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LEED v4.1

LEED (Leadership in Energy and Environmental Design) is an internationally recognised building certification system developed by the U.S. Green Building Council. It is one of the most widely used sustainability standards for buildings worldwide and is particularly applied in internationally oriented projects. LEED assesses buildings holistically across categories such as energy efficiency, resource conservation, material selection, indoor environmental quality and site sustainability. Depending on the number of points achieved, projects are awarded one of the certification levels: LEED Certified, Silver, Gold or Platinum.

Criteria	Product category	Considered substances	Assessment
EQ Credit: Low-Emitting Materials	Bodenbeläge	Emissionen: Formaldehyd, VOC, Krebserregende Stoffe	compliant
Verification: Zertifikat TÜV PROFiCERT-product Interior PREMIUM vom 10.08.2023 / Zertifikats Nr. 707205828-			

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Product labels

In the construction industry, high-quality materials are crucial for a building's indoor air quality and sustainability. Product labels and certificates offer guidance to meet these requirements. However, the evaluation criteria of these labels vary, and it is important to carefully assess them to ensure products align with the specific needs of a construction project.

Eurofins Indoor Air Comfort® confirms compliance with requirements for low VOC emissions. The standard level covers all mandatory VOC regulations in the EU, while the Gold level additionally takes into account emission criteria from voluntary ecolabels and building certifications.

"TÜV PROFiCERT-product Interior" is a certification procedure developed for interior products. The certification is carried out according to strict TÜV health and quality criteria. The PREMIUM variant requires particularly low emission levels.

This product is SHI Indoor Air Quality certified and recommended by Sentinel Holding Institut. Indoor-air-focused construction, renovation, and operation of buildings is made possible by transparent and verifiable criteria thanks to the Sentinel Holding concept.

Products bearing the Sentinel Holding Institute QNG-ready seal are suitable for projects aiming to achieve the "Qualitätssiegel Nachhaltiges Gebäude" (Quality Seal for Sustainable Buildings). QNG-ready products meet the requirements of QNG Appendix Document 3.1.3, "Avoidance of Harmful Substances in Building Materials." The KfW loan program Climate-Friendly New Construction with QNG may allow for additional funding.

SCS Global Services is an international testing and certification organisation that, through its own EPD programme, enables manufacturers to develop verified Environmental Product Declarations (EPDs) in accordance with international standards.

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Legal notices

(*) These criteria apply to the construction project as a whole. While individual products can positively contribute to the overall building score through proper planning, the evaluation is always conducted at the building level. The information was provided entirely by the manufacturer.

Find our criteria here: https://www.sentinel-holding.eu/de/Themenwelten/Pr%C3%BCfkriterien%20f%C3%BCr%20Produkte

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Printing date 08.Jun.2024 Reviewed on 08.Jun.2024

Material Safety Data Sheet

1 Identification of the substance/preparation and of the company/undertaking

. Product details

. Trade name: Luxury Vinyl Tile/ LVT Flooring

. Manufacturer/Supplier: Zhejiang Kingdom New Material Group Co., Ltd.

No. 38, Desheng Road, Heshan Industrial Park, Heshan Town, Tongxiang City, Zhejiang Province, China

. Further information obtainable from: Zhejiang Kingdom New Material Group Co., Ltd.

. Information in case of emergency: Zhejiang Kingdom New Material Group Co., Ltd.

No. 38, Desheng Road, Heshan Industrial Park, Heshan Town, Tongxiang City, Zhejiang Province, China

Tel: 86-573-89383298

2Hazards identification

. Classification of the substance or mixture

. Classification according to EU Directives 1272/2008/EC

This product is not classified as dangerous according to EC criteria.

. Label elements

. Labelling according to EC Directives

This product is not classified as dangerous according to EC criteria.

3 Composition/information on ingredients

. Chemical characterization: Under normal conditions of use and handling, this product is not expected to create any health or safety hazards.

. Description: Mixture of substances listed below with additions.

Product Name:		CAS Number	**Approximate(%)by Wt.Or Vol.**
Base Layer	PVC	9002-86-2	13-20%
	CaCO3	471-34-1	60-72%
	DOTP	6422-86-2	3-8%
	Calcium-Zinc Stearate	1592-23-0	0.2-0.5%
	carbon black	1333-86-4	0.03-0.1%
	Fiberglass	65997-17-3	1-2%
Wearlayer (PVC)		9002-86-2	5-10%
Priting Film (PVC)		9002-86-2	1-2%
UV coating		---	0.1-0.3%

4 First aid measures

Persons using these products should consult a physician or other medical professional if an accident involving these products in injury. Specific first-aid measures are as follows:

·***Eye Contact:*** *Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If irritation develops, get medical aid.*

·***Skin Contact:*** *If irritation occurs, flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.*

·***Ingestion:*** *Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water. Get medical aid if irritation or symptoms occur.*

· ***Inhalation:*** *Not Applicable*

-Medical conditions aggravated by exposure: *No medical conditions are known to be aggravated by these products.*

-Recommendations to physicians: *Not Applicable*

5 Fire-fighting measures

General Information: *As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Non-combustible, substance itself does not burn but may decompose upon heating to produce irritating, corrosive and/or toxic fumes.*

. ***Flammable class:*** *Not determined*

. ***Suitable extinguishing media:*** *Water, CO2, Dry Chemicals, Foam-Fog*

. ***Fire/Explosion Hazards:*** *Negligible fire hazard when exposed to heat or flame.*

. ***Fire Fighting Procedure:*** *Wear self contained breathing apparatus meeting NIOSH standards.*

. ***Other information:*** *Wear self-contained breathing apparatus and complete personal protective equipment when potential for exposure to products of combustion exists.*

6 Accidental release measures

. ***Small Spill:*** *Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.*

. ***Large Spill:*** *Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow evacuating through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.*

7 Handling and storage

The regulations relating to storage remises apply to workshop where the product is handled:

. ***Handling:*** *Apply good manufacturing practice & industrial hygiene practices. Observe good personal hygiene, and do not eat, drink or smoke whilst handling. Wear protective goggles and gloves when handling material. Clean cloths must be worn. Observe all warnings and precautions listed for the product.*

. ***Storage:*** *Store in tightly closed original container, in a cool & dry area away from heat sources & protected from light. Avoid dust formation and control ignition sources. Keep air contact to a minimum.*

. ***Further information about storage condition:*** *None.*

8 Exposure controls/personal protection

. Ventilation and Engineering controls:

No special ventilation and engineering controls are required for handling of these products.

. Respiratory Protection:

No special respiratory protection is required for use of these products. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHS Standard, applicable U.S. State regulations, or the Canadian CSA standard.

. Body Protection:

No special protective clothing is required.

. Protective Gloves:



Protective Gloves

Rubber or plastic acid-resistant gloves with elbow-length gauntlet.

.Eye Protection:



Tightly sealed goggles

Chemical goggles or face shield.

9 Physical and chemical properties

.General Information	
Form:	Solid
Color:	color
Odor:	Odor
.Change in condition	
Melting point/Melting range:	Not available
Boiling point/Boiling range:	Not available
.Flash point:	Not available
.Self-igniting:	Product is not self-igniting
.Danger of explosion:	Not available
.Density:	Not available
.Relative density:	Not available
.Vapor density:	Not available
.Evaporation rate	Not available
.Solubility in/Miscibility with	
Water:	Not miscible or difficult to mix

.PH-Value:	Not available
.Viscosity:	
Dynamic:	Not available

10 Stability and reactivity

. Chemical Stability: Stable under normal temperatures and pressures.

. Decomposition Products: Products of thermal decomposition can include produce related gases (e.g. carbon oxides, and various hydrocarbons). Refer to the NFPA manual for more specific information.

. Materials with which substance is incompatible: None known.

. Hazardous Polymerizations: Will not occur.

. Conditions to Avoid: Avoid exposure or contact to extreme temperatures, incompatible chemicals.

11 Toxicological information

. Toxicity to Animals:

LD50: Not available.

LC50: Not available.

. Chronic Effects on Humans: CARCINOGENIC EFFECTS: Classified NONE by NTP, NONE by OSHA. 3 (Not classifiable for human.) by IARC.

. Other Toxic Effects on Humans: None

. on the skin: Irritant to skin and mucous membranes if soluble

. on the eye: Sensitizing effects known.

.Carcinogenicity: None Determine.

.Mutagenicity: None Determine.

.Teratogenicity: None Determine

12 Ecological information

. Instability: Not applicable.

. Persistence/Degradability: Like plastic in the long term.

. Environmental Precautions: It must be disposed of by incineration or in an authorized waste deposit.

13 Disposal considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

. Waste Disposal Methods: Disposal must be done as territory and /or local government regulations. Waste management information will help to receive the best results.

. Disposal of packaging: Dispose of according to local regulations. Avoid disposing into drainage systems and into the environment

14 Transport information

.DOT Classification: Not a DOT controlled material (United States).

. Identification: Not applicable.

. Special Provisions for Transport: Not applicable.

. Marine Pollutant: Not applicable

15 Regulatory information

. Sara reporting requirements: Not applicable as an article. The components of these products do not have requirements as pure compounds; if dusts from the product are produced, SARA requirements may be applicable.

. Sara threshold planning quantity: There are no specific threshold planning quantities for the components of these products. None of the ingredients is listed.

. TSCA (Toxic substances Control ACT): There are articles and are not subject to the requirements of TSCA.

. California Safe drinking water and toxic enforcement act (Proposition 65): No component of these products is on the proposition 65 lists.

16 Other information

The contents and format of this MSDS/SDS are in accordance with REGULATION (EC) No 1907/2006 and Regulation (EU) 2021/2030, REGULATION (EC) No 1272/2008.

****

DISCLAIMER OF LIABILITY

The information in this MSDS/SDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handing, storage, use or disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. This MSDS/SDS was prepared and is to be used only for this product. If the product is used as a component in another product, this MSDS/SDS information may be applicable.

****

End of document

**********The End**********

Kingdomfloor
www.kingdomflooring.com.cn

Technical Data Sheet

Kingdom LVT Flooring			
No	**Property**	**Method & Standard**	**Review in accordance with Standard**
1	Formaldehyde emission	EN 717-1	E1
2	Reaction to fire	EN 13501-1	Bfl-s1
3	Slip resistance	EN 13893	Class DS
4	Slip resistance	DIN EN 16165	R9/R10
5	Micro-scratch resistance	EN 16094	⩽ MSR-A2
6	Effect of furniture leg	EN ISO 16581	No visible damage
7	Castor chair resistance	EN ISO 4918	25000 cycles
8	Resistance to staining	ISO 26987	Not affected
9	Light stability	EN ISO 105-B02	⩾ 6
10	Antistatic resistance	EN 1815	< 2kV
11	Thermal conductivity&Thermal resistance	EN 12664	0.051 W/(m· K) & 0.039 (㎡.K)/W
12	Dimensional stability	EN ISO 23999	⩽ 0.15%
13	Curling after exposure to heat	EN ISO 23999	⩽ 1mm
14	Residual Indentation	ISO 24343-1	⩽ 0.1mm
15	Sound Insulation	ISO 10140-3 ISO 717-2	4 db
16	VOC emissions	ISO 16000 parts -3, -6, -9, 11	A+
17	REACH SVHC	REACH	ND
18	Phthalates	EN14372	ND
19	CE	EN 14041	Certified
20	UKCA	EN 14041	Certified
21	EPD	EN 16810, EN 15804, ISO 14025	Certified
22	Floorscore	CDPH/EHLB (California Section 01350)	Certified
23	Indoor Air Comfort Gold	AgBB, French A+, BlueAngel, EU Taxonomy	Certified
24	TUV ProFiCert PREMIUM	ISO 10582, EN 14041, AgBB, French VOC	Certified
25	Sustainability Assessment	NSF/ANSI 332 Platinum	Certified
26	Utilization		Recyclable
27	Anticipated Product Lifetime		25 Years



Declaration Owner

Zhejiang Kingdom New Material Group Co., Ltd.
No.38 Desheng Road, Heshan Town,
Tongxiang City, Zhejiang Province, China
www.kingdomflooring.com.cn | Sales@kingdomflooring.com.cn
+ 0086-573-8938 3298

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

Product
Designer's LVT
DESIGN FLOOR LVT
Luxury Vinyl Tile (LVT) flooring

(UNSPSC Class Code 30161700/CSI Code 09 65 00)

Functional Unit
The functional unit is one square meter of flooring over a 75-year period

EPD Number and Period of Validity
SCS-EPD-10031
EPD Valid March 21, 2024 through March 20, 2029

Product Category Rule
Product Category Rule.PCR2019:14. Construction Products. International EPD® System. Version 1.3.2. December 2023
Complementary Product Category Rules (c-PCR) To PCR 2019:14. Resilient, Textile And Laminate Floor Coverings (EN 16810:2017). International EPD® System. Version 2019-12-20. December 2019
CEN standard EN 15804 serves as the core Product Category Rules (PCR)

Program Operator
SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608
+1.510.452.8000 | www.SCSglobalServices.com

Declaration Owner:	Zhejiang Kingdom New Material Group Co., Ltd.
Address:	No.38 Desheng Road, Heshan Town, Tongxiang City, Zhejiang Province, China
Declaration Number:	SCS-EPD-10031
Declaration Validity Period:	EPD Valid March 21, 2024 through March 20, 2029
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Gerard Mansell, Ph.D., SCS Global Services
LCA Software and LCI database:	OpenLCA v1.11 software and the Ecoinvent v3.9.1 database
Product RSL:	25 years
Markets of Applicability:	Europe
EPD Type:	Product-Specific
EPD Scope:	Cradle-to-Grave
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☐ internal ☒ external
LCA Reviewer:	Thomas Gloria, Ph.D., Industrial Ecology Consultants
Product Category Rule:	Product Category Rule.PCR2019:14. Construction Products. International EPD® System. Version 1.3.2. December 2023.
Part A PCR Review conducted by:	The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile.
Complementary Product Category Rule:	Complementary Product Category Rules (c-PCR) To PCR 2019:14. Resilient, Textile And Laminate Floor Coverings (EN 16810:2017). International EPD® System. Version 2019-12-20. December 2019
Part B PCR Review conducted by:	The Technical Committee of the International EPD® System.
Independent verification of the declaration and data, according to ISO 14025 and the PCR	☐ internal ☒ external
EPD Verifier:	Thomas Gloria, Ph.D., Industrial Ecology Consultants
Declaration Contents:	1. Kingdom Floor ..... 2 2. Product ..... 2 3. LCA: Calculation Rules ..... 5 4. LCA: Scenarios and Additional Technical Information ..... 11 5. LCA: Results ..... 14 6. LCA: Interpretation ..... 23 7. References 23

Disclaimers: *This EPD conforms to ISO 14025, 14040, 14044, and EN 15804.*

Scope of Results Reported: *The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.*

Accuracy of Results: *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*

Comparability: *EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.*

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1. Kingdom Floor

Kingdomfloor has been involved in the manufacturing and exporting of vinyl flooring since 1992. With its technically advanced production equipment, professional technical staffs and experienced sales team, Kingdomfloor has maintained its position at the forefront of vinyl flooring industry.

Till now, Kingdomfloor has exported to more than 50 countries such as Germany, France, the Netherlands, UK, USA, Australia, South American etc and has a proven reputation. Kingdomfloor covers an area of about 170,000 square meters and produces a wide range of flooring products including LVT, EPC, SPC, digital printed SPC, PVC-free, wall panel and flooring accessories. The annual production capacity reaches 45 million square meters.

All products from Kingdomfloor meet the highest quality standards. To this end, we continue to maintain our high quality level with an experienced production team, carefully selected and responsible raw material suppliers, reliable quality management and professional sales service team. Besides all internal quality control, we have our products checked through annual audit by well-known third party testing institute EPH, Eurofins. This is how we ensure consistent quality that is proven by the following certificates, Floorscore, VOC A+, CE, EPD, Blue Angel etc.

2. Product

2.1 PRODUCT DESCRIPTION

Product Name	Representative Thickness (mm)	Description
Designer's LVT DESIGN FLOOR LVT LVT Luxury Vinyl Tile (2.5mm & 5.0mm)	2.5 mm; 5.0 mm	LVT products belong to PVC plastic flooring, which is a multi-layer structure and is formed using hot pressing technology. They can be formed in different thicknesses according to needs, and have characteristics such as fire proof, formaldehyde free, and waterproof

2.2 PRODUCT FLOW DIAGRAM

A flow diagram illustrating the production processes and life cycle phases included in the scope of the EPD is provided below.



2.3 APPLICATION

The products provide the primary function of flooring for interior applications. The flooring products are used in various residential and commercial applications including retail, healthcare, education, and hospitality.

2.4 DECLARATION OF METHODOLOGICAL FRAMEWORK

The scope of the EPD is cradle-to-grave, including raw material extraction and processing, transportation, product manufacture, product delivery, installation and use, and product disposal. The life cycle phases included in the product system boundary are shown below.

Cut-off and allocation procedures are described below and conform to the PCR and ISO standards.

Table 1. *Life cycle phases included in the product system boundary.*

	Product			Construction Process		Use							End-of-life				Benefits and loads beyond the system boundary
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
Modules Declared	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Geography	GLO	GLO	CN	GLO	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Share of specific data	>90%			>90%		-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-			-		-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	-			-		-	-	-	-	-	-	-	-	-	-	-	-

X = Included in system boundary
GLO = Global; NA = North America; CN = China

2.5 TECHNICAL DATA

Technical specifications for the vinyl flooring products are summarized in Table 2.

Table 2. *Product characteristics for the* **LVT Luxury Vinyl Tile** *flooring product.*

Characteristic			Description			
Sustainable certifications			CE, Floorscore, IAC Gold, UKCA			
VOC emissions test method			French VOC, AgBB, ISO 16000, California Specification 01350			
Characteristic			**Average Value**	**Unit**	**Min Value**	**Max Value**
Product thickness			2.50 (0.10)	mm (in)	1.50 (0.06)	5.00 (0.20)
Wear layer thickness (where applicable)			0.50 (0.02)	mm (in)	0.07 (0.00)	1.00 (0.04)
Product weight			4,474 (14.7)	g/m^2 (oz/ft^2)	2,475 (8.1)	9,693 (31.8)
Product Form	Planks	Width	187.0 (7.36)	mm (in)	95.0 (3.74)	1280.0 (50.4)
		Length	1.27 (4.17)	m (ft)	0.38 (1.25)	1.84 (6.04)

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2.6 MARKET PLACEMENT/APPLICATION RULES

Technical specifications of the flooring products are summarized below. Detailed product performance results can be found on the manufacturer's website www.kingdomflooring.com.cn/.

2.7 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

The flooring products are delivered for installation in the form of planks and tiles of various dimensions.

2.8 MATERIAL COMPOSITION

The Luxury Vinyl flooring products (UNSPSC Class Code 30161700/CSI Code 09 65 00) are manufactured at the production facility in China. The primary materials include PVC, plasticizers, fillers and stabilizers.

Table 3. *Material content for the flooring products in kg per square meter and percent of total mass.*

Component	Renewable	Recycled Content (%)	LVT Luxury Vinyl Tile 2.5mm	LVT Luxury Vinyl Tile 5mm
PVC	No	0%	1.38	2.16
			31%	22%
$CaCO_3$	No	0%	2.73	6.75
			61%	70%
Plasticizer	No	0%	0.220	0.495
			4.9%	5.1%
Stabilizer	No	0%	$8.50x10^{-3}$	$2.29x10^{-2}$
			0.19%	0.24%
Other	No	0%	0.138	0.267
			3.1%	2.8%
Total Product			**4.48**	**9.69**
			100%	**100%**

In conformance with the PCR, product materials were reviewed for the presence of any toxic or hazardous chemicals. Based on a review of the product components provided by the manufacturer, no regulated chemicals, i.e., substances of Very High Concern (SVHC) or substances on the REACH Candidate List, were identified in the product or product components.

2.9 MANUFACTURING

The products are manufactured at the production facility in Tongxiang City, Zhejiang, China. The manufacturer provided primary data for their annual production, resource use and electricity consumption and waste generation at the facility. Electricity consumption is modeled using Ecoinvent datasets for the regional electricity grid resource mix on the market[1].

The production of the flooring involves the following general manufacturing processes. The raw materials are first mixed and heated. The mixture is then pressed into a sheet to create the backing or the transparent wear layers. The sheets are cut and laminated with a print film. Finally, the product is cut into planks and packaged. Quality checks are made at each step of the production process.

2.10 PACKAGING

The products are packaged for shipment using plastic wrap, corrugated board and wooden pallets.

[1] The Chinese electricity grid resource mix consists of approximately 66% coal, 32% wind and hydropower, and 2% natural gas as represented in the ecoinvent v3.9 database. The GWP-GHG (AR6) impact of the grid electricity is ~0.9443 kg CO_2e/kWh.

Table 4. *Material content for the flooring product packaging in kg per square meter of flooring.*

Component	Renewable	Recycled Content (%)	LVT Luxury Vinyl Tile 2.5mm	LVT Luxury Vinyl Tile 5mm
Corrugated	Yes	0%	0.124	0.124
			31%	31%
Plastic	No	0%	$6.04x10^{-3}$	$6.04x10^{-3}$
			1.5%	1.5%
Wood	Yes	0%	0.275	0.275
			68%	68%
Total Packaging			**0.405**	**0.405**
			100%	**100%**

2.11 PRODUCT INSTALLATION

Installation of the product is accomplished using hand tools with negligible impacts. The impacts associated with packaging disposal are included with the installation phase as per PCR requirements.

2.12 USE CONDITIONS

No special conditions of use are noted.

2.13 REFERENCE SERVICE LIFE

The Reference Service Life (RSL) of the flooring products varies based on the manufacturer's warranted lifetime.

2.14 RE-USE PHASE

The flooring products are not reused at end-of-life.

2.15 DISPOSAL

At end-of-life, the products are disposed of in a landfill.

2.16 FURTHER INFORMATION

Further information on the product can be found on the manufacturer's website www.kingdomflooring.com.cn/.

3. LCA: Calculation Rules

3.1 FUNCTIONAL UNIT

The functional unit used in the study is defined as 1 m^2 of floor covering installed for use over a 75-year period. The corresponding reference flow for the product system is presented in Table 5. For the present assessment, a reference service lifetime (RSL) corresponding to the manufacturer's warranted lifetime is assumed. The total number of required product lifecycles during the 75-year period over which the product system is modeled is also summarized for the products in Table 5.

Table 5. *Reference flow and RSL for the flooring products.*

Product Name	Reference Flow (kg/m^2)	Reference Service Life – RSL (years)	Replacement Cycle (ESL/RSL-1)
LVT Luxury Vinyl Tile (2.5mm)	4.88	25	2.0
LVT Luxury Vinyl Tile (5.0mm)	10.10	25	2.0

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3.2 SYSTEM BOUNDARY

The scope of the EPD is cradle-to-grave, including raw material extraction and processing, transportation, product manufacture, product delivery, installation and use, and product disposal.

Consistent with PCR requirements, processes excluded from the system boundary include the following:

- Construction activities, capital equipment, and infrastructure
- Maintenance and operation of capital equipment
- Personnel travel and resource use

The deletion of these processes is permitted since it is not expected to significantly change the overall conclusions of the study.

The life cycle phases included in the EPD scope are described in Table 6 and illustrated in Figure 1.

Table 6. *The modules and unit processes included in the scope for the flooring product system.*

Module	Module description from the PCR	Unit Processes Included in Scope
A1	Extraction and processing of raw materials; any reuse of products or materials from previous product systems; processing of secondary materials; generation of electricity from primary energy resources; energy, or other, recovery processes from secondary fuels	Extraction and processing of raw materials for the flooring components.
A2	Transport (to the manufacturer)	Transport of component materials to the manufacturing facility
A3	Manufacturing, including ancillary material production	Manufacturing of flooring products and packaging (incl. upstream unit processes)
A4	Transport (to the building site)	Transport of product (including packaging) to the building site
A5	Construction-installation process	Impacts from the installation of product are assumed negligible. Impacts from the production, transport and disposal of waste material associated with installation are included in this phase in addition to impacts from packaging disposal.
B1	Product use	Use of the flooring in a commercial building setting. There are no associated emissions or impacts from the use of the product
B2	Product maintenance	Maintenance of products over the 75-year ESL, including periodic cleaning.
B3	Product repair	The flooring is not expected to require repair over its lifetime.
B4	Product replacement	The materials and energy required for replacement of the product over the 75-year ESL of the assessment are included in this phase
B5	Product refurbishment	The flooring is not expected to require refurbishment over its lifetime.
B6	Operational energy use by technical building systems	There is no operational energy use associated with the use of the product
B7	Operational water use by technical building systems	There is no operational water use associated with the use of the product
C1	Deconstruction, demolition	Demolition of the product is accomplished using hand tools with no associated emissions and negligible impacts
C2	Transport (to waste processing)	Transport of flooring product to waste treatment at end-of-life
C3	Waste processing for reuse, recovery and/or recycling	The product is disposed of by landfilling which require no waste processing
C4	Disposal	Disposal of flooring product in municipal landfill
D	Reuse-recovery-recycling potential	There are no significant impacts associated with Module D as only minimal amounts of recycled materials are used in the products.

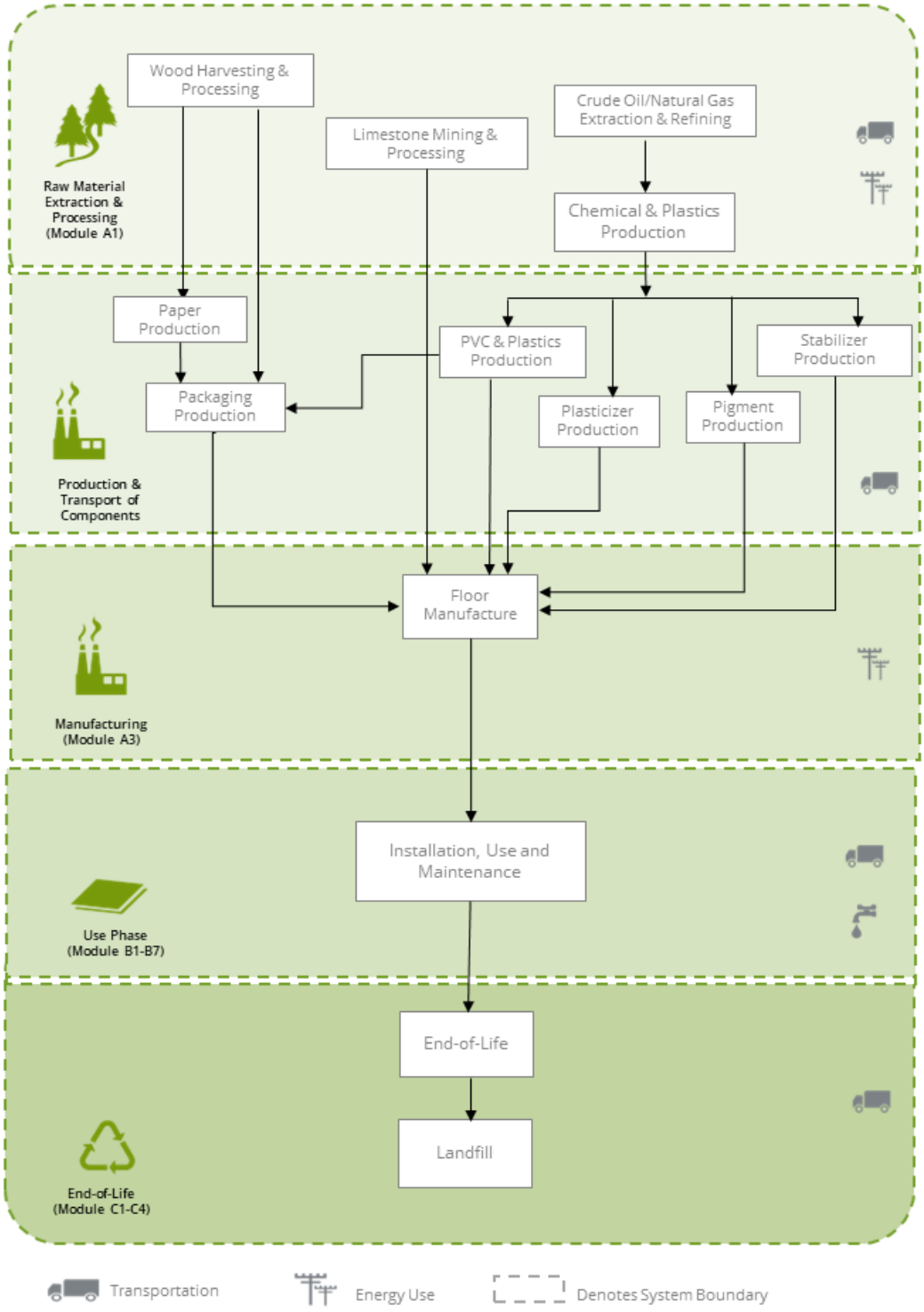


Figure 1. *Flow diagram for the life cycle of the vinyl flooring products.*

3.3 PRODUCT SPECIFIC CALCULATION FOR USE PHASE

The recommended cleaning regime is highly dependent on the use of the premises where the floor covering is installed. In high traffic areas more frequent cleaning will be needed compared to areas where there is low traffic. For the purposes of this EPD, average maintenance (moderate traffic levels) is presented based on typical installations.

3.4 UNITS

All data and results are presented using SI units.

3.5 ESTIMATES AND ASSUMPTIONS

- Electricity use at the manufacturing facility was allocated to the products based on the product area as a fraction of the total production.
- The Kingdom Floors facility under review is located in eastern China. An Ecoinvent inventory dataset for the country-specific energy grid was used to model resource use and emissions from electricity use at the manufacturing facility.
- The Reference Service Life (RSL) of the products was modeled based on information provided by the manufacturer assuming their products are installed and maintained as recommended and used for the specific application noted.
- Downstream transport was modeled based on information provided by the manufacturer representing distribution to consumer markets in Europe.
- Inventory data for some material components were unavailable and modeled using proxy datasets from the Ecoinvent LCI databases.
- The maintenance phase of the product life cycle was modeled based on information provided by the manufacturers including recommended installation and cleaning methods, as well as cleaning frequency.
- For the product end-of-life, disposal of product and product packaging is modeled based on regional statistics regarding recycling rates of product and packaging materials.
- For final disposal of the packaging material and flooring products at end-of-life, all materials are assumed to be transported 161 km by diesel truck to either a landfill or material reclamation facility (for recycling). Datasets representing disposal in a landfill and waste incineration are from Ecoinvent.

The PCR requires the results for several inventory flows related to construction products to be reported including energy and resource use and waste and outflows. These are aggregated inventory flows, and do not characterize any potential impact; results should be interpreted taking into account this limitation.

3.6 CUT-OFF RULES

According to the PCR, processes contributing greater than 5% of the total environmental impact indicator for each impact are included in the inventory. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results. No known flows are deliberately excluded from this EPD.

3.7 DATA SOURCES

Primary data were provided for the manufacturing facility. The sources of secondary LCI data are the Ecoinvent database.

Table 7. *Data sources for the flooring products.*

Component	Dataset	Data Source	Publication Date
PRODUCT			
PVC			
Polyvinyl Chloride	polyvinylchloride production, bulk polymerisation | polyvinylchloride, bulk polymerised | Cutoff, S/RoW	EI v3.9	2022
Filler			
Calcium Carbonate	limestone production, crushed, washed | limestone, crushed, washed | Cutoff, S/RoW	EI v3.9	2022
Plasticizer			
PVC Plasticizer	dioctyl terephthalate production | dioctyl terephthalate | Cutoff, S/GLO	EI v3.9	2022
Stabilizer			
Stabilizer	Ca-Zn stabilizer;	EI v3.9	2022
	chemical production, organic | chemical, organic | Cutoff, S/GLO	EI v3.9	2022
	chemical production, inorganic | chemical, inorganic | Cutoff, S/GLO	EI v3.9	2022
	limestone production, crushed, washed | limestone, crushed, washed | Cutoff, S/RoW	EI v3.9	2022
	zinc oxide production | zinc oxide | Cutoff, S/RoW	EI v3.9	2022
Pigment			
Carbon Black	carbon black production | carbon black | Cutoff, S/GLO	EI v3.9	2022
Plastics			
IXPE	IXPE; PE polyethylene production, low density, granulate | steam, in chemical industry | Cutoff, S/RoW	EI v3.9	2022
HDPE	polyethylene production, high density, granulate | polyethylene, high density, granulate | Cutoff, S/RoW	EI v3.9	2022
Other			
Organic chemicals	chemical production, organic | chemical, organic | Cutoff, S/GLO	EI v3.9	2022
Adhesive	polyurethane adhesive production | polyurethane adhesive | Cutoff, S/GLO	EI v3.9	2022
Lubricant	lubricating oil production | lubricating oil | Cutoff, S/RoW	EI v3.9	2022
Epoxy	epoxy resin production, liquid | epoxy resin, liquid | Cutoff, S/RoW	EI v3.9	2022
PACKAGING			
Cardboard	corrugated board box production | corrugated board box | Cutoff, S/RoW	EI v3.9	2022
Wood	EUR-flat pallet production | EUR-flat pallet | Cutoff, S/RoW	EI v3.9	2022
Plastic	packaging film production, low density polyethylene | packaging film, low density polyethylene | Cutoff, S/RoW;	EI v3.9	2022
	polyethylene terephthalate production, granulate, amorphous | polyethylene terephthalate, granulate, amorphous | Cutoff, S/RoW	EI v3.9	2022
TRANSPORT			
Road transport	transport, freight, lorry 16-32 metric ton, EURO4 | transport, freight, lorry 16-32 metric ton, EURO4 | Cutoff, S/RoW	EI v3.9	2022
Ship transport	transport, freight, sea, container ship | transport, freight, sea, container ship | Cutoff, S/GLO	EI v3.9	2022
RESOURCES			
Grid electricity	market group for electricity, medium voltage | electricity, medium voltage | Cutoff, S/CN	EI v3.9	2022
Heat - Heavy fuel oil	heat production, heavy fuel oil, at industrial furnace 1MW | heat, district or industrial, other than natural gas | Cutoff, S/RoW	EI v3.9	2022
Heat - Light fuel oil	heat production, light fuel oil, at industrial furnace 1MW | heat, district or industrial, other than natural gas | Cutoff, S/RoW	EI v3.9	2022

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3.8 DATA QUALITY

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 8. *Data quality assessment for the flooring product system.*

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 5 years old. All of the data used represented an average of at least one year's worth of data collection, and up to three years in some cases. Manufacturer-supplied data (primary data) are based on annual production for 2022.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Electricity use for product manufacture is modeled using representative data for Asia. Surrogate data used in the assessment are representative of global or European operations. Data representative of European operations are considered sufficiently similar to actual processes. Data representing product disposal are based on regional statistics.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative fabrication datasets, specific to the type of material, are used to represent the actual processes, as appropriate.
Precision: Measure of the variability of the data values for each data expressed	Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	The LCA model included all known mass and energy flows for production of the flooring products. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	Data used in the assessment represent typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used; with a bias towards Ecoinvent v3.9 data where available. Different portions of the product life cycle are equally considered.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the Data: Description of all primary and secondary data sources	Data representing energy use at the manufacturing facility represents an annual average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. For secondary LCI data, Ecoinvent v3.9 LCI data are used.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the products and packaging is low. Actual supplier data for upstream operations were not available and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years) but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment method required by the PCR includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

3.9 PERIOD UNDER REVIEW

The LCA results are based on annualized production data for 2022.

3.10 ALLOCATION

Manufacturing resource use was allocated to the products based on surface area. Impacts from transportation were modeled based on the mass of material and distance transported.

3.11 COMPARABILITY

The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.

4. LCA: Scenarios and Additional Technical Information

Delivery and Installation stage (A4 - A5)

Distribution of the flooring products to the point of sale is included, based on data from the manufacturer. Average transport distances for distribution of the products from the manufacturing facilities to distribution centers in Europe were provided by the manufacturer. Transport by diesel truck from the distribution centers to the point of installation is also included, based on information provided by the manufacturer. Transportation parameters for modeling product distribution are summarized in Table 9.

Table 9. *Product distribution parameters by transport mode.*

Parameter	Unit	Value
	Truck transport	
Fuel type	-	Diesel
Liters of fuel	L/100km	18.7
Vehicle type	-	Diesel truck
Transport distance	km	558
Capacity utilization	%	76
	Ocean transport	
Fuel type	-	Fuel oil
Liters of fuel	L/tkm	2.23
Vehicle type	-	Ocean freighter
Transport distance	km	18,383
Capacity utilization	%	70

Product Name/Consumer Market	Gross density of products transported (kg/m3)	Weight of products transported (kg)
LVT Luxury Vinyl Tile (2.5mm)	4.88	1,952
LVT Luxury Vinyl Tile (5.0mm)	10.10	2,020

Installation of the product is accomplished using hand tools with no associated emissions and negligible impacts. Approximately 4% installation waste is assumed landfilled. The impacts associated with packaging disposal, as well as the production, transport and disposal of installation waste are included with the installation phase as per PCR requirements. Modeling parameters for product installation are summarized in Table 10.

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Table 10. *Installation parameters for the flooring products, per 1 m^2.*

Parameter		LVT Luxury Vinyl Tile 2.5mm	LVT Luxury Vinyl Tile 5mm
Ancillary materials (kg)		neg.	neg.
Net freshwater consumption (m^3)		-	-
Electricity consumption (kWh)		-	-
Product loss per functional unit (kg)		0.179	0.388
Waste materials generated by product installation (kg)		0.179	0.388
Output materials resulting from on-site waste processing (kg)		n/a	n/a
Mass of packaging waste (kg)	Corrugated	0.124	0.124
	Plastic	$6.04x10^{-3}$	$6.04x10^{-3}$
	Wood	0.275	0.275
Biogenic carbon contained in packaging (kg CO_2)		0.731	0.731
Direct emissions (kg)		-	-

Use stage (B1)

No impacts are associated with the use of the product over the Reference Service Lifetime.

Maintenance stage (B2)

According to the manufacturer, typical maintenance involves regular sweeping and damp mopping, as well as periodic machine cleaning of the vinyl flooring. The present assessment is based on a recommended weekly cleaning schedule including sweeping and mopping with a neutral cleaner and monthly machine cleaning. The parameters used to model the product maintenance are summarized in Table 11.

Table 11. *Maintenance parameters for the flooring products, per 1 m^2.*

Parameter	Unit	LVT Luxury Vinyl Tile 2.5mm	LVT Luxury Vinyl Tile 5mm
Maintenance cycle	Cycles / RSL	1,300	1,300
Maintenance cycle	Cycles / ESL	3,900	3,900
Maintenance process	-	Damp mopping	Damp mopping
Net freshwater consumption	$m^3/m^2/yr$	0.0058	0.0058
Cleaning agent	$kg/m^2/yr$	0.0119	0.0119
Maintenance process	-	Machine cleaning	Machine cleaning
Electricity	$kWh/m^2/yr$	0.022	0.022
Further assumptions	-	Moderate traffic; weekly maintenance	Moderate traffic; weekly maintenance

Repair/Refurbishment stage (B3; B5)

Product repair and refurbishment are not relevant during the lifetime of the product.

Replacement stage (B4)

The materials and energy required for replacement of the product over the 75-year estimated service lifetime of the assessment are included in this stage. Modeling parameters for the product replacement stage are summarized in Table 12.

Table 12. *Product replacement parameters for the flooring products, per 1 m².*

Parameter	Units	LVT Luxury Vinyl Tile 2.5mm	LVT Luxury Vinyl Tile 5mm
Reference service life	Years	25	25
Replacement cycle	-	2,0	2,0
Energy input	kWh	-	-
Freshwater consumption	m^3	-	-
Ancillary materials	kg	--	
Replacement parts	kg	9,76	20,20
Direct emissions	kg	-	-

Building operation stage (B6 – B7)

There is no operational energy or water use associated with the use of the product.

Disposal stage (C1 - C4)

At end-of-life, the product is assumed to be disposed in a landfill per PCR requirements. Assumptions for end-of-life for the packaging are based on regional statistics regarding municipal solid waste generation and disposal, including end-of-life recycling rates of packaging and product materials. The packaging materials are recycled based on material recycling rates for Europe[2].

Transportation of waste materials at end-of-life (*C2*) assumes a 161 km (~100 miles) average distance to disposal, No recycling of the product materials is assumed at end-of-life. The relevant disposal parameters used for the product system are summarized in Table 13.

Table 13. *End-of-life disposal scenario parameters for the flooring product.*

Parameter	Value LVT Luxury Vinyl Tile (2.5mm)	LVT Luxury Vinyl Tile (5.0mm)
Assumptions for scenario development	100% landfill	100% landfill
Collection process		
Collected with mixed construction waste (kg)	4.88	10.10
Recovery	n/a	n/a
Landfill disposal (kg)	4.88	10.10
Removals of biogenic carbon (kg CO_2 eq)[1]	n/a	n/a

[2] Eurostat, Recovery and recycling rates for packaging. 2015. https://ec.europa.eu/eurostat/web/products-datasets/-/cei_wm020

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5. LCA: Results

Results of the Life Cycle Assessment are presented below. It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. All LCA results are stated to three significant figures in agreement with the PCR for this flooring product and therefore the sum of the total values may not exactly equal 100%.

The impact indicators specified by the PCR include:

- Potential for Global Warming,
- Acidification Potential,
- Eutrophication Potential,
- Ozone Depletion Potential,
- Photochemical Ozone (smog) Creation Potential.
- Ecotoxicity,
- Human Toxicity, and
- Land Use/Land Occupation

Impact category indicators for acidification, eutrophication, ozone depletion potential and photochemical ozone creation are estimated using the characterization factors[3], as prescribed by the PCR, including from CML-IA and ReCiPe methodologies as well as those defined by EN 15804 reference package based on EF 3.0. Impact indicators for Ecotoxicity and Human Toxicity are estimated using the USEtox 2.02 characterization method, while Land Occupation impacts are estimated using the ReCiPe 2016 version 1.1 methodology. The impact category indicators included in the assessment are summarized below.

Note that the use of the results of modules A1-A3 without considering the results of module C is discouraged.

[3] https://www.environdec.com/resources/indicators

Table 14. *Key Life Cycle Impact Assessment results for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.* ***(LVT Luxury Vinyl Tile 2.5mm)***

Impact Category	Climate change (kg CO_2 eq)	Climate change - Biogenic (kg CO_2 eq)	Climate change - Fossil (kg CO_2 eq)	Climate change - Land use and LU change (kg CO_2 eq)	GWP-GHG (IPCC AR6)	Acidification (mol H^+ eq)	Eutrophication, freshwater (kg $(PO_4)^{3-}$ eq)	Eutrophication, marine (kg N eq)	Eutrophication, terrestrial (mol N eq)	Ozone depletion (kg CFC11 eq)	Photochemical ozone formation (kg NMVOC eq)	Particulate matter (disease inc.)
Key Indicators												
A1	5.73	$2.36x10^{-2}$	5.70	$5.36x10^{-3}$	5.49	$2.56x10^{-2}$	$4.81x10^{-3}$	$4.92x10^{-3}$	$5.18x10^{-2}$	$4.75x10^{-6}$	$2.07x10^{-2}$	$2.19x10^{-7}$
	14%	0.27%	18%	18%	15%	12%	23%	6.7%	9.1%	32%	10%	14%
A2	0.203	$8.76x10^{-5}$	0.203	$1.03x10^{-4}$	0.198	$8.72x10^{-4}$	$4.95x10^{-5}$	$3.20x10^{-4}$	$3.42x10^{-3}$	$3.14x10^{-9}$	$1.18x10^{-3}$	$1.33x10^{-8}$
	0.5%	0.001%	0.63%	0.35%	0.53%	0.4%	0.23%	0.43%	0.6%	0.021%	0.59%	0.84%
A3	0.366	-0.250	0.614	$1.73x10^{-3}$	0.776	$1.88x10^{-3}$	$3.56x10^{-4}$	$1.24x10^{-3}$	$5.28x10^{-3}$	$3.15x10^{-8}$	$2.60x10^{-3}$	$3.20x10^{-8}$
	0.89%	-2.9%	1.9%	5.9%	2.1%	0.87%	1.7%	1.7%	0.93%	0.21%	1.3%	2%
A4	1.46	$8.89x10^{-5}$	1.46	$9.73x10^{-4}$	1.42	$2.94x10^{-2}$	$2.23x10^{-4}$	$7.62x10^{-3}$	$8.40x10^{-2}$	$2.20x10^{-8}$	$2.33x10^{-2}$	$6.08x10^{-8}$
	3.6%	0.001%	4.5%	3.3%	3.8%	14%	1.1%	10%	15%	0.15%	12%	3.8%
A5	0.744	0.310	0.434	$3.44x10^{-4}$	0.552	$2.88x10^{-3}$	$2.34x10^{-4}$	$1.17x10^{-3}$	$8.39x10^{-3}$	$1.94x10^{-7}$	$2.96x10^{-3}$	$2.55x10^{-8}$
	1.8%	3.6%	1.3%	1.2%	1.5%	1.3%	1.1%	1.6%	1.5%	1.3%	1.5%	1.6%
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	3.17	$3.63x10^{-2}$	3.13	$3.05x10^{-3}$	3.02	$1.54x10^{-2}$	$3.48x10^{-3}$	$2.65x10^{-3}$	$2.74x10^{-2}$	$2.50x10^{-8}$	$1.43x10^{-2}$	$1.26x10^{-7}$
	7.7%	0.42%	9.7%	10%	8.1%	7.2%	16%	3.6%	4.8%	0.17%	7.1%	7.9%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	25.2	5.73	19.5	$1.74x10^{-2}$	22.9	0.133	$1.18x10^{-2}$	$4.74x10^{-2}$	0.361	$1.00x10^{-5}$	0.124	$9.69x10^{-7}$
	62%	66%	60%	60%	61%	62%	56%	64%	63%	67%	62%	61%
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.02	$2.13x10^{-4}$	1.02	$1.26x10^{-4}$	0.993	$5.46x10^{-3}$	$5.72x10^{-5}$	$2.37x10^{-3}$	$2.56x10^{-2}$	$1.56x10^{-8}$	$1.00x10^{-2}$	$1.25x10^{-7}$
	2.5%	0.0025%	3.2%	0.43%	2.7%	2.5%	0.27%	3.2%	4.5%	0.1%	5%	7.9%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	3.09	2.78	0.309	$7.98x10^{-5}$	2.04	$6.51x10^{-4}$	$1.58x10^{-4}$	$6.08x10^{-3}$	$1.97x10^{-3}$	$1.48x10^{-9}$	$1.32x10^{-3}$	$9.14x10^{-9}$
	7.5%	32%	0.96%	0.27%	5.4%	0.3%	0.75%	8.2%	0.35%	0.0098%	0.66%	0.58%
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Table 15. *Life Cycle Impact Assessment results for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.* ***(LVT Luxury Vinyl Tile 2.5mm)***

Impact Category	Freshwater ecotoxicity (PAF.m³.day)	Human toxicity, cancer (cases)	Human toxicity, non-cancer (cases)	Land use (species.yr)	Resource use, fossils (MJ)[1]	Resource use, minerals and metals (kg Sb eq)[1]	Water use (m³ depriv.)[1]
Other Indicators							
A1	91,500	$4.14x10^{-7}$	$1.05x10^{-6}$	$7.42x10^{-10}$	121	$5.60x10^{-5}$	-0.300
	8.6%	17%	10%	3.8%	20%	26%	-1.7%
A2	875	$1.36x10^{-8}$	$2.72x10^{-8}$	$6.70x10^{-11}$	2.81	$6.39x10^{-7}$	$1.45x10^{-2}$
	0.083%	0.57%	0.27%	0.34%	0.47%	0.29%	0.081%
A3	23,000	$4.99x10^{-8}$	$2.29x10^{-7}$	$4.98x10^{-9}$	8.16	$1.31x10^{-6}$	-0.557
	2.2%	2.1%	2.3%	25%	1.4%	0.6%	-3.1%
A4	3,670	$8.67x10^{-8}$	$1.11x10^{-7}$	$2.06x10^{-10}$	18.5	$2.55x10^{-6}$	$6.61x10^{-2}$
	0.35%	3.7%	1.1%	1%	3.1%	1.2%	0.37%
A5	16,300	$3.06x10^{-8}$	$1.45x10^{-7}$	$2.52x10^{-10}$	7.35	$2.50x10^{-6}$	$-2.53x10^{-2}$
	1.5%	1.3%	1.4%	1.3%	1.2%	1.1%	-0.14%
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	50,200	$2.19x10^{-7}$	$5.72x10^{-7}$	$4.99x10^{-10}$	75.9	$2.59x10^{-5}$	20.1
	4.7%	9.2%	5.7%	2.5%	13%	12%	110%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	672,000	$1.44x10^{-6}$	$6.28x10^{-6}$	$1.28x10^{-8}$	345	$1.28x10^{-4}$	-1.44
	64%	61%	63%	65%	58%	59%	-8%
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	931	$1.91x10^{-8}$	$4.11x10^{-8}$	$4.69x10^{-11}$	12.9	$6.41x10^{-7}$	$2.60x10^{-2}$
	0.088%	0.8%	0.41%	0.24%	2.2%	0.29%	0.15%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	200,000	$1.05x10^{-7}$	$1.54x10^{-6}$	$1.19x10^{-10}$	1.42	$2.28x10^{-7}$	$5.49x10^{-2}$
	19%	4.4%	15%	0.6%	0.24%	0.1%	0.31%
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[1)] *The results of this environmental impact indicator shall be used with case as uncertainties on these results are high or as there is limited experience with the indicator.*

Table 16. *Resource use and waste flows for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.* ***(LVT Luxury Vinyl Tile 2.5mm)***

Impact Category	Use of renewable primary energy (MJ)	Use of renewable primary energy resources used as raw materials (MJ)	Total Renewable primary energy (MJ)	Use of nonrenewable primary energy (MJ)	Use of nonrenewable primary energy resources used as raw materials (MJ)	Total Nonrenewable primary energy (MJ)	Use of secondary materials (MJ)	Use of Renewable secondary fuels (MJ)	Use of Nonrenewable secondary fuels (MJ)	Use of net fresh water (m3)
Resources										
A1	4.70	0.00	4.70	ND	ND	121	0.00	0.00	0.00	0.385
	9.3%	0%	9.3%			0%	0%	0%	0%	19%
A2	$3.58x10^{-2}$	0.00	$3.58x10^{-2}$	ND	ND	2.81	0.00	0.00	0.00	$2.14x10^{-3}$
	0.071%	0%	0.071%			0%	0%	0%	0%	0.11%
A3	9.72	0.00	9.72	ND	ND	8.17	0.00	0.00	0.00	$1.40x10^{-2}$
	19%	0%	19%			0%	0%	0%	0%	0.7%
A4	0.173	0.00	0.173	ND	ND	18.5	0.00	0.00	0.00	$1.02x10^{-2}$
	0.34%	0%	0.34%			0%	0%	0%	0%	0.51%
A5	0.594	0.00	0.594	ND	ND	7.35	0.00	0.00	0.00	$1.71x10^{-2}$
	1.2%	0%	1.2%			0%	0%	0%	0%	0.86%
B1	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B2	4.70	0.00	4.70	ND	ND	75.9	0.00	0.00	0.00	0.686
	9.3%	0%	9.3%			0%	0%	0%	0%	34%
B3	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B4	30.7	0.00	30.7	ND	ND	345	0.00	0.00	0.00	0.872
	60%	0%	60%			0%	0%	0%	0%	44%
B5	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
C2	$5.11x10^{-2}$	0.00	$5.11x10^{-2}$	ND	ND	12.9	0.00	0.00	0.00	$4.61x10^{-3}$
	0.1%	0%	0.1%			0%	0%	0%	0%	0.23%
C3	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
C4	$5.64x10^{-2}$	0.00	$5.64x10^{-2}$	ND	ND	1.42	0.00	0.00	0.00	$2.75x10^{-3}$
	0.11%	0%	0.11%			0%	0%	0%	0%	0.14%
D	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00

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Table 17. *Resource use and waste flows for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.* ***(LVT Luxury Vinyl Tile 2.5mm)***

Impact Category	Hazardous waste (kg)	Nonhazardous waste (kg)	Radioactive waste (kg)	Components for re-use (kg)	Materials for recycling (kg)	Materials for energy recovery (kg)	Exported energy (MJ)
Wastes & Outflows							
A1	$1.97x10^{-4}$	0.593	$9.51x10^{-5}$	0.00	0.00	0.00	0.00
	13%	3.1%	0%	0%	0%	0%	0%
A2	$1.82x10^{-5}$	0.136	$5.68x10^{-7}$	0.00	0.00	0.00	0.00
	1.2%	0.7%	0%	0%	0%	0%	0%
A3	$3.42x10^{-5}$	0.367	$3.91x10^{-6}$	0.00	0.00	0.00	0.00
	2.3%	1.9%	0%	0%	0%	0%	0%
A4	$1.03x10^{-4}$	0.385	$2.71x10^{-6}$	0.00	0.00	0.00	0.00
	7%	2%	0%	0%	0%	0%	0%
A5	$2.29x10^{-5}$	0.349	$4.25x10^{-6}$	0.00	0.218	0.00	0.00
	1.6%	1.8%	0%	0%	33%	0%	0%
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	$6.34x10^{-5}$	0.225	$1.19x10^{-4}$	0.00	0.00	0.00	0.00
	4.3%	1.2%	0%	0%	0%	0%	0%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	$9.43x10^{-4}$	12.8	$2.17x10^{-4}$	0.00	0.435	0.00	0.00
	64%	66%	0%	0%	67%	0%	0%
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	$8.78x10^{-5}$	$6.55x10^{-2}$	$9.44x10^{-7}$	0.00	0.00	0.00	0.00
	5.9%	0.34%	0%	0%	0%	0%	0%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	$8.34x10^{-6}$	4.49	$1.07x10^{-6}$	0.00	0.00	0.00	0.00
	0.56%	23%	0%	0%	0%	0%	0%
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 18. *Key Life Cycle Impact Assessment results for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. (**LVT Luxury Vinyl Tile 5mm**)*

Impact Category	Climate change (kg CO2 eq)	Climate change - Biogenic (kg CO2 eq)	Climate change - Fossil (kg CO2 eq)	Climate change - Land use and LU change (kg	GWP-GHG (IPCC AR6)	Acidification (mol H+ eq)	Eutrophication, freshwater (kg (PO4)3- eq)	Eutrophication, marine (kg N eq)	Eutrophication, terrestrial (mol N eq)	Ozone depletion (kg CFC11 eq)	Photochemical ozone formation (	Particulate matter (disease inc.)
Key Indicators												
A1	9.47	$3.90x10^{-2}$	9.42	$8.75x10^{-3}$	9.07	$4.19x10^{-2}$	$7.93x10^{-3}$	$8.07x10^{-3}$	$8.51x10^{-2}$	$7.93x10^{-6}$	$3.44x10^{-2}$	$3.61x10^{-7}$
	12%	0.18%	17%	20%	14%	11%	24%	5.5%	8%	32%	9.4%	13%
A2	0.480	$2.07x10^{-4}$	0.480	$2.44x10^{-4}$	0.467	$2.06x10^{-3}$	$1.17x10^{-4}$	$7.56x10^{-4}$	$8.09x10^{-3}$	$7.42x10^{-9}$	$2.78x10^{-3}$	$3.14x10^{-8}$
	0.63%	0.00095%	0.88%	0.55%	0.7%	0.53%	0.36%	0.52%	0.76%	0.03%	0.76%	1.1%
A3	0.553	$-7.43x10^{-2}$	0.626	$1.74x10^{-3}$	0.899	$1.91x10^{-3}$	$3.65x10^{-4}$	$1.59x10^{-3}$	$5.38x10^{-3}$	$3.15x10^{-8}$	$2.67x10^{-3}$	$3.24x10^{-8}$
	0.73%	-0.34%	1.2%	3.9%	1.3%	0.49%	1.1%	1.1%	0.5%	0.13%	0.73%	1.2%
A4	3.02	$1.84x10^{-4}$	3.02	$2.01x10^{-3}$	2.95	$6.09x10^{-2}$	$4.61x10^{-4}$	$1.58x10^{-2}$	0.174	$4.55x10^{-8}$	$4.83x10^{-2}$	$1.26x10^{-7}$
	4%	0.00085%	5.6%	4.5%	4.4%	16%	1.4%	11%	16%	0.18%	13%	4.6%
A5	1.17	0.505	0.670	$5.32x10^{-4}$	0.903	$4.88x10^{-3}$	$3.82x10^{-4}$	$2.03x10^{-3}$	$1.36x10^{-2}$	$3.22x10^{-7}$	$4.65x10^{-3}$	$3.50x10^{-8}$
	1.5%	2.3%	1.2%	1.2%	1.3%	1.2%	1.2%	1.4%	1.3%	1.3%	1.3%	1.3%
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	3.17	$3.63x10^{-2}$	3.13	$3.05x10^{-3}$	3.02	$1.54x10^{-2}$	$3.48x10^{-3}$	$2.65x10^{-3}$	$2.74x10^{-2}$	$2.50x10^{-8}$	$1.43x10^{-2}$	$1.26x10^{-7}$
	4.2%	0.17%	5.8%	6.9%	4.5%	4%	11%	1.8%	2.6%	0.099%	3.9%	4.6%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	48.6	14.5	34.2	$2.75x10^{-2}$	42.6	0.250	$1.95x10^{-2}$	$9.53x10^{-2}$	0.692	$1.67x10^{-5}$	0.235	$1.75x10^{-6}$
	64%	67%	63%	62%	64%	64%	60%	65%	65%	67%	64%	64%
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	2.21	$4.62x10^{-4}$	2.21	$2.74x10^{-4}$	2.15	$1.18x10^{-2}$	$1.24x10^{-4}$	$5.14x10^{-3}$	$5.55x10^{-2}$	$3.38x10^{-8}$	$2.17x10^{-2}$	$2.71x10^{-7}$
	2.9%	0.0021%	4.1%	0.62%	3.2%	3%	0.38%	3.5%	5.2%	0.13%	5.9%	9.8%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	7.41	6.76	0.649	$1.84x10^{-4}$	4.88	$1.48x10^{-3}$	$3.79x10^{-4}$	$1.43x10^{-2}$	$4.39x10^{-3}$	$3.27x10^{-9}$	$3.06x10^{-3}$	$2.01x10^{-8}$
	9.7%	31%	1.2%	0.41%	7.3%	0.38%	1.2%	9.8%	0.41%	0.013%	0.83%	0.73%
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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Table 19. *Life Cycle Impact Assessment results for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.* ***(LVT Luxury Vinyl Tile 5mm)***

Impact Category	Freshwater ecotoxicity (PAF.m^3.day)	Human toxicity, cancer (cases)	Human toxicity, non-cancer (cases)	Land use (species.yr)	Resource use, fossils (MJ)[1]	Resource use, minerals and metals (kg Sb eq)[1]	Water use (m^{3}depriv.)[1]
Other Indicators							
A1	149,000	$6.83x10^{-7}$	$1.71x10^{-6}$	$1.22x10^{-9}$	202	$8.97x10^{-5}$	-0.396
	6.8%	17%	8.8%	5.3%	21%	27%	-2.2%
A2	2,070	$3.22x10^{-8}$	$6.43x10^{-8}$	$1.58x10^{-10}$	6.64	$1.51x10^{-6}$	$3.42x10^{-2}$
	0.094%	0.79%	0.33%	0.69%	0.68%	0.45%	0.19%
A3	35,500	$5.60x10^{-8}$	$3.14x10^{-7}$	$4.98x10^{-9}$	8.23	$1.32x10^{-6}$	-0.554
	1.6%	1.4%	1.6%	22%	0.85%	0.39%	-3%
A4	7,590	$1.79x10^{-7}$	$2.29x10^{-7}$	$4.26x10^{-10}$	38.3	$5.28x10^{-6}$	0.137
	0.35%	4.4%	1.2%	1.9%	3.9%	1.6%	0.75%
A5	32,700	$5.26x10^{-8}$	$2.71x10^{-7}$	$2.89x10^{-10}$	11.6	$4.00x10^{-6}$	$-2.28x10^{-2}$
	1.5%	1.3%	1.4%	1.3%	1.2%	1.2%	-0.13%
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	50,200	$2.19x10^{-7}$	$5.72x10^{-7}$	$4.99x10^{-10}$	75.9	$2.59x10^{-5}$	20.1
	2.3%	5.3%	3%	2.2%	7.8%	7.7%	110%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	$1.43x10^{6}$	$2.59x10^{-6}$	$1.25x10^{-5}$	$1.49x10^{-8}$	596	$2.08x10^{-4}$	-1.25
	65%	63%	65%	65%	61%	62%	-6.9%
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	2,020	$4.14x10^{-8}$	$8.90x10^{-8}$	$1.01x10^{-10}$	28.0	$1.39x10^{-6}$	$5.63x10^{-2}$
	0.092%	1%	0.46%	0.45%	2.9%	0.41%	0.31%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	484,000	$2.48x10^{-7}$	$3.58x10^{-6}$	$2.58x10^{-10}$	3.14	$5.26x10^{-7}$	0.120
	22%	6.1%	19%	1.1%	0.32%	0.16%	0.66%
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00

[1)] The results of this environmental impact indicator shall be used with case as uncertainties on these results are high or as there is limited experience with the indicator.

Table 20. *Resource use and waste flows for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.* ***(LVT Luxury Vinyl Tile 5mm)***

Impact Category	Use of renewable primary energy (MJ)	Use of renewable primary energy resources used as raw materials (MJ)	Total Renewable primary energy (MJ)	Use of nonrenewable primary energy (MJ)	Use of nonrenewable primary energy resources used as raw materials (MJ)	Total Nonrenewable primary energy (MJ)	Use of secondary materials (MJ)	Use of Renewable secondary fuels (MJ)	Use of Nonrenewable secondary fuels (MJ)	Use of net fresh water (m3)
Resources										
A1	7.73	0.00	7.73	ND	ND	202	0.00	0.00	0.00	0.634
	13%	0%	13%			0%	0%	0%	0%	22%
A2	$8.45x10^{-2}$	0.00	$8.45x10^{-2}$	ND	ND	6.64	0.00	0.00	0.00	$5.07x10^{-3}$
	0.14%	0%	0.14%			0%	0%	0%	0%	0.18%
A3	9.73	0.00	9.73	ND	ND	8.23	0.00	0.00	0.00	$1.42x10^{-2}$
	16%	0%	16%			0%	0%	0%	0%	0.5%
A4	0.357	0.00	0.357	ND	ND	38.3	0.00	0.00	0.00	$2.10x10^{-2}$
	0.58%	0%	0.58%			0%	0%	0%	0%	0.74%
A5	0.728	0.00	0.728	ND	ND	11.6	0.00	0.00	0.00	$2.78x10^{-2}$
	1.2%	0%	1.2%			0%	0%	0%	0%	0.98%
B1	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B2	4.70	0.00	4.70	ND	ND	75.9	0.00	0.00	0.00	0.686
	7.7%	0%	7.7%			0%	0%	0%	0%	24%
B3	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B4	37.7	0.00	37.7	ND	ND	596	0.00	0.00	0.00	1.44
	62%	0%	62%			0%	0%	0%	0%	51%
B5	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
C2	0.111	0.00	0.111	ND	ND	28.0	0.00	0.00	0.00	$9.99x10^{-3}$
	0.18%	0%	0.18%			0%	0%	0%	0%	0.35%
C3	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
C4	0.132	0.00	0.132	ND	ND	3.14	0.00	0.00	0.00	$6.37x10^{-3}$
	0.21%	0%	0.21%			0%	0%	0%	0%	0.22%
D	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00

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Table 21. *Waste and outflows for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.* ***(LVT Luxury Vinyl Tile 5mm)***

Impact Category	Hazardous waste (kg)	Nonhazardous waste (kg)	Radioactive waste (kg)	Components for re-use (kg)	Materials for recycling (kg)	Materials for energy recovery (kg)	Exported energy (MJ)
Wastes & Outflows							
A1	$3.29x10^{-4}$	0.941	$1.53x10^{-4}$	0.00	0.00	0.00	0.00
	12%	2.4%	0%	0%	0%	0%	0%
A2	$4.29x10^{-5}$	0.322	$1.34x10^{-6}$	0.00	0.00	0.00	0.00
	1.6%	0.82%	0%	0%	0%	0%	0%
A3	$3.46x10^{-5}$	0.563	$3.97x10^{-6}$	0.00	0.00	0.00	0.00
	1.3%	1.4%	0%	0%	0%	0%	0%
A4	$2.13x10^{-4}$	0.797	$5.61x10^{-6}$	0.00	0.00	0.00	0.00
	8%	2%	0%	0%	0%	0%	0%
A5	$3.40x10^{-5}$	0.604	$6.80x10^{-6}$	0.00	0.218	0.00	0.00
	1.3%	1.5%	0%	0%	33%	0%	0%
B1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B2	$6.34x10^{-5}$	0.225	$1.19x10^{-4}$	0.00	0.00	0.00	0.00
	2.4%	0.57%	0%	0%	0%	0%	0%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	$1.72x10^{-3}$	26.2	$3.51x10^{-4}$	0.00	0.435	0.00	0.00
	65%	66%	0%	0%	67%	0%	0%
B5	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B6	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B7	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	$1.90x10^{-4}$	0.142	$2.04x10^{-6}$	0.00	0.00	0.00	0.00
	7.2%	0.36%	0%	0%	0%	0%	0%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	$1.88x10^{-5}$	9.72	$2.51x10^{-6}$	0.00	0.00	0.00	0.00
	0.71%	25%	0%	0%	0%	0%	0%
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00

6. LCA: Interpretation

The contributions to total impact indicator results are dominated by the product replacement phase (B4) of the assessment. Of the remaining life cycle phases, with few exceptions, the raw material extraction and processing (A1) phase is the largest contributor to indicator impact results followed by product use and maintenance (B2), product distribution (A4), product manufacture A3), and disposal (C4). Other life cycle phase contributions are minimal.

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ZERTIFIKAT

für

TÜV PROFiCERT-product Interior PREMIUM

Nachstehende(s) Produkt/Produktgruppe erfüllt die Vergabekriterien V1.3 der Zertifizierung „TÜV PROFiCERT-product Interior“. Dieses Zertifikat entbindet den Hersteller nicht von seiner Verantwortung für die Erfüllung aller gesetzlichen Vorgaben und Produkteigenschaften.

Zhejiang Kingdom New Material Group Co. Ltd.
No. 38 Desheng Road, Heshan Town
Tongxiang City, Zhejiang Province
Postcode 314512
Volksrepublik China

Heterogene PVC-Bodenbeläge Kingdom VINYL PLANK & TILES

Ergebnisse der Qualitätsprüfung: Kein Nachreis von REACH-relevanten Phtalaten.
Anforderungen an Phtalate gemäß EN 14041:2018 sind erfüllt.
Allgemeine Anforderungen an die Dimensionsstabilität gemäß EN ISO 10582:2018 sind erfüllt.

Ergebnis der Emissionsprüfung: TÜV PROFiCERT-product Interior Premium erfüllt

Damit werden auch die folgenden Emissionsgrenzwerte eingehalten:

√	AgBB 2018	√	BREEAM Exemplary Level	√	Anhang 8 MVV TB / ABG
√		√	Österreichisches Umweltzeichen, Richtlinie UZ 42	√	CAM Italien
√	Belgische VOC-Verordnung	√	LEED v4 (außerhalb Nordamerika)	√	Finnische M1 Klassifizierung

Zertifikat-Registrier-Nr. **70 720 5828-1** Zertifikat gültig von 2023-08-16 bis **2026-08-15**

Auditbericht-Nr. 2117115/2023/2 Erstzertifizierung 2017-08-16

Darmstadt, 2023-08-10
Zertifizierungsstelle des TÜV Hessen
– Der Zertifizierungsstellenleiter –

Diese Zertifizierung wurde gemäß TÜV PROFiCERT-plus-Verfahren durchgeführt und wird regelmäßig überwacht.
Die aktuelle Gültigkeit ist nachprüfbar unter www.proficert.com. Originalzertifikate enthalten ein aufgeklebtes Hologramm.
TÜV Technische Überwachung Hessen GmbH, Robert-Bosch-Straße 16, D-64293 Darmstadt, Tel. +49 6151/600331 Rev-DE-2001

CERTIFICATE

for

TÜV PROFiCERT-product Interior PREMIUM

The following product/product group particularly fulfills the criteria V1.3 of the TÜV PROFi-CERT-product Interior certification. This certificate does not acquit the producer of his responsibility to comply with all legal requirements and product properties.

Zhejiang Kingdom New Material Group Co. Ltd.
No. 38 Desheng Road, Heshan Town
Tongxiang City, Zhejiang Province
Postcode 314512
People's Republic of China

Heterogeneous PVC flooring Kingdom VINYL PLANK & TILES

Result of quality testing: No REACH relevant phthalates were detected.
Requirements on phthalates acc. to 14041:2018 are fulfilled.
General requirements on dimensional stability according to EN ISO 10582:2018 are fulfilled.

Result of the emission testing: TÜV PROFiCERT-product Interior Premium fulfilled

Thus, the results comply with the emission thresholds of:

√	AgBB 2018	√	BREEAM Exemplary Level	√	Annex 8 MVV TB / ABG
√	A+	√	Austrian Eco Label, Guideline UZ 42	√	CAM Italy
√	Belgian VOC regulation	√	LEED v4 (outside North America)	√	Finnish M1 classification

Certificate registration No. **70 720 5828-1** Certificate valid from 2023-08-16 to **2026-08-15**

Audit report No. 2117115/2023/2 First certification 2017-08-16

QUALITY TESTED
tested for: emissions harmful substances EPH
PREMIUM

Darmstadt, 2023-08-10
Certification body of TÜV Hessen
– Head of Certification body –

This certification was conducted in accordance with the TÜV PROFiCERT-plus auditing and certification procedures and is subject to regular surveillance audits. Verifiable under www.proficert.com. Original certificates contain a glued on hologram.
TÜV Technische Überwachung Hessen GmbH, Robert-Bosch-Straße 16, D-64293 Darmstadt, Tel. +49 6151/600331 Rev-GB-2001

Certificate

Indoor Air Comfort Gold

LVT, SPC, ESPC, PET Flooring, Loose Lay, EPC

Certified Product

Zhejiang Kingdom New Material Group Co., Ltd

No.38 Desheng Road, Heshan Industrial Park, Heshan Town, Tongxiang City, Zhejiang, China

Applicant

The above product complies with the Indoor Air Comfort Gold specifications, version 9.0 (2023). These include both inspection of factory production and VOC emissions testing according to EN 16516, at regular intervals. Indoor Air Comfort Gold combines all key European and selected global requirements on VOC product emissions. Additional requirements not related to VOC product emissions, for example content of certain substances or odour are not combined or evaluated. The following VOC emission requirements are combined and the certified product shows compliance with these VOC emission related limit values:

- Belgian VOC regulation
- France VOC class A+
- Germany (AgBB/ABG)
- Italian CAM Edilizia
- EU Taxonomy Regulation
- LEED (ACP)
- BREEAM New Construction
- WELL Building
- DGNB
- SKA Rating
- French HQE certification
- Blue Angel DE-UZ 120
- Austrian Ecolabel UZ 42
- Austrian Baubook
- M1
- Danish Indoor Climate Label (Emission Class 1)
- BVB (Sweden)
- Miljöbyggnad (Sweden)
- Eco Product Norway
- SINTEF (Norway)
- Cradle to Cradle
- very low emitting products according to EN 16798-1
- Singapore Green Label
- Global GreenTag
- Declare 2.0

Issue date: 22 March 2024

Validity date: 30 November 2028

Product type: Resilient Floorings

Certificate number: IACG-373-01-01-06-2024

This certificate is valid as specified if regular surveillance and testing is done.

Thomas Neuhaus
Head of Certification Body

Eurofins Product Testing A/S
Smedeskovvej 38, Gate 9
8464 Galten
Denmark

DANAK
PROD Reg.no. 7054
Member EA MLA

Appendix to Certificate IACG-373-01-01-06-2024

Zhejiang Kingdom New Material Group Co., Ltd

receives the Indoor Air Comfort Gold certificate with validity 30 November 2028

for below product group, including subgroups and individual products as listed:

Product group: LVT, SPC, ESPC, PET Flooring, Loose Lay, EPC

Product type: Resilient Floorings

Products included:

This certificate combines products from the six product groups

LVT,
SPC,
ESPC,
PET Flooring,
Loose Lay,
EPC.

Each product group is being tested and evaluated separately on an annual basis.

The products in this group are based on identical or similar recipe and are produced under equivalent conditions. Grouping of the products and inspection of the production process is part of the Indoor Air Comfort Gold certification. A worst-case product, which is representative for the whole group, is being tested frequently.

Eurofins Product Testing A/S
Smedeskovvej 38, Gate 9
8464 Galten
Denmark

DANAK
PROD Reg.no. 7054
Member EA MLA

***SCS Global Services** does hereby certify that an independent assessment has been conducted on behalf of:*

Zhejiang Kingdom New Material Group Co., Ltd.

No. 38, Desheng Road, Heshan Industrial Park, Heshan Town, Tongxiang City, Zhejiang, China

For the following product(s):

Vinyl Tile:

Vinyl Dry Back (2mm to 3mm), Loose Lay (5mm), Vinyl Click (5mm), WPC (7.5mm), ESPC (5.5mm)



The product(s) meet(s) all of the necessary qualifications to be certified for the following claim(s):

NSF/ANSI 332 Resilient Flooring: Platinum

Conforms to the NSF/ANSI 332-2015 Sustainability Assessment for Resilient Floor Coverings

Registration # SCS-RF-05179
Valid from: December 8, 2023 to December 31, 2026

SCSglobal SERVICES

Nicole Munoz, Vice President
SCS Global Services
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