ENVIRONMENTAL PRODUCT DECLARATION

SŌYA LUXURY VINYL TILES – PRO FRIENDS BY TER HÜRNE - DRYBACK

TER HÜRNE GMBH & CO. KG

SŌYA LUXURY VINYL TILES – PRO
FRIENDS BY TER HÜRNE - DRYBACK

ter Hürne is a leading European hard-wood engineered flooring manufacturer based in Südlohn in Münsterland. The family owned and run company, which was founded in 1959 and is now managed in the second generation, manufactures high quality products made in Germany and has approximately 300 employees at the site.

As a wood specialist ter Hürne focusses on innovative and attractive flooring solutions made of a multitude of materials and has established itself as a market leader in the sector on a national and international level. The product range extends from engineered hardwood floors, wood powder floors, laminate floors, wall and ceiling panels, and LVT floors to the PVC-free Avatara Design Floor.

For more information visit:
www.terhuerne.com
or contact:
+49 (0)2862 701-0

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ENVIRONMENTAL PRODUCT DECLARATION
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ENVIRONMENTAL PRODUCT DECLARATION

ter Hürne

TER HÜRNE
SŌYA LUXURY VINYL TILES – PRO | FRIENDS BY TER HÜRNE DRYBACK

According to ISO 14025, EN 15804, and ISO 21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Road Northbrook, IL 60611 https://www.ul.com/ https://spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	General Program Instructions v.2.1 April 2017
MANUFACTURER NAME AND ADDRESS	ter Hürne GmbH & Co. KG Ramsdorferstraße 5, 46359 Südlohn, Germany
DECLARATION NUMBER	4789201527.101.1
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	1 m^2
REFERENCE PCR AND VERSION NUMBER	Product Category Rules for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements, *Standard 10010, Version 3.2* Part B: Flooring EPD Requirements, *UL 10010-7, Version 2.0*
DESCRIPTION OF PRODUCT APPLICATION/USE	LVT for commercial and residential spaces
PRODUCT RSL DESCRIPTION	Commercial: 10 Years Residential: 20 Years
MARKETS OF APPLICABILITY	Global
DATE OF ISSUE	January 1, 2020
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product-specific
RANGE OF DATASET VARIABILITY	Industry-average only
EPD SCOPE	Cradle to grave
YEAR(S) OF REPORTED PRIMARY DATA	April 2023 – April 2024
LCA SOFTWARE & VERSION NUMBER	SimaPro 9
LCI DATABASE(S) & VERSION NUMBER	Ecoinvent 3, Ecoinvent 3- CN, USLCI, ELCD
LCIA METHODOLOGY & VERSION NUMBER	CML-IA (baseline) & TRACI

The PCR review was conducted by:	UL Environment PCR Review Panel epd@ulenvironment.com
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Grant R. Martin
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Grant R. Martin, UL Environment Ecovane Environmental Co., Ltd
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas Gloria, Industrial Ecology Consultants

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

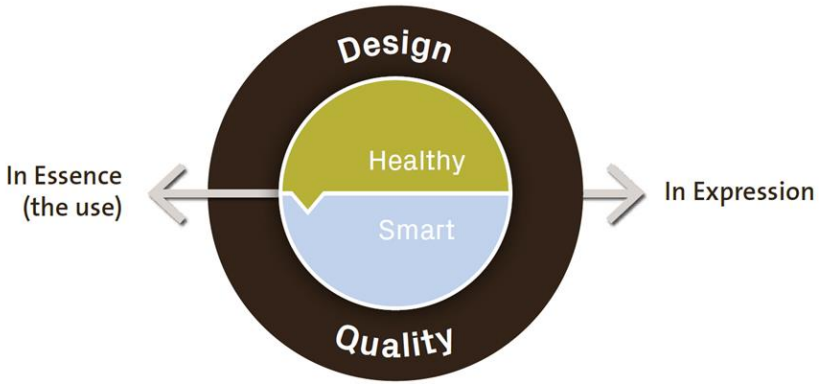
Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

1. Product Definition and Information

1.1 Description of Company/Organization

ter Hürne designs healthy & technically intelligent floors with German quality standards.



- **Healthy living:** ter Hürne aims to be a leader in providing floors designed for healthy living.
- **Natural design:** ter Hürne products are naturally beautiful. Nature, whether wood or some pattern, are the model and benchmark for our design processes.
- **Smart properties:** ter Hürne products are intelligent. They provide added benefits to the customer in installation, design, use and durability.
- **Environmentally responsible:** ter Hürne is highly environmentally conscious and strives to actively reduce the environmental impact of its production and products. Preservation of nature and resources is a priority in the company strategy.

1.2 Product Description

1.2.1 Product Identification

ter Hürne SŌYA LUXURY VINYL TILES – PRO | FRIENDS BY TER HÜRNE DRYBACK is waterproof and has strong scratch- and stain-resistance, making it a perfect selection for varied residential and commercial applications where style, comfort and performance are always in demand. This declaration covers the two types of LVT flooring below that provide a wide range of flooring options for various applications.

- SŌYA LUXURY VINYL TILES – PRO – Gue Down LVT(GD)
- FRIENDS BY TER HÜRNE DRYBACK - Glue Down LVT (GD)

1.2.2 Product Specification

ter Hürne SŌYA Pro and FRIENDS Dryback feature a wide range of beautiful flooring options for many applications. These products have excellent stain-, scratch-, and dent- resistance. They are constructed with a durable wear layer and proprietary AMP (Aminomethyl Propanol) polyurethane coating, making it an ideal flooring product for multi-family units, condominiums, corporate offices and a variety of other residential and light commercial environments.

Pro/ Dryback: The perfect long-term flooring solution for heavy traffic areas including areas with heavy rolling loads. With a variety of applications, the glue down system is used in virtually all commercial sectors.

The following figure shows the construction.

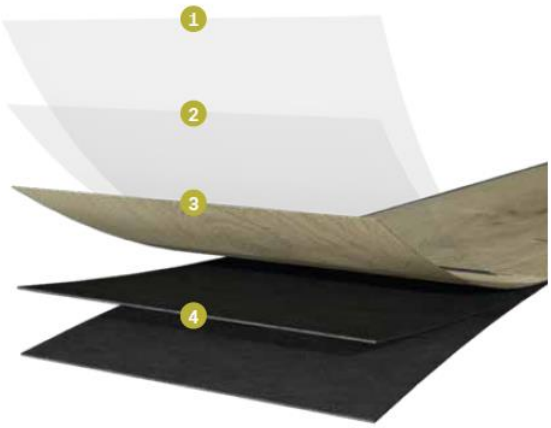


Figure 1. Construction of ter Hürne Pro / Friends Dryback

1 Transparent, hard-wearing PU-coating: The transparent PU hardening layer provides the floor with its antistatic and antibacterial properties. It is also water-resistant and makes your floor easy to clean and care for.

2 Transparent wear layer with embossed structure: The hard-wearing protective layer protects the floor and the underlying decor image from all stresses and strains. In addition, it provides its soft and appealing surface. Inside it are the pressed-in structures for the special feel of the floor.

3 Printed decor layer: The decor layer is the carrier of the decor. It is the decor that brings the floor to life. It gives the floor its appearance and expression in the room.

4 Double LVT middle layer: The fully plastic vinyl backing layer is bonded together in two layers. That makes it particularly resilient and robust.

Table 1. Technical Specifications of ter Hürne Pro / Friends Dryback

STANDARDS	RESULTS
ASTM F1700 - SOLID VINYL TILE	CLASS III, TYPE B
ASTM F1914 - RESIDUAL INDENTATION	PASSES, <10%
ASTM F137 - FLEXIBILITY	PASSES, 25.4MM MANDREL
ASTM F2199 - DIMENSIONAL STABILITY	PASSES, <0.020 IN. PER LIN. FT
ASTM F925 - CHEMICAL RESISTANCE	PASSES
ASTM F1514 - HEAT COLOR STABILITY	PASSES, < Δ8E
ASTM F1515 - LIGHT COLOR STABILITY	PASSES, < Δ8E
ASTM F970 - STATIC LOAD LIMIT	PASSES, 250 LBS.
ASTM F970 - MODIFIED FOR MAX WEIGHT	1,200 LBS.
ASTM E648 (NFPA 253) - CRITICAL RADIANT FLUX	CLASS I, >0.45 W/CM^2
ASTM E662 (NFPA 258) - SMOKE DENSITY	PASSES, <450
ASTM D2047 - SLIP RESISTANCE	>0.6 (DRY)
CHPS / CA SECTION 01350	COMPLIANT

1.2.3 Product-Specific EPD

This declaration covers this type of LVT flooring products: SŌYA Pro and FRIENDS Dryback. Each type has several specifications with various tile and wear layer thicknesses. The “ter Hürne Pro” specification is the representative specifications because it has the highest annual production quantity.
Ter Hürne Pro means the thickness of the product is 2.5 mm and the thickness of its wear layer is 0.55 mm. In the Life-Cycle Assessment (LCA) study, each specification was analyzed, and the LCA results were presented separately. However, only the LCA results of the representative specification for each type are presented in this declaration.

While allocating energy and material usage within the production site, allocations were carried out based on either the average annual mass or average annual surface area produced.

1.3 Application

The products covered in this declaration are for use in corporate offices, retail spaces, residential spaces, hospitality, and a variety of other commercial environments.

1.4 Declaration of Methodological Framework

In this project, a full LCA approach was considered with some simplification on data modeling using generic data for most background systems. The EPD analysis uses a cradle-to-grave system boundary. No known flows are deliberately excluded from this EPD.

To calculate the LCA results for the product maintenance stage a 10- or 20-year reference service life (RSL) was assumed for the declared products. Dryback with wear layers no thinner than 0.55mm will be used for commercial purposes with a RSL of 10 years and the rest will be considered for residential use with a RSL of 20 years.

Additional details on assumptions, cut-offs and allocation procedures can be found in section 2.4, 2.5, and 2.9, respectively.

1.5 Technical Requirements

Ter Hürne Pro and Friends Dryback products offer a wide range of beautiful flooring options in various specifications for many applications. Therefore, the following technical data provides a range of values for each parameter.

Table 2. Technical Data for ter Hürne Pro / Friends Dryback

Name		Average Value		Min Value	Max Value	Unit
PRODUCT THICKNESS		-		2.0	5.0	MM
WEAR LAYER THICKNESS (WHERE APPLICABLE)		-		0.1	0.5	MM
PRODUCT WEIGHT		-		3950.0	8960.0	G/M^2
PRODUCT FORM	ROLLS	WIDTH	-	-	-	MM
		LENGTH	-	-	-	M
	TILES	-		228.6 x 228.6	1000 x 1000	MM
	PLANKS	-		101.6 x 406.4	241.3 x 1516.9	MM

1.6 Placing on the Market / Application Rules

Ter Hürne transparently declares the composition and environmental impact of SŌYA Pro and FRIENDS Dryback products with a Health Product Declaration (HPD) and Environmental Product Declaration (EPD). In addition, SŌYA Pro and FRIENDS Dryback products are 100% recyclable, have the technical specifications shown in Table 1, and meet the criteria of the following certifications and standards:

- GREENGUARD Gold
- Eurofins Indoor Air Comfort Gold
- FloorScore®
- REACH

1.7 Material Composition

Table 5. Material Composition of SŌYA Pro and FRIENDS Dryback

COMPONENT	MATERIALS	GLUE DOWN	CLIC
Substrate - Plasticizer	**(Bio) Plasticizer + DOTP**	5.96% - 10.16%	6.32% - 7.35%
Substrate	**$CaCO_3$**	15.23% - 68.74%	59.42% - 68.52%
Substrate	**Polyvinyl Chloride (PVC)**	17.77% - 36.87%	18.57% - 21.72%
Substrate	**Epoxized Soybean Oil**	0.89% - 1.37%	0.93% - 1.09%
Substrate	**Calcium Stearate**	0.29% - 0.55%	0.30% - 0.39%
Substrate	**Zinc Stearate**	0.22% - 0.44%	0.23% - 0.31%
Substrate	**Carbon Black**	0.05% - 0.16%	0.11% - 0.16%
Substrate	**$Mg(OH)_2$**	0 - 8.05%	0
Wear layer	**Polyvinyl Chloride (PVC)**	1.50% - 24.49%	1.50% - 9.22%
UV coating	**Urethane Acrylates**	0.33% - 0.77%	0.39% - 0.48%
Film	**TiO_2**	1.12% - 2.56%	1.14% - 1.60%

The main raw materials used to SŌYA Pro and FRIENDS Dryback are polyvinyl chloride (PVC) resins and calcium carbonate ($CaCO_3$). In addition, a plasticizer, stabilizer, pigment, lubricant and other materials are used.

1.8 Manufacturing

The manufacturing process of SŌYA Pro and FRIENDS Dryback includes preparing the base layer, undergoing lamination, coating with a UV layer, gluing, cutting, profiling, and packaging.

The main raw materials used to produce SŌYA Pro and FRIENDS Dryback are polyvinyl chloride (PVC) resins and calcium carbonate ($CaCO_3$). During the production of the PVC base layer, these two materials are mixed with a plasticizer, stabilizer, and other materials. Once the compound is ready, a series of heated rollers are used to squeeze the compound into a continuous sheet with a precise width and thickness. After that, the sheet is sent through a cooling process and is ready for lamination. The different layers are bonded to each other through the lamination process. Engraved rollers are then used to apply a textured design onto the surface, which is followed by the application of the UV layer and an annealing treatment. Finally, the products are cut into pieces matching the specifications, and the edges are profiled. After a quality check, the products that pass are packaged for transportation.

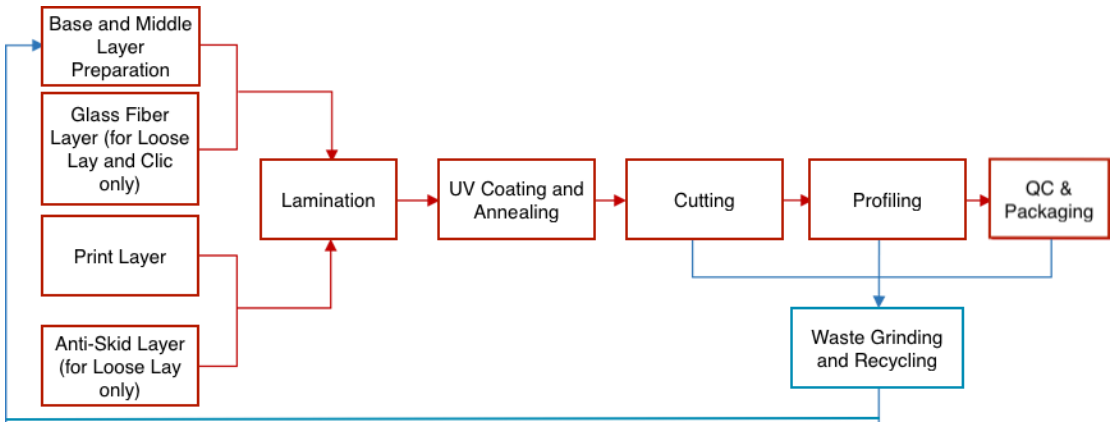


Figure 2. Production Process of the SŌYA Pro and FRIENDS Dryback

1.9 Packaging

Cardboard and wood pallets are the main packaging materials for SŌYA Pro and FRIENDS Dryback. According to ter Hürne, the target markets of these LVT products include Europe, the United States, Canada, Asia, and other regions. In the LCA study, the disposal of packaging materials adopted a rough country- and region-based weighted average disposal model following the UL PCR for Building-Related Products and Services Part A Section 2.8.5. For packaging disposal in Asia and the other regions, the study used the waste disposal scenario from China as the default as scenarios for the rest of the markets were unavailable. A sensitivity analysis on packaging disposal scenarios was also conducted.

1.10 Transportation

According to ter Hürne, the target markets of LVT products are Europe, the United States, Canada, Asia, and other regions. Oceanic and road transportation distance for product delivery was estimated with reference to external resources. Table 11 demonstrates the data used for stage A4 in the LCA modelling.

1.11 Product Installation

SŌYA Pro and FRIENDS Dryback flooring offer one method of installation. These two types requires glue to be applied for the installation. The flooring requires 300 grams of glue per square meter.

1.12 Use and Maintenance

After installation, very little effort is required in order to use SŌYA Pro and FRIENDS Dryback. However, routine vacuuming, cleaning and surface conditioning is required for regular maintenance and upkeep of the product. The cleaning schedule depends on multiple factors, including weight capacity, terminal function, the amount of dust entering the building, and more. For the purposes of this EPD, average maintenance is presented based on typical installations. The calculations are based off of the cleaning routine presented in Table 8.

1.13 Reference Service Life and Estimated Building Service Life

SŌYA Pro flooring with a wear layer no thinner than 0.55mm has a RSL of 10 years for commercial purposes and a RSL of 20 years for residential use. FRIENDS Dryback has a RSL of 5 years for commercial purposes and a RSL of 15 years for residential use. An ESL of 75 years was applied in the LCA study.

1.14 Reuse, Recycling, and Energy Recovery

ter Hürne is an active member of the German DSD Organisation “Grüner Punkt” and of Interseroh for the recycling of packing material. ter Hürne is currently working with its large retail customers to develop a take-back program for the reuse and recycling of LVT flooring that is no longer needed by end users. The goal of this strategy will be to employ methods both of rerouting the flooring for reuse and of grinding up and recycling the flooring to be used in the creation of ter Hürne flooring or other products, such as rubber hoses, car mats, speed bumps, paneling, and more.

1.15 Disposal

According to ter Hürne, the majority of the SŌYA Pro and FRIENDS Dryback is purchased and used in Europe, the United States, Canada, Asia, and other regions. For the LCA study, the disposal of the used SŌYA Pro and FRIENDS Dryback flooring adopted a country- and region-based weighted average disposal model following disposal routes and waste classification referenced in PCR part A section 2.8.5 and 2.8.6. This LCA used an end-of-life disposal treatment process (C4) from Ecoinvent and USLCI. The waste scenario assumed 100 km of road transportation (C2) from an installation site to a MSW treatment site.

2. Life Cycle Assessment Background Information

2.1 Functional or Declared Unit

In this study, the functional unit was defined as 1 (one) m^2 of SŌYA Pro and FRIENDS Dryback flooring.

Table 7. Functional Unit Information

NAME	VALUE		UNIT
FUNCTIONAL UNIT	1		m^2
MASS	GLUE DOWN	3.90 – 8.96	kg

2.2 System Boundary

The life cycle stages considered in this LCA study are from cradle to grave.

The following stages have been assessed:

- A1-A3: Product stage (raw material acquisition, transport to manufacturing site and manufacturing)
- A4-A5: Construction stage (transport to user site, installation)
- B2: Maintenance
- B4: Replacement
- C1-C4: End of life stage (deconstruction, transport, waste processing and disposal)

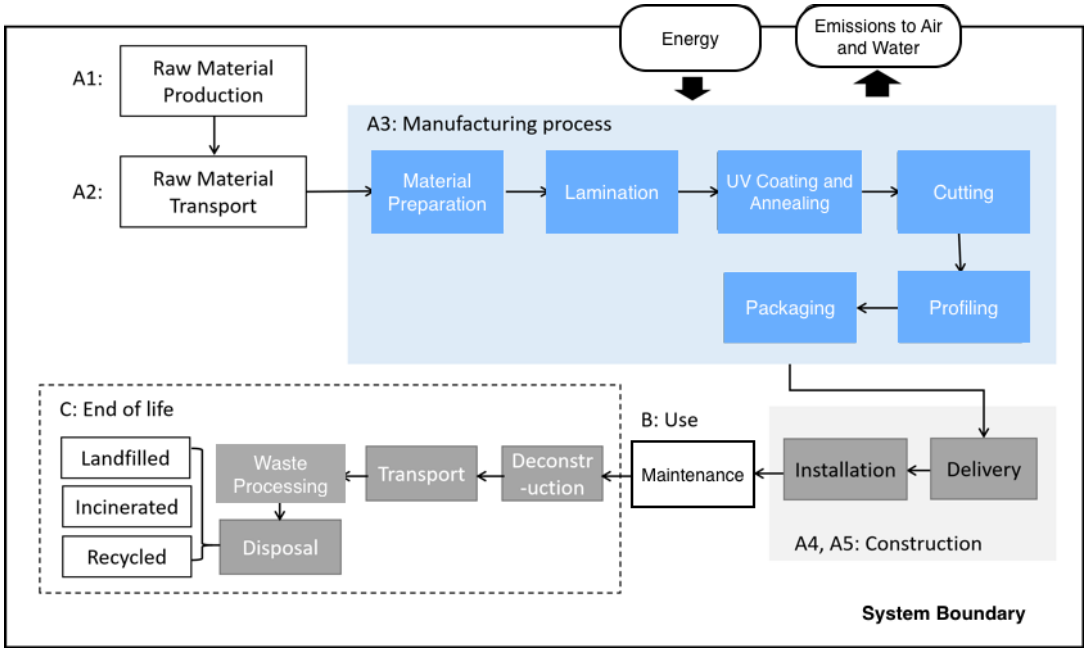


Figure 3. System Boundary of LCA study

The LCA study traced all energy and material inputs back to the extraction of resources for each life-cycle stage of the products. In addition, the study quantified emissions from the whole system, and included various waste management scenarios.

2.3 Product for Maintenance Phase (Modules B1-B7)

For the calculations of maintenance phase, the following cleaning routine was considered:

Table 8. Cleaning and Maintenance

Cleaning Process	Cleaning Frequency	Consumption of energy and resources
Vacuuming	weekly	Electricity
Mopping	weekly	Water and detergent

Table 9. Inputs in Maintenance Stage

	Amount	Units	Scenario
Water	5.20	L/m^2/year	Based on weekly vacuum and weekly mopping
Electricity	0.02	kWh/m^2/year	
Detergent	104.00	g/m^2/year	

2.4 Estimates and Assumptions

The main assumptions of this LCA study are as follows:

- The product description paper (1 page) included in the packaging contributes less than 0.1% to the total weight of the final product's packaging and was therefore excluded from the analysis;
- The raw materials calcium stearate and zinc stearate were not in the background database, so they were substituted with stearic acid from the EI database;
- Background data for the raw material $Mg(OH)_2$ (a type of flame retardant used in the base layer) was not in the database, so it was substituted with MgO from the EI database;
- As there is no specific metering or monitoring system on-site to track material flows in the factory, the distribution of water, natural gas, and electricity consumption during the production processes were calculated by the site engineer based on historical data and experience with operations;
- Similarly, since the consumption of power and water increase linearly with the mass of production, the distribution of energy, water, and natural gas usage during the production of various product specifications were modeled using a mass ratio allocation method. However, the ratio for the distribution of UV coating usage for various product specifications was calculated based on surface area, since surface area, not mass, is the relevant factor when UV coating is applied;
- Assumptions on transportation were made where it was not possible to obtain the specific data, such as the distance of oceanic transportation and inland transportation in the United States, Europe, Asia and other markets. When this occurred, it was clearly stated in the report, and a sensitivity analysis was conducted;
- The report makes assumptions for certain processes, such as maintenance, for which electricity and water consumption data were not obtained. The report clearly states when making assumptions such as this or others;
- Disassembly of the LVT from the subfloor during the disposal stage was assumed to be done manually for Clic and Loose Lay LVT products, but to be done both manually and mechanically for Glue Down LVT product, as it is glued onto the floor. However, because the disassembly of the LVT from the subfloor likely accounted for less than 1% of overall energy consumption, it was omitted from the model.

2.5 Cut-off Criteria

The following procedures were followed for the exclusion of inputs and outputs:

- All inputs and outputs to a (unit) process were included in the calculation where data was available. Data gaps were filled by conservative assumptions with average or generic data. Any assumptions for such choices were documented;
- In case of insufficient input data or data gaps for a unit process, according to the PCR requirement, the cut-off criteria chosen is 1% of renewable and non-renewable primary energy usage and 1% of the total mass of that unit process. The total neglected input flows of the cradle to grave stage, e.g. per module A1-A3, A4-A5, B1-B5, B6-B7, C1-C4 and module D shall be a maximum of 5% of energy usage and mass. In this study, the neglected flow is demonstrated in the table below.

Table 10. Cut-off Flows

FLOW NAME	PROCESS STAGE	MASS %	TOTAL MASS %
GLUE AND DESCRIPTION PACKAGING PAPER	PACKAGING	2.93E-05, <<1%	2.93E-05, <<1%

Material and energy flows known to have the potential to cause significant emissions into air, water or soil related to the environmental indicators of this study were included in the assessment. After reviewing the Material Safety Data Sheets and relevant physical, chemical and other information of the flows listed in table above, no significant negative emission to the environment from above listed flows was identified.

Other processes that contribute to obviously less than 1% of overall mass and energy contribution were cut off, which include:

- Storage phases and sales of product
- Handling operations at the distribution center and retail outlet
- Secondary and transit packaging
- Transport from distribution warehouse to retail outlet and from retail outlet to consumer household or commercial center

2.6 Data Sources

The study used generic data from various sources, including scientific literature, public sources, and databases such as Ecoinvent, ELCD, Chinese LCI, USLCI, and others.

In the study, the key parameters for producer-specific foreground data were based on one year (July 2018 to June 2019) of averaged data from ter Hürne. The life-cycle inventory includes data collected from a variety of publicly available sources, taking into consideration the degree to which it was technologically, temporally and geographically representative. The study utilized the Chinese-regionalized LCI database to the greatest extent possible. In the event data was missing from or not available in the LCI database, the study referred to Ecoinvent and regional databases such as USLCI, ELCD and other relevant databases. The study then conducted sensitivity analyses to validate the data and outputs using realistic parameters.

2.7 Data Quality

The data quality requirements for this study were as follows:

- Existing LCI data were, at most, 10 years old. Newly collected LCI data were current or up to 3 years old;
- The LCI data related to the geographical locations where the processes took place, e.g. electricity and transportation data from China, disposal data in the USA, Europe and etc. were utilized;
- The scenarios represented the average technologies at the time of data collection.

2.8 Period under Review

The study used primary data collected from July 2018 to June 2019.

2.9 Allocation

This study assumed that in-plant recycling for the production of the two types of LVT was a closed loop, meaning that the study allocated all of the environmental impacts from the recycling of the scraps from cutting, profiling, and any defective products and all of the environmental benefits of using recycled material to avoid waste generation during the production of the three types of LVT to the process of production.

To be conservative, the environmental benefits of recycling and energy recovery were not included in the study for the recycling and disposal processes at the end-of-life stage.

For process-related allocations, the study distinguished between multi-input and multi-output processes.

- Multi-input processes

  While allocating energy and auxiliary materials within the production site, allocation was carried out on the basis of either the average annual mass or the average annual surface area produced. The decision to use average annual mass or average annual surface area was based on the relationship of the input to the environmental impacts. In most cases, the input amount increases linearly with the mass of product produced. However, the amount of energy and materials used in the annealing and UV coating processes is proportional to the surface area of product produced. Accordingly, the allocation of energy and material related to these types of processes was based on surface area rather than mass.

- Multi-output processes

  In this study, there were no other by-products from the production line, therefore there were very few situations that required allocation from multi-output processes. For waste treatment, one allocation was carried out on the environmental emissions. In the end-of-life stage, the allocation within the disposal scenario was based on mass, which applies to the waste treatment process inventory that was adopted from the Ecoinvent data.Multi-input processes

2.10 Comparability (Optional)

No comparisons or benchmarking are included in this EPD. LCA results across EPDs can be calculated with different background databases, modeling assumptions, geographic scope and time periods, all of which are valid and acceptable according to the Product Category Rules (PCR) and ISO standards. The user of the EPD should take care when comparing EPDs from different companies. Assumptions, data sources, and assessment tools may all impact the uncertainty of the final results and make comparisons misleading.

3. Life Cycle Assessment Scenarios

According to ter Hürne, the majority of the SŌYA Pro and FRIENDS Dryback is purchased and used in Europe, North America, and Asia. The study estimated oceanic and road transportation distance for product delivery by referring to external resources. The table below demonstrates the data used for stage A4 in the LCA modelling.

Table 11. Transport to the Building Site (A4)

Name		Value		Unit
		Road	Ocean	
Fuel type		Diesel	Heavy Oil	
Liters of fuel		31.11 l/100km	12.483 t/100km	l/100km or t/100km
Vehicle type		Lorry (32t)	Ship (50000dwt)	
Transport distance		1000	Glue Down 22609 Clic 23507 Loose Lay 24151	km
Capacity utilization (including empty runs, mass based		50	100	%
Gross density of products transported	Glue Down	1724	1724	kg/m³
	Clic	1788	1788	
	Loose Lay	1810	1810	
Capacity utilization volume factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaging products)		0.4	0.4	-

Table 12. Installation into the Building (A5)

Name	Value	Unit
Ancillary materials	0.3	kg
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	-	m^3
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Product loss per functional unit	0.05	m^2/m^2
Waste materials at the construction site before waste processing, generated by product installation	0.05	m^2/m^2
Output materials resulting from on-site waste processing (specified by route; e.g. for recycling, energy recovery and/or disposal)	-	kg
Mass of packaging waste specified by type	Pulp: 0.229 Wood: 0.385 Plastic: 0.003 Metal: 0.00017	kg
Biogenic carbon contained in packaging	0.851	kg CO_2
Direct emissions to ambient air, soil and water	-	kg
VOC emissions	N/A	µg/m^3

Table 13. Reference Service Life

NAME	VALUE	UNIT
RSL	10 (Commercial use) 20 (Residential use)	years
Declared product properties (at the gate) and finishes, etc.	ter Hürne Pro	m^2
Design application parameters (if instructed by the manufacturer), including references to the appropriate practices and application codes)	-	-
An assumed quality of work, when installed in accordance with the manufacturer's instructions	-	-
Outdoor environment, (if relevant for outdoor applications), e.g. weathering, pollutants, UV and wind exposure, building orientation, shading, temperature	-	-
Indoor environment, (if relevant for indoor applications), e.g. temperature, moisture, chemical exposure)	Prevent water and moisture from accumulating underneath walk-off mats	-
Use conditions, e.g. frequency of use, mechanical exposure.	Commercial / Residential use	-
Maintenance, e.g. required frequency, type and quality of replacement components	Weekly vacuuming Weekly mopping	-

Table 14. Maintenance (B2)

NAME	VALUE	UNIT
Maintenance process information (cite source in report)	Weekly vacuum and weekly mopping	-
Maintenance cycle	Weekly vacuum and weekly mopping	Cycles/ RSL
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	5.2 city water disposed to sewer	L/m^2/year
Ancillary materials specified by type (e.g. cleaning agent)	104 (cleaning agent)	g/m^2/year
Other resources	-	kg
Energy input, specified by activity, type and amount	Electricity consumption 0.018	kWh/m^2/year
Other energy carriers specified by type	-	kWh
Power output of equipment	-	kW
Waste materials from maintenance (specify materials)	-	kg
Direct emissions to ambient air, soil and water	-	kg
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants);	-	-

Table 15.Replacement (B4)

NAME	VALUE	UNIT
Replacement cycle	1	Number/ RSL
Replacement cycle	7 (Commercial use) 2 (Residential use)	Number/ ESL
Energy input, specified by activity, type and amount	-	kWh
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	-	m3
Ancillary materials specified by type (e.g. cleaning agent)	-	kg
Replacement of worn parts, specify parts/materials	-	kg
Direct emissions to ambient air, soil and water	-	kg
Further assumptions for scenario development, e.g. frequency and time period of use	-	As appropriate

As mentioned above, the majority of ter Hürne Pro / Friends Dryback products are purchased and used in Europe, the United States, Canada, Asia, and other regions. The disposal of the used LVT products adopted a country- and region-based weighted average disposal model following disposal routes and waste classification referenced in PCR Part A Section 2.8.5 and 2.8.6. The LCA study used the end-of-life disposal treatment process (C4) from Ecoinvent and USLCI.

For the waste scenario, the study assumed a moderate distance of 100 km for the road transportation (C2) required from an installation site to a MSW treatment site. According to ter Hürne, the tile can be manually removed from the floor, so input and output were omitted for the deconstruction (C1) and waste processing (C3) stages. The table below displays the data used for stages C1-C4 in the LCA modeling.

Table 16. End-of-Life (C1-C4)

NAME		VALUE		UNIT
Assumptions for scenario development (description of deconstruction, collection, recovery, disposal method and transportation)		See description above		
Collection process (specified by type)	Collected separately	-		kg
	Collected with mixed construction waste	GLUE DOWN	4.31	kg
		CLIC	8.95	
		LOOSE LAY	9.05	
Recovery (specified by type)	Reuse	-		kg
	Recycling	GLUE DOWN	0.809	kg
		CLIC	1.000	
		LOOSE LAY	0.333	
	Landfill	GLUE DOWN	3.293	kg
		CLIC	7.718	
		LOOSE LAY	8.633	
	Incineration	GLUE DOWN	0.208	kg
		CLIC	0.232	
		LOOSE LAY	0.084	
	Incineration with energy recovery	-		kg
	Energy conversion efficiency rate	-		
Disposal (specified by type)	Product or material for final deposition	0		kg
Removals of biogenic carbon (excluding packaging)		GLUE DOWN	6.10E-03	kg CO_2
		CLIC	1.13E-02	
		LOOSE LAY	2.26E-02	

4. Life Cycle Assessment Results

Table 17. Description of the System Boundary Modules

	PRODUCT STAGE			CONSTRUCT-ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				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 supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type: Cradle to grave	x	x	x	x	x	MND	x	MND	x	MND	MND	MND	x	x	x	x	MND

4.1 Life Cycle Impact Assessment Results

To analyze the environmental impact of each process, an LCIA was conducted using the CML-IA baseline method and the TRACI method on the chosen representative **SŌYA Pro and FRIENDS Dryback** products. The result was allocated by stages, as shown in tables below. Note that the results are based on 75 years' ESL with a RSL of 10 years, as the general specifications will be all used for commercial purposes.

Table 18. North American Impact Assessment (TRACI) Results for SŌYA Pro and FRIENDS Dryback

Impact category (TRACI)	Unit	Production	Transport of product	Installation	Maintenance	Replacement	Transport of waste	Disposal
		A1-A3	A4	A5	B2	B4	C2	C4
Ozone depletion	kg CFC-11 eq	1.96E-07	1.19E-07	2.32E-08	1.77E-06	3.12E-06	4.79E-08	5.99E-08
Global warming	kg CO_2 eq	8.75E+00	1.82E+00	9.94E-01	3.67E+01	9.68E+01	5.70E-01	1.70E+00
Smog	kg O_3 eq	4.90E-01	4.33E-01	4.53E-02	1.30E+00	7.56E+00	8.91E-02	2.28E-02
Acidification	kg SO_2 eq	4.75E-02	2.81E-02	4.00E-03	1.21E-01	5.91E-01	3.10E-03	1.75E-03
Eutrophication	kg N eq	1.33E-02	1.50E-03	3.51E-03	2.30E-01	3.22E-01	2.67E-04	2.74E-02
Carcinogenics	CTUh	3.45E-07	3.18E-08	2.09E-08	1.14E-06	3.42E-06	3.94E-09	8.70E-08
Non carcinogenics	CTUh	2.90E-06	1.63E-07	2.11E-07	3.81E-06	5.04E-05	3.92E-08	3.89E-06
Respiratory effects	kg PM2.5 eq	4.59E-03	1.85E-03	3.62E-04	3.22E-02	5.30E-02	3.74E-04	3.96E-04
Ecotoxicity	CTUe	2.98E+01	3.16E+00	4.59E+00	2.41E+02	2.33E+03	4.16E-01	2.95E+02
Fossil fuel depletion	MJ surplus	1.60E+01	3.25E+00	3.11E+00	1.27E+01	1.67E+02	1.20E+00	3.06E-01

Table 19. EU Impact Assessment (CML) Results for SÕYA Pro and FRIENDS Dryback

Impact category (CML)	Unit	Production	Transport of product	Installation	Maintenance	Replacement	Transport of waste	Disposal
		A1-A3	A4	A5	B2	B4	C2	C4
Abiotic depletion	kg Sb eq	5.89E-06	5.55E-07	3.15E-06	7.65E-05	7.22E-05	2.24E-07	4.90E-07
Abiotic depletion (fossil fuels)	MJ	1.38E+02	2.55E+01	2.27E+01	1.30E+02	1.39E+03	8.42E+00	3.67E+00
Global warming (GWP100a)	kg CO_2 eq	8.75E+00	1.82E+00	9.94E-01	3.67E+01	9.68E+01	5.70E-01	1.70E+00
Ozone layer depletion (ODP)	kg CFC-11 eq	1.65E-07	9.00E-08	1.93E-08	1.53E-06	2.54E-06	3.61E-08	5.30E-08
Human toxicity	kg 1.4-DB eq	1.51E+00	7.75E-01	2.19E-01	1.10E+01	3.89E+01	8.60E-02	2.97E+00
Fresh water aquatic ecotox.	kg 1.4-DB eq	7.28E-01	1.95E-01	1.31E-01	9.08E+01	1.19E+02	9.49E-03	1.60E+01
Marine aquatic ecotoxicity	kg 1.4-DB eq	4.39E+03	1.01E+03	4.85E+02	1.28E+04	4.73E+05	4.77E+01	6.16E+04
Terrestrial ecotoxicity	kg 1.4-DB eq	2.60E-02	1.88E-03	6.44E-04	3.60E+01	2.36E-01	1.92E-04	5.04E-03
Photochemical oxidation	kg C_2H_4 eq	2.11E-03	1.10E-03	2.57E-04	2.11E-02	2.75E-02	9.91E-05	3.62E-04
Acidification	kg SO_2 eq	4.68E-02	2.75E-02	4.19E-03	1.07E-01	5.77E-01	2.49E-03	1.41E-03
Eutrophication	kg $(PO_4)^{3-}$eq	8.66E-03	2.59E-03	1.46E-03	1.13E-01	1.65E-01	5.10E-04	1.03E-02

4.2 Life Cycle Inventory Results

Table 24. Resource Use calculated based on ESL of 75 years

PARAMETER	UNIT	ter Hürne Pro Friends Dryback
RPR_E: Renewable primary resources used as energy carrier (fuel)	[MJ]	3.39E+02
RPR_M: Renewable primary resources with energy content used as material	[MJ]	0.00E+00
$NRPR_E$: Non-renewable primary resources used as an energy carrier (fuel)	[MJ]	2.05E+03
$NRPR_M$: Non-renewable primary resources with energy content used as material	[MJ]	0.00E+00
SM: Secondary materials	[kg]	0.00E+00
RSF: Renewable secondary fuels	[MJ]	0.00E+00
NRSF: Non-renewable secondary fuels	[MJ]	0.00E+00
RE: Recovered energy	[MJ]	0.00E+00
FW: Use of net fresh water resources	[m^3]	7.82E-02

Table 25. Output Flows and Waste Categories calculated based on ESL of 75 years

PARAMETER	UNIT	ter Hürne Pro Friends Dryback
HWD : Hazardous waste disposed	[kg]	2.72E-02
NHWD: Non-hazardous waste disposed	[kg]	3.03E-02
HLRW: High-level radioactive waste, conditioned, to final repository	[kg]	0.00E+00
ILLRW: Intermediate- and low-level radioactive waste, conditioned, to final repository	[kg]	0.00E+00
CRU: Components for re-use	[kg]	0.00E+00
MR: Materials for recycling	[kg]	0.00E+00
MER: Materials for energy recovery	[kg]	0.00E+00
EE: Recovered energy exported from the product system	[MJ]	0.00E+00

Table 26. Carbon Emissions and Removals calculated based on RSL of 10 years

PARAMETER	UNITS	ter Hürne Pro Friends Dryback
BCRP	[kg CO_2]	6.10E-03
BCEP	[kg CO_2]	6.10E-03
BCRK	[kg CO_2]	8.51E-01
BCEK	[kg CO_2]	2.65E-01
BCEW	[kg CO_2]	N/A
CCE	[kg CO_2]	N/A
CCR	[kg CO_2]	N/A
CWNR	[kg CO_2]	N/A

5. LCA Interpretation

Analysis of impact categories on various life cycle stages reveals that the production, transportation (oceanic and road), maintenance, and end-of-life treatment of the two types of LVT are the main contributors to its environment impacts. The process contribution analysis reveals that PVC raw materials, electricity consumption, transportation, incineration, and landfill component of waste treatment contribute the most to the environmental impacts.

The sensitivity analysis shows that a change in assumptions (such as transportation distance), inputs during maintenance, the disposal scenarios, and the quality of data can lead to fluctuations in the final LCA results. It is therefore recommended to revise the model with updated data, assumptions, or parameters as they become available to get the most up-to-date and accurate results.

The LCA study has been carried out based on available information, including that from regional and global databases and experience, to make the results as accurate, complete and representative as possible.

6. Additional Environmental Information

6.1 Environment and Health During Manufacturing

No substances required to be reported as hazardous, as listed in the "List of Toxic Chemicals Severely Restricted on the Import and Export in China (Circular No. 65 [2005]) and Measures for the Administration of Restricted Use of Hazardous Substances in Electrical and Electronic Products (Circular No. 32 [2016])", are associated with the production of this product.

6.2 Environment and Health During Installation

Instructions should be followed as indicated on the Safety Data Sheets and installation guidelines. It is suggested to use the adhesive recommended by ter Hürne for the installation of Glue Down LVT on the purpose of higher indoor air quality.

6.3 Extraordinary Effects

Fire

ASTM E648 Radiant Panel: Class I, >0.45 W/cm^2
ASTM E662 Smoke Density: Passes, <450

Water

In daily use, prevent water and moisture from accumulating underneath walk-off tiles. Exposure to flooding for long periods may result in damage to the product.

Mechanical Destruction

Performance requires proper installation according to ter Hürne installation guidelines.

6.4 Further Information

SŌYA Pro and FRIENDS Dryback flooring are certified with GREENGUARD Gold, Eurofins Indoor Air Comfort Gold and FloorScore$^{\circ R}$ Label. The total VOC emissions of the products are no more than 0.5 mg/m^3 after a test period of 14 days. The products comply with California DPH Section 01350 Version 1.2 for the school classroom, private office, and single-family residence parameters.

7. References

UL ENVIRONMENT

UL Environment General Program Instructions March 2022, version 2.7

Part A: Life Cycle Assessment Calculation Rules and Report Requirements UL Environment (September 2018, version 3.2)

Part B: Flooring EPD Requirements UL 10010-7

SUSTAINABILITY REPORTING STANDARDS

European Standards. (2013). EN 15804+A1 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

ISO. (2006). ISO 14044: Environmental management - Life cycle assessment - Requirements and guidelines.

ISO. (2009). ISO 14040: Environmental management - Life cycle assessment - principles and frameworks.

ISO. (2011). ISO 14025: Environmental labels and declarations - Type III environmental declarations - principles and procedures.

ISO. (2017). ISO 21930 Sustainability in building construction - Environmental declaration of building products.

8. Contact Information

8.1 EPD Owner

ter Hürne

TER HÜRNE GMBH & CO. KG

Email: nadine.lensing@terhuerne.de

Website: www.terhuerne.com

8.2 LCA and EPD Practitioner

1mi1 全生命周期绿色智造平台

Ecovane Environmental Co., Ltd

Ms. Fangyan Xu (fangyan@1mi1.cn)
Ms. Dandan Li (dandan@1mi1.cn)

Website：www.1mi1.org

CERTIFICATE
OF COMPLIANCE

GREENGUARD

PRODUCT CERTIFIED FOR
LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

ter Hurne GmbH & Co. KG

Sōya luxury vinyl floor Pro +
Friends by ter Hürne Dryback

297555-410
Certificate Number

10 Jan 2023 - 13 Jan 2024
Certificate Period

Certified
Status

UL 2818 - 2013 Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Flooring is determined compliant in accordance with an Office environment with an air change of 0.68 hr^{-1} and a loading of 11.10 m^2.

Products tested in accordance with UL 2821 test method to show compliance to emission limits in UL 2818, Section 7.1.

GREENGUARD Certification Criteria for Building Products and Interior Finishes

Criteria	CAS Number	Maximum Allowable Predicted Concentration	Units
TVOC(A)	-	0.50	mg/m³
Formaldehyde	50-00-0	61.3 (50 ppb)	µg/m³
Total Aldehydes (B)	-	0.10	ppm
Particle Matter less than 10 µm (C)	-	50	µg/m³
4-Phenylcyclohexene	4994-16-5	6.5	µg/m³
Individual VOCs (D)	-	1/10th TLV	-

(A) Defined to be the total response of measured VOCs falling within the C_6 – C_{16} range, with responses calibrated to a toluene surrogate. Maximum allowable predicted TVOC concentrations for GREENGUARD (0.50 mg/m³) fall in the range of 0.5 mg/m³ or less, as specified in CDPH Standard Method v1.2.

(B) The sum of all measured normal aldehydes from formaldehyde through nonanal, plus benzaldehyde, individually calibrated to a compound specific standard. Heptanal through nonanal are measured via TD/GC/MS analysis and the remaining aldehydes are measured using HPLC/UV analysis.

(C) Particle emission requirement only applicable to HVAC Duct Products with exposed surface area in air streams (a forced air test with specific test method) and for wood finishing (sanding) systems.

(D) Allowable levels for chemicals not listed are derived from 1/10th of the Threshold Limit Value (TLV) industrial work place standard (Reference: American Conference of Government Industrial Hygienists, 6500 Glenway, Building D-7, and Cincinnati, OH 45211-4438).

CERTIFICATE
OF COMPLIANCE

ter Hurne GmbH & Co. KG

Sōya luxury vinyl floor Pro +
Friends by ter Hürne Dryback

297555-420
Certificate Number

10 Jan 2023 - 03 Nov 2024
Certificate Period

Certified
Status

UL 2818 - 2022 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Flooring products are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.2-2017 using a Classroom Environment.

Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Section 7.1 and 7.2.

GREENGUARD Gold Certification Criteria for Building Products and Interior Finishes

Criteria	CAS Number	Maximum Allowable Predicted Concentration	Units
TVOC (A)	-	0.22	mg/m³
Formaldehyde	50-00-0	9 (7.3 ppb)	µg/m³
Total Aldehydes (B)	-	0.043	ppm
4-Phenylcyclohexene	4994-16-5	6.5	µg/m³
Particle Matter less than 10 µm (C)	-	20	µg/m³
1-Methyl-2-pyrrolidinone (D)	872-50-4	160	µg/m³
Individual VOCs (E)	-	1/2 CREL or 1/10oth TLV	-

(A) Defined to be the total response of measured VOCs falling within the C_6 – C_{16} range, with responses calibrated to a toluene surrogate. Maximum allowable predicted TVOC concentrations for GREENGUARD Gold (0.22 mg/m³) fall in the range of 0.5 mg/m³ or less, as specified in CDPH Standard Method v1.2.

(B) The sum of all measured normal aldehydes from formaldehyde through nonanal, plus benzaldehyde, individually calibrated to a compound specific standard. Heptanal through nonanal are measured via TD/GC/MS analysis and the remaining aldehydes are measured using HPLC/UV analysis.

(C) Particle emission requirement only applicable to HVAC Duct Products with exposed surface area in air streams (a forced air test with specific test method) and for wood finishing (sanding) systems.

(D) Based on the CA Prop 65 Maximum Allowable Dose Level for inhalation of 3,200 µg/day and an inhalation rate of 20 m³/day

(E) Allowable levels for chemicals not listed are derived from the lower of 1/2 the California Office of Environmental Health Hazard Assessment (OEHHA) Chronic Reference Exposure Level (CREL) as required per the CDPH/EHLB/Standard Method v1.2 and BIFMA level credit 7.6.2 and 1/100th of the Threshold Limit Value (TLV) industrial work place standard (Reference: American Conference of Government Industrial Hygienists, 6500 Glenway, Building D-7, and Cincinnati, OH 45211-4438).

ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	MMFA - Multilayer Modular Flooring Association
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-MMF-20240106-CBG1-EN
Issue date	04.06.2024
Valid to	03.06.2029

Vinyl- HDF- floor covering

MMFA (Multilayer Modular Flooring Association)

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

www.ibu-epd.com | https://epd-online.com

General Information

MMFA (Multilayer Modular Flooring Association)

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-MMF-20240106-CBG1-EN

This declaration is based on the product category rules:

Floor coverings, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

04.06.2024

Valid to

03.06.2029

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Vinyl- HDF- floor covering

Owner of the declaration

MMFA - Multilayer Modular Flooring Association
Mittelstrasse 50
33602 Bielefeld
Germany

Declared product / declared unit

1 m² of Vinyl-HDF floor covering

Scope:

This Environmental Product Declaration (EPD) is an association EPD and refers to a representative Vinyl-HDF floor covering produced by European manufacturers that are members of MMFA®.
Data are based upon production during 2022 in Europe. Data have been provided by 4 companies of MMFA which represent 66% percent of MMFA members.
The declared Vinyl-HDF floor covering represents a weighted average of best-selling products withing the thickness range of 9,1 - 10 mm, that meets the requirements of the use classes: 21-23, 31-34 according to EN ISO 20326 or EN 16511, ISO 10874.
The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR			
Independent verification of the declaration and data according to ISO 14025:2011			
☐	internally	☒	externally

Mrs Kim Allbury,
(Independent verifier)

Product

Product description/Product definition

Vinyl-HDF floor coverings described in this EPD are produced by member companies of MMFA®. The floor coverings meet the requirements of EN ISO 20326 or EN 16511.
Vinyl-HDF floorings consist of a number of layers. On the top side there is a PVC-decor with a transparent, wear-resistant contact surface which is varnished; in the middle there is a core layer made of high-density wood fibres (HDF) and on the back side there is a stabilizing layer to guarantee floor stability. Certain product constructions offer as well integrated impact sound insolation.
The decorative layer of a Vinyl-HDF floor covering can be printed with any design and gives the floor its individual appearance. For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration EN 14041:2004+AC:2005+AC:2006 Resilient, textile and laminate floor coverings – Essential characteristics and the CE-marking. For the application and use the respective national provisions apply.

Application

The Vinyl-HDF floor covering described in this EPD is intended to be used within a building and meets the requirements of the use classes: 21-23, 31-34 according to EN ISO 20326 or EN 16511, EN ISO 10874.
For the application and use the respective national provisions apply.

Technical Data

The following table contains the construction data of the declared product group:

Constructional data

Name	Value	Unit
Product thickness	9.1 - 10	mm
Grammage	850 - 980	g/m^2
Product Form	Panel	-
Length of the surface layer	300 - 2500	mm
Width of the surface layer	70 - 600	mm
Length and width of squared elements	250 - 700	mm
Density	930 - 970	kg/m^3

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to EN 14041:2004+AC:2005+AC:2006.

Base materials/Ancillary materials

The composition of a Vinyl floor covering in mass % is:

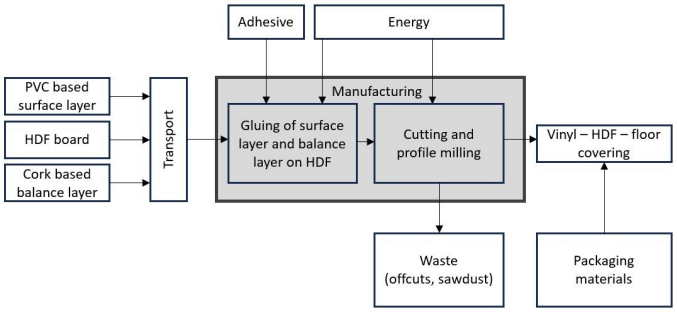
- 64 % High Density Fibre board (HDF)
- 31 % PVC
- 3 % Cork
- 2 % Adhesives

HDF (high-density fibreboard)
The core board is a HDF board composed of wood fibres and a thermosetting resin, mainly MUF (melamine-urea-formaldehyde) resin.
PVC based surface layer The surface layer consists of a transparent wear layer and a decorative layer.
Balance layer
The balance layer can consist of different material e.g. cork**.**

This product contains substances listed in the candidate list (date: 25.08.2023) exceeding 0.1 percentage by mass: **NO.**

Manufacturing

The illustration below describes the manufacturing process of the floor covering (simplified).



Packaging

As packaging materials mainly wooden pallets, cardboard and polyethylene-film are used. Wooden pallets can be used several times and can be recycled at the end of life. Cardboards and polyethylene-films can be fed into the recycling cycle in accordance with local regulations and possibilities and thus be reused.

Reference service life

The estimated service life of a floor covering depends e.g. on the type of floor covering and the area of application, the user and the maintenance of the product. Comparisons of different floor coverings are only allowed if these parameters are considered in a consistent way. A minimum service life of 20 years can be assumed, technical service life can be considerably longer (BNB refers to a service life of 20 years). The use stage is declared in this EPD for a one-year usage.

Extraordinary effect

Vinyl-HDF-floor coverings are normally in the reaction to fire class Cfl-s1 according to EN 13501-1.

Re-use phase

Vinyl-HDF-panels are installed loose laid and do have a high light resistance that delays a change in the decorative surface. They can thus be re-used in another flooring installation in case of careful and selective dismantling (damaged planks should be sorted out in any case).
Recycling solutions of the panels are not known in the moment. But all panels can be used for energy recovery in specific recovery facilities. A landfill of the material is not known.

Disposal

The European waste code is 17 02 03 (plastics).
If repeated use as floor coverings is no longer possible, the product can be sent for energy recovery to generate heat and electricity.
Open burning in a chimney is not possible, as the combustion of plastics leads to harmful emissions. Incineration should take place in a plant with a connected flue gas cleaning system, such as a waste incineration plant.
Dispose of in any case accordance with Federal, State and Local Waste Disposal Regulations.

LCA: Calculation rules

Declared Unit

Declared is 1 m^2 Vinyl- HDF- floor covering with the specifications listed in the table below.

Name	Value	Unit
Declared unit	1	m^2
Grammage	9.11	kg/m^2
Layer thickness	0.0095	m
Gross density	944	kg/m^3

The EPD declares an average of a specific product from factories of several manufacturers of floor coverings. The averaging was done by weighting according to the total production quantities of the manufacturers. The EPD is representative for the association MMFA. Regarding the variability of production data of the individual manufacturers, slight fluctuations can occur due to different production technologies, supply-chains and locations.

System boundary

Type of EPD: cradle to gate with options, modules A4, A5, B2, modules C1–C3, module D.

Modules A1-A3 include processes that provide materials and energy input for the system, manufacturing and transport processes up to the factory gate, as well as waste processing.

Module A4 includes transport of the floor covering to the place of installation (100km - truck diesel Euro 6).

Module A5 includes the incineration of packaging material. Installation efforts in form of offcuts or auxiliaries are not declared in the EPD.
For a simplified calculation of the environmental impact of 1 m² flooring including a certain amount of installation offcuts the values for the product stage (A1-A3), delivery (A4) and end of life (C, D) have to be multiplied with the amount of waste (e.g. 3% installation waste, factor 1.03).

Module B2 is including provision of cleaning agent, energy and water consumption for the cleaning of the floor covering incl. wastewater treatment. The LCA results in this EPD are declared for a one-year usage.

Module C1 considers manual deconstruction/ dismantling.

Module C2 includes transportation of post-consumer waste to a waste processing plant (50km - truck diesel Euro 6).

Module C3: 100% Incineration in a waste incineration plant in EU. The collection rate is set to 100%.

Module C4: As the product is incinerated at its end-of-life, this module is not relevant for this study and therefore not declared.

Module D includes potential benefits from all net flows given in modules A5 and C3 that leave the product boundary system after having passed the end-of-waste state in the form of recovery potential.

Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. The used database is LCA FE (GaBi) 2023, version 2023.1.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	2.719	kg C
Biogenic carbon content in accompanying packaging	0.086	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Transport to the construction site (A4)

Name	Value	Unit
Litres of fuel	0.03	l/100km
Transport distance	100	km
Capacity utilisation (including empty runs)	55	%

Maintenance (B2) per year

Name	Value	Unit
Water consumption	0.0068	m^3
Auxiliary (Detergent)	0.051	kg
Electricity consumption	0.0739	kWh

End of Life (C1-C3)

Name	Value	Unit
Collected separately waste type	9.11	kg
Waste materials for energy recovery	9,11	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

In module D, potential benefits from incineration processes in module A3, A5 and C3 are declared.

LCA: Results

The following tables display the LCA-results for 1 m² Vinyl- HDF- floor covering with a total thickness of 9.5 mm and a surface weight of 9.11 kg/m². LCA-results for module B2 declare a one-year usage.
The LCA-results are representative for MMFA Vinyl- HDF- floor coverings with the described product characteristics, including product composition and geographical scope, and a thickness within the range of the collected data (9.1 - 10 mm).

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	X	MNR	MNR	MNR	MND	MND	X	X	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² Vinyl- HDF- floor covering

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	D
GWP-total	kg CO_2 eq	5.73E+00	9.19E-02	3.42E-01	8.1E-02	0	3.9E-02	1.54E+01	-4.37E+00
GWP-fossil	kg CO_2 eq	1.56E+01	8.79E-02	4.84E-02	7.72E-02	0	3.73E-02	5.43E+00	-4.35E+00
GWP-biogenic	kg CO_2 eq	-9.82E+00	4.02E-03	2.94E-01	3.74E-03	0	1.7E-03	9.97E+00	-2.31E-02
GWP-luluc	kg CO_2 eq	9.84E-03	1.8E-06	2.06E-06	6.43E-06	0	7.61E-07	9.89E-04	-2.67E-04
ODP	kg CFC11 eq	5.73E-11	6.8E-15	4.07E-14	3.66E-13	0	2.88E-15	4.92E-12	-3.07E-11
AP	mol H^+ eq	4.28E-02	1.02E-04	6.73E-05	1.15E-04	0	4.53E-05	7.2E-03	-5.11E-03
EP-freshwater	kg P eq	3.47E-05	1.91E-08	1.18E-08	4.41E-06	0	8.1E-09	1.97E-06	-6.35E-06
EP-marine	kg N eq	1.3E-02	3.71E-05	2.17E-05	5.08E-05	0	1.69E-05	3.13E-03	-1.53E-03
EP-terrestrial	mol N eq	1.26E-01	4.21E-04	2.94E-04	3.75E-04	0	1.91E-04	3.78E-02	-1.64E-02
POCP	kg NMVOC eq	3.49E-02	9.64E-05	5.86E-05	1.4E-04	0	4.3E-05	8.07E-03	-4.28E-03
ADPE	kg Sb eq	1.88E-06	9.49E-10	3.74E-10	6.01E-09	0	4.02E-10	4.66E-08	-2.85E-07
ADPF	MJ	2.31E+02	1.27E+00	1.02E-01	1.78E+00	0	5.37E-01	1.04E+01	-7.85E+01
WDP	m^3 world eq deprived	2.56E+00	1.61E-04	3.86E-02	1.36E-02	0	6.8E-05	1.66E+00	-3.72E-01

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² Vinyl- HDF- floor covering

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	D
PERE	MJ	6.15E+01	5.34E-03	3.53E+00	1.39E-01	0	2.26E-03	1.03E+02	-2.1E+01
PERM	MJ	1.04E+02	0	-3.5E+00	0	0	0	-1E+02	0
PERT	MJ	1.65E+02	5.34E-03	2.49E-02	1.39E-01	0	2.26E-03	2.78E+00	-2.1E+01
PENRE	MJ	1.93E+02	1.27E+00	4.87E-01	1.8E+00	0	5.39E-01	4.89E+01	-7.86E+01
PENRM	MJ	3.9E+01	0	-3.86E-01	0	0	0	-3.86E+01	0
PENRT	MJ	2.32E+02	1.27E+00	1.02E-01	1.8E+00	0	5.39E-01	1.04E+01	-7.86E+01
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	7.72E-02	6.95E-06	9.09E-04	4.7E-04	0	2.94E-06	3.99E-02	-1.7E-02

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² Vinyl- HDF- floor covering

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	D
HWD	kg	3.45E-06	3.07E-12	2.35E-12	8.69E-11	0	1.3E-12	1.27E-10	-5E-09
NHWD	kg	3.31E-01	1.16E-04	1.11E-02	7.12E-03	0	4.9E-05	1.88E+00	-3.73E-02
RWD	kg	6.86E-03	1.44E-06	5.23E-06	1.22E-04	0	6.1E-07	4.29E-04	-5.56E-03
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0

MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	1.15E+00	0	5.09E-01	0	0	0	1.68E+01	0
EET	MJ	2.37E+00	0	9.17E-01	0	0	0	3.6E+01	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 m² Vinyl- HDF- floor covering

Parameter	Unit	A1-A3	A4	A5	B2	C1	C2	C3	D
PM	Disease incidence	6.8E-07	6.31E-10	4.41E-10	9.78E-10	0	3.42E-10	4.05E-08	-4.34E-08
IR	kBq U235 eq	9.25E-01	2.05E-04	8.18E-04	1.76E-02	0	8.67E-05	6.05E-02	-9.24E-01
ETP-fw	CTUe	7.83E+01	8.88E-01	5.04E-02	1.13E+00	0	3.76E-01	5.55E+00	-1.58E+01
HTP-c	CTUh	5.42E-08	1.64E-11	3.57E-12	3.13E-11	0	6.93E-12	3.29E-10	-8.47E-10
HTP-nc	CTUh	1.46E-07	6.74E-10	2.32E-10	2.49E-09	0	2.85E-10	2.59E-08	-2.69E-08
SQP	SQP	4.59E+02	4.04E-03	2.92E-02	1.19E-01	0	1.71E-03	2.96E+00	-1.38E+01

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

References

Standards

EN ISO 10874
EN ISO 10874:2012 + A1:2020, Resilient, textile and laminate floor coverings - Classification.

EN 13501-1

EN 13501-1:2019-01-14;Fire classification of construction products and building elements.

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EN 14041:2004+AC:2005+AC:2006, Resilient, textile and laminate floor coverings – Essential characteristics.

EN 15804
EN 15804:2012+A1 2013, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

EN 15804
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EN 16511
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EN ISO 20326
EN ISO 20326:2018 + A1:2020, Resilient floor coverings – Specification for floor panels/assembly for loose laying.

ISO 14025
EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

Further References

BNB
BBSR table (german): 'Nutzungsdauern von Bauteilen zur Lebenszyklusanalyse nach BNB', Bundesinstitut für Bau-, Stadt- und Raumforschung, Referat II Nachhaltiges Bauen; online available under: https://www.nachhaltigesbauen.de/austausch/nutzungsdauern-von-bauteilen/, 2017.

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PCR - Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019, version 1.3, Institut Bauen und Umwelt e.V., https://ibu-epd.com/, 2022.

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Publisher

Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Programme holder

Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Author of the Life Cycle Assessment

Sphera Solutions GmbH
Hauptstraße 111- 113
70771 Leinfelden-Echterdingen
Germany

+49 711 341817-0
info@sphera.com
www.sphera.com

Owner of the Declaration

MMFA - Multilayer Modular Flooring Association
Mittelstrasse 50
33602 Bielefeld
Germany

+32 2 788 3169
info@mmfa.eu
www.mmfa.eu

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

ter Hürne GmbH & Co. KG

Ramsdorfer Str. 5, Südlohn, Nordrhein-Westfalen 46354, Germany

For the following product(s):

Vinyl Tile:
Soya Design Vinyl Floor Perform/Solid + Friends by ter Hürne Rigid; Soya Design Vinyl Floor Pro + Friends by ter Hürne Dryback

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

FloorScore®

Indoor Air Quality Certified to SCS-105 Version 4.2 – 2023

Conforms to the CDPH/EHLB Standard Method v1.2-2017 (California Section 01350), effective April 1, 2017, for the school classroom and private office parameters when modeled as Flooring.

Measured Concentration of Total Volatile Organic Compounds (TVOC): Less than/equal to 0.5 mg/m3 (in compliance with CDPH/EHLB Standard Method v1.2-2017)

Registration # SCS-FS-08438

Valid from: August 01, 2024 to April 30, 2025

SCS Global Services is currently the only certification body approved by the Resilient Floor Covering Institute (RFCI) to provide FloorScore® product certification; certified products are only listed on the SCS Green Products Guide, http://www.scsglobalservices.com/certified-green-products-guide.

Nicole Munoz, Vice President, ECS
SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA

ter Hürne

VERIFIED by SCS Global Services
ENVIRONMENTAL PRODUCT DECLARATION
BASED ON LCA

Declaration Owner

ter Hürne GmbH & Co. KG
Ramsdorfer Str.5, 46354
Südlohn, Deutschland
www.terhuerne.com | info@terhuerne.com | +49 2862 701-0

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

Product

- Sōya Luxury Vinyl Tiles - Pro
- Sōya Luxury Vinyl Tiles - Solid
- Sōya Luxury Vinyl Tiles - Perform

(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-10256

EPD Valid September 24, 2024 through September 23, 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

SCSglobal SERVICES

Declaration Owner:	ter Hürne GmbH & Co. KG
Address:	Ramsdorfer Str.5, 46354 Südlohn, Deutschland
Declaration Number:	SCS-EPD-10256
Declaration Validity Period:	EPD Valid September 24, 2024 through September 23, 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:	

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.*

1. ter Hürne

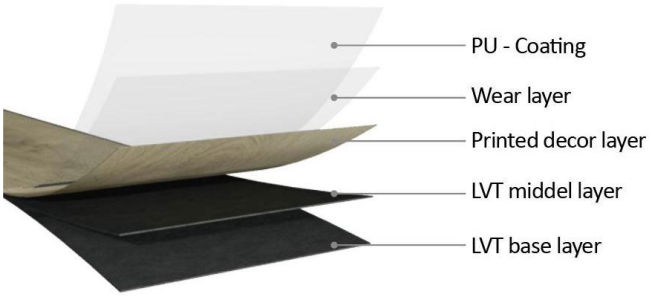
ter Hürne is a leading European hardwood engineered flooring manufacturer based in Südlohn in Münsterland. The family owned and run company, which was founded in 1959 and is now managed in the second generation, manufactures high quality products made in Germany and has approximately 300 employees at the site.

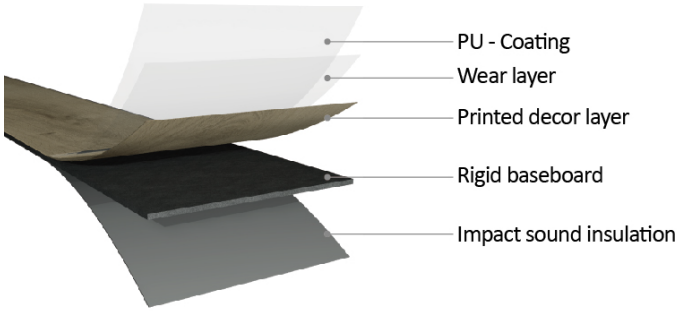
As a wood specialist ter Hürne focusses on innovative and attractive flooring solutions made of a multitude of materials and has established itself as a market leader in the sector on a national and international level. The product range extends from engineered hardwood floors, wood powder floors, laminate floors, wall and ceiling panels, and LVT floors to the PVC-free Avatara Design Floor.

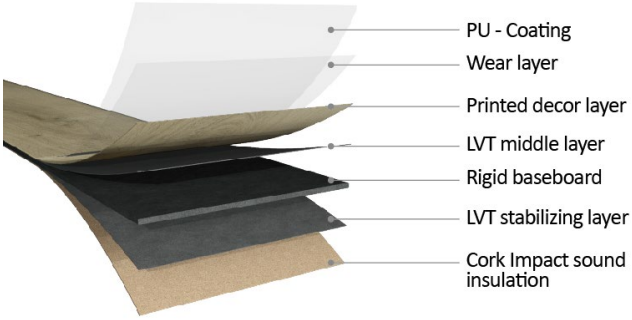
2. Product

2.1 PRODUCT DESCRIPTION

Product Name	Representative Thickness (mm)	Description
Sōya Pro	2.5 mm	Sōya Pro is completely elastic and thus designed for professional bonding. The adhesive bond between the product and the building structure not only produces perfect results in terms of walking comfort and soundproofing, but also in terms of water resistance.
Sōya Solid	4.0 mm	ter Hürne Sōya Solid is equipped with a rigid baseboard. In combination with the decorative and wear layers, this creates a robust, stable floor with high utility value. The synthetic walking sound insulation backing ensures comfort and pleasant acoustics. Solid offers water resistance and is installed as a floating floor.
Sōya Perform	6.0 mm	ter Hürne Sōya Perform features a wide range of beautiful flooring options for many applications. Sōya Perform includes an attached Cork pad, which greatly improves its sound reduction characteristics without requiring the use of a separate sound control product. It is constructed with a waterproof core, a durable wear layer, and proprietary AMP® (Aminomethyl Propanol) polyurethane coating, making it an ideal flooring product for multi-family units, condominiums, corporate offices and a variety of other residential and light commercial environments.







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			Construc-tion 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 SPC flooring product are summarized in Table 2 through Table 4.

Table 2. *Product characteristics for the **Sōya Pro** 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)

Table 3. *Product characteristics for the **Sōya Solid** 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			4.00 (0.16)	mm (in)	3.00 (0.12)	10.00 (0.39)
Wear layer thickness (where applicable)			0.30 (0.01)	mm (in)	0.15 (0.01)	0.70 (0.03)
Product weight			8,272 (27.1)	g/m^2 (oz/ft^2)	6,300 (20.6)	21,000 (68.8)
Product Form	Planks	Width	180.0 (7.09)	mm (in)	110.0 (4.33)	950.0 (37.4)
		Length	1.22 (4.00)	m (ft)	0.55 (1.80)	1.84 (6.04)

Table 4. *Product characteristics for the **Sōya Perform** flooring product.*

Characteristic			Description			
Sustainable certifications			CE, Floorscore, IAC Gold			
VOC emissions test method			French VOC, AgBB, ISO 16000, California Specification 01350			
Characteristic			**Average Value**	**Unit**	**Min Value**	**Max Value**
Product thickness			6.00 (0.24)	mm (in)	4.00 (0.16)	8.00 (0.31)
Wear layer thickness (where applicable)			0.50 (0.02)	mm (in)	0.30 (0.01)	0.70 (0.03)
Product weight			11,758 (38.5)	g/m^2 (oz/ft^2)	7,800 (25.6)	15,600 (51.1)
Product Form	Planks	Width	180.0 (7.09)	mm (in)	110.0 (4.33)	950.0 (37.4)
		Length	1.22 (4.00)	m (ft)	0.55 (1.80)	1.84 (6.04)

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.terhuerne.com/.

2.7 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

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

2.8 MATERIAL COMPOSITION

The SPC 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 5. *Material content for the flooring products in kg per square meter and percent of total mass*

Component	Renewable	Recycled Content (%)	Sōya Pro	Sōya Solid	Sōya Perform
PVC	No	0%	1.38	2.08	3.07
			31%	25%	26%
$CaCO_3$	No	0%	2.73	5.91	8.17
			61%	71%	69%
Plasticizer	No	0%	0.220	0.00	0.198
			4.9%	0%	1.7%
Stabilizer	No	0%	$8.50x10^{-3}$	0.00	0.00
			0.19%	0%	0%
Other	No	0%	0.138	0.283	0.326
			3.1%	3.4%	2.8%
Total Product			**4.48**	**8.27**	**11.8**
			100%	**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 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.

Table 6. *Material content for the flooring product packaging in kg per square meter of flooring.*

Component	Renewable	Recycled Content (%)	Sōya Pro	Sōya Solid	Sōya Perform
Corrugated	Yes	0%	0.124	$9.90x10^{-2}$	0.124
			31%	31%	31%
Plastic	No	0%	$6.04x10^{-3}$	$4.83x10^{-3}$	$6.04x10^{-3}$
			1.5%	1.5%	1.5%
Wood	Yes	0%	0.275	0.220	0.275
			68%	68%	68%
Total Packaging			**0.405**	**0.324**	**0.405**
			100%	**100%**	**100%**

[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.

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.terhuerne.com/.

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 6. 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 7.

Table 7. *Reference flow and RSL for the ESPC flooring products.*

Product Name	Reference Flow (kg/m^2)	Reference Service Life – RSL (years)	Replacement Cycle (ESL/RSL-1)
Sōya Pro	4.88	25	2.0
Sōya Solid	8.60	25	2.0
Sōya Perform	12.16	25	2.0

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. The life cycle phases included in the EPD scope are described in Table 8 and illustrated in Figure 1 and Figure 2.

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.

Table 8. *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.

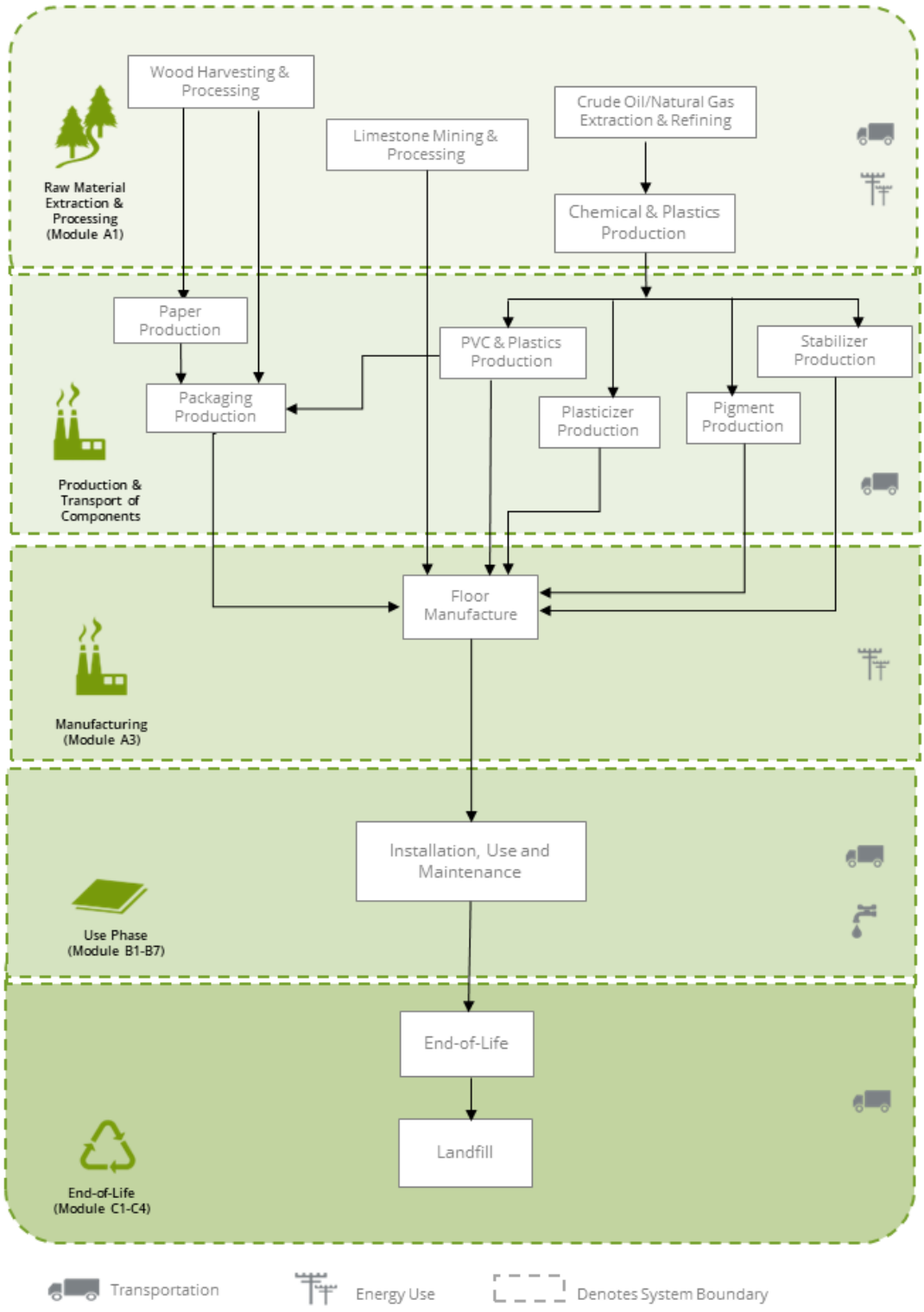


Figure 1. *Flow diagram for the life cycle of the flooring products (**Sōya Pro; Sōya Perform**)*

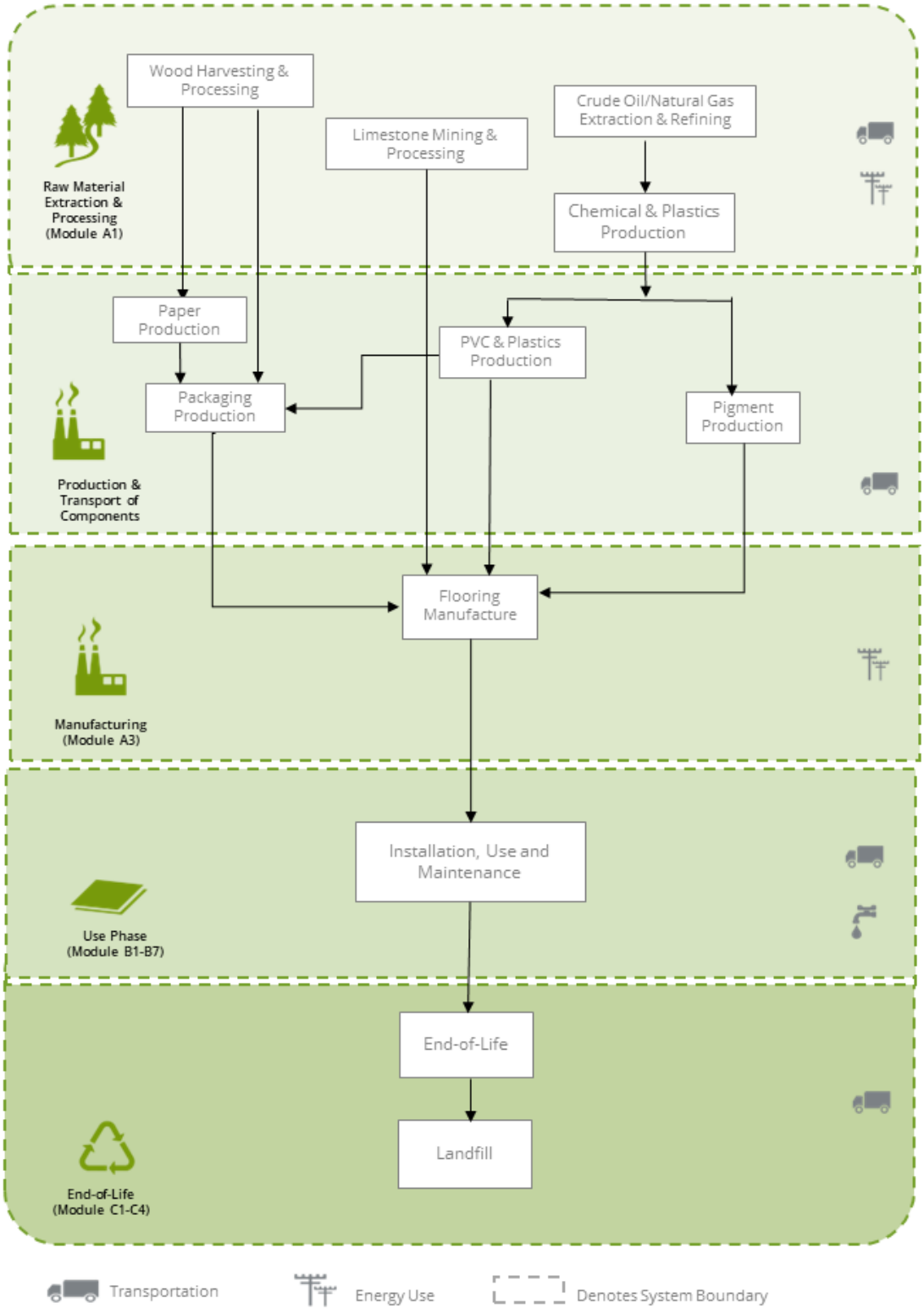


Figure 2. *Flow diagram for the life cycle of the SPC flooring products (**Sōya Solid**).*

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 production facility under review is located in 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 8. *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

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 9. *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 11.

Table 11. *Product distribution parameters by transport mode.*

Parameter	Unit	Sōya Pro	Sōya Solid	Sōya Perform
Truck transport				
Fuel type	-	Diesel	Diesel	Diesel
Liters of fuel	L/100km	18.7	18.7	18.7
Vehicle type	-	Diesel truck	Diesel truck	Diesel truck
Transport distance	km	558	58	558
Capacity utilization	%	76	76	76
Gross density of products transported	kg/m^3	1,952	2,149	2,027
Weight of products transported	kg	4.88	8.60	12.2
Ocean transport				
Fuel type	-	Fuel oil	Fuel oil	Fuel oil
Liters of fuel	L/tkm	2.23	2.23	2.23
Vehicle type	-	Ocean freighter	Ocean freighter	Ocean freighter
Transport distance	km	18,383	18,383	18,383
Capacity utilization	%	70	70	70
Gross density of products transported	kg/m^3	1,952	2,149	2,027
Weight of products transported	kg	4.88	8.60	12.2

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 12.

Table 12. *Installation parameters for the flooring products, per 1 m^2.*

Parameter		Sōya Pro	Sōya Solid	Sōya Perform
Ancillary materials (kg)		neg.	neg.	neg.
Net freshwater consumption (m^3)		-	-	-
Electricity consumption (kWh)		-	-	-
Product loss per functional unit (kg)		0.179	0.331	0.470
Waste materials generated by product installation (kg)		0.179	0.331	0.470
Output materials resulting from on-site waste processing (kg)				n/a
Mass of packaging waste (kg)	Corrugated	0.124	0.124	0.124
	Plastic	$6.04x10^{-3}$	$6.04x10^{-3}$	$6.04x10^{-3}$
	Wood	0.275	0.275	0.275
Biogenic carbon contained in packaging (kg CO_2)		0.731	0.731	0.731
Direct emissions (kg)		-	-	

Use stage (B1)

No impacts are associated with the use of the products 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 13.

Table 13. *Maintenance parameters for the flooring products, per 1 m^2.*

Parameter	Unit	Sōya Pro	Sōya Solid	Sōya Perform
Maintenance cycle	Cycles / RSL	1,300	1,300	1,300
Maintenance cycle	Cycles / ESL	3,900	3,900	3,900
Maintenance process	-	Damp mopping	Damp mopping	Damp mopping
Net freshwater consumption	$m^3/m^2/yr$	0.0058	0.0058	0.0058
Cleaning agent	$kg/m^2/yr$	0.0119	0.0119	0.0119
Maintenance process	-	Machine cleaning	Machine cleaning	Machine cleaning
Electricity	$kWh/m^2/yr$	0.022	0.022	0.022
Further assumptions	-	Moderate traffic; weekly maintenance	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 14.

Table 14. *Product replacement parameters for the flooring products, per 1 m^2.*

Parameter	Units	Sōya Pro	Sōya Solid	Sōya Perform
Reference service life	Years	25	25	25
Replacement cycle	-	2,0	2.0	2.0
Energy input	kWh	-	-	-
Freshwater consumption	m^3	-	-	-
Ancillary materials	kg	--	-	-
Replacement parts	kg	9,76	17.19	24.33
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 15.

Table 15. *End-of-life disposal scenario parameters for the flooring product.*

Parameter	Sōya Pro	Sōya Solid	Sōya Perform
Assumptions for scenario development	100% landfill	100% landfill	100% landfill
Collection process			
Collected with mixed construction waste (kg)	4.88	8.0	12.16
Recovery	n/a	n/a	n/a
Landfill disposal (kg)	4.88	8.60	12.16
Removals of biogenic carbon (kg CO_2 eq)[1]	n/a	n/a	n/a

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

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 16. *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.* ***(Sōya Pro)***

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 CO2 eq)	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 (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

Table 17. *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.* ***(Sōya Pro)***

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 18. *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.* ***(Sōya Pro)***

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

Table 19. *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.* ***(Sōya Pro)***

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 20. *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.* ***(Sōya Solid)***

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 CO2 eq)	GWP-GHG (IPCC AR6)	Acidification (mol H+ eq)	Eutrophication, freshwater (kg P 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	7.07	$3.15x10^{-2}$	7.03	$6.43x10^{-3}$	6.78	$3.27x10^{-2}$	$1.93x10^{-3}$	$6.21x10^{-3}$	$6.65x10^{-2}$	$3.25x10^{-6}$	$2.42x10^{-2}$	$2.80x10^{-7}$
	11%	0.17%	16%	19%	12%	10%	23%	5.1%	7.5%	31%	8.1%	12%
A2	0.414	$1.79x10^{-4}$	0.414	$2.11x10^{-4}$	0.403	$1.78x10^{-3}$	$3.29x10^{-5}$	$6.53x10^{-4}$	$6.98x10^{-3}$	$6.41x10^{-9}$	$2.40x10^{-3}$	$2.71x10^{-8}$
	0.67%	0.00098%	0.94%	0.61%	0.74%	0.55%	0.39%	0.54%	0.78%	0.061%	0.8%	1.2%
A3	0.612	$3.39x10^{-2}$	0.576	$1.41x10^{-3}$	0.849	$1.62x10^{-3}$	$1.02x10^{-4}$	$1.49x10^{-3}$	$4.55x10^{-3}$	$2.66x10^{-8}$	$2.39x10^{-3}$	$2.67x10^{-8}$
	0.99%	0.19%	1.3%	4%	1.6%	0.5%	1.2%	1.2%	0.51%	0.25%	0.8%	1.2%
A4	2.57	$1.57x10^{-4}$	2.57	$1.71x10^{-3}$	2.51	$5.18x10^{-2}$	$1.28x10^{-4}$	$1.34x10^{-2}$	0.148	$3.88x10^{-8}$	$4.11x10^{-2}$	$1.07x10^{-7}$
	4.1%	0.00086%	5.9%	4.9%	4.6%	16%	1.5%	11%	17%	0.37%	14%	4.7%
A5	0.954	0.426	0.527	$4.08x10^{-4}$	0.729	$4.01x10^{-3}$	$9.49x10^{-5}$	$1.69x10^{-3}$	$1.12x10^{-2}$	$1.34x10^{-7}$	$3.71x10^{-3}$	$2.81x10^{-8}$
	1.5%	2.3%	1.2%	1.2%	1.3%	1.2%	1.1%	1.4%	1.3%	1.3%	1.2%	1.2%
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	$1.54x10^{-2}$	$1.13x10^{-3}$	$2.65x10^{-3}$	$2.74x10^{-2}$	$2.50x10^{-8}$	$1.43x10^{-2}$	$1.26x10^{-7}$
	5.1%	0.2%	7.1%	8.8%	5.6%	4.7%	14%	2.2%	3.1%	0.24%	4.8%	5.5%
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	39.3	12.1	27.1	$2.11x10^{-2}$	34.3	0.207	$4.84x10^{-3}$	$7.95x10^{-2}$	0.577	$6.97x10^{-6}$	0.190	$1.44x10^{-6}$
	63%	67%	62%	61%	63%	64%	58%	65%	65%	67%	63%	63%
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	1.89	$3.94x10^{-4}$	1.88	$2.33x10^{-4}$	1.83	$1.01x10^{-2}$	$3.45x10^{-5}$	$4.38x10^{-3}$	$4.74x10^{-2}$	$2.88x10^{-8}$	$1.85x10^{-2}$	$2.32x10^{-7}$
	3%	0.0022%	4.3%	0.67%	3.4%	3.1%	0.41%	3.6%	5.3%	0.28%	6.2%	10%
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	6.12	5.56	0.560	$1.54x10^{-4}$	4.03	$1.24x10^{-3}$	$1.02x10^{-4}$	$1.19x10^{-2}$	$3.71x10^{-3}$	$2.77x10^{-9}$	$2.56x10^{-3}$	$1.71x10^{-8}$
	9.9%	31%	1.3%	0.44%	7.4%	0.38%	1.2%	9.8%	0.42%	0.026%	0.86%	0.75%
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

Table 21. *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.* ***(Sōya Solid)***

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	110,000	$5.16x10^{-7}$	$1.30x10^{-6}$	$9.87x10^{-10}$	147	$6.83x10^{-5}$	-1.22
	6.2%	16%	8.1%	5.3%	19%	26%	-7.9%
A2	1,780	$2.78x10^{-8}$	$5.55x10^{-8}$	$1.37x10^{-10}$	5.73	$1.30x10^{-6}$	$2.95x10^{-2}$
	0.099%	0.84%	0.35%	0.74%	0.75%	0.49%	0.19%
A3	35,200	$5.00x10^{-8}$	$3.00x10^{-7}$	$3.99x10^{-9}$	7.53	$1.13x10^{-6}$	-0.576
	2%	1.5%	1.9%	22%	0.99%	0.42%	-3.7%
A4	6,460	$1.53x10^{-7}$	$1.95x10^{-7}$	$3.63x10^{-10}$	32.6	$4.50x10^{-6}$	0.116
	0.36%	4.6%	1.2%	2%	4.3%	1.7%	0.76%
A5	27,400	$4.21x10^{-8}$	$2.26x10^{-7}$	$2.34x10^{-10}$	8.85	$3.08x10^{-6}$	$-5.91x10^{-2}$
	1.5%	1.3%	1.4%	1.3%	1.2%	1.2%	-0.38%
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
	2.8%	6.6%	3.6%	2.7%	10%	9.7%	130%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	$1.16x10^{6}$	$2.06x10^{-6}$	$1.03x10^{-5}$	$1.20x10^{-8}$	458	$1.60x10^{-4}$	-3.12
	65%	62%	64%	65%	60%	60%	-20%
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	1,720	$3.53x10^{-8}$	$7.60x10^{-8}$	$8.66x10^{-11}$	23.9	$1.18x10^{-6}$	$4.81x10^{-2}$
	0.096%	1.1%	0.48%	0.47%	3.1%	0.45%	0.31%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	398,000	$2.06x10^{-7}$	$2.99x10^{-6}$	$2.20x10^{-10}$	2.66	$4.39x10^{-7}$	0.102
	22%	6.2%	19%	1.2%	0.35%	0.17%	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 22. *Resource use for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.* ***(Sōya Solid)***

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	5.64	0.00	5.64	ND	ND	147	0.00	0.00	0.00	0.499
	12%	0%	12%			0%	0%	0%	0%	21%
A2	$7.29x10^{-2}$	0.00	$7.29x10^{-2}$	ND	ND	5.73	0.00	0.00	0.00	$4.37x10^{-3}$
	0.15%	0%	0.15%			0%	0%	0%	0%	0.18%
A3	7.79	0.00	7.79	ND	ND	7.53	0.00	0.00	0.00	$1.18x10^{-2}$
	16%	0%	16%			0%	0%	0%	0%	0.49%
A4	0.304	0.00	0.304	ND	ND	32.6	0.00	0.00	0.00	$1.79x10^{-2}$
	0.63%	0%	0.63%			0%	0%	0%	0%	0.75%
A5	0.562	0.00	0.562	ND	ND	8.85	0.00	0.00	0.00	$2.20x10^{-2}$
	1.2%	0%	1.2%			0%	0%	0%	0%	0.92%
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
	9.7%	0%	9.7%			0%	0%	0%	0%	29%
B3	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B4	29.2	0.00	29.2	ND	ND	458	0.00	0.00	0.00	1.14
	60%	0%	60%			0%	0%	0%	0%	48%
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	$9.44x10^{-2}$	0.00	$9.44x10^{-2}$	ND	ND	23.9	0.00	0.00	0.00	$8.52x10^{-3}$
	0.19%	0%	0.19%			0%	0%	0%	0%	0.36%
C3	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
C4	0.110	0.00	0.110	ND	ND	2.66	0.00	0.00	0.00	$5.32x10^{-3}$
	0.23%	0%	0.23%			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

Table 23. *Waste and outflows for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.* ***(Sōya Solid).***

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	$2.32x10^{-4}$	0.790	$1.11x10^{-4}$	0.00	0.00	0.00	0.00
	11%	2.3%	0%	0%	0%	0%	0%
A2	$3.70x10^{-5}$	0.278	$1.16x10^{-6}$	0.00	0.00	0.00	0.00
	1.7%	0.82%	0%	0%	0%	0%	0%
A3	$3.21x10^{-5}$	0.556	$3.33x10^{-6}$	0.00	0.00	0.00	0.00
	1.5%	1.6%	0%	0%	0%	0%	0%
A4	$1.81x10^{-4}$	0.678	$4.77x10^{-6}$	0.00	0.00	0.00	0.00
	8.5%	2%	0%	0%	0%	0%	0%
A5	$2.67x10^{-5}$	0.512	$5.00x10^{-6}$	0.00	0.174	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
	3%	0.66%	0%	0%	0%	0%	0%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	$1.37x10^{-3}$	22.5	$2.58x10^{-4}$	0.00	0.348	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	$1.62x10^{-4}$	0.121	$1.74x10^{-6}$	0.00	0.00	0.00	0.00
	7.6%	0.36%	0%	0%	0%	0%	0%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	$1.58x10^{-5}$	8.30	$2.09x10^{-6}$	0.00	0.00	0.00	0.00
	0.74%	24%	0%	0%	0%	0%	0%
D	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 24. *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.* ***(Soya Perform)***

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 CO2 eq)	GWP-GHG (IPCC AR6)	Acidification (mol H+ eq)	Eutrophication, freshwater (kg P 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	11.1	$4.86x10^{-2}$	11.0	$1.02x10^{-2}$	10.6	$5.03x10^{-2}$	$3.01x10^{-3}$	$9.60x10^{-3}$	0.102	$6.53x10^{-6}$	$3.85x10^{-2}$	$4.31x10^{-7}$
	12%	0.19%	17%	20%	14%	11%	25%	5.5%	8%	31%	9%	13%
A2	0.579	$2.49x10^{-4}$	0.578	$2.94x10^{-4}$	0.563	$2.48x10^{-3}$	$4.60x10^{-5}$	$9.11x10^{-4}$	$9.75x10^{-3}$	$8.95x10^{-9}$	$3.35x10^{-3}$	$3.79x10^{-8}$
	0.65%	0.00097%	0.91%	0.58%	0.72%	0.53%	0.38%	0.53%	0.77%	0.043%	0.78%	1.2%
A3	0.734	$9.50x10^{-2}$	0.638	$1.74x10^{-3}$	1.02	$1.94x10^{-3}$	$1.22x10^{-4}$	$1.92x10^{-3}$	$5.47x10^{-3}$	$3.16x10^{-8}$	$2.74x10^{-3}$	$3.28x10^{-8}$
	0.82%	0.37%	1%	3.5%	1.3%	0.42%	1%	1.1%	0.43%	0.15%	0.64%	1%
A4	3.64	$2.22x10^{-4}$	3.64	$2.42x10^{-3}$	3.55	$7.34x10^{-2}$	$1.81x10^{-4}$	$1.90x10^{-2}$	0.209	$5.48x10^{-8}$	$5.82x10^{-2}$	$1.52x10^{-7}$
	4.1%	0.00087%	5.7%	4.8%	4.5%	16%	1.5%	11%	16%	0.26%	14%	4.6%
A5	1.35	0.586	0.767	$6.08x10^{-4}$	1.05	$5.74x10^{-3}$	$1.45x10^{-4}$	$2.39x10^{-3}$	$1.58x10^{-2}$	$2.67x10^{-7}$	$5.27x10^{-3}$	$3.93x10^{-8}$
	1.5%	2.3%	1.2%	1.2%	1.3%	1.2%	1.2%	1.4%	1.2%	1.3%	1.2%	1.2%
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	$1.54x10^{-2}$	$1.13x10^{-3}$	$2.65x10^{-3}$	$2.74x10^{-2}$	$2.50x10^{-8}$	$1.43x10^{-2}$	$1.26x10^{-7}$
	3.6%	0.14%	4.9%	6.1%	3.9%	3.3%	9.3%	1.5%	2.2%	0.12%	3.3%	3.8%
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	57.3	17.1	40.2	$3.16x10^{-2}$	50.1	0.300	$7.40x10^{-3}$	0.114	0.830	$1.39x10^{-5}$	0.276	$2.09x10^{-6}$
	64%	67%	63%	63%	64%	64%	60%	66%	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	2.68	$5.60x10^{-4}$	2.68	$3.32x10^{-4}$	2.61	$1.43x10^{-2}$	$4.90x10^{-5}$	$6.23x10^{-3}$	$6.74x10^{-2}$	$4.10x10^{-8}$	$2.64x10^{-2}$	$3.29x10^{-7}$
	3%	0.0022%	4.2%	0.66%	3.3%	3.1%	0.4%	3.6%	5.3%	0.2%	6.2%	10%
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	8.59	7.79	0.799	$2.17x10^{-4}$	5.67	$1.76x10^{-3}$	$1.43x10^{-4}$	$1.67x10^{-2}$	$5.26x10^{-3}$	$3.93x10^{-9}$	$3.61x10^{-3}$	$2.42x10^{-8}$
	9.6%	30%	1.3%	0.43%	7.3%	0.38%	1.2%	9.7%	0.41%	0.019%	0.84%	0.74%
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

Table 25. *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.* ***(Soya Perform)***

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	173,000	$8.10x10^{-7}$	$2.01x10^{-6}$	$1.50x10^{-9}$	232	$1.05x10^{-4}$	-1.62
	6.8%	17%	8.8%	6.2%	21%	27%	-11%
A2	2,490	$3.88x10^{-8}$	$7.75x10^{-8}$	$1.91x10^{-10}$	8.00	$1.82x10^{-6}$	$4.12x10^{-2}$
	0.098%	0.81%	0.34%	0.78%	0.72%	0.46%	0.28%
A3	47,600	$6.18x10^{-8}$	$3.96x10^{-7}$	$4.99x10^{-9}$	8.30	$1.33x10^{-6}$	-0.552
	1.9%	1.3%	1.7%	21%	0.75%	0.34%	-3.8%
A4	9,140	$2.16x10^{-7}$	$2.76x10^{-7}$	$5.13x10^{-10}$	46.1	$6.36x10^{-6}$	0.165
	0.36%	4.5%	1.2%	2.1%	4.1%	1.6%	1.1%
A5	39,500	$6.21x10^{-8}$	$3.25x10^{-7}$	$3.08x10^{-10}$	13.2	$4.69x10^{-6}$	$-6.94x10^{-2}$
	1.5%	1.3%	1.4%	1.3%	1.2%	1.2%	-0.48%
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%	4.6%	2.5%	2.1%	6.8%	6.6%	140%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	$1.67x10^{6}$	$3.06x10^{-6}$	$1.48x10^{-5}$	$1.59x10^{-8}$	691	$2.44x10^{-4}$	-3.65
	65%	64%	65%	65%	62%	62%	-25%
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	2,450	$5.02x10^{-8}$	$1.08x10^{-7}$	$1.23x10^{-10}$	34.0	$1.68x10^{-6}$	$6.84x10^{-2}$
	0.096%	1%	0.47%	0.51%	3.1%	0.43%	0.47%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	559,000	$2.90x10^{-7}$	$4.21x10^{-6}$	$3.13x10^{-10}$	3.77	$6.20x10^{-7}$	0.145
	22%	6%	18%	1.3%	0.34%	0.16%	0.99%
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 26. *Resource use for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.* ***(Soya Perform)***

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	8.93	0.00	8.93	ND	ND	232	0.00	0.00	0.00	0.768
	14%	0%	14%			0%	0%	0%	0%	23%
A2	0.102	0.00	0.102	ND	ND	8.00	0.00	0.00	0.00	$6.11x10^{-3}$
	0.16%	0%	0.16%			0%	0%	0%	0%	0.19%
A3	9.73	0.00	9.73	ND	ND	8.30	0.00	0.00	0.00	$1.43x10^{-2}$
	15%	0%	15%			0%	0%	0%	0%	0.44%
A4	0.430	0.00	0.430	ND	ND	46.1	0.00	0.00	0.00	$2.53x10^{-2}$
	0.66%	0%	0.66%			0%	0%	0%	0%	0.77%
A5	0.781	0.00	0.781	ND	ND	13.2	0.00	0.00	0.00	$3.35x10^{-2}$
	1.2%	0%	1.2%			0%	0%	0%	0%	1%
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
	7.2%	0%	7.2%			0%	0%	0%	0%	21%
B3	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
B4	40.5	0.00	40.5	ND	ND	691	0.00	0.00	0.00	1.73
	62%	0%	62%			0%	0%	0%	0%	53%
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	0.134	0.00	0.134	ND	ND	34.0	0.00	0.00	0.00	$1.21x10^{-2}$
	0.2%	0%	0.2%			0%	0%	0%	0%	0.37%
C3	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00
C4	0.155	0.00	0.155	ND	ND	3.77	0.00	0.00	0.00	$7.50x10^{-3}$
	0.24%	0%	0.24%			0%	0%	0%	0%	0.23%
D	0.00	0.00	0.00	ND	ND	0.00	0.00	0.00	0.00	0.00

Table 27. *Waste and outflows for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values.* ***(Soya Perform)***

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	$3.72x10^{-4}$	1.19	$1.74x10^{-4}$	0.00	0.00	0.00	0.00
	12%	2.5%	0%	0%	0%	0%	0%
A2	$5.17x10^{-5}$	0.389	$1.62x10^{-6}$	0.00	0.00	0.00	0.00
	1.7%	0.81%	0%	0%	0%	0%	0%
A3	$3.50x10^{-5}$	0.753	$4.03x10^{-6}$	0.00	0.00	0.00	0.00
	1.1%	1.6%	0%	0%	0%	0%	0%
A4	$2.56x10^{-4}$	0.960	$6.75x10^{-6}$	0.00	0.00	0.00	0.00
	8.3%	2%	0%	0%	0%	0%	0%
A5	$3.81x10^{-5}$	0.714	$7.72x10^{-6}$	0.00	0.218	0.00	0.00
	1.2%	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
	2.1%	0.47%	0%	0%	0%	0%	0%
B3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B4	$2.01x10^{-3}$	31.9	$4.00x10^{-4}$	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	$2.31x10^{-4}$	0.172	$2.48x10^{-6}$	0.00	0.00	0.00	0.00
	7.5%	0.36%	0%	0%	0%	0%	0%
C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	$2.24x10^{-5}$	11.8	$2.94x10^{-6}$	0.00	0.00	0.00	0.00
	0.73%	24%	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.

7. References

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For more information, contact:

ter Hürne GmbH & Co. KG
Ramsdorfer Str.5, 46354 Südlohn, Deutschland
www.terhuerne.com | info@terhuerne.com | +49 2862 701-0

SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA
Main +1.510.452.8000 | fax +1.510.452.8001

Certificate

Indoor Air Comfort Gold

Pro, Solid, Perform

Certified Product

ter Hürne GmbH & Co. KG

Ramsdorfer Str. 5, 46354 Südlohn, Germany

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: 19 April 2024

Validity date: 19 June 2025

Product type: Resilient Floorings

Certificate number: IACG-469-02-02-2024

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

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PROD Reg.no. 7054
Member EA MLA