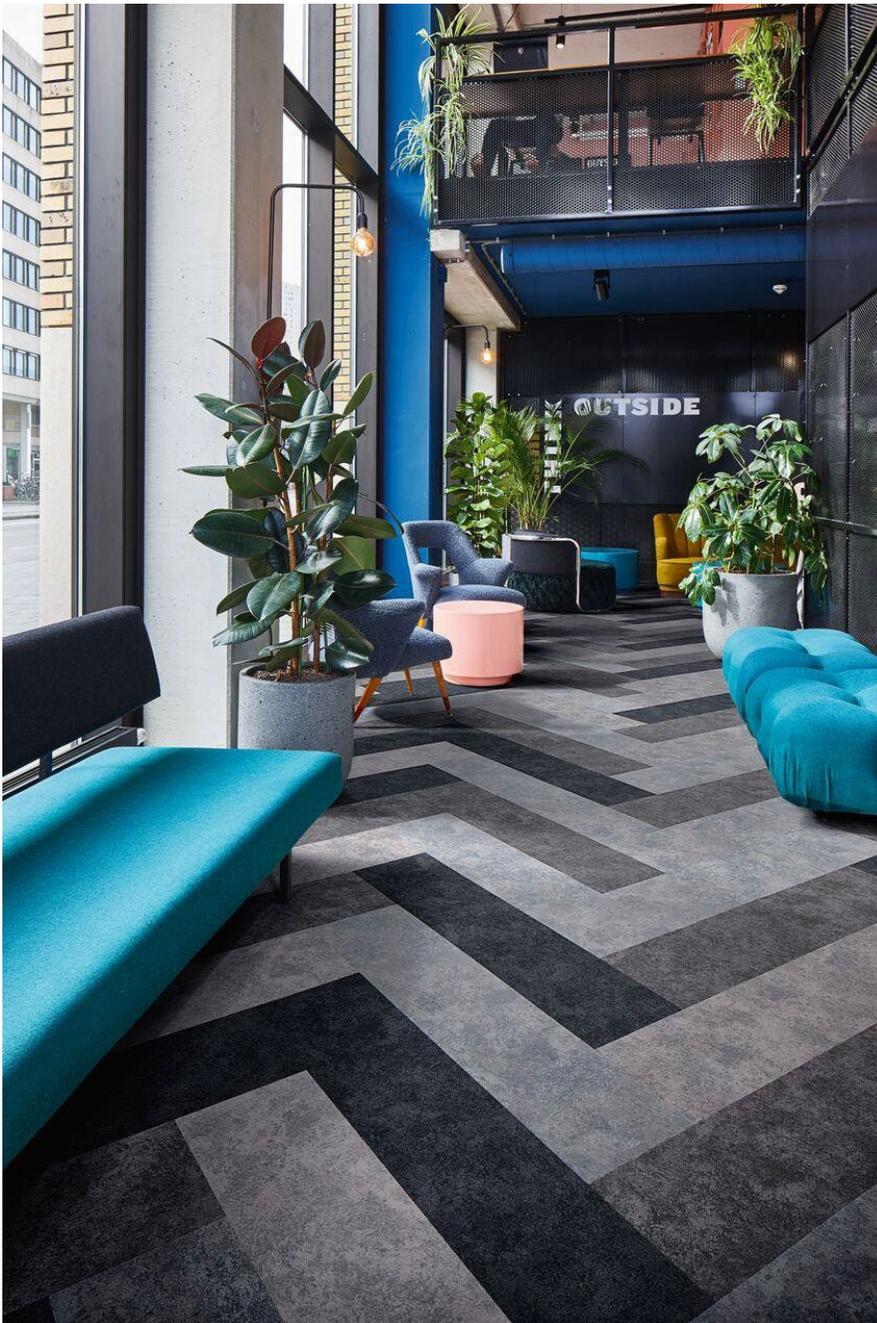


ENVIRONMENTAL PRODUCT DECLARATION

FLOTEX ACOUSTICPLUS TILE & PLANK

FORBO FLOORING SYSTEMS
FLOCKED FLOOR COVERING

Flotex AcousticPlus: Calgary Cement 990012, Calgary Grey 990002,
Calgary Ash 990010



FLOORING SYSTEMS

Flotex is a unique, textile, flocked floor covering, combining the cleaning properties and durability of a resilient flooring with the comfort, slip resistance and acoustic properties usually associated with textiles. It is made by electrostatically flocking 80 million nylon fibres into a watertight backing, resulting in a floor covering that is strong, hygienic, and completely waterproof. Flotex can be rotary or digitally printed, the latter allowing for high-definition quality. It has been proven to contribute towards better indoor air quality and is the only textile floorcovering that carries the Allergy UK seal or approval.

Forbo was the first flooring manufacturer to publish a complete Life Cycle Assessment (LCA) report verified by CML in 2000 to create full transparency that is independently evaluated. To offer further transparency this EPD is also including additional information to show the impacts on human health and eco-toxicity.

For more information visit;

www.forbo-flooring.com



ENVIRONMENTAL PRODUCT DECLARATION



FLOORING SYSTEMS

Flotex AcousticPlus Tile / Plank
Flocked Floor Covering

According to ISO 14025 and EN 15804

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPD's rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPD's do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCA's do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPD's 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: EPD's regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPD's are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPD's from different programs may not be comparable.



PROGRAM OPERATOR	UL Environment 333 Pfingsten Road Northbrook, IL 60611	
DECLARATION HOLDER	Forbo Flooring B.V. Industrieweg 12 P.O. Box 13 NL-1560 AA Krommenie	
DECLARATION NUMBER	4790391233.102.1	
DECLARED PRODUCT	Flotex AcousticPlus Tile & Plank Flocked Floor Covering	
REFERENCE PCR	EN 15804+A2: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products	
DATE OF ISSUE	April 1, 2023	
PERIOD OF VALIDITY	5 Years	
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications	
The PCR review was conducted by:	European Standards	
	CSN EN 15804+A2	
	info@en-standard.eu	
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories		

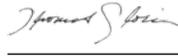
ENVIRONMENTAL PRODUCT DECLARATION



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Flotex AcousticPlus Tile/Plank
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<input type="checkbox"/> INTERNAL	<input checked="" type="checkbox"/> EXTERNAL	Cooper McCollum, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:		
		Thomas P. Gloria, Industrial Ecology Consultants

This EPD conforms with EN 15804



ENVIRONMENTAL PRODUCT DECLARATION



FLOORING SYSTEMS

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According to ISO 14025 and EN 15804

1 Product Definition

1.1 Description of Company/Organization

Forbo Flooring Systems has mastered the craft of manufacturing Flotex over the last 30 years and has been driving this development experience through in its Flotex brand. Flotex is made in Ripley in the United Kingdom. The manufacturing location is a state-of-the-art production site that is making sheet, tiles and planks in hundreds of different designs and colours.

Making Flotex has always been done in a way to achieve the lowest carbon footprint; the starting point for innovation and development. The Forbo organization has key environmental focus areas to displaying a carbon-negative product portfolio, using renewable electricity, becoming a zero-waste company and actively contributing to the circular economy.

For its complete manufacturing of Flotex, Forbo holds all the main certifications. For environmental performance **ISO 14001**, for quality **ISO 9001**, **SA8000** for social accountability and **ISO 45001** for Occupational Health and Safety Management Systems. In addition, Flotex is the only textile floor covering to receive the **Allergy UK Seal of Approval™**.

1.2 Product Classification and description

This declaration covers a wide range of designs and colorways for Flotex products that are manufactured and printed using both rotary and digital print methods. Flotex is suitable for any commercial specification.

Flotex is a unique, textile, flocked floor covering, combining the cleaning properties and durability of a resilient flooring with the comfort, slip resistance and acoustic properties usually associated with textiles. It is made by electrostatically flocking 80 million nylon fibres into a watertight backing, resulting in a floor covering that is strong, hygienic, and completely waterproof. Flotex can be rotary or digitally printed, the latter allowing for high-definition quality. It has been proven to contribute towards better indoor air quality and is the only textile floorcovering that carries the Allergy UK seal of approval. Flotex complies with all requirements of EN1307: Textile Floor Coverings – Classification of Pile Carpets.

This declaration refers to Flotex AcousticPlus Tile/Plank covering a broad range of designs and colors :

Flotex Colour, Flotex Linear, Flotex Planks Digital and Flotex Planks Conventional

Flotex AcousticPlus Tile/Plank is comprised of a Nylon 6.6 pile above a glass fiber reinforced backing with a recycled polyester acoustic backing. This special backing increases the impact sound reduction to a total of 22 dB and offers a sound absorption of 0.25 which is comparable to most commonly used carpet sheet and tiles. Next to sound absorption, Flotex AcousticPlus Tile/Plank offers a very good shock absorption. This is relevant for areas where people are standing for a long time and where underfoot comfort is important.



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FLOORING SYSTEMS

Flotex AcousticPlus Tile/Plank
Flocked Floor Covering

According to ISO 14025 and EN 15804

Flotex AcousticPlus Tile/Plank is built up in 5 layers as illustrated in the following image:

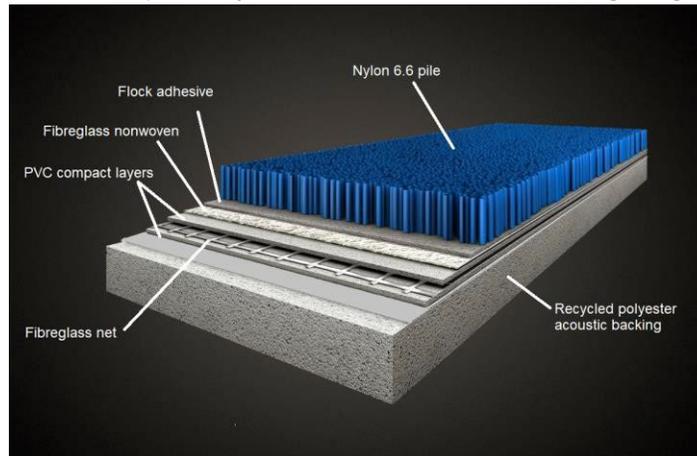


Figure 1: Typical construction

- 1. Surface pile layer (Nylon 6.6):** This layer gives Flotex AcousticPlusTile/Plank its design, colour and wear properties.
- 2. Adhesive layer:** This layer bonds the surface layer to the backing
- 3. Glass fibre layer:** This layer provides strength and dimensional stability to the product
- 4. Lamination layer:** This layer bonds the polyester acoustic backing to the tile-top
- 5. Fibreglass net:** This layer gives dimensional stability to the product
- 6. Recycled Polyester backing:** This layer is composed of 85% recycled polyester fibre and provides acoustic properties

This declaration refers to the declared/functional unit of 1 m² installed flooring product.

ENVIRONMENTAL PRODUCT DECLARATION



FLOORING SYSTEMS

Flotex AcousticPlus Tile/Plank
Flocked Floor Covering

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1.3 Range of application

Flotex AcousticPlus Tile/Plank is classified in accordance with EN1307 to be installed in the following use areas defined in EN-ISO 10874:

Area of application	Flotex AcousticPlus Tile/Plank
Domestic	Class 23 
Commercial	Class 33 

1.4 Product Standard

The product considered in this EPD has the following technical specifications:

- Meets or exceeds all requirements of EN1307: Textile Floor Coverings - Classification of Pile Carpets.

Flotex AcousticPlus Tile/Plank meets the requirements of EN 14041 and BS EN 14041



EN 13501-1	Reaction to fire	B _{fl} - s1
EN 13893	Slip resistance	DS: ≥ 0.30
ISO 6356	Body voltage	< 2 kV
ISO 8302	Thermal conductivity	0.0818 m ² K/W

Fire Testing:

- Class 1 when tested in accordance with ASTM E 648/NFPA 253, Standard Test Method for Critical Radiant Flux.
- Meets 450 or less when tested in accordance with ASTM E 662/NFPA 258, Standard Test Method for Smoke Density.



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Emission testing :

- AgBB requirements following EN ISO 16000-9 Indoor Air Emissions : TVOC at 28 days
- French act Grenelle: A+



1.5 Accreditation

All Forbo Flooring Systems' manufacturing operations have certified Management System in accordance with:

- ISO 9001 Quality Management System
- ISO 14001 Environmental Management System
- ISO 45001 Occupational Health and Safety Management Systems
- SA 8000 Social Accountability standard

Forbo's Flotex AcousticPlus Tile/Plank is rewarded with the Allergy UK Seal of Approval™.



1.6 Delivery Status

Table 1: Specification of delivered product

Characteristics	Nominal Value	Unit
Product thickness	5,9	mm
Product Weight	2600	g/m ²
Tiles Planks	Width x Length 50 x 50 25 x 100	cm cm



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2 Material Content

2.1 Material Content of the Product

Table 2: Composition of Flotex AcousticPlus Tile

Component	Material	Availability			Amount [%]	Origin
		Renewable	Recycled	Non-Renewable		
Polymer	Emulsion PVC			X	24.5	Europe
Plasticizer	DOTP			X	17.3	Europe
Recycled Filler	Calcium carbonate		Pre-consumer		16.4	Europe
Substrate	Glass tissue			X	2.2	Europe
Reinforcement	Glass net			X	1.1	Europe
Carpet Pile	Polyamide 6.6			X	9.6	Europe/USA
Additives	Various chemicals			X	1.9	Europe/Asia
Recycled backing	Carpet/vinyl waste		Pre-consumer		27	Europe

2.2 Production of Main Materials

Emulsion PVC: Polymer which is manufactured by the polymerisation of vinyl chloride monomer.

DOTP: A non-phthalate plasticiser, being the diester of terephthalic acid and the branched-chain 2-ethylhexanol. This colorless viscous liquid used for softening PVC plastics is known for chemical similarity to general purpose phthalates such as DEHP and DINP, but without any negative regulatory pressure.

Calcium carbonate: An abundant mineral found in all parts of the world as the chief substance in rocks (i.e., marble and limestone). It can be ground to varying particle sizes and is widely used as filler.

Glass tissue: A non-woven sheet material comprising chopped glass fiber filaments bound together with a binder imparts dimensional stability and lay-flat properties

Glass net: A non-woven grid structure comprising glass filament yarn bound together with a binder. Increases tear resistance of finished flooring

Nylon 6.6: Synthetic fibre made from the condensation reaction of hexamethylene diamine and adipic acid. Forms the pile surface of Flotex and gives excellent abrasion resistance and durability.

Recycled Polyester backing: Needle-punched material made from 85% post consumer recycled polyester fibre, which gives approximately 23% recycled content by weight in the finished tile product.

Various chemicals: Minor components including – conductive fibre, pigments, fire retardant, heat stabilizer



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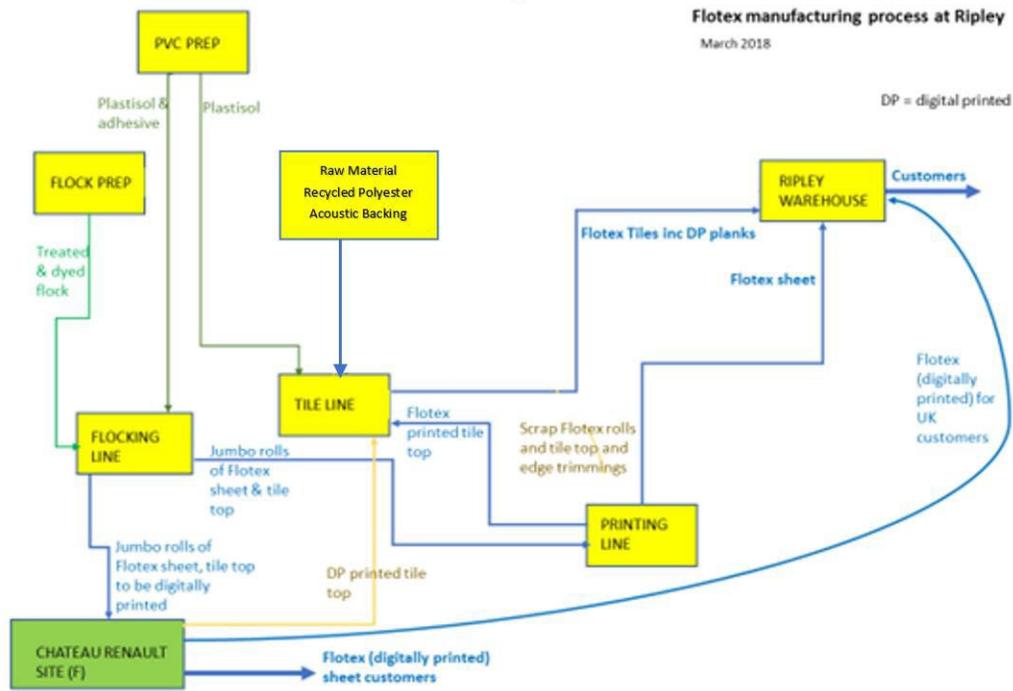
FLOORING SYSTEMS

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3 Production of the Floor Covering

3.1 Manufacturing



Flotex AcousticPlus Tile/Plank is produced in several stages starting with PVC prep, where the compounding of PVC emulsion polymers with plasticizer and other functional additives is carried out to produce various PVC plastisols. These plastisols are then spread-coated onto a glass substrate on the flocking line. The top surface of Flotex AcousticPlus Tile/Plank is based on Nylon-6.6 tow, which is cut into 2mm fibers in the flock prep area. These fibers are scoured and dyed to give the desired color base shade before electrostatically flocking into the wet PVC plastisol on the Flocking Line. The flocked fibers form the surface pile of Flotex AcousticPlus Tile/Plank. After flocking, the plastisols are fully cured at elevated temperature on the flocking line.

The finished tile-top is processed on the Ripley printing line where specific designs can be applied to the surface layer using a rotary screen technique, or at the digital printing facility in Chateau-Renault, France. The printed carpet is steamed to fix dyestuffs then washed and dried.

A recycled polyester acoustic backing is then laminated to the printed tile-top sheet on the tile line. After final curing, the tile material is cooled before cutting into tiles or planks. The tiles/planks are then automatically boxed and palletized.

3.2 Production Waste

Materials are collected separately and externally recycled.



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4 Delivery and Installation of the Floor Covering

4.1 Delivery

A worldwide distribution by truck and container ship is considered. On average every square meter of Flotex AcousticPlus Tile/Plank is transported as follows:

- | | |
|--|--------|
| ○ Transport distance 40 t truck | 760 km |
| ○ Transport distance 7.5t truck (Fine distribution) | 246 km |
| ○ Capacity utilization trucks (including empty runs) | 85 % |
| ○ Transport distance Ocean ship | 800 km |
| ○ Capacity utilization Ocean ship | 48% |

4.2 Installation

Because of the specific techniques used during the installation of Flotex AcousticPlus Tile/Plank approximately 2% of the material is cut off as installation waste. For the installation of Flotex AcousticPlus Tile on the floor a scenario has been modeled assuming an amount 0.1 kg/m² of flooring tackifier is applied to the sub-floor.

Forbo Flooring Systems recommends to use (low) zero emission tackifier for installing Flotex AcousticPlus Tile/Plank floorcovering.

Cardboard boxes and PE-foil can be collected separately and should be used in a local recycling process. The wooden pallets can be reused.

Waste during the installation process may be thermally recycled in a waste incineration plant. Since the major part of Flotex AcousticPlus Tile/Plank is sold in Europe, the European electricity grid mix is used in the calculations for the energy recovery during incineration.

6 Use stage

The service lifetime of a floor covering for a certain application on a floor is too widespread to give one common number. For this EPD model the reference service lifetime (RSL) is set to one year. This means that all impacts for the use phase are based on the cleaning and maintenance model for one year. Depending on the area of use, the technical lifetime advised by the manufacturer and the estimated time on the floor by the customer, the service lifetime can be determined. The use phase impacts should be multiplied with the foreseen service life to calculate the total environmental impact.



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6.1 Cleaning and Maintenance

Level of use	Cleaning Process	Cleaning Frequency	Consumption of energy and resources
Commercial/Residential	Vacuuming	Twice a week	Electricity
	Wet Cleaning	Once a week	Hot water Neutral detergent

For the calculations the following cleaning regime is considered:

- Dry cleaning with a 1.5 kW vacuum cleaner for 0.21 min/m², twice a week. This equates to 0.55 kWh/m²*year.
- Once a week wet cleaning with 0.062 l/m² water and 0.0008 kg/m² detergent. This result in the use of 3.224 l/m²*year water and 0.04 kg/m²*year detergent. The wet cleaning takes place without power machine usage. Waste water treatment of the arising waste water from cleaning is considered (Data sourced from Forbo GABI model).

The cleaning regime that is recommended in practice will be 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. The use of an entrance mat of at least four Flotex AcousticPlus Tile/Plank will reduce the cleaning frequency.

The cleaning regime used in the calculations is suitable for high traffic areas.

6.2 Prevention of Structural Damage

All newly laid floor coverings should be covered and protected with a suitable non-staining protective covering if other building activities are still in progress. Castor wheels should be suitable for Textile floorcoverings.

7 End of Life

The deconstruction of installed Flotex AcousticPlus Tile/Plank from the floor is done manually, since the tiles/planks are installed using a tackifier.

For the end of life stage two scenarios have been calculated assuming that the flooring is either 100% incinerated or 100% landfilled.





8 Life Cycle Assessment

A full Life Cycle Assessment has been carried out according to ISO 14040 and ISO 14044.

The following Life Cycle Stages are assessed :

- A1-3 : Product Stage (Raw material acquisition, transportation to Manufacturing and Manufacturing)
- A4-5 : Construction process stage (Transport Gate to User, installation flooring)
- B2 : Use Stage (Maintenance of the floor). For floor coverings the modules B1, B3 to B7 are not relevant to the environmental performance of a product.
- C1-4 : End of Life Stage (Deconstruction, transport, waste processing, Disposal). Two different End of Life scenarios are declared and the results are indicated separately in module C. Each scenario is calculated as a 100% scenario:
 Scenario 1: 100% Municipal Waste Incineration (MWI) with R1 > 60%
 Scenario 2: 100% landfill disposal
- D : Benefits and loads beyond the system boundary (Reuse, recovery, recycling potential)

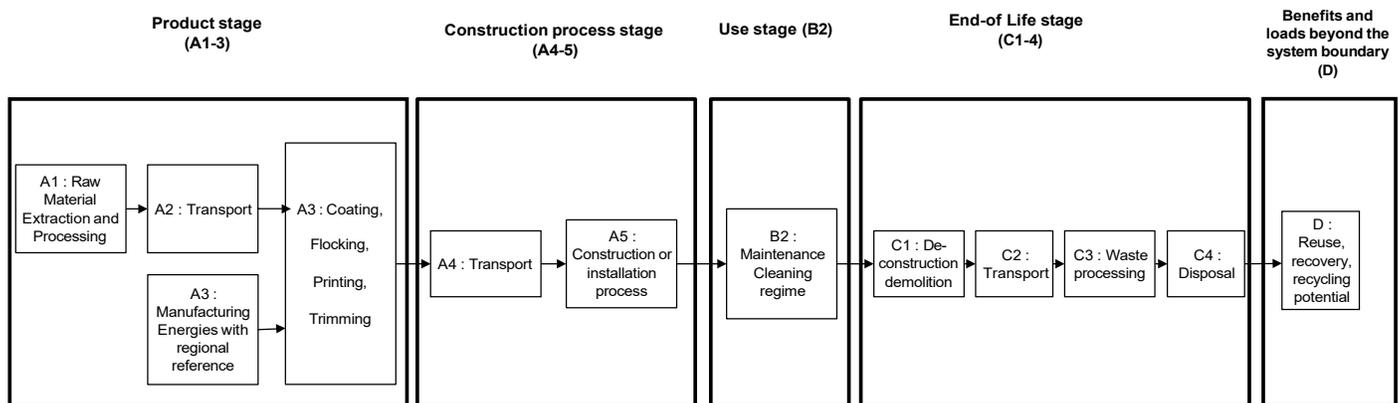


Figure 2: Flow chart of the Life Cycle Assessment

Comparisons of different floor coverings are only allowed, where EN 15804 consistent and/or preverified background data and EN 15804 consistent calculation methods and database versions are used and when the building context is taken into account, i.e. on the basis of the same use-classification (EN ISO 10874), same service life and comparable assumptions for the end of life.

8.1 Description of the Declared Functional Unit

The functional unit is one square meter of installed product, and the use stage is considered for one year of service life.

8.2 Cut off Criteria

The cut-off criteria shall be 1% of renewable and non-renewable primary energy usage and 1% of the total mass of the unit process. The total neglected input flows per module shall be a maximum of 5% of energy usage and mass.

In practice, in this assessment, all data from the production data acquisition are considered, i.e. all raw materials used



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as per formulation, use of water, electricity and other fuels, the required packaging materials, and all direct production waste. Transport data on all considered inputs and output material are also considered.

8.3 Allocations

In the present study some allocations have been made. Detailed explanations can be found in the chapters below.

8.4 Co-product allocation

No co-product allocation occurs in the product system.

8.5 Allocation of multi-input processes

The Production and End of Life stage include incineration plants. In these processes different products are treated together within a process. The allocation procedures followed in these cases are based on a physical classification of the mass flows or calorific values.

Credits from energy substitution are allocated to the production stage, because the gained energy from energy substitution is lower than the energy input in this stage. The same quality of energy is considered.

8.6 Allocation procedure of reuse, recycling and recovery

The installation waste and end of life waste is fed into incineration processes. Incineration processes include cogeneration processes which give thermal and power energy as outputs. It is assumed that this recovered energy offsets that produced by the European average grid mix and thermal energy generation from natural gas. The gained energy is declared in module D as avoided environmental burden. Generated electricity and steam due to the incineration of installation and end of life waste are listed in the result table as exported energy.

8.7 Description of the allocation processes in the LCA report

The description of allocation rules in of this LCA report meets the requirements of the PCR.

8.8 LCA Data

As a general rule, specific data derived from specific production processes or average data derived from specific production processes have been used as the first choice as a basis for calculating an EPD.

For life cycle modeling of the considered products, the GaBi 10 Software System for Life Cycle Engineering, developed by Sphera has been used. All relevant LCA datasets are taken from the GaBi 10 software database. The datasets from the database GaBi are documented in the online documentation. To ensure comparability of results in the LCA, the basic data of GaBi database were used for energy, transportation and auxiliary materials.

8.9 Data Quality

The requirements for data quality and LCA data correspond to the specifications of the PCR.



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Foreground data are based on 1 year averaged data (year 2022). The reference ages of LCA datasets vary but are given in the table in the Appendix. The time period over which inputs to and outputs from the system is accounted for is 100 years from the year for which the data set is deemed representative. The technological LCA of the collected data reflects the physical reality of the declared product. The datasets are complete, conform to the system boundaries and the criteria for the exclusion of inputs and outputs and are geographical representative for the supply chain of Forbo Flooring Systems.

For life cycle modeling of the considered products the GaBi 10 Software System for Life Cycle Engineering, developed by Sphera, is used. All relevant LCA datasets are taken from the GaBi 10 software database. The last revision of the used data sets took place within the last 10 years.

8.10 System Boundaries

Production Stage includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues during the product stage.

Transport and Installation Stage includes provision of all materials, products and energy, as well as waste processing up to the end-of-waste state or disposal of final residues during the construction stage. These information modules also include all impacts and aspects related to any losses during this construction stage (i.e. production, transport, and waste processing and disposal of the lost products and materials). For the transportation a worldwide distribution is considered.

Use Stage includes provision and transport of all materials, products and related energy and water use, as well as waste processing up to the end-of-waste state or disposal of final residues during this part of the use stage. These information modules also include all impacts and aspects related to the losses during this part of the use stage (i.e. production, transport, and waste processing and disposal of the lost products and materials).

End of Life Stage includes provision and all transports, provision of all materials, products and related energy and water use. It also includes any declared benefits and loads from net flows leaving the product system that have not been allocated as co-products and that have passed the end-of-waste state in the form of reuse, recovery and/or recycling potentials.

8.11 Power mix

The selection of LCA data for the electricity generation is in line with the PCR.

The products are manufactured in Ripley, the United Kingdom. The GaBi 10 Hydropower, Wind power and Biomass dataset have therefore been used (reference year 2023). The energy supplier is providing Forbo Flooring Systems with a certificate every year.

8.12 CO₂-Certificates

No CO₂-certificates are considered in this study.



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8.13 Life Cycle Inventory Analysis

In the table 3 the environmental impacts are presented for all the lifecycle stages with two End of Life scenarios:

- Scenario 1: 100% Municipal Waste Incineration (MWI) with R1 > 60%
- Scenario 2: 100% landfill disposal.

Table 3: Results of the LCA – Environmental impacts one lifecycle (one year) – Flotex AcousticPlus Tile/Plank

Parameter	A1-A3	A4	A5	B2	C1	C2	C3/1	C4/2	D/1	D/2
GWP – total	7,32E+00	5,12E-01	2,65E-01	2,45E-01	4,38E-03	2,20E-02	4,62E+00	4,09E+00	-1,34E+00	-2,86E-02
GWP – fossil	7,41E+00	5,03E-01	1,91E-01	2,40E-01	4,33E-03	2,21E-02	1,25E+00	3,54E-01	-1,33E+00	-2,84E-02
GWP – biogenic	-1,00E-01	7,58E-03	7,44E-02	4,52E-03	4,70E-05	-3,07E-04	3,36E+00	3,73E+00	-7,54E-03	-1,61E-04
GWP - luluc	6,67E-04	2,28E-03	1,92E-05	1,99E-05	4,65E-07	2,01E-04	1,38E-05	1,50E-04	-8,57E-05	-1,83E-06
ODP	2,55E-08	2,42E-14	8,60E-11	1,58E-09	7,90E-14	1,90E-15	5,25E-13	3,07E-13	-1,03E-11	-2,21E-13
AP	1,62E-02	2,84E-03	4,91E-04	4,95E-04	9,15E-06	7,54E-05	3,78E-03	9,49E-04	-1,64E-03	-3,52E-05
EP – freshwater	7,51E-05	9,07E-07	2,73E-07	2,75E-06	1,60E-08	7,92E-08	1,43E-07	3,60E-05	-2,13E-06	-4,57E-08
EP – marine	4,51E-03	1,03E-03	1,51E-04	1,31E-04	2,19E-06	3,47E-05	1,72E-03	1,88E-03	-4,80E-04	-1,03E-05
EP – terrestrial	4,77E-02	1,14E-02	1,60E-03	1,18E-03	2,29E-05	3,91E-04	1,95E-02	3,47E-03	-5,14E-03	-1,10E-04
POCP	1,52E-02	2,26E-03	4,29E-04	3,33E-04	5,84E-06	6,88E-05	4,42E-03	2,06E-03	-1,34E-03	-2,86E-05
ADPF	1,59E+02	3,83E+00	4,11E+00	4,96E+00	9,01E-02	2,95E-01	1,78E+00	2,73E+00	-2,42E+01	-5,19E-01
ADPE	1,19E-06	1,62E-08	7,10E-09	2,76E-08	6,64E-10	1,40E-09	4,83E-09	4,83E-09	-9,47E-08	-2,03E-09
WDP	3,51E+00	2,90E-03	2,58E-02	1,77E-01	9,54E-04	2,50E-04	5,29E-01	1,34E-02	-1,25E-01	-2,68E-03

Caption: GWP - total = global warming potential; GWP - fossil = global warming potential (fossil fuel only); GWP - biogenic = global warming potential (biogenic); GWP - luluc = global warming potential (land use only); ODP = ozone depletion; AP = acidification terrestrial and freshwater; EP - freshwater = eutrophication potential (freshwater); EP - marine = eutrophication potential (marine); EP - terrestrial = eutrophication potential (terrestrial); POCP = photochemical ozone formation; ADPE = abiotic depletion potential (element), ADPF = abiotic depletion potential (fossil) WDP = water scarcity

8.14 Interpretation

The interpretation of the results has been carried out considering the assumptions and limitations declared in the EPD, both methodology- and data-related for a one-year usage.

Except for GWP-Biogenic and GWP-luluc the production stage has the main contribution to the overall impact. The raw material supply is the key contributor for all of these impact categories mainly coming from PA 6.6, PVC and plasticizers used for the production of Flotex AcousticPlus Tile/Plank. The main contributor to the manufacturing stage is the thermal energy used for producing Flotex AcousticPlus Tile/Plank.

Forbo declares in the EPD a worldwide distribution by truck and container ship. For this scenario the transport has a relevance of 0%-11% in the environmental impact categories.

In general the impact of the installation of the flooring is not very significant as only 2% of the material is cut off as installation waste and the installation is modelled with a zero emission tackifier.

In the use stage which is calculated for one year of service life time the use of water is the main contributor for EP-fw and WDP.



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8.15 Resource use

In table 4 the parameters describing resource use are presented for all the lifecycle stages for a one-year usage.

Table 4: Results of the LCA – Resource use for Flotex AcousticPlus Tile/Plank (one year)

	A1-A3	A4	A5	B2	C1	C2	C3/1	C4/2	D/1	D/2
PERE [MJ]	9,03E+00	2,39E-01	2,26E-01	2,25E+00	5,39E-02	2,09E-02	3,17E-01	2,46E-01	-7,06E+00	-1,51E-01
PERM [MJ]	0,00E+00	-	-	-	-	-	-	-	-	-
PERT [MJ]	9,03E+00	2,39E-01	2,26E-01	2,25E+00	5,39E-02	2,09E-02	3,17E-01	2,46E-01	-7,06E+00	-1,51E-01
PENRE [MJ]	1,59E+02	3,84E+00	4,11E+00	4,96E+00	9,01E-02	2,96E-01	1,78E+00	2,73E+00	-2,42E+01	-5,19E-01
PENRM [MJ]	1,25E+00	-	-	-	-	-	-	-	-	-
PENRT [MJ]	1,60E+02	3,84E+00	4,11E+00	4,96E+00	9,01E-02	2,96E-01	1,78E+00	2,73E+00	-2,42E+01	-5,19E-01
SM [kg]	5,89E-01	-	-	-	-	-	-	-	-	-
RSF [MJ]	0,00E+00	-	-	-	-	-	-	-	-	-
NRSF [MJ]	0,00E+00	-	-	-	-	-	-	-	-	-
FW [m3]	8,41E-02	2,64E-04	8,74E-04	1,85E-03	4,35E-05	2,30E-05	1,25E-02	3,99E-04	-5,72E-03	-1,22E-04

Caption: 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

8.16 Waste categories and output flows

In table 5 other environmental information describing different waste categories and output flows are presented for all the lifecycle stages.

Table 5: Results of the LCA – Output flows and Waste categories for Flotex AcousticPlus Tile/Plank (one year)

	A1-A3	A4	A5	B2	C1	C2	C3/1	C4/2	D/1	D/2
HWD [kg]	4,68E-04	1,39E-11	3,05E-10	-2,93E-10	-7,05E-12	1,10E-12	1,42E-10	2,30E-10	-1,29E-09	-2,75E-11
NHWD [kg]	7,03E-02	5,28E-04	2,69E-03	6,26E-03	6,60E-05	4,27E-05	6,02E-02	1,92E+00	-1,20E-02	-2,56E-04
RWD [kg]	1,11E-03	4,91E-06	3,15E-05	6,19E-04	1,43E-05	3,83E-07	6,62E-05	3,23E-05	-1,87E-03	-4,01E-05
CRU [kg]	0,00E+00	-	-	-	-	-	-	-	-	-
MFR [kg]	0,00E+00	-	-	-	-	-	-	-	-	-
MER [kg]	0,00E+00	-	-	-	-	-	-	-	-	-
EEE [MJ]	0,00E+00	-	1,80E-01	-	-	-	8,25E+00	-	-	-
EET [MJ]	0,00E+00	-	3,24E-01	-	-	-	1,48E+01	-	-	-

Caption: 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



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8.17 Biogenic Carbon content

Table 6: Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit (kg C/m ²)
Biogenic carbon content in product	0.13
Biogenic carbon content in accompanying packaging	0.09
Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO ₂	

9 Additional Environmental Impact Indicators

To be fully transparent Forbo Flooring does not only want to declare the environmental impacts required in the PCR, but also the additional environmental impact indicators according to the European Standard EN15804 + A2.

Table 7: Results of the LCA – Environmental impact for Flotex AcousticPlus Tile/Plank (one year)

	A1-A3	A4	A5	B2	C1	C2	C3/1	C4/2	D/1	D/2
PM [Disease incidences]	1,65E-07	3,32E-08	2,79E-09	3,96E-09	7,70E-11	4,88E-10	1,17E-08	9,09E-09	-1,39E-08	-2,98E-10
IR [kBq U235 eq.]	5,39E-01	7,07E-04	8,58E-03	1,01E-01	2,38E-03	5,53E-05	1,03E-02	4,77E-03	-3,12E-01	-6,67E-03
ETF-fw [CTUe]	5,50E+01	2,67E+00	1,12E+00	1,94E+00	3,97E-02	2,06E-01	6,04E-01	6,45E+00	-5,31E+00	-1,14E-01
HTP-c [CTUh]	2,07E-09	5,38E-11	4,57E-11	6,21E-11	1,33E-12	4,19E-12	1,34E-10	1,30E-10	-2,68E-10	-5,74E-12
HTP-nc [CTUh]	8,13E-08	4,02E-09	2,76E-09	1,57E-09	3,26E-11	2,86E-10	1,30E-08	1,43E-08	-8,34E-09	-1,79E-10
SQP [Pt]	5,54E+00	1,40E+00	1,72E-01	1,47E+00	3,54E-02	1,23E-01	3,61E-01	2,36E-01	-4,64E+00	-9,94E-02
Caption: PM = Particulate matter emissions; IR = Ionizing radiation, human health; ETF-fw = Eco-toxicity (freshwater); HTP-c = Human toxicity, cancer effects; HTP-nc = Human toxicity, non-cancer effects, SQP = Soil quality potential/ Land use related impacts										

9.1 Interpretation

The interpretation of the results has been carried out considering the assumptions and limitations declared in the EPD, both methodology- and data-related for a one year usage.

As with the mandatory environmental impact categories, the production phase is dominant in the contribution of the total lifespan of the additional environmental impact indicators. This is largely due to the production of the raw materials.

A much smaller impact is coming from the thermal energy used to manufacture the Flotex AcousticPlus tile/plank.



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9.2 Disclaimers to the declaration of core and additional environmental impact indicators

According to the "ILCD Handbook: Recommendations for Life Cycle Impact Assessment in the European context" the recommended characterization models and associated characterization factors are classified according to their quality into three levels:

- Type 1 (recommended and satisfactory),
- Type 2 (recommended but in need of some improvements)
- Type 3 (recommended, but to be applied with caution).

Table 8: Classification of disclaimers to the declaration of core and additional environmental impact indicators

ILCD classification	Indicator	Disclaimer
ILCD Type 1	Global Warming Potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD Type 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD Type 2	Abiotic depletion potential for non-fossil resources (ADP-minerals & metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user)deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans HTP-c)	2
	Potential Comparative Toxic Unit for humans HTP-nc)	2
	Potential Soil quality index (SQP)	2
Disclaimer 1 – 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 nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator		
Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.		



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10 References

GABi 10 2012	Sphera; GaBi 10: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2017.
GABi 10 2012D	GaBi 10: Documentation of GaBi 10: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2017. http://documentation.gabi-software.com/
UL ENVIRONMENT	UL Environment's Program Operator Rules
PE 2012	Description of Selected Impact Categories, Sphera, 2012
ILCD Handbook: General guide for Life Cycle Assessment - Detailed guidance	European Commission-Joint Research Centre - Institute for Environment and Sustainability: International Reference Life Cycle Data System (ILCD) Handbook- Recommendations for Life Cycle Impact Assessment in the European context. First edition November 2011. EUR 24571 EN. Luxemburg. Publications Office of the European Union; 2011
STANDARDS AND LAWS	
DIN EN ISO 14044	Environmental management - Life cycle assessment - Requirements and guidelines (ISO 14044:2006); English version EN ISO 14044
ISO 14025 2006	EN ISO 14025: Environmental labels and declarations — Type III environmental declarations — Principles and procedures
ISO 14040 2006	Environmental management - Life cycle assessment - Principles and framework (ISO 14040); English version EN ISO 14040
CEN/TR 15941	Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data; German version CEN/TR 15941
EN 15804 + A2	EN 15804+A2: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products
ISO 24011	Resilient floor coverings - Specification for plain and decorative linoleum
CPR	REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC
EN-ISO 10874	Resilient, textile and laminate floor coverings – Classification

