ENVIRONMENTAL PRODUCT DECLARATION

FLOTEX SHEET

FORBO FLOORING SYSTEMS
FLOCKED FLOOR COVERING

Flotex Sheet: Calgary grey 290002

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 of 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

UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
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ENVIRONMENTAL PRODUCT DECLARATION

FLOORING SYSTEMS

Flotex Sheet 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	4790857560.104.1
DECLARED PRODUCT	Flotex Sheet Flocked Floor Covering
REFERENCE PCR	EN 15804+A2: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products EN 16810:2017 Resilient, textile and laminate floor coverings – Environmental product declarations – Product category rules
DATE OF ISSUE	September 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 CEN/TC 134 https://www.en-standard.eu/

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forbo FLOORING SYSTEMS

Flotex Sheet
Flocked Floor Covering

According to ISO 14025 and EN 15804

This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL	Cooper McC 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

Environment

FLOORING SYSTEMS

Flotex Sheet
Flocked Floor Covering

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 50 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 Sheet covering a broad range of designs and colors :

Flotex Colour, Flotex Vision, Flotex Naturals, Flotex Hospitality& Leisure and Flotex Designers/Created by.

Flotex Sheet is comprised of a Nylon 6.6 pile above a glass fiber reinforced PVC cushioned backing.

Flotex Sheet is built up in 4 layers as illustrated in the following image:

Figure 1: Typical construction

1. **Surface pile layer (Nylon 6.6):** This layer gives Flotex Sheet 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. **Backing / Fibreglass net layer:** This layer provides cushioning and acoustic properties

This declaration refers to the declared/functional unit of 1 m^2 installed flooring product.

1.3 Range of application

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

Area of application	Flotex Sheet
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 Sheet meets the requirements of EN 14041 and BS EN 14041 CE UKCA		
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	0.06 W.mK

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.

Emission testing :

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

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 Sheet 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	4.3	mm
Product Weight	1815	g/m^2
Rolls Width	2.0	m
Length	30	m

2 Material Content

2.1 Material Content of the Product

Table 2: Composition of Flotex Sheet

Component	Material	Availability			Amount [%]	Origin
		Renewable	Recycled	Non-Renewable		
Polymer	Emulsion PVC			X	35	Europe
Plasticizer	DOTP			X	24	Europe
Stabilizer	CaZn			X	2	Europe
Recycled Filler	Calcium carbonate		Pre-consumer		18	Europe
Substrate	Glass fleece			X	3	Europe
Carpet Pile	Polyamide 6.6			X	14	Europe/USA
Additives	Various chemicals			X	4	Europe/Asia

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

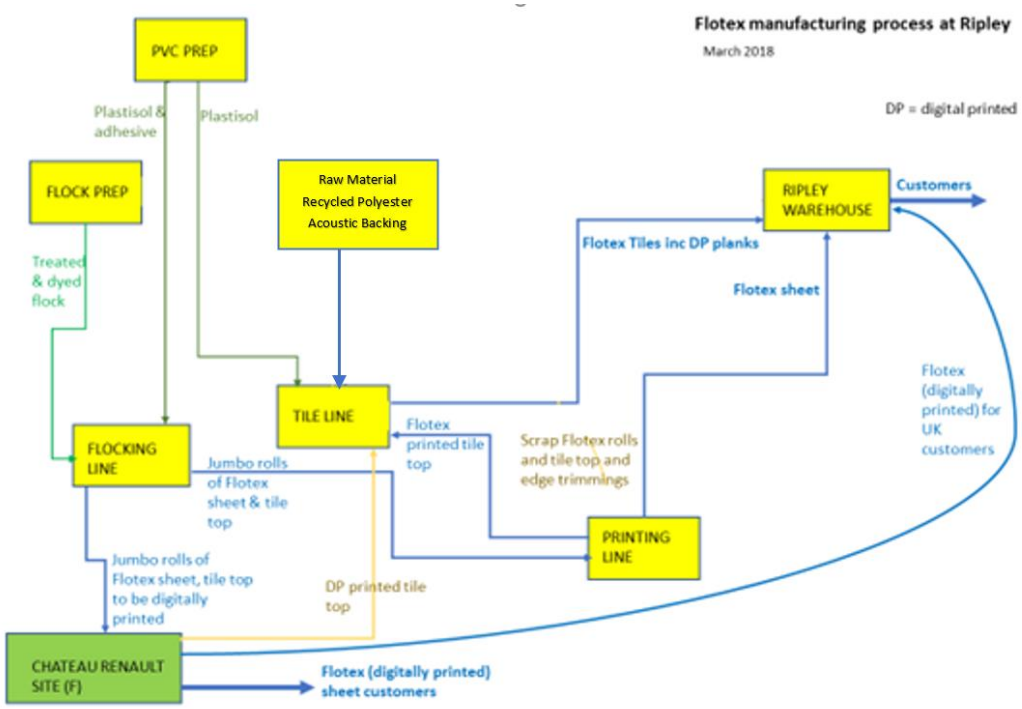
Glass net: A non-woven grid structure comprising glass filament yarn bound together with a binder. Increases tear resistance of finished flooring

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.

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

3 Production of the Floor Covering

3.1 Manufacturing



Flotex Sheet 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 Sheet 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 Sheet. After flocking, the plastisols are fully cured at elevated temperature on the flocking line.

The flocked base material is then 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.

3.2 Production Waste

Materials are collected separately and externally recycled.

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 Sheet 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) 100%
- Transport distance Ocean ship 800 km
- Capacity utilization Ocean ship 100%

4.2 Installation

Because of the specific techniques used during the installation of Flotex Sheet approximately 2% of the material is cut off as installation waste. For the installation of Flotex Sheet 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 Sheet 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 recycled as floor covering through the manufacturers' facility. Forbo Flooring has a Back to The Floor program in which both post-installation and end of life flooring can be recycled.

BACK TO THE FLOOR
RECYCLING PROGRAM

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.

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/m^2, twice a week. This equates to 0.55 kWh/m^2*year.
- Once a week wet cleaning with 0.062 l/m^2 water and 0.0008 kg/m^2 detergent. This result in the use of 3.224 l/m^2*year water and 0.04 kg/m^2*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 Sheet 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

Flotex can be easily dismantled and reused after usage. For recycling purposes both the subfloor and the floor covering need to remain as intact as possible at the End of Life stage and contamination of the material needs to be avoided. Therefore the deconstruction of installed Flotex from the floor is done mechanically with a special floor stripper for the fixated areas.
The electrical energy needed for this is estimated to be 0.03 kWh/sqm, this amount of energy is taken into account for the calculations, although currently circularity has not yet been achieved on a large scale for floor coverings.

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 bee 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)

End of life scenario 1: 100% Municipal Waste Incineration (MWI) with R_1 > 60%

- C3-1 (Waste processing): Impact from waste incineration, generated electricity and steam are listed in the result table as exported energy
- C4-1 (Disposal): The product waste leaves the system in module C3-1 and causes no additional impact
- D-1 (Recycling potential): Benefits for generated energy due to incineration of product waste at the end-of-life

End of life scenario 2: 100% landfill disposal

- C3-2 (Waste processing): Landfill disposal needs no waste processing and causes no additional impact
- C4-2(Disposal): Impact from landfill disposal
- D-2 (Recycling potential): Benefits for generated energy due to landfill disposal of product waste at the end of life

Modules C3-2 and C4-1 cause no additional impact and are therefore not displayed in the result tables

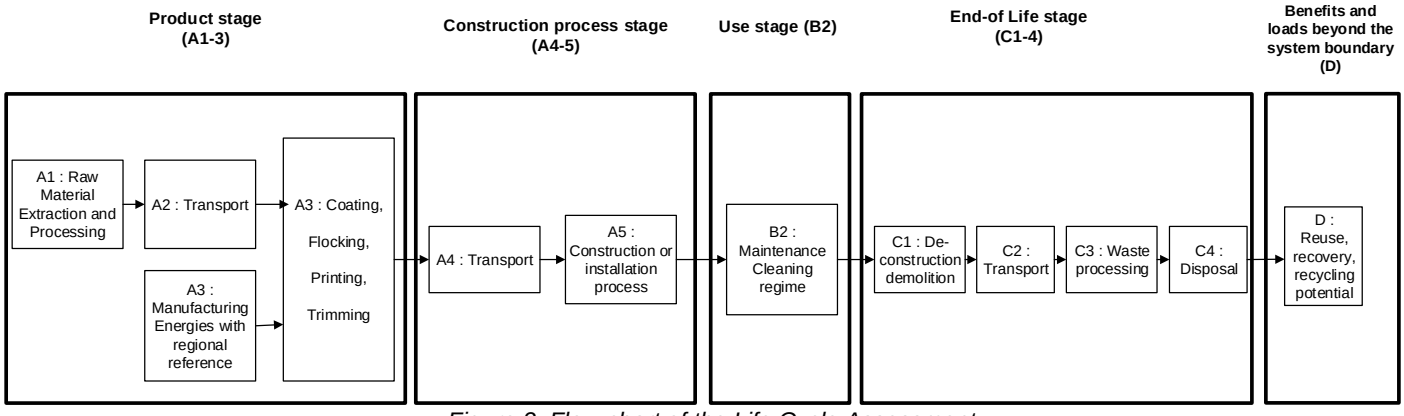


Figure 2: Flow chart of the Life Cycle Assessment

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 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.

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 Wind power dataset has therefore been used (reference year 2023). The energy supplier is providing Forbo Flooring Systems with a certificate every year.

8.12 CO_2-Certificates

No CO_2-certificates are considered in this study.

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 Sheet

Parameter	A1-A3	A4	A5	B2	C1	C2	C3/1	C4/2	D/1	D/2
GWP - total [kg CO2 eq.]	7.13E+00	3.45E-01	1.89E-01	2.45E-01	3.01E-03	1.51E-02	3.17E+00	4.09E+00	-1.21E+00	0.00E+00
GWP - fossil [kg CO2 eq.]	7.13E+00	3.38E-01	1.86E-01	2.40E-01	2.98E-03	1.52E-02	8.60E-01	3.54E-01	-1.21E+00	0.00E+00
GWP - biogenic [kg CO2 eq.]	7.44E-03	5.30E-03	2.93E-03	4.52E-03	3.23E-05	-2.11E-04	2.31E+00	3.73E+00	-6.85E-03	0.00E+00
GWP - luluc [kg CO2 eq.]	2.21E-04	1.60E-03	1.62E-05	1.99E-05	3.20E-07	1.38E-04	9.47E-06	1.50E-04	-7.79E-05	0.00E+00
ODP [kg CFC-11 eq.]	1.82E-09	1.60E-14	6.13E-13	1.58E-09	5.43E-14	1.31E-15	3.61E-13	3.07E-13	-9.40E-12	0.00E+00
AP [Mole of H+ eq.]	1.51E-02	1.49E-03	3.85E-04	4.95E-04	6.29E-06	5.18E-05	2.60E-03	9.49E-04	-1.49E-03	0.00E+00
EP - freshwater [kg P eq.]	1.46E-05	6.33E-07	3.06E-07	2.75E-06	1.10E-08	5.45E-08	9.83E-08	3.60E-05	-1.94E-06	0.00E+00
EP - marine [kg N eq.]	4.14E-03	6.03E-04	1.12E-04	1.31E-04	1.50E-06	2.38E-05	1.18E-03	1.88E-03	-4.37E-04	0.00E+00
EP - terrestrial [Mole of N eq.]	4.25E-02	6.74E-03	1.23E-03	1.18E-03	1.57E-05	2.69E-04	1.34E-02	3.47E-03	-4.68E-03	0.00E+00
POCP [kg NMVOC eq.]	1.59E-02	1.25E-03	3.03E-04	3.33E-04	4.01E-06	4.73E-05	3.04E-03	2.06E-03	-1.22E-03	0.00E+00
ADPF [MJ]	1.51E+02	2.51E+00	4.67E+00	4.96E+00	6.19E-02	2.03E-01	1.23E+00	2.73E+00	-2.20E+01	0.00E+00
ADPE [kg Sb eq.]	7.74E-06	1.13E-08	7.64E-09	2.76E-08	4.56E-10	9.63E-10	3.32E-09	4.83E-09	-8.61E-08	0.00E+00
WDP [m³ world equiv.]	1.05E+00	2.01E-03	8.14E-03	1.77E-01	6.56E-04	1.72E-04	3.64E-01	1.34E-02	-1.14E-01	0.00E+00

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 Sheet . The main contributor to the manufacturing stage is the thermal energy used for producing Flotex Sheet .

The worldwide distribution by truck and container ship shows a significant contribution for GWP-Luluc, AP, EP-marine, EP terrestrial and POCP.

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 and the waste water treatment are the main contributors for ODP, EP-fw and WDP.

8.15 Resource use

In table 4 the parameters describing resource use are presented for all the lifecycle stages for a one-year usage with two End of Life scenarios:

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

Table 4: Results of the LCA – Resource use for Flotex Sheet (one year)

	A1-A3	A4	A5	B2	C1	C2	C3/1	C4/2	D/1	D/2
PERE [MJ]	6.49E+00	1.67E-01	3.10E-01	2.25E+00	3.70E-02	1.44E-02	2.18E-01	2.46E-01	-6.42E+00	0.00E+00
PERM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT [MJ]	6.49E+00	1.67E-01	3.10E-01	2.25E+00	3.70E-02	1.44E-02	2.18E-01	2.46E-01	-6.42E+00	0.00E+00
PENRE [MJ]	1.63E+02	2.52E+00	4.67E+00	4.96E+00	6.20E-02	2.04E-01	1.23E+00	2.73E+00	-2.20E+01	0.00E+00
PENRM [MJ]	1.25E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT [MJ]	1.64E+02	2.52E+00	4.67E+00	4.96E+00	6.20E-02	2.04E-01	1.23E+00	2.73E+00	-2.20E+01	0.00E+00
SM [kg]	3.74E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW [m3]	2.60E-02	1.84E-04	6.59E-04	1.85E-03	2.99E-05	1.58E-05	8.57E-03	3.99E-04	-5.20E-03	0.00E+00

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 with two End of Life scenarios:

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

Table 5: Results of the LCA – Output flows and Waste categories for Flotex Sheet (one year)

	A1-A3	A4	A5	B2	C1	C2	C3/1	C4/2	D/1	D/2
HWD [kg]	1.48E-03	9.23E-12	5.00E-10	-2.93E-10	-4.85E-12	7.53E-13	9.76E-11	2.30E-10	-1.17E-09	0.00E+00
NHWD [kg]	7.66E-02	3.54E-04	1.88E-03	6.26E-03	4.54E-05	2.93E-05	4.13E-02	1.92E+00	-1.09E-02	0.00E+00
RWD [kg]	2.48E-03	3.24E-06	3.24E-05	6.19E-04	9.85E-06	2.63E-07	4.55E-05	3.23E-05	-1.70E-03	0.00E+00
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR [kg]	0.00E+00	0.00E+00	1.83E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.67E+00	0.00E+00	0.00E+00	0.00E+00
EET [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E+01	0.00E+00	0.00E+00	0.00E+00

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

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 with two End of Life scenarios:

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

Table 7: Results of the LCA – Environmental impact for Flotex Sheet (one year)

	A1-A3	A4	A5	B2	C1	C2	C3/1	C4/2	D/1	D/2
PM [Disease incidences]	1.60E-07	1.45E-08	2.98E-09	3.96E-09	5.29E-11	3.36E-10	8.04E-09	9.09E-09	-1.27E-08	0.00E+00
IR [kBq U235 eq.]	1.76E+00	4.67E-04	3.49E-03	1.01E-01	1.64E-03	3.80E-05	7.10E-03	4.77E-03	-2.83E-01	0.00E+00
ETF-fw [CTUe]	5.21E+01	1.75E+00	1.62E+00	1.94E+00	2.73E-02	1.42E-01	4.15E-01	6.45E+00	-4.83E+00	0.00E+00
HTP-c [CTUh]	3.62E-09	3.55E-11	7.73E-11	6.21E-11	9.12E-13	2.88E-12	9.23E-11	1.30E-10	-2.44E-10	0.00E+00
HTP-nc [CTUh]	5.41E-08	2.72E-09	5.73E-09	1.57E-09	2.24E-11	1.97E-10	8.90E-09	1.43E-08	-7.59E-09	0.00E+00
SQP [Pt]	3.70E+00	9.81E-01	2.62E-01	1.47E+00	2.43E-02	8.47E-02	2.48E-01	2.36E-01	-4.22E+00	0.00E+00
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 Sheet.

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.		

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 V2.7 2022
PE 2012 ILCD Handbook: General guide for Life Cycle Assessment - Detailed guidance	Description of Selected Impact Categories, Sphera, 2012 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); German and English version EN ISO 14044
ISO 14025 2006	DIN 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); German and 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
EN15804:2012+A2:2019+AC:2021	EN 15804: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products
EN 16810:2017	Resilient, textile and laminate floor coverings – Environmental product declarations – Product category rules
CPR	REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonized conditions for the marketing of construction products and repealing Council Directive 89/106/EEC