Environmental Product Declaration (EPD) Report

Report No: RepLCA202310006

Polynexx Industries Yancheng Co., LTD

1 m^2 Bio Based Futura PVC Free Click Flooring (Type: 6 mm)

As per ISO 14025

EN 10584

Verification Company：Ti Certification (Shanghai) Co., Ltd.
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Website: https://www.titcgroup.com/en

Verification Company Name, Address & Website	Ti Certification (Shanghai) Co., Ltd. 7th Floor, West Mansion, 767 Changshou Road, Shanghai, China https://www.titcgroup.com/en		
Manufacturer Name & Address	Polynexx Industries (Yancheng) Co., LTD No.3 Chunpu Road, Xingou Auto Parts Industrial Park, Funing County, Yancheng, Jiangsu Province		
Declared Product & Functional Unit	Bio Based Futura PVC Free Click Flooring (Type:6mm) 1 m^2		
Product Category	Building material		
Reference PCR	/		
System Boundary	Cradle to Gate		
Time Period for Data Collection	01/02/2023—31/3/2023		
Product Service Life (If Applicable)	/		
Main Markets of Product	Netherlands		
LCA Software	SimaPro 9.4.0.1		
Conclusion	This declaration was independently verified in accordance with ISO 14025: 2006 and EN 15804 ☑ External ☐ Internal		
	This life cycle assessment was independently verified in accordance with ISO14044 :		
Verification Team	Team Leader: Dongmei Liu Team member(s): Zhichao He		
Technical Review	Name: Sarah Chan Date: 25.09.2023		Signatory: 
Revision Number	1.0	Date:	25.09.2023

Limitation

Accuracy of Results: This data is based on information provided by the product manufacturer. 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 come 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.

Table of Content

1. Product Definition and Information

1.1.Description of Company/ Organization

Polynexx Industries (Yancheng) Co., LTD. is located at No.3 Chunpu Road, Xingou Auto Parts Industrial Park, Funing County, Yancheng, Jiangsu Province. The company has a registered capital of 5 million Chinese yuan and covers a total land area of 6,500 m^2 with a total building area of 3,400 m^2. It is a production-oriented enterprise that integrates research and development, manufacturing, sales, and services. The company boasts advanced equipment and production capabilities and primarily focuses on the research and production of plastic flooring that complies with European and American standards.

1.2.Report Purpose

The purpose of this report is to assess the environmental impact of the life cycle process of the 1 m^2 Bio Based Futura PVC Free Click Flooring (Type:6mm) produced by Polynexx Industries (Yancheng) Co., LTD. at the chosen production location at No.3 Chunpu Road, Xingou Auto Parts Industrial Park, Funing County, Yancheng, Jiangsu Province. The research findings will be beneficial for Polynexx Industries (Yancheng) Co., LTD. to gain insights into the environmental impact throughout the product's life cycle, helping the company identify potential opportunities to reduce environmental impact and effectively communicate with consumers.

1.3.Product Specification

The 1 m^2 Bio Based Futura PVC Free Click Flooring (Type:6mm) is commonly used in commercial, light commercial, and residential interiors. Product information is show in Table 1 below.

Table 1 Product information

Product Name	1 m^2 Bio Based Futura PVC Free Click Flooring
Model/Type	6mm
Product Technical Data (If Applicable)	Product thickness: 6mm Weight: 9.39kg

Product Appearance Diagram	

1.4.Material Composition

Almost all the raw materials of the product are sourced from China. The weight ratio of raw materials per product are listed in Table 2 below.

Table 2 Main Product Components per Functional Unit

Product Components	Weight Ratio
Biobased Polyester	16.65%
Modified Functional Resin	14.49%
Ethylene Copolymer Resin	8.69%
Stone Powder	42.05%
Agricultural Waste Such as Straw	2.61%
Soybean Oil	0.85%
Wood Meal	6.54%
PET Membrane	8.03%
Paint	0.09%

1.5.Product Manufacturing

The product production follows the flow diagram shown in Figure 1.

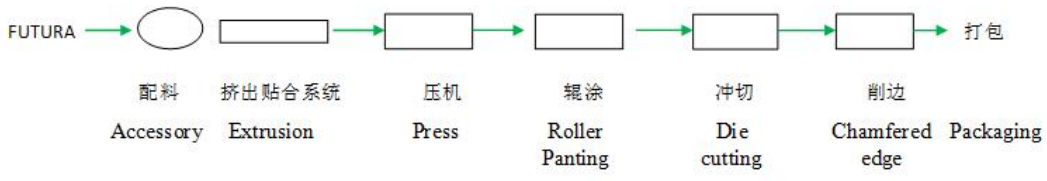

Figure 1 Diagram of Production Process

2. Life Cycle Assessment Background and Scenarios

2.1.Functional Unit

The declaration refers to the functional unit of 1 m^2 installed bio based Futura PVC free click flooring (Type: 6mm) covering.

Table 3 Functional Unit Information

Item	Information
Functional Unit	1 m^2
Mass (If Applicable)	9.39 kg

2.2.System Boundary

The system boundary for the EPD is “cradle to gate” . As such, the analysis includes the following modules:

- Raw material acquisition stage: modules A1 to A2
- Production stage: module B
- Distribution stage: module C

Each module includes provision of all relevant materials, products and energy.

Figure 2: System Boundary（The red box represents the system boundary for the product life cycle in this report）

2.3.Cut-off Criteria

The Cut-off criteria are used as follows:

- Cut-off criteria based on the weight ratio of each raw material input to the product’s weight or the total process input weight. When the weight of ordinary materials is less than 1% of the total product’s weight, or high-purity components is less than 0.1% of the total product’s weight, the upstream production data for that material can be cut off. The total weight of materials cut off can not exceed 5%.
- The upstream production data of low-value waste materials used as raw materials, such as fly ash, slag, straw, household waste, etc., can be cut off.
- In most cases, assets such as production equipment, buildings, can be cut off.
- The widely recognized emission data within the selected types of environmental impact should not be cut off.

As per the criteria listed above, the following material has been cut-off:

- Agricultural waste such as straw.

2.4.Data Sources

In accordance with the requirements of the EPD (Environmental Product Declaration) standard, an EPD analysis working group conduct an EPD analysis for the considered product. The team conducted research and collected some primary data, including the company's production records and energy consumption records, to ensure the completeness and accuracy of the data.

As a general rule, specific data derived from specific production processes or average data derived from specific production processes were the first choice as a basis for calculating LCA results.

For life cycle modeling of the considered products. the SimaPro software system for Life Cycle Engineering was used to model the product systems considered in this assessment. All relevant background datasets were taken from the SimaPro software database (Ver 9.4.0.1). The datasets from the SimaPro database are documented in the online documentation.

The data sources used for the life cycle assessment are listed in Table 4 below.

Table 4 Data Sources

Input		Items	Data Sources
Primary Data	Energy Use	Electricity	Invoice
	Raw Material	Biobased polyester	Raw material requisition form
		Modified functional resin	Raw material requisition form
		Ethylene copolymer resin	Raw material requisition form
		Stone powder	Raw material requisition form
		Soybean oil	Raw material requisition form
		Wood meal	Raw material requisition form
		Pet membrane	Raw material requisition form
		Paint	Raw material requisition form
Secondary Data	Raw Material Transport	Lorry 3.5t, euro6	Based on the manufacturer's address, collect distance data using online maps
	Emission Factor	Electricity EF	Database and literature resources
		Raw material acquisition EF	Database and literature resources

		Transport EF	Database and literature resources
Output		**Items**	**Data Sources**
Primary Data	Product	1 m^2 Bio Based Futura PVC Free Click Flooring	/
	Solid Waste	Defective products	Waste weighting form
Secondary Data	Product Distribution	Lorry>32t, euro 6	Based on the dock address, collect distance data using online maps
		Freight, container ship	Based on the dock address, collect distance data using online maps
	Emission Factor	Distribution EF	Database and literature resources

2.5.Data Quality

A variety of tests and checks were performed throughout the project to ensure high quality of the completed LCA checks included an extensive review of project-specific LCA models as well as the background data used.

Temporal Coverage

Foreground data represent a continuous 2-month period from 01.02.2023 to 31.03.2023. Manufacturers were permitted to choose to report for this data collection period to facilitate data collection. Background datasets area based on data from SimaPro software database (Ver 9.4.0.1).

Geographical Coverage

Proxy datasets were used as needed for emission factors to address lack of data for a specific material or for a specific geographical region. These proxy datasets were chosen for their representativeness of the actual product. Additionally, global data or rest of the word (ROW for short, referred to outside Europe in SimaPro software database) were used when China data were not available.

Technological Coverage

The primary data represent the material consumption and the production of the products under evaluation. Secondary data were chosen to be specific to the technologies in question (or appropriate proxy data used where necessary). For details please refers to “Table 3 Data Sources” above.

2.6.Allocation

Rational modeling approaches are used to allocate the resource and environmental impacts in the complex and diverse product systems. Allocation methods in a way that reflects the underlying physical relationships between the different products are used in this EPD. Details are listed below:

- Mass-based allocation: The electricity consumption is allocated based on the proportion of the target product's production to the company's total production.

2.7.Comparability

No comparisons or benchmarking is 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 ISO standards. Caution should be used when attempting to compare EPD results.

3. Life Cycle Assessment Results

3.1.Description of the System Boundary

The system boundary the of the product 1 m^2 Bio Based Futura PVC Free Click Flooring (Type:6mm) is from cradle to gate, including raw material acquisition stage, production stage, and distribution stage. Modules are listed below.

Table 5 Description of the System Boundary Modules

	A: Raw material Acquisition Stage		B: Production Stage	C: Distribution Stage	D: Use Stage	E: End-of-life Stage		
	A1	A2	B	C	D	E1	E2	E3
	Extraction and processing of raw materials	Transportation of raw materials	Product manufacturing	Distribution to client	Product usage	Reuse, recycling, or energy recovery	Landfilled	Incinerated
EPD Type: cradle to gate	√	√	√	√	×	×	×	×

3.2.Life Cycle Impact Assessment Results

Table 6 contains a total LAC results for 1 m^2 Bio Based Futura PVC Free Click Flooring (Type:6mm). For details please refer to Table 7.

Table 6 Total LCA Results

Environmental Impact		A: Raw Material Acquisition Stage		B: Production Stage	C: Distribution stage
		A1	A2	B	C
Item	Unit	Extraction and processing of raw materials	Transportation of raw materials	Product manufacturing	Distribution to client
Global Warming	kg CO_2 eq	1.69E+01	1.71E+00	2.08E+00	1.93E+00
		1.86E+01			

Stratospheric Ozone Depletion	Kg CFC11 eq	4.30E-05	1.05E-06	4.31E-07	1.36E-06
		4.40E-05			
Terrestrial Acidification	kg SO_2 eq	4.60E-02	3.43E-03	7.04E-03	3.32E-02
		4.94E-02			
Freshwater Eutrophication	kg P eq	0.00284	1.94E-04	4.73E-05	2.12E-04
		0.00303			
Water Consumption	m^3	3.05E-01	3.53E-03	5.13E-03	1.88E-03
		3.09E-01			
Mineral Resource Scarcity	kg Cu eq	4.55E-02	4.97E-03	7.43E-04	3.72E-03
		5.04E-02			
Fossil Resource Scarcity	kg oil eq	4.85E+00	5.56E-01	4.04E-01	5.88E-01
		5.41E+00			
Ozone Formation, terrestrial ecosystems	kg NO_x eq	3.18E-02	2.70E-03	5.77E-03	3.41E-02
		3.45E-02			
Ozone Formation, human health	kg NOx eq	3.02E-02	2.57E-03	5.76E-03	3.38E-02
		3.28E-02			

Table 7 Detailed LCA Results

System Boundary Modules	Materials, energy, or Other Stage	Environmental Impact								
		Global Warming	Stratospheric Ozone Depletion	Terrestrial Acidification	Freshwater Eutrophication	Water Consumption	Mineral Resource Scarcity	Fossil Resource Scarcity	Ozone Formation Terrestrial Ecosystems	Ozone Formation Human Health
		kg CO_2 eq	Kg CFC11 eq	kg SO_2 eq	kg P eq	m^3	kg Cu eq	kg oil eq	kg NO_x eq	kg NOx eq
A1	Biobased Polyester	4.74E+00	1.71E-05	2.11E-02	8.87E-04	2.02E-01	1.29E-02	1.27E+00	1.24E-02	1.18E-02
A1	Modified Functional Resin	1.06E+00	5.34E-07	3.50E-03	1.33E-03	1.38E-02	7.94E-03	2.47E-01	2.75E-03	2.71E-03
A1	Ethylene Copolymer Resin	3.57E+00	1.62E-07	5.87E-03	4.63E-05	4.25E-02	5.97E-04	1.62E+00	4.66E-03	4.32E-03
A1	Stone Powder	1.36E+00	4.73E-07	5.74E-03	5.32E-05	1.29E-02	1.06E-02	3.91E-01	3.82E-03	3.74E-03
A1	Soybean Oil	3.75E+00	9.67E-06	2.55E-03	3.80E-04	4.93E-03	2.43E-03	1.01E-01	2.79E-03	2.50E-03
A1	Wood Meal	4.67E-03	2.65E-08	2.47E-05	4.34E-06	3.69E-05	3.94E-05	1.17E-03	2.49E-05	2.44E-05
A1	PET Membrane	2.40E+00	1.50E-05	7.07E-03	1.32E-04	2.93E-02	8.41E-03	1.20E+00	5.30E-03	5.06E-03
A1	Paint	2.70E-02	9.42E-09	1.33E-04	2.57E-06	4.35E-04	2.63E-03	8.93E-03	7.29E-05	7.11E-05
A2	Lorry 3.5t, euro 6	1.71E+00	1.05E-06	3.43E-03	1.94E-04	3.53E-03	4.97E-03	5.56E-01	2.70E-03	2.57E-03
B	Electricity	2.08E+00	4.31E-07	7.04E-03	4.73E-05	5.13E-03	7.43E-04	4.04E-01	5.77E-03	5.76E-03

C	Lorry>32t, euro 6	3.64E-01	2.68E-07	9.37E-04	4.62E-05	6.99E-04	5.89E-04	1.28E-01	1.28E-03	1.24E-03
C	Freight, container ship	1.57E+00	1.09E-06	3.23E-02	1.66E-04	1.18E-03	3.13E-03	4.61E-01	3.28E-02	3.26E-02

4. Life Cycle Assessment Interpretation

As shown in Table 7 above, ethylene copolymer resin and PET membrane are the two key contributors to most impact categories considered. This is because these two components are the main raw materials for the product 1 m^2 Bio Based Futura PVC Free Click Flooring (Type:6mm), accounting for 8.69% and 8.03% of the total, and since both of these materials are chemically synthesized, therefore,they have a significant environmental impact during the production process.

5. References

ISO 14025: Environmental labels and declarations - Type III environmental declarations - Principles and procedures

EN 15804: Sustainability of construction works - Environmental product declarations – Core rules for the product category of construction products

ISO 14040: Environmental management – Life cycle assessment – Principles and framework

ISO 14044: Environmental management – Life cycle assessment – Requirements and guidelines