EPD™

Environmental Product Declaration

Global GreenTag^{CertTM} EPD Program

Compliant to EN 15804:2012+A1 2013

Polyflor Ltd

Safety Flooring

Polysafe Verona PUR

Polyflor Ltd., Leicester Rd, Whitefield, Manchester M 45 7NG, United Kingdom

POLYFLOR™
COVERING THE WORLD

Compliant to EN 15804, ISO 14025 ISO 21930

Safety Flooring

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EPD Verification and LCA Details

EPD Scope	Cradle to Gate
EPD Number	PLF H2 2021EP
Issue Date	10 Sept 2021
Valid Until	10 Sept 2026

Demonstration of Verification

CEN standard EN 15804+A2 2019 serves as the core Product Category Rules (PCR) [1].

Independent external verification of the declaration and data, according to ISO 14025:2010

☑ External	Third Party Verifier[a] Shloka Ashar, Sustainability Consultant LCA Reviewed by Mathilde Vlieg, Sustainability Consultant
☑ Internal	EPD Reviewed by David Baggs, Global GreenTag Pty Ltd

a: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4) [2]

EPD Program Operator	LCA and EPD Producer	Declaration Owner
Global GreenTag Pty Ltd	The Evah Institute Ecquate Pty Ltd	Polyflor Ltd
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Communication	This EPD discloses potential environmental outcomes compliant with EN 15804:2012 + A1 2013 for business-to-business communication.
Comparability	Construction product EPDs may not be comparable if not EN15804 compliant. Different program EPDs may not be comparable. Comparability is further dependent on the product category rules and data source used.
Reliability	LCIA results are relative expressions that do not predict impacts on category endpoints, exceeding of thresholds, safety margins or risks.
Owner	The EPD is property of declared manufacturer.
Explanations	Further explanatory information is available at info@globalgreentag.com or by contacting certification1@globalgreentag.com [3].

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Product Information

Product name	Polyflor Safety Flooring
Product codes	Polysafe Verona
Declared Unit	The declared product per kilogram
Product Specifications	Polysafe Verona is 2.0 mm gauge homogeneous flooring
Standards	EN 13845:2017 Resilient floor coverings - Polyvinyl chloride floor coverings with particle based enhanced slip resistance – Specification
Manufacture Site	Leicester Rd, Whitefield, Manchester M 45 7NG, United Kingdom
Factory Warranty	10 years
Representation Site & Geography	United Kingdom, Europe, Pacific Rim and Australasia

Functional & Technical Performance	**Property**	**Conformance to Standard**	**Polysafe Verona**
	Performance	EN 13845	Conforms
	Reaction to Fire	EN 13501-1	Class Bfl-S1
	Use Area	EN 685/ISO 10874	23, 34 & 43
	Slip Resistance	DIN 51130	R10
	VOC Emissions	Indoor Air Comfort	Eurofins Gold certified
		AgBB/ABG	Pass

Base Material Origin and Detail

Table 1 lists product composition by function, component, source and mass share amount. The listed ±5% product content considers intellectual property protection and normal resource acquisition, supply chain, sedimentation, seasonal, manufacturing and product colour variation over this EPD's 5-year

Function	Component	Source	Polysafe Verona
Binder	Polyvinylchloride	Europe	>42 <50
Filler	Dolomite	The United Kingdom	>26 <31
Plasticiser	Dioctyl Terephthalate	Europe & Sth Korea	>18 <22
Grip & Resilience	Coloured Quartz	Germany	>4 <5.5
Carrier	Fibreglass Crenette	The United Kingdom	>2.5 <3.0
Plasticiser	Epoxidised Esters	The United Kingdom	>1.5 <2.0
Grip	White Alumina	The United Kingdom	>1.0 <1.5
Pigment paste	Pigment in Dioctyl Terephthalate	The United Kingdom	>1.0 <1.3
Filler	Recycled Glass	The United Kingdom	>0.6 <0.7
Colour chip	Pigment in Polyvinylchloride	The Netherlands	>0.5 <0.7
Stabiliser	Barium Zinc soaps	The United Kingdom	>0.4 <0.6
Coating	Polyurethane	The United Kingdom	>0.2 <0.4
White chip	Calcium carbonate and Titania	United Kingdom & Europe	<0.1

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Program Description

EPD type	Cradle to gate A1 to A3 as defined by EN 15804 [1]
System boundary	The system boundary with nature includes material and energy acquisition, processing, manufacture, transport, installation plus waste arising.to end of life.
Information Modules	Figure 1 depicts all modules being declared including some with zero results. Any module not declared (MND) does not indicate a zero result.
Scope Depiction	See Figure 1 below

Model	Actual			Scenarios													Potential		
Phase	Produce			Construct		Building Fabric					Building Use		End of life				Beyond Boundary		
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D1	D2	D3
Unit Operations	Resource supply	Transport	Manufacturing	Transport	Construction	Use	Maintain	Repair	Replace	Refurbish	Operating Energy	Operating Water	Demolish	Transport	Process Waste	Disposal	Reuse	Recovery	Recycling
Cradle to Gate	x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Figure 1 EPD Life Cycle Modules Cradle to Grave

Stages included	A1-3
Stages excluded	A4-5, B1-7, C1-4, D
Product stage Definitions	Stages are included from raw material acquisition, refining and processing plus scrap or material reuse from prior systems; electricity generated from all sources with extraction, refining & transport plus secondary fuel energy and recovery processes. Also, transport to factory gates; manufacture of inputs, ancillary material, product, packaging, maintenance, replacement plus flows leaving at end-of-waste boundary are included as well as fates of all flows at end of life.
Primary Data	Data was collected from primary sources including the manufacturer, suppliers and their publications on standards locations, logistics, technology, market share, management system and commitment to improved environmental performance in accordance with EN ISO 14044:2006, 4.3.2, [4].
Variability Range	Significant differences of average LCIA results are declared
Data cut-off & quality criteria	Complies with EN 15804 [1]. The LCA used background data aged <10 years and quality parameters tabled below.

Background	**Data Quality**	**Parameters and Uncertainty (U)**			
Correlation	Metric σg	U ±0.01	U ±0.05	U ±0.10	U ±0.20
Reliability	Reporting	Site Audit	Expert verify	Region	Sector
	Sample	>66% trend	>25% trend	>10% batch	>5% batch
Completion	Including	>50%	>25%	>10%	>5%
	Cut-off	0.01%w/w	0.05%w/w	0.1%w/w	0.5%w/w
Temporal	Data Age	<3 years	≤5 years	<7.5 years	<10 years
	Duration	>3 years	<3 years	<2 years	1 year
Technology	Typology	Actual	Comparable	In Class	Convention
Geography	Focus	Process	Line	Plant	Corporate
	Range	Continent	Nation	Plant	Line
	Representation	Global. Africa, America, Europe, Pacific Rim			

Scope and System Boundary

Figure 2 shows included processes in a cradle to gate system boundary and dashed lines defining excluded scenarios to end of life fate to recycling or to landfill grave.

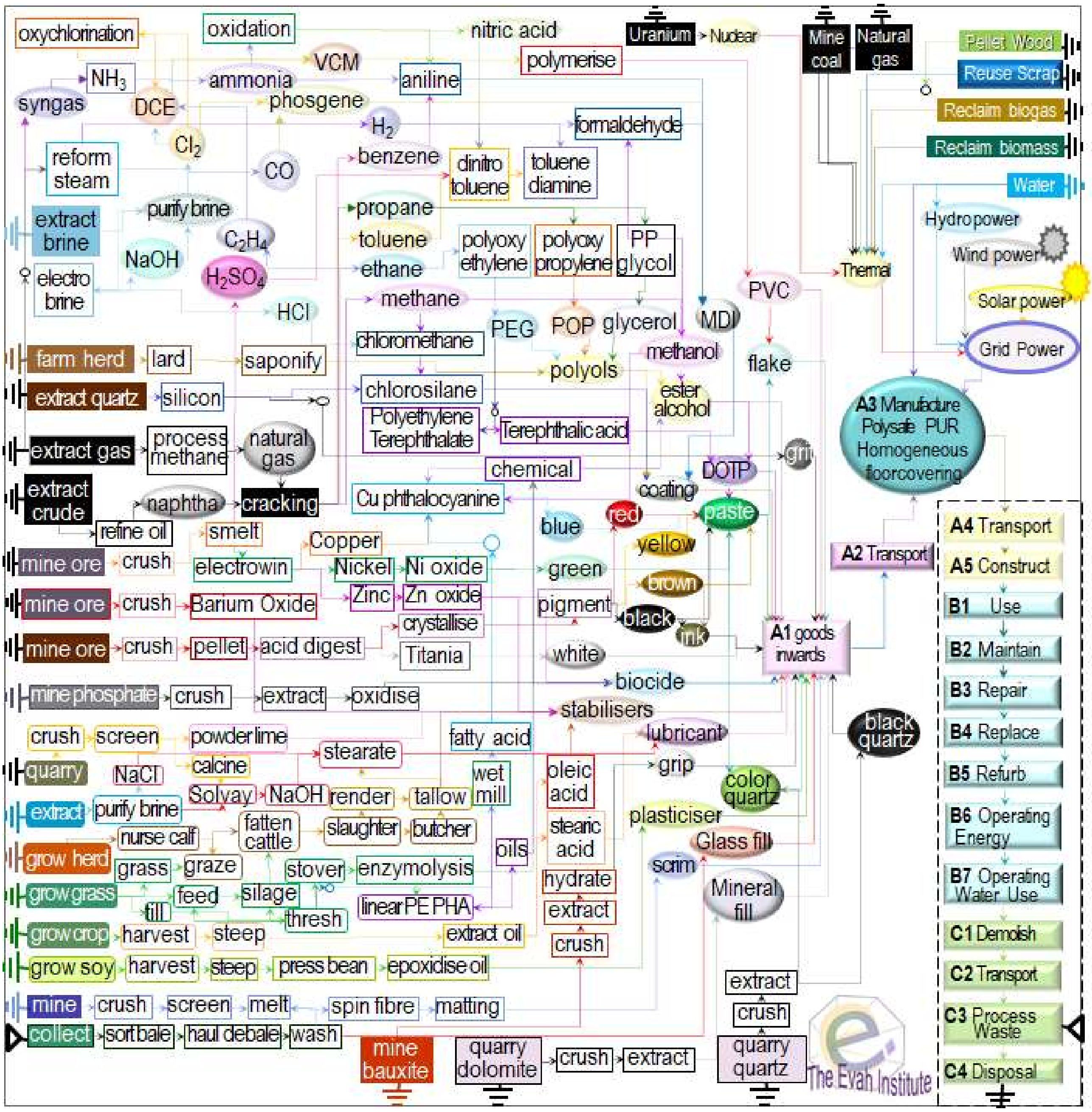

Figure 2 Process Flow Chart

Environmental Impact Terminology

Environmental impacts contributing to risks of social and ecological issues and collapse are tabled below with ***common names*** and remedies given for each indicator listed in subsequent results tables.

Global warming	Greenhouse gases absorb infra-red radiation. This heat reduces thermal energy differentials, from equator to poles, forcing ocean current and wind circulation to blend and regulate climate. Weakly blended "lumpier" weather has more frequent, extreme heat wave, wildfire, cyclone, storm, flood and blizzard events. Accumulation of carbon dioxide, natural gas methane, nitrous oxides and volatile organic compounds from burning fossil fuels causes global warming. Forest and wilderness growth absorbing air-borne carbon in biomass can drawdown such accumulation. Urgent renewable energy reliance is vital in time to avoid imminent tipping points and the worsening ***"climate emergency"***.
Ozone depletion	Stratospheric ozone loss weakens the planet's solar shield so more shorter wavelength ultraviolet (UVB) light reaching earth damages plants and increases malignant melanoma and skin cancer in humans and animals. Chlorofluorocarbons, hydrochlorofluorocarbons (HCFC), chlorobromomethane, hydrobromofluorocarbons, carbon tetrachloride, methyl chloroform, methyl bromide and halon gas cause ozone layer loss. To repair the ***"ozone hole"*** reliance on ozone-safe refrigerants, aerosols and solvents is essential to avoid further its depletion and enable accumulation of naturally-formed ozone.
Acidification of land and water	Acidification reduces soil and waterway pH, impedes nitrogen fixation vital for plant growth and inhibits natural decomposition. It increases rates and incidence of fish kills, forest loss and deterioration of buildings and materials. Chief synthetic causes of ***"acid rain"*** are emissions of sulphur and nitrogen oxides, hydrochloric and hydrofluoric acids and ammonia from burning fossil fuels polluting rain and snow precipitation world-wide.
Eutrophication	Eutrophication from excessively high macronutrient levels added to natural waters promotes excessive plant growth that severely reduces oxygen, water and habitat security for aquatic and terrestrial life across related ecosystems. Chief synthetic cause of ***"algal blooms"*** is nitrogen (N, NOx, NH_4) and phosphorus (P, PO_4^{3-}) in rain run-off across over-fertilised land catchments.
Photochemical ozone creation	Tropospheric photochemical ozone, called ***"smog"*** near ground level, is created from natural and synthetic compounds in UV sunlight. Low concentration smog damages vegetation and crops. High concentration smog is hazardous to human health. Chief synthetic causes are nitrogen oxides, carbon monoxide and volatile organic compounds (VOC) pollutants. Avoiding reliance on dirtiest coal fuel and volatile chemicals has reduced smog incidence in many areas globally.
Abiotic depletion minerals and metals (elemental)	Abiotic depletion of finite mineral resources increases time, effort and money required to obtain more resources to the point of extinction of naturally viable reserves. This limits future accessibility to vital technical, medicinal and chemical resources. The youth movement ***"extinction rebellion"*** calls on adults to secure ore reserves, biodiversity and climate for current and future generations.
Abiotic depletion fossil fuel	Abiotic depletion of resources by consuming finite oil, natural gas, coal and nuclear fossil fuel reserves leaves current and future generations suffering limited available, accessible, plentiful, essential valuable as well as scarce raw material, medicinal, chemical, fuel and feedstock. Approaching ***"peak oil"*** acknowledges fossil fuel reserves are finite and the need for decision-makers to act to avoid market instability, insecurity and or oil and gas wars.

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Cradle to Gate Inventory and Potential Impact Results

Table 2 shows inputs, outputs and potential impacts per declared unit.

Table 2 Resource Amounts A1-A3 /kg

Inventory Input Categories	Unit	Polysafe Verona
Net Fresh Water	m^3	0.33
Secondary Material	kg	0.13
Secondary Renewable Fuel	MJ ncv	5.7
Secondary Non-renewable Fuel	MJ ncv	0.32
Primary Renewable Energy Not Feedstock	MJ ncv[1]	8.5
Primary Renewable Feedstock Material Energy	MJ ncv	1.5
Primary Renewable Energy Resources	MJ ncv	9.9
Primary Non-renewable Energy Not Feedstock	MJ ncv	44.6
Primary Non-renewable Feedstock Energy	MJ ncv	19.6
Total Primary Non-renewable Energy Resources	MJ ncv	64.2
Inventory Output Categories		
Hazardous Waste Disposed	kg	2.4E-03
Non-hazardous Waste Disposed	kg	0.41
Radioactive Waste Disposed	kg	1.03E-15
Components for Reuse	kg	0.E+00
Material for Recycling	kg	0.83
Material for Energy Recovery	kg	2.5E-03
Exported Electrical Energy	MJ ncv	0.E+00
Exported Thermal Energy	MJ ncv	0.E+00

[1] ncv stands for net calorific value

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Cradle to Gate Potential Impact Results

Glossary of Terms and Units	Indicator Potential and Methods	Units
Climate Change total	Global Warming Potential (GWP) total 5]	kg CO_{2eq}.
Climate Change fossil	GWP fossil fuels (GWP fossil)	
Climate Change biogenic	GWP biogenic (GWP biogenic)	
Climate Change land use	GWP land use & change (GWP luluc)	
Ozone Depletion Potential	Stratospheric Ozone Depletion (ODP) [6]	kg CFC_{11eq}
Photochemical Ozone Potential	Photochemical Ozone Creation (POCP) [7]	kg $NMOC_{eq}$
Acidification Potential	Acidity Accumulated Exceedance (AP) [8]	mol H^+_{eq}
Eutrophication Potential freshwater	EP nutrients freshwater (EP freshwater) [9]	kg P_{eq}
Eutrophication Potential marine	Eutrophication marine nutrients (EP marine)	kg N_{eq}
Eutrophication Potential terrestrial	Terrestrial Accumulated Exceedance (EP terra)	mol N_{eq}
Mineral Depletion Potential	Abiotic depletion (ADP mineral (& metal)) [10]	kg Sb_{eq}
Fossil Fuel Depletion potential	Abiotic depletion fossil fuel (ADP fossil) [11]	MJ_{ncv}
Water Depletion Potential	Water deprivation-weighted (WDP) [12]	$m^3_{WDP\ eq}$

Table 3 shows inputs, outputs and potential impacts per declared unit.

Table 3 Resource Amounts A1-A3 /kg

Potential Impact Categories	Unit	Polysafe Verona
Global Warming Biogenic	kg CO_{2e}	-0.53
Global Warming Land Use Land Use Change	kg CO_{2eq}	3.6E-04
Global Warming Fossil	kg CO_{2eq}	3.11
Global Warming Total	kg CO_{2eq}	2.58
Stratospheric Ozone Depletion	kg $CFC11_{eq}$	6.3E-08
Photochemical Ozone Creation	kg $NMOC_{eq}$	1.6E-02
Acidity Accumulated Exceedance	Mole $H+_{eq}$	7.1E-03
Eutrophication Freshwater	kg P_{eq}	5.7E-06
Eutrophication Marine	kg N_{eq}	1.5E-03
Eutrophication Terrestrial	mol N_{eq}	6.7E-03
Abiotic Depletion Fossil Fuel	MJ_{ncv}	3.08
Abiotic Depletion Mineral & Metal	kg Sb_{eq}	1.1E-03
Water Deprivation-weighted Potential	$m^3_{WDP\ eq}$	5.4E-02

Interpretation of Results Cradle to Gate

Components embodied 98% EE and 99% GWP mostly from supply chain fossil fuel. Per kg dispatched product packaging gross embodied energy (EE) input share was 2% and Global Warming (GWP) emissions share was 1%. Except for lowest impact minerals, component mass share correlated with gross EE and GWP/kg product.

On average, the Whitefield factory manufacturing used only 17% gross energy with 13% being electrical and 4% gas fuel with GWP emissions 12% and 5% shares respectively. While factory power supply is predominantly renewable all fuel was transported and most wood scrap fuel was shipped from North America.

Overall, of the gross product input 85% EE was fossil fuelled with 15% from renewable sources. On average 74% was fossil fuelled and 26% was feedstock that is recoverable at end of product life via material re-use or transformation to energy. Of gross, on average 59% EE was burnt as fossil fuels, 26% retained in fossil feedstock, 14% used as renewable energy and 1% retained in renewable feedstock. Of the gross primary non-renewable energy 69% was used as fuel and 31% was retained in feedstock. Of the gross renewable energy 95% was used and 5% retained in feedstock material.

References

[1] EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

[2[ISO 14025:2010 Environmental labels and declarations – Type III – environmental declarations - Principles and procedures

[3] GreenTag™ 2021 EPD Program, Product Category Rules https://www.globalgreentag.com/EPD

[4] ISO14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines

[5] IPCC 2013, Global Warming Potential 100-year, IPCC Fifth Assessment Report Climate Change

[6] WMO 2014, Ozone Depletion Potentials for Steady-state, Scientific Assessment of Ozone Depletion: 2014, Global Ozone Research and Monitoring Project Report No. 55, 2014

[7] Van Zelm et al. 2008 as applied in ReCiPe LOTOS-EUROS,

[8] Seppälä et al.,2006 and Posch et al., 2008, Accumulated Exceedance

[9] Struijs et al., 2009b, EUTREND model, as implemented in ReCiPe

[10] CML–IA V4.1 LCA methodology, 2002, October 2012, CML University of Leiden, Netherlands

[11] Guinée et al., 2002, and van Oers et al., 2002 CML LCA methodology 2002a, Institute of Environmental Sciences (CML), Faculty of Science, University of Leiden, Netherlands

[12] Boulay et al., 2016, Available WAter REmaining (AWARE)

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EN 15643-1:2010, Sustainability of construction works - Sustainability assessment of buildings - Part 1: General framework

EN 15643-2, Sustainability of construction works - Assessment of buildings - Part 2: Framework for the assessment of environmental performance

EN 16449, Wood and wood-based products - Calculation of the biogenic carbon content of wood and conversion to carbon dioxide

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ISO 21931-1:2010, Sustainability in building construction - Framework for methods of assessment of the environmental performance of construction works - Part 1: Buildings