



Compliant to ISO 14025
Expona Control PUR

This Environmental Product Declaration (EPD) discloses potential environmental outcomes compliant with ISO 14025 for business to business communication.

The declared product Heterogeneous Expona Control PUR luxury vinyl tile (LVT) was made by Polyflor Australia in China in 2017 in both Stone and Wood décor.

It is sold with a warranty for 10 years of service in commercial flooring applications and for 15 years of service in residential flooring applications.

Polyflor is recognised globally as a leading manufacturer of high-quality vinyl floor coverings.

It specialises in stylish, durable and low maintenance vinyl flooring that is available in sheet, planks and tiles.

In collaboration with industry partners, Polyflor is working on developing new products and technologies.

They continually evaluate new ideas or alternatives that minimise environmental impacts.

The company strives to be an environmentally and economically sustainable business.

It reports annually on progress in key areas including energy efficiency, recycling, air quality, freight and packaging.

Low emissions of Volatile Organic Compounds (VOC) also enable a healthy indoor environment.

Polyflor is the founding member of Recofloor the vinyl flooring take-back scheme where used vinyl is collected and diverted from landfill to be recycled.

Socially aware, Polyflor has commitments to continuously improve life quality of their workforce and families as well as the larger community.

Polyflor factories are ISO 14001 Environmental Management Systems certified.

More information is at <http://www.polyflor.com.au>



Figure 1 Expona Control LVT PUR



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Different program EPDs may not be comparable as e.g. Australian transport is more than elsewhere. **Further explanatory information is found at <http://www.globalgreentag.com/>** or contact: certification1@globalgreentag.com © This EPD remains the property of Global GreenTag Pty Ltd.



1. Details of This Declaration

Program Operator	GreenTag Global Pty Ltd hereafter called Global GreenTag noted at www.globalgreentag.com
EPD Number	PLF LVT1 2019
Date issue	2 nd September 2019
Validity	2 nd September 2021
Reference PCR	Compliant with PCR: FC 2017
Time	Made in and sold from 2017 for 20 years use
Geography	Made in China. Uses are assumed as for Australasia.
Application	Commercial and residential interior flooring of luxury vinyl tiles
Functional unit	Polyflor Expona Control PUR 2.5mm thick LVT 20-year use cradle to fate 4.3kg/m ²

2. Product Characterisation

Definition	Expona Control PUR LVT commercial and residential floorcovering by Polyflor Ltd
Standard	EN 13845 Resilient floor coverings. Polyvinyl chloride floor coverings with particle based enhanced slip resistance

3. Green Star® Certified Credits

Products are relevant to the Green Building Council of Australia's (GBCA) Green Star® scheme. If required this EPD is evidence that the declared product meets the following Green Star® credits. It may be used as evidence in Green Star® submissions for those credits. The product is certified by GBCA recognised Global GreenTag Certified EPDs to meet the following credits of Green Star®:

- Performance V1.1: Refurbishment Materials
- Interiors V1.2: Sustainable Products
- Design and As Built V1.2: Sustainable Products

GBCA Disclaimer

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4. Verification of this Declaration

This EPD was approved on 11th July 2019 according to requirements of ISO14025 8.1.3b.

Role	Name	Position	Signature
PCR Review Chair	Murray Jones	Ecquate Pty Ltd CEO	 17-07-2019
LCI, LCIA & EPD Developer	Delwyn Jones	The Evah Institute CEO	 11/07/2019
3 rd Party LCI Verifier	Shloka Ashar	Sustainability Studio	 11/07/2019
External EPD Audit	David Baggs	Global GreenTag CEO & Program Director	 18/09/19

5. Packaging, Installation, Use & Disposal

Packaging	Cardboard forms & cartons, plastic wrap & strapping on reused pallets.
Service life	Residential and commercial refits vary but 20 year life is assumed typical.
Health Safety Environment	Apart from compliance to occupational and workplace health safety and environmental laws no additional personal protection is considered essential.
Residual Scrap	Mill off-cuts are reused. Installation scrap of 5% is assumed to landfill.
Cleaning Maintenance Scenario	The recommended cleaning and maintenance raises no ecosystem or human health concerns. Care and maintenance guides are on company websites.
Recycling	Weekly detergent spray, light mop, monthly wet machine scrub and cloth dry.
Re-use	Home mill, fabrication and installation scrap is reworked into new product.
Disposal	This study assumes 60% product is serviceable for reuse over 40 more years. It assumes 30% is recycled. Incineration is rare in Australia so none is modelled.

6. Whole of life Performance

Health Protection	The product does not contain levels of carcinogenic, toxic or hazardous substances that warrant ecological or human health concern cradle to grave. It passed the Ecospecifier Cautionary Assessment Process (ESCAP) and no issues or red-light concerns existed for product human or ecological toxicity.
Effluent Waste	The LCI results and ESCAP raised no red-light concerns in emissions to water ¹ . Cradle to grave waste to landfill was 1% hazardous and 99% non-hazardous.
Environmental Protection	Continuous improvement under the maker’s certified ISO14001 EMS aims to avoid toxics, waste and pollution plus reduce their material and energy use.
Environmental Health Effects	Installed products are certified as having VOC’s compliant with Green Star® IEQ VOC credits for indoor environment ² quality credits. No other potential in-use impacts on environment or health are known.

1 According with national standards in ANZECC Guideline for Fresh & Marine Water Quality (2000)
2 in accordance with national standards and practice.



7. Base Material Origin and Detail

Table 1 lists key components by function, type, key operation, source and amount.

Table 1 Base Material

Function	Component	Production	Origin	% Mass
Filler	Limestone	Mine, Crush, Sieve, Haul	China ³	>48 <53
Wear Layer	SPVC & DOTP	Plasticise, Stabilise & Extrude	China & Taiwan	>20 <25
Binder	SPVC	Drill, Refine, Chlorinate, Polymerise	China & Taiwan	>15 <20
Plasticiser	DOTP	Drill, Refine, Extract, Polymerise	China	>5.0 <10
Print film	PVC, DOTP & Dye	Plasticise, Stabilise, Dye, Extrude	China & Taiwan	>2.0 <5.0
Grip	Aluminium Oxide	Collect, Clean, Crush, Fire, Blend	China	>1.5 <2.0
Stabiliser	Ca Zn Soap	Farm, Press, Extract, Refine, Mill	China	>0.1 <0.5
Black	Carbon Black	Mine, Digest, Precipitate, Mill	China	>0.1 <0.5
Coating	Polyurethane	Farm, Drill, Extract, Polymerise	China	>0.1 <0.5
Thickener	Gum Rosin	Forestry, tap, extract, refine	China	>0.1 <0.5
Colour	Pigment	Drill, Distil, Extract, Mill	China	<0.1

8. Life Cycle Impact Results

Table 2 shows Life Cycle Impact Assessment (LCIA) results for 20 years of product use.

Table 2 Potential Impact Results

Evaluation Category	Unit	Result
Product mass	kg/m ²	4.29
Carbon Dioxide Equivalent Emissions ⁴	kg CO _{2e}	9.37
Ecosystem Quality Damages	PDF*m ² *yr	1.40E-04
Human Health Damages	DALY	1.70E-03
Ozone Depletion	kg R11 _e	2.25E-06
Acidification	kg SO _{2e}	4.66E-01
Eutrophication	kg PO ₄ ^{3-e}	4.91E-02
Fossil Fuel Depletion	MJ _{surplus}	9.50
Mineral Resource	MJ _{surplus}	0.29

³ Mainland China

⁴ Stocker et al (eds.) Climate Change 2013: The Physical Science Basis, CH8, IPCC AR5, Cambridge U Press, UK.



9. Supply Chain Modelling

Processes to acquire, refine, transport, fabricate, coat, use, clean, repair, reuse and dispose of metal, masonry, ceramic, timber, glass, plastic and composites are modelled. A flow chart in Figure 2 shows most key product supply chain operations from cradle to fate. Operations include those of:

- Mining, extracting and refining resources to make commodities and packaging;
- Acquiring, cultivating, harvesting, extracting, refining produce and biomass;
- Fuel production to supply power and process energy and freight;
- Chemicals use in processing resources, intermediates and ancillaries;
- Process energy, fuel and freight of resources, intermediates and ancillaries;
- Use, cleaning, recoating, repair, recycling, re-use and landfill, as well as
- Infrastructure process energy transformed and material wear loss e.g. tyres.

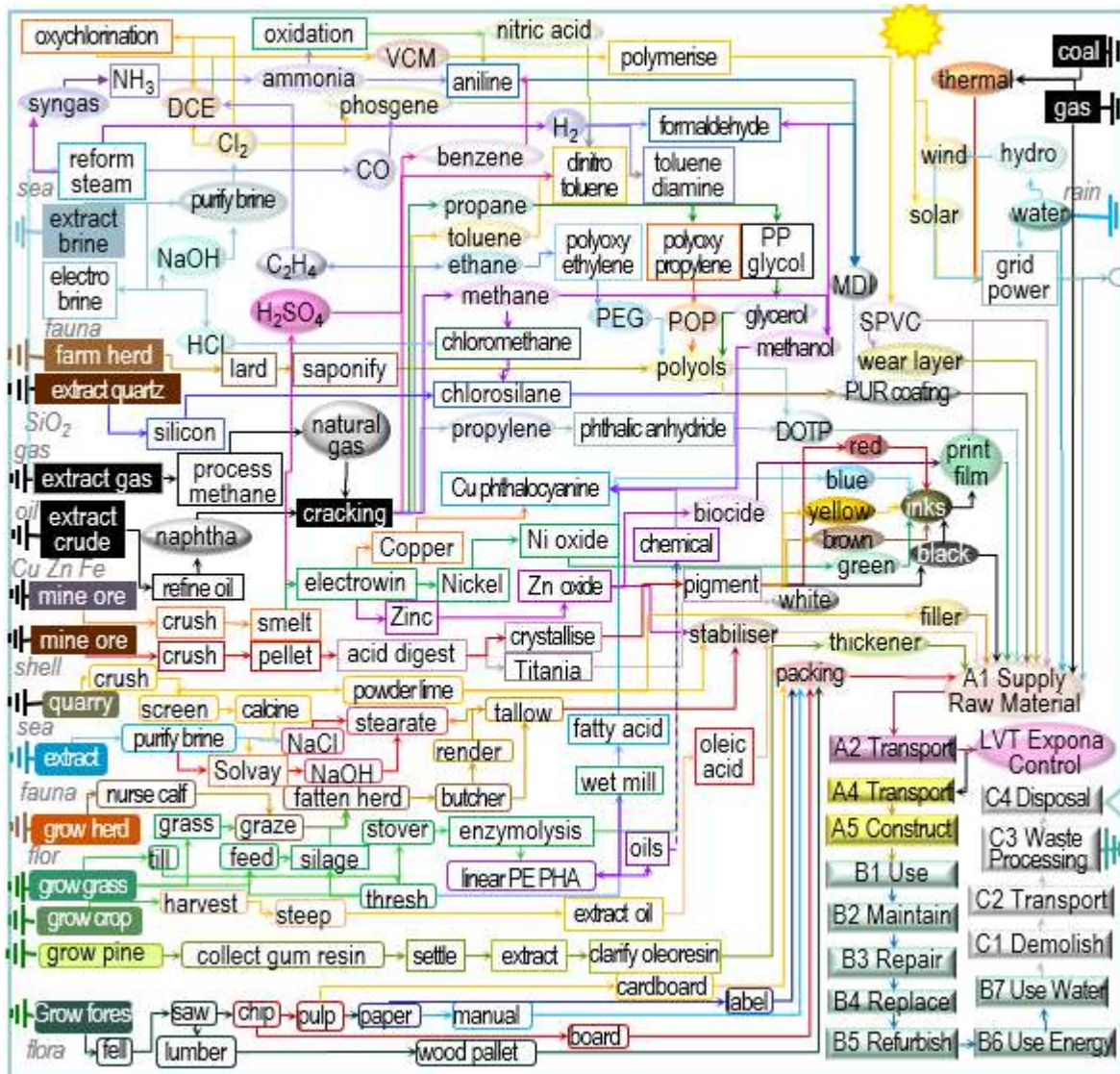


Figure 2 Major Product Operations



10. Life Cycle Assessment Method

LCA Author The Evah Institute as described at www.evah.com.au

Study Period Factory data was collected from 2015 to 2019

LCA Method Compliant with ISO 14040 and ISO 14044 Standards

LCIA method EcoIndicator 99 Life Cycle Impact (LCIA) Assessment

Scope Cradle to Fate including all supply chain phases and stages depicted in Figure 2.

Phases The LCA covered all known flows in all known stages cradle to end of life fate.

Assumptions Typical use is to Australian Facility Management professional practice.

Scenarios Use, cleaning, maintenance plus disposal and re-use were scenario-based using Facility Management Association denoted and published typical operations.

System Boundaries The LCA system boundary as in Figure 3 includes all operations A1-A3 production supply & transport; A4 package & deliver & A5 construct; B1 use with cleaning, B2 maintain, B3 repair⁵ B5 refurbish, C1 demolish, C2 transport and C4 disposal.

Processes All significant resource acquisition, water, fuel & energy use, power generation & distribution, freight, refining, intermediates, manufacture, scrap re-use, packing and dispatch, installation, use, maintenance, landfill waste and emission flows from all supply chain operations involved to make, pack and install the product are included.



	Actual		Scenarios					Potential										
	Produce			Construct		Building Fabric & Operation					End of life				Beyond Boundary			
Phases	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D 1, 2, 3			
Modules	Resource supply	Transport	Manufacturing	Transport	Construction	Use	Maintain	Repair	Replace	Refurbish	Demolish	Transport	Process Waste	Disposal	Reuse	Recovery	Recycling	
Unit Operations						B6 Operating Energy use												
						B7 Operating Water use												
Cradle to Grave	Mandatory for each and every phase																	
Cradle to Gate+options	Mandatory each phase			Optional for each and every phase												Optional		
Cradle to Gate	Optional																	

Figure 3 Phases and Stages Cradle to Grave

Evah industry databases cover all known domestic and global scope 1 and 2 operations. They exclude scope 3 burdens from capital facilities, equipment churn, noise and dehydration as well as incidental activities and employee commuting. The databases exist in top zones of commercial global modelling and calculating engines. Electricity supply models in active databases are updated annually. As each project is modelled and new data is available the databases are updated and audited by external Type 1 ecolabel certifiers. Quality control methods are applied to ensure:

- Coverage of place in time with all information for each dataset noted, checked and updated;
- Consistency to Evah guidelines for all process technology, transport and energy demand;
- Completeness of modeling based on in-house reports, literature and industry reviews;
- Plausibility in 2-way checks of LCI input and output flows of data checked for validity, plus
- Mathematical correctness of all calculations in mass and energy balance cross checks.



11. Data Sources Representativeness and Quality

Primary data used for modelling the state of art of each operation includes all known process for:

- Technology sequences;
- Energy and water use;
- Landfill and effluent plus
- Reliance on raw and recycled material;
- High and reduced process emissions;
- Freight and distribution systems.

Primary data is sourced from clients, annual reports and their publications on corporate locations, logistics, technology use, market share, management systems, standards and commitment to improved environmental performance. Information on operations is also sourced from client:

- Supply chain mills, their technical manuals, corporate annual reports and sector experts, and
- Manufacturing specifications websites and factory site development licensed applications.

Background data is sourced from the International Energy Agency, IBISWorld, USGS Minerals, Franklin Associates, Boustead 6, Plastics Europe, CML2, Simapro 8, Ecolnvent 3 and NREL USLCI model databases. Information on operations is also sourced from:

- Library, document, NPI and web searches, review papers, building manuals and
- Global Industry Association and Government reports on Best Available Technology (BAT).

For benchmarking, comparison and integrity checks inventory data is developed to represent BAT, business as usual and worst practice options with operations covering industry sector supply and infrastructure in Australia and overseas.

Such technology, performance and license conditions were modelled and evaluated across mining, farming, forestry, freight, infrastructure and manufacturing and building industry sectors since 1995.

As most sources do not provide estimates of accuracy, a pedigree matrix of uncertainty estimates to 95% confidence levels of geometric standard deviation² (σ_g) is used to define quality as in Table 3⁶.

Table 3 Data Quality Parameters and Uncertainty (U)

Correlation	Metric σ_g	U ±0.01	U ±0.05	U ±0.10	U ±0.20	U ±0.30
Reliability	Reporting	site audit	expert verify	region	sector	academic
	Sample	>66% trend	>25% trend	>10% batch	>5% batch	<1% batch
Completion	Including	>50%	>25%	>10%	>5%	<5%
	Cut-off	0.01%w/w	0.05%w/w	0.1%w/w	0.5%w/w	1%w/w
Temporal	Data Age	<3 years	≤5 years	<10 years	<15 years	>16 years
	Duration	>3 years	<3 years	<2 years	1 year	<1 year
Geography	Focus	process	line	plant	corporate	sector
	Range	continent	nation	plant	Line	process
Technology	Typology	actual	comparable	in class	convention	in sector

No data set with >±30% uncertainty is used without notation in the LCA as well as the EPD.

⁶ Evah Institute data quality control system accords with UNEP SETAC Global LCI Database Quality 2010 Guidelines



12. Supply Chain Modelling Assumptions

Australian building sector rules and Evah assumptions applied are defined in Table 4.

Table 4 Scope Boundaries Assumptions and Metadata

Quality/Domain	National including Import and Export
Process Model	Typical industry practice with currently most common or best (BAT) technology
Resource flows	Regional data for resource mapping, fuels, energy, electricity and logistics
Temporal	Project data was collated from 2016 to 2019
Geography	Designated client, site, regional, national, Pacific Rim then European jurisdiction
Representation	Designated client, their suppliers and energy supply chains back to the cradle
Consistency	Model all operations by known given operations with closest proximity
Technology	Pacific Rim industry supply chain technology typical of 2015 to 2019
Functional Unit	Typical product usage with cleaning & disposal/m ² over the set year service life
System Control	
Primary Sources	Client's and supplier's mills, publications, websites, specifications & manuals
Other Sources	IEA 2019, GGT 2019, Boustead 2013, Simapro 2016, IBIS 2019, EcoInvent 2016
Data mix	Power grid and renewable shares updated to latest IEA 2019 reports
Operational	Company data for process performance, product share, waste and emissions
Logistics	Local data is used for power, fuel mix, water supply, logistics share & capacity
New Data Entry	VliegLCA, Evah Institute 2019; Global GreenTag Researchers 2019
Data Generator	Manufacturers, Evah Institute 2019; GGT 2019; Meta: IBIS 2019, Other pre 2019
Data Publisher	The Evah Institute Pty Ltd to Global GreenTag and designated client only
Persons input	All contributors cited in Evah & Global GreenTag records or websites
Data Flow & Mix	
System Boundary	Earth's cradle of all resource & emission flows to end of use, fitout or build life
System flows	All known from and to air, land, water and community sources & sinks
Capital inclusions	Natural stocks, industry stockpiles, capital wear, system losses and use
Arid Practice	Dry technology adopted; Water use is factored by 0.1 as for e.g. mining
Transportation	Distance >20% than EU; >20% fuel efficient larger vehicles, load & distance
Industrial	Company or industry sector data for manufacturing and minerals involved
Mining	All raw material extraction is based on Australian or Pacific Rim technology
Imported fuel	Mix is from nearest sources is e.g. UAE, SE Asia, Canada or New Zealand
Finishes	Processing inputs with finishing burdens are factored in. If not, that is denoted
Validation	
Accuracy	10 th generation study is ± 5 to 15% uncertain due to some background data
Completeness	All significant operations are tracked and documented from the cradle to grave
Precision	Tracking of >90% flows applies a 90:10 rule sequentially to 99.9% and beyond
Allocation	%100 to co products on reaction stoichiometry by energetic or mass fraction
Burdens	All resource use from & emissions to community air land, water are included
Plausibility	Results are checked and benchmarked against BAT, BAU & worst practice
Sensitivity	Calculated U is reported & compared to libraries of Bath U RICE & EcoInvent 3.2
Validity Checks	Are made versus Plastics Europe, Ecobilan, GaBi & or Industry LCA Literature



13. References for this LCA & EPD

- Australian & New Zealand (ANZECC) Guidelines For Fresh & Marine Water Quality (2000) <http://www.environment.gov.au/water/quality/national-water-quality-management-strategy>
- Basel Convention (2011) Control of Transboundary Movement of Hazardous Waste & Disposal <http://www.basel.int/portals/4/basel%20convention/docs/text/baselconvention-text-e.pdf>
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- Evah (2018) LCA Tools, Databases & Methodology at <http://www.evah.com.au/tools.html>
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- International Energy Agency (2019) Energy Statistics <http://www.iea.org/countries/membercountries/>
- ISO 9001:2008 Quality Management Systems Requirements
- ISO 14001:2004 Environmental management systems: Requirements with guidance for use
- ISO 14004:2004 EMS: General guidelines on principles, systems & support techniques
- ISO 14015:2001 EMS: Environmental assessment of sites & organizations (EASO)
- ISO 14020:2000 Environmental labels & declarations — General principles
- ISO 14024:2009 Environmental labels & declarations -- Type I Principles & procedures
- ISO 14025:2006 Environmental labelling & declarations Type III EPDs Principles & procedures
- ISO 14031:1999 EM: Environmental performance evaluation: Guidelines
- ISO 14040:2006 EM: Life cycle assessment (LCA): Principles & framework
- ISO 14044:2006 EM: LCA: Requirement & guideline for data review: LCI; LCIA, Interpretation results
- ISO 14064:2006 EM: Greenhouse Gases: Organisation & Project reporting, Validation & verification
- ISO 15392:2008 Sustainability in building construction General principles
- ISO 15686-1:2011 Buildings & constructed assets Service life planning Part 1: General principles
- ISO 15686-2:2012 Buildings & constructed assets Service life (SL) planning Part 2: prediction
- ISO 15686-8:2008 Buildings & constructed assets SL planning Part 8: Reference & estimation
- ISO 21929-1:2011 Sustainability in building construction Sustainability indicators Part 1: Framework
- ISO 21930:2007 Building construction: Sustainability, Environmental declaration of building products
- ISO/TS 21931-1:2010 Sustainability in building construction: Framework for assessment, Part 1:
- ISO 21932:2013 Sustainability in buildings and civil engineering works -- A review of terminology
- Plastics Europe (2019) Portal <http://www.plasticseurope.org/plastics-sustainability/eco-profiles.aspx>
- Pre (2016) SimaPro 8 Software, The Netherlands <http://www.pre-sustainability.com/simapro-manuals>
- Myhre et al, 2013, Anthropogenic and Natural Radiative Forcing Chapter 8 in Stocker et al (eds.) Climate Change 2013, AR5 of the IPCC, Cambridge U Press UK. <http://www.ipcc.ch/report/ar5/wg1/>
- Roache S. K. (2012) IMF Report WP/12/115 China's Impact on World Commodity Markets <http://www.imf.org/external/pubs/ft/wp/2012/wp12115.pdf> International Monetary Fund
- UNEP (2016) Persistent Organic Pollutants <http://www.chem.unep.ch/pops/> The UN
- USLCI (2019) Life-Cycle Inventory Database <https://www.lcacommons.gov/nrel/search>, USA
- U.S. Geological Survey National Minerals (2019) <http://minerals.usgs.gov/minerals/pubs/country/> USA
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14. Reviewers Report Conclusions

The independent LCA reviewer’s report confirmed that the LCA project report and addition information addressed the EPD.

The verifier was not involved in developing the LCA or EPD and has no conflict of interests from their organisational position.

While the report is confidential its conclusions confirmed that documentation according to set ISO Standard requirements was provided including evidence from the:

The Evah Institute, the LCA developer:

- a) Recipes of input and output data of unit processes used for LCA calculations ✓
- b) Datasheets of measures, calculations, estimates and emails with sources as in Table 6 ✓
- e) References to literature and databases from which data was extracted as noted in Table 6 ✓
- g) Notes on supply chain processes and scenarios satisfying requirements of this Standard ✓
- i) Embodied Energy shares as used for sensitivity analyses re ISO 14044:2006, 4.5.3.3 ✓
- j) Proof percentages or figures in calculations in the end of life scenario ✓
- k) Notes on proof of % and allocation calculations ✓
- o) All operations covered Vs criteria and substantiation used to determine system boundaries ✓

Product Manufacturer in:

- c) Specifications used to create the manufacturer's product ✓
- d) Citations, references, specifications or regulations & data showing completeness ✓
- f) Specification demonstrating that the building product can fulfil the intended use ✓

The Certifier Global GreenTag on:

- l) Notes and calculation of averages of different locations yielding generic data ✓
- m) Substantiating additional environmental information ISO 14025:2006, 7.2.4 ✓
- n) Procedures for data collection, questionnaires, instructions, confidentiality deeds ✓

Requiring No Evidence:

As the EPD is cradle to grave as well as PCR compliant the independent reviewer did not need to:

- h) Substantiate a few stages as all stages were substantiated ✓
- p) Substantiate alternatives when no other choices and assumptions were applied ✓
- q) Demonstrate consistency for few stages as the same rules in Tables 5 and 6 applied to all. ✓



This Environmental Product Declaration (EPD) discloses potential environmental outcomes compliant with ISO 14025 for business to business communication.

Further and explanatory information is found at

<http://www.globalgreentag.com/>

or contact:

certification1@globalgreentag.com



Global GreenTagCert™ EPD Program
Environmental Product Declaration
Compliant to ISO 14025

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