Berger Paints (Solvent-Based)

Environmental Product Declaration

ISO 14020:2000, IS0 14025:2006, ISO 14040:2006,
ISO 14044:2006, EN 15804:2012

EPD registration number:	S-P-02108
Publication date:	2020-07-24
Validity date:	2025-07-23
Geographical scope:	India

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1. Introduction

With modest beginnings in India in 1923, today, Berger Paints India Limited is the second largest paint company in the country with a consistent track record of being one of the fastest growing paint companies, quarter on quarter, for the past few years.

Berger Paints India is headquartered at Kolkata, with 16 strategically located manufacturing units across India (including the subsidiaries), 2 in Nepal, 1 each in Poland and Russia and about 162 stock points. The company also has an international presence in 4 countries (Nepal, Bangladesh, Poland and Russia). Berger is acclaimed as a game changer in the sector with a vibrant portfolio of paints and tailor-made customer services in every paint segment.

This Environmental Product Declaration covers 21 solvent-based paint products of Berger Paints India Limited. The 21 solvent-based paint products are classified into Enamel, Undercoats and Wood-Coating. All the 21 paints products are decorative paint products.

Among the tools available to evaluate environmental performance, Life Cycle Assessment (LCA) provides a holistic approach by considering the potential impacts from all stages of manufacture, product use and end-of-life stages.

thinkstep Sustainability- a Sphera Company, has been entrusted to conduct Life Cycle Assessment for Berger Paint's solvent-based paint products as per the ISO 14040/44. The LCA model was created using the GaBi ts Software system for life cycle engineering, developed by thinkstep AG.

2. General Information

2.1 EPD, PCR, LCA Information

Table 1. EPD Information	
Programme	The International EPD® System, www.environdec.com
Program operator	EPD International AB Box 210 60, SE-100 31 Stockholm, Sweden.
Declaration holder	Berger Paints India Limited Berger House, 129, Park Street, Kolkata - 700017, India
Product	Solvent- Based Paint Products
CPC Code	UN CPC 3511
EPD registration number	S-P- 02108
Publication date	2020-07-24
Validity date	2025-07-23
Geographical scope	India
Reference standards	IS0 14020:2001, ISO 14025:2006, ISO 14040/44, EN 15804:2012

Table 2. PCR Information	
Reference PCR	'Construction Products and Construction Services' Version 2.31, 2012:01
Date of Issue	2019-12-20 (Version 2.31)

Table 3. Verification Information	
Demonstration of verification	External, independent verification
Third party verifier	Dr Hüdai Kara, Metsims Sustainability Consulting, 4 Clear Water Place, Oxford OX2 7NL, UK Email: hudai.kara@metsims.com

Table 4. LCA Information	
Title	Environmental Product Declaration of Berger ETICS
Preparer	Dr. Rajesh Kumar Singh Thinkstep Sustainability Solutions- a Sphera Company 707, Meadows, Sahar Plaza, Andheri Kurla Road, Andheri East, Mumbai - 400059, India Email: rsingh@sphera.com

2.2 Reference Period of EPD Data

The reference period for the data used within this EPD is the 2018-19 (October 2018 to September 2019)

2.3 Geographical Scope of EPD Application

The geographical scope of this EPD is India.

2.4 Additional Information about EPD

This EPD provides information for 21 solvent-based paint products manufactured at 8 plants of Berger Paints India Limited in India. The EPD is in accordance with ISO 14025 and EN 15804. EPD of construction products may not be comparable if they do not comply with EN 15804. The Life Cycle Assessment (LCA) study carried out for developing this EPD for solvent-based paint product is done as per ISO 14040 and ISO 14044 requirements for Berger Paints India Limited.

Product Category Rules (PCR) for the assessment of the environmental performance of Paint products is 'Construction Products and Construction Services' 2012:01 Version 2.31. All EPDs based on this PCR shall be compliant with EN 15804:2012+A1:2013

The target audience includes Berger Paints management, operational and marketing departments. Furthermore, it will be made available for many different external applications of the data, for technical and non-technical people, including customers of the industry, policy makers, LCA practitioners and academia as per company's decision to share information as they seem appropriate.

3. Product Description and System Boundaries

3.1 Product Identification and Usage

Solvent-based paint various constituents like pigments, filler, extenders, binder and other additives. Solvent-based paints contain organic compounds as solvents. The organic compounds ensure a hard and durable finish that resists scratches and abrasions on your wall. Solvent-based coatings are too thick and the thicker nature of it also tends to hide the imperfections on your wall.

Table 5. Properties of solvent-based enamels

Product Name	Product Type	Surface Type	Surface Coverage (m^2/litre)	Number of coats
Butterfly GP Synthetic Enamel	Solvent Based	Exterior/Interior	6.90	2
Luxol High Gloss Enamel	Solvent Based	Exterior/Interior	8.00	2
Luxol Lustre Enamel	Solvent Based	Exterior/Interior	8.50	2
Luxol Satin Enamel	Solvent Based	Exterior/Interior	7.85	2
Luxol Xtra	Solvent Based	Exterior/Interior	8.00	2
Luxol Satin Xtra	Solvent Based	Exterior/Interior	8.40	2
Luxol 7 in 1 Enamel	Solvent Based	Exterior/Interior	8.00	2

Table 6. Properties of solvent-based undercoats

Product Name	Product Type	Surface Type	Surface Coverage (m^2/litre)	Number of coats
BP Cement Primer (ST)	Solvent Based	Exterior/Interior	8.9	2
BP white Primer (ST)	Solvent Based	Exterior/Interior	7.75	2
Parrot Wood Primer	Solvent Based	Exterior/Interior	7.9	2
Red Oxide Primer	Solvent Based	Exterior/Interior	5.35	2
BP Zinc Yellow Primer	Solvent Based	Exterior/Interior	7.7	2
Luxol QD1K Epoxy Primer	Solvent Based	Exterior/Interior	5.1	2

Table 7. Properties of solvent-based wood-coating

Product Name	Product Type	Surface Type	Surface Coverage (m^2/litre)	Number of coats
Melamine Sealer	Solvent Based	Interior	6.5-10	2
Melamine Fin	Solvent Based	Interior	15	2
Woodkeeper	Solvent Based	Exterior/Interior	12	2
Imperia	Solvent Based	Exterior/Interior	13	2
Imperia Gold	Solvent Based	Exterior/Interior	11	2
Epoxy Block Primer	Solvent Based	Interior	9	2
Melamine Matt	Solvent Based	Interior	6.5-10	2

3.2 Content declaration

The paint consists of various ingredients like pigment to impart colour and opacity, binders for good adhesion of the coating to the substrate, fillers and extenders to increase the volume, increase the paint film thickness and to impart toughness or abrasion resistance to the coating, additives in small amounts of substances for modifying the paint properties and Solvent (organic solvent) which is a medium where the binder, pigment and additives are dispersed in molecular form.

4. LCA

4.1 Information Sources and Data Quality

To ensure that Berger Paints Ltd. can provide the most accurate and representative data for solvent-based paint product, the quality of the data used in the models must be very high. The quality of the LCI data for modelling the life cycle stages have been assessed according to ISO 14044 (2006). Data quality is judged by its precision (measured, calculated or estimated), completeness (e.g. are there unreported emissions?), consistency (degree of uniformity of the methodology applied on an LCA serving as a data source) and representativeness (geographical, time period, technology). To achieve this, industry data collected directly from the producers were used wherever possible. For all other data, primary data were used where possible and finally upstream LCA data from the GaBi 9 professional database. For this latter case, GaBi data were adapted for the data collection part.

4.2 Methodological Details

4.2.1 Declared unit

The declared unit for the paint products is 1 litre paint, including packaging, manufactured at Berger Paints India Limited (India)

4.2.2 Selection of application of LCIA categories

A list of relevant impact categories and category indicators is defined and associated with the inventory data. CML 2001 (January 2016) method developed by Institute of Environmental Sciences, Leiden University, Netherlands have been selected for evaluation of environmental impacts. These indicators are scientifically and technically valid.

The environmental impact per declared unit for the following environmental impact categories were reported in the EPD according with EN15804 (Table 8) and divided into core, upstream (and downstream, if included) module.

Table 8. Environmental impacts indicators

Impact Indicator	LCIA Method	Unit
Acidification Potential	CML	kg SO_2 equivalent
Eutrophication Potential	CML	kg PO_4^{3-} equivalent
Global Warming Potential	CML	kg CO_2 equivalent
Ozone Depletion Potential	CML	kg CFC-11 equivalent
Photochemical Ozone Creation Potential	CML	kg Ethene equivalent
Abiotic Depletion Potential - Elements	CML	kg Sb- equivalent
Abiotic Depletion Potential - Fossil resources		MJ, net calorific value

The consumption of resources per declared or function unit is reported in the EPD. Input parameters, according with EN15804, describing resource use are shown in Table 9

Table 9. Resources use parameters

Parameter	Unit
Renewable primary energy as energy carrier	MJ, net calorific value
Renewable primary energy resources as material utilization	MJ, net calorific value
Total use of renewable primary energy resources	MJ, net calorific value
Non-renewable primary energy as energy carrier	MJ, net calorific value
Non-renewable primary energy as material utilization	MJ, net calorific value
Total use of non-renewable primary energy resources	MJ, net calorific value

Table 10. Other Environmental Indicators

Parameter	Unit
Components for re-use	kg
Materials for recycling	kg
Materials for energy recovery	kg
Exported energy	MJ
Hazardous waste disposed	kg
Non-hazardous waste disposed	kg
Radioactive waste disposed/stored	kg

Table 11. Toxicity indicators

Parameter	Unit
Human toxicity, cancer and non-cancer (USEtox)	CTUh
Ecotoxicity (USEtox)	CTUe

4.3 Cut-off Criteria

Life Cycle Inventory data for a minimum of 99 % of total inflows to the core module shall be included. Inflows not included in the LCA shall be documented in the EPD. Input and output data have been collected through detailed questionnaires which have been developed and refined. In practice, this means that, at least, all material flows going into the production processes (inputs) higher than 1% of the total mass flow or higher than 1% of the total primary energy input are part of the system and modelled in order to calculate elementary flows. Inputs with less than 1% of mass flow and less than 1% of the total primary energy input are also considered as all these were environmentally relevant.

4.4 Allocation

No allocation has been done. As no co-products are produced, the flow of materials and energy and the associated release of substances and energy into the environment is related exclusively to the paint produced. Any allocation performed in the background processes is according to the PCR.

4.5 System Boundaries

The system boundary for Berger Paint product represents a Cradle-to-Gate, which covers production Phase. The production phase includes the raw material extraction, production of the raw materials, auxiliary material production, upstream transportation, manufacturing process of the final product and its packaging.

4.5.1 Geographic System Boundaries

The geographical coverage of this declaration covers the production of paint in India. Wherever possible, the country specific (India) boundaries have been adapted and other datasets were chosen from EU if no India datasets were available

4.5.2 Temporal System Boundaries

The data collection is related to one year of operation and the year of the data is indicated in the questionnaire for each data point. The majority of data was derived for the year 2018-19 (October 2018 to September 2019) and is believed to be representative of production of paint product in India during this time frame.

Table 12. Details of system boundary included in the study

Life Cycle Phases	Life Cycle stages	Modules	Life Cycle sub-stages	Definitions
Production Phase	Raw Materials	A1	Primary raw materials production	Extraction and production of raw materials
				Electricity from all sources (import from grid, captive power generation, DG set), water used in Extraction, production of raw materials raw materials and manufacturing.
	Upstream transport	A2	Rail, road and waterways transport	Transport of raw materials to the production plant site.
	Manufacturing	A3	Manufacturing	Manufacturing of construction products and co-products
			Waste treatment during manufacturing	Waste treatment processes (hazardous and non-hazardous waste into landfilling and incineration plant) generated during manufacturing process, Effluent treatment process.
			Product Packaging	Packaging material of final product

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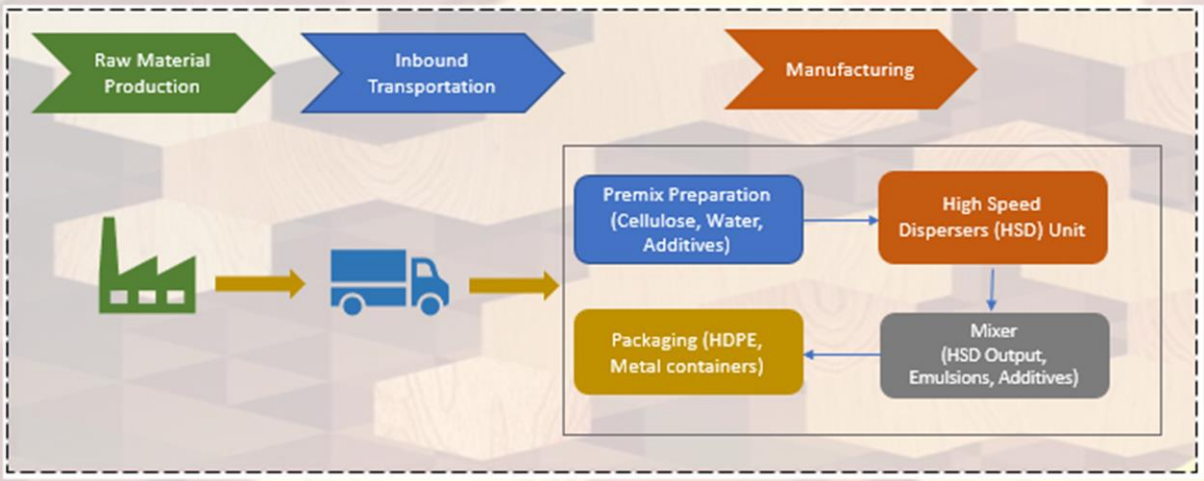

Figure 1. System Boundary along with flow diagram of paint manufacturing

4.5.3 Technology coverage

The exact technological configuration was used for the various process's operation of its plant for efficient performance in production and minimizing environmental impacts. It was assumed that secondary data from databases that were used for this assessment, were temporally and technologically comparable to that of primary data and within the temporal coverage already addressed.

4.6 Software and database

The LCA model was created using the GaBi 9 Software system for life cycle engineering, developed by thinkstep AG. The GaBi database provides the life cycle inventory data for several of the raw and process materials obtained from the upstream system. Detailed database documentation for GaBi datasets can be accessed at http://www.gabi-software.com/international/support/gabi/gabi-database-2020-lci-documentation.

4.7 Comparability

According to the standards, EPDs do not compare the environmental performance of products in the sector. Any comparison of the declared environmental performance of products lies outside the scope of these standards and is suggested to be feasible only if all compared declarations follow equal standard provisions.

4.8 Results

Modules of the production life cycle included as per PCR is given in Table 13.

Table 13. Modules of the production life cycle included

Production			Installation		Use stage							End-of-Life				Next product system
Raw material supply (extraction, processing, recycled material)	Transport to manufacturer	Manufacturing	Transport to building site	Installation into building	Use / application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport to EoL	Waste processing for reuse, recovery or recycling	Disposal	Reuse, recovery or recycling energy recovery potentials
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

(X = declared module; MND = Module Not Declared)

❖ Enamel

1. Berger Butterfly GP Synthetic Enamel

Berger Butterfly GP Enamel is a long lasting, glossy, solvent-based paint for interior surface only. It can be applied on wooden surfaces like interior doors, windows, interior ply board partition, walls, furniture and cabinets and on mild steel metal surfaces like grills, steel furniture, collapsible gates, shutters etc.

Table 14. Cradle to Gate LCIA results for Berger Butterfly GP Synthetic Enamel

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	5.34E-05	6.99E-10	5.07E-07	5.39E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	2.47E+01	7.87E-01	7.43E+00	3.30E+01
Acidification Potential (AP)	kg SO_2-Equiv.	6.69E-03	2.65E-04	4.20E-03	1.12E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	3.85E-04	5.26E-05	4.61E-04	8.99E-04
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	9.50E-01	5.83E-02	7.07E-01	1.72E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	2.71E-12	2.71E-16	1.04E-12	3.75E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	6.59E-04	-7.86E-05	2.92E-04	8.72E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	2.61E+01	7.88E-01	7.51E+00	3.44E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.61E+01	7.88E-01	7.51E+00	3.44E+01
Non-Renewable primary energy as energy carrier	MJ	7.09E+00	2.53E-03	1.91E+00	9.00E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	7.09E+00	2.53E-03	1.91E+00	9.00E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	8.71E-03	1.17E-05	1.54E-03	1.03E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	7.05E-08	5.13E-11	3.24E-08	1.03E-07
Non-hazardous waste disposed	kg	8.20E-02	4.68E-06	6.80E-02	1.50E-01
Radioactive waste disposed/stored	kg	5.35E-04	1.81E-07	2.92E-05	5.64E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	5.61E-11	1.66E-13	2.08E-11	7.70E-11
Ecotoxicity (USEtox)	CTUe	4.62E-03	9.02E-05	1.42E-03	6.13E-03

2. Berger Luxol High Gloss Enamel

Berger Luxol Hi-Gloss enamel is manufactured with suitable alkyd, finest pigments and few important additives. It gives a mirror-like gloss with tough film and everlasting finish and can be applied on all surfaces, mainly on mild steel, wooden and suitably prepared masonry surfaces.

Table 15. Cradle to Gate LCIA results for Berger Luxol High Gloss Enamel

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	5.00E-05	7.28E-10	5.07E-07	5.05E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	2.76E+01	8.21E-01	7.43E+00	3.59E+01
Acidification Potential (AP)	kg SO_2-Equiv.	1.02E-02	2.77E-04	4.20E-03	1.47E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	4.46E-04	5.49E-05	4.61E-04	9.62E-04
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	1.13E+00	6.08E-02	7.07E-01	1.90E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	2.70E-12	2.82E-16	1.04E-12	3.74E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	8.14E-04	-8.19E-05	2.92E-04	1.02E-03

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	2.93E+01	8.21E-01	7.51E+00	3.76E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.93E+01	8.21E-01	7.51E+00	3.76E+01
Non-Renewable primary energy as energy carrier	MJ	6.88E+00	2.64E-03	1.91E+00	8.80E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	6.88E+00	2.64E-03	1.91E+00	8.80E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	9.59E-03	1.22E-05	1.54E-03	1.11E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	6.58E-08	5.35E-11	3.24E-08	9.83E-08
Non-hazardous waste disposed	kg	1.41E-01	4.88E-06	6.80E-02	2.09E-01
Radioactive waste disposed/stored	kg	6.58E-04	1.89E-07	2.92E-05	6.88E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	6.24E-11	1.74E-13	2.08E-11	8.34E-11
Ecotoxicity (USEtox)	CTUe	4.97E-03	9.40E-05	1.42E-03	6.49E-03

3. Berger Luxol Lustre Enamel

Berger Luxol Lustre Enamel is an excellent sheen finish for interior walls, giving glow finish like pearl. It is long lasting solvent-based paint for all interior walls. Its usage area is metal, wall and wood surface.

Table 16. Cradle to Gate LCIA results for Berger Luxol Lustre Enamel

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	3.63E-05	8.40E-10	5.07E-07	3.69E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	3.06E+01	9.46E-01	7.43E+00	3.90E+01
Acidification Potential (AP)	kg SO_2-Equiv.	1.91E-02	3.19E-04	4.20E-03	2.36E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	6.35E-04	6.33E-05	4.61E-04	1.16E-03
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	1.39E+00	7.01E-02	7.07E-01	2.17E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	4.23E-12	3.26E-16	1.04E-12	5.27E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	1.14E-03	-9.44E-05	2.92E-04	1.34E-03

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	3.32E+01	9.47E-01	7.51E+00	4.17E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	3.32E+01	9.47E-01	7.51E+00	4.17E+01
Non-Renewable primary energy as energy carrier	MJ	1.14E+01	3.04E-03	1.91E+00	1.33E+01
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	1.14E+01	3.04E-03	1.91E+00	1.33E+01
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.20E-02	1.41E-05	1.54E-03	1.35E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	1.12E-07	6.17E-11	3.24E-08	1.44E-07
Non-hazardous waste disposed	kg	3.53E-01	5.63E-06	6.80E-02	4.21E-01
Radioactive waste disposed/stored	kg	1.03E-03	2.17E-07	2.92E-05	1.06E-03
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	8.18E-11	2.01E-13	2.08E-11	1.03E-10
Ecotoxicity (USEtox)	CTUe	4.88E-03	1.08E-04	1.42E-03	6.41E-03

4. Berger Luxol Satin Enamel

Berger Luxol Satin enamel gives excellent sheen finish for interior walls in solvent-based range. It builds a tough film with outstanding washable properties. It is a long-lasting solvent-based paint for special areas like bathrooms, kitchen, balcony and hotels' common areas.

Table 17. Cradle to Gate LCIA results for Berger Luxol Satin Enamel

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	4.47E-05	8.65E-10	5.07E-07	4.52E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	2.43E+01	9.74E-01	7.43E+00	3.27E+01
Acidification Potential (AP)	kg SO_2-Equiv.	8.82E-03	3.28E-04	4.20E-03	1.33E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	4.69E-04	6.51E-05	4.61E-04	9.95E-04
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	8.65E-01	7.21E-02	7.07E-01	1.64E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	4.10E-12	3.35E-16	1.04E-12	5.14E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	7.07E-04	-9.72E-05	2.92E-04	9.02E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	2.58E+01	9.74E-01	7.51E+00	3.43E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.58E+01	9.74E-01	7.51E+00	3.43E+01
Non-Renewable primary energy as energy carrier	MJ	1.12E+01	3.13E-03	1.91E+00	1.32E+01
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	1.12E+01	3.13E-03	1.91E+00	1.32E+01
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	9.00E-03	1.45E-05	1.54E-03	1.06E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	1.15E-07	6.35E-11	3.24E-08	1.48E-07
Non-hazardous waste disposed	kg	1.21E-01	5.79E-06	6.80E-02	1.89E-01
Radioactive waste disposed/stored	kg	5.97E-04	2.24E-07	2.92E-05	6.26E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	6.22E-11	2.06E-13	2.08E-11	8.31E-11
Ecotoxicity (USEtox)	CTUe	4.40E-03	1.12E-04	1.42E-03	5.93E-03

5. Berger Luxol Xtra

Luxol Xtra Super Gloss Enamel offers a superior mirror like gloss which can be used both for exterior and interior surfaces mainly on mild steel, wooden and suitably prepared masonry surfaces. Formulated with alkyd and select colorants & it gives a long-lasting glossy finish with superior coverage.

Table 18. Cradle to Gate LCIA results for Berger Luxol Xtra

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	3.29E-05	7.81E-10	5.07E-07	3.34E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	3.39E+01	8.79E-01	7.43E+00	4.22E+01
Acidification Potential (AP)	kg SO_2-Equiv.	2.01E-02	2.96E-04	4.20E-03	2.46E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	6.42E-04	5.88E-05	4.61E-04	1.16E-03
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	1.58E+00	6.51E-02	7.07E-01	2.35E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	3.61E-12	3.03E-16	1.04E-12	4.65E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	1.23E-03	-8.77E-05	2.92E-04	1.43E-03

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	3.67E+01	8.80E-01	7.51E+00	4.50E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	3.67E+01	8.80E-01	7.51E+00	4.50E+01
Non-Renewable primary energy as energy carrier	MJ	9.40E+00	2.83E-03	1.91E+00	1.13E+01
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	9.40E+00	2.83E-03	1.91E+00	1.13E+01
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.26E-02	1.31E-05	1.54E-03	1.42E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	8.82E-08	5.73E-11	3.24E-08	1.21E-07
Non-hazardous waste disposed	kg	3.60E-01	5.23E-06	6.80E-02	4.28E-01
Radioactive waste disposed/stored	kg	1.08E-03	2.02E-07	2.92E-05	1.11E-03
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	8.43E-11	1.87E-13	2.08E-11	1.05E-10
Ecotoxicity (USEtox)	CTUe	5.50E-03	1.01E-04	1.42E-03	7.03E-03

6. Berger Luxol Satin Xtra

Berger Luxol Satin enamel gives excellent sheen finish for interior walls in solvent-based range. It builds a tough film with outstanding washable properties. It is a long-lasting solvent-based paint for special areas like bathrooms, kitchen, balcony and hotels' common areas.

Table 19. Cradle to Gate LCIA results for Berger Luxol Satin Xtra

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	5.68E-05	8.88E-10	5.07E-07	5.73E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	2.58E+01	1.00E+00	7.43E+00	3.42E+01
Acidification Potential (AP)	kg SO_2-Equiv.	9.68E-03	3.37E-04	4.20E-03	1.42E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	4.75E-04	6.68E-05	4.61E-04	1.00E-03
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	1.08E+00	7.40E-02	7.07E-01	1.86E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	3.39E-12	3.44E-16	1.04E-12	4.42E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	7.60E-04	-9.98E-05	2.92E-04	9.53E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	2.76E+01	1.00E+00	7.51E+00	3.61E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.76E+01	1.00E+00	7.51E+00	3.61E+01
Non-Renewable primary energy as energy carrier	MJ	9.72E+00	3.21E-03	1.91E+00	1.16E+01
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	9.72E+00	3.21E-03	1.91E+00	1.16E+01
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.01E-02	1.48E-05	1.54E-03	1.17E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	1.01E-07	6.52E-11	3.24E-08	1.34E-07
Non-hazardous waste disposed	kg	1.77E-01	5.95E-06	6.80E-02	2.45E-01
Radioactive waste disposed/stored	kg	6.96E-04	2.30E-07	2.92E-05	7.25E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	6.83E-11	2.12E-13	2.08E-11	8.92E-11
Ecotoxicity (USEtox)	CTUe	4.42E-03	1.15E-04	1.42E-03	5.96E-03

7. Berger Luxol 7 in 1

Berger Luxol 7 in 1 Enamel is a quick drying, super gloss, lead/chrome-free anti-corrosive PU enamel for metal, wood and masonry surfaces. It is applicable for both interior and exterior surfaces- metal, wood and masonry surfaces.

Table 20. Cradle to Gate LCIA results for Berger Luxol 7 in 1

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	7.26E-05	7.73E-10	5.07E-07	7.31E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	2.92E+01	8.71E-01	7.43E+00	3.76E+01
Acidification Potential (AP)	kg SO_2-Equiv.	9.83E-03	2.93E-04	4.20E-03	1.43E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	4.73E-04	5.82E-05	4.61E-04	9.93E-04
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	1.19E+00	6.45E-02	7.07E-01	1.96E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	3.01E-12	3.00E-16	1.04E-12	4.05E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	8.27E-04	-8.69E-05	2.92E-04	1.03E-03

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	3.10E+01	8.71E-01	7.51E+00	3.94E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	3.10E+01	8.71E-01	7.51E+00	3.94E+01
Non-Renewable primary energy as energy carrier	MJ	7.98E+00	2.80E-03	1.91E+00	9.90E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	7.98E+00	2.80E-03	1.91E+00	9.90E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.04E-02	1.29E-05	1.54E-03	1.19E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	7.89E-08	5.68E-11	3.24E-08	1.11E-07
Non-hazardous waste disposed	kg	1.38E-01	5.18E-06	6.80E-02	2.06E-01
Radioactive waste disposed/stored	kg	6.86E-04	2.00E-07	2.92E-05	7.15E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	6.70E-11	1.84E-13	2.08E-11	8.80E-11
Ecotoxicity (USEtox)	CTUe	5.28E-03	9.98E-05	1.42E-03	6.80E-03

❖ Undercoats

1. Berger BP Cement Primer (ST)

BP Cement Primer (ST) is manufactured with a special type of synthetic alkyd binder and micro fine pigments along with extenders and different additives. It is an air-drying primer for masonry surfaces providing hard and tough film. It is best for masonry and asbestos surfaces.

Table 21. Cradle to Gate LCIA results for Berger BP Cement Primer (ST)

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	1.19E-05	9.81E-10	5.07E-07	1.24E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	2.07E+01	1.11E+00	7.43E+00	2.93E+01
Acidification Potential (AP)	kg SO_2-Equiv.	7.95E-03	3.73E-04	4.20E-03	1.25E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	3.80E-04	7.39E-05	4.61E-04	9.15E-04
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	8.40E-01	8.18E-02	7.07E-01	1.63E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	2.74E-12	3.80E-16	1.04E-12	3.77E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	6.25E-04	-1.10E-04	2.92E-04	8.07E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	2.21E+01	1.11E+00	7.51E+00	3.07E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.21E+01	1.11E+00	7.51E+00	3.07E+01
Non-Renewable primary energy as energy carrier	MJ	7.45E+00	3.55E-03	1.91E+00	9.36E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	7.45E+00	3.55E-03	1.91E+00	9.36E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	7.71E-03	1.64E-05	1.54E-03	9.26E-03

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	7.52E-08	7.21E-11	3.24E-08	1.08E-07
Non-hazardous waste disposed	kg	1.29E-01	6.58E-06	6.80E-02	1.98E-01
Radioactive waste disposed/stored	kg	5.34E-04	2.54E-07	2.92E-05	5.63E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	5.53E-11	2.34E-13	2.08E-11	7.63E-11
Ecotoxicity (USEtox)	CTUe	3.60E-03	1.27E-04	1.42E-03	5.15E-03

2. Berger BP White Primer (ST)

BP White Primer (ST) is an oil modified alkyd-based primer suitably pigmented with micro fine pigments and extenders. It is a white primer ideal for plaster surfaces and can be used in wooden and ferrous - metallic substrate.

Table 22. Cradle to Gate LCIA results for Berger BP White Primer (ST)

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	3.27E-05	1.12E-09	5.07E-07	3.32E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	1.76E+01	1.26E+00	7.43E+00	2.62E+01
Acidification Potential (AP)	kg SO_2-Equiv.	5.82E-03	4.23E-04	4.20E-03	1.04E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	3.70E-04	8.40E-05	4.61E-04	9.16E-04
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	5.79E-01	9.30E-02	7.07E-01	1.38E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	3.83E-12	4.32E-16	1.04E-12	4.87E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	5.10E-04	-1.25E-04	2.92E-04	6.77E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	1.87E+01	1.26E+00	7.51E+00	2.75E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	1.87E+01	1.26E+00	7.51E+00	2.75E+01
Non-Renewable primary energy as energy carrier	MJ	1.04E+01	4.04E-03	1.91E+00	1.24E+01
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	1.04E+01	4.04E-03	1.91E+00	1.24E+01
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	6.92E-03	1.87E-05	1.54E-03	8.47E-03

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	1.08E-07	8.19E-11	3.24E-08	1.40E-07
Non-hazardous waste disposed	kg	8.78E-02	7.47E-06	6.80E-02	1.56E-01
Radioactive waste disposed/stored	kg	4.54E-04	2.89E-07	2.92E-05	4.83E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	5.13E-11	2.66E-13	2.08E-11	7.23E-11
Ecotoxicity (USEtox)	CTUe	3.21E-03	1.44E-04	1.42E-03	4.78E-03

3. Berger Parrot Wood Primer

Berger Parrot Wood Primer is manufactured with a special type of synthetic alkyd binder and micro fine pigments along with extenders and different additives. It is an air-drying primer for wood and its by-products, providing hard and tough film. It is the best Primer for wooden and its by-products surfaces.

Table 23. Cradle to Gate LCIA results for Berger Parrot Wood Primer

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	1.36E-05	1.03E-09	5.07E-07	1.41E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	1.92E+01	1.16E+00	7.43E+00	2.78E+01
Acidification Potential (AP)	kg SO_2-Equiv.	9.71E-03	3.91E-04	4.20E-03	1.43E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	4.59E-04	7.75E-05	4.61E-04	9.98E-04
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	6.28E-01	8.59E-02	7.07E-01	1.42E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	4.91E-12	3.99E-16	1.04E-12	5.95E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	6.63E-04	-1.16E-04	2.92E-04	8.40E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	2.07E+01	1.16E+00	7.51E+00	2.94E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.07E+01	1.16E+00	7.51E+00	2.94E+01
Non-Renewable primary energy as energy carrier	MJ	1.32E+01	3.73E-03	1.91E+00	1.51E+01
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	1.32E+01	3.73E-03	1.91E+00	1.51E+01
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	7.77E-03	1.72E-05	1.54E-03	9.32E-03

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	1.35E-07	7.56E-11	3.24E-08	1.67E-07
Non-hazardous waste disposed	kg	1.61E-01	6.90E-06	6.80E-02	2.29E-01
Radioactive waste disposed/stored	kg	6.00E-04	2.66E-07	2.92E-05	6.30E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	5.78E-11	2.46E-13	2.08E-11	7.88E-11
Ecotoxicity (USEtox)	CTUe	3.40E-03	1.33E-04	1.42E-03	4.96E-03

4. Berger Red Oxide Primer

It is an oil modified alkyd-based primer suitably pigmented with micro fine red oxide and extenders. Ideal for ferrous metal surfaces. It is the economic primer best for mild steel.

Table 24. Cradle to Gate LCIA results for Berger Red Oxide Primer

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	3.32E-05	9.59E-10	5.07E-07	3.37E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	2.07E+01	1.08E+00	7.43E+00	2.92E+01
Acidification Potential (AP)	kg SO_2-Equiv.	7.35E-03	3.64E-04	4.20E-03	1.19E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	5.46E-04	7.22E-05	4.61E-04	1.08E-03
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	3.45E-01	8.00E-02	7.07E-01	1.13E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	7.29E-12	3.72E-16	1.04E-12	8.33E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	5.92E-04	-1.08E-04	2.92E-04	7.76E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	2.19E+01	1.08E+00	7.51E+00	3.05E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.19E+01	1.08E+00	7.51E+00	3.05E+01
Non-Renewable primary energy as energy carrier	MJ	2.02E+01	3.47E-03	1.91E+00	2.21E+01
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	2.02E+01	3.47E-03	1.91E+00	2.21E+01
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	7.84E-03	1.60E-05	1.54E-03	9.40E-03

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	2.12E-07	7.04E-11	3.24E-08	2.44E-07
Non-hazardous waste disposed	kg	4.60E-02	6.43E-06	6.80E-02	1.14E-01
Radioactive waste disposed/stored	kg	4.72E-04	2.48E-07	2.92E-05	5.01E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	5.99E-11	2.29E-13	2.08E-11	8.09E-11
Ecotoxicity (USEtox)	CTUe	4.11E-03	1.24E-04	1.42E-03	5.65E-03

5. Berger BP Zinc Yellow Primer

BP Zinc Yellow Primer is formulated with a special type of synthetic alkyd binder and micro zinc pigment to withstand high degree corrosion. It is an ideal primer for saline weather and heavily corrosive conditions. It is an air-drying primer for Mild Steel and non-ferrous surfaces providing hard and tough film.

Table 25. Cradle to Gate LCIA results for Berger BP Zinc Yellow Primer

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	3.32E-05	9.59E-10	5.07E-07	3.37E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	2.07E+01	1.08E+00	7.43E+00	2.92E+01
Acidification Potential (AP)	kg SO_2-Equiv.	7.35E-03	3.64E-04	4.20E-03	1.19E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	5.46E-04	7.22E-05	4.61E-04	1.08E-03
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	3.45E-01	8.00E-02	7.07E-01	1.13E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	7.29E-12	3.72E-16	1.04E-12	8.33E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	5.92E-04	-1.08E-04	2.92E-04	7.76E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	2.19E+01	1.08E+00	7.51E+00	3.05E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.19E+01	1.08E+00	7.51E+00	3.05E+01
Non-Renewable primary energy as energy carrier	MJ	2.02E+01	3.47E-03	1.91E+00	2.21E+01
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	2.02E+01	3.47E-03	1.91E+00	2.21E+01
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	7.84E-03	1.60E-05	1.54E-03	9.40E-03

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	2.12E-07	7.04E-11	3.24E-08	2.44E-07
Non-hazardous waste disposed	kg	4.60E-02	6.43E-06	6.80E-02	1.14E-01
Radioactive waste disposed/stored	kg	4.72E-04	2.48E-07	2.92E-05	5.01E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	5.99E-11	2.29E-13	2.08E-11	8.09E-11
Ecotoxicity (USEtox)	CTUe	4.11E-03	1.24E-04	1.42E-03	5.65E-03

6. Berger Luxol QD1K Epoxy Primer

Table 26. Cradle to Gate LCIA results for Berger Luxol QD1K Epoxy Primer

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	5.95E-05	9.74E-10	5.07E-07	6.00E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	4.84E+01	1.10E+00	7.43E+00	5.69E+01
Acidification Potential (AP)	kg SO_2-Equiv.	1.46E-02	3.70E-04	4.20E-03	1.91E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	6.16E-04	7.33E-05	4.61E-04	1.15E-03
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	2.28E+00	8.12E-02	7.07E-01	3.07E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	1.34E-12	3.77E-16	1.04E-12	2.38E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	1.04E-03	-1.09E-04	2.92E-04	1.22E-03

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	5.08E+01	1.10E+00	7.51E+00	5.94E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	5.08E+01	1.10E+00	7.51E+00	5.94E+01
Non-Renewable primary energy as energy carrier	MJ	5.13E+00	3.53E-03	1.91E+00	7.04E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	5.13E+00	3.53E-03	1.91E+00	7.04E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.29E-02	1.63E-05	1.54E-03	1.45E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	5.72E-08	7.15E-11	3.24E-08	8.97E-08
Non-hazardous waste disposed	kg	2.82E-01	6.53E-06	6.80E-02	3.50E-01
Radioactive waste disposed/stored	kg	9.59E-04	2.52E-07	2.92E-05	9.88E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	1.00E-10	2.33E-13	2.08E-11	1.21E-10
Ecotoxicity (USEtox)	CTUe	8.64E-03	1.26E-04	1.42E-03	1.02E-02

❖ Wood Coating

1. Berger Melamine Sealer

Berger Melamine Sealer is one of the variants of Berger Melamine, which is a 2-pack system specifically meant to be applied on wood. The mixing ratio of the base and catalyst is 9:1 specifically meant for interiors. It is applied upon wood, veneer, plywood and MDF

Table 27. Cradle to Gate LCIA results for Berger Melamine Sealer

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	4.83E-06	7.41E-10	5.07E-07	5.33E-06
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	3.95E+01	8.35E-01	7.43E+00	4.78E+01
Acidification Potential (AP)	kg SO_2-Equiv.	5.74E-03	2.81E-04	4.20E-03	1.02E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	1.34E-03	5.58E-05	4.61E-04	1.86E-03
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	1.67E+00	6.18E-02	7.07E-01	2.44E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	8.21E-13	2.87E-16	1.04E-12	1.86E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	6.79E-04	-8.33E-05	2.92E-04	8.88E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	4.10E+01	8.36E-01	7.51E+00	4.94E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	4.10E+01	8.36E-01	7.51E+00	4.94E+01
Non-Renewable primary energy as energy carrier	MJ	4.96E+00	2.68E-03	1.91E+00	6.87E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	4.96E+00	2.68E-03	1.91E+00	6.87E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.39E-01	1.24E-05	1.54E-03	1.41E-01

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	-4.06E-08	5.45E-11	3.24E-08	-8.13E-09
Non-hazardous waste disposed	kg	4.70E-02	4.97E-06	6.80E-02	1.15E-01
Radioactive waste disposed/stored	kg	5.83E-04	1.92E-07	2.92E-05	6.12E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	7.60E-11	1.77E-13	2.08E-11	9.69E-11
Ecotoxicity (USEtox)	CTUe	7.58E-03	9.57E-05	1.42E-03	9.09E-03

2. Berger Melamine Fin

Berger Melamine Finish is one of the variants of Berger Melamine, which is a 2-pack system specifically meant to be applied on wood. The mixing ratio of the base and catalyst is 9:1 specifically meant for interiors. It is applied upon wood, veneer, plywood and MDF.

Table 28. Cradle to Gate LCIA results for Berger Melamine Fin

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	1.64E-06	7.66E-10	5.07E-07	2.15E-06
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	3.19E+01	8.62E-01	7.43E+00	4.02E+01
Acidification Potential (AP)	kg SO_2-Equiv.	4.00E-03	2.91E-04	4.20E-03	8.50E-03
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	3.20E-04	5.77E-05	4.61E-04	8.39E-04
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	1.31E+00	6.39E-02	7.07E-01	2.08E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	6.97E-13	2.97E-16	1.04E-12	1.73E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	6.63E-04	-8.61E-05	2.92E-04	8.69E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	3.31E+01	8.63E-01	7.51E+00	4.15E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	3.31E+01	8.63E-01	7.51E+00	4.15E+01
Non-Renewable primary energy as energy carrier	MJ	1.43E+00	2.77E-03	1.91E+00	3.34E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	1.43E+00	2.77E-03	1.91E+00	3.34E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	9.20E-03	1.28E-05	1.54E-03	1.08E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	1.11E-08	5.62E-11	3.24E-08	4.36E-08
Non-hazardous waste disposed	kg	2.49E-02	5.13E-06	6.80E-02	9.29E-02
Radioactive waste disposed/stored	kg	4.82E-04	1.98E-07	2.92E-05	5.12E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	6.05E-11	1.83E-13	2.08E-11	8.14E-11
Ecotoxicity (USEtox)	CTUe	6.20E-03	9.88E-05	1.42E-03	7.73E-03

3. Berger Woodkeeper

WoodKeeper Melamine is a 2-pack system meant for interior wood. Melamine is one of the most widely used wood coating product in the country. It is a long lasting 2 pack interior wood coating capable of resisting daily wear and tear.

Table 29. Cradle to Gate LCIA results for Berger Woodkeeper

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	7.39E-06	6.69E-10	5.07E-07	7.89E-06
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	2.44E+01	7.54E-01	7.43E+00	3.26E+01
Acidification Potential (AP)	kg SO_2-Equiv.	3.51E-03	2.54E-04	4.20E-03	7.97E-03
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	2.98E-04	5.04E-05	4.61E-04	8.09E-04
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	9.51E-01	5.58E-02	7.07E-01	1.71E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	1.52E-12	2.59E-16	1.04E-12	2.56E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	5.61E-04	-7.52E-05	2.92E-04	7.78E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	2.54E+01	7.54E-01	7.51E+00	3.37E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.54E+01	7.54E-01	7.51E+00	3.37E+01
Non-Renewable primary energy as energy carrier	MJ	3.84E+00	2.42E-03	1.91E+00	5.75E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	3.84E+00	2.42E-03	1.91E+00	5.75E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	8.08E-03	1.12E-05	1.54E-03	9.63E-03

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	3.73E-08	4.91E-11	3.24E-08	6.98E-08
Non-hazardous waste disposed	kg	2.62E-02	4.48E-06	6.80E-02	9.42E-02
Radioactive waste disposed/stored	kg	4.23E-04	1.73E-07	2.92E-05	4.52E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	5.15E-11	1.60E-13	2.08E-11	7.24E-11
Ecotoxicity (USEtox)	CTUe	4.69E-03	8.64E-05	1.42E-03	6.20E-03

4. Berger Imperia

Imperia Luxury Polyurethane comes in Clears as well as Pigmented. This 2 pack Polyurethane comes in sealers (Clear, Black & White Sealer) & Topcoats (Clear, Black & White). It is applied upon wood, veneer, plywood and MDF.

Table 30. Cradle to Gate LCIA results for Berger Imperia

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	8.14E-06	7.66E-10	5.07E-07	8.65E-06
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	8.11E+01	8.62E-01	7.43E+00	8.94E+01
Acidification Potential (AP)	kg SO_2-Equiv.	6.16E-03	2.91E-04	4.20E-03	1.07E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	9.56E-04	5.77E-05	4.61E-04	1.47E-03
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	4.58E+00	6.39E-02	7.07E-01	5.35E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	8.52E-13	2.97E-16	1.04E-12	1.89E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	9.42E-04	-8.61E-05	2.92E-04	1.15E-03

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	8.29E+01	8.63E-01	7.51E+00	9.13E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	8.29E+01	8.63E-01	7.51E+00	9.13E+01
Non-Renewable primary energy as energy carrier	MJ	3.77E+00	2.77E-03	1.91E+00	5.69E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	3.77E+00	2.77E-03	1.91E+00	5.69E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.96E-02	1.28E-05	1.54E-03	2.11E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	4.78E-08	5.62E-11	3.24E-08	8.04E-08
Non-hazardous waste disposed	kg	1.56E-01	5.13E-06	6.80E-02	2.24E-01
Radioactive waste disposed/stored	kg	7.03E-04	1.98E-07	2.92E-05	7.33E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	2.07E-10	1.83E-13	2.08E-11	2.28E-10
Ecotoxicity (USEtox)	CTUe	1.18E-02	9.88E-05	1.42E-03	1.33E-02

5. Berger Imperia Gold

Imperia Gold is a 2 Pack polyurethane topcoat meant for tinting purposes to provide all shades of the RAL K7 shade card. In total, 180 opaque shades and 17 metallic shades (all RAL shades) are to be provided.

Table 31. Cradle to Gate LCIA results for Berger Imperia Gold

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	1.29E-05	7.43E-10	5.07E-07	1.34E-05
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	8.06E+01	8.37E-01	7.43E+00	8.89E+01
Acidification Potential (AP)	kg SO_2-Equiv.	6.40E-03	2.82E-04	4.20E-03	1.09E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	9.93E-04	5.60E-05	4.61E-04	1.51E-03
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	4.65E+00	6.20E-02	7.07E-01	5.42E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	9.43E-13	2.88E-16	1.04E-12	1.98E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	9.56E-04	-8.36E-05	2.92E-04	1.17E-03

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	8.26E+01	8.38E-01	7.51E+00	9.10E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	8.26E+01	8.38E-01	7.51E+00	9.10E+01
Non-Renewable primary energy as energy carrier	MJ	4.78E+00	2.69E-03	1.91E+00	6.69E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	4.78E+00	2.69E-03	1.91E+00	6.69E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	2.06E-02	1.24E-05	1.54E-03	2.22E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	6.23E-08	5.46E-11	3.24E-08	9.48E-08
Non-hazardous waste disposed	kg	1.94E-01	4.98E-06	6.80E-02	2.62E-01
Radioactive waste disposed/stored	kg	7.75E-04	1.92E-07	2.92E-05	8.04E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	2.12E-10	1.78E-13	2.08E-11	2.33E-10
Ecotoxicity (USEtox)	CTUe	1.15E-02	9.60E-05	1.42E-03	1.30E-02

6. Berger Epoxy Block Primer

Imperia Epoxy Block Primer is a high-performance two-component clear system specially designed for natural wood and wood veneers. It is a 2-pack indigenous product that is applied on wood prior to the application of 2 Pack PU Sealer.

Table 32. Cradle to Gate LCIA results for Berger Epoxy Block Primer

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	9.31E-06	6.99E-10	5.07E-07	9.81E-06
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	9.66E+01	7.87E-01	7.43E+00	1.05E+02
Acidification Potential (AP)	kg SO_2-Equiv.	7.95E-03	2.65E-04	4.20E-03	1.24E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	1.06E-03	5.26E-05	4.61E-04	1.57E-03
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	5.13E+00	5.83E-02	7.07E-01	5.89E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	9.28E-13	2.71E-16	1.04E-12	1.96E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	9.81E-04	-7.86E-05	2.92E-04	1.19E-03

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	9.86E+01	7.88E-01	7.51E+00	1.07E+02
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	9.86E+01	7.88E-01	7.51E+00	1.07E+02
Non-Renewable primary energy as energy carrier	MJ	4.23E+00	2.53E-03	1.91E+00	6.14E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	4.23E+00	2.53E-03	1.91E+00	6.14E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	2.02E-02	1.17E-05	1.54E-03	2.17E-02

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	5.39E-08	5.13E-11	3.24E-08	8.64E-08
Non-hazardous waste disposed	kg	1.20E-01	4.68E-06	6.80E-02	1.88E-01
Radioactive waste disposed/stored	kg	8.04E-04	1.81E-07	2.92E-05	8.33E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	2.37E-10	1.66E-13	2.08E-11	2.59E-10
Ecotoxicity (USEtox)	CTUe	1.40E-02	9.02E-05	1.42E-03	1.55E-02

7. Berger Melamine Matt

Berger Melamine Matt is one of the variants of Berger Melamine, which is a 2-pack system specifically meant to be applied on wood. The mixing ratio of the base and catalyst is 9:1 specifically meant for interiors. It is applied upon wood, veneer, plywood and MDF.

Table 33. Cradle to Gate LCIA results for Berger Melamine Matt

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	4.83E-06	7.41E-10	5.07E-07	5.33E-06
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	3.95E+01	8.35E-01	7.43E+00	4.78E+01
Acidification Potential (AP)	kg SO_2-Equiv.	5.74E-03	2.81E-04	4.20E-03	1.02E-02
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	1.34E-03	5.58E-05	4.61E-04	1.86E-03
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	1.67E+00	6.18E-02	7.07E-01	2.44E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	8.21E-13	2.87E-16	1.04E-12	1.86E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	6.79E-04	-8.33E-05	2.92E-04	8.88E-04

Resource Use	Unit	A1	A2	A3	Total
Renewable primary energy as energy carrier	MJ	4.10E+01	8.36E-01	7.51E+00	4.94E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	4.10E+01	8.36E-01	7.51E+00	4.94E+01
Non-Renewable primary energy as energy carrier	MJ	4.96E+00	2.68E-03	1.91E+00	6.87E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	4.96E+00	2.68E-03	1.91E+00	6.87E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.39E-01	1.24E-05	1.54E-03	1.41E-01

Waste categories	Unit	A1	A2	A3	Total
Hazardous waste disposed	kg	-4.06E-08	5.45E-11	3.24E-08	-8.13E-09
Non-hazardous waste disposed	kg	4.70E-02	4.97E-06	6.80E-02	1.15E-01
Radioactive waste disposed/stored	kg	5.83E-04	1.92E-07	2.92E-05	6.12E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Toxicity	Unit	A1	A2	A3	Total
Human toxicity, cancer and non-cancer (USEtox)	CTUh	7.60E-11	1.77E-13	2.08E-11	9.69E-11
Ecotoxicity (USEtox)	CTUe	7.58E-03	9.57E-05	1.42E-03	9.09E-03

8. Berger Melamine Gloss

Berger Melamine Finish is one of the variants of Berger Melamine, which is a 2-pack system specifically meant to be applied on wood. The mixing ratio of the base and catalyst is 9:1 specifically meant for interiors. It is applied upon wood, veneer, plywood and MDF.

Table 34. Cradle to Gate LCIA results for Berger Melamine Gloss

Environmental Impacts	Unit	A1	A2	A3	Total
Abiotic Depletion Potential (ADP elements)	kg Sb-Equiv.	1.53E-06	7.34E-10	5.07E-07	2.04E-06
Abiotic Depletion Potential (ADP-fossil fuels)	MJ	3.49E+01	8.27E-01	7.43E+00	4.31E+01
Acidification Potential (AP)	kg SO_2-Equiv.	4.07E-03	2.79E-04	4.20E-03	8.55E-03
Eutrophication Potential (EP)	kg PO_4^{3-}Equiv.	3.27E-04	5.53E-05	4.61E-04	8.44E-04
Global Warming Potential (GWP 100 years)	kg CO_2-Equiv.	1.41E+00	6.12E-02	7.07E-01	2.18E+00
Ozone Layer Depletion Potential (ODP)	kg CFC11-Equiv.	6.86E-13	2.85E-16	1.04E-12	1.72E-12
Photochemical Ozone Creation Potential (POCP)	kg Ethene-Equiv.	6.48E-04	-8.25E-05	2.92E-04	8.57E-04
Resource Use	**Unit**				
Renewable primary energy as energy carrier	MJ	3.60E+01	8.27E-01	7.51E+00	4.44E+01
Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	3.60E+01	8.27E-01	7.51E+00	4.44E+01
Non-Renewable primary energy as energy carrier	MJ	1.39E+00	2.66E-03	1.91E+00	3.30E+00
Non-Renewable primary energy resources as material utilization	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of Non-Renewable primary energy resources	MJ	1.39E+00	2.66E-03	1.91E+00	3.30E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	8.74E-03	1.23E-05	1.54E-03	1.03E-02
Waste categories	**Unit**				
Hazardous waste disposed	kg	1.10E-08	5.39E-11	3.24E-08	4.35E-08
Non-hazardous waste disposed	kg	2.27E-02	4.92E-06	6.80E-02	9.07E-02
Radioactive waste disposed/stored	kg	4.75E-04	1.90E-07	2.92E-05	5.04E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Toxicity	**Unit**				
Human toxicity, cancer and non-cancer (USEtox)	CTUh	6.19E-11	1.75E-13	2.08E-11	8.29E-11
Ecotoxicity (USEtox)	CTUe	6.95E-03	9.48E-05	1.42E-03	8.47E-03

4.9 Interpretation

The interpretation of the average results for 1 litre of Berger Paint product is given in Table 35.

Table 35. Interpretation of most significant contributors to life cycle parameters

Parameter	Most significant contributor
Abiotic Depletion Potential (ADP) -Elements	For most of the paint products, more than 95% of Abiotic depletion of elements is caused by raw materials. Among raw materials, metal dryer contributes around 80% of ADP elements. Utilities and packaging contributed around 1-2 % of total ADP elements.
Abiotic depletion potential (ADP) - Fossil	The abiotic depletion of fossils has been contributed the highest by raw materials by around 73% to 80% in most of the paint products, around 20% is contributed by packaging and remaining is contributed by utilities (mainly from electricity consumed) and transportation. Resin and rutile are the highest contributor among the raw materials.
Acidification Potential (AP)	Around 75% to 78% of acidification is contributed by raw materials. Around 18% is contributed by the packaging materials and remaining by the by utilities at plant and transportation Among the raw materials, rutile contributes the highest by 65% to 67%.
Eutrophication Potential (EP)	For most of the paint products, eutrophication is contributed by raw materials by around 50%, around 40% is contributed by packaging materials and remaining is contributed by the utilities of the plants and inbound transportation. Among the raw materials, resins and rutile are the highest contributors along with tin container in packaging.
Global Warming Potential (GWP)	Almost 65% of the Global warming potential is contributed by the raw materials, around 30% is contributed by packaging materials and remaining is contributed by utilities of the plants and inbound transportation. Resin and rutile contribute around 30% each.
Ozone Layer Depletion Potential (ODP)	Around 77% of the ozone depletion potential is contributed by raw materials, of which around 43% is contributed by the solvent like turpentine. 21% is contribute by the packaging and the remaining by utilities of the plants and inbound transportation.
Photochemical Ozone Creation Potential (POCP)	The Photochemical Ozone Creation Potential or the summer smog is contributed highest by raw materials by around 83% to 85% of which rutile contributes the highest by around 50%. 20% is contributed by the metal container in packaging. Transport leads to a credit in terms of POCP i.e. around -7%. This is due to the fact that nitrogen monoxide emissions occurring during transport have a negative characterisation factor in the impact estimate as per CML 2001.
Primary Energy Demand	Around 79% of primary energy demand is contributed by raw materials production, 17% is contributed by the packaging materials production and remaining 3% to 4% is contributed by the utilities of the manufacturing plant and inbound transportation.

Net freshwater use	The net freshwater used is highly contributed by the production of raw materials consumed in paint. The contribution is around 86% for most of the products. Around 11% is contributed by the production of packaging materials and remaining by the utilities of manufacturing plant.

Concluding, the study provides fair understanding of environmental impacts during the various life cycle stages of the solvent-based paint products. It also identifies the hotspots in the value chain where improvement activities can be prioritised and accordingly investment can be planned. The scope covers the ecological information to be divided into raw material production, transportation and manufacturing of product along with its packaging.

5. LCA Terminology

Cradle to Gate	Scope of study extends from mining of natural resources to the completed product ready for shipping from the manufacturing dispatch "gate", known as Modules A1-A3.
Cradle to Grave	Scope of study extends from mining of natural resources to manufacture, use and disposal of products at End of Life.
End of life (including module D)	Post-use phase life cycle stages involving collection and processing of materials (e.g. scrap) and recycling or disposal, known as Modules C and D.

6. Glossary of Terms

Impact Category	Units	Description	Characterisation Method
Global Warming (Climate Change) Potential	kg CO_2 equiv	Contribution to the greenhouse effect, referred to as carbon dioxide equivalent)	CML
Stratospheric Ozone Depletion Potential	kg CFC-11 equiv	Impact on the ozone layer	CML
Acidification Potential of Land and Water	kg SO_2 equiv	Emissions which increase the acidity of the environment	CML
Eutrophication Potential	kg PO_4^{3-} equiv	Addition of nutrients to a water system resulting in reduction of the oxygen available to support aquatic life	CML
Photochemical Ozone Creation Potential	kg C_2H_2 equiv	Contribution to air pollution in the form of smog	CML
Depletion of Abiotic Resources (Elements/Minerals)	kg Sb equiv	Impact of consuming non- renewable metal resources	CML
Depletion of Abiotic Resources (Fossil)	MJ	Impact of consuming non- renewable fossil fuel resources	CML

7. Other Environmental Information

The constituent materials used within our products are responsibly sourced and we apply the principles of Sustainable Development and of Environmental Stewardship as a standard business practice in our operations. Protecting the environment by preserving non-renewable natural resources, increasing energy efficiency, reducing the environmental emissions, limiting the impact of materials transportation to and from our operations is part of our way in doing business.

Products do not contain any substances that can be included in “Candidate List of Substances of Very High Concern for Authorization” and raw materials used are not part of the EU REACH regulation.

8. References

- EN 15804: 2012, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- GaBi 9_2020: Dokumentation der GaBi-Datensätze der Datenbank zur Ganzheitlichen Bilanzierung. LBP, Universität Stuttgart und PE International, 2012
- GaBi 9_2020: Software und Datenbank zur Ganzheitlichen Bilanzierung. LBP, Universität Stuttgart und PE International, 2012
- ISO 14020:2000 Environmental labels and declarations - General principles
- ISO 14025:2006 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
- ISO 14040:2006 Environmental management- Life cycle assessment - Principles and framework
- ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines.
- PCR 2012:01, Product Category Rules (PCR) for Construction Products, Version 2.31, dated 2019-12-20