ENVIRONMENTAL PRODUCT DECLARATION
as per *ISO 14025* and *EN 15804+A1*

Owner of the Declaration	PPG Coatings Deutschland GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-PPG-20210123-CBC1-EN
Issue date	13.04.2022
Valid to	12.04.2027

Water-Based Wood Lacquers
Contour Aqua-PU Satin
Contour Aqua-PU Matt
Contour Vorlack Aqua
Contour Aqua-PU Spray Matt
Contour Aqua-PU Spray Satin
Contour Aqua-PU Spray Primer

Sigma Coatings

www.ibu-epd.com | https://epd-online.com

General Information

Sigma Coatings

Programme holder
IBU – Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number
EPD-PPG-20210123-CBC1-EN

This declaration is based on the product category rules:
Coatings with organic binders, 09.2017
(PCR checked and approved by the SVR)

Issue date
13.04.2022

Valid to
12.04.2027

(signature)

Dipl. Ing. Hans Peters
(chairman of Institut Bauen und Umwelt e.V.)

(signature)

Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.))

Water-Based Wood Lacquers

Owner of the declaration
PPG Coatings Deutschland GmbH
An der Halde 1
D-44805 Bochum

Declared product / declared unit
1 kg of Sigma Coatings water-based wood lacquers

Scope:
This EPD is applicable to the following products:

- Contour Aqua-PU Satin
- Contour Aqua-PU Matt
- Contour Vorlack Aqua
- Contour Aqua-PU Spray Matt
- Contour Aqua-PU Spray Satin
- Contour Aqua-PU Spray Primer

The products are produced at the PPG production site in Amsterdam, The Netherlands. The results are average values of the analyzed products.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.
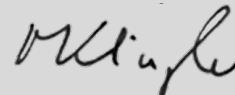The EPD was created according to the specifications of *EN 15804+A1*. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard *EN 15804* serves as the core PCR	
Independent verification of the declaration and data according to *ISO 14025:2010*	
☐ internally	☒ externally

(signature)

Matthias Klingler
(Independent verifier)

Product

Information about the enterprise
PPG is a global manufacturer of coatings and is the owner of many brands throughout Germany and Europe, one of these being Sigma Coatings. PPG's decorative coatings brands are strongly identified by the customers. This LCA/EPD has been commissioned by the Region North Marketing Team for the Sigma Brand and is conducted by the PPG AC-EMEA product stewardship group. All references to Sigma Coatings can thus be considered to refer to PPG.

Product description/Product definition
Sigma Coatings water-based wood lacquers are matt and satin, water-based lacquers for indoor and exterior use on wood, metal, non-metal and plastic substrates.

In the wet state, the products have a free-flowing, thick consistency with a homogeneous appearance. After a longer period in which the can has been untouched, a small amount of liquid can settle on the paint surface.

This can be undone by stirring the product until it becomes a homogeneous mass again. This will not affect product properties.

Sigma Coatings water-based wood lacquers are available in a wide range of colours. The colour of the wet paint gives an approximation of the hue of the dried coating.

This declaration refers to a mass-weighted average of the quantities sold of the following products:

- Contour Aqua-PU Gloss
- Contour Aqua-PU Matt
- Contour Vorlack Aqua
- Contour Aqua-PU Spray Matt
- Contour Aqua-PU Spray Satin
- Contour Aqua-PU Spray Primer

For this declaration, a white hue was modelled, which is a conservative estimate.

For the placing on the market in the EU no harmonizing provisions exist.

For the use and application of the product the respective national provisions at the place of use apply, in Germany for example the building codes of the federal states and the corresponding national specifications.

Application
Sigma Coatings water-based wood lacquers can be applied using a roller, a brush or by spraying and can be applied on various substrates such as wood, metal, non-metal and plastic.

The lacquer systems can be used on new uncoated substrates as well as for renovation of already coated substrates.

The surface should be dry, firm and free of contaminants. Porous, dusty and absorbent substrates must be primed. Water-soluble contaminants must be cleaned and primed with a water-insulating coating.

During application, the environmental and substrate temperature should be at least 10°C and the relative humidity at a maximum of 80%.

Technical Data

Constructional data

Name	Value	Unit
Density	1100 - 1400	kg/m^3
Solids content	45 - 60	%
pH value	7.9 - 8.9	$-\log_{10}(a_{H+})$
Water vapor diffusion equivalent air layer thickness	N.A.	m
Water vapour diffusion resistance factor	N.A.	-
Whiteness	>80	-
Brightness	N.A.	-
Gloss (Lacke)	<45	%
Viscosity (Lacke)	14 - 47	m^2s^{-1}
Colour change to BFS no. 26 (Lacke)	N.A.	-
Lifting strength (Lacke)	N.A.	N/mm^2
Salt spray resistance (falls aus der Anwendung relevant)	N.A.	-
Sulphur dioxide and moisture condensation test (falls aus der Anwendung relevant)	N.A.	-
Accelerated weathering (falls aus der Anwendung relevant)	N.A.	-
Outdoor weathering (falls aus der Anwendung relevant)	N.A.	-
Curing time (Pulverlacke)	N.A.	h
Curing temperature (Pulverlacke)	N.A.	°C
Theoretical spreading rate in accordance to the layer thickness (µm) (Pulverlacke)	N.A.	m^2/kg
Hardness test (Pulverlacke)	N.A.	mm
Mandrel bending test (Pulverlacke)	N.A.	-
Indentation hardness (Pulverlacke)	N.A.	-

Sound absorption coefficient (optional)	N.A.	%

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (no CE-marking).

Base materials/Ancillary materials
Composition of Sigma Coatings water-based wood lacquers:
- Additives <5 %
- Biocides <0.1 %
- Fillers <20 %
- Glycols, esters and ethers <10 %
- Binder 10-30 %
- Titanium Dioxide 10-30 %
- Water 30-50 %

This product/article/at least one partial article contains substances listed in the *REACH* candidate list of substances of very high concern for authorisation (date: 27.06.2018) exceeding 0,1 percentage by mass:
NO

The safety data sheets for Sigma Coatings water based wood lacquers can be found at the Sigma Coatings website at the following link:

https://www.sigmacoatings.de/sigmacoatings/produkte/lacke/

This product/article/at least one partial article contains other Carcinogenic, Mutagenic, Reprotoxic (CMR) substances in categories 1A or 1B which are not on *the candidate list*, exceeding 0.1 percentage by mass
NO

Biocide products were added to this construction product or it has been treated with biocide products:
YES

The biocides included in this product and their function are:
- 2-methyl-4-isothiazolin-3-one (In-can)
- 2-octyl-2-H-isothiazolin-3-one (In-can)
- 2,2`-dithiobis[n-methylbenzamide] (In-can)
- Benzothiazolone (In-can)
- Isothiazolone solution (In-can)
- 3-iodo-2-propynyl butyl carbamate (Dry film)
- Zinc pyrithione (Dry film)

Information on hazardous substances (if any) contained in this product can be found in the product specific Safety Data sheet. The latest version is available at the Sigma Coatings Website:
https://www.sigmacoatings.de/sigmacoatings/produkte/lacke/

Reference service life
The RSL is dependent on the application scenario which has not been defined in this EPD. Therefore, no RSL is declared.

LCA: Calculation rules

Declared Unit
The declared unit for the calculation is 1 kg of Sigma Coatings water-based wood lacquers.

Declared unit

Name	Value	Unit
Gross density (mean value)	1100 - 1400	kg/m³
Declared unit	1	kg

Production data was obtained from PPG's reporting systems and background data was obtained from the *Ecoinvent* database. Both data sources are of high quality. In paint manufacturing, the majority of the environmental impact occurs during the raw material extraction and processing phase, which depends on the background data. Therefore the *Ecoinvent* database contributes more to the overall impact than the actual PPG data. This may reduce the specific accuracy of the results since the variations between general *Ecoinvent* industry data and specific supply chain locations are not known

System boundary
The system boundaries of the product LCA follow the modular design defined by *EN15804*. This cradle-togate with options study includes the Product stage (A1- A3).

A1 - Raw materials. This module includes all operations immediately up to the point before the products leave the gate of the supplier. Included in this module are:
- Extraction of the raw materials
- Transport of the materials from the point of extraction to the site of processing, and any on-site or intermediate transport
- Processing of the raw materials including the impact of the energy requirements and waste processing

A2 -Transport of raw materials from the suppliers' site to the product manufacturing site. This includes:
- The production of fuel and emissions for fuel consumption for the operation of the vehicle
- An allocation for the construction, maintenance and disposal of the vehicle at the end of its life
- An allocation for the construction and maintenance of road infrastructure

A3 - This module includes all the activities involved in the production of Sigma Coatings Satin Interior Wall Paints. This includes:
- Energy requirements for processing
- Disposal of any waste generated in the production process
- Emissions, both direct and indirect, during the production process

- The extraction of raw materials and processing into the final product for any packaging used

A4 - Transport of packaged product to site of application. This includes:
- The production and emissions for fuel consumption for the operation of the vehicle including
- An allocation for the construction, maintenance and disposal of the vehicle at the end of its life
- An allocation for the construction and maintenance of road infrastructure

A5 – Application Process. This includes:
- The manufacture of application tools and other ancillary materials including their raw materials and processing.
- Transport of the application tools and other ancillary materials from the site of manufacture to the site of installation
- Life-cycle impacts of losses due to spills and residual product in packaging
- Disposal of packaging
- Disposal of waste from spills and residual product in packaging
- Any direct Volatile Organic Compound (VOC) emissions to the environment during drying of the coating

C1 – Demolition Stage. This includes:
- An allocation for the construction, maintenance and disposal of the demolition machinery at the end of life
- The production and emissions for fuel consumption for the operation of the vehicle during demolition.
- An allocation for the construction, maintenance and disposal of the demolition machinery at the end of life

C2 - Transport at End of Life. This includes:
- The production and emissions for fuel consumption for the operation of the vehicle including
- An allocation for the construction, maintenance and disposal of the vehicle at the end of its life
- An allocation for the construction and maintenance of road infrastructure

C4 - Disposal. This includes:
- Construction and maintenance of landfill site
- Direct environmental emissions from landfill site

Impact indicators were calculated using *SimaPro V.9.0*.

To calculate the impact categories the characterisation factors published in *EN 15804* (Annex C) were used. These characterisation factors were published as the "baseline" by *CML* (Institute of Environmental Sciences, Faculty of Science, University of Leiden, Netherlands) in the 2012 version.

Upstream data was modelled using the *Ecoinvent LCI* database version 3.5 using the *Allocation, cut-off by classification* dataset.

Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

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LCA: Scenarios and additional technical information

The following scenarios were used:

Transport to the building site (A4)
 Transport is assumed to be via a EURO4 freight lorry 16-32 tonnes.

The transport distance is based on the assumptions of the *EeB Guide*.

Name	Value	Unit
Litres of fuel	-	l/100km
Transport distance	300	km
Capacity utilisation (including empty runs)	85	%
Gross density of products transported	1250	kg/m³
Capacity utilisation volume factor	-	-

Installation into the building (A5)
 The installation of a product is very dependent on a number of factors such as the application tool, the area to be applied, etc.

For the purpose of the study it will be assumed that the coating is being applied to an interior mineral trim substrate by brush. To protect the floor from spatter and spills a disposable plastic sheet is used.

Name	Value	Unit
VOC in the air	0.005 - 0.13	kg
Brush for application (supply and disposal)	106.35	g
Polypropylene sheeting for application (supply and disposal)	114	g
Application losses from drips, spills and residual product in packaging (Assume 3% landfill and 97% incineration)	1	%
Disposal of steel primary packaging (Assume 3% landfill and 97% incineration)	0.07-1.0	kg
Disposal of wooden pallet (Assume 25% recycling and 75% incineration)	0.04-0.09	kg

End of life (C1-C4)
 Interior wood paints generally stay on the site of application until the end of life of the building. At the end of life of the building the paint is not removed but becomes part of the demolished building waste. For this study it is assumed a mineral substrate is used,

which is then landfilled.

Transport distances for waste are based on the assumptions of the *EeB Guide*.

Name	Value	Unit
Collected as mixed construction waste	0.46 - 0.57	kg
Landfilling	0.46 - 0.57	kg

LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	MND	X	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 kg Sigma Coatings Water-Based Wood Lacquers

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4
Global warming potential	[kg CO_2-Eq.]	3.47E+0	5.93E-2	1.14E-1	1.79E-4	2.56E-3	4.67E-2
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	5.14E-7	1.10E-8	9.03E-9	3.16E-11	4.74E-10	1.49E-9
Acidification potential of land and water	[kg SO_2-Eq.]	2.22E-2	1.91E-4	5.03E-4	1.33E-6	8.26E-6	3.72E-5
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	6.80E-3	4.46E-5	3.13E-4	3.20E-7	1.93E-6	2.08E-3
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	3.49E-3	3.08E-5	7.13E-3	2.09E-7	1.33E-6	1.35E-5
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.08E-5	1.82E-7	2.15E-7	1.00E-10	7.86E-9	7.76E-9
Abiotic depletion potential for fossil resources	[MJ]	5.03E+1	8.99E-1	1.40E+0	2.56E-3	3.89E-2	1.36E-1

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 kg Sigma Coatings Water-Based Wood Lacquers

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4
Renewable primary energy as energy carrier	[MJ]	3.89E+0	9.62E-3	2.27E+0	2.14E-5	4.16E-4	2.28E-3
Renewable primary energy resources as material utilization	[MJ]	2.04E+0	0.00E+0	-2.04E+0	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	5.93E+0	9.62E-3	2.33E-1	2.14E-5	4.16E-4	2.28E-3
Non-renewable primary energy as energy carrier	[MJ]	4.81E+1	9.14E-1	1.60E+0	2.60E-3	3.95E-2	1.41E-1
Non-renewable primary energy as material utilization	[MJ]	8.25E+0	0.00E+0	6.28E-2	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	5.64E+1	9.14E-1	1.66E+0	2.60E-3	3.95E-2	1.41E-1
Use of secondary material	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m³]	7.71E-2	1.65E-4	-1.83E-3	4.12E-7	7.15E-6	1.45E-4

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A1: 1 kg Sigma Coatings Water-Based Wood Lacquers

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4
Hazardous waste disposed	[kg]	4.55E-1	5.65E-4	5.86E-2	2.44E-6	2.44E-5	1.47E-4
Non-hazardous waste disposed	[kg]	1.62E+0	4.75E-2	3.86E-2	1.45E-5	2.05E-3	5.22E-1
Radioactive waste disposed	[kg]	1.68E-4	6.18E-6	4.36E-6	1.77E-8	2.67E-7	8.54E-7
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	2.26E-2	0.00E+0	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	4.37E-1	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	9.21E-1	0.00E+0	0.00E+0	0.00E+0

References

IBU 2021
General Instructions for the EPD programme of Institut Bauen und Umwelt e.V. Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021. www.ibu-epd.com

ISO 14025
DIN EN /ISO 14025:2011-10/, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804

/EN 15804:2012-04+A1 2013/, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

EN 13300:2001
European Committee For Standardization: Paints and varnishes. Water-borne coating materials and coating systems for interior walls and ceilings. Classification. 2001.

ISO 11475:2004
ISO 11475:2004: Paper and board -- Determination of CIE whiteness, D65/10 degrees (outdoor daylight)

DIN EN ISO 3251:2008-06
DIN EN ISO 3251:2008-06: Paints, varnishes and plastics - Determination of non-volatile-matter content (ISO 3251:2008); German version EN ISO 3251:2008.

DIN EN ISO 2813:2015-02
DIN EN ISO 2813:2015-02: Paints and varnishes - Determination of gloss value at 20°, 60° and 85° (ISO 2813:2014); German version EN ISO 2813:2014.

PCR Part A (Version 1.7)
Product category rules for building-related products and services. Part A: Calculation rules for the life cycle assessment and requirements on the project report. Version 1.7; 03-2018

PCR Part B (Version 1.1)
Institut Bauen und Umwelt e.V.: Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part B: Requirements on the EPD for Coatings with organic binders. Version 1.1, 08.09.2017.

Ecoinvent LCI
Ecoinvent Life Cycle Inventory Database
www.ecoinvent.org

EeBGuide
EeBGuide Project: Operational Guidance for Life Cycle Assessment Studies of the Energy Efficient Buildings initiative http://www.eebguide.eu

Institute of Environmental Science, Leiden (CML)
http://www.cml.leiden.edu/

REACH
Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

SimaPro V9.0
SimaPro LCA software developed by PRé www.pre-sustainability.com