

Owner: PPG Coatings A/S
No.: MD-23176-EN
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3rd PARTY VERIFIED

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804



SIGMA
COATINGS

Owner of declaration

PPG Coatings A/S
Gladsaxevej 300
DK-2860 Søborg
DK18998696



Issued:
06-12-2023

Valid to:
06-12-2028

Programme

EPD Danmark
www.epddanmark.dk



- Industry EPD
- Product EPD

Declared product(s)

Sigma Facademaling: Facade Topcoat Semi-Matt

This EPD is only valid for Sigmas Facade Topcoat Semi-Matt architectural coating.

Sigma's Façade Topcoat Semi-Matt is a type of acrylic paint, which is generally composed of pigments, binders, fillers and additives, and a diluent. The function of Façade Topcoat Semi-Matt is decorative, and to protect the surface to which it is applied, shielding the surface from UV radiation, moisture, and oxidation.

Number of declared datasets/product variations: 1

Production site

PPG Coatings production site in Søborg; Gladsaxevej 300, DK-2860 Søborg, Denmark

Product(s) use

The product is designed specifically to be applied to facades as an acrylic coating.

Declared unit

1 L of Acrylic Coating.

Year of production site data

2021

EPD version

6th December 2023

Basis of calculation

This EPD is developed in accordance with the European standard EN 15804+A2.

Comparability

EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

Validity

This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

Use

The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

EPD type

- Cradle-to-gate with modules C1-C4 and D
- Cradle-to-gate with options, modules C1-C4 and D
- Cradle-to-grave and module D
- Cradle-to-gate
- Cradle-to-gate with options

CEN standard EN 15804 serves as the core PCR

Independent verification of the declaration and data, according to EN ISO 14025

internal external

Third party verifier:

Kim Christiansen

Martha Katrine Sørensen
EPD Danmark

Life cycle stages and modules (MND = module not declared)

Product			Construction process		Use								End of life				Beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Re-use, recovery and recycling potential	
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	X	X	X	X	X	

Product information

Product description

The main product components are shown in the table below.

Material	w/w% of declared product
Binder (Emulsion)	42%
Pigment	16%
Water	14%
Filler	17%
Plastic Pigment	5%
Coalescing Agent	2%
Thickener	1%
Cutt-off	3%
Sum	100%

Product packaging:

Material	w/w% of packaging
Polypropylene granulate	20%
Recycled Plastic Granulate	72%
Stainless Steel 304	8%
Sum	100%

Bulk transport packaging:

Material	w/w% of packaging
Euro-Pallet	6%
LDPE film	61%
Cardboard	33%
Sum	100%

Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of acrylic paint on the production site located in Søborg, Denmark. Product specific data are based on average values collected in the period 2021. Background data are based on the GaBi 2022.2 database and are less than 10 years old, apart from a few petrochemical additives making up less than 0,1% of the product mass. Generally, the used background datasets are of high quality, where the majority of the datasets are only a couple of years old.

Hazardous substances

Acrylic Paint does not contain substances listed in the "Candidate List of Substances of Very High Concern for authorization", in quantities above ECHA's declaration threshold of 0,1% of the products mass.

(<http://echa.europa.eu/candidate-list-table>)

Essential characteristics

Most paints do not have a CE marking, as required by EU construction products regulation 305/2011. This is because for the majority of paints, no harmonized standard has been issued, meaning that paints cannot be tested for compliance with any specific requirements. Currently only coatings for concrete surfaces can be covered by the mandatory harmonized standard EN 15042:2004,

Surface protection systems for concrete, which is not relevant for this product¹.

PPG Coatings currently operates with an EU Ecolabel license, with number NL/044/003. This license certifies that their products meet ecological criteria for indoor and outdoor paints and varnishes according to 2014/312/EU.

Further technical information can be obtained by contacting the manufacturer or on the manufacturer's website:

<https://www.ppg.com/>

Reference Service Life (RSL)

Outdoor Architectural Coatings have an expected service life of at least 10 years depending on application and external conditions during use phase.

Picture of product(s)



¹https://cdn.ymaws.com/coatings.org.uk/resource/resmgr/webpage_files/technical_publications/general/G_015_BCF_Guide_to_CE_markin.pdf

LCA background

Declared unit

The LCI and LCIA results in this EPD relates to environmental impacts incurred by the production and end-of -life of 1 L of acrylic paint.

Name	Value	Unit
Declared unit	1	L
Density	1328	kg/m ³
Conversion factor to 1 kg.	1,33	kg/L

Functional unit

The functional unit is not defined as the use stages B1-B7 are not declared.

PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804. There does exist any PCR for paints or varnishes. There does exist a PEFCR on decorative paints, and a PCR from the USA on architectural coatings however these were disregarded based on their irrelevance.

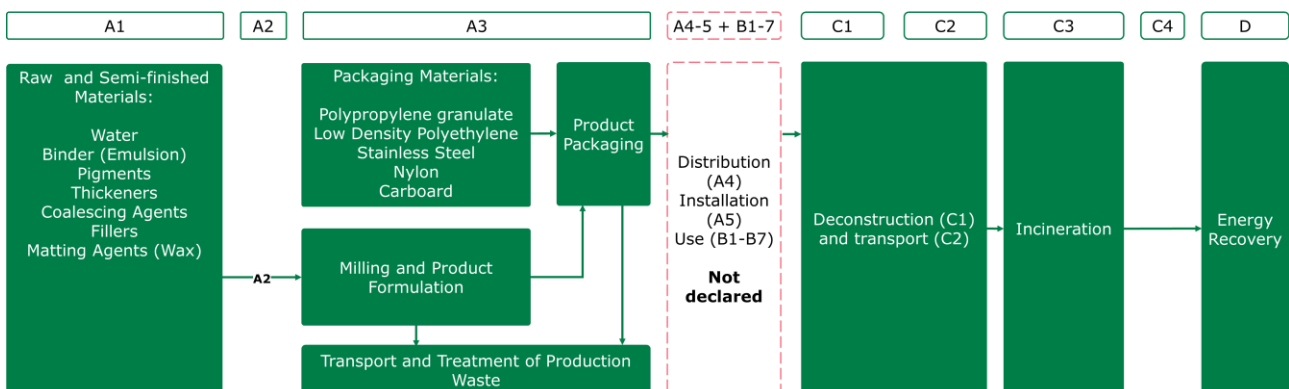
Guarantee of Origin – certificates

Foreground:

There are no "Guarantees of Origin" certificates used in the production.

Flowdiagram

The process diagram below represents the life cycle of acrylic paint produced by PPG.



Consumption of electricity is modelled with residual grid mix. This consumption powers predominantly: the milling of raw materials, compressors to pump raw materials and product, around the assembly line via piping. This electricity also as powers both the production assembly line of conveyor belts as well as the packaging assembly line which includes heating of product labelling in the form of applying shrink-wraps to product packaging.

District heating is consumed mainly in the warehouse for maintaining product stock at room temperature, as cold temperatures can detrimentally impact the products functionality. The district heating consumed uses a mix of fuel sources based off the actual fuel mix consumed by Gentofte-Gladsaxe district heating².

Background system:

Other processes upstream and downstream from the production is modelled with processes from the GaBi background database that is based on average data.

² [Gladsaxe District Heating Data](#)

System boundary

This EPD is based on a cradle-to-gate LCA, including options, modules C1-C4, and module D, in which 97 weight-% has been accounted for. The remaining 3% has been excluded.

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes.

Product stage (A1-A3) includes:

A1 – Extraction and processing of raw materials

A2 – Transport to the production site

A3 – Manufacturing processes

The product stage comprises the acquisition of all raw materials, products and energy, transport to the production site, packaging and waste processing up to the "end-of-waste" state or final disposal. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

A wide range of chemicals are used in the formulation of paints including fillers, binders, dispersants, waxes, pigments, thinners, and thickeners. Most of these chemicals and raw materials are sourced from the petrochemical industry. Often paints will also include a solvent, often an alcohol, however as these are acrylic paints, this is replaced with water. Pigments are comprised mainly of titanium, which is mined in China, and processed into titanium dioxide via the chlori-alkali process. Some of the components such as thickeners, waxes, and alcohols, can be sourced either synthetically from fossil fuels or biogenically from biomass.

Once all the raw materials and semi-finished materials are received at the PPG plant, the pigments are put through a milling device to crush the pigments into a consistently sized

powder. These are then added to a large batch mixer where other components are added according to each product formulation. The finished product is then pumped through piping at the plant, into packaging, i.e. a 10 L plastic bucket, lid, and steel handle. The bucket itself is made from 100% recycled polypropylene granulate.

Construction process stage (A4-A5) includes:

Not Included

Use stage (B1-B7) includes:

Not included

End of Life (C1-C4) includes:

The most likely scenario for end of life for architectural coatings on a façade, is that the coating is removed before subsequent paint applications and is sent for energy recovery via incineration. It is assumed that 100% of the paints' original water content will have evaporated. Furthermore it is assumed that 100% of the remaining dry matter is collected, transported and incinerated. End-of-life for the product packaging disregarded, as it falls outside the scope of this assessment, within EPD module A5, Installation.

Re-use, recovery and recycling potential (D) includes:

Module D includes the benefits derived from recovering electrical, and thermal energy via incineration of the product.

LCA results

The LCIA results are calculated using GaBi 10.6 with database version 2022.2, and using the characterization model defined in GaBi as EN15804+A2 for classifying and characterizing input and output flows. In some instances supplementary data was sourced from the Ecoinvent 3.6 database.

ENVIRONMENTAL IMPACTS PER LITRE OF SIGMA'S FAÇADE COATING							
Parameter	Unit	A1-A3	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ eq.]	2,20E+00	0,00E+00	9,96E-03	6,23E-01	0,00E+00	-3,22E-01
GWP-fossil	[kg CO ₂ eq.]	2,25E+00	0,00E+00	9,88E-03	6,23E-01	0,00E+00	-3,21E-01
GWP-biogenic	[kg CO ₂ eq.]	-9,57E-02	0,00E+00	1,92E-06	1,80E-04	0,00E+00	-5,40E-04
GWP-luluc	[kg CO ₂ eq.]	5,44E-02	0,00E+00	8,33E-05	3,85E-05	0,00E+00	-1,71E-05
ODP	[kg CFC 11 eq.]	2,16E-07	0,00E+00	1,23E-15	2,44E-13	0,00E+00	-1,30E-12
AP	[mol H ⁺ eq.]	1,09E-02	0,00E+00	4,23E-05	1,70E-04	0,00E+00	-2,43E-04
EP-freshwater	[kg PO ₄ eq.]	6,86E-04	0,00E+00	3,31E-08	1,94E-07	0,00E+00	-4,13E-07
EP-marine	[kg N eq.]	2,84E-03	0,00E+00	1,19E-05	5,75E-05	0,00E+00	-9,43E-05
EP-terrestrial	[mol N eq.]	2,38E-02	0,00E+00	1,35E-04	8,31E-04	0,00E+00	-1,00E-03
POCP	[kg NMVOC eq.]	8,06E-03	0,00E+00	3,18E-05	1,51E-04	0,00E+00	-2,54E-04
ADPm ¹	[kg Sb eq.]	1,39E-05	0,00E+00	6,00E-10	2,97E-09	0,00E+00	-2,14E-08
ADPf ¹	[MJ]	4,16E+01	0,00E+00	1,33E-01	4,07E-01	0,00E+00	-5,19E+00
WDP ¹	[m ³ world eq. deprived]	1,03E+00	0,00E+00	1,10E-04	1,26E-01	0,00E+00	-6,14E-03
Caption	GWP-total = Globale Warming Potential - total; GWP-fossil = Global Warming Potential - fossil fuels; GWP-biogenic = Global Warming Potential - biogenic; GWP-luluc = Global Warming Potential - land use and land use change; ODP = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water use						
Disclaimer	¹ The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.						

ADDITIONAL ENVIRONMENTAL IMPACTS PER LITRE OF SIGMA'S FAÇADE COATING							
Parameter	Unit	A1-A3	C1	C2	C3	C4	D
PM	[Disease incidence]	1,70E-07	0,00E+00	6,33E-10	3,91E-09	0,00E+00	-1,66E-09
IRP ²	[kBq U235 eq.]	2,84E-01	0,00E+00	3,61E-05	1,39E-03	0,00E+00	-8,31E-03
ETP-fw ¹	[CTUe]	5,33E+01	0,00E+00	9,43E-02	1,90E-01	0,00E+00	-2,77E-01
HTP-c ¹	[CTUh]	5,49E-09	0,00E+00	1,92E-12	9,22E-12	0,00E+00	-6,01E-11
HTP-nc ¹	[CTUh]	1,20E-07	0,00E+00	1,01E-10	3,00E-10	0,00E+00	-4,53E-10
SQP ¹	-	1,56E+01	0,00E+00	5,12E-02	1,92E-01	0,00E+00	-1,20E+00
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless)						
Disclaimers	¹ The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.						
	² This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.						

RESOURCE USE PER LITRE OF SIGMA'S FAÇADE COATING

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
PERE	[MJ]	6,96E+00	0,00E+00	8,96E-03	1,98E-01	0,00E+00	-1,82E+00
PERM	[MJ]	8,08E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	[MJ]	7,04E+00	0,00E+00	8,96E-03	1,98E-01	0,00E+00	-1,82E+00
PENRE	[MJ]	4,08E+01	0,00E+00	1,33E-01	4,07E-01	0,00E+00	-5,19E+00
PENRM	[MJ]	8,11E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	[MJ]	4,16E+01	0,00E+00	1,33E-01	4,07E-01	0,00E+00	-5,19E+00
SM	[kg]	3,47E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	[m ³]	2,49E-02	0,00E+00	9,82E-06	2,82E-03	0,00E+00	-5,30E-04
Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials; PENRM = Use of non renewable primary energy resources used as raw materials; PENRT = Total use of non renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Net use of fresh water						

WASTE CATEGORIES AND OUTPUT FLOWS PER LITRE OF SIGMA'S FAÇADE COATING

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
HWD	[kg]	1,03E-05	0,00E+00	4,14E-13	-4,51E-11	0,00E+00	3,26E-10
NHWD	[kg]	2,68E-02	0,00E+00	1,97E-05	7,79E-02	0,00E+00	-3,47E-03
RWD	[kg]	5,12E-04	0,00E+00	2,42E-07	1,28E-05	0,00E+00	-7,30E-05
CRU	[kg]	5,60E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	[kg]	2,16E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,80E-01
EET	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,33E+00
Caption	HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EE = Exported energy						

BIOGENIC CARBON CONTENT PER LITRE OF SIGMA'S FAÇADE COATING

Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0
Biogenic carbon content in accompanying packaging	[kg C]	2,50E-02
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂	

Additional information

LCA interpretation

The tables below show the processes contributing the most to the specific impact categories, and how much they contribute to the given environmental impact category.

The contributions (in percentages) are expressed relative to the total impacts, which is a result of both impacts (positive values) and savings from processes such as recycling and energy recovery (negative values). In cases where the impact from a certain process appears to be larger than the net impact from the entire product system, the percentage contribution will thus be larger than 100%.

Maximum contribution to environmental impact categories

ENVIRONMENTAL IMPACTS				
Impact Category	Unit	Maximum contribution on category	Process	Percentage of category
Climate Change - total	[kg CO ₂ eq.]	1,41E+00	A1:Pigment	44,78%
Climate Change, fossil	[kg CO ₂ eq.]	1,41E+00	A1:Pigment	43,95%
Climate Change, biogenic	[kg CO ₂ eq.]	-1,02E-01	A1:Binder (Emulsion)	87,00%
Climate Change, land use and land use change	[kg CO ₂ eq.]	5,24E-02	A1:Binder (Emulsion)	96,07%
Ozone depletion	[kg CFC 11 eq.]	1,72E-07	A1:Pigment	79,45%
Acidification	[mol H ⁺ eq.]	7,94E-03	A1:Pigment	69,94%
Eutrophication, freshwater	[kg PO ₄ eq.]	6,75E-04	A1:Pigment	98,28%
Eutrophication, marine	[kg N eq.]	1,46E-03	A1:Pigment	48,73%
Eutrophication, terrestrial	[mol N eq.]	1,43E-02	A1:Pigment	55,40%
Photochemical ozone formation, human health	[kg NMVOC eq.]	5,40E-03	A1:Pigment	63,53%
Resource use, mineral and metals	[kg Sb eq.]	1,36E-05	A1:Pigment	97,42%
Resource use, fossils	[MJ]	2,06E+01	A1:Pigment	43,54%
Water use	[m ³]	6,88E-01	A1:Pigment	58,23%

Technical information on scenarios

Reference service life

RSL information	Years
Reference service Life	10

End of life (C1-C4)

Scenario information	Value	Unit
Collected separately	0	kg
Collected with mixed waste	0,8	kg
For reuse	0	kg
For recycling	0	kg
For energy recovery	0,8	kg
For final disposal	0	kg

Re-use, recovery and recycling potential (D)

Scenario information/Materiel	Value	Unit
Credit for electricity recovery	0,88	MJ
Credit for thermal energy recovery	4,3	MJ

Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

References

Publisher	 www.epddanmark.dk
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA-practitioner	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA software / background data	Thinkstep GaBi 10.6 Database version 2021.2 www.gabi-software.com
3rd party verifier	Kim Christiansen KimConsult Marienborg Alle 91C DK-2860 Søborg www.kimconsult.dk

General program instructions

Version 2.0

www.epddanmark.dk

EN 15804

DS/EN 15804 + A2:2019 - "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

EN 15942

DS/EN 15942:2011 – " Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

ISO 14025

DS/EN ISO 14025:2010 – " Environmental labels and declarations – Type III environmental declarations – Principles and procedures"

ISO 14040

DS/EN ISO 14040:2008 – " Environmental management – Life cycle assessment – Principles and framework"

ISO 14044

DS/EN ISO 14044:2008 – " Environmental management – Life cycle assessment – Requirements and guidelines"

EN 13300:2001

European Committee for Standardization: Paints and Varnishes. Water-borne coating materials and coating systems for interior walls and ceilings classification. 2001.

REACH

Regulation (EC) No1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

ISO 3251:2019

Paints, varnishes and plastics – Determination of non-volatile-matter content

[PEFCR Version 1.0]

[EXPIRED 31/12/20] Product Environmental Footprint Category Rules – Decorative Paints, Technical secretariat Decorative Paints, CEPE:European Council of the Paint, Printing Ink, and Artists' Colours Industry, 2018]

[PCR]

[Not relevant to EU products] Product Category Rules for Environmental Product Declarations: Architectural Coatings, National Center for Sustainability Standards, NSD International, 2022.