EPD | Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019

Class 2
Powder Coating

Programme:
The International EPD® System
www.environdec.com

Programme Operator:
EPD International AB

Local Operator:
EPD Turkey

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01.11.2021

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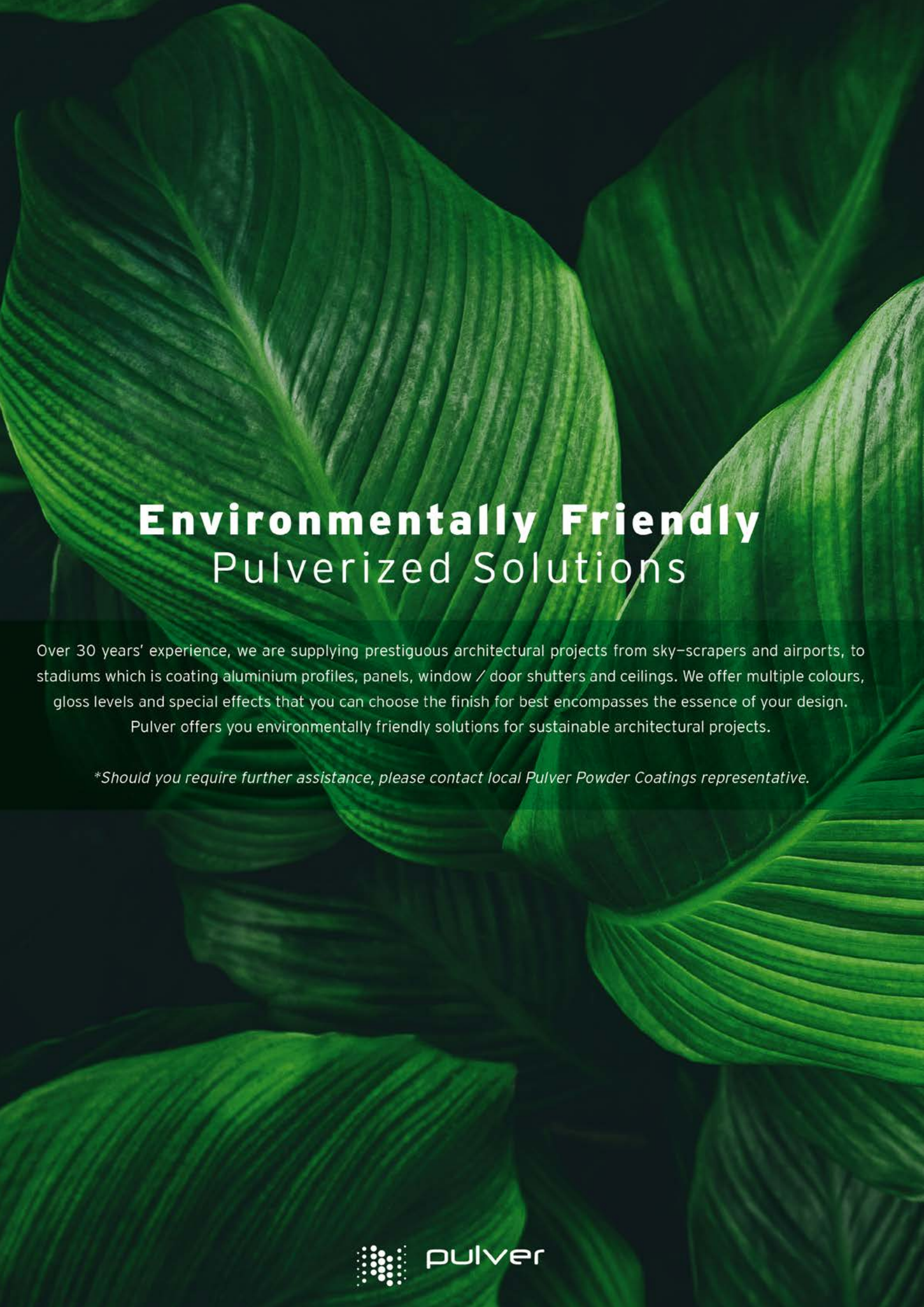
V1.1.

TURKEY EPD®
ENVIRONMENTAL PRODUCT DECLARATIONS

ECO PLATFORM EPD EN 15804 VERIFIED

pulver



Environmentally Friendly
Pulverized Solutions

Over 30 years' experience, we are supplying prestiguous architectural projects from sky–scrapers and airports, to stadiums which is coating aluminium profiles, panels, window / door shutters and ceilings. We offer multiple colours, gloss levels and special effects that you can choose the finish for best encompasses the essence of your design. Pulver offers you environmentally friendly solutions for sustainable architectural projects.

**Should you require further assistance, please contact local Pulver Powder Coatings representative.*

pulver

PROGRAMME INFORMATION

Programme

EPD Turkey, managed and run by:

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Turkish Centre for Sustainable Production
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Product Category Rules (PCR): 2019:14 Version 1.11, 2021-02-05, Construction Products and CPC 54 Construction Services, EN 15804:2012 + A2:2019 Sustainability of Construction Works

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process certification EPD verification **X**

Third party verifier: Professor Vladimír Kocí

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes No **X**

The EPD owner has the sole ownership, liability, and responsibility for the EPD.
EPDs within the same product category but from different programmes may not be comparable.
EPDs of construction products may not be comparable if they do not comply with EN 15804.

Revisions:
V1.1. : Minor design changes

ABOUT PULVER

Our powder coating production started in 1988, and we have been producing powder coating under the name of Pulver since 1991. In our powder coating journey, which began to touch and revive customers' lives, we maintain our operations based on our globally reputable brand that holds the flags of the largest and the second-largest powder coating plant of Turkey and Europe, respectively.

We create differences in Turkey's powder coating industry, the leading powder coating producer and exporter country of Europe. Thanks to our global export network, we deliver top line and eco-friendly surface coating solutions to Russia, North Africa, Middle East, and Turkic Republics, as well as Europe.

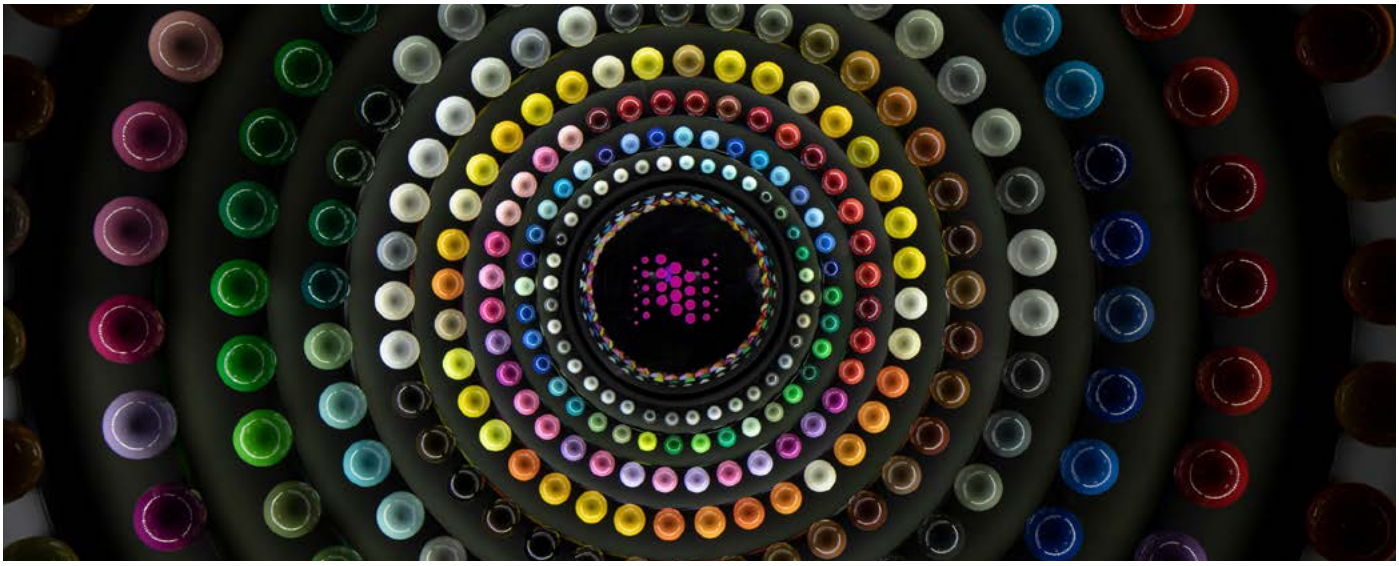
The production of Pulver makes up almost 30% of the total powder coating production in Turkey, and 50% of our production is exported to 40 countries. Having the highest export volume of coating in Turkey, we have been the leading coating manufacturer for years.

ABOUT THE PRODUCT

In architecture, the pursuit of form and color is an ongoing journey that dates back to the beginning of architecture history. Architects and designers have always valued the colors which complement design visually and integrally. On occasions, tones, textures, manners of application, or sometimes the environmental effects of colors constitute the main reasons for them to be preferred. Pulver architectural series, having the largest color database in the industry, contain durable powder coatings which provide convenience for architects. The products are specifically designed for being used in aluminum and metal systems.
Our architectural powder coatings are classified into three:

- Class 1 (Standard Durable Powder Coatings),
- Class 2 (Super Durable Powder Coatings),
- Class 3 (Hyper Durable Powder Coatings).

We design our products according to the climatic conditions of the architectural structure. Thus, we contribute to buildings' aesthetics and longevity with optimal color solutions that are durable both indoors and outdoors. While you form the building's identity, Pulver products generate unique finish coats that achieve different gloss forms and appearances on surfaces and constitute a meaningful whole with all components of the facade.
The UN CPC code of the product is 3511.



Application Areas

Some of our architectural powder coatings' usage areas are as follows: aluminum door and window systems, sunshades and perforated and expanded metal systems, facade elements, summer / winter gardens and garage doors, aluminum railings and shutters, metal furniture, suspended ceilings...

As Pulver, we prepare for taking you to a colorful exploration with our architectural powder coating series, which provides long-lasting colors and gloss both indoor and outdoor and achieves outstanding protection of buildings as well as having aesthetic appearance. In this exploration, we will see the rich palette of powder coating, which colors buildings.

Usage Advantages

Unlike liquid paints, powder coatings do not contain any solvent substances and consist of mixtures of resins, hardeners, pigments, fillers and additives. There are various application techniques in powder coating. The most common techniques include Electrostatic Coating and Fluidized Bed Coating. The immersing technique enables a thicker coating.

During its production and use, powder has fewer negative effects on health compared to wet paint. This has been proven by various studies. In addition, the amount of energy required for the powder to ignite is 100 times higher than liquid-based paints. Therefore, the powder is very difficult to ignite and its lower explosive limit is higher than liquid paints.

The advantages of powder coating can be summarized briefly as follows;

- *Powder coating is environmentally friendly. No waste is produced during production and consumption; therefore, it does not cause air or water pollution. In terms of environmental protection, powder coating does not contain the volatile organic compounds (VOC) found in wet paint.*
- *The amount of energy required for powder to ignite is much higher than liquid paints. Therefore, its lower explosive limit is higher.*
- *Powder has fewer negative effects on health than other paints. Moreover, it does not cause any problems when incontact with skin.*
- *Powder is ready to use. It does not require any mixing or dilution with liquid. The gun hose can be inserted into the powder bag and used immediately.*
- *The powder coating technique is easy to use and the operator can be trained in a very short period. It is very suitable for being used in manual and robotic systems. Thus, the operator can become an expert with brief and practical training.*
- *All kinds of decorative surfaces can be obtained with powder coating. Surfaces with a e.g. smooth, shiny, rough, sandpaper-like, and varnished appearance can be easily achieved with powder coating.*

Content Declaration

The raw materials of Pulver Class 2 Powder Coatings are polyester resin, colour pigments, fillers, and other additives.

Packaging Materials

Pulver powder coating products are delivered to customers in PE bags, big bags and corrugated board box packaging materials. The primary and secondary packaging quantities per unit product are included in the LCA model.

Technical Specifications

Property	Unit	Value	Standard
Density	gr/cm^3	1.2 – 1.7	ISO 8130-2
Gloss (60°)	%	5 - 95	ASTM D 523
Salt Spray (Iron Phosphate)	hour	240	ISO 9227
Salt Spray (Zinc Phosphate)	hour	480	ISO 9227
Salt Spray (Chromate)	hour	1000	ISO 9227
Water Condensation (Iron Phosphate)	hour	240	ISO 6270-2
Exterior durability (1 year Florida Exposure)	%	>50% residual gloss	ISO 2810
Curing time	minute	5 - 20	-
Curing temperature	°C	160 - 200	-
Impact test	kg.cm	min. 25	ASTM D 2794

**These specifications are given based on Pulver Coatings Powders Class 2. For the latest table it is recommended to contact the relevant sales executive.*

LCA INFORMATION

Declared Unit	1 kg of Pulver Class 2 Powder Coatings with packaging
Time Representativeness	2020
Database(s) and LCA Software Used	Ecoinvent 3.6, SimaPro 9.1

The inventory for the LCA study is based on the 2020 production figures for Pulver Class 2 Coating Powders by Pulver production plants in Kocaeli, Turkey.

This EPD's system boundary is cradle to gate. The system boundary covers A1 - A3 product stages. Additionally, A4 transport to the customer stage was added optionally.

According to EN 15804+A2:2019 standard, if the product or material is physically integrated with other products during installation then they cannot be physically separated at the end of life stage. For this reason, modules C1-C4 and Module D are excluded.

Product Stage			Constrcution Process Stage		Use Stage							End of Life Stage				Benefits and Loads
Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction, demolition	Transport	Waste Processing	Disposal	Future reuse, recycling or energy recovery potentials
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

X = Included in LCA, ND = Not Declared

System Boundary Descriptions

A1: Raw Material Supply
Pulver's productions start from preparing product recipe. The company supplies its raw materials necessary from suitable suppliers. Raw material supply includes raw material extraction/preparation and pre-treatment processes before production.

A2: Transportation
Transport is relevant for delivery of raw materials and other materials to the plant and the transport of materials within the plant. Transport of raw materials to production sites is taken as the weight average values for transport from raw materials supplier in 2020.

A3 : Manufacturing
Manufacturing steps of Pulver Coating Powders are respectively:

1 - The raw materials of powder coating are prepared by weighing according to the formulation.

2 - The raw materials are homogenized using the "dry mixing" technique. This process is carried out using mixers. Different types of mixers can be used depending on different requirements.

3 - The prepared homogeneous mixture is given to the feeding section of hot extruders.

4 - Hot extruders increase the contact of mixed and homogenized raw materials with each other and allow resins to combine with other raw materials. Extruders operate at high temperatures (100°C to 130°C).

5 - After the hot extrusion and homogenization are completed, the powder is extruded in molten form from the extruder and passes through chill rolls.

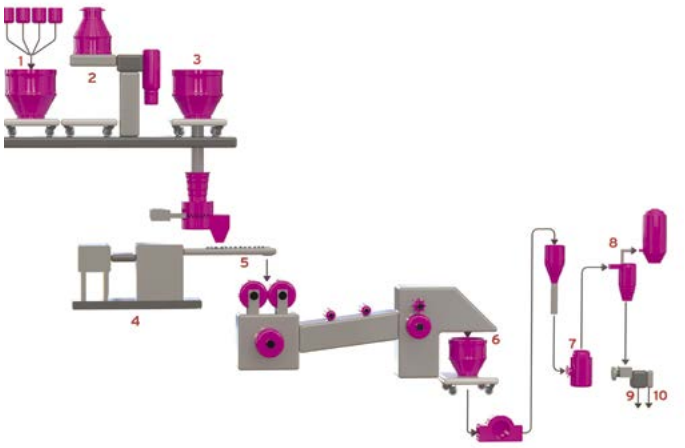
6 - The powder, which is formed into a thin layer, passes through the cooling belt and cools to room temperature. The cooled material passes under the crusher and is transformed into fine chips.

7 - The grinding process is carried out with suitable mills. Powder size is very important for the user. With mills and classifiers, powder sizes can be brought to desired ranges according to use and powder type.

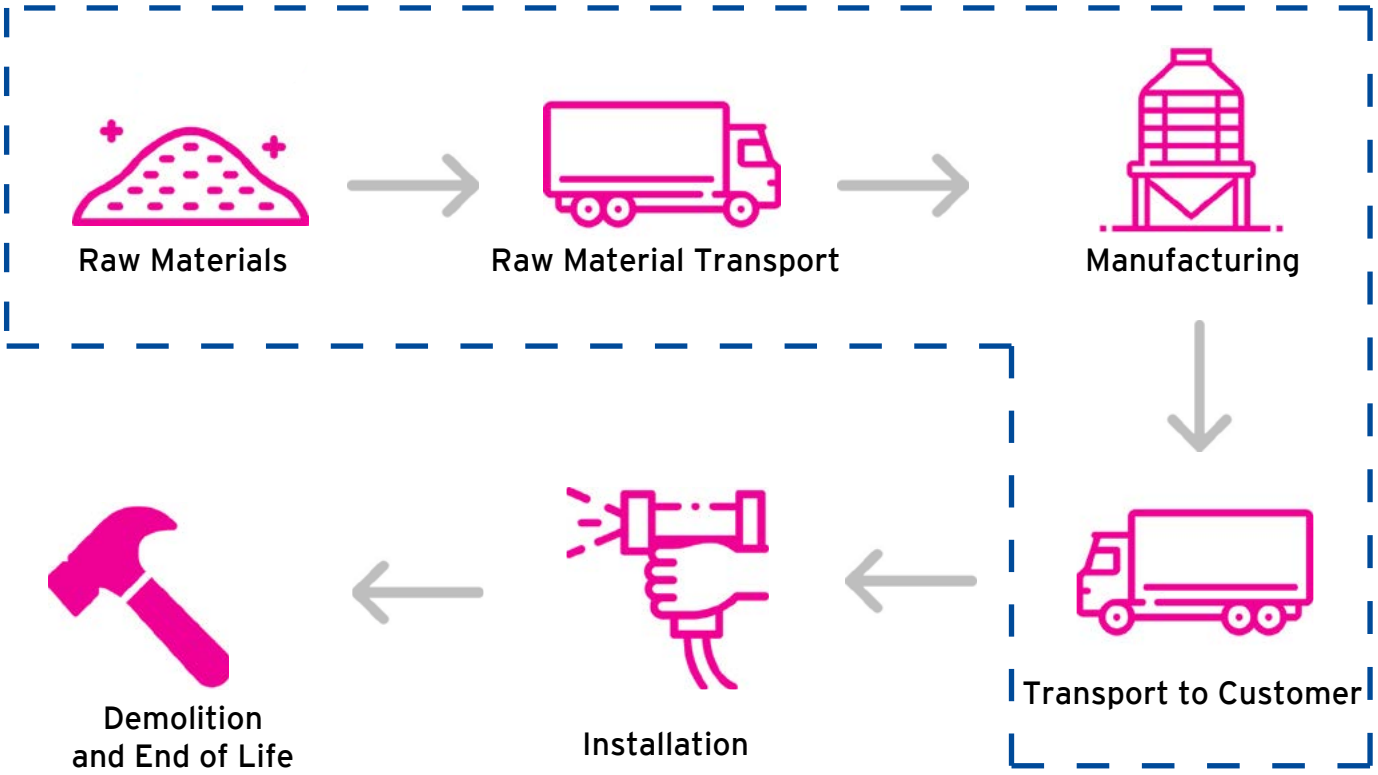
8 - After very fine powders are collected with air, they are passed through suitable filters and cyclones by separating from the air to prevent them from polluting the air.

9 - Coarse powders are also separated from the product using the sieving process.

10 - Powders which are ground and brought to desired sizes are packaged in appropriate weights and presented to the user.



A4 : Transport to Customer
This stage cover transportation of Pulver Coating Powders to customers. According to Pulver sales figures, the transportation distance is assumed as 125 km roadway with a lorry and 1500 km seaway with the ship.



More Information

Allocations
Water consumption, energy consumption and raw material transportation were weighted according to 2020 production figures.

In addition, hazardous and non-hazardous waste amounts were also allocated from the 2020 total waste generation.

Cut-Off Criteria
%1 cut-off applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

REACH Regulation
No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1 % (wt/wt).

LCA Modelling, Calculation and Data Quality
The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while fresh water use is calculated with selected inventory flows in SimaPro according to the PCR.

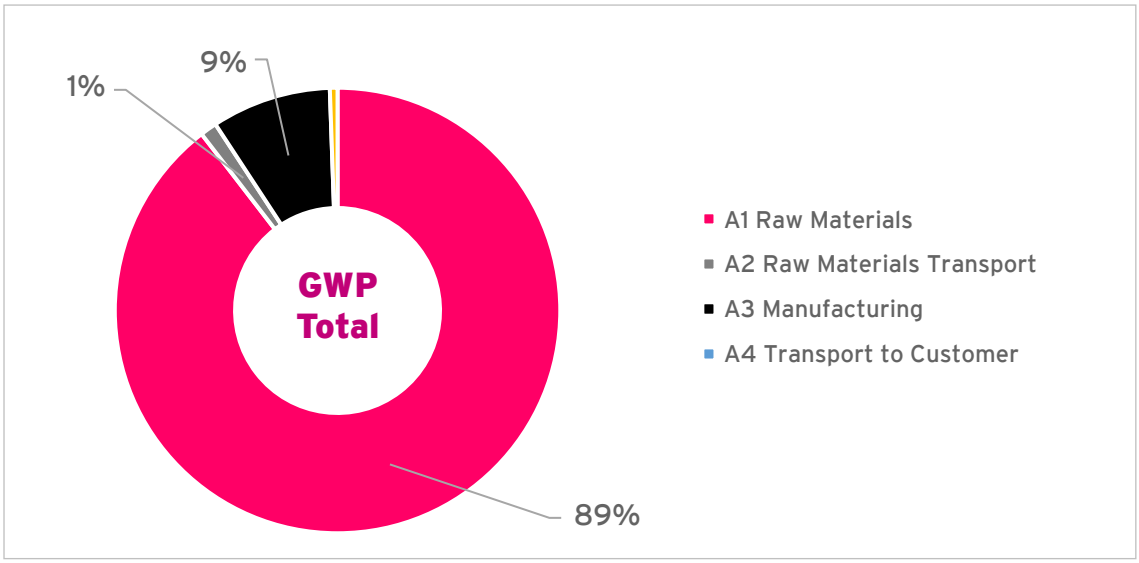
There are no co-product allocations within the LCA study underlying this EPD.

The SimaPro 9.1 LCA software and the Ecoinvent 3.6 LCA database were used to calculate the environmental impacts. The regional energy datasets were used for all energy calculations.

Geographical Scope
The geographical scope of this EPD is global.

LCA RESULTS

Environmental Impacts for 1 kg Pulver Class 2 Powder Coating						
Impact Category	**Unit**	**A1**	**A2**	**A3**	**A1 - A3**	**A4**
GWP - Fossil	kg CO_2 eq	4.04	0.056	0.393	4.49	0.025
GWP - Biogenic	kg CO_2 eq	-0.189	-16.4E-6	0.003	-0.186	3.97E-6
GWP - Luluc	kg CO_2 eq	0.269	38.4E-6	0.003	0.272	13.1E-6
GWP - Total	kg CO_2 eq	4.12	0.056	0.400	4.58	0.025
ODP	kg CFC-11 eq	481E-9	11.2E-9	14.8E-9	507E-9	5.51E-9
AP	mol H+ eq	0.019	0.002	0.002	0.023	0.001
EP - Freshwater	kg P eq	0.001	2.21E-6	367E-6	0.001	1.36E-6
*EP - Freshwater	kg PO_4 eq	0.003	6.76E-6	0.001	0.004	4.16E-6
EP - Marine	kg N eq	0.004	443E-6	444E-6	0.005	127E-6
EP - Terrestrial	mol N eq	0.037	0.005	0.004	0.046	0.001
POCP	kg NMVOC	0.040	0.001	0.001	0.043	376E-6
ADPE	kg Sb eq	58.1E-6	421E-9	1.56E-6	60.1E-6	299E-9
ADPF	MJ	76.7	0.715	5.13	82.5	0.357
WDP	m^3 depriv.	2.45	0.001	0.189	2.64	0.001
PM	disease inc.	175E-9	1.75E-9	13.4E-9	190E-9	1.46E-9
IR	kBq U-235 eq	0.219	0.003	0.011	0.234	0.002
ETP - FW	CTUe	161	0.462	8.42	170	0.257
HTTP - C	CTUh	6.18E-9	31.5E-12	85.2E-12	6.29E-9	11.5E-12
HTTP - NC	CTUh	119E-9	373E-12	3.56E-9	123E-9	254E-12
SQP	Pt	28.7	0.105	1.92	30.7	0.227
Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshw ter, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.						
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport to Customer					



**Disclaimer: EP-freshwater: This indicator has been calculated as "kg P eq" as required in the characterization model. (EUTREND model, Struijs et al, 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)*

Resource Use for 1 kg Pulver Class 2 Powder Coating						
Impact Category	**Unit**	**A1**	**A2**	**A3**	**A1 - A3**	**A4**
PERE	MJ	7.53	0.005	1.22	8.76	0.003
PERM	MJ	0	0	0	0	0
PERT	MJ	7.53	0.005	1.22	8.76	0.003
PENRE	MJ	77.1	0.716	5.13	82.9	0.357
PENRM	MJ	0	0	0	0	0
PENRT	MJ	77.1	0.716	5.13	82.9	0.357
SM	kg	0	0	0	0	0
RSF	MJ	0	0	0	0	0
NRSF	MJ	0	0	0	0	0
FW	m^3	0.042	68.2E-6	0.003	0.045	53.8E-6
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water.					

Waste&Outputs for 1 kg Pulver Class 2 Powder Coating						
Impact Category	**Unit**	**A1**	**A2**	**A3**	**A1 - A3**	**A4**
HWD	kg	0	0	0.007	0.007	0
NHWD	kg	0	0	0.029	0.029	0
RWD	kg	0	0	0	0	0
CRU	kg	0	0	0	0	0
MFR	kg	0	0	0	0	0
MER	kg	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0
Acronyms	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal.					

REFERENCES

/GPI/ General Programme Instructions of the International EPD® System. Version 3.01

/ISO 9001/ Quality management systems – Requirements

/ISO 14001/ Enviroment Management System- Requirements

/EN 15804:2012+A2:2019/ Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products

/ISO 14020:2000/ Environmental labels and declarations — General principles

/ISO 14025/ ISO 14025:2006 Preview Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures

/ISO 14040-44/ ISO 14040:2006-10, Environmental management - Life cycle assessment -Principles and framework (ISO 14040:2006) and Requirements and guidelines (ISO 14044:2006)

/ISO 45001/ Occupational Health and Safety - Requirements

/PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL
IVL Swedish Environmental Research Institute Secretariat of the International EPD® System, 2019:14 Version 1.11, DATE 2021-02-05

/Ecoinvent/ Ecoinvent Centre, www.ecoinvent.org

/SimaPro/ SimaPro LCA Package, Pré Consultants, the Netherlands,
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