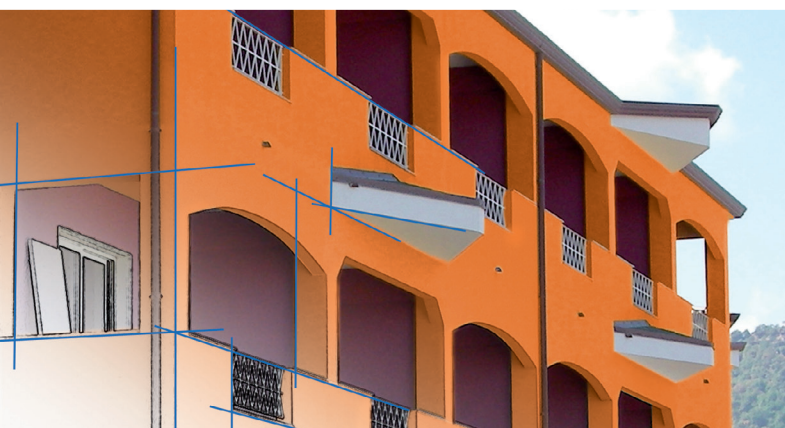




ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 for
Silancolor AC Pittura
Silancolor AC Pittura Plus
Silancolor AC Tonachino
Silancolor AC Tonachino Plus



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

Programme
operator:
EPD International AB

EPD registration
number:
S-P-01384

Publication
date:
2019-06-18

Valid until:
2024-06-17

Geographical
scope:
International





1. COMPANY DESCRIPTION / GOAL & SCOPE

Founded in 1937 in Milan, Italy, Mapei produces adhesives and complementary products for laying all types of floor, wall and coating materials, and also specializes in other chemical products used in the building industry, such as waterproofing products, specialty mortars, admixtures for concrete, products for underground constructions and for the restoration of concrete and historical buildings.

There are currently 85 subsidiaries in the Mapei Group, with a total of 80 production facilities located around the world in 35 different countries and in 5 different continents. Mapei also has 31 central laboratories. Most locations are ISO 9001 and ISO 14001 or EMAS-certified.

Mapei's strategy of internationalization is based on two main objectives: being closer to local needs and lowering transportation costs. With the declared objective of being close to buyers and clients, Mapei's presence in the five continents enables the company to comply with the requirements of each location, and to use only locally-based managers and qualified personnel, without changing the approach of Mapei.

Mapei invests 12% in its company's total work-force and 5% of its turnover in Research & Development; in particular, 70% of its R&D efforts are directed to develop eco-sustainable and environmentally friendly products, which give important contribution to all major green rating systems for eco-sustainable buildings such as LEED and BREEAM.

Furthermore, Mapei has developed a sales and technical service network with offices all over the world and offers an efficient Technical Assistance Service that is valued by architects, engineers, contractors and owners.

The goal of the study is to provide necessary data and documentation to produce an EPD according to the requirements of PCR Environdec (version 2.3, 2018-11-15) under EN 15804:2014 and to have more comprehension about the environmental impacts related to **Silancolor AC Pittura**, **Silancolor AC Pittura Plus**, **Silancolor AC Tonachino** and **Silancolor AC Tonachino Plus** manufactured in Mapei S.p.A. located in Robbiano di Mediglia (Italy), including packaging of the finished products.

Target audiences of the study are customers and other parties with an interest in the environmental impacts of **Silancolor AC Pittura**, **Silancolor AC Pittura Plus**, **Silancolor AC Tonachino** and **Silancolor AC Tonachino Plus**.

This analysis shall not support comparative assertions intended to be disclosed to the public.

2. PRODUCT DESCRIPTION

Silancolor AC Pittura is a water-repellent acrylic-siloxane paint with high resistance to UV rays, for internal and external surfaces.

Silancolor AC Pittura Plus is an acryl-siloxane paint for the hygiene of walls in internal and external applications, water-repellent, mould and algae resistant.

Silancolor AC Tonachino (1,2 mm) is a water-repellent, thick-layered acrylic-siloxane coating with high filling properties, for internal and external surfaces. Available in 1,2 mm grain size.

Silancolor AC Tonachino Plus (1,2 mm) is an acryl-siloxane plaster for the hygiene of walls in internal and external applications, water-repellent, mould and algae resistant.

Silancolor AC Tonachino and **Silancolor AC Tonachino Plus** comply with the requirements of EN 15824 (“Specifications for external renders and internal plasters based on organic binders”) for internal and external applications.

The products studied are supplied in plastic bucket with 20 kg of product and are delivered on wooden pallet wrapped with LDPE.

For further information see the Technical Data Sheets (TDS).

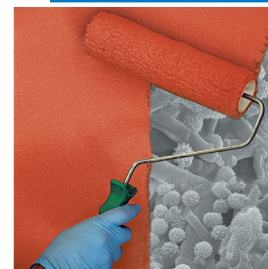
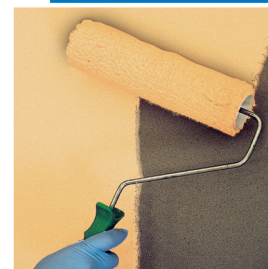
3. CONTENT DECLARATION

The main components and ancillary materials of the products studied are the following:

Table 1: Composition

Materials	Percentage (%) by mass
Polymer dispersions	< 30
Fillers	< 60
Biocides	< 1
Pigments	< 15
Water	< 20
Other (Additives & Packaging)	< 5

The products contain neither carcinogenic substances nor substances of very high concern (SVHC) on the REACH Candidate List published by the European Chemicals Agency, in a concentration higher than 0,1 % (by unit weight).



Silancolor AC Pittura
Silancolor AC Pittura Plus
Silancolor AC Tonachino
Silancolor AC Tonachino Plus



4. DECLARED UNIT AND REFERENCE SERVICE LIFE

The declared unit is 1 kg of coating (packaging included).

Packaging materials include:

- Wooden pallet
- Polypropylene bucket
- LDPE for wrapping

An average consumption for the products studied is the following:

Table 2: Average consumption amount

Product	Consumption kg/m ²
Silancolor AC Pittura	0,35
Silancolor AC Pittura Plus	0,35
Silancolor AC Tonachino (1,2 mm)	2,1
Silancolor AC Tonachino Plus (1,2 mm)	2,1

According to the system boundary applied the RSL is not specified in this study.

5. SYSTEM BOUNDARIES AND ADDITIONAL TECHNICAL INFORMATION

The approach is “cradle to gate”.

The following modules have been considered:

- A1, A2, A3 (Product Stage): extraction and transport of raw materials and packaging, manufacturing process.

Table 3: System boundaries

System Boundaries														
A1 – A3			A4 – A5		B1 – B7					C1 – C4				D
PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE					END OF LIFE STAGE				
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	
Raw Material Supply	Transport	Manufacturing	Transport	Installation Process	Use	Maintenance	Repair	Replacement	Refurbishment	Deconstruction/ Demolition	Transport	Waste Processing	Disposal	
					B6	Operational Energy Use								
					B7	Operational Water Use								

included
 excluded

A brief description of production process, is the following:

The production process starts from raw materials, that are purchased from external and intercompany suppliers and stored in the plant. Bulk raw materials are stored in specific silos and added automatically in the production mixer, according to the formula of the product. Other raw materials, supplied in bags, big bags or tanks, are stored in the warehouse and added automatically or manually in the mixer. The production is a discontinuous process, in which all the components are mechanically mixed in batches. The semi-finished product is then packaged, put on wooden pallets and stored in the finished products warehouse. The quality of final products is controlled before the sale.

Silancolor AC Pittura
 Silancolor AC Pittura Plus
 Silancolor AC Tonachino
 Silancolor AC Tonachino Plus



Figure 1: Production process detail

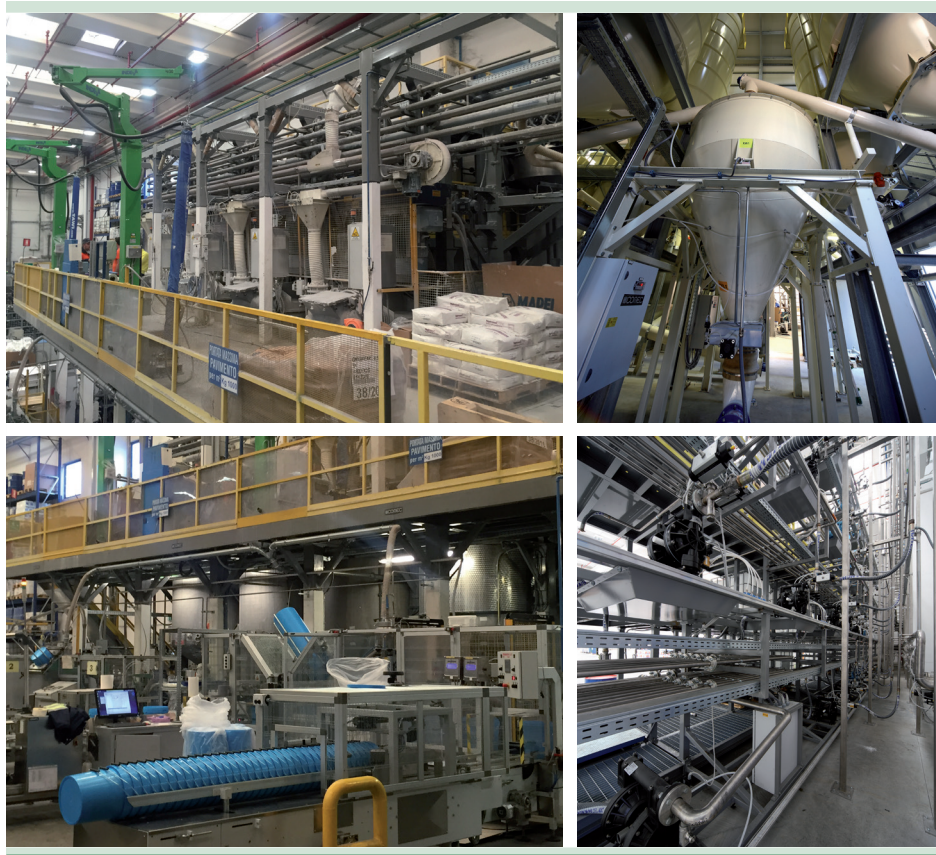


Figure 2: Mediglia Plant



6. CUT-OFF RULES AND ALLOCATION

Criteria for the exclusion of inputs and outputs (cut-off rules) in the LCA, information modules and any additional information are intended to support an efficient calculation procedure. They are not applied in order to hide data.

The procedure of exclusion of inputs and outputs is the following:

- All inputs and outputs to a unit process, for which data are available, are included in the calculation
- Cut-off criteria, where applied, are described in Table 4.

Input flows are covered for the whole formula.

Table 4: Cut-off criteria

Process excluded from the study	Cut-off criteria	Quantified contribution from process
A3: production (auxiliary materials)	Less than 10^{-5} kg/kg of finished product	Sensibility study demonstrates a contribute lower than 0,5%
A3: waste and particle emission	Less than 10^{-5} kg/kg of finished product	Sensibility study demonstrates a contribute lower than 0,5%

For the allocation procedure and principles, consider the Table 5.

Table 5: Allocation procedure and principles

Module	Allocation Principle
A1	All data are referred to 1 kg of product • A1: electricity is allocated to the whole plant production
A3	All data are referred to 1 kg of powder packaged product • A3-wastes: all data are allocated to the whole plant production

Silancolor AC Pittura
Silancolor AC Pittura Plus
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7. ENVIRONMENTAL PERFORMANCE & INTERPRETATION



GWP₁₀₀

Global Warming Potential refers to the emission/presence of GHGs (greenhouse gases) in the atmosphere (mainly CO₂, N₂O, CH₄) which contribute to the increase in the temperature of the planet.



AP

Acidification Potential refers to the emission of specific acidifying substances (i.e. NO_x, SO_x) in the air. These substances decrease the pH of the rainfall with predictable damages to the ecosystem.



EP

Eutrophication Potential refers to the nutrient enrichment of flowing water, which determines unbalance in aquatic ecosystems and causes the death of the aquatic fauna.



ODP

Ozone Depletion Potential refers to the degradation of the stratospheric layer of the ozone involved in blocking the UV component of sunrays. Depletion is due to particularly reactive components that originate from chlorofluorocarbon (CFC) or chlorofluoromethanes (CFM).



POCP

The Photochemical Ozone Creation Potential is the ozone formation in low atmosphere. This is quite common in the cities where a great amount of pollutants (like VOC and NO_x) are emitted every day (industrial emissions and vehicles). It is mainly diffused during the summertime.



ADP_e (elements)

Abiotic Depletion Potential elements refers to the depletion of the mineral resources.










ADP_f (fossil fuel)

Abiotic Depletion Potential fossil fuel refers to the depletion of the fossil fuel resources.

Following tables show environmental impacts for the products considered according to CML methodology (2001 – Jan. 2016 ver. 4.7). All the results are referred to the declared unit (see § 4).

Silancolor AC Pittura

Table 6: **Silancolor AC Pittura**: Environmental categories referred to the declared unit

Environmental category	Unit	A1-A3
 GWP₁₀₀	(kg CO ₂ eq.)	1,24E+00
 ADPe (element)	(kg Sb eq.)	4,20E-03
 ADPf (fossil)	(MJ)	2,40E+01
 AP	(kg SO ₂ eq.)	2,48E-02
 EP	(kg (PO ₄) ³⁻ eq.)	6,49E-04
 ODP	(kg R-11 eq.)	3,75E-07
 POCP	(kg ethylene eq.)	1,09E-03

GWP₁₀₀: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

Silancolor AC Pittura
 Silancolor AC Pittura Plus
 Silancolor AC Tonachino
 Silancolor AC Tonachino Plus



Table 7: **Silancolor AC Pittura**: other environmental indicators referred to the declared unit

Environmental Indicator	Unit	A1-A3
RPEE	MJ	1,39E+00
RPEM	MJ	-
TPE	MJ	1,39E+00
NRPE	MJ	2,56E+01
NRPM	MJ	-
TRPE	MJ	2,56E+01
SM	kg	-
RSF	MJ	-
NRSF	MJ	-
W	m ³	8,38E-03

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; **NRPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water








Table 8: **Silancolor AC Pittura**: waste production and other output flows referred to the declared unit

Output flow	Unit	A1-A3
NHW	kg	1,42E-02
HW	kg	2,43E-03
RW	kg	0,00E00
Components for re-use	kg	-
Materials for recycling	kg	-
Materials for energy recovery	kg	-
Exported energy	MJ	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

Silancolor AC Pittura Plus

Table 9: **Silancolor AC Pittura Plus**: Environmental categories referred to the declared unit

Environmental category	Unit	A1-A3
 GWP₁₀₀	(kg CO ₂ eq.)	1,28E+00
 ADPe (element)	(kg Sb eq.)	4,20E-03
 ADPf (fossil)	(MJ)	2,46E+01
 AP	(kg SO ₂ eq.)	2,55E-02
 EP	(kg (PO ₄) ³⁻ eq.)	7,45E-04
 ODP	(kg R-11 eq.)	1,03E-06
 POCP	(kg ethylene eq.)	1,13E-03

GWP₁₀₀: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

Silancolor AC Pittura
 Silancolor AC Pittura Plus
 Silancolor AC Tonachino
 Silancolor AC Tonachino Plus



Table 10: **Silancolor AC Pittura Plus**: other environmental indicators referred to the declared unit

Environmental Indicator	Unit	A1-A3
RPEE	MJ	1,43E+00
RPEM	MJ	-
TPE	MJ	1,43E+00
NRPE	MJ	2,63E+01
NRPM	MJ	-
TRPE	MJ	2,63E+01
SM	kg	-
RSF	MJ	-
NRSF	MJ	-
W	m ³	8,68E-03

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; **NRPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water








Table 11: **Silancolor AC Pittura Plus**: waste production and other output flows referred to the declared unit

Output flow	Unit	A1-A3
NHW	kg	1,42E-02
HW	kg	2,43E-03
RW	kg	0,00E00
Components for re-use	kg	-
Materials for recycling	kg	-
Materials for energy recovery	kg	-
Exported energy	MJ	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

Silancolor AC Tonachino (1,2 mm)

Table 12: **Silancolor AC Tonachino (1,2 mm)**: Environmental categories referred to the declared unit

Environmental category	Unit	A1-A3
 GWP₁₀₀	(kg CO ₂ eq.)	5,57E-01
 ADPe (element)	(kg Sb eq.)	2,56E-03
 ADP_f (fossil)	(MJ)	1,27E+01
 AP	(kg SO ₂ eq.)	5,88E-03
 EP	(kg (PO ₄) ³⁻ eq.)	3,40E-04
 ODP	(kg R-11 eq.)	3,24E-07
 POCP	(kg ethylene eq.)	3,17E-04

GWP₁₀₀: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADP_f**: Abiotic Depletion Potential (fossil)

Silancolor AC Pittura
 Silancolor AC Pittura Plus
 Silancolor AC Tonachino
 Silancolor AC Tonachino Plus



Table 13: **Silancolor AC Tonachino (1,2 mm)**: other environmental indicators referred to the declared unit

Environmental Indicator	Unit	A1-A3
RPEE	MJ	8,65E-01
RPEM	MJ	-
TPE	MJ	8,65E-01
NRPE	MJ	1,34E+01
NRPM	MJ	-
TRPE	MJ	1,34E+01
SM	kg	-
RSF	MJ	-
NRSF	MJ	-
W	m ³	4,90E-03

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; **NRPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water








Table 14: **Silancolor AC Tonachino (1,2 mm)**: waste production and other output flows referred to the declared unit

Output flow	Unit	A1-A3
NHW	kg	1,42E-02
HW	kg	2,43E-03
RW	kg	0,00E00
Components for re-use	kg	-
Materials for recycling	kg	-
Materials for energy recovery	kg	-
Exported energy	MJ	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

Silancolor AC Tonachino Plus (1,2 mm)

Table 15: **Silancolor AC Tonachino Plus (1,2 mm)**: Environmental categories referred to the declared unit

Environmental category	Unit	A1-A3
 GWP₁₀₀	(kg CO ₂ eq.)	5,82E-01
 ADPe (element)	(kg Sb eq.)	2,56E-03
 ADPf (fossil)	(MJ)	1,31E+01
 AP	(kg SO ₂ eq.)	6,33E-03
 EP	(kg (PO ₄) ³⁻ eq.)	4,08E-04
 ODP	(kg R-11 eq.)	7,91E-07
 POCP	(kg ethylene eq.)	3,44E-04

GWP₁₀₀: Global Warming Potential; **ADPe**: Abiotic Depletion Potential (elements); **EP**: Eutrophication Potential; **AP**: Acidification Potential; **POCP**: Photochemical Ozone Creation Potential; **ODP**: Ozone Depletion Potential; **ADPf**: Abiotic Depletion Potential (fossil)

Silancolor AC Pittura
 Silancolor AC Pittura Plus
 Silancolor AC Tonachino
 Silancolor AC Tonachino Plus



Table 16: **Silancolor AC Tonachino Plus (1,2 mm)**: other environmental indicators referred to the declared unit

Environmental Indicator	Unit	A1-A3
RPEE	MJ	8,96E-01
RPEM	MJ	-
TPE	MJ	8,96E-01
NRPE	MJ	1,39E+01
NRPM	MJ	-
TRPE	MJ	1,39E+01
SM	kg	-
RSF	MJ	-
NRSF	MJ	-
W	m ³	5,12E-03.

RPEE Renewable primary energy as energy carrier; **RPEM** Renewable primary energy as material utilisation; **TPE** Total use of renewable primary energy sources; **NRPE** Non-renewable primary energy as energy carrier; **NRPM** Non-renewable primary energy as material utilization; **TRPE** Total use of non-renewable primary energy sources; **SM** Use of secondary materials; **RSF** Renewable secondary fuels; **NRSF** Non-renewable secondary fuels; **W** Net use of fresh water

Table 17: **Silancolor AC Tonachino Plus (1,2 mm)**: waste production and other output flows referred to the declared unit

Output flow	Unit	A1-A3
NHW	kg	1,42E-02
HW	kg	2,43E-03
RW	kg	0,00E00
Components for re-use	kg	-
Materials for recycling	kg	-
Materials for energy recovery	kg	-
Exported energy	MJ	-

HW Hazardous waste disposed; **NHW** Non Hazardous waste disposed; **RW** Radioactive waste disposed

Tables above (from 6 to 17) and following plots (from Table 18 to Table 20) show absolute results and relative contribution for the environmental categories considered in this EPD.

The module **A1** (raw materials extraction and processing) has the greatest contribution for all the environmental categories included in this study. Considering ODP and ADPe, module **A1** highlights a relative contribution close to 100% for all products.

A GWP_{100} detail shows that polymer dispersions, pigments and additives give a significant contribution; also biocides have a remarkable importance even though they are contained in the products with a relative weight lower than 1%. The electricity consumption used for the manufacturing process doesn't significantly affect the results.

The module **A2** (raw materials transportation) gives a negative contribution to POCP due to the NO and NO₂ emission factors (for more details, see the methodology used: *HBEFA -Handbook Emission Factors for Road Transport*).

Table 18: Environmental Impact as percentage – **Silancolor AC Pittura** and **Silancolor AC Pittura Plus**



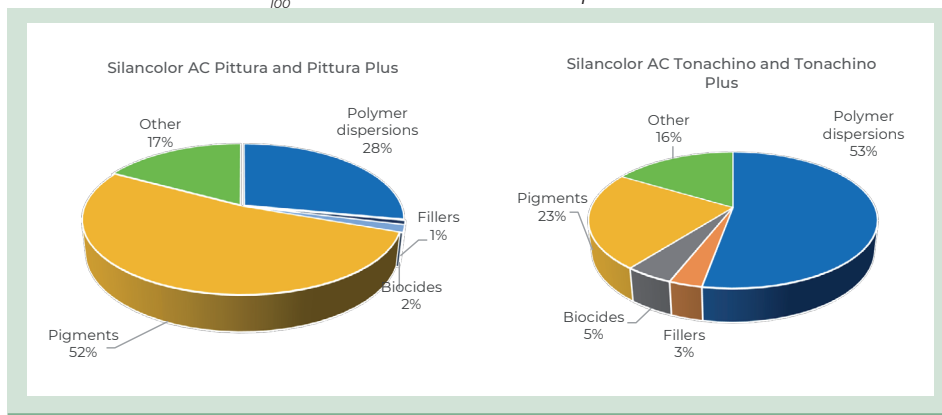
Silancolor AC Pittura
 Silancolor AC Pittura Plus
 Silancolor AC Tonachino
 Silancolor AC Tonachino Plus



Table 19: Environmental Impact as percentage – **Silancolor AC Tonachino (1,2 mm)** and **Silancolor Tonachino Plus (1,2 mm)**



Table 20: Focus on GWP_{100} of the module A1 for the all products studied



More details about electrical mix used in this EPD, is shown below:

	Data source	Amount	Unit
Electricity grid mix (IT) – 2016	GaBi database	0,4247	kg CO ₂ -eq/kWh
Electricity from photovoltaic (IT) – 2016	GaBi database	0,0629	kg CO ₂ -eq/kWh

8. DATA QUALITY

Table 21: Data quality

Dataset & Geographical reference	Database (source)	Temporary reference
A1; A3		
Fillers (EU)	GaBi Database	2018
Additives (EU)	GaBi Database; ecoinvent 3.5	2013 – 2018
EPDLA Life Cycle Inventory of Polymer Dispersions (EU)	EcoProfile EPDLA	2015
Electricity grid mix (IT)	GaBi Database	2016
Electricity from photovoltaic (IT)	GaBi Database	2016
Packaging components (EU)	GaBi Database; PlasticsEurope	2005 – 2018
A2		
Truck transport (euro 3, 27t payload – GLO)	GaBi Database	2018
Diesel for transport (EU)	GaBi Database	2016

All data included in table above refer to a period between 2005 and 2018; the most relevant ones are specific from supplier, while the others (i.e. transport and minor contribution dataset), come from European and global databases.

All dataset are not more than 10 years old according to EN 15804 § 6.3.7 “Data quality requirements”. The only exception is represented by one raw material used for one packaging component production, coming from PlasticsEurope database.

Primary data concern the year 2018 and represent the whole annual production.

Silancolor AC Pittura
Silancolor AC Pittura Plus
Silancolor AC Tonachino
Silancolor AC Tonachino Plus



9. VERIFICATION AND REGISTRATION

EPD of construction products may not be comparable if they do not comply with EN 15804

Environmental product declarations within the same product category from different programs may not be comparable.

CEN standard EN15804 served as the core PCR

PCR:	PCR 2012:01 Construction products and Construction services, Version 2.3, 2018-11-15
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino Contact via info@environdec.com
Independent verification of the declaration and data, according to ISO 14025	<input checked="" type="checkbox"/> EPD Process Certification (Internal) <input type="checkbox"/> EPD Verification (external)
Third party verifier:	Certiquality S.r.l. Number of accreditation: 003H rev15
Accredited or approved by:	Accredia
Procedure for follow-up of data during EPD validity involves third-party verifier	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

12. REFERENCES

- EN15804:SUSTAINABILITYOFCONSTRUCTIONWORKS-ENVIRONMENTAL PRODUCT DECLARATIONS - CORE RULES FOR THE PRODUCT CATEGORY OF CONSTRUCTION PRODUCTS
- EN 15824: SPECIFICATIONS FOR EXTERNAL RENDERS AND INTERNAL PLASTERS BASED ON ORGANIC BINDERS
- GENERAL PROGRAMME INSTRUCTIONS OF THE INTERNATIONAL EPD® SYSTEM. VERSION 3.0
- HBEFA - HANDBOOK EMISSION FACTORS FOR ROAD TRANSPORT
- ISO 14025 ENVIRONMENTAL LABELS AND DECLARATIONS - TYPE III ENVIRONMENTAL DECLARATIONS - PRINCIPLES AND PROCEDURES
- ISO 14044 ENVIRONMENTAL MANAGEMENT – LIFE CYCLE ASSESSMENT – REQUIREMENTS AND GUIDELINES
- PCR 2012:01; “PRODUCT GROUP CLASSIFICATION: MULTIPLE UN CPC CODES CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES”; VERSION 2.3

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