EPD®
THE INTERNATIONAL EPD® SYSTEM

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 for

Planitop Intonaco Armato
Planitop HDM Restauro
Planitop HDM Maxi

Programme:	Programme operator:	EPD registration number:	Publication date:	Valid until:	Geographical scope:	Revision:
The International EPD® System; www.environdec.com	**EPD International AB**	**S-P-01380**	**2018-12-03**	**2023-12-02**	**International**	**2019-12-02**

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ADHESIVES · SEALANTS · CHEMICAL PRODUCTS FOR BUILDING

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 **Planitop Intonaco Armato (A+B)**, **Planitop HDM Restauro (A+B)** and **Planitop HDM Maxi (A+B)**, manufactured in Mapei S.p.A. located in Robbiano di Mediglia and Latina (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 the products studied.

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

2. PRODUCT DESCRIPTION

Planitop Intonaco Armato is a two-component ready-mixed high-ductility fibre-reinforced natural hydraulic lime (NHL) and eco-pozzolan mortar, particularly recommended for levelling off the surface of stone, bricks and tuff, and for the structural strengthening of facing walls, including when extra strengthening mesh is not applied.
The product contains 30% of recycled material in the powder (part A).

Planitop HDM Restauro is a two-component, pre-blended, high-ductility, fibre-reinforced, hydraulic lime (NHL) and eco-pozzolan-based light-coloured mortar, particularly recommended for "reinforced" structural strengthening of masonry substrates.
The product contains 30% of recycled material in the powder (part A).

Planitop HDM Maxi is a two-component ready-mixed, high ductility pozzolan-reaction, fibre-reinforced mortar for structural "reinforced" strengthening work.
The product contains around 5% of recycled material in the powder (part A).

Planitop Intonaco Armato and **Planitop HDM Restauro** are compliant with EN 998-1 and 998-2 (Specification for mortars for masonry: rendering e plastering mortars) while **Planitop HDM Maxi** is compliant with EN 998-2 and EN 1504-3 (Product and system for the protection and repair of concrete structers).

Products are supplied as follows:

- **Planitop Intonaco Armato** (kit A+B): 25 kg multiplybag for powder and 5 kg HDPE tank for latex
- **Planitop HDM Restauro** (kit A+B): 25 kg multiplybag for powder and 5 kg HDPE tank for latex
- **Planitop HDM Maxi** (kit A+B): 25 kg multiplybag for powder and 6,25 kg HDPE tank for latex

3. CONTENT DECLARATION

The main components and ancillary materials of **Planitop Intonaco Armato**, **Planitop HDM Restauro** and **Planitop HDM Maxi**, are the following:

Table 1: Composition

Materials	Percentage (%) by mass
Inorganic binders	< 35
Fillers	< 65
Additives	< 5
Recycled material	≤ 30
Packaging	< 2

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 more than 0,1 % (by unit weight).

4. DECLARED UNIT AND REFERENCE SERVICE LIFE

The declared unit is 1 kg of powder (part A) and the requested weight for the latex (part B), both with packaging, as follows:

- **Planitop Intonaco Armato**: 1 kg powder + 200 g latex + packaging
- **Planitop HDM Restauro**: 1 kg powder + 200 g latex + packaging
- **Planitop HDM Maxi**: 1 kg powder + 250 g latex + packaging

Packaging materials (for both powder and latex) include:

- Wooden pallet
- Paper/PE/paper (used for powders bags)
- HDPE + PP (used for latex drum)
- LDPE used as wrapping material

The reference service life of the mortars, if professionally installed and properly used, is estimated to be the same as the building one.

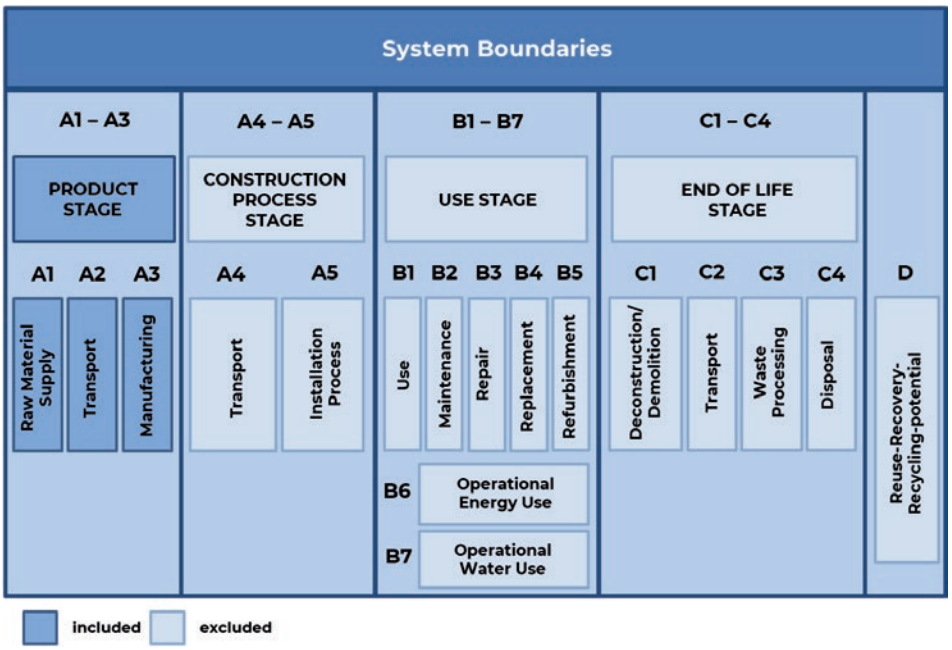
5. SYSTEM BOUNDARIES AND ADDITIONAL TECHNICAL INFORMATION

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 2: System boundaries



A brief description of the production process, is the following:

The production process starts from raw materials, which 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. During the production of the powder, all the components are mechanically mixed in batches. Raw materials of latexes are mixed, properly diluted and packed into drums. The semi-finished product is then packaged, put on wooden pallets, covered by stretched hoods and stored

Figure 1: Production process detail

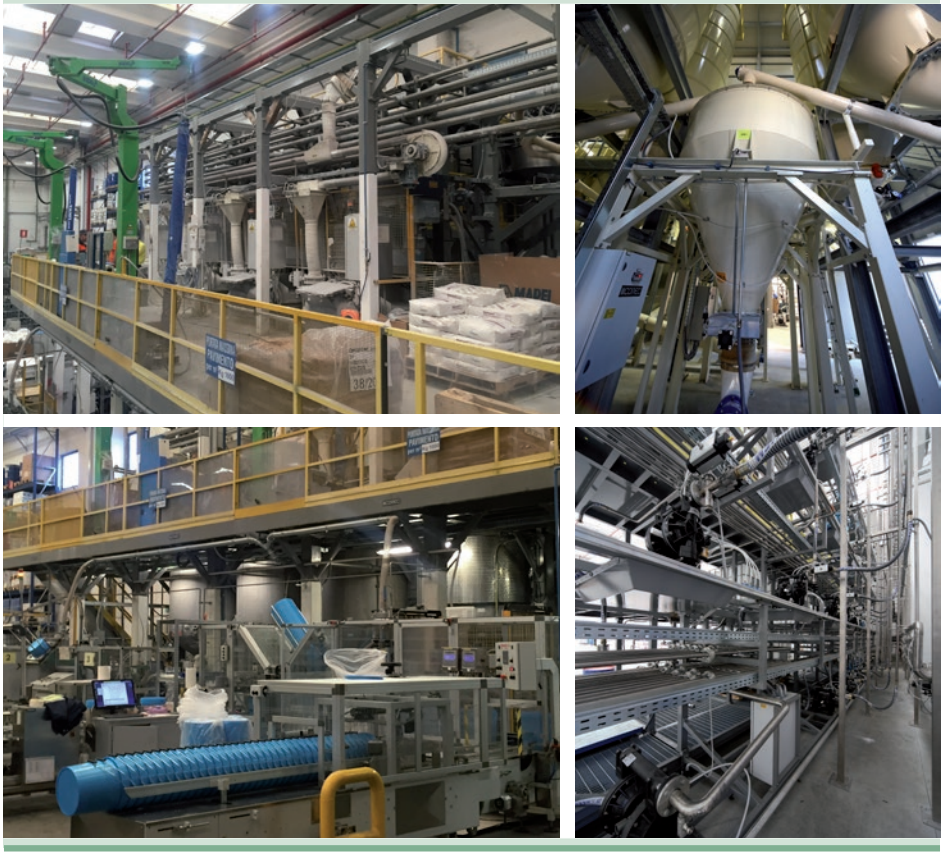


Figure 2: Mediglia Plant

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 following procedure is followed for the exclusion of inputs and outputs::

- 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 3.

Table 3: Cut-off criteria

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

For the allocation procedure and principles, consider the following table:

Table 4: Allocation procedure and principles

Module	Allocation Principle
A1	All data are referred to 1 kg of powder 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

7. ENVIRONMENTAL PERFORMANCE AND INTERPRETATION

GWP_{100}
Global Warming Potential refers to the emission/presence of GHGs (greenhouse gases) in the atmosphere (mainly CO_2, N_2O, CH_4) which contribute to the increase in the temperature of the planet.

AP
Acidification Potential refers to the emission of specific acidifying substances (i.e. NOx, SOx) 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 NOx) 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, version 4.7). All the results are referred to the declared unit (see § 4).

Planitop Intonaco Armato

Table 5: ***Planitop Intonaco Armato****: Environmental categories referred to the declared unit*

Environmental category	Unit	A1 – A3
 **GWP_{100}**	(kg CO_2 eq.)	3,55E-01
 **ADPe (element)**	(kg Sb eq.)	6,12E-04
 **ADPf (fossil)**	(MJ)	4,48E+00
 **AP**	(kg SO_2 eq.)	1,13E-03
 **EP**	(kg $(PO_4)^{3-}$eq.)	1,14E-04
 **ODP**	(kg R-11 eq.)	5,37E-08
 **POCP**	(kg ethylene eq.)	7,25E-05

GWP_{100}: 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)

*Table 6: **Planitop Intonaco Armato**: Other environmental indicators referred to the declared unit*

Environmental Indicator	Unit	A1-A3
RPEE	MJ	4,18E-01
RPEM	MJ	-
TPE	MJ	4,18E-01
NRPE	MJ	4,73E+00
NRPM	MJ	-
TRPE	MJ	4,73E+00
SM	kg	3,00E-01*
RSF	MJ	-
NRSF	MJ	-
W	m^3	1,50E-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

**The value is referred only to the powder component (Part A)*

*Table 7: **Planitop Intonaco Armato**: Waste production and other output flows referred to the declared unit*

Output flow	Unit	A1-A3
NHW	kg	1,40E-03
HW	kg	1,89E-04
RW	kg	0,00E+00
Components for re-use	kg	-
Materials for recycling	kg	2,99E-03
Materials for energy recovery	kg	-
Exported energy	MJ	-

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

Planitop HDM Restauro

Table 8: ***Planitop HDM Restauro****: Environmental categories referred to the declared unit*

Environmental category	Unit	A1 – A3
GWP_{100}	(kg CO_2 eq.)	3,53E-01
ADPe (element)	(kg Sb eq.)	6,13E-04
ADPf (fossil)	(MJ)	3,98E+00
AP	(kg SO_2 eq.)	1,19E-03
EP	(kg $(PO_4)^{3-}$ eq.)	1,18E-04
ODP	(kg R-11 eq.)	5,37E-08
POCP	(kg ethylene eq.)	7,14E-05

GWP_{100}: 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)

*Table 9: **Planitop HDM Restauro**: Other environmental indicators referred to the declared unit*

Environmental Indicator	Unit	A1-A3
RPEE	MJ	5,36E-01
RPEM	MJ	-
TPE	MJ	5,36E-01
NRPE	MJ	4,22E+00
NRPM	MJ	-
TRPE	MJ	4,22E+00
SM	kg	3,00E-01*
RSF	MJ	-
NRSF	MJ	-
W	m^3	1,59E-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

**The value is referred only to the powder component (Part A)*

*Table 10: **Planitop HDM Restauro**: Waste production and other output flows referred to the declared unit*

Output flow	Unit	A1-A3
NHW	kg	1,40E-03
HW	kg	1,89E-04
RW	kg	0,00E+00
Components for re-use	kg	-
Materials for recycling	kg	2,99E-03
Materials for energy recovery	kg	-
Exported energy	MJ	-

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

Planitop HDM Maxi

Planitop HDM Maxi is manufactured both in Mediglia and Latina plants; the results in the following tables represent the average of the two.

*Table 11: **Planitop HDM Maxi**: Environmental categories referred to the declared unit*

Environmental category	Unit	A1 – A3
GWP_{100}	(kg CO_2 eq.)	5,29E-01
ADPe (element)	(kg Sb eq.)	1,08E-03
ADPf (fossil)	(MJ)	6,61E+00
AP	(kg SO_2 eq.)	1,26E-03
EP	(kg $(PO_4)^{3-}$eq.)	2,01E-04
ODP	(kg R-11 eq.)	8,19E-08
POCP	(kg ethylene eq.)	2,58E-04

GWP_{100}: 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)

*Table 12: **Planitop HDM Maxi**: Other environmental indicators referred to the declared unit*

Environmental Indicator	Unit	A1-A3
RPEE	MJ	4,46E-01
RPEM	MJ	-
TPE	MJ	4,46E-01
NRPE	MJ	6,80E+00
NRPM	MJ	-
TRPE	MJ	6,80E+00
SM	kg	5,17E-02*
RSF	MJ	-
NRSF	MJ	-
W	m^3	4,11E-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

**The value is referred only to the powder component (Part A)*

*Table 13: **Planitop HDM Maxi**: Waste production and other output flows referred to the declared unitdeclared unit*

Output flow	Unit	A1-A3
NHW	kg	3,15E-03
HW	kg	4,25E-04
RW	kg	0,00E+00
Components for re-use	kg	-
Materials for recycling	kg	2,05E-03
Materials for energy recovery	kg	-
Exported energy	MJ	-

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

Tables above show absolute results for every considered environmental impact category. The **module A1** gives the highest contribution for each of them, up to 99% of the total impact in the whole system boundary.

In particular hydraulic binders carry a significant impact for all environmental categories.

The **module A2** (raw materials transport) gives a negative contribution to POCP due to NO and NO_2 emission factors (for more details, see the methodology used: HBEFA -Handbook Emission Factors for Road Transport).
A specific amount of **recycled material** is used in the formulations and the value is shown in Table 6, Table 9 and Table 12 as **SM** (Secondary Material) indicator.

The following tables show the percentage contribution of the modules considered in the system boundary to the environmental impacts.

*Table 14: Environmental Impact as percentage (average of **Planitop Intonaco Armato** and **Planitop HDM Restauro**)*

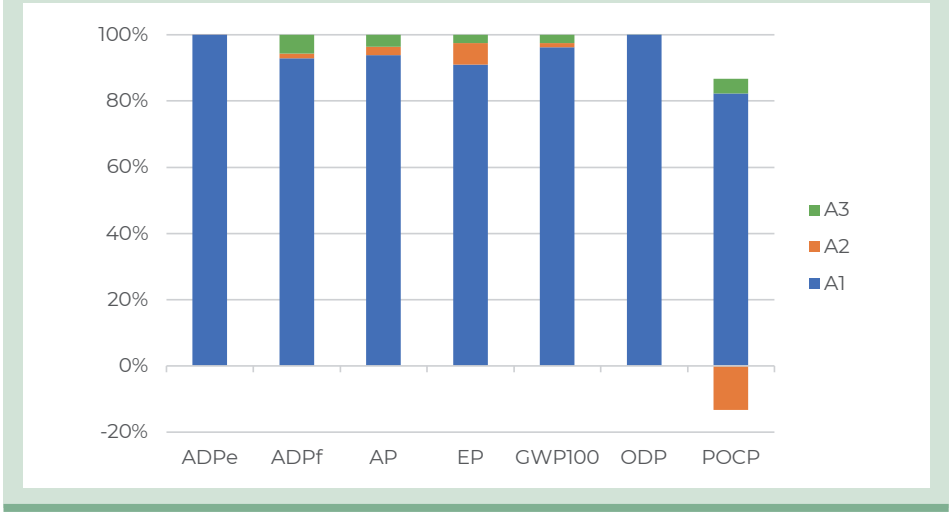
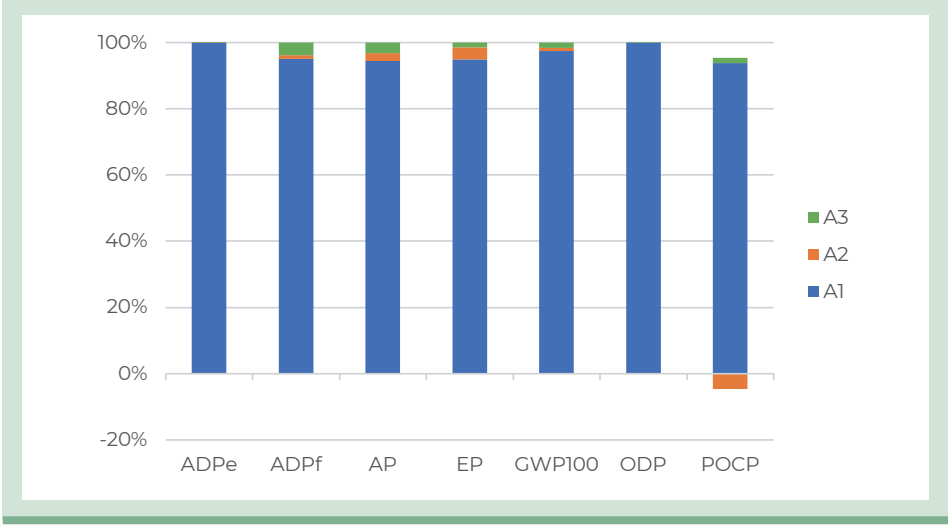


Table 15: Environmental Impact as percentage of ***Planitop HDM Maxi***



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

	Data source	Amount	Unit
Electricity grid mix (IT) – 2014	GaBi database	0,4020	kg CO_2-eqv/kWh
Electricity from photovoltaic (IT) – 2014	GaBi database	0,0641	kg CO_2-eqv/kWh

8. DATA QUALITY

Table 16: Data quality

Dataset & Geographical reference	Database (source)	Temporary reference
A1; A3		
Inorganic Binders (DE)	GaBi Database – ecoinvent 3.4	2015 – 2017
Organic Binders (DE)	GaBi Database	2012
Fillers (EU)	GaBi Database	2017
Additives (EU)	GaBi Database	2012 – 2017
Recycled Material (DE)	GaBi Database	2017
Electricity grid mix (IT)	GaBi Database	2014
Electricity from photovoltaic (IT)	GaBi Database	2014
Packaging components (EU)	GaBi Database, PlasticsEurope	2005 – 2017
A2		
Truck transport (euro 3, 27t payload – GLO)	GaBi Database	2017
Diesel for transport (EU)	GaBi Database	2014

All data included in the table above refer to a period between 2005 and 2017; 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 datasets 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.

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

9. REQUISITE EVIDENCE

9.1. Recycled content

Planitop Intonaco Armato contains 30% of recycled material in the powder (part A).
Planitop HDM Restauro contains 30% of recycled material in the powder (part A).
Planitop HDM Maxi contains around 5% of recycled material in the powder (part A).

10. SIGNIFICANT CHANGES FROM THE PREVIOUS VERSION

In this revision new primary data (referred to the reference year 2018) have been adopted and the last update of the PCR 2.3 has been considered. The indicator ”Materials for recycling” has been assessed.

11. 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: Filippo Sessa Contact via **info@environdec.com**
Independent verification of the declaration and data, according to ISO 14025	☒ EPD Process Certification (Internal) ☐ 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	☒ Yes ☐ No

12. REFERENCES

- EN 998-1 SPECIFICATION FOR MASONRY - PART 1: RENDERING AND PLASTERING MORTAR
- EN 998-2 SPECIFICATION FOR MASONRY - PART 2: MASONRY MORTAR
- EN 1504-3 PRODUCTS AND SYSTEMS FOR THE PROTECTION AND REPAIR OF CONCRETE STRUCTURE-DIFINITIONS, REQUIREMENTS, QUALITY CONTROL AND EVALUATION OF CONFORMITY - PART 3: STRUCTURAL AND NON-STRUCTURAL REPAIR
- EN 15804:2014 SUSTAINABILITY OF CONSTRUCTION WORKS - ENVIRONMENTAL PRODUCT DECLARATIONS - CORE RULES FOR THE PRODUCT CATEGORY OF CONSTRUCTION PRODUCTS
- 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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