

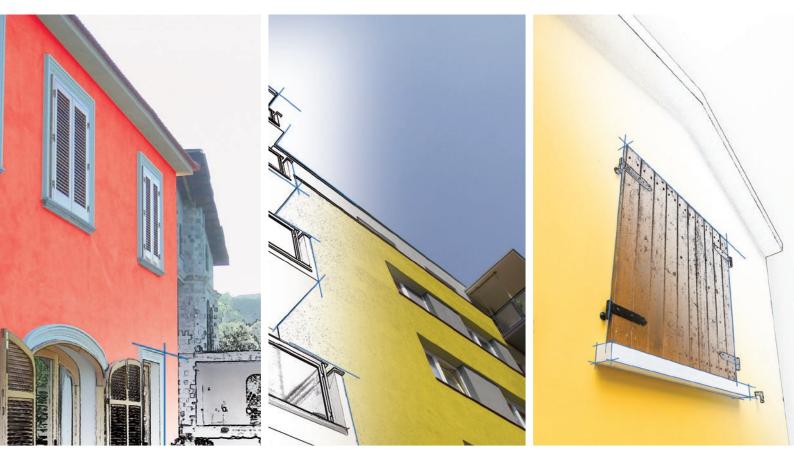


ENVIRONMENTAL PRODUCT DECLARATION



In accordance with ISO 14025 for

Quarzolite Base Coat Quarzolite Pittura Quarzolite HF Plus Quarzolite Tonachino Quarzolite Tonachino Plus



Programme: The International EPD[®] System; www.environdec.com Programme operator:

EPD International AB

EPD registration number:

S-P-01376

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Valid until:

2024-01-17

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 2.2, 2017-05-30) under EN 15804:2014 and to have more comprehension about the environmental impacts related to **Quarzolite Base Coat**, **Quarzolite Pittura**, **Quarzolite HF Plus**, **Quarzolite Tonachino** and **Quarzolite 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 **Quarzolite Base Coat**, **Quarzolite Pittura**, **Quarzolite HF Plus**, **Quarzolite Tonachino** and **Quarzolite Tonachino Plus**.

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



2. PRODUCT DESCRIPTION

Quarzolite Base Coat is a coloured acrylic undercoat with a smooth finish and good filling and adhesion promoting properties, for internal and external surfaces.

Quarzolite Pittura is an acrylic paint with micro-granular quartz with a smooth finish for long-lasting protection of internal and external surfaces.

Quarzolite HF Plus is an acrylic hygienising paint with granular quartz fillers for external use, with filling properties, durable and resistant to mould and algae.

Quarzolite Tonachino is a highly protective, thick-layer acrylic coating with high filling properties, for internal and external surfaces. Available in the following grain sizes: 0.7 mm, 1.2 mm, 1.5 mm and 2.0 mm.

Quarzolite Tonachino Plus is a highly protective, mould and algae resistant acrylic coating for internal and external surfaces. Available in the following grain sizes: 1.2 mm and 1.5 mm.

Quarzolite Tonachino and Quarzolite 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 (%)	
Polymer dispersions	< 40	
Fillers	< 40	
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 greater than 0,1 % (by unit weight).

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

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

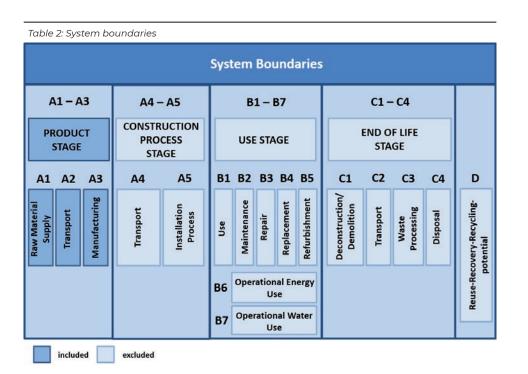


5. SYSTEM BOUNDARIES AND ADDITIONAL TECHNICAL INFORMATION

The approach is "cradle to gate".

The following modules have been considered:

• A1 – A3 (Product stage): extraction and transport of raw materials, packaging included, production process.



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.





Figure 1: Production process detail







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6. CUT-OFF RULES & 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 3.

Input flows are covered for the whole formula.

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	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 4.

Table 4: Allocation procedure and principles

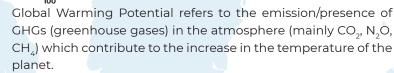
Module	Allocation Principle
Al	All data are referred to 1 kg of product • Al: electricity is allocated to the coating department
A3	 All data are referred to 1 kg of packaged product A3-wastes: all data are allocated to the whole plant production





7. ENVIRONMENTAL PERFORMANCE & INTERPRETATION

GWP₁₀₀



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.



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

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ODP

EP



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)

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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).

Quarzolite Basecoat

Table 5: Quarzolite Basecoat: Environmental categories referred to the declared unit			
Environm	nental category	Unit	A1 - A3
	GWP ₁₀₀	(kg CO₂ eq.)	5,51E-01
	ADPe (element)	(kg Sb eq.)	2,68E-03
	ADPf (fossil)	(MJ)	1,30E+01
	АР	(kg SO ₂ eq.)	6,97E-03
	EP	(kg (PO₄)³-eq.)	3,27E-04
	ODP	(kg R-11 eq.)	2,47E-07
	РОСР	(kg ethylene eq.)	3,74E-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 6: Quarzolite Basecoat: Other environmental indicators referred to the declared unit		
Environmental Indicator	Unit	A1-A3
RPEE	MJ	7,29E-01
RPEM	MJ	-
TPE	МЈ	7,29E-01
NRPE	МЈ	1,38E+01
NRPM	МЈ	-
TRPE	МЈ	1,38E+01
SM	kg	-
RSF	МЈ	-
NRSF	МЈ	-
W	m ³	6,14E-03
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Table 7: Quarzolite Basecoat: Waste: Waste production & other output flows referred to the declared unit		
Output flow	Unit	A1-A3
NHW	kg	7,54E-03
НW	kg	4,41E-06
RW	kg	0,00E+00
Components for re-use	kg	-
Materials for recycling	kg	-
Materials for energy recovery	kg	-
Exported energy	МЈ	-
HW Hazardous waste disposed; NHW Non Hazardous waste disposed; RW Radioactive waste disposed		





Quarzolite Pittura

Table 8: Quarzolite Pittura: Environmental categories referred to the declared unit			
Environn	nental category	Unit	A1 – A3
	GWP ₁₀₀	(kg CO ₂ eq.)	1,16E+00
	ADPe (element)	(kg Sb eq.)	3,83E-03
	ADPf (fossil)	(MJ)	2,23E+01
	АР	(kg SO ₂ eq.)	2,35E-02
	EP	(kg (PO₄)³-eq.)	6,30E-04
	ODP	(kg R-11 eq.)	3,71E-07
	РОСР	(kg ethylene eq.)	1,03E-03
: : 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: Quarzolite Pittura: Other environmental indicators referred to the declared unit		
Unit	A1-A3	
МЈ	1,38E+00	
МЈ	-	
МЈ	1,38E+00	
МЈ	2,41E+01	
МЈ	-	
МЈ	2,41E+01	
kg	-	
МЈ	-	
МЈ	-	
m ³	8,76E-03	
	Unit MJ MJ	

Table 10: Quarzolite Pittura: Waste production & other output flows referred to the declared unit		
Output flow	Unit	A1-A3
NHW	kg	7,54E-03
HW	kg	4,41E-06
RW	kg	0,00E+00
Components for re-use	kg	-
Materials for recycling	kg	-
Materials for energy recovery	kg	-
Exported energy	МЈ	-
HW Hazardous waste disposed; NHW Non Hazardous waste disposed; RW Radioactive waste disposed		



Quarzolite HF Plus

Table 11: Quarzolite HF Plus: Environmental categories referred to the declared unit			
Environn	nental category	Unit	A1 – A3
	GWP ₁₀₀	(kg CO ₂ eq.)	1,14E+00
	ADPe (element)	(kg Sb eq.)	3,65E-03
	ADPf (fossil)	(MJ)	2,19E+01
	AP	(kg SO ₂ eq.)	2,23E-02
	EP	(kg (PO₄)³·eq.)	6,91E-04
	ODP	(kg R-11 eq.)	1,03E-06
	РОСР	(kg ethylene eq.)	1,00E-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) 			





	Table 12: Quarzolite HF Plus: Other environmental indicators referred to the declared unit		
Unit	A1-A3		
MJ	1,31E+00		
MJ	-		
МJ	1,31E+00		
MJ	2,35E+01		
MJ	-		
MJ	2,35E+01		
kg	-		
MJ	-		
MJ	-		
m ³	8,88E-03		
	MJ MJ MJ MJ MJ MJ MJ kg MJ MJ MJ		

Table 13: Quarzolite HF Plus: Waste production & other output flows referred to the declared unit		
Output flow	Unit	A1-A3
NHW	kg	7,54E-03
HW	kg	4,41E-06
RW	kg	0,00E+00
Components for re-use	kg	-
Materials for recycling	kg	-
Materials for energy recovery	kg	-
Exported energy	МЈ	-
HW Hazardous waste disposed; NHW Non Hazardous waste disposed; RW Radioactive waste disposed		



Quarzolite Tonachino

Table 14: Quarzolite Tonachino: Environmental categories referred to the declared unit			
Environn	nental category	Unit	A1 - A3
My w	GWP ₁₀₀	(kg CO ₂ eq.)	5,17E-01
	ADPe (element)	(kg Sb eq.)	2,34E-03
	ADPf (fossil)	(MJ)	1,21E+01
	AP	(kg SO ₂ eq.)	6,13E-03
	EP	(kg (PO ₄) ^{3.} eq.)	2,91E-04
	ODP	(kg R-11 eq.)	3,28E-07
	РОСР	(kg ethylene eq.)	3,05E-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 15: Quarzolite Tonachino: Other environmental indicators referred to the declared unit		
Environmental Indicator	Unit	A1-A3
RPEE	MJ	8,23E-01
RPEM	MJ	-
TPE	MJ	8,23E-01
NRPE	MJ	1,28E+01
NRPM	MJ	-
TRPE	МЈ	1,28E+01
SM	kg	-
RSF	МЈ	-
NRSF	МЈ	-
W	m ³	5,98E-03
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Table 16: Quarzolite Tonachino: Waste production & other output flows referred to the declared unit		
Output flow	Unit	A1-A3
NHW	kg	7,54E-03
НW	kg	4,41E-06
RW	kg	0,00E+00
Components for re-use	kg	-
Materials for recycling	kg	-
Materials for energy recovery	kg	-
Exported energy	МЈ	-
HW Hazardous waste disposed; NHW Non Hazardous waste disposed; RW Radioactive waste disposed		





Quarzolite Tonachino Plus

Table 17: Quarzolite Tonachino Plus: Environmental categories referred to the declared unit			
Environmental category Unit A1 – A3			A1 - A3
	GWP ₁₀₀	(kg CO ₂ eq.)	5,58E-01
	ADPe (element)	(kg Sb eq.)	2,34E-03
	ADPf (fossil)	(MJ)	1,26E+01
	AP	(kg SO ₂ eq.)	7,31E-03
	EP	(kg (PO₄)³-eq.)	3,13E-04
	ODP	(kg R-11 eq.)	7,67E-07
	РОСР	(kg ethylene eq.)	3,57E-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 18: Quarzolite Tonachino Plus: Other environmental indicators referred to the declared unit		
Environmental Indicator	Unit	A1-A3
RPEE	МЈ	8,67E-01
RPEM	МЈ	-
TPE	МЈ	8,67E-01
NRPE	МЈ	1,33E+01
NRPM	MJ	-
TRPE	МЈ	1,33E+01
SM	kg	-
RSF	МЈ	-
NRSF	МЈ	-
W	m ³	6,26E-03

Table 19: **Quarzolite Tonachino Plus**: Waste production & other output flows referred to the declared unit

Output flow	Unit	A1-A3
NHW	kg	7,54E-03
HW	kg	4,41E-06
RW	kg	0,00E+00
Components for re-use	kg	-
Materials for recycling	kg	-
Materials for energy recovery	kg	-
Exported energy	МЈ	-
HW Hazardous waste disposed; NHW Non Hazardous waste disposed; RW Radioactive waste disposed		

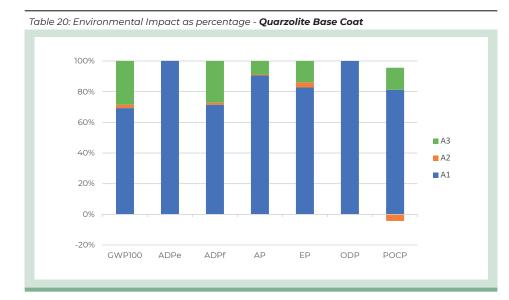


Tables above (from 5 to 19) and following graphs (from Table 20 to 25) show absolute results and relative contribution for the environmental categories considered in this EPD.

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.

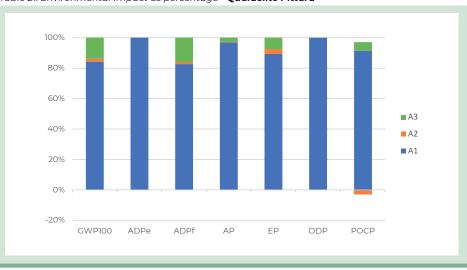
A GWP₁₀₀ detail shows that polymer dispersions, pigments and additives give a significant contribution; also biocides have a remarkable importance even though they are contained in the products with a relative weight lower than 1%. The electricity consumption used for the manufacturing process doesn't 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*).

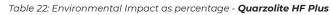












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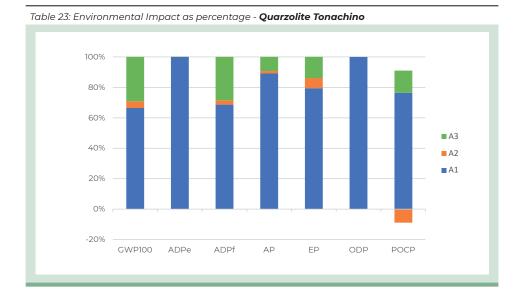


Table 24: Environmental Impact as percentage - Quarzolite Tonachino Plus 100% 80% 60% A3 40% A2 A1 20% 0% -20% GWP100 ADPe ADPf AP ΕP ODP POCP

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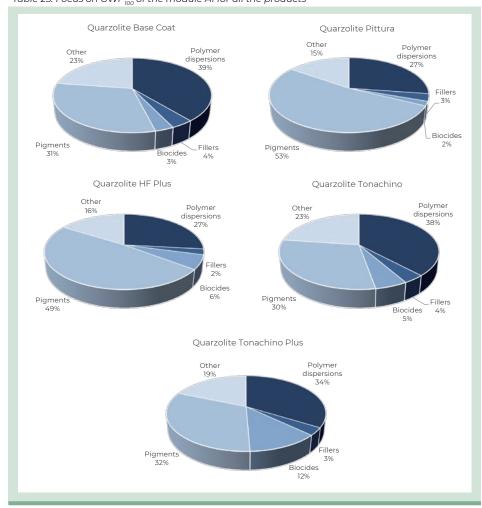


Table 25: Focus on GWP₁₀₀ of the module A1 for all the products

More details about electrical mix used in this EPD (Italian grid mix – 2014), 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 26: Data quality		
Dataset & Geographical reference	Database (source)	Temporary reference
	A1; A3	
Fillers (EU)	GaBi Database	2017
Additives (EU)	GaBi Database; ecoinvent 3.3	2013 - 2017
EPDLA Life Cycle Inventory of Polymer Dispersions (EU)	EcoProfile EPDLA	2015
Electricity grid mix (IT)	GaBi Database	2014
Electricity from photovoltaic (IT)	GaBi Database	2014
Packaging components (EU)	GaBi Database, Plastic Europe	2005 - 2017
	A2	
Truck transport (euro 3, 27t payload – GLO)	GaBi Database	2017
Diesel for transport (EU)	GaBi Database	2014

All data included in 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 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 PlasticEurope database.

Primary data concern the year 2017 and represent the whole annual production.





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.

PCR 2012:01 Construction products and Construction services, Version 2.2, 2017-05-30
The Technical Committee of the International EPD® System. Chair: Massimo Marino Contact via info@environdec.com
EPD Process Certification (Internal) EPD Verification (external)
Certiquality S.r.l. Number of accreditation: 003H rev14
Accredia
⊠ Yes

CEN standard EN15804 served as the core PCR

10.REFERENCES

- EN 15804: SUSTAINABILITY OF CONSTRUCTION WORKS -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 2.2



CONTACT INFORMATION

EPD owner:	ADHESIVES - SEALANTS - CHEMICAL PRODUCTS FOR BUILDING
	Mapei SpA www.mapei.it
LCA Author:	ADHESIVES - SEALANTS - CHEMICAL PRODUCTS FOR BUILDING Mapei SpA WWW.mapei.it; Environmental Sustainability Office
Programme operator:	EPD International AB info@environdec.com

Quarzolite HF Plus, Quarzolite Tonachino Quarzolite Base Coat, Quarzolite Pittura **Quarzolite Tonachino Plus**





SEDE MAPEI SpA Via Cafiero, 22 - 20158 Milano Tel. +39-02-37673.1 Fax +39-02-37673.214 Internet: www.mapei.com E-mail: mapei@mapei.it



