EPD®

THE INTERNATIONAL EPD® SYSTEM

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 for

MA.G.A./C 200
MA.G.A./C 280

Programme:	Programme operator:	EPD registration number:	Publication date:	Valid until:	Geographical scope:
The International EPD® System; www environdec com	**EPD International AB**	**S-P-01575**	**2020-05-05**	**2025-05-04**	**International**

www.mapei.com

MAPEI®

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, cement additives, products for underground constructions and for the restoration of concrete and historical buildings.

There are currently 89 subsidiaries in the Mapei Group, with a total of 83 production facilities located around the world in 36 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 2.31, 2019-12-20) under EN 15804:2014 and to have more comprehension about the environmental impacts related to **MA.G.A./C 200** and **MA.G.A./C 280** manufactured in Mapei S.p.A. located in Robbiano di Mediglia (Italy), in year 2019, including packaging of the finished products.

Target audiences of the study are customers and other parties with an interest in the environmental impacts of **MA.G.A./C 200** and **MA.G.A./C 280**.

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

2. PRODUCT DESCRIPTION

MA.G.A./C 200 and **MA.G.A./C 280** are high performance grinding aids generally used to increase mill production and to improve the cement quality. They are highly concentrated additives formulated with only selected raw materials, to guarantee absolute constancy of quality and superior performance. MA.G.A./C are available in plastic tanks, in flexytanks or in bulk.
In this study only the bulk option is considered.
For more information about the product, see the TDS (Technical Data Sheet).

3. CONTENT DECLARATION

The main components and ancillary materials of **MA.G.A./C 200** and **MA.G.A./C 280** are the following:

Table 1: Composition

Materials	Percentage (%)
Mix of ammines	< 65
Mix of glycols	< 20
Water	< 50
Other	< 20

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

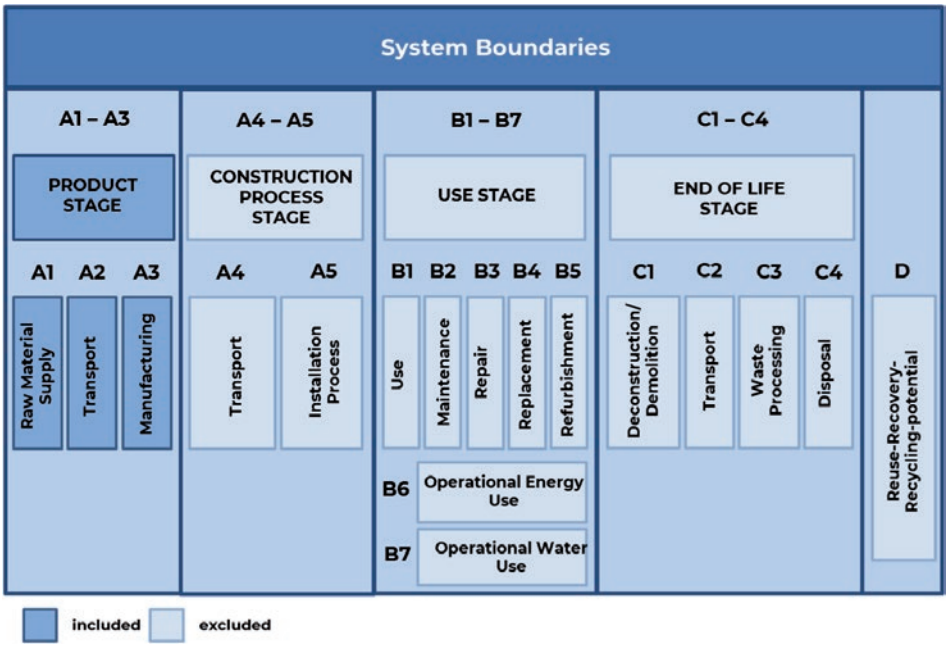
The declared unit is 1 kg of finished product.

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, production process

Table 2: System boundaries



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 IBCs (1 m^3 International Bulk Containers), are stored in their 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 stored in silos, then shipped with suitable bulk liquid transport systems (tank truck, isotank, IBC, flexitank, drum). The quality of final products is controlled before the sale.

Figure 1: Production process detail

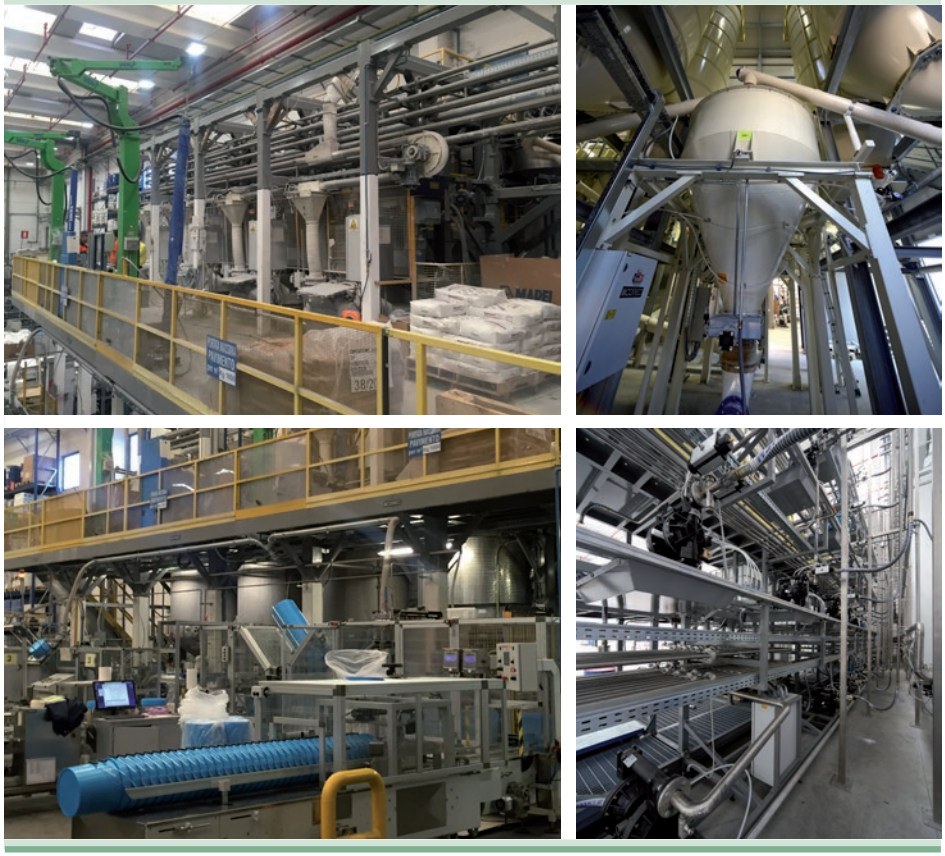


Figure 2: Mediglia Plant

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 applied 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

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^{-4} kg/kg of finished product	Sensitivity study demonstrates a relative contribution lower than 0,5%
A3: waste and particle emission	less than 10^{-4} 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):

Table 4: 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 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.

MA.G.A./C 200
MA.G.A./C 280

Following tables show environmental impacts for the products considered according to CML methodology (2001 – Jan. 2016).

MA.G.A./C 200

(1 kg in bulk)

*Table 5: **MA.G.A./C 200**: Environmental categories referred to 1 kg of product supplied in bulk*

Environmental Category	Unit	A1 – A3
GWP_{100}	(kg CO_2 eq.)	1,30E+00
ADPe (element)	(kg Sb eq.)	4,91E-06
ADPf (fossil)	(MJ)	3,05E+01
AP	(kg SO_2 eq.)	4,90E-03
EP	(kg $(PO_4)^{3-}$eq.)	5,10E-03
ODP	(kg R-11 eq.)	9,02E-08
POCP	(kg ethylene eq.)	5,00E-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: **MA.G.A./C 200**: Other environmental indicators referred to 1 kg of product supplied in bulk*

Environmental Indicator	Unit	A1-A3
RPEE	MJ	1,43E+00
RPEM	MJ	-
TPE	MJ	1,43E+00
NRPE	MJ	3,25E+01
NRPM	MJ	-
TRPE	MJ	3,25E+01
SM	kg	-
RSF	MJ	-
NRSF	MJ	-
W	m^3	2,07E-02

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; N**RPM** 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 7: **MA.G.A./C 200**: Waste production & other output flows referred to 1 kg of product supplied in bulk*

Output flow	Unit	A1-A3
NHW	kg	2,46E-03
HW	kg	1,21E-03
RW	kg	0,00E+00
Components for re-use	kg	-
Materials for recycling	kg	7,71E-03
Materials for energy recovery	kg	-
Exported energy	MJ	-

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

MA.G.A./C 280

(1 kg in bulk)

*Table 8: **MA.G.A./C 280**: Environmental categories referred to 1 kg of product supplied in bulk*

Environmental Category	Unit	A1 – A3
GWP_{100}	(kg CO_2 eq.)	2,04E+00
ADPe (element)	(kg Sb eq.)	7,12E-06
ADPf (fossil)	(MJ)	4,98E+01
AP	(kg SO_2 eq.)	7,36E-03
EP	(kg $(PO_4)^{3-}$eq.)	8,20E-03
ODP	(kg R-11 eq.)	1,57E-07
POCP	(kg ethylene eq.)	7,65E-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 9: **MA.G.A./C 280**: Other environmental indicators referred to 1 kg of product supplied in bulk*

Environmental Indicator	Unit	A1-A3
RPEE	MJ	1,97E+00
RPEM	MJ	-
TPE	MJ	1,97E+00
NRPE	MJ	5,28E+01
NRPM	MJ	-
TRPE	MJ	5,28E+01
SM	kg	-
RSF	MJ	-
NRSF	MJ	-
W	m^3	3,14E-02

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; N**RPM** 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

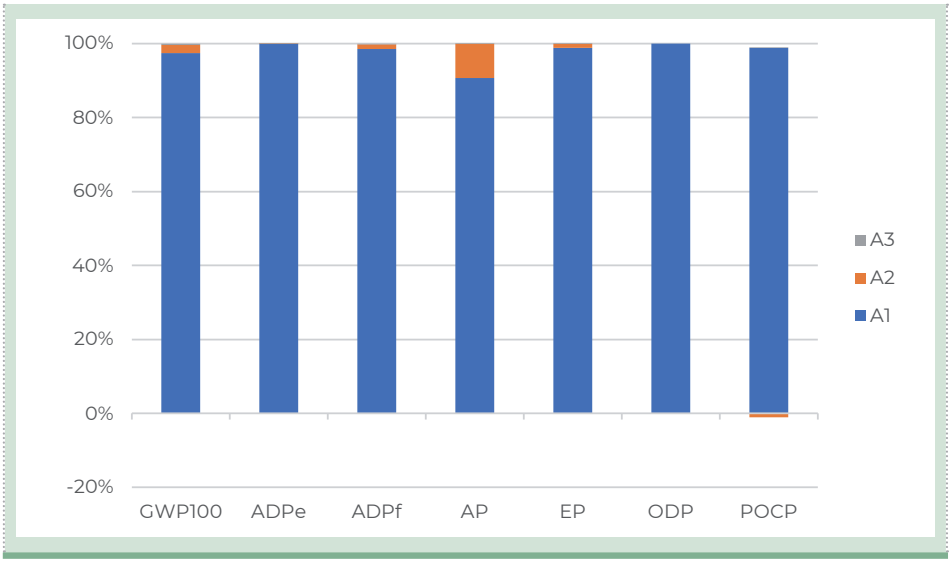
*Table 10: **MA.G.A./C 280**: Waste production & other output flows referred to 1 kg of product supplied in bulk*

Output flow	Unit	A1-A3
NHW	kg	2,46E-03
HW	kg	1,21E-03
RW	kg	0,00E+00
Components for re-use	kg	-
Materials for recycling	kg	7,71E-03
Materials for energy recovery	kg	-
Exported energy	MJ	-

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

Tables from 5 to 10 show absolute results for all the environmental categories considered. For both products, the **module A1** (raw materials extraction and processing) gives the highest contribution to all the environmental indicators. 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"). The **module A3** (product manufacturing) doesn't affect considerably the results.
The details about the relative contribution of the different modules considered in the system boundaries are shown in Table 11.

Table 11: Environmental Impact of MA.G.A./C 200 and MA.G.A./C 280 as percentage



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

	Data source	Amount	Unit
Electricity grid mix (IT) – 2015	GaBi database	0,425	kg CO_2-eqv/kWh
Electricity from photovoltaic (IT) – 2015	GaBi database	0,0629	kg CO_2-eqv/kWh

8. DATA QUALITY

Table 12: Data quality

Dataset & Geographical reference	Database (source)	Temporary reference
A1; A3		
Organic compounds (EU - GLO)	Thinkstep Database Ecoinvent 3.5	2011 – 2018
Electricity grid mix (IT)	Thinkstep Database	2015
Electricity from photovoltaic (IT)	Thinkstep Database	2015
A2		
Truck transport (euro 3, 27t payload – GLO)	Thinkstep Database	2018
Oceanic ship (27500 DWT - GLO)	Thinkstep Database	2018
Diesel for transport (EU)	Thinkstep Database	2016
Heavy Fuel Oil (EU)	Thinkstep Database	2015

All data included in the table above refer to a period between 2011 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 datasets are not more than 10 years old according to EN 15804 § 6.3.7 “Data quality requirements”.
Primary data concern the year 2019 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.

CEN standard EN15804 served as the core PCR	
PCR:	PCR 2012:01 Construction products and Construction services, Version 2.31, 2019-12-20
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 15804: 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 2.31

CONTACT INFORMATION

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

(GB) 4/20

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