EPD®

THE INTERNATIONAL EPD® SYSTEM

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 for

Re-Con Zero Evo

Programme:	Programme operator:	EPD registration number:	Approval date:	Valid until:	Geographical scope:
The International EPD® System; www.environdec.com	**EPD International AB**	**S-P-01105**	**2018-03-09**	**2023-03-08**	**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, products for underground constructions and for the restoration of concrete and historical buildings.

There are currently 81 subsidiaries in the Mapei Group, with a total of 73 production facilities located around the world in 34 different countries and in 5 different continents. Mapei also has 18 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 under EN 15804:2014 and PCR Environdec, version 2.2, date 2017-05-30 and to have more comprehension about the environmental impacts related to **Re-Con Zero Evo** 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 **Re-Con Zero Evo**.

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

2. PRODUCT DESCRIPTION

Re-Con Zero Evo is a two-component powder product used to completely recover the unused concrete from mixer trucks.
Re-Con Zero Evo transforms the unused concrete into aggregates that, once cured, may be used as follows:

- to partially replace natural aggregates for normal concrete;
- to completely replace natural aggregates for lean concrete, substrates, mixed cements, etc.

Treating concrete with **Re-Con Zero Evo** does not generate waste or by-products, such as rinsing water or fines, because the process allows the cementitious conglomerate to be completely recovered. After treating concrete with **Re-Con Zero Evo**, the interior of the mixing drum is extremely clean and considerably less rinsing water is required compared with the amount normally used for cleaning mixing drums.

3. CONTENT DECLARATION

The main components of **Re-Con Zero Evo** (A+B) are the following:

Table 1: Composition

Materials	Percentage (%)
Inorganic Substances	50 – 100
Organic Substances	0 – 50
Packaging	< 1

Re-Con Zero Evo contains no 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. FUNCTIONAL UNIT AND REFERENCE SERVICE LIFE

The functional unit is 2 kg (0,5 kg part A + 1,5 kg part B) of packaged finish product, which is necessary to treat 1m^3 of returned concrete.
Primary packaging material is made of PVA (PolyVinyl Alcohol).
Due to the selected system boundary and the use of **Re-Con Zero Evo**, the reference service life of the product is not specified.

5. SYSTEM BOUNDARIES & 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

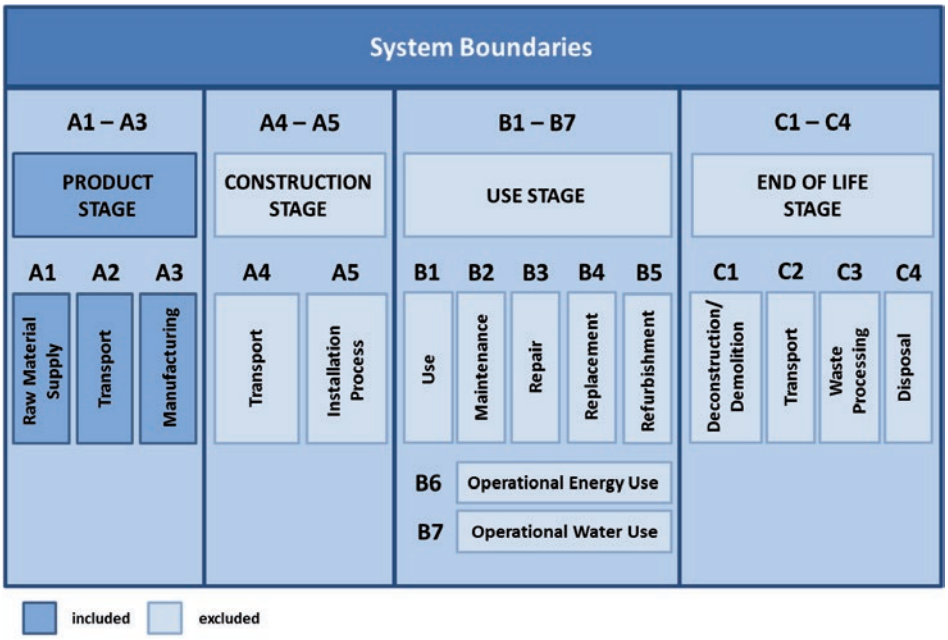
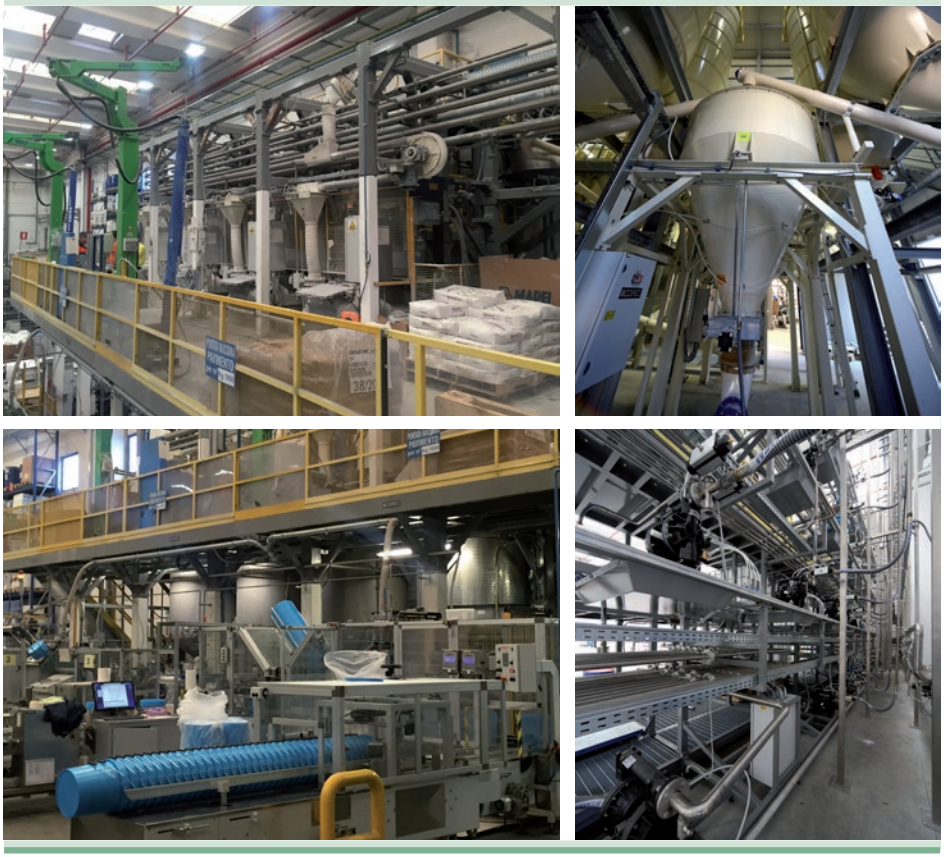


Figure 1: Mediglia Plant

A brief description of production process, is the following:
Raw materials, that are purchased from external and intercompany suppliers, are transported 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. Packaged 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 in PVA bags and stored in the Finished Products' warehouse. The finished product can be delivered also in bulk. The quality of the final products is controlled before the sale.

Figure 2: Production process detail



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 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.
- Less than 1% of the total mass inputs/outputs of the unit process A1 and A3, are cut-off (see 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	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 following table (Table 4):

Table 4: Allocation procedure and principles

Module	Allocation Principle
A1	All data are referred to 2 kg of powder • A1: electricity is allocated to the whole plant
A3	All data are referred to 2 kg of powder packaged product • A3-wastes: all data are allocated to the whole plant

7. ENVIRONMENTAL PERFORMANCE & 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 – Jan2016). All the results are referred to the functional unit (see chapter 4).

*Table 5: **Re-Con Zero Evo**: Environmental categories*

System boundary		Upstream + core
Modules	Unit	A1-A3
GWP_{100}	kg CO_2 eq.	5,88E+00
ADP_e (element)	kg Sb eq.	2,73E-05
ADP_f (fossil)	MJ	1,16E+02
AP	kg SO_2 eq.	3,39E-02
EP	kg $(PO_4)^{3-}$ eq.	1,20E-02
ODP	kg R-11 eq.	9,05E-07
POCP	kg ethylene eq.	2,11E-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 6: **Re-Con Zero Evo**: Other environmental indicators*

System boundary		Upstream + core
Parameter	**Unit**	**A1-A3**
RPEE	MJ	6,02E+00
RPEM	MJ	-
TPE	MJ	6,02E+00
NRPE	MJ	1,20E+02
NRPM	MJ	-
TRPE	MJ	1,20E+02
SM	kg	-
RSF	MJ	-
NRSF	MJ	-
W	m^3	-5,50E-01

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 [total freshwater consumption]

*Table 7: **Re-Con Zero Evo**: Waste production & other output flows*

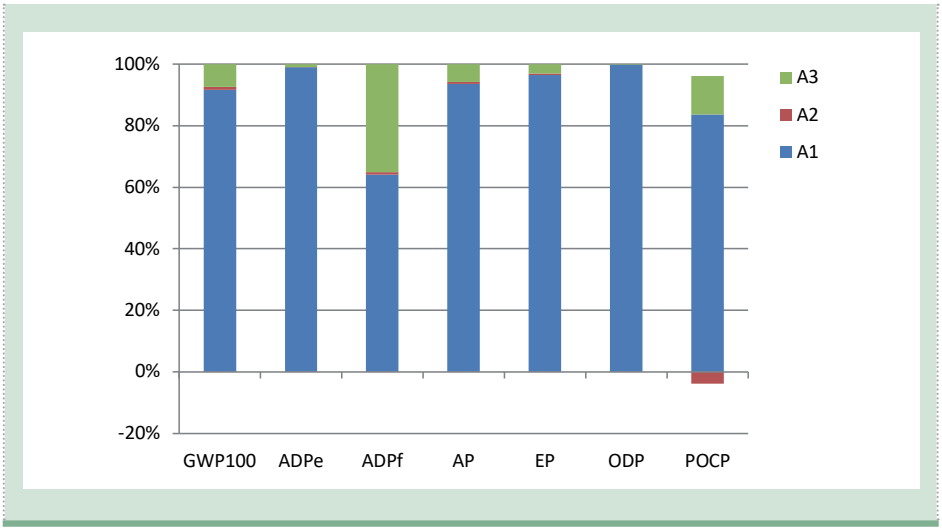
System boundary		Upstream + core
Parameter	**Unit**	**A1-A3**
NHW	kg	1,05E-02
HW	kg	5,78E-06
RW	kg	0,00E+00
Components for re-use	kg	-
Materials for recycling	kg	-
Materials for energy recovery	kg	-
Exported energy	MJ	-

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

Tables above (from Table 5 to Table 7) and the following histogram (Table 8) show absolute results and relative contributions for the environmental categories considered in this EPD. Calculations point out that module A1 has the highest contribution for all environmental indicators. Considering ODP and ADPe, module A1 highlights a relative contribution close to 100%. The module A2 (raw materials transportation) gives a negative contribution to POCP due to the NO and NO_2 emission factors (for more details, see the methodology used: CML2001 – Jan2016).

The total freshwater consumption indicator has a negative value (see table 6); this result is due to the synthesis of one component in **Re-Con Zero Evo** formulation which occurs through a condensation reaction, producing water.

*Table 8: Environmental impact as percentage – **Re-Con Zero Evo***



More details about electrical mixes used in this EPD are shown below:

	Data source	Amount	Unit
Electricity grid mix (IT) – 2013	GaBi database	0,4290	kg CO_2-eqv/kWh
Electricity from photovoltaic (IT) – 2013	GaBi database	0,0512	kg CO_2-eqv/kWh

8. DATA QUALITY

Table 10: Data quality

Dataset & Geographical reference	Database (source)	Temporary reference
A1; A3		
Inorganic Additives (GLO)	ecoinvent v. 3.3	2014
Organic Additives (GLO)	ecoinvent v. 3.3	2014
Electricity grid mix (IT)	GaBi Database	2013
Electricity from photovoltaic (IT)	GaBi Database	2013
Packaging components	GaBi Database, ecoinvent v 3.3	2006 - 2016
A2		
Truck transport (euro 3,27 ton payload – GLO)	GaBi Database	2016
Diesel for transport (EU)	GaBi Database	2013

All data included in the table above refer to a period between 2006 and 2016; 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 no 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 2016 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 2.2, 2017-05-30
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	☒ EPD Process Certification (Internal) ☐ EPD Verification (external)
Third party verifier:	Certiquality S.r.l. Number of accreditation: 003H rev14
Accredited or approved by:	Accredia

10. REFERENCES

- GENERAL PROGRAMME INSTRUCTIONS OF THE INTERNATIONAL EPD® SYSTEM. VERSION 3.0
- PCR 2012:01; “PRODUCT GROUP CLASSIFICATION: MULTIPLE UN CPC CODES CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES”; VERSION 2.2

11. CONTACT INFORMATION

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