



# ENVIRONMENTAL PRODUCT DECLARATION

*In accordance with ISO 14025 for*  
**Adesilex P9 Express**



Programme:  
**The International  
EPD<sup>®</sup> System;**  
[www.environdec.com](http://www.environdec.com)

Programme  
operator:  
**EPD International AB**

EPD  
registration  
number:  
**S-P-01111**

Approval  
date:  
**2018-09-20**

Valid  
until:  
**2023-09-19**

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 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 Environdec (version 2.2, date 2017-05-30) under EN 15804:2014 and to have more comprehension about the environmental impacts related to **Adesilex P9 Express** in both versions grey and white, manufactured in Mapei S.p.A. located in Robbiano di Mediglia (Italy), including packaging of the finished product. Target audiences of the study are customers and other parties with an interest in the environmental impacts of **Adesilex P9 Express**.

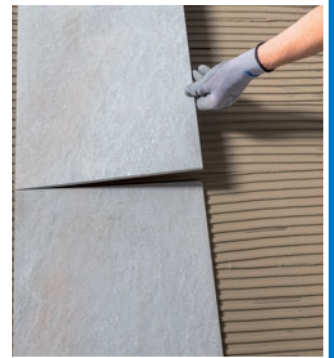
This analysis shall not support comparative assertions intended to be disclosed to the public.

## 2. PRODUCT DESCRIPTION

**Adesilex P9 Express** is high-performance, fast setting cementitious adhesive with no vertical slip, for ceramic tiles and stone, including large formats. It has very low emission level of organic volatile compounds.

It is compliant with EN 12004 (Adhesives for tiles. Requirements, evaluation of conformity, classification and designation) and ISO 13007-1 (Ceramic tiles - Grouts and adhesives) as C2FT.

The product is supplied in 25 kg multiply bags.



## 3. CONTENT DECLARATION

The main components and ancillary materials of **Adesilex P9 Express** (grey and white) are the following:

Table 1: Composition

Materials	Percentage (%) by mass
Organic binders	< 2
Inorganic binders	< 40
Fillers	< 60
Additives	< 3
Packaging	< 2

These products contain 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. DECLARED UNIT AND REFERENCE SERVICE LIFE

**The declared unit is 1 kg of packaged finish product.**

Packaging materials include:

- Multiply bag (paper/PE/paper)
- Wooden pallet
- LDPE used as wrapping material

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

Adesilex P9 Express





## 5. SYSTEM BOUNDARIES & ADDITIONAL TECHNICAL INFORMATION

The approach is “cradle to gate”. The following modules have been considered:

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

Table 2: System boundaries

System Boundaries													
A1 – A3			A4 – A5		B1 – B7					C1 – C4			
PRODUCT STAGE			CONSTRUCTION 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							

includedexcluded

included
  excluded

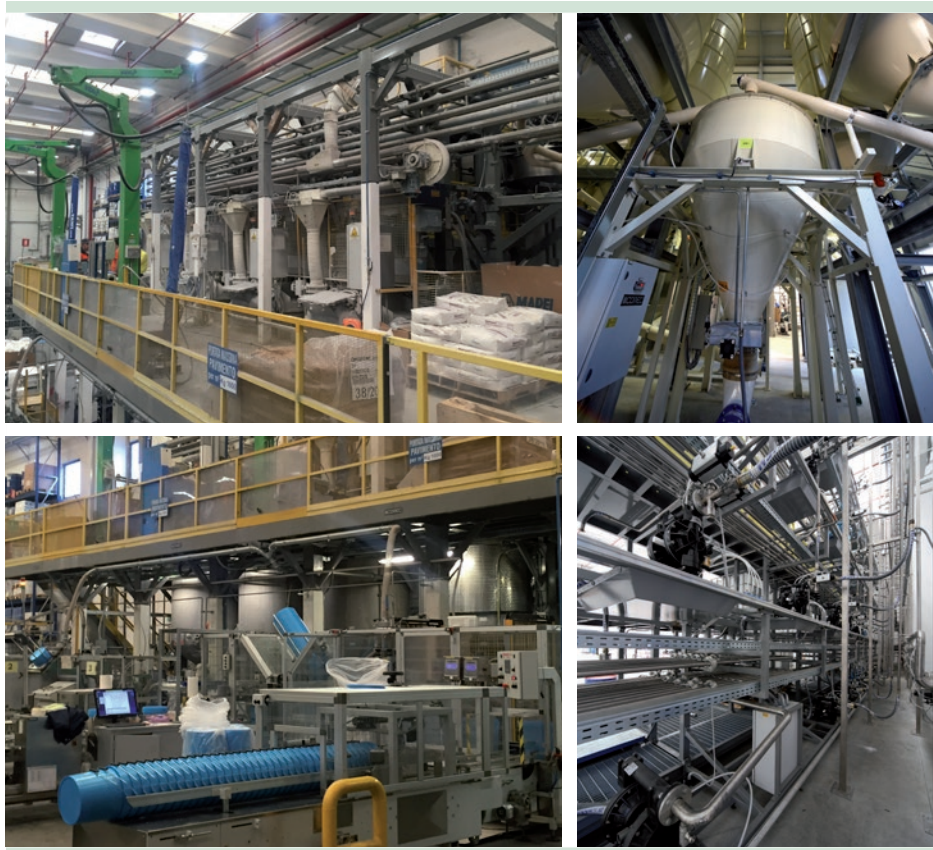
Figure 1: Mediglia Plant



A brief description of 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. The production is a discontinuous process, in which all the components are mechanically mixed in batches. The semi-finished product is then packaged in multiply bags, put on wooden pallets, covered by stretched hoods and stored in the finished products warehouse. The quality of final product is controlled before the sale.

Figure 2: Production process detail



Adesilex P9 Express



## 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.
- 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):

Table 4: Allocation procedure and principles

Module	Allocation Principle
A1	All data are referred to 1 kg of product: <ul style="list-style-type: none"><li>• A1: electricity is allocated to the whole plant</li></ul>
A3	All data are referred to 1 kg of packaged product: <ul style="list-style-type: none"><li>• A3-wastes: all data are allocated to the whole plant</li></ul>

## 7. ENVIRONMENTAL PERFORMANCE & INTERPRETATION



### **GWP<sub>100</sub>**

Global Warming Potential refers to the emission/presence of GHGs (greenhouse gases) in the atmosphere (mainly CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>) 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<sub>x</sub>, SO<sub>x</sub>) 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<sub>x</sub>) are emitted every day (industrial emissions and vehicles). It is mainly diffused during the summertime.



### **ADP<sub>e</sub> (elements)**

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



### **ADP<sub>f</sub> (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 declared unit (see chapter 4).

## Adesilex P9 Express (grey)

Table 5: **Adesilex P9 Express (grey): Environmental categories**

Environmental Category	Unit	A1-A3
 <b>GWP<sub>100</sub></b>	kg CO <sub>2</sub> eq.	4,36E-01
 <b>ADP<sub>e</sub> (element)</b>	kg Sb eq.	5,40E-07
 <b>ADP<sub>f</sub> (fossil)</b>	MJ	3,95E+00
 <b>AP</b>	kg SO <sub>2</sub> eq.	7,87E-04
 <b>EP</b>	kg (PO <sub>4</sub> ) <sup>3-</sup> eq.	1,47E-04
 <b>ODP</b>	kg R-11 eq.	1,50E-08
 <b>POCP</b>	kg ethylene eq.	1,83E-04

**GWP<sub>100</sub>**: 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: **Adesilex P9 Express (grey): Other environmental indicators**

Environmental Indicator	Unit	A1-A3
RPEE	MJ	4,78E-01
RPEM	MJ	-
TPE	MJ	4,78E-01
NRPE	MJ	4,06E+00
NRPM	MJ	-
TRPE	MJ	4,06E+00
SM	kg	-
RSF	MJ	-
NRSF	MJ	-
W	m <sup>3</sup>	1,70E-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 [total freshwater consumption]








Table 7: **Adesilex P9 Express (grey): Waste production & other output flows**

Output Flow	Unit	A1-A3
NHW	kg	4,28E-03
HW	kg	4,21E-06
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

## Adesilex P9 Express (white)

Table 8: **Adesilex P9 Express (white)**: Environmental categories

Environmental Category	Unit	A1-A3
 <b>GWP<sub>100</sub></b>	kg CO <sub>2</sub> eq.	5,34E-01
 <b>ADP<sub>e</sub> (element)</b>	kg Sb eq.	4,04E-07
 <b>ADP<sub>f</sub> (fossil)</b>	MJ	2,58E+00
 <b>AP</b>	kg SO <sub>2</sub> eq.	1,75E-03
 <b>EP</b>	kg (PO <sub>4</sub> ) <sup>3-</sup> eq.	2,88E-04
 <b>ODP</b>	kg R-11 eq.	5,73E-08
 <b>POCP</b>	kg ethylene eq.	1,44E-04

**GWP<sub>100</sub>**: 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: **Adesilex P9 Express (white)**: Other environmental indicators

Environmental Indicator	Unit	A1-A3
RPEE	MJ	2,17E+00
RPEM	MJ	-
TPE	MJ	2,17E+00
NRPE	MJ	2,67E+00
NRPM	MJ	-
TRPE	MJ	2,67E+00
SM	kg	-
RSF	MJ	-
NRSF	MJ	-
W	m <sup>3</sup>	1,78E-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 [total freshwater consumption]

Table 10: **Adesilex P9 Express (white)**: Waste production & other output flows

Output Flow	Unit	A1-A3
NHW	kg	4,28E-03
HW	kg	4,21E-06
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 show absolute results for every considered environmental impact category. They clearly indicate that 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 and organic polymers, which are some of the main components in the adhesive formulation, carry a significant impact for all environmental categories.

Electricity consumption in the production process does not affect the considered environmental categories.

The module **A2** (raw materials transportation) gives a negative contribution to POCP due to the NO and NO<sub>2</sub> emission factors (for more details, see the methodology used: HBEFA - Handbook Emission Factors for Road Transport).

Table 11: Environmental Impact of **Adesilex P9 Express (grey)** as percentage

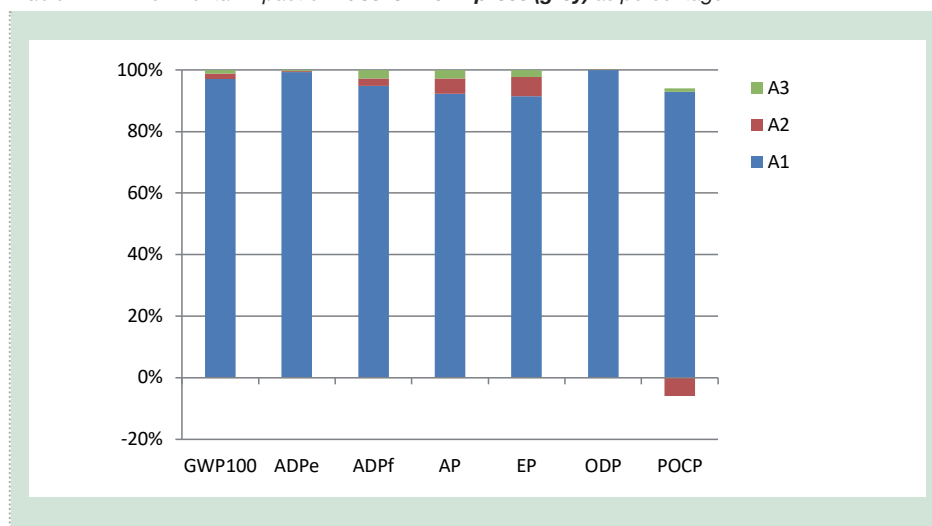
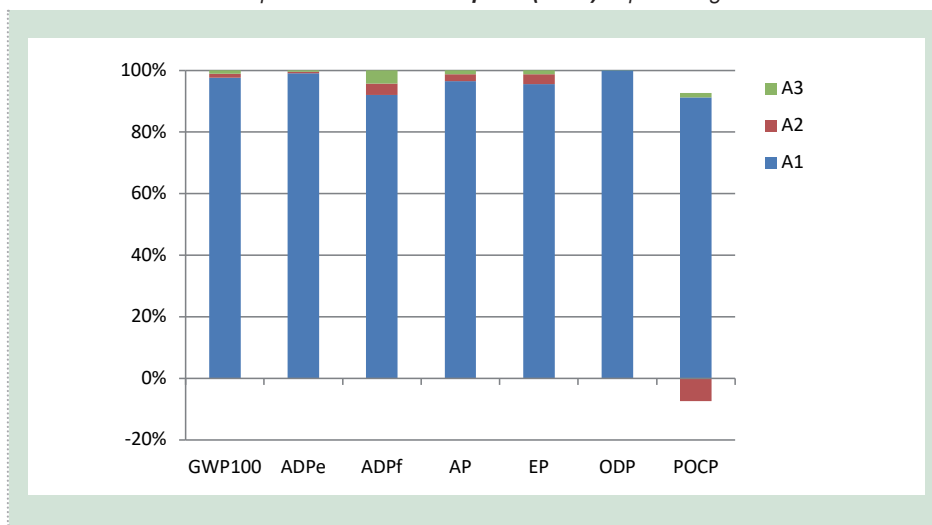


Table 12: Environmental Impact of **Adesilex P9 Express (white)** as percentage





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

	Data source	Amount	Unit
Electricity grid mix (IT) – 2014	GaBi database	0,4020	kg CO <sub>2</sub> -eqv/kWh
Electricity from photovoltaic (IT) – 2014	GaBi database	0,0641	kg CO <sub>2</sub> -eqv/kWh

## 8. DATA QUALITY

Table 13: Data quality

Dataset & Geographical reference	Database (source)	Temporary reference
<b>A1; A3</b>		
Inorganic Binders (DE)	GaBi Database	2015 – 2017
Organic Binders (DE)	GaBi Database	2012
Fillers (EU)	GaBi Database	2017
Additives (EU)	GaBi Database	2012 – 2017
Electricity grid mix (IT)	GaBi Database	2014
Electricity from photovoltaic (IT)	GaBi Database	2014
Packaging components (EU)	GaBi Database, PlasticEurope	2005 – 2017
<b>A2</b>		
Truck transport (euro 3,27 t payload - GLO)	GaBi Database	2017
Light Train (Gross Ton Weight 500 t - GLO)	GaBi Database	2017
Electricity grid mix (EU)	GaBi Database	2014
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.

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



## 9. REQUISITE EVIDENCE

### 9.1 VOC emissions

Volatile Organic Compounds (VOC) special tests and evidence have been carried out on the product, according to ISO 16000 parts 3, 6, 9 and 11 and CN/TS 16516.

The tile-adhesives have been evaluated in emission chambers, in order to detect their VOC emissions after 3 and 28 days storage in the ventilated chambers, according to GEV (Gemeinschaft Emissionskontrollierte Verlegewerkstoffe, Klebstoffe und Bauprodukte e.V.) test method.

**Adesilex P9 Express** meets the requirements for the emission class Emission Code EC1<sup>RPLUS</sup>, as "very low VOC emission", released by GEV.

The next table describes the limits for the Emission Code EC1<sup>RPLUS</sup> class:

Table 14: EC1<sup>RPLUS</sup> VOC limits

	3 days $\mu\text{g}/\text{m}^3$	28 days $\mu\text{g}/\text{m}^3$
TVOC (C6-C16)	$\leq 750 \mu\text{g}/\text{m}^3$	$\leq 60 \mu\text{g}/\text{m}^3$
TSVOC (C16-C22)		$\leq 40 \mu\text{g}/\text{m}^3$
C1A-C1B substances	Total $\leq 10 \mu\text{g}/\text{m}^3$	Single substance $\leq 1 \mu\text{g}/\text{m}^3$
Formaldehyde/ acetaldehyde	$\leq 50 \mu\text{g}/\text{m}^3$	
Sum of formaldehyde/acetaldehyde	$\leq 50 \text{ ppb}$	
Sum of non-assessable VOCs		$\leq 40$
R value		$\leq 1$

## 10. 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 <a href="mailto:info@environdec.com">info@environdec.com</a>
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 rev14
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

## 11. 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
- HBEFA: HANDBOOK EMISSION FACTORS FOR ROAD TRANSPORT

## 12. CONTACT INFORMATION

EPD owner:	 ADHESIVES • SEALANTS • CHEMICAL PRODUCTS FOR BUILDING  Mapei SpA <a href="http://www.mapei.it">www.mapei.it</a>
LCA Author:	 ADHESIVES • SEALANTS • CHEMICAL PRODUCTS FOR BUILDING  Mapei SpA <a href="http://www.mapei.it">www.mapei.it</a> ; Environmental Sustainability Office
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