



ENVIRONMENTAL PRODUCT DECLARATION

*In accordance with ISO 14025 and
EN 15804:2012+A2:2019/AC:2021 for:*

KERAFLEX MAXI S1 ZERO
KERAFLEX MAXI S1 WHITE
KERAQUICK MAXI S1



An EPD should provide current information and may be updated if conditions change.
The stated validity is, therefore, subject to the continued registration and publication at
www.environdec.com.

Programme:

**The International EPD®
System;**
www.environdec.com

Programme
operator:

**EPD
International
AB**

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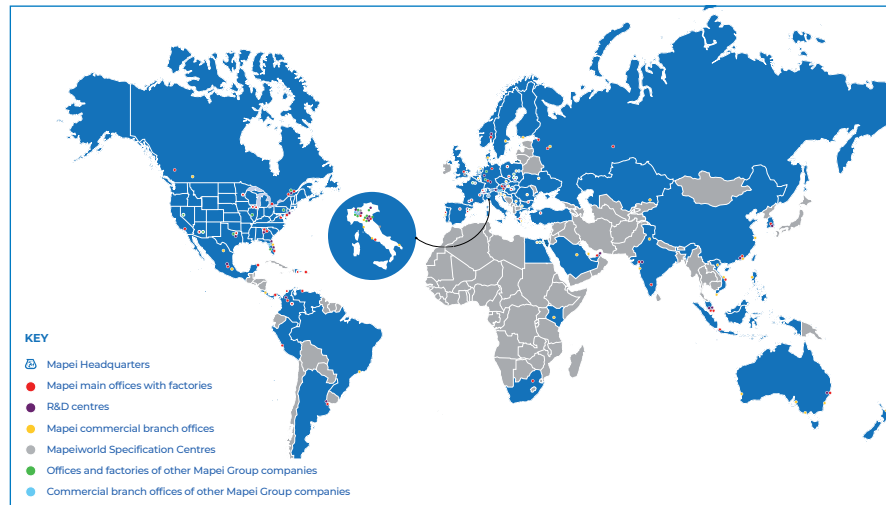


1. COMPANY DESCRIPTION / GOAL & SCOPE

Founded in 1937 in Milan, Italy, Mapei produces adhesives and complementary products for laying all types of floors, 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 100 subsidiaries in the Mapei Group, with a total of 86 production facilities located around the world in 35 different countries and in 5 different continents. Mapei also has 31 central laboratories. Most locations, including Mapei Australia, are ISO 9001 and ISO 14001 or EMAS certified

Mapei invests 12% in its company's total workforce 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.



LEED V4.1 is the latest version of Leadership in Environmental and Energy Design, an American protocol that enables buildings to be certified as eco-sustainable according to parameters

and credits described in the most widely adopted green building criteria in the world. Issued by the GBC US, it is mandatory for all LEED projects registered after October 2016.

Numerous changes have been made to the previous version: Mapei products play a part in obtaining important credits thanks to their EPD's (type III environmental declarations) and their products with very low emission of VOC.



Founded by Green Building Council of Australia in 2003, **Green Star** is an internationally recognised rating system

setting the standard for healthy, resilient, positive buildings and places. Developed for the Australian environment, Green Star has certified thousands of sustainable fit-outs, buildings, homes and communities right across the country.

Mapei products and their certification such as low VOC and EPDs can contribute towards obtaining relative credits and from various Green Star rating tools.

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.

Mapei Australia's production site is located in Queensland, Australia. The production site consists of two factories: one factory for powder-based products and one factory for liquid admixtures.

Mapei Australia actively focuses on manufacturing and logistics optimisation with their continuous production of over one thousand tonnes of powdered products whilst managing an influx

and outflow of over one hundred trucks weekly.

The goal of the study is to provide necessary data and documentation to produce an EPD according to the requirements of PCR 2019:14 Environdec (version 1.11, 2021-02-05) under EN 15804:2012+A2:2019/AC:2021 and to have more comprehension about the environmental impacts related to **Keraflex Maxi S1 white**, **Keraflex Maxi S1 Zero**, **Keraquick Maxi S1 (grey & white)** manufactured in Mapei AU located in Wacol (Australia), in the year 2020, including packaging of the finished product.

Target audiences of the study are customers and other parties with an interest in the environmental impacts of **Keraflex Maxi S1 white**, **Keraflex Maxi S1 Zero**, **Keraquick Maxi S1 (grey & white)**. This analysis shall not support comparative assertions intended to be disclosed to the public.

2. PRODUCT DESCRIPTION

Keraflex Maxi S1 white and **Keraflex Maxi S1 Zero** are high performance, deformable cementitious white and grey adhesives with extended open time and no vertical slip, for ceramic tiles and stone material, with very low emission level of volatile organic compounds. Especially suitable for the installation of large-size porcelain tiles and natural stone.

Keraquick Maxi S1 (grey & white) are high-performance, deformable, rapid-setting and hydrating, non-slip cementitious adhesives with extended workability and very low emission of volatile organic compounds particularly recommended for stone, including thick, large formats. They are suitable for application in layers up to 15 mm.

They are available in 20 kg multiply bags.

For more information about the products see the TDS (Technical Data Sheet) on Mapei website.

3. CONTENT DECLARATION

The main components and ancillary materials of the products included in this EPD are the following:

Table 1: Composition referred to 1kg of packaged product

Materials	Percentage (%) by mass
Binders	< 45%
Fillers	< 70%
Additives	< 5%
Packaging	Percentage (%) by mass
Multiply bag	< 0.5%
Wrapping material (PE)	< 0.1%
Pallet (WOOD)	< 1%

The products do not contain a concentration higher than 0,1% (by unit weight) of either carcinogenic substances or substances of very high concern (SVHC) on the REACH Candidate List published by the European Chemicals Agency.

4. DECLARED UNIT AND REFERENCE SERVICE LIFE

The declared unit is 1 kg of finished product with packaging.

Due to the selected system boundary, the reference service life of the products is not specified.

5. SYSTEM BOUNDARIES AND ADDITIONAL TECHNICAL INFORMATION

The approach is “cradle to gate with modules C1–C4 and module D” (A1–A3 + C + D);

- A1, A2, A3 (Product stage): extraction and processing of raw materials and packaging (A1), transportation up to the factory gate (A2), manufacturing of the finished product (A3);
- C1, C2, C3, C4 (End of Life stage): de-construction/demolition (C1), transport to waste processing (C2), waste processing for reuse, recovery and/or recycling (C3), disposal (C4); with a collection rate of 100% as C&D waste, the transports are carried out by lorry over 100 km (C2). A recycling ratio (C3) of 80% is considered according to the Australian National Target. The remaining 20% is landfilled (C4).
- D (Resource recovery stage): contains credits from the recycling of the product in module C3. The product is collected and recycled for use in substitution of virgin raw aggregates.

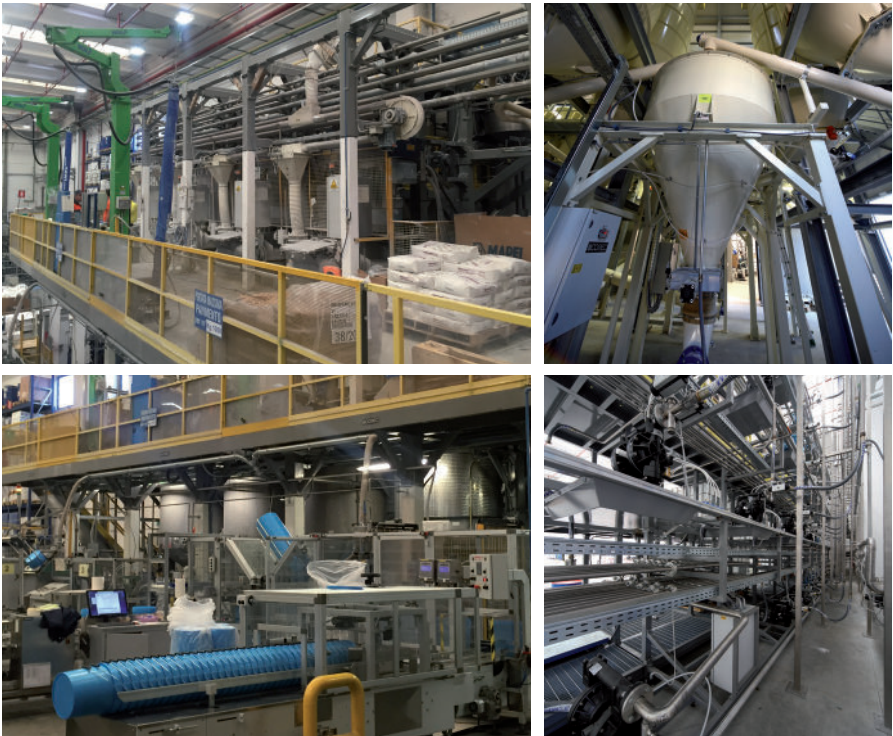
Table 2: System boundaries

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
Geography	EU, AU, ASIA	EU, AU, ASIA	AU	-	-	-	-	-	-	-	-	-	AU	AU	AU	AU	AU
Specific data	> 90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	Not-relevant					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not-relevant					-	-	-	-	-	-	-	-	-	-	-	-

MND: Module Not Declared

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 or big-bags, 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 bags, put on wooden pallets, covered by stretched hoods and stored in the Finished Products' warehouse. The quality of final products is controlled before the sale.

Figure 1: Production process detail



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 ⁻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 A1: electricity is allocated to the specific production line
A3	All data are referred to 1 kg of packaged product A3-wastes: all data are allocated to the whole production plant

7. ENVIRONMENTAL PERFORMANCE AND INTERPRETATION



GWP

Climate change

GWPTotal - Global Warming Potential refers to the emission/presence of GHGs (greenhouse gases) in the atmosphere (mainly CO₂, N₂O, CH₄) which contribute to the increase in the temperature of the planet.

GWP-total considers:

- GWP-fossil
- GWP-biogenic
- GWP-luluc (land use and land use change)



ODP

Ozone Depletion

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 chlorofluoromethane (CFM).



AP

Acidification

Acidification Potential refers to the emission of specific acidifying substances (i.e. NO_x, SO_x) in the air. These substances decrease the pH of the rainfall with predictable damages to the ecosystem.



EP

Eutrophication

Eutrophication Potential refers to the nutrient enrichment, which determines unbalance in ecosystems and causes the death of the fauna and decreased biodiversity in flora.

It considers:

- EP-freshwater: aquatic freshwater
- EP-marine: aquatic marine
- EP-terrestrial



POCP

Photochemical ozone formation

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_x) are emitted every day (industrial emissions and vehicles). It is mainly diffused during the summertime.



**ADP
minerals&metals**

Depletion of abiotic resources – minerals and metals

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



ADP - fossil

Depletion of abiotic resources – fossil fuel

Abiotic Depletion Potential fossil fuel refers to the depletion of the fossil fuel resources.



WDP

Water use

It expresses the potential deprivation of water, that consists in not having the water needs satisfied.

The following tables show the environmental impacts for the products considered according to the requirements of EN 15804:2012+A2:2019/AC:2021. The results refer to the declared unit (see § 4). The additional environmental indicators are not declared.

KERAFLEX MAXI S1 white

(1 kg product + packaging)

Table 5: KERAFLEX MAXI S1 white: Potential environmental impact – mandatory indicators according to EN 15804 referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP_{TOTAL}	(kg CO ₂ eq.)	5.65E-01	5.16E-03	4.00E-03	2.08E-03	2.90E-03	-1.71E-02
GWP_{FOSSIL}	(kg CO ₂ eq.)	6.50E-01	5.16E-03	3.84E-03	2.07E-03	2.98E-03	-1.49E-02
GWP_{BIOGENIC}	(kg CO ₂ eq.)	-1.41E-02	-1.73E-07	1.67E-04	3.54E-07	-8.84E-05	-1.98E-03
GWP_{LULUC}	(kg CO ₂ eq.)	5.10E-04	5.14E-08	4.28E-08	9.57E-06	5.51E-06	-2.54E-04
ODP	(kg CFC 11 eq.)	9.94E-09	1.22E-14	3.99E-16	3.08E-15	7.02E-15	-8.57E-10
AP	(mol H ⁺ eq.)	3.63E-03	3.30E-05	1.26E-05	1.07E-05	2.12E-05	-1.17E-04
EP_{FRESHWATER}	(kg P eq.)	2.97E-04	9.25E-11	6.54E-10	5.94E-09	5.06E-09	-2.86E-06
EP_{MARINE}	(kg N eq.)	2.84E-04	6.64E-06	5.87E-06	4.88E-06	5.41E-06	-2.86E-05
EP_{TERRESTRIAL}	(mol N eq.)	8.11E-03	7.26E-05	6.46E-05	5.39E-05	5.95E-05	-2.98E-04
POCP	(kg NMVOC eq.)	2.77E-03	1.85E-05	1.20E-05	1.33E-05	1.64E-05	-8.39E-05
ADP_{MINERALS&METALS}*	(kg Sb eq.)	9.03E-02	1.73E-10	7.16E-11	2.29E-09	3.06E-10	-1.82E-08
ADP_{FOSSIL}*	(MJ)	5.07E+00	5.30E-02	5.27E-02	4.05E-02	3.91E-02	-1.84E-01
WDP*	(m ³ world eq.)	1.12E-01	1.04E-03	2.52E-05	3.99E-04	3.27E-04	-4.93E-03

GWP_{TOTAL}: Global Warming Potential total; **GWP_{FOSSIL}**: Global Warming Potential fossil fuels; **GWP_{BIOGENIC}**: Global Warming Potential biogenic; **GWP_{LULUC}**: Global Warming Potential land use and land use change; **ODP**: Depletion Potential of the stratospheric Ozone layer; **AP**: Acidification Potential; **EP_{FRESHWATER}**: Eutrophication Potential, freshwater; **EP_{MARINE}**: Eutrophication Potential, marine; **EP_{TERRESTRIAL}**: Eutrophication Potential, terrestrial; **POCP**: Formation potential of tropospheric ozone; **ADP_{MINERALS&METALS}***: Abiotic Depletion Potential for non-fossil resources; **ADP_{FOSSIL}***: Abiotic Depletion Potential for fossil resources; **WDP**: Water Deprivation Potential.

* The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is a limited experience with the indicator

Table 6: KERAFLEX MAXI S1 white Potential environmental impact – additional mandatory and voluntary indicators referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-GHG	(kg CO ₂ eq.)	5.81E-01	5.11E-03	3.78E-03	2.03E-03	2.94E-03	-1.46E-02

GWP-GHG: The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Table 7: KERAFLEX MAXI S1 white: Use of resources referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	5.14E-01	3.46E-03	2.58E-04	3.25E-03	5.87E-03	-1.89E-02
PERM	MJ	4.17E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	9.31E-01	3.46E-03	2.58E-04	3.25E-03	5.87E-03	-1.89E-02
PENRE	MJ	5.07E+00	5.30E-02	5.27E-02	4.06E-02	3.91E-02	-1.84E-01
PENRM	MJ	2.99E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	5.10E+00	5.30E-02	5.27E-02	4.06E-02	3.91E-02	-1.86E-01
SM*	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m³	5.84E-04	1.44E-05	5.02E-07	1.13E-05	9.93E-06	-1.16E-04

PERE: Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM:** Use of renewable primary energy resources used as raw materials; **PERT:** Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials); **PENRE:** Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PENRM:** Use of non-renewable primary energy resources used as raw materials; **PENRT:** Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials); **SM:** Use of secondary material; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of fresh water.

* Referred only to 1 kg of product without packaging

Table 8: KERAFLEX MAXI S1 white: Waste production and output flows referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
HWD	kg	7.20E-05	6.20E-13	8.56E-14	5.07E-13	2.01E-12	-6.10E-13
NHWD	kg	6.10E-04	1.63E-05	1.28E-06	1.08E-05	2.00E-01	-1.61E-02
RWD	kg	2.39E-05	4.78E-09	1.03E-08	5.34E-07	4.36E-07	-8.17E-07
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	6.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	5.04E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HWD: Hazardous waste disposed; **NHWD:** Non-Hazardous waste disposed; **RWD:** Radioactive waste disposed

Table 9: KERAFLEX MAXI S1 white Information on biogenic carbon content at the factory gate referred to 1 kg of product with packaging

Biogenic Carbon Content	Unit	Quantity
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	9.48E-03

KERAFLEX MAXI S1 ZERO

(1 kg product + packaging)

Table 10: KERAFLEX MAXI S1 ZERO: Potential environmental impact – mandatory indicators according to EN 15804 referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP_{TOTAL}	(kg CO ₂ eq.)	4.71E-01	5.16E-03	4.00E-03	2.08E-03	2.90E-03	-1.71E-02
GWP _{FOSSIL}	(kg CO ₂ eq.)	5.56E-01	5.16E-03	3.84E-03	2.07E-03	2.98E-03	-1.49E-02
GWP _{BIOGENIC}	(kg CO ₂ eq.)	-1.86E-02	-1.73E-07	1.67E-04	3.54E-07	-8.84E-05	-1.98E-03
GWP _{LULUC}	(kg CO ₂ eq.)	4.11E-04	5.14E-08	4.28E-08	9.57E-06	5.51E-06	-2.54E-04
ODP	(kg CFC 11 eq.)	1.61E-08	1.22E-14	3.99E-16	3.08E-15	7.02E-15	-8.57E-10
AP	(mol H ⁺ eq.)	2.15E-03	3.30E-05	1.26E-05	1.07E-05	2.12E-05	-1.17E-04
EP _{FRESHWATER}	(kg P eq.)	3.20E-04	9.25E-11	6.54E-10	5.94E-09	5.06E-09	-2.86E-06
EP _{MARINE}	(kg N eq.)	2.88E-04	6.64E-06	5.87E-06	4.88E-06	5.41E-06	-2.86E-05
EP _{TERRESTRIAL}	(mol N eq.)	8.15E-03	7.26E-05	6.46E-05	5.39E-05	5.95E-05	-2.98E-04
POCP	(kg NMVOC eq.)	1.04E-03	1.85E-05	1.20E-05	1.33E-05	1.64E-05	-8.39E-05
ADP _{MINERALS&METALS} *	(kg Sb eq.)	9.03E-02	1.73E-10	7.16E-11	2.29E-09	3.06E-10	-1.82E-08
ADP _{FOSSIL} *	(MJ)	2.67E+00	5.30E-02	5.27E-02	4.05E-02	3.91E-02	-1.84E-01
WDP*	(m ³ world eq.)	1.11E-01	1.04E-03	2.52E-05	3.99E-04	3.27E-04	-4.93E-03

GWP_{TOTAL}: Global Warming Potential total; **GWP_{FOSSIL}**: Global Warming Potential fossil fuels; **GWP_{BIOGENIC}**: Global Warming Potential biogenic; **GWP_{LULUC}**: Global Warming Potential land use and land use change; **ODP**: Depletion Potential of the stratospheric Ozone layer; **AP**: Acidification Potential; **EP_{FRESHWATER}**: Eutrophication Potential, freshwater; **EP_{MARINE}**: Eutrophication Potential, marine; **EP_{TERRESTRIAL}**: Eutrophication Potential, terrestrial; **POCP**: Formation potential of tropospheric ozone; **ADP_{MINERALS&METALS}**: Abiotic Depletion Potential for non-fossil resources; **ADP_{FOSSIL}**: Abiotic Depletion Potential for fossil resources; **WDP**: Water Deprivation Potential.

* The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is a limited experience with the indicator

Table 11: KERAFLEX MAXI S1 ZERO Potential environmental impact – additional mandatory and voluntary indicators referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-GHG	(kg CO ₂ eq.)	4.87E-01	5.11E-03	3.78E-03	2.03E-03	2.94E-03	-1.46E-02

GWP-GHG: The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Table 12: KERAFLEX MAXI S1 ZERO: Use of resources referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	4.09E-01	3.46E-03	2.58E-04	3.25E-03	5.87E-03	-1.89E-02
PERM	MJ	4.17E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.26E-01	3.46E-03	2.58E-04	3.25E-03	5.87E-03	-1.89E-02
PENRE	MJ	2.68E+00	5.30E-02	5.27E-02	4.06E-02	3.91E-02	-1.84E-01
PENRM	MJ	2.99E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.71E+00	5.30E-02	5.27E-02	4.06E-02	3.91E-02	-1.86E-01
SM*	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	1.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	1.20E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m ³	5.77E-04	1.44E-05	5.02E-07	1.13E-05	9.93E-06	-1.16E-04

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* Referred only to 1 kg of product without packaging

Table 13: KERAFLEX MAXI S1 ZERO: Waste production and output flows referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
HWD	kg	5.76E-05	6.20E-13	8.56E-14	5.07E-13	2.01E-12	-6.10E-13
NHWD	kg	4.60E-04	1.63E-05	1.28E-06	1.08E-05	2.00E-01	-1.61E-02
RWD	kg	2.39E-05	4.78E-09	1.03E-08	5.34E-07	4.36E-07	-8.17E-07
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	6.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	5.04E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HWD: Hazardous waste disposed; **NHWD:** Non-Hazardous waste disposed; **RWD:** Radioactive waste disposed

Table 14: KERAFLEX MAXI S1 ZERO: Information on biogenic carbon content at the factory gate referred to 1 kg of product with packaging

Biogenic Carbon Content	Unit	Quantity
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	9.48E-03

KERAQUICK MAXI S1 WHITE

(1 kg product + packaging)

Table 15: KERAQUICK MAXI S1 white: Potential environmental impact – mandatory indicators according to EN 15804 referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP_{TOTAL}	(kg CO ₂ eq.)	5.20E-01	5.16E-03	4.00E-03	2.08E-03	2.90E-03	-1.71E-02
GWP _{FOSSIL}	(kg CO ₂ eq.)	5.99E-01	5.16E-03	3.84E-03	2.07E-03	2.98E-03	-1.49E-02
GWP _{BIOGENIC}	(kg CO ₂ eq.)	-3.53E-02	-1.73E-07	1.67E-04	3.54E-07	-8.84E-05	-1.98E-03
GWP _{LULUC}	(kg CO ₂ eq.)	6.12E-04	5.14E-08	4.28E-08	9.57E-06	5.51E-06	-2.54E-04
ODP	(kg CFC 11 eq.)	6.17E-08	1.22E-14	3.99E-16	3.08E-15	7.02E-15	-8.57E-10
AP	(mol H ⁺ eq.)	6.91E-03	3.30E-05	1.26E-05	1.07E-05	2.12E-05	-1.17E-04
EP _{FRESHWATER}	(kg P eq.)	1.87E-04	9.25E-11	6.54E-10	5.94E-09	5.06E-09	-2.86E-06
EP _{MARINE}	(kg N eq.)	1.21E-03	6.64E-06	5.87E-06	4.88E-06	5.41E-06	-2.86E-05
EP _{TERRESTRIAL}	(mol N eq.)	1.65E-02	7.26E-05	6.46E-05	5.39E-05	5.95E-05	-2.98E-04
POCP	(kg NMVOC eq.)	3.76E-03	1.85E-05	1.20E-05	1.33E-05	1.64E-05	-8.39E-05
ADP _{MINERALS&METALS} *	(kg Sb eq.)	5.89E-02	1.73E-10	7.16E-11	2.29E-09	3.06E-10	-1.82E-08
ADP _{FOSSIL} *	(MJ)	3.13E+00	5.30E-02	5.27E-02	4.05E-02	3.91E-02	-1.84E-01
WDP*	(m ³ world eq.)	1.14E-01	1.04E-03	2.52E-05	3.99E-04	3.27E-04	-4.93E-03

GWP_{TOTAL}: Global Warming Potential total; **GWP_{FOSSIL}**: Global Warming Potential fossil fuels; **GWP_{BIOGENIC}**: Global Warming Potential biogenic; **GWP_{LULUC}**: Global Warming Potential land use and land use change; **ODP**: Depletion Potential of the stratospheric Ozone layer; **AP**: Acidification Potential; **EP_{FRESHWATER}**: Eutrophication Potential, freshwater; **EP_{MARINE}**: Eutrophication Potential, marine; **EP_{TERRESTRIAL}**: Eutrophication Potential, terrestrial; **POCP**: Formation potential of tropospheric ozone; **ADP_{MINERALS&METALS}**: Abiotic Depletion Potential for non-fossil resources; **ADP_{FOSSIL}**: Abiotic Depletion Potential for fossil resources; **WDP**: Water Deprivation Potential.

* The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is a limited experience with the indicator

Table 16: KERAQUICK MAXI S1 WHITE Potential environmental impact – additional mandatory and voluntary indicators referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-GHG	(kg CO ₂ eq.)	5.52E-01	5.11E-03	3.78E-03	2.03E-03	2.94E-03	-1.46E-02

GWP-GHG: The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Table 17: KERAQUICK MAXI S1 WHITE: Use of resources referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	6.50E-01	3.46E-03	2.58E-04	3.25E-03	5.87E-03	-1.89E-02
PERM	MJ	4.17E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.00E+00	3.46E-03	2.58E-04	3.25E-03	5.87E-03	-1.89E-02
PENRE	MJ	6.15E+00	5.30E-02	5.27E-02	4.06E-02	3.91E-02	-1.84E-01
PENRM	MJ	2.99E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.16E+00	5.30E-02	5.27E-02	4.06E-02	3.91E-02	-1.86E-01
SM*	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	2.53E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m ³	1.41E-03	1.44E-05	5.02E-07	1.13E-05	9.93E-06	-1.16E-04

PERE: Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM:** Use of renewable primary energy resources used as raw materials; **PERT:** Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials); **PENRE:** Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PENRM:** Use of non-renewable primary energy resources used as raw materials; **PENRT:** Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials); **SM:** Use of secondary material; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of fresh water.

* Referred only to 1 kg of product without packaging

Table 18: KERAQUICK MAXI S1 WHITE: Waste production and output flows referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
HWD	kg	2.75E-03	6.20E-13	8.56E-14	5.07E-13	2.01E-12	-6.10E-13
NHWD	kg	1.08E-02	1.63E-05	1.28E-06	1.08E-05	2.00E-01	-1.61E-02
RWD	kg	2.70E-05	4.78E-09	1.03E-08	5.34E-07	4.36E-07	-8.17E-07
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.73E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	5.04E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HWD: Hazardous waste disposed; **NHWD:** Non-Hazardous waste disposed; **RWD:** Radioactive waste disposed

Table 19: KERAQUICK MAXI S1 WHITE Information on biogenic carbon content at the factory gate referred to 1 kg of product with packaging

Biogenic Carbon Content	Unit	Quantity
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	9.48E-03

KERAQUICK MAXI S1 GREY

(1 kg product + packaging)

Table 20: KERAQUICK MAXI S1 GREY: Potential environmental impact – mandatory indicators according to EN 15804 referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP_{TOTAL}	(kg CO ₂ eq.)	3.90E-01	5.16E-03	4.00E-03	2.08E-03	2.90E-03	-1.71E-02
GWP _{FOSSIL}	(kg CO ₂ eq.)	4.68E-01	5.16E-03	3.84E-03	2.07E-03	2.98E-03	-1.49E-02
GWP _{BIOGENIC}	(kg CO ₂ eq.)	-3.56E-02	-1.73E-07	1.67E-04	3.54E-07	-8.84E-05	-1.98E-03
GWP _{LULUC}	(kg CO ₂ eq.)	6.36E-04	5.14E-08	4.28E-08	9.57E-06	5.51E-06	-2.54E-04
ODP	(kg CFC 11 eq.)	7.63E-09	1.22E-14	3.99E-16	3.08E-15	7.02E-15	-8.57E-10
AP	(mol H ⁺ eq.)	5.36E-03	3.30E-05	1.26E-05	1.07E-05	2.12E-05	-1.17E-04
EP _{FRESHWATER}	(kg P eq.)	1.34E-04	9.25E-11	6.54E-10	5.94E-09	5.06E-09	-2.86E-06
EP _{MARINE}	(kg N eq.)	1.23E-03	6.64E-06	5.87E-06	4.88E-06	5.41E-06	-2.86E-05
EP _{TERRESTRIAL}	(mol N eq.)	1.67E-02	7.26E-05	6.46E-05	5.39E-05	5.95E-05	-2.98E-04
POCP	(kg NMVOC eq.)	3.46E-03	1.85E-05	1.20E-05	1.33E-05	1.64E-05	-8.39E-05
ADP _{MINERALS&METALS} *	(kg Sb eq.)	5.89E-02	1.73E-10	7.16E-11	2.29E-09	3.06E-10	-1.82E-08
ADP _{FOSSIL} *	(MJ)	3.84E+00	5.30E-02	5.27E-02	4.05E-02	3.91E-02	-1.84E-01
WDP*	(m ³ world eq.)	9.70E-02	1.04E-03	2.52E-05	3.99E-04	3.27E-04	-4.93E-03

GWP_{TOTAL}: Global Warming Potential total; **GWP_{FOSSIL}**: Global Warming Potential fossil fuels; **GWP_{BIOGENIC}**: Global Warming Potential biogenic; **GWP_{LULUC}**: Global Warming Potential land use and land use change; **ODP**: Depletion Potential of the stratospheric Ozone layer; **AP**: Acidification Potential; **EP_{FRESHWATER}**: Eutrophication Potential, freshwater; **EP_{MARINE}**: Eutrophication Potential, marine; **EP_{TERRESTRIAL}**: Eutrophication Potential, terrestrial; **POCP**: Formation potential of tropospheric ozone; **ADP_{MINERALS&METALS}**: Abiotic Depletion Potential for non-fossil resources; **ADP_{FOSSIL}**: Abiotic Depletion Potential for fossil resources; **WDP**: Water Deprivation Potential.

* The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is a limited experience with the indicator

Table 21: KERAQUICK MAXI S1 GREY Potential environmental impact – additional mandatory and voluntary indicators referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-GHG	(kg CO ₂ eq.)	4.19E-01	5.11E-03	3.78E-03	2.03E-03	2.94E-03	-1.46E-02

GWP-GHG: The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Table 22: KERAQUICK MAXI S1 GREY: Use of resources referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	6.26E-01	3.46E-03	2.58E-04	3.25E-03	5.87E-03	-1.89E-02
PERM	MJ	4.17E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.04E+00	3.46E-03	2.58E-04	3.25E-03	5.87E-03	-1.89E-02
PENRE	MJ	3.84E+00	5.30E-02	5.27E-02	4.06E-02	3.91E-02	-1.84E-01
PENRM	MJ	2.99E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.87E+00	5.30E-02	5.27E-02	4.06E-02	3.91E-02	-1.86E-01
SM*	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	6.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	5.16E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m ³	1.02E-03	1.44E-05	5.02E-07	1.13E-05	9.93E-06	-1.16E-04

PERE: Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM:** Use of renewable primary energy resources used as raw materials; **PERT:** Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials); **PENRE:** Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PENRM:** Use of non-renewable primary energy resources used as raw materials; **PENRT:** Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials); **SM:** Use of secondary material; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of fresh water.

* Referred only to 1 kg of product without packaging

Table 23: KERAQUICK MAXI S1 GREY: Waste production and output flows referred to 1 kg of product with packaging

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
HWD	kg	7.38E-06	6.20E-13	8.56E-14	5.07E-13	2.01E-12	-6.10E-13
NHWD	kg	7.86E-03	1.63E-05	1.28E-06	1.08E-05	2.00E-01	-1.61E-02
RWD	kg	2.47E-05	4.78E-09	1.03E-08	5.34E-07	4.36E-07	-8.17E-07
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	6.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	5.04E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HWD: Hazardous waste disposed; **NHWD:** Non-Hazardous waste disposed; **RWD:** Radioactive waste disposed

Table 24: KERAQUICK MAXI S1 GREY Information on biogenic carbon content at the factory gate referred to 1 kg of product with packaging








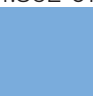





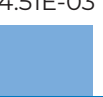








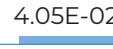



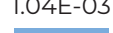
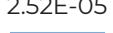

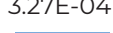
Biogenic Carbon Content	Unit	Quantity
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	9.48E-03

Tables from 5 to 24 show absolute results for all the environmental categories considered.

The main contribution to almost all the environmental impacts categories in the product life cycle comes from extraction and processing of raw materials (**module A1**). Its relative contribution is over 80% in some categories (such as GWP_{TOTAL} , $ADP_{MINERALS\&METALS}$, Eutrophication). End of life stages (**modules C1 – C4**) have relative contribution around 20% in EP and ADP_{FOSSIL} .

An overview about the average contribution of the different modules considered in the system boundaries is shown in Table 25.

Table 25: Some environmental impacts of Keraflex Maxi S1 White, Keraflex Maxi S1 Zero, Keraquick Maxi S1 (grey & white)

Environmental impacts	 A1-A3	 C1	 C2	 C3	 C4	 TOT
CLIMATE CHANGE (total) 	4.86E-01 	5.16E-03 	4.00E-03 	2.08E-03 	2.90E-03 	0.501 kg CO ₂ eq.
ACIDIFICATION 	4.51E-03 	3.30E-05 	1.26E-05 	1.07E-05 	2.12E-05 	4.59E-03 mol H ⁺ eq.
DEPLETION OF ABIOTIC RESOURCES (fossil) 	3.68E+00 	5.30E-02 	5.27E-02 	4.05E-02 	3.91E-02 	3.86 MJ
WATER USE 	1.08E-01 	1.04E-03 	2.52E-05 	3.99E-04 	3.27E-04 	1.10E-01 m ³ world eq.

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

	Data source	GWP_{TOTAL}	Unit
Residual electricity grid mix (AU) – 2020	Australian Energy Update 2021	0.809*	kg CO ₂ -eqv/kWh

* According to CML 2001 – Aug. 2016 Methodology

8. DATA QUALITY

Table 26: Data quality

Dataset & Geographical reference	Database (source)	Temporary reference
A1; A3		
White PTL cement	EPD-CIS-20150243-CAA1	2018-2023
Grey PTL cement	EPD S-P-00850	2019-2024
Fillers (GLO)	Sphera Database; ecoinvent 3.8	2020
Additives (GLO)	Sphera Database; ecoinvent 3.8	2020
Electricity grid mix (AU)	Sphera Database	2020
Packaging components (GLO)	Sphera Database, PlasticsEurope	2005 – 2020
A2		
Truck, Euro 5, 27t payload (GLO)	Sphera Database	2020
Diesel for transport (AU)	Sphera Database	2017
C1 – C4		
Construction waste treatment (EU)	Sphera Database	2020
Construction waste dumping (EU)	Sphera Database	2020
Electricity grid mix (AU)	Sphera Database	2017
Truck, Euro 4, 9.3t payload (GLO)	Sphera Database	2020
Diesel for transport (AU)	Sphera Database	2017

All data included in table above refer to a period between 2005 and 2020; 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 §6.3.8.2 “Data quality requirements”. The only exception is represented by one raw material used for one packaging component production.

Primary data concern the year 2020 and represent the whole annual production.

9. REQUISITE EVIDENCE

9.1 CO₂ Offset

Total CO₂ emissions measured throughout the entire life cycle have been offset through the purchasing of certified carbon credits in support of renewable energy and forestry protection projects.

<https://www.mapei.com/it/en/about-us/product-sustainability/sustainable-products>



Figure 2: Rimba Raya Biodiversity Reserve Project



9.2 VOC emission

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

The product has 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.

The following products meets the requirements for the emission class EMICODE® **EC1^{PLUS}**, as "very low VOC emission", released by GEV:

- **Keraflex Maxi S1**: license number 5388
- **Keraquick Maxi S1**: license number 9167
- **Keraflex Maxi S1 Zero**: 5437

Next table describes the limits for the EMICODE® EC1^{PLUS} class:

Table 27: EC1^{PLUS} VOC limits

	3 days µg/m ³	28 days µg/m ³
TVOC (C6-C16)	≤ 750 µg/m ³	≤ 60 µg/m ³
TSVOC (C16-C22)		≤ 40 µg/m ³
C1A-C1B substances	Total ≤ 10 µg/m ³	Single substance ≤ 1 µg/m ³
Formaldehyde / acetaldehyde	≤ 50 µg/m ³	
Sum of formaldehyde/acetaldehyde	≤ 50 ppb	

10. DIFFERENCES VERSUS PREVIOUS VERSIONS

In this version, the names of **Keraflex Maxi S1 White** and **Keraflex Maxi S1 Grey** have been updated to the new one - **Keraflex Maxi S1 White** and **Keraflex Maxi S1 Zero**. While **Keraquick Maxi S1 White** and **Keraquick Maxi S1 Grey** are changed in **Keraquick Maxi S1 (grey & white)**. Minor editorial changes have been made in the document.

11. VERIFICATION AND REGISTRATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

CEN standard EN 15804 served as the Core Product Category Rules (PCR)	
PCR:	PCR 2019:14 Construction products (EN 15804:A2), Version 1.11, 2021-02-05, UN CPC code 54
PCR review was conducted by:	The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact .
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	<input checked="" type="checkbox"/> EPD Process Certification <input type="checkbox"/> EPD Verification
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	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

12. REFERENCES

- ISO 13007-1: CERAMIC TILES – GROUTS AND ADHESIVES – PART 1: TERMS, DEFINITIONS AND SPECIFICATIONS FOR ADHESIVES
- GENERAL PROGRAMME INSTRUCTIONS OF THE INTERNATIONAL EPD® SYSTEM. VERSION 3.01
- ISO 14025 ENVIRONMENTAL LABELS AND DECLARATIONS - TYPE III ENVIRONMENTAL DECLARATIONS - PRINCIPLES AND PROCEDURES
- ISO 14044 ENVIRONMENTAL MANAGEMENT – LIFE CYCLE ASSESSMENT – REQUIREMENTS AND GUIDELINES
- PCR 2019:14 CONSTRUCTION PRODUCTS (EN 15804: A2), UN CPC CODE 54; VERSION 1.11
- NATIONAL WASTE POLICY ACTION PLAN (2019)
- EN 13813: SCREED MATERIAL AND FLOOR SCREEDS - SCREED MATERIAL - PROPERTIES AND REQUIREMENTS
- AUSTRALIAN ENERGY UPDATE 2021, AUSTRALIAN ENERGY STATISTICS - DEPARTMENT OF INDUSTRY, SCIENCE, ENERGY AND RESOURCES
- EN 15804: SUSTAINABILITY OF CONSTRUCTION WORKS - ENVIRONMENTAL PRODUCT DECLARATIONS - CORE RULES FOR THE PRODUCT CATEGORY OF CONSTRUCTION PRODUCTS

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