ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

Average EPD for Concrete Repair Products (Group 2)
FOSROC UK

Fosroc®
Concrete Repair Products

FOSROC constructive solutions

EPD HUB, HUB-0366
Publishing date 29 March 2023, last updated date 29 March 2023, valid until date until 29 March 2028

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	FOSROC UK
Address	Drayton Manor Business Park, Coleshill Road, Tamworth, Staffordshire, B78 3XN, United Kingdom
Contact details	enquiryuk@fosroc.com
Website	https://www.fosroc.com/

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Kris Atkins (Ocker Environmental Ltd)
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	E.A as an authorized verifier acting for EPD Hub Limited

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	Average EPD for Concrete Repair Products (Group 2)
Additional labels	Includes products: Renderoc S, Renderoc HBS, Renderoc HB45, Renderoc HB, Renderoc Plug 1, Renderoc Plug 20, Renderoc FCR.
Product reference	various
Place of production	Drayton Manor Business Park, Coleshill Road, Tamworth, Staffs. B783XN
Period for data	2021
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3	+42 / -7 %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1kg of Concrete Repair Product dry mix
Declared unit mass	1 kg
GWP-fossil, A1-A3 (kgCO2e)	0.460
GWP-total, A1-A3 (kgCO2e)	0.419
Secondary material, inputs (%)	0.785
Secondary material, outputs (%)	91.8
Total energy use, A1-A3 (kWh)	0.886
Total water use, A1-A3 (m3e)	0.00462

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Fosroc is a leading international manufacturer and supplier of high performance chemicals for the construction industry, with a particular focus on concrete repair materials, machinery grouts, concrete admixtures, waterproofing materials, joint sealants and protective coatings.

PRODUCT DESCRIPTION

The Fosroc range of concrete repair materials are high performance products based on portland cement, silica sand, limestone and specially selected chemical additives which minimize water demand on site. After the addition of clean water, the products are mixed and applied to the prepared substrate in accordance with the relevant product technical datasheet. The materials are chloride free, alkaline in nature and will protect embedded steel reinforcement. The products conform with the requirements of BS EN 1504-3 Structural and Non-structural concrete.

Typical Composition: approx. 48% hydraulic binder, 4% supplementary cementitious materials, 46% mineral mass, 2% additives.

Further information can be found at https://www.fosroc.com/.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	-	-
Minerals	98	UK, Europe and Global
Chemical additives	2	UK, Europe and Global
Fossil materials	-	-
Bio-based materials	-	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0.04721

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1kg of Concrete Repair Product dry mix
Mass per declared unit	1 kg
Functional unit	
Reference service life	

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	x	x	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

The concrete repair products in group 2 are manufactured at the Fosroc powder plant in Tamworth, UK, following the process outlined below.

Raw materials are conveyed from silo storage into weighing hoppers and then into a mixing stage, where small charge additives are incorporated, prior to bagging of the product. The first mix of each production run is sent for quality assurance, to ensure weighing / mixing process is acceptable, before subsequent mixes are sent for packing. Product bags are filled and packed by palletiser robot for dispatch. Production losses during manufacturing are 1.8%. The inert waste is sent for processing as recycled aggregate. Additional transport is considered in A2, relevant to ancillary fuel and packaging transport to site.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions. Transport comprises manufacturing site to vendor (average 160km, by HGV) and from vendor to site (average 40km by LDV).

Products are prepared by addition of clean water at a rate given on the product TDS and mixed in a forced action mixer (e.g. a drill and paddle) for 3 - 5 minutes. The materials are then hand applied into place. Installation wastes are limited to packaging and product wastage from site use (average 5% by mass).

PRODUCT USE AND MAINTENANCE (B1-B7)

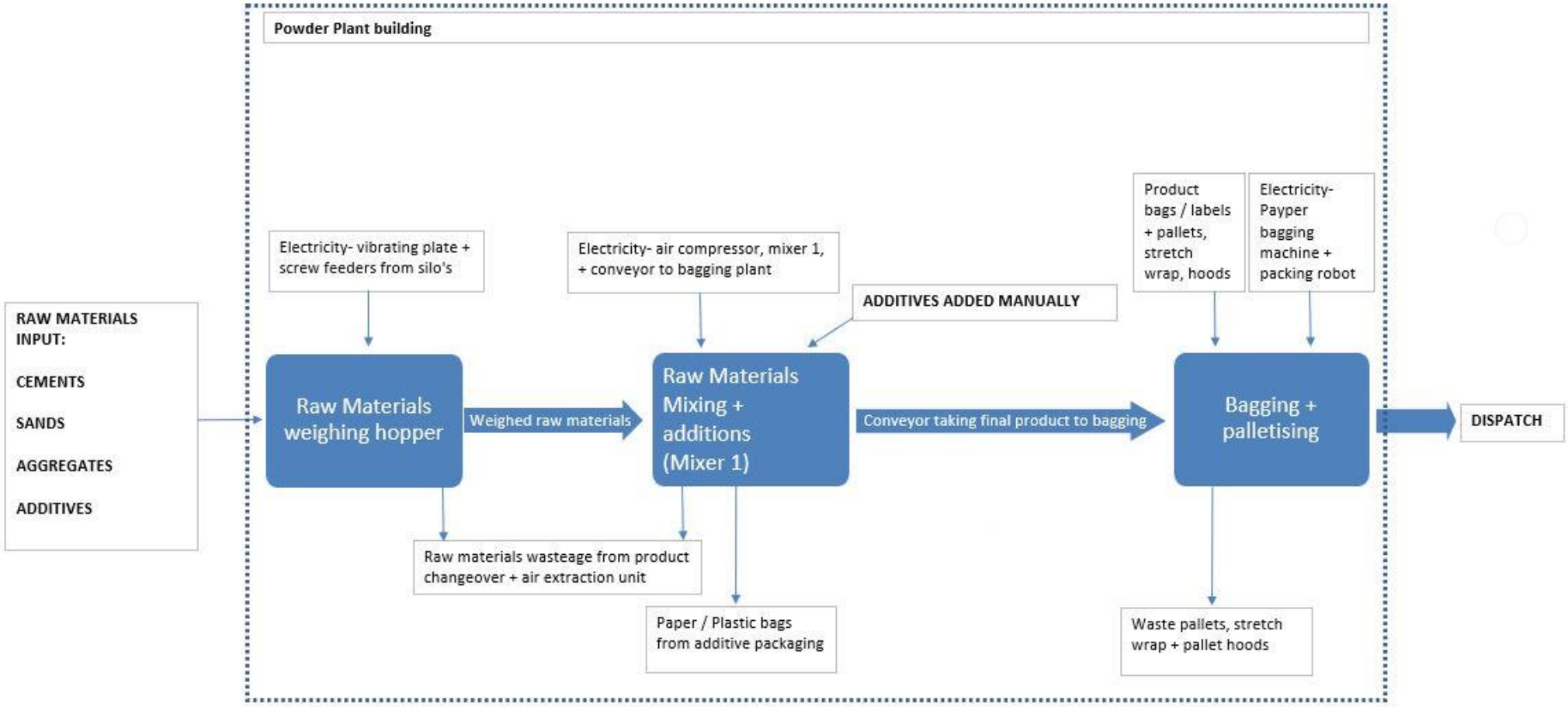
This EPD does not cover the use phase. Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

At the end of its service life, the product is embedded within the concrete structure subject to repair. The demolition process comprises the structure being mechanically broken apart, with concrete transported off site (average 50km) for reprocessing. 80% by mass reused as inert aggregate; 20% disposal to inert landfill. Data for demolition / end of life scenarios is taken from industry standard performance data regarding plant energy use, typical transport distances and likely recycling rates.

Module D considers loads from waste incineration and related benefits from heat /electricity production + loads from waste concrete processing, and related benefits from offsetting primary aggregate production.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging materials	Allocated by mass or volume
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	No allocation

AVERAGES AND VARIABILITY

Type of average	Multiple products
Averaging method	Averaged by shares of total mass
Variation in GWP-fossil for A1-A3	+42 / -7 %

This EPD applies to the following Concrete Repair Products (referred to as Group 2):

Renderoc S (taken to be the **minimum case** product for GWP fossil)
Renderoc FCR
Renderoc HBS
Renderoc HB45
Renderoc HB (the **base case**, highly typical product within the group)
Renderoc Plug 20
Renderoc Plug 1 (taken to be the **maximum case** product for GWP fossil)

The Group 2 base case product Renderoc HB, was selected as highly typical due to its typical raw material composition and typical GWP (fossil) content within the group, as well as being a product with high production and sales volumes. For this base case product, within units A1 - A3, 92% of GWP fossil impacts are associated with the raw materials, therefore this has been the main comparator for this average.

The Group 2 products are all manufactured by Fosroc at their powder plant facility in the Drayton Manor Business Park site, using a common process. The products all share an equivalent purpose (concrete repair). Products in this group have very similar raw material composition- a balance of

hydraulic binders (cements), supplementary cementitious materials, silica mineral materials, stone + additives. Group 2 products have around 40 - 65% cement content.

For Group 2 products, the variance against the base case GWP fossil is shown below:

MAX GWP (fossil) value: 0.602 kg CO2 e
MIN GWP (fossil) value: 0.393 kg CO2 e
Base Case Product GWP (fossil) value: 0.423 kg CO2 e

Variance from base case product (max +/- 50%) :
42.3 % max
-7.2 % min

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. Ecoinvent and One Click LCA databases were used as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	4,28E-1	1,63E-2	-2,6E-2	4,19E-1	9,05E-2	8,73E-2	MND	MND	MND	MND	MND	MND	MND	3,79E-3	5,22E-3	3,68E-3	1,21E-3	1,2E-2
GWP – fossil	kg CO_2e	4,23E-1	1,63E-2	2,12E-2	4,6E-1	9,13E-2	4,21E-2	MND	MND	MND	MND	MND	MND	MND	3,78E-3	5,22E-3	3,68E-3	1,21E-3	-2,98E-2
GWP – biogenic	kg CO_2e	5,58E-3	9,56E-6	-4,72E-2	-4,16E-2	1,69E-4	4,51E-2	MND	MND	MND	MND	MND	MND	MND	1,05E-6	3,79E-6	1,02E-6	2,4E-6	4,19E-2
GWP – LULUC	kg CO_2e	9,3E-5	5,73E-6	3,48E-5	1,34E-4	5,16E-5	1,22E-5	MND	MND	MND	MND	MND	MND	MND	3,2E-7	1,57E-6	3,11E-7	3,59E-7	-2,5E-5
Ozone depletion pot.	kg $CFC_{-11}e$	1,64E-8	3,75E-9	1,77E-9	2,19E-8	1,96E-8	2,33E-9	MND	MND	MND	MND	MND	MND	MND	8,17E-10	1,23E-9	7,94E-10	4,98E-10	-2,92E-9
Acidification potential	mol H^+e	1,15E-3	1,23E-4	9,47E-5	1,37E-3	4,83E-4	1,03E-4	MND	MND	MND	MND	MND	MND	MND	3,96E-5	2,19E-5	3,84E-5	1,15E-5	-3,02E-4
EP-freshwater[2)]	kg Pe	8,6E-6	1,26E-7	6,99E-7	9,43E-6	1,47E-6	6,3E-7	MND	MND	MND	MND	MND	MND	MND	1,53E-8	4,24E-8	1,49E-8	1,46E-8	-1,94E-6
EP-marine	kg Ne	2,76E-4	3,32E-5	2,14E-5	3,3E-4	1,39E-4	2,58E-5	MND	MND	MND	MND	MND	MND	MND	1,75E-5	6,6E-6	1,7E-5	3,95E-6	-3,89E-5
EP-terrestrial	mol Ne	3,33E-3	3,68E-4	2,43E-4	3,94E-3	1,56E-3	3,02E-4	MND	MND	MND	MND	MND	MND	MND	1,92E-4	7,29E-5	1,86E-4	4,35E-5	-4,74E-4
POCP ("smog")[3)]	kg NMVOCe	8,63E-4	1,08E-4	9,34E-5	1,06E-3	5,13E-4	8,57E-5	MND	MND	MND	MND	MND	MND	MND	5,27E-5	2,34E-5	5,12E-5	1,26E-5	-1,28E-4
ADP-minerals & metals[4)]	kg Sbe	2,08E-6	2,71E-7	2,29E-7	2,58E-6	2E-6	2,41E-7	MND	MND	MND	MND	MND	MND	MND	5,78E-9	8,9E-8	5,61E-9	1,1E-8	-8,73E-7
ADP-fossil resources	MJ	2,47E0	2,47E-1	5,41E-1	3,26E0	1,38E0	2,84E-1	MND	MND	MND	MND	MND	MND	MND	5,21E-2	8,11E-2	5,06E-2	3,38E-2	-5,48E-1
Water use[5)]	m^3e depr.	3,23E-2	8,71E-4	1,84E-2	5,16E-2	6,97E-3	6,13E-3	MND	MND	MND	MND	MND	MND	MND	9,71E-5	3,02E-4	9,43E-5	1,56E-3	-1,6E-2

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	1,57E-1	2,99E-3	1,47E-1	3,07E-1	3,34E-2	2,51E-2	MND	MND	MND	MND	MND	MND	MND	2,82E-4	1,02E-3	2,74E-4	2,73E-4	-1,2E-1
Renew. PER as material	MJ	1,39E-3	0E0	4,56E-1	4,57E-1	0E0	-4,33E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	1,59E-1	2,99E-3	6,02E-1	7,64E-1	3,34E-2	-4,08E-1	MND	MND	MND	MND	MND	MND	MND	2,82E-4	1,02E-3	2,74E-4	2,73E-4	-1,2E-1
Non-re. PER as energy	MJ	2,29E0	2,47E-1	3,46E-1	2,88E0	1,38E0	2,65E-1	MND	MND	MND	MND	MND	MND	MND	5,21E-2	8,11E-2	5,06E-2	3,38E-2	-5,48E-1
Non-re. PER as material	MJ	2,02E-1	0E0	1,95E-1	3,97E-1	0E0	-1,75E-1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of non-re. PER	MJ	2,49E0	2,47E-1	5,41E-1	3,28E0	1,38E0	9E-2	MND	MND	MND	MND	MND	MND	MND	5,21E-2	8,11E-2	5,06E-2	3,38E-2	-5,48E-1
Secondary materials	kg	7,83E-3	0E0	2,38E-5	7,85E-3	0E0	3,93E-4	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

Use of net fresh water	m^3	4,45E-3	4,79E-5	1,13E-4	0.00462	2,49E-4	4,32E-4	MND	MND	MND	MND	MND	MND	MND	4,6E-6	1,69E-5	4,47E-6	3,7E-5	-1,16E-3

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,12E-2	2,46E-4	1,05E-3	1,25E-2	2,3E-3	9,73E-4	MND	MND	MND	MND	MND	MND	MND	5,6E-5	7,89E-5	0E0	3,15E-5	-3,05E-3
Non-hazardous waste	kg	3,15E-1	2,36E-2	3,08E-2	3,69E-1	1,23E-1	3,2E-2	MND	MND	MND	MND	MND	MND	MND	5,99E-4	8,72E-3	0E0	2,3E-1	-4,16E-2
Radioactive waste	kg	9,19E-6	1,7E-6	1,54E-6	1,24E-5	9,24E-6	1,47E-6	MND	MND	MND	MND	MND	MND	MND	3,65E-7	5,57E-7	0E0	2,24E-7	-2,61E-6

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	1,86E-2	1,86E-2	0E0	9,32E-4	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	3,3E-4	3,3E-4	0E0	1,65E-5	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	9,18E-1	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	4,77E-2	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	4,09E-1	1,61E-2	2,03E-2	4,45E-1	9,05E-2	4,13E-2	MND	MND	MND	MND	MND	MND	MND	3,76E-3	5,17E-3	3,65E-3	1,19E-3	-2,88E-2
Ozone depletion Pot.	kg $CFC_{-11}e$	1,37E-8	2,98E-9	1,67E-9	1,83E-8	1,57E-8	1,97E-9	MND	MND	MND	MND	MND	MND	MND	6,47E-10	9,75E-10	6,28E-10	3,95E-10	-2,69E-9
Acidification	kg SO_2e	8,53E-4	8,07E-5	7,4E-5	1,01E-3	3,63E-4	7,66E-5	MND	MND	MND	MND	MND	MND	MND	5,59E-6	1,06E-5	5,43E-6	4,78E-6	-2,53E-4
Eutrophication	kg PO_4^3e	2,94E-4	1,16E-5	2,28E-5	3,28E-4	9,75E-5	2,49E-5	MND	MND	MND	MND	MND	MND	MND	9,84E-7	2,14E-6	9,56E-7	9,26E-7	-5,7E-5
POCP (“smog”)	kg C_2H_4e	3,45E-5	3,18E-6	5,96E-6	4,36E-5	3,07E-5	4,04E-6	MND	MND	MND	MND	MND	MND	MND	5,75E-7	6,73E-7	5,59E-7	3,51E-7	-1,17E-5
ADP-elements	kg Sbe	2,08E-6	2,71E-7	2,29E-7	2,58E-6	2E-6	2,41E-7	MND	MND	MND	MND	MND	MND	MND	5,78E-9	8,9E-8	5,61E-9	1,1E-8	-8,73E-7
ADP-fossil	MJ	2,47E0	2,47E-1	5,41E-1	3,26E0	1,38E0	2,84E-1	MND	MND	MND	MND	MND	MND	MND	5,21E-2	8,11E-2	5,06E-2	3,38E-2	-5,48E-1

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? Read more online
This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Elma Avdyli as an authorized verifier acting for EPD Hub Limited
29.03.2023

VERIFIED ISO 14025