GEOPOLYMER SOLUTIONS, LLC

ENVIRONMENTAL PRODUCT DECLARATION

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

GPS - Cold Fusion Cement® A100

EPD HUB, HUB-0603

Publishing date 7 August 2023, last updated date 7 August 2023, valid until 7 February 2025

Created by McMac CX with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Geopolymer Solutions, LLC
Address	11200 Cox Road, Suites A1 & A2, Conroe, Texas USA 77385
Contact details	rodz@geopolymertech.com
Website	http://www.geopolymertech.com

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	ISO 21930:2017 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022
Sector	Construction product
Category of EPD	Design phase EPD
Scope of the EPD	Cradle to gate with modules C1-C4, D
EPD author	David MacLean McMac CX
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	Haiha Nguyen, 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	GPS - Cold Fusion Cement® A160
Additional labels	GPS – A100
Product reference	-
Place of production	United States
Period for data	2022
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	0%

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 metric ton of cold fusion cementitious material
Declared unit mass	1000 kg
GWP-fossil, A1-A3 (kgCO2e)	2.7E2
GWP-total, A1-A3 (kgCO2e)	2.67E2
Secondary material, inputs (%)	85.65%
Secondary material, outputs (%)	80.0
Total energy use, A1-A3 (kWh)	1110.0
Total water use, A1-A3 (m3e)	3.36E0

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

https://www.geopolymertech.com/red-mud/

Another term for Geopolymer is Alkali Activated Cement. Alkali Activated Cements have been around for thousands of years. While in the Roman and Egyptian times the binders were based upon basic materials including crushed limestone and wood ash and were designed generally with one characteristic consisting of strength; most times low strength, Geopolymer Solutions LLC (GPS) has solved the problems with this material that hundreds of researchers across the globe have been unable to do. The problems consisted of shrinkage (plastic, drying, and autogenous), time of set, caustic behaviours, and relatively low strength. GPS accomplished this by abandoning the typical researcher's path that included unsafe dry and liquid chemicals, without sacrificing quality and the sustainability of Geopolymers' including ensuring no Portland Cement is used in our mixtures.

GPS has assembled a team of professionals constituting a combined 2 centuries of construction and construction materials experience. The professionals are responsible for navigating the generally coarse path of all new and highly technical materials. The acceptance of our materials has been difficult due to the failure of most academia to solve the problems with the most advanced cement on the planet, and the corresponding disbelief that a private company such as ours has accomplished the task fully. Some of this scepticism has been alleviated by the certification of our production plant and materials by agencies such as Underwriter Laboratories LLC, who have issued three designs to GPS for Spray Applied Fireproofing including certifications for our ASTM C119/UL263 and UL1709 mixtures. Most of our client base consists of return clientele, most of which completed a comprehensive laboratory testing process prior to using our materials.

GPS was incorporated as a Limited Liability Company in February of 2016 and has been serving the North American Continent with acid resistant concrete/cement materials, and spray applied fireproofing. The quality of our materials was exhibited while at Underwriter Laboratories' facility in Chicago, Illinois, where surprise was expressed by observers of the fire testing of our materials when the layers did not fall off the columns. Reportedly, materials falling off the columns during the test is a common characteristic of our competitors' products. The chemical bonding of all our materials to metal substrates occurs at the molecular level and consequently removes the possibility that GPS materials will ever be removed from the metal after application. This suggests that even during explosions such as aircraft collisions, our material will continue to protect structural items on which it is applied.

GPS is proud and excited to serve our community by producing the most advanced building materials on the earth. The fact that the production and use of our materials reduces the carbon footprint of cement production by over 90-percent is an added benefit.

PRODUCT DESCRIPTION

This LCA study represents 1 metric ton of cold fusion cementitious material. This product consists of binders, fly ash, minerals, and other components. All of the components are dry when shipped from the site and then mixed with water during installation. The cement is used in both horizontal and vertical structural applications.

Concrete, which is used throughout the world in buildings, dams, roads, and other construction projects, is the second most consumed substance on earth after water. The main ingredient in the most widely used concrete is Portland cement, which accounts for about 5% to 10% of all greenhouse gas emissions. Portland cement is made by heating limestone and other materials to extreme temperatures, causing greenhouse gases to be released into the atmosphere at a rate of one ton of carbon dioxide for every ton of cement produced.

Traditional Portland cement is produced by mining and depositing a calcium source mineral, a silicon source mineral and other materials into a large rotary kiln. The kiln is heated between 2,300° to 3,000° Fahrenheit using coal, natural gas or other hydrocarbons creating a particle called clinker. This clinker is placed into large grinders where calcium sulfate is added, resulting in Portland cement. The energy requirements and greenhouse gas release is significant throughout the process.

Geopolymer cement is the economical, more durable, and environmentally friendly option with a carbon footprint of only about 10% of Portland cement. Our product is made by recycling waste from fly ash, ground granulated blast-furnace slag (a steel production waste) and other naturally occurring minerals from around the world. We offer tremendous environmental benefits: decreased CO2 output, energy reduction, preservation of virgin resources, reduced landfill requirements and profound water savings.

The production of Geopolymer cement does not require heating at all. Instead, various minerals and silicates are blended, resulting in cement that is of a significantly higher quality than Portland cement and is batched at traditional ready-mixed concrete facilities using identical protocols.

Cold Fusion Cement utilizes all dry materials including sodium or potassium metasilicate and/or sodium or potassium metasilicate pentahydrate as an activator. Sodium or potassium metasilicate/pentahydrate are alkali salts, have an elevated pH, and are anhydrous or pentahydrate versions of silicates. Sodium or potassium liquid hydroxides and/or silicates while unnecessary, can be used in conjunction with Cold Fusion Cement technology.

Cold Fusion Cement is a silicon dioxide primary chemistry relying upon the glassy components of directly installed silicon dioxide, various minerals, and waste materials to achieve an approximate 70% SiO2 content, which is extremely similar to glass chemistry. The silicon dioxide, aluminum, and calcium constituents in red mud, or lithium, gold, copper, silver, or other mining waste are either primary or majority constituents in Cold Fusion Cement. As such, the synergy between Cold Fusion Cement and mining waste is profound. The Ferrous and other metal components of the waste present no deleterious reactions in the final product and heavy metals are encapsulated safely within.

The resulting cement achieves a compressive strength of from 4,000 to 10,000 pounds per square inch (psi), similar modulus properties as Portland mixtures, low permeability, and elevated resistance to freeze and thaw cycling and chemical attack.

FURTHER INFORMATION CAN BE FOUND AT

HTTP://WWW.GEOPOLYMERTECH.COM

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	0	-
Minerals	98.99	North America
Fossil materials	0.67	North America
Bio-based materials	0.34	North America

BIOGENIC CARBON CONTENT

Product’s biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	-
Biogenic carbon content in packaging, kg C	-

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 metric ton of cold fusion cementitious material
Mass per declared unit	1000 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	MND	MND	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.

All ingredients arrive dried to the manufacturing site. They are mixed in a specific proportion according to the manufacturers requirements. The manufacturing process requires mixing in an electrically driven hopper. The study considers the losses of the main raw ingredients (FLY ASH, GGBFS, SODIUM METASILICATE, SODIUM TETRABORATE, SULFONATED FORMALDEHYDE, PROTEIN, MAGNESIUM OXIDE) to be minimal due to the simplicity of the process and does not exceed more than 1%. The finished product is shipped unpackaged to the jobsite in a standard batch truck.

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.

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)

The construction of the waste processing facility and the appropriate equipment are not a part of this model. Due to the material and energy recovery potential of parts in the end-of-life product and packaging, recycled raw materials lead to avoided virgin material production. The concrete product has a recycling rate of 80% and landfilling rate of 20% according to the US EPAs Construction Waste Data from 2018. The concrete waste is transport via truck with an average distance of 300 km. Diesel usage is considered during the demolition or deconstruction phase of this product.

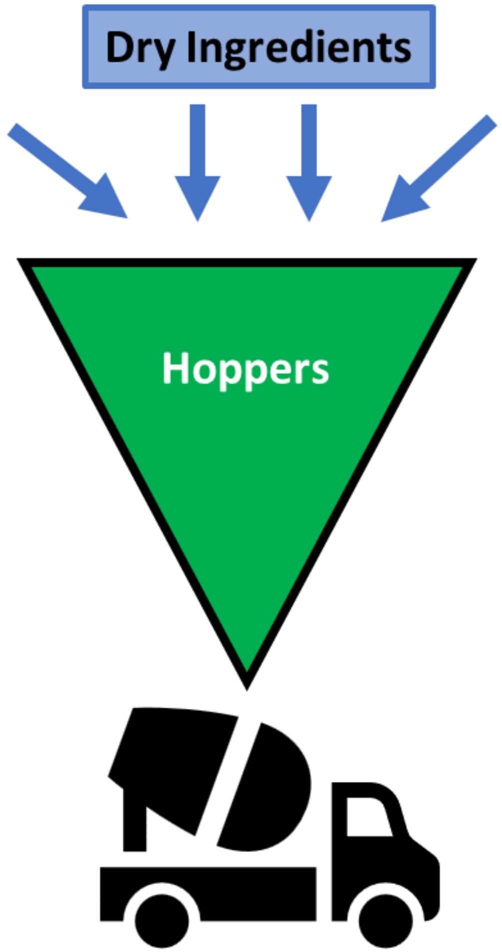
MANUFACTURING PROCESS

All dry ingredients are batch mixed in large hoppers driven by grid connected electric motors. No drying equipment is utilized. The Cold Fusion Cement is then transferred directly to large transport vehicles and delivered to the construction site. No additional bagging or storge is used. At the construction site the Cold Fusion Cement is mixed with aggregates and water in large site located mixers typical of the cementitious industry. No speciality equipment is utilized during the manufacture, transport, of site construction.

Cold Fusion Cement utilizes all dry materials including sodium or potassium metasilicate and/or sodium or potassium metasilicate pentahydrate as an activator. Sodium or potassium metasilicate/pentahydrate are alkali salts, have an elevated pH, and are anhydrous or pentahydrate versions of silicates. Sodium or potassium liquid hydroxides and/or silicates while unnecessary, can be used in conjunction with Cold Fusion Cement technology.

Cold Fusion Cement is a silicon dioxide primary chemistry relying upon the glassy components of directly installed silicon dioxide, various minerals, and waste materials to achieve an approximate 70% SiO2 content, which is extremely similar to glass chemistry.

The resulting cement achieves a compressive strength of from 4,000 to 10,000 pounds per square inch (psi), similar modulus properties as Portland mixtures, low permeability, and elevated resistance to freeze and thaw cycling and chemical attack.



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	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	0%

There is no average result considered in this study since EPD refers to one specific product produced in one production plant.

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	2.38E2	2.67E1	2.59E0	2.67E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	8.78E-1	2.82E1	1.02E1	1.05E0	-4.45E-1
GWP – fossil	kg CO_2e	2.41E2	2.67E1	2.57E0	2.7E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	8.78E-1	2.82E1	1.01E1	1.05E0	-4.43E-1
GWP – biogenic	kg CO_2e	-4.36E0	1.03E-2	2.71E-3	-4.35E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	9.95E-5	1.09E-2	2.93E-2	6.86E-4	-1.39E-3
GWP – LULUC	kg CO_2e	1.26E0	9.85E-3	1.45E-2	1.29E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.84E-5	1.04E-2	2.15E-2	9.94E-4	-6.14E-4
Ozone depletion pot.	kg $CFC_{11}e$	6.92E-5	6.14E-6	1.51E-7	7.55E-5	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.91E-7	6.48E-6	1.89E-6	4.26E-7	-3.72E-8
Acidification potential	mol H^+e	1.45E0	1.13E-1	9.48E-3	1.57E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.24E-2	1.19E-1	7.94E-2	9.9E-3	-2.9E-3
EP-freshwater[2)]	kg Pe	9.93E-3	2.18E-4	1.2E-4	1.03E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.18E-6	2.31E-4	1.87E-4	1.1E-5	-2.63E-5
EP-marine	kg Ne	2.69E-1	3.36E-2	2.32E-3	3.05E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	5.55E-3	3.54E-2	2.89E-2	3.43E-3	-6.27E-4
EP-terrestrial	mol Ne	2.98E0	3.71E-1	2.59E-2	3.38E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	6.08E-2	3.91E-1	3.17E-1	3.77E-2	-8.2E-3
POCP (“smog”)[3)]	kg NMVOCe	7.9E-1	1.19E-1	9.86E-3	9.19E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.59E-2	1.25E-1	8.86E-2	1.1E-2	-2.1E-3
ADP-minerals & metals[4)]	kg Sbe	4.26E-2	6.26E-5	8.07E-6	4.26E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	6.22E-7	6.6E-5	2.79E-5	2.42E-6	-4.46E-6
ADP-fossil resources	MJ	3.27E3	4.01E2	2.39E1	3.69E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.16E1	4.23E2	1.57E2	2.89E1	-6.59E0
Water use[5)]	m^3e depr.	1.39E2	1.79E0	5.35E-1	1.42E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.6E-2	1.89E0	1.18E0	9.16E-2	-8.78E-1

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

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	3.14E2	4.52E0	5.86E0	3.25E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.27E-2	4.76E0	5.28E0	2.51E-1	-6.15E-1
Renew. PER as material	MJ	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	3.14E2	4.52E0	5.86E0	3.25E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	3.27E-2	4.76E0	5.28E0	2.51E-1	-6.15E-1
Non-re. PER as energy	MJ	3.26E3	4.01E2	2.39E1	3.69E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.16E1	4.23E2	1.57E2	2.89E1	-6.59E0
Non-re. PER as material	MJ	6.9E0	0E0	-6.83E-2	6.83E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-5.46E0	-1.37E0	0E0
Total use of non-re. PER	MJ	3.27E3	4.01E2	2.38E1	3.69E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.16E1	4.23E2	1.51E2	2.75E1	-6.59E0
Secondary materials	kg	5.63E2	1.11E-1	1.62E-1	5.64E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	6.68E-4	1.17E-1	5.72E-2	6.07E-3	-7.28E-3
Renew. secondary fuels	MJ	2.08E-2	1.12E-3	1.07E-3	2.3E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	9.88E-6	1.18E-3	9.35E-4	1.59E-4	-5.21E-5

Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m³	3.3E0	5.19E-2	1.33E-2	3.36E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.08E-4	5.48E-2	7.84E-2	3.16E-2	-2.12E-2

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	1.96E1	5.31E-1	9.93E0	3.01E1	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.08E-3	5.61E-1	4.41E-1	0E0	-3.73E-2
Non-hazardous waste	kg	4.01E2	8.73E0	4.51E-1	4.1E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	4.68E-2	9.21E0	2.23E2	2E2	-1.16E0
Radioactive waste	kg	1.07E-2	2.68E-3	1.24E-5	1.34E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	8.45E-5	2.83E-3	9.03E-4	0E0	-3.47E-5

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	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	8E2	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	MND	MND	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	2.38E2	2.64E1	2.51E0	2.67E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	8.62E-1	2.79E1	1E1	1.03E0	-4.32E-1
Ozone depletion Pot.	kg CFC_{-11}e	6.66E-5	4.86E-6	1.35E-7	7.16E-5	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.51E-7	5.13E-6	1.5E-6	3.37E-7	-3.09E-8
Acidification	kg SO_2e	1.19E0	8.78E-2	7.46E-3	1.28E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	8.83E-3	9.26E-2	5.93E-2	7.48E-3	-2.25E-3
Eutrophication	kg PO_4^{3}e	4.01E-1	2E-2	7.24E-2	4.94E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.97E-3	2.11E-2	1.7E-2	1.61E-3	-1.09E-3
POCP ("smog")	kg C_2H_4e	5.04E-2	3.43E-3	8.52E-4	5.47E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	2.62E-4	3.62E-3	1.9E-3	3.14E-4	-1.54E-4
ADP-elements	kg Sbe	4.09E-3	6.06E-5	5.84E-6	4.16E-3	MND	MND	MND	MND	MND	MND	MND	MND	MND	6.17E-7	6.39E-5	2.74E-5	2.38E-6	-4.41E-6
ADP-fossil	MJ	3.27E3	4.01E2	2.39E1	3.69E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.16E1	4.23E2	1.57E2	2.89E1	-6.59E0

ENVIRONMENTAL IMPACTS – TRACI 2.1. / 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	2.35E2	2.64E1	2.5E0	2.64E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	8.73E-1	2.79E1	9.96E0	1.03E0	-4.33E-1
Ozone Depletion	kg $CFC_{-11}e$	6.65E-5	4.86E-6	1.35E-7	7.15E-5	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.51E-7	5.13E-6	1.5E-6	3.37E-7	-3.06E-8
Acidification	kg SO_2e	6.43E1	5.37E0	4.33E-1	7.01E1	MND	MND	MND	MND	MND	MND	MND	MND	MND	6.43E-1	5.67E0	3.94E0	4.85E-1	-1.31E-1
Eutrophication	kg Ne	5.82E-2	1.12E-2	7.6E-4	7.02E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	8.59E-4	1.19E-2	5.59E-3	9.06E-4	-1.26E-4
POCP (“smog”)	kg O_3e	6.39E-1	8.68E-2	6.18E-3	7.32E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.44E-2	9.16E-2	7.45E-2	8.9E-3	-1.63E-3
ADP-fossil	MJ	3E2	5.48E1	1.9E0	3.57E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	1.69E0	5.78E1	1.92E1	4.04E0	-4.95E-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.

HaiHa Nguyen, as an authorized verifier acting for EPD Hub Limited
07.08.2023

EPD Hub
VERIFIED ISO 14025