EPD®
THE INTERNATIONAL EPD® SYSTEM

Kolos
Bâtir L'Ile Maurice de Demain

ENVIRONMENTAL PRODUCT DECLARATION

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

KOLOS CEMENT CEM I 52.5 N

KOLOS CEMENT LTD

Programme: The International EPD® System, www.environdec.com	Programme operator: EPD International AB	EPD registration number: S-P-05842	Verification date: 2022-04-06	Publication date: 2022-04-13	Valid until date: 2027-04-12	Revision date 2022-06-10	Geographical Scope: Mauritius

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.

ecosis

One Click LCA

ECO PLATFORM EPD VERIFIED

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Kolos Cement Ltd
Address	Mer Rouge, Port Louis
Contact details	rishta.rajiah@koloscement.com
Website	https://www.koloscement.com/

PRODUCT IDENTIFICATION

Product name	Kolos Cement CEM I 52.5 N
Additional label(s)	Portland Cement
Product number / reference	CEM I 52.5 N
Place(s) of production	Mauritius
CPC code	3744 - Portland cement, aluminous cement, slag cement and similar hydraulic cements, except in the form of clinkers

The International EPD System

EPDs within the same product category but from different programmes may not be comparable.

EPD INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	The International EPD System
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the Int'l EPD System PCR 2019:14 Construction products, version 1.11 (05.02.2021) is used.
EPD author	Tony Lee Luen Len/ - Ecosis (Mtius) Ltd
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Verification date	Started on 2022-04-06
EPD verifier	Silvia Vilčeková, Silcert S.r.o.
EPD number	S-P-05842
ECO Platform nr.	-
Revision date	2022-06-10
Publishing date	2022-04-13
EPD valid until	2027-04-12

PRODUCT INFORMATION

PRODUCT DESCRIPTION

The product is basic cement CEM I 52.5N which is also called ordinary Portland cement (OPC). The cement is conformed to the Mauritian Standard MS EN 197-1:2011

PRODUCT APPLICATION

The product is used in all types of construction works such as beam, pylon, slab, pouring concrete, and high rise building structural work

MECHANICAL CHARACTERISTICS

Compressive Strengh (Mpa) (EN 196-1)	Requirements
2 days	≥ 20
7 days	_
28 days	≥ 52.5
Initial Setting Time (min) (EN 196-3)	≥ 45
Soundness (Expansion((mm)	≤ 10

PRODUCT STANDARDS

MS EN 197-1

CHEMICAL CHARACTERISTICS

Sulfate Content (SO3) (%) (EN 196-2)
≤ 4
Loss on ignition (%) (EN 196-2)
≤ 5.0
Chloride Content (%) (EN 196-2)
≤ 0.1
Insoluble Residue
≤ 5.0

ADDITIONAL TECHNICAL INFORMATION

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

PRODUCT RAW MATERIAL COMPOSITION

Product and Packaging Material	Share (%)	Weight, kg	Post-consumer %	Renewable %
Clinker	95-100	950	-	-
Minor additional constituents	0-5	50	-	-

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

MANUFACTURING AND PACKAGING (A1-A3)

This raw material is processed in Vietnam.

The cement is imported by sea freight and delivered to the industry located in the port area. It is transferred from the ship to the sheds via the Kovako Ship Unloader.

The cement is loaded into the hopper, using front end loaders and the cement is transferred via air slide through extraction to the silo. From the silo, the cement goes into the delivery unit.

The plant is equipped with a Dedusting System to remove dust.

TRANSPORT AND INSTALLATION (A4-A5)

This EPD does not cover transportation and installation impacts occurred from final products delivery to construction site.

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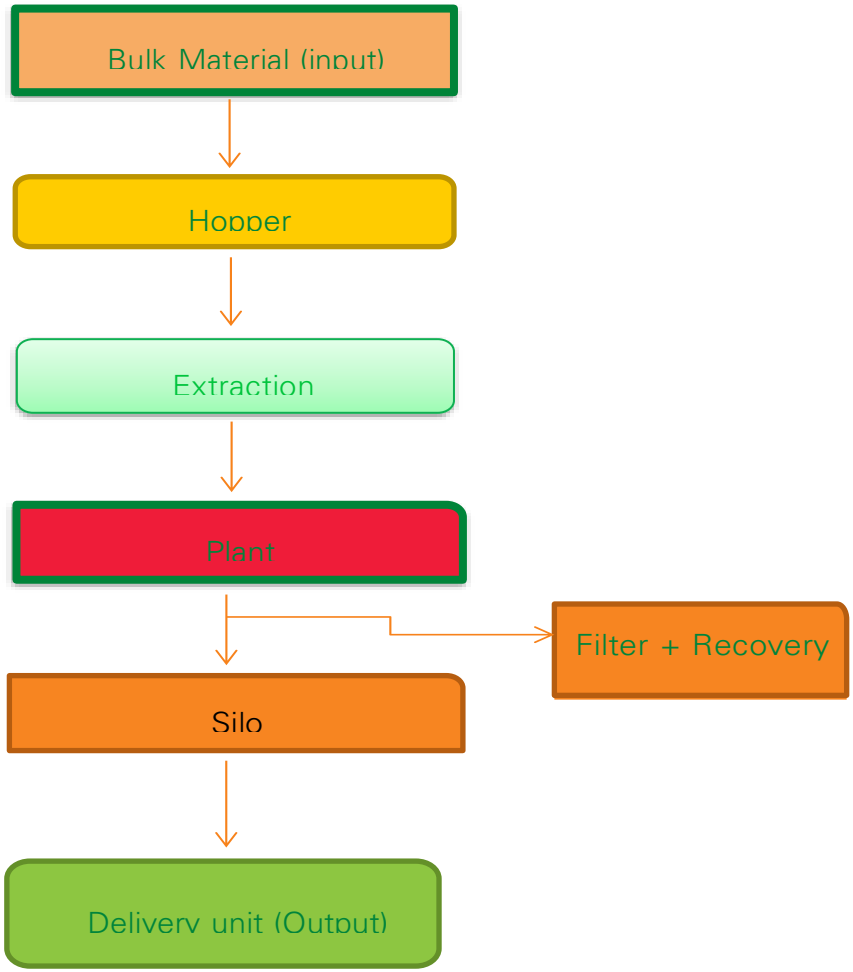
PRODUCT USE AND MAINTENANCE (B1-B7)

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 end-of-life phase (modules C1-C4, and D) is excluded as per EN 15804+A2 exclusion criteria for products that become chemically bonded and inseparable with other products.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2020

DECLARED AND FUNCTIONAL UNIT

Declared unit	1 tonne
Mass per declared unit	1000 kg

SYSTEM BOUNDARY

The type of scope of this study is cradle to gate and covers impacts of raw materials' production, their transportation to the production plant, and manufacturing process.

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	D	D
x	x	x	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR	MNR
Geography, by two-letter ISO country code or regions. The International EPD System only.																		
VN/MU	VN/MU	VN/MU	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
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.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 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. The life cycle analysis includes all industrial processes from raw material acquisition to production, distribution, and end-of-life stages.

For easier modelling and because of lack of accuracy in available modelling resources, some constituents under 0,1% of product mass are excluded. These include some cement constituents (some secondary fuels, trace metals and mineral constituents) which are all present in the product only in very small amounts and have no serious impact on the emissions of the product.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.

In this study, as per EN 15804, allocation is conducted in the following order.

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g., mass, volume) when the difference in revenue is small.

3. Allocation should be based on economic values.

In this study, allocation could not be avoided for ancillary material, energy consumption and waste production as the information was only measured on factory or production process level. The inputs were allocated to study product based on annual production volume (mass). There was no need to allocate for raw material data as the percentage per declared unit was taken directly from the product's technical data sheet (TDS). As a deviation from this, production loss was added to the values by including the allocated product-related waste into the raw material inputs.

The values for 1 tonne of cement are calculated by considering the total annual production. In the factory, several kinds of cement are produced; since the production processes of these products are similar, the annual production percentages are taken into consideration for allocation. As the processes for all products produced at the factory are very similar regardless of the products formulation, ancillary materials, energy consumption, and waste streams are assumed to be the same for all types of products.

Allocation used in generic environmental data sources follow the requirements of the EN 15804 -standard. Allocation method 'allocation, cut-off by classification' has been used for ecoinvent 3.6 data, which complies with EN 15804.

AVERAGES AND VARIABILITY

The International EPD System additional data requirements

Data specificity and GWP-GHG variability for GWP-GHG for A1-A3.

Supply-chain specific data for GWP-GHG	> 80%
Variation in GWP-GHG between products	- %
Variation in GWP-GHG between sites	- %

ENVIRONMENTAL IMPACT DATA

Note: additional environmental impact data may be presented in annexes.

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	kg CO_2e	9,14E2	5,72E1	3,4E0	9,75E2	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
GWP – fossil	kg CO_2e	9,03E2	5,72E1	3,4E0	9,64E2	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
GWP – biogenic	kg CO_2e	1,05E1	-2,81E-2	1,43E-3	1,05E1	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
GWP – LULUC	kg CO_2e	1,82E-1	4,84E-2	1,46E-4	2,3E-1	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Ozone depletion pot.	kg CFC_{-11}e	2,86E-5	1,14E-5	6,86E-7	4,06E-5	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Acidification potential	mol H^+e	2,25E0	1,67E0	3,59E-2	3,95E0	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
EP-freshwater[2)]	kg Pe	9,62E-3	2,94E-4	7,01E-6	9,92E-3	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
EP-marine	kg Ne	6,73E-1	3,75E-1	8E-3	1,06E0	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
EP-terrestrial	mol Ne	7,8E0	4,18E0	8,55E-2	1,21E1	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
POCP ("smog")	kg NMVOCe	1,94E0	1,1E0	2,32E-2	3,06E0	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
ADP-minerals & metals	kg Sbe	9,26E-2	5,24E-4	3,76E-6	9,32E-2	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
ADP-fossil resources	MJ	3,48E3	7,29E2	4,24E1	4,25E3	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Water use[1)]	m^3e depr.	7,72E1	1,85E0	6,49E-1	7,97E1	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR

1) GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. 2) 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 experienced with the indicator. 3) Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO_4e.

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	MJ	1,8E2	5,68E0	1,45E0	1,87E2	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Renew. PER as material	MJ	MNR	MNR	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Total use of renew. PER	MJ	1,8E2	5,68E0	1,45E0	1,87E2	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Non-re. PER as energy	MJ	3,48E3	7,29E2	4,24E1	4,25E3	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Non-re. PER as material	MJ	MNR	MNR	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR

Total use of non-re. PER	MJ	3,48E3	7,29E2	4,24E1	4,25E3	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Secondary materials	kg	MNR	MNR	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Renew. secondary fuels	MJ	MNR	MNR	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Non-ren. secondary fuels	MJ	MNR	MNR	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Use of net fresh water	m^3	3,32E0	7,42E-2	7,05E-3	3,4E0	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR

6) PER = Primary energy resource

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	1,38E1	9,91E-1	1,48E-2	1,48E1	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Non-hazardous waste	kg	4,17E2	1,25E1	2,7E-1	4,3E2	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Radioactive waste	kg	1,32E-2	5,08E-3	3,07E-4	1,86E-2	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR

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	MNR	MNR	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Materials for recycling	kg	MNR	MNR	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Materials for energy rec	kg	MNR	MNR	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Exported energy	MJ	MNR	MNR	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR

ENVIRONMENTAL IMPACTS – GWP-GHG - THE INTERNATIONAL EPD SYSTEM

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG	kg CO_2e	9,03E2	5,72E1	3,4E0	9,64E2	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR

8) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013) This indicator Is almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Market for electricity, medium voltage (Reference product: electricity), Mauritius, Ecoinvent 3.6, year: 2019
Electricity CO_2e / kWh	0.85
District heating data source and quality	-
District heating CO_2e / kWh	-

DIFFERENCES VERSUS PREVIOUS VERSIONS

The following changes in the new version of the report are as follows:

The absolute indicative values have been replaced by a range of values in the following tables:

1) Mechanical characteristics

2) Chemical characteristics

In the table 'product raw material composition', 'additional constituents' has been changed into 'minor additional constituents'.

In the manufacturing and packaging (A1-A3) section, the term ''Kovaco'' has been replaced by ''Kovako''.

BIBLIOGRAPHY

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

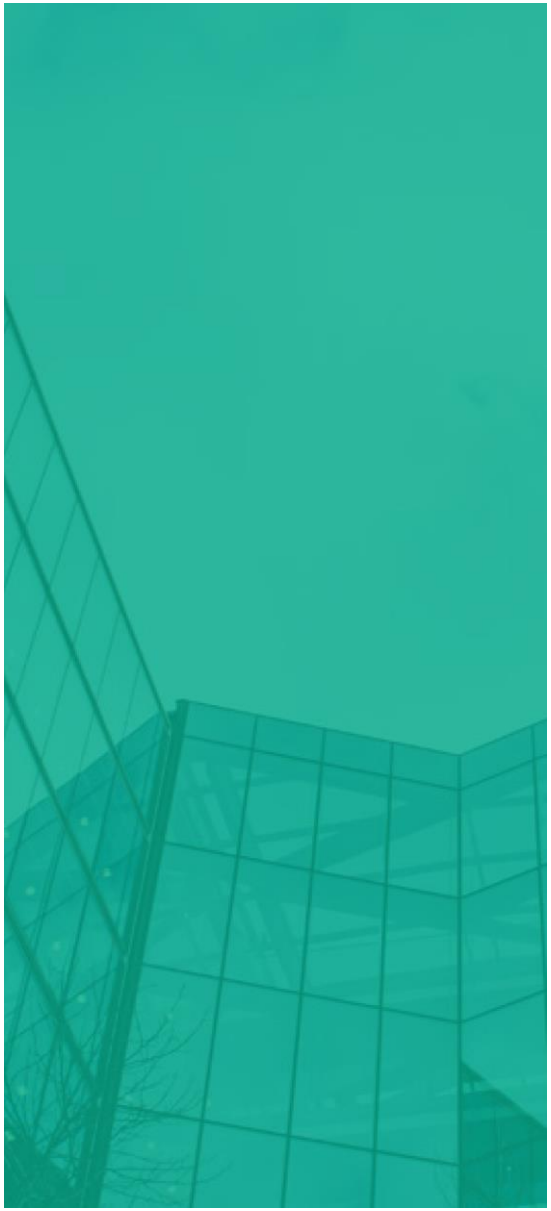
ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

Ecoinvent database v3.6 (2019) and One Click LCA database.

EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

Int'l EPD System PCR 2019:14 Construction products, version 1.11 (05.02.2021)

Kolos Cement 52.5 LCA background report 17.03.2022



ABOUT THE MANUFACTURER

Kolos came to life two decades ago, when some Mauritian entrepreneurs decided to build and operate a second cement import terminal in the country which, at that time was mainly dominated by an international brand. Today, thanks to a passionate, innovative, and committed team, Kolos supplies cement to most of the large and medium construction companies as well as to a multitude mix sized hardware stores scattered over the island.

EPD AUTHOR AND CONTRIBUTIONS

Manufacturer	Kolos Cement Ltd
EPD author	Tony Lee Luen Len - Ecosis (Mtius) Ltd
EPD verifier	Silvia Vilčeková, Silcert S.r.o.
EPD program operator	The International EPD System
Background data	This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Cementitious Products

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 EN 15804, 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 background report (project report) for this EPD

Why does verification transparency matter? Read more online.

VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

EPD verification information	Answer
Independent EPD verifier rd-party verifier for EPD	Silvia Vilčeková, Silcert S.r.o.
EPD verification started on	2022-03-22
EPD verification completed on	2022-04-06
Supply-chain specific data %	> 80%
Approver of the EPD verifier	The International EPD System

Author & tool verification	Answer
EPD author	Tony Lee Luen Len - Ecosis (Mtius) Ltd
EPD author training completion	2021-04-16
EPD Generator module	Cementitious Products
Independent software verifier	Ugo Pretato, Studio Fieschi & soci Srl.
Software verification date	2021-05-11

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 EN 15804:2012+A2:2019.

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.

Verifier: Silvia Vilčeková, Silcert S.r.o.

VERIFICATION AND REGISTRATION (ENVIRONDEC)

ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR)	
PCR	PCR 2019:14 Construction products, version 1.11
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:	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Third party verifier	Silvia Vilčeková, Silcert S.r.o.
	Approved by: The International EPD® System Technical Committee, supported by the Secretariat

EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden, E-mail: info@environdec.com

ANNEX 1 : 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	8,94E2	5,68E1	3,38E0	9,55E2	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Ozone depletion Pot.	kg CFC_{-11}e	2,28E-5	9,01E-6	5,42E-7	3,23E-5	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Acidification	kg SO_2e	1,7E0	1,35E0	2,9E-2	3,08E0	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
Eutrophication	kg PO_4^3e	4,89E-1	1,39E-1	3,03E-3	6,31E-1	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
POCP (“smog”)	kg C_2H_4e	6,29E-2	3,75E-2	1,05E-3	1,01E-1	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
ADP-elements	kg Sbe	9,26E-2	5,24E-4	3,76E-6	9,32E-2	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR
ADP-fossil	MJ	3,48E3	7,29E2	4,24E1	4,25E3	MNR	MND	MND	MND	MND	MND	MND	MND	MND	MNR	MNR	MNR	MNR	MNR