EPD - ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

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Concrete addition cyment L

cyment Kft.

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1 General information

Product name cyment L type-II concrete addition	**Declared Product / Declared Unit** 1 t concrete addition **Number of datasets in EPD Document(s): 1** **Range of validity** The present EPD applies to all products of cyment L manufactured at the Mosonmagyaróvár plant. The products are distributed in Hungary, Slovakia, the Czech Republic and Austria.
Declaration number BAU-EPD-CYMENTkft-2024-1-ecoinvent-cymentLTypII	
Declaration data ☒ Specific data ☐ Average data	
Declaration based on: MS-HB Version 5.0.0 dated 2023-09-20: Concrete additions Typ II PCR-Code: 1.1.2 Version 1.0 dated 29.09.2024 (PCR tested and approved by the independent expert committee = PKR-Gremium) M-14A2 content and format template: Version 7.0 dated 2023-09-20 The owner of the declaration is liable for the underlying information and evidence; Bau EPD GmbH is not liable with respect to manufacturer information, life cycle assessment data and evidence.	
Type of Declaration as per EN 15804 From cradle to gate LCA-method: Cut-off by classification	**Database, Software, Version** Ecoinvent 3.9.1, SimaPro 9.5.0.1 **Version Characterisation Factors:** Joint Research Center, EF 3.1
Author of the Life Cycle Assessment IBO GmbH Alserbachstraße 5/8 1090 Vienna Austria	**The CEN standard EN 15804:2019+A2 serves as the core-PCR.** **Independent verification of the declaration according to ISO 14025:2010** ☐ internally ☒ externally **Verifier 1:** DI Dr. sc. ETHZ Florian Gschösser **Verifier 2:** DI Dr. Alexander Passer
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Note: EPDs from similar product groups from different programme operators might not be comparable.

2 Product

2.1 General product description

cyment L is classified as a type II concrete addition according to ÖNORM EN 206. cyment L has pozzolanic and latent hydraulic properties and can be used as an addition in accordance with EN 206 according to the k-value principle, as well as according to the concept of equivalent concrete performance (ECPC) and the concept of equivalent performance of combinations of cement and admixture (EPCC). The addition of cyment L to concrete can enhance fresh concrete properties, properties during curing (reduction of heat of hydration), and the properties of hardened concrete (dense pore structure, high final strength, and durability). cyment L is grey-brown in colour and is stored dry in sealed silos.

2.2 Application field

cyment L can be used for all applications in building and civil engineering, including watertight structures, as well as precast concrete elements and other mineral-based construction products made from concrete, reinforced concrete and prestressed concrete. The use of this addition allows a reduction in cement content in the concrete mix. The product is suitable for a wide range of applications, from fill concrete to self-compacting concrete and can be used for load-bearing structures, retaining walls, dams, diaphragm walls or piles. It is particularly suitable for massive structural components due to its high final strength and low heat of hydration. Additionally cyment L can be used in road construction for stabilisation and can also replace part of the cement in mortars, adhesives, or plasters.

2.3 Standards, guidelines and regulations relevant for the product

Table 1: Product-relevant standards

Standard	Title
EN 206	Concrete - Specification, performance, production and conformity; German version EN 206:2013+A2:2021
ÖNORM B 4710-1	Concrete - Specification, performance, production, use and conformity - Part 1: Rules for the implementation of OENORM EN 206 for normal and heavy concrete
ETA 23/0294	cyment L, Single or multi-component ground volcanic tuff-based type II additions for use in concrete
EAD-260072-00-0301	Type II additions for use in concrete

According to ÖNORM B 4710-1, Section 5.1.1, the suitability of materials for use in concrete may be demonstrated through a European Technical Assessment that explicitly references ÖNORM B 4710-1, if no ÖNORM is available. According to the Authentic Interpretation of ÖNORM B 4710-1 (2024), the responsible standardisation committee has decided that suitability can also be demonstrated by an ETA that explicitly refers to EN 206. This is done through the ETA listed in Table 1.

2.4 Technical data

The technical data according to the European Technical Assessment (ETA 23/0294) are shown in the following table.

Table 2: technical data of the concrete addition from ETA

Characterization	Value	Unit
Raw density range	2900–3300	kg/m³
Average bulk density	3100	kg/m³
Grinding fineness (Blaine)	≥ 400	m²/kg
Activity index, 28 days	≥ 75	%
Activity index, 90 days	≥ 85	%

2.5 Basic/auxiliary materials

Table 3: Basic and auxiliary materials in mass percentage

Components	Mass fraction in percent
Vulcanic tuff rock	30-70
By-product from the metal industry	30-70

The product does not contain any substances from the ECHA Candidate List of Substances of Very High Concern (SVHC) (date 21st October 2024) above 0.1% by mass.

2.6 Production

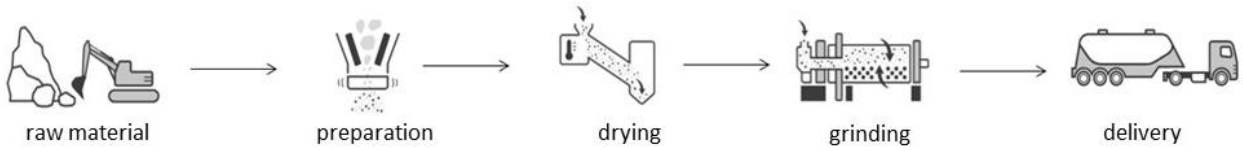

Figure 1: Flowchart of manufacturing processes

Both raw materials are transported to the manufacturing plant, pre-ground separately and partially dried. They are then stored in an intermediate storage facility and subsequently milled together and stored until they are transported away.

2.7 Packaging

The product is not packaged but stored in bulk in silos until delivery.

2.8 Conditions of delivery

The product is stored on the factory premises and is delivered in bulk.

2.9 Transport

The cyment L product is mainly delivered by lorry to Hungary, Slovakia, the Czech Republic and Austria.

2.10 Processing/ installation

cyment L is added to the concrete as a concrete addition in mixing specifications and replaces part of the cement content required to achieve the strength class or to ensure durability.

2.11 Use stage

As type II concrete additions are used as an intermediate product in the production of various bound building materials (ready-mixed concrete, precast concrete, screed, etc.), it is usually not possible to provide information on the environmental impacts of the product during the construction process stage, the use stage and the end of life stage, as these depend largely on the use of the product. The life cycle stage A1-A3 (raw material supply, transport to the manufacturer, manufacturing) are therefore considered in the EPD. The construction process stage, the use stage and the end of life stage are not considered in the life cycle assessment for type II concrete additions. This is permissible in accordance with ÖNORM EN 15804, as concrete additions fulfil the conditions specified in the standard (see 3.2 System boundary).

2.12 Reference service life (RSL)

Not relevant for concrete additions (see 2.11 Use stage and 3.2 System boundary).

2.13 Reuse and recycling

Not relevant for concrete additions (see 2.11 Use stage and 3.2 System boundary).

2.14 Disposal

If product residues occur during processing, these should be collected dry and if possible, reused or recycled (e.g. as filler). Waste treatment techniques are not required. If disposal is necessary, the product should be disposed of in accordance with local regulations. Disposal of the hardened product is the same as for concrete waste and concrete sludge (European Waste Catalogue (EWC): 17 01 01 [22] (concrete) or 10 13 14 [22] (concrete waste and concrete sludge).

2.15 Further information

Further information can be found at www.cyment.eu

3 LCA: Calculation rules

3.1 Declared unit/ Functional unit

The declared unit is 1 tonne of the concrete addition cyment L.

Table 4: Declared unit

Characterization	value	unit
Declared unit	1	t
Raw density	3100	kg/m³
Mass-related volume	3,23E-04	m³/kg

3.2 System boundary

As the concrete addition is used as an intermediate product in the manufacture of various concrete products (ready-mixed concrete, precast concrete, screed, etc.) it is usually not possible to provide information on the environmental impacts of the product during the construction process stage, the use stage and the end of life stage, as these depend largely on the use of the concrete. The life cycle stages A1-A3 (raw material supply, transport to the manufacturer, manufacturing) are therefore considered in this EPD. The construction process stage, use stage and end of life stage are therefore not considered. This is permissible in accordance with ÖNORM EN 15804 paragraph 5.2, as the following three conditions are met:

- the product or material is physically integrated with other products during installation so they cannot be physically separated from them at end of life, and
- the product or material is no longer identifiable at end of life as a result of a physical or chemical transformation process, and
- the product or material does not contain biogenic carbon.

Table 5: Declared life cycle stages

PRODUCT STAGE			CON-STRUCTION PROCESS STAGE		USE STAGE							END-OF-LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Construction, installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction, demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
x	x	x	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

X = included in LCA; ND = Not declared

3.3 Flow chart of processes/stages in the life cycle

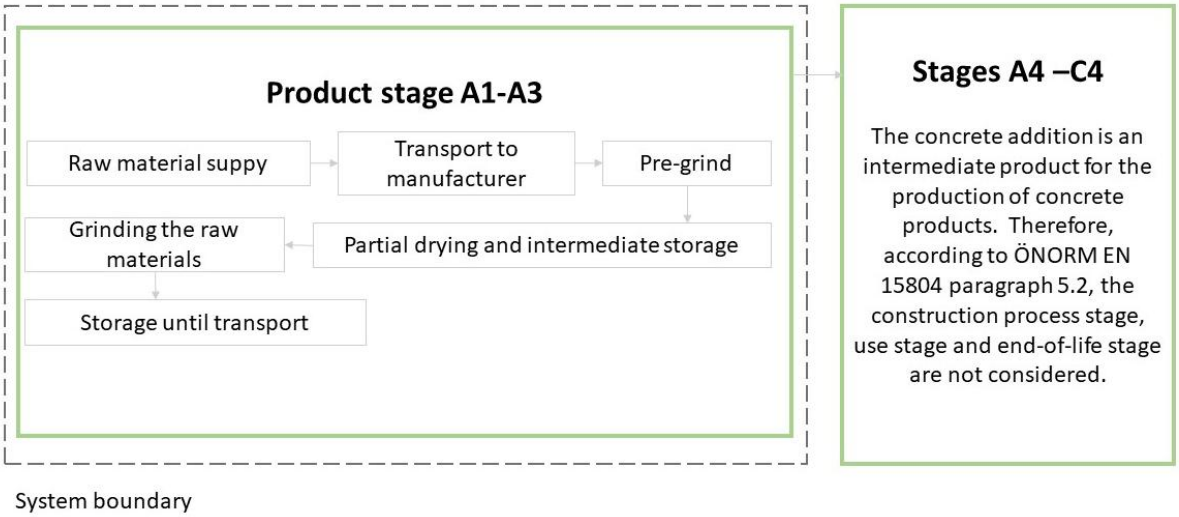

Figure 2: Flow chart of life cycle stages

3.4 Estimations and assumptions

No further estimations or assumptions have been made.

3.5 Cut-off criteria

All input and output flows in the production stage have been considered. The manufacturing of the plant was excluded due to its very low impact.

3.6 Data sources

All background data for the input and output flows were taken from the ecoinvent v3.9.1 - allocation, cut-off by classification database.

3.7 Data quality

The foreground data was transmitted via Excel tables and dosing protocols. Queries were clarified in an iterative process in writing via e-mail or by telephone. The completeness and plausibility of the manufacturer's data was checked on site as part of a visit to the production site.

A consistent and standardised calculation method in accordance with ISO 14044 was applied. In the absence of specific data, generic data sets were used. When selecting the background data, attention was paid to the technological, geographical and time-related representativeness of the data basis. The background database ecoinvent 3.9.1 was published in 2023, but contains individual datasets whose survey or reference year dates back more than 10 years (requirement EN 15804 or Bau EPD GmbH). These datasets have been included in the various ecoinvent database versions over the years, considering necessary adjustments for database updates. Nevertheless, these data sets are subject to a corresponding potential for fluctuation because (technological) developments in recent years are not always reflected in them.

3.8 Reporting period

As production data for a full year is not yet available for the product, the data in this EPD relates to the production period from December 2023 to March 2024.

3.9 Allocation

An economic allocation was carried out for the production of the by-product from the metal industry in accordance with EN 15804. The information on the price of the corresponding products was taken from a study from 2011 for a Brazilian steelwork [Ruschi 2011], as no more recent data is available. The share of the burdens assigned to the by-product is well below 1%.

3.10 Comparability

In principle, a comparison or evaluation of EPD data is only possible under certain conditions. All data sets to be compared must have been created in the same version of EN 15804, the same programme-specific PCR or any additional rules. The same background database must also have been used, the building context or product-specific performance characteristics must have been considered.

4 LCA: Scenarios and additional technical information

4.1 A1-A3 product stage

According to ÖNORM EN 15804, no technical scenario information is required for stages A1-A3, as the balancing of these stages is the responsibility of the manufacturer and may not be changed by the user of the LCA.

4.2 A4-A5 Construction process stage

No accounting is performed in accordance with PCR-B and EN 15804.

4.3 B1-B7 use stage

No accounting is performed in accordance with PCR-B and EN 15804.

4.4 C1-C4 End-of-Life stage

No accounting is performed in accordance with PCR-B and EN 15804.

4.5 D Potential of reuse and recycling

No accounting is performed in accordance with PCR-B and EN 15804.

5 LCA: results

Table 6: Parameters to describe the environmental impact

Parameter	unit	A1-A3
GWP total	kg CO_2 eq.	26,2
GWP fossil fuels	kg CO_2 eq.	26,1
GWP biogenic	kg CO_2 eq.	0
GWP luluc	kg CO_2 eq.	1,65E-02
ODP	kg CFC-11 eq.	8,70E-07
AP	mol H^+ eq.	8,61E-02
EP freshwater	kg P eq.	1,44E-03
EP marine	kg N eq.	3,54E-02
EP terrestrial	mol N eq.	3,82E-01
POCP	kg NMVOC eq.	1,33E-01
ADPE	kg Sb eq.	3,02E-05
ADPF	MJ H_u	3,69E+02
WDP	m3 Welt eq. entz.	1,44E+00
Legend		GWP = Global warming potential; luluc = land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources WDP = Water (user) deprivation potential, deprivation-weighted water consumption

Table 7: Additional environmental impact indicators

Parameter	Unit	A1-A3
PM	disease incidence	9,47E-07
IRP	kBq U235 eq.	4,29E-01
ETP-fw	CTUe	8,60E+01
HTP-c	CTUh	9,98E-09
HTP-nc	CTUh	1,05E-07
SQP	dimension-less	1,36E+02
Legend		PM = Potential incidence of disease due to Partuculate Matter emissions; IRP = Potential Human exposure efficiency, relative to U235; ETP-fw = Potential Comparative Toxic Unit for ecosystems; HTP-c = Potential Comparative Toxic Unit for humans – cancer effect; HTP-nc = Potential Comparative Toxic Unit for humans – non-cancer effect; SQP = Potential soil quality index

Table 8: Parameters to describe the use of resources

Parameter	unit	A1-A3
PERE	MJ, net calorific value	2,91E+02
PERM	MJ, net calorific value	0,00E+00
PERT	MJ, net calorific value	2,91E+02
PENRE	MJ, net calorific value	3,69E+02
PENRM	MJ, net calorific value	0,00E+00
PENRT	MJ, net calorific value	3,69E+02
SM	kg	0,00E+00
RSF	MJ, net calorific value	0,00E+00
NRSF	MJ, net calorific value	0,00E+00
FW	m^3	ND*
Legend		PERE = Renewable primary energy as energy carrier; PERM = Renewable primary energy resources as material utilization; PERT = Total use of renewable primary energy resources; PENRE = Non-renewable primary energy as energy carrier; PENRM = Non-renewable primary energy as material utilization; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of fresh water
*Not declared: the ecoinvent datasets do not allow a complete recording of the use of freshwater resources		

Table 9: Parameters describing LCA-output flows and waste categories

Parameter	unit	A1-A3
HWD	kg	1,94E-03
NHWD	kg	8,49E+00
RWD	kg	1,95E-04
CRU	kg	0,00E+00
MFR	kg	0,00E+00
MER	kg	0,00E+00
EEE	MJ	0,00E+00
EET	MJ	0,00E+00
Legend		HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electric energy; EET = Exported thermal energy

Table 10: Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit
Biogenic carbon content in product	0 kg C
Biogenic carbon content in accompanying packaging	0 kg C
NOTE 1 kg biogenic carbon is equivalent to 44/12 kg of CO2	

Table 11 presents disclaimers which shall be declared in the project report and in the EPD with regard to the declaration of relevant core and additional environmental impact indicators according to the following classification. That can be declared in a footnote in the EPD.

Table 11: Classification of disclaimers to the declaration of core and additional environmental impact indicators

ILCD-classification	Indicator	disclaimer
ILCD-Type 1	Global warming potential (GWP)	none
	Depletion potential of the stratospheric ozone layer (ODP)	none
	Potential incidence of disease due to PM emissions (PM)	none
ILCD-Type 2	Acidification potential, Accumulated Exceedance (AP)	none
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	none
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	none
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	none
	Formation potential of tropospheric ozone (POCP)	none
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD-Type 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2
Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.		
Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.		

6 LCA: Interpretation

The results of the life cycle assessment are mainly influenced by the thermal processing and transport of the raw material. Thermal processing dominates the GWP fossil, ODP and ADPF indicators, accounting for more than half of the impacts in each case (54–71 %). The transport of the metallurgical by-product has the greatest impact on the remaining impact assessment indicators. The transport of the main input material causes an average of around 10 % in the individual categories, primarily due to the significantly lower distance. The remaining material and energy flows, such as internal transport or the provision of electricity, play a subordinate role.
The results for resource use also show a similar picture, at least for non-renewable resources. The PENRT indicator is also dominated by thermal processing and the transport of raw materials. The use of renewable resources is caused almost exclusively by the electricity used in the plant, as this is generated renewably and the remaining input materials contain little to no renewable energy.

7 Literature

ISO 14025
ÖNORM EN ISO 14025:2010-07-01: Environmental labels and declarations - Type III environmental declarations - Principles and procedures

ISO 14040
ÖNORM EN ISO 14040:2021-03-01: Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006 + Amd 1:2020)

ISO 14044
ÖENORM EN ISO 14044:2021-03-01 Environmental management - Life cycle assessment - Requirements and guidelines (ISO 14044:2006 + Amd 1:2017 + Amd 2:2020)

EN 15804
ÖNORM EN 15804:2022-02-15: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

EN 16449
ÖNORM EN 16449:2014-04-15: Wood and wood-based products - Calculation of the biogenic carbon content of wood and conversion to carbon dioxide

EN 16485
ÖNORM EN 16485:2014-05-01: Round and sawn timber - Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction

Bau-EPD (2023)
Management-System Handbook. Quality Management and Verification. General Product Category Rules for EPD.General LCA Calculation Rules for EPDs. Version: 5.0.0. Date 2023-09-20

Ruschi (2011)
Ruschi, M. und Oliverira, B. und Silva, M. und Silva, V. (2011). Influence of impact allocation between steel and ist slags on their potential use in the construction sector. Helsinki, Finnland.

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8.3 Abbreviations

8.3.1 Abbreviations as per EN 15804

EPD	environmental product declaration
PCR	product category rules
LCA	life cycle assessment
LCI	life cycle inventory analysis
LCIA	life cycle impact assessment
RSL	reference service life
ESL	estimated service life
EPBD	Energy Performance of Buildings Directive
GWP	global warming potential
ODP	depletion potential of the stratospheric ozone layer
AP	acidification potential of soil and water
EP	eutrophication potential
POCP	formation potential of tropospheric ozone
ADP	abiotic depletion potential

8.3.2 Abbreviations as per corresponding PCR

CE-mark	french: Communauté Européenne or Conformité Européenne = EC certificate of conformity
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals

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