Environmental Product Declaration



In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Precast concrete elements – stairs and landings

From





Programme: Programme operator: EPD registration number: Publication date: Valid until: The International EPD® System, <u>www.environdec.com</u> EPD International AB S-P-03868 2021-05-27 2026-05-27

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



EPD[®]

Company information

Owner of the EPD: Elematus, JSC

Contact: tomas@elematus.lt

<u>Description of the organisation:</u> Company was founded in 2016-07-08. ELEMATUS company is certified producer and designer of precast concrete elements – stairs and landings. Precast concrete elements are being used in factories, schools, hospitals, and residential buildings. Our company has all required certificates to sell products in EU countries. Almost 100% of production is being exported to Sweden.

<u>Product-related or management system-related certifications:</u> Precast concrete elements comply with the requirements of the European Union (EU), health and environmental protection and are marked with the CE mark. Products are certified and complies with the following European Union regulations:

1. EN14843:2007 Precast concrete products. Stairs.

2. EN13369:2004 +EN13369:2004/A1:2006 together with supplementary Swedish requirements. Producer is authorized to use Nordcerts registered BBC mark.

<u>Name and location of production site(s)</u>: The manufacturing plant of Elematus is based in Vilnius district (Lithuania).

Product information

Product name: precast concrete elements - stairs and landings.

<u>Product identification:</u> Precast concrete elements – stairs and landings - comply with the requirements of the European Union (EU), health and environmental protection regulations and are marked with the CE mark. Products are certified and complies with EN14843:2007 (Precast concrete products. Stairs) standard and EN13369:2004 +EN13369:2004/A1:2006 together with supplementary Swedish requirements. Producer is authorized to use Nordcerts registered BBC mark.

Product description: ELEMATUS company produces precast concrete elements - stairs and landings. Stair elements can be different shapes: straight, spiral, U-shaped. All stairs and landings can have different finished surface. Bottom and sides of the product always have smooth surface, while top can have different options. Top of the elements can be covered with terrazzo tiles or can be kept with smooth concrete. Precast concrete elements are being used in factories, schools, hospitals, and residential buildings. Elements can be used inside and outside of





building. Stair elements can used as way to move between floors or as emergency way, when using elevator is not recommended. UN CPC code: 375

Geographical scope: Europe

LCA information

<u>Functional unit / declared unit:</u> In accordance with the PCR the declared unit is 1 metric tonne of the product.

Reference service life: Precast concrete elements reference service life is 50 -100 years.

<u>Time representativeness</u>: Primary data were collected internally. The production data refer to an average of the year 2020.

<u>Database(s) and LCA software used:</u> The Ecoinvent database provides the life cycle inventory data for the raw and process materials obtained from the background system. The used database is Ecoinvent 3.6. The LCA software used is One Click LCA.

<u>Description of system boundaries:</u> Cradle to gate with options. The LCA was carried out considering the Product stage phases (A1-A2-A3), Distribution (A4), End of life (C2-C3-C4), Potential environmental benefits (D) in accordance with EN 15804.

<u>Data quality:</u> The foreground data collected internally is based on yearly production amounts and extrapolations of measurements on specific machines and plants. Overall, the data quality can be described as good. The primary data collection has been done thoroughly.

<u>Cut-off criteria</u>: Life cycle inventory data for a minimum of 99% of total material and energy input flows have been included in the life cycle analysis. Although only materials having in summa less than 1% of weight of product were not used in calculations.

Resource Product Construction Use stage End of life stage recovery stage process stage stage teuse-Recovery-Recyclingconstruction demolitior Construction installatior use Derational water use material supply perational energy processing **Aanufacturing** *tefurbishment* Replacement tenance ransport ransport ransport Disposal otential aste | tepair laint Raw Jse Module A2 A3 A5 **B1 B2 B4 B5 B6 B**7 C1 C2 C4 D A1 A4 **B**3 C3 Modules MND MND MND MND MND MND MND MND х х х х х declared

System boundary:

Description of the system boundary (X = Included in LCA; MND = Module Not declared)

Product stage:

A1: This stage considers the extraction and processing of raw materials as well as energy consumption. A2: The raw materials are transported to the manufacturing plant. In this case, the model includes road transportation of each raw material.

A3: This stage includes the manufacture of products and packaging. It also considers the energy consumption and waste generated in the production plant.

Production process description

Production of precast concrete stairs and landings begin with 3D geometry model. Then using special programs reinforcement carcass is being calculated. Later designer makes drawings for element and drawing for mould. After receiving drawings mould for element is being made and reinforcement carcass bent and hand tightened. Then carcass is being put to mould and casted with concrete. On the next day element is being demoulded, checked for quality and geometry, and sent to storage yard. Metal waste generated during production is sorted and send to recycling utilities.

Construction process stage:

A4: This stage includes transportation from the production gate to the construction site where the product shall be installed.

Transportation is calculated based on data form manufacturer and a scenario with the parameters described in the following table.

Parameter	Value/Description
Vehicle type used for transport	EURO 5 truck with a trailer with an average load of 32t and container ship
Distance	100% of production: Truck – 571 km; Ship - 318 km.
Capacity utilization	56 % of the capacity in volume (truck) 50 % of the capacity in volume (ship)

Use stage:

In normal use scenario, it is assumed that no maintenance (B2), repair (B3), replacement (B4) and refurbishment (B5) is needed.

End of Life stage:

This stage includes the following modules:

C1, Deconstruction, dismantling, demolition.

Consumption of fuel in demolition process is calculated according to transported mass. Energy consumption for demolition is 10 kWh. The source of energy is diesel fuel used by work machines.

C2, Transport of the discarded product to the processing site

Concrete and steel mixture is transported to the processing site. Materials are transported by truck. A transportation distance of 50 km has been considered.

C3, Waste processing for reuse, recovery and/or recycling



Based on European average 90% of steel and 70 % of concrete are transformed into secondary material in a recycling plant.

C4, Discharge (disposal)

10% of the steel cannot be separated and are assumed to be landfilled. 30 % of concrete also considered as landfilling.

Benefits and loads beyond the system boundary (D):

Benefits of recyclable waste generated in the phase C3 are considered in the phase D. The recycled steel and concrete have been modelled to avoid use of primary materials. The scrap content in the studied product has been acknowledged and only the mass of primary steel in the product provides the benefit in order to avoid double counting. If amount of primary materials are higher than 90% of steel which is recycled, there is no benefit in D stage. As for concrete case, all amount of recycled concrete is considered as a benefit.

Content information

Product components	Weight, %
Reinforcement steel	5
Concrete	95
TOTAL	100

No dangerous substances from the candidate list of SVHC for Authorisation are used in the product.

Packaging

In very rear occasions products are packed in geotextile. After use, packaging materials can be re-used or recycled.

Environmental Information

Note: Environmental impacts according to EN 15804+A1, CML/ISO 21930 are presented below

Potential environmental impact – mandatory indicators according to 15804:2012+A2:2019

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1,54E+02	4,295E-2	4,74E+01	2,01E+02	5,49E+01	3,30E+00	4,55E+00	3,71E+00	1,53E+00	-5,568E0
GWP-fossil	kg CO2 eq.	1,53E+02	4,291E-2	4,43E+01	1,97E+02	5,49E+01	3,30E+00	4,54E+00	3,77E+00	1,53E+00	-5,493E0
GWP-biogenic	kg CO ₂ eq.	1,06E+00	3,116E-5	2,93E+00	3,99E+00	3,678E-2	9,168E-4	3,3E-3	-6,291E-2	3,028E-3	-6,786E-2
GWP-luluc	kg CO2 eq.	1,442E-1	1,291E-5	1,773E-1	3,215E-1	1,766E-2	2,785E-4	1,368E-3	1,485E-3	4,535E-4	-7,131E-3
ODP	kg CFC 11 eq.	1,176E-5	1,009E-8	7,34E-6	1,912E-5	1,28E-5	7,119E-7	1,068E-6	7,342E-7	6,289E-7	-4,982E-7
АР	mol H⁺ eq.	6,134E-1	1,802E-4	3,775E-1	9,911E-1	3,154E-1	3,448E-2	1,909E-2	4,129E-2	1,45E-2	-3,592E-2
EP-freshwater	kg P eq.	4,156E-3	3,491E-7	2,115E-3	6,271E-3	4,356E-4	1,333E-5	3,697E-5	8,736E-5	1,845E-5	-3,528E-4
EP-marine	kg N eq.	1,638E-1	5,431E-5	1,3E-1	2,938E-1	8,962E-2	1,523E-2	5,752E-3	1,526E-2	4,991E-3	-7,577E-3
EP-terrestrial	mol N eq.	1,87E+00	5,998E-4	1,46E+00	3,33E+00	9,915E-1	1,67E-1	6,352E-2	1,693E-1	5,497E-2	-9,99E-2
POCP	kg NMVOC eq	5,489E-1	1,929E-4	4,07E-1	9,561E-1	3,022E-1	4,592E-2	2,042E-2	4,648E-2	1,597E-2	-2,522E-2
ADP-minerals & metals*	kg Sb eq.	8,816E-3	7,322E-7	3,235E-4	9,14E-3	9,077E-4	5,034E-6	7,754E-5	6,557E-5	1,396E-5	-6,065E-4
ADP-fossil*	MJ	1,42E+03	6,674E-1	7,11E+02	2,13E+03	8,45E+02	4,54E+01	7,07E+01	5,20E+01	4,27E+01	-7,875E1
WDP	m³	6,35E+01	2,483E-3	2,24E+01	8,59E+01	3,08E+00	8,462E-2	2,629E-1	2,867E-1	1,97E+00	-9,823E0
Acronyms	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, Accumulated Exceedance; EP- freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of										

onyms use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EPfreshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

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

Use of resources

Use of resources per functional of declared unit											
Indicator	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	1,02E+02	8,401E-3	6,15E+02	7,17E+02	1,04E+01	2,454E-1	8,897E-1	2,61E+00	3,452E-1	-6,723E0
PERM	MJ	0,00E+00	0,00E+00	3,87E+02	3,87E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,02E+02	8,401E-3	1,00E+03	1,10E+03	1,04E+01	2,454E-1	8,897E-1	2,61E+00	3,452E-1	-6,723E0
PENRE	MJ	1,42E+03	6,674E-1	7,15E+02	2,13E+03	8,45E+02	4,54E+01	7,07E+01	5,20E+01	4,27E+01	-7,875E1
PENRM	MJ	0,00E+00									
PENRT	MJ	1,42E+03	6,674E-1	7,15E+02	2,13E+03	8,45E+02	4,54E+01	7,07E+01	5,20E+01	4,27E+01	-7,875E1
SM	kg	4,51E+01	0,00E+00	0,00E+00	4,51E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00									
NRSF	MJ	0,00E+00									
FW	m ³	3,11E+00	1,39E-4	7,905E-1	3,90E+00	1,717E-1	4,007E-3	1,472E-2	9,515E-3	4,671E-2	-7,847E-1
	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary										

Acronyms
PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PENM = Use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources; PENRE = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of non-renewable primary energy resources; NRSF = 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 net fresh water

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Waste production and output flows

Waste production

	Results per functional or declared unit										
Indicator	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1,44E+01	6,486E-4	1,69E+00	1,61E+01	8,291E-1	4,882E-2	6,869E-2	0,00E+00	3,983E-2	-4,106E-1
Non- hazardous waste disposed	kg	2,14E+02	7,175E-2	9,11E+01	3,05E+02	8,73E+01	5,218E-1	7,60E+00	0,00E+00	2,90E+02	-1,681E1
Radioactive waste disposed	kg	6,347E-3	4,582E-6	3,942E-3	1,029E-2	5,809E-3	3,177E-4	4,852E-4	0,00E+00	2,825E-4	-3,628E-4

Output flows

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00									
Material for recycling	kg	0,00E+00	0,00E+00	1,40E+00	1,40E+00	0,00E+00	0,00E+00	0,00E+00	7,10E+02	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00									
Exported energy	MJ	0,00E+00									

Environmental impacts - EN 15804+A1, CML / ISO 21930

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4 SWE (3)	C1	C2	C3	C4	D
GWP	kg CO ₂ eq.	1,50E+02	4,253E-2	4,72E+01	1,98E+02	5,44E+01	3,272E-3	4,504E-3	3,73E+00	1,50E+00	-5,376E0
ODP	kg CFC 11 eq.	9,928E-6	8,018E-9	6,388E-6	1,632E-5	1,017E-5	5,634E-10	8,491E-10	5,902E-7	4,983E-7	-4,546E-7
АР	mol H⁺ eq.	4,039E-1	8,73E-5	1,683E-1	5,722E-1	1,835E-1	4,866E-6	9,246E-6	1,229E-2	6,043E-3	-2,211E-2
EP	kg PO₄ ³⁻ eq.	1,744E-1	1,764E-5	6,408E-2	2,385E-1	2,999E-2	8,573E-7	1,868E-6	4,107E-3	1,169E-3	-1,189E-2
POCP	kg Ethenee	2,777E-2	5,532E-6	1,359E-2	4,136E-2	8,718E-3	5,011E-7	5,858E-7	7,966E-4	4,431E-4	-1,806E-3
ADP- minerals & metals*	kg Sb eq.	8,816E-3	7,322E-7	3,235E-4	9,14E-3	9,077E-4	5,034E-9	7,754E-8	6,557E-5	1,396E-5	-6,065E-4
ADP-fossil*	MJ	1,42E+03	6,674E-1	7,11E+02	2,13E+03	8,45E+02	4,537E-2	7,068E-2	5,20E+01	4,27E+01	-7,875E1
	GWP = Global Warming Potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential; EP = Eutrophication potential;										

Acronyms GWP = Global Warming Potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential; EP = Eutrophication potential; POCP = Formation of ozone of lower atmosphere; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

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

Programme information

Programme:	The International EPD [®] System					
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden					
Website: www.environdec.com						
E-mail:	info@environdec.com					

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product category rules (PCR): PCR 2019:14 Construction products (version 1.1) Complementary PCR (c-PCR): c-PCR-003 (to PCR 2019:14) – Concrete and concrete elements, version 2019-12-20

This

PCR review was conducted by: The International EPD® System

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

 \Box EPD process certification \boxtimes EPD verification

Third party verifier: Silvia Vilčeková

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

⊠ Yes □ No

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.

References

- General Programme Instructions of the International EPD® System. Version 3.01.
- PCR 2019:14 Construction products (version 1.1)
- c-PCR-003 (to PCR 2019:14) Concrete and concrete elements, version 2019-12-20
- EN 15804:2012+A2:2019 Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.
- ISO 14044:2006 Environmental management. Life Cycle Assessment. Requirements and guidelines.
- ISO 14025:2010 Environmental labels and declarations. Type III environmental declarations. Principles and procedures.
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

Tools and database

- One Click LCA tool
- Ecoinvent 3.6 database

Contact information

EPD owner:



Elematus, JSC https://www.elematus.lt



LCA author:

Sustainability Consulting Vesta Consulting, UAB https://www.vestaconsulting.lt/



Programme operator:

https://www.environdec.com