Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Concrete blocks

from

CITY STONE DESIGN s.r.o.

EPD of multiple sites, based on average results

CITYSTONEDESIGN®

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-13340
Publication date:	2024-04-12
Valid until:	2029-04-11

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

General information

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

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 CONSTRUCTION PRODUCTS, version 1.3.2
PCR review was conducted by: The Technical Committee of the International EPD® System. Chair of the PCR review is Claudia A. Peña. The review panel may be contacted via info@environdec.com
Life Cycle Assessment (LCA)
LCA accountability: LCA Studio s.r.o. Ing. Petra Kšenžighová, Ing. et Ing. Tatiana Trecáková, PhD., prof. Ing. Vladimír Kočí, Ph.D.,MBA Šárecká 1962/5, 16000 Prague 6, Czech Republic, www.lcastudio.cz LCA Studio
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: prof. Ing. Silvia Vilčeková, Ph.D., Silcert, s.r.o. 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 registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: CITY STONE DESIGN s.r.o.
Contact: Ing. Dušan Malárik; malarik@citystonedesign.sk
Description of the organisation: City Stone Design is a Slovak manufacturer of concrete paving and concrete fence elements. Outdoor space is the domain of CITY STONE DESIGN and nature is the main source of inspiration.
Name and location of production site(s): Areál IN VEST 1179, Šaľa 927 03, Slovak Republic; Cintorínska 4, 044 10 Geča, Slovak Republic

Product information

Product name: Concrete blocks
Product identification: Industrial elements and curbs, ecological pavements, pavements and slabs manufactured in accordance with STN EN 1338 and STN EN 1339, STN EN 1340 in standard, ground, shot-blasted and artificially sharpened surface treatments: Naturo, Senso, Antico.
Product description: Concrete paving blocks and their supplementary elements are used for communications, pedestrian zones and public spaces, areas for pedestrians, cycling roads, roads for cars up to 3.5 t, stopping and parking areas for cars up to 3.5 t and for trucks over 3.5 t, bus stations, public transport stops, petrol filling stations. Permeable pavement structures - areas where rainwater is drained into the subsoil of the area. Products shall be installed in accordance with the manufacturer's instructions and project documentation.

Table 1: Declared parameters

Properties	**Parameters**	
Fortress		
Transverse tensile strength	>3,6 (MPa)	
Fracture load	> 250 (N/mm^2)	
Physical properties	**class**	**marking**
Absorption	2	B
Frost hardiness	3	D
Resistance to abrasion	4	I
Skid/slip resistance	sufficient	
Hazardous substances	not include	
Reaction to fire	class A1	

UN CPC code: 3754 Tiles, flagstones, bricks and similar articles, of cement, concrete or artificial stone
Geographical scope: Global, Slovak Republic

LCA information

Functional unit / declared unit: Declared unit is 1m^2 of the concrete blocks with a thickness of 6 cm.

Table 2: Declared unit

	Value	**Unit**
Declared unit	1	m^2
Weight	135	kg/m^2
Conversion factor per 1 kg (weight per declared unit)	0,0074	-

Time representativeness: Site specific data from producer are based on 1 year average for process data (reference year 2022). Time scope less than 10-years were applied for background data. Time scope less than 2-years were applied for specific data.

Database(s) and LCA software used: LCA for Experts (Sphera), Sphera database and ecoinvent database.

Description of system boundaries:
This EPD is based on system boundary cradle to gate, modules C1–C4, module D and with optional modules A4-A5.
The system boundary covers the production of raw materials, all relevant transport down to factory gate, manufacturing by CITY STONE DESIGN, Slovak Republic, transport from the CITY STONE DESIGN plant to the site (150 km) and installation of concrete blocks including product unpacking, deconstruction of the concrete blocks, transport of deconstructed materials, treatment of produced waste.

System diagram:

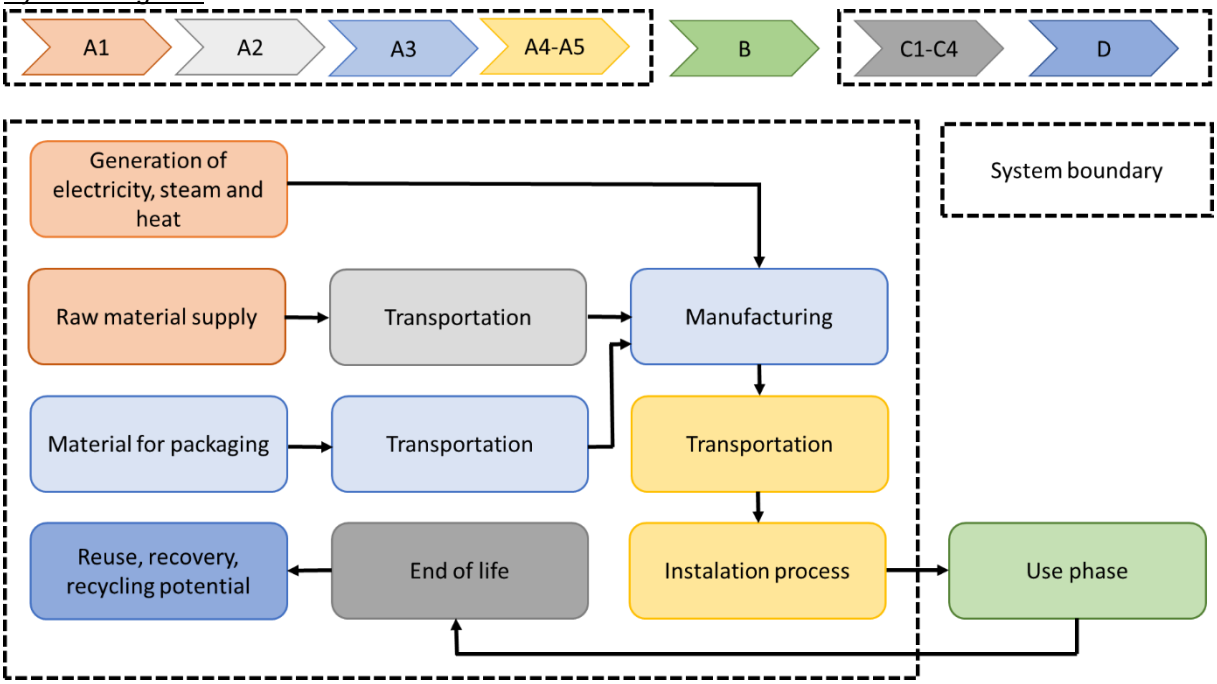

Figure 1 System boundary of the LCA study conducted on production of concrete blocks

Cut off rules: The cut-off criterion was chosen based on the used PCR. According to the used PCR, more than 95 % of flows were included.

Allocations: Specific inputs and outputs were measured or calculated for specific product. The allocation of common inputs (thermal energy) and outputs (waste, emissions) is based on the general allocation rule what represents the proportion of production of every specific product in overall production expressed in pieces.

Secondary concrete is used as a raw material for the production of concrete blocks. General content of steel and iron scrap used in steel, cold rolled production. Secondary polyethylene granulate is used in the production of plastics packaging. No secondary fuels used during the production. Generic process data for the production of input materials and components were used.

Electricity mix: Sphera DB process of Slovak residual grid mix is used for production process in City Stone Design. The used dataset has impact of 0,27 kg CO_2 eq./kWh. for GWP-GHG indicator.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	x	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	GLO	GLO	SVK	GLO	GLO	NR	NR	NR	NR	NR	NR	NR	GLO	GLO	GLO	GLO	GLO
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Cement	21,1349	0	0
Secondary concrete	6,2698	0	0
Natural stone	104,0036	0	0
Concrete admixture	0,1542	0	0
Others	0,2071	0	0
Water	3,2304	0	0
TOTAL	135,0000	0	0
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Low density polyethylene film	0,0222	0,0164	0
Polyethylene terephthalate	0,0279	0,0207	0
Steel, cold rolled	0,0005	0,0004	0
Polyethylene tape	0,0050	0,0037	0
Low density polyethylene granulate	0,0002	0,0001	0
Low density polyethylene granulate secondary	0,0125	0,0093	0
Polyethylene foam	0,0009	0,0007	0
TOTAL	0,0691	0,0512	0

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per results per 1 m^2 of concrete blocks
No substances from the SVHC list to report.			

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Results per 1 m^2 of concrete blocks									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	1,65E+01	1,94E+00	2,53E-01	8,19E-02	1,29E+00	0,00E+00	6,00E-01	-7,25E-02
GWP-biogenic	kg CO_2 eq.	-1,19E-01	-2,87E-02	-1,11E-03	-1,12E-03	-1,91E-02	0,00E+00	1,54E-01	-7,38E-05
GWP-luluc	kg CO_2 eq.	8,06E-03	1,80E-02	7,50E-04	7,47E-04	1,20E-02	0,00E+00	1,89E-03	-3,55E-06
GWP-total	kg CO_2 eq.	1,63E+01	1,93E+00	2,53E-01	8,15E-02	1,28E+00	0,00E+00	7,56E-01	-7,26E-02
ODP	kg CFC 11 eq.	6,10E-10	1,70E-13	4,06E-14	7,06E-15	1,13E-13	0,00E+00	1,56E-12	-3,53E-13
AP	mol H^+ eq.	3,19E-02	2,52E-03	4,34E-04	4,13E-04	1,68E-03	0,00E+00	4,32E-03	-7,47E-05
EP-freshwater	kg P eq.	2,68E-05	7,07E-06	3,03E-07	2,94E-07	4,71E-06	0,00E+00	1,23E-06	-1,84E-08
EP-marine	kg N eq.	1,09E-02	8,86E-04	2,00E-04	1,94E-04	5,90E-04	0,00E+00	1,12E-03	-2,40E-05
EP-terrestrial	mol N eq.	1,17E-01	1,06E-02	2,25E-03	2,15E-03	7,08E-03	0,00E+00	1,23E-02	-2,60E-04
POCP	kg NMVOC eq.	3,01E-02	2,18E-03	5,62E-04	5,45E-04	1,45E-03	0,00E+00	3,36E-03	-6,90E-05
ADP-minerals&metals*	kg Sb eq.	3,13E-06	1,26E-07	5,53E-09	5,24E-09	8,39E-08	0,00E+00	2,82E-08	-4,64E-09
ADP-fossil*	MJ	9,14E+01	2,64E+01	1,17E+00	1,10E+00	1,76E+01	0,00E+00	8,10E+00	-1,37E+00
WDP*	m^3	5,87E-01	2,15E-04	7,27E-04	0,00E+00	2,26E-06	0,00E+00	6,66E-02	-2,70E-03
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 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.*

Additional mandatory and voluntary impact category indicators

Results per 1 m² of concrete blocks									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	1,65E+01	1,96E+00	2,54E-01	8,28E-02	1,31E+00	0,00E+00	6,93E-01	-7,26E-02
Particulate matter	Disease incidences	4,65E-07	1,68E-08	4,93E-09	4,66E-09	1,12E-08	0,00E+00	5,31E-08	-6,61E-10
Ionising radiation, human health	kBq U235 eq.	7,78E-01	4,93E-03	5,82E-04	2,05E-04	3,29E-03	0,00E+00	1,04E-02	-1,84E-02
Ecotoxicity fresh water	CTUe	3,70E+01	1,86E+01	8,22E-01	7,72E-01	1,24E+01	0,00E+00	4,38E+00	-7,99E-02
Human toxicity, cancer	CTUh	2,65E-09	3,74E-10	1,82E-11	1,56E-11	2,49E-10	0,00E+00	6,80E-10	-8,99E-12
Human toxicity, non-cancer	CTUh	2,36E-07	1,65E-08	9,08E-10	6,89E-10	1,10E-08	0,00E+00	7,18E-08	-3,28E-10
Land Use	Pt	2,78E+01	1,10E+01	4,76E-01	4,57E-01	7,33E+00	0,00E+00	2,04E+00	-7,08E-02

Resource use indicators

Results per 1 m² of concrete blocks									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,78E+01	1,87E+00	9,59E-02	7,76E-02	1,24E+00	0,00E+00	1,33E+00	-1,11E-01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,78E+01	1,87E+00	9,59E-02	7,76E-02	1,24E+00	0,00E+00	1,33E+00	-1,11E-01
PENRE	MJ	9,15E+01	2,64E+01	1,18E+00	1,10E+00	1,76E+01	0,00E+00	8,11E+00	-1,37E+00
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	9,15E+01	2,64E+01	1,18E+00	1,10E+00	1,76E+01	0,00E+00	8,11E+00	-1,37E+00
SM	kg	6,63E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	2,57E-02	2,06E-03	4,72E-04	8,55E-05	1,37E-03	0,00E+00	2,04E-03	-1,68E-04
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water								

Waste indicators

Results per 1 m^2 of concrete blocks									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	4,10E-04	9,78E-11	4,67E-12	4,07E-12	6,52E-11	0,00E+00	1,75E-10	-1,63E-10
Non-hazardous waste disposed	kg	4,65E+00	3,81E-03	1,57E-02	1,58E-04	2,54E-03	0,00E+00	4,05E+01	-3,27E-04
Radioactive waste disposed	kg	6,88E-03	3,42E-05	4,16E-06	1,42E-06	2,28E-05	0,00E+00	9,11E-05	-1,26E-04

Output flow indicators

Results per 1 m^2 of concrete blocks									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	5,85E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-3,11E-01
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,56E-01

References

General Programme Instructions of the International EPD® System. Version 4.1.

Product Category Rules (PCR) document for Construction Products (PCR 2019:14 Version 1.3.2 2024-12-20)

ISO 14020:2000 Environmental labels and declarations — General principles, 2000-09

ISO 14025: EN ISO 14025:2006-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework, 2006-07

ISO 14044:2006 Environmental management — Life cycle assessment — Requirements and guidelines, 2006-07

EN 15804+A2:2019/AC:2021 European Committee for Standardization: Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products, 2021

Ecoinvent: www.ecoinvent.org, ecoinvent database.

Sphera: software LCA for Experts. 2023, Sphera solutions, www.sphera.com

EPD®

www.environdec.com