Environmental Product Declaration

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

DRAINAGE CHANNEL (BIRCOsir NW 200 AS)

from

BIRCO GmbH

Programme:	The International EPD® System, www.environdec.com
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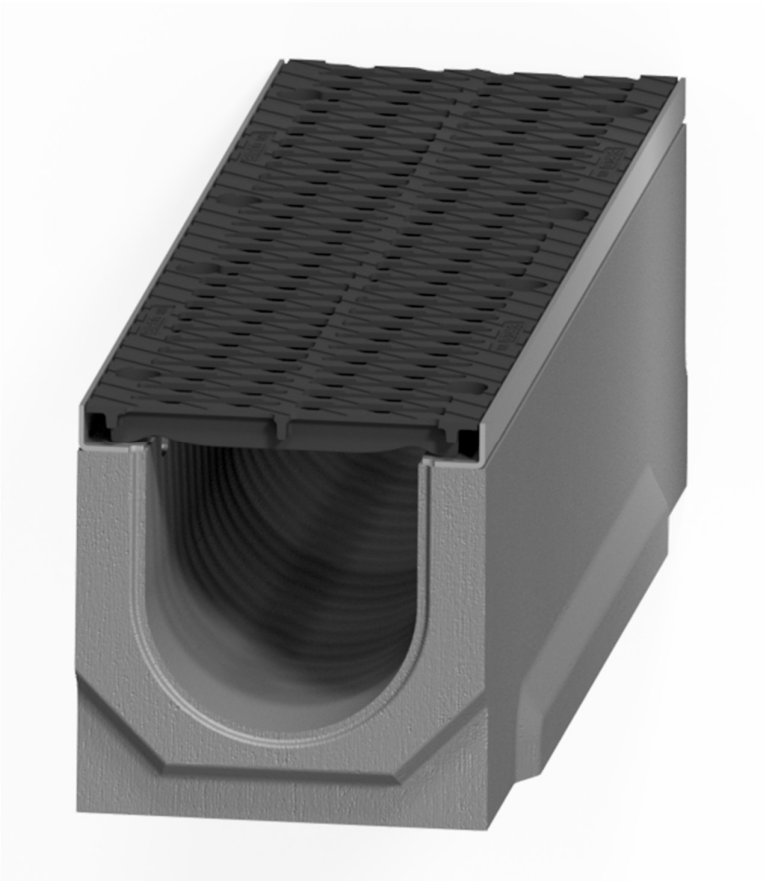

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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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 VERSION 1.3.1 (2023-07-08), C-PCR-003 (2023-01-02) UN CPC code 375*
PCR review was conducted by: *Technical Committee of the International EPD® System. A full list of members available on www.environdec.com. The review panel may be contacted via info@environdec.com. No chair of the PCR review was appointed for this version. Chair of the PCR review for version 1.2: Claudia A. Peña*
Life Cycle Assessment (LCA)
LCA accountability: *Dr. Christine Wenk, Neosys AG, Privatstrasse 10, 4563 Gerlafingen, Switzerland*
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: *Angela Schindler, Tüfinger Str. 12, 88682 Salem, Germany* 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: BIRCO GmbH
Contact: Patrik Kist, p.kist@birco.de, www.birco.de
Description of the organisation: BIRCO was founded in 1927 as a coal and building materials supplier. As early as the 1950s, the first concrete drainage channels were produced for agricultural use. This triggered the idea of producing drainage channels for traffic areas. In 1965 BIRCO was the first German producer of a concrete channel covered with a mesh grating. The beginning of BIRCO's specializing in solid channel systems for surface drainage was thus marked. Today BIRCO is amongst the leading suppliers of channel systems in Europe. The products are marketed through the company's sales agencies in Germany, France, Belgium, the Netherlands, and Luxembourg. In numerous other countries they are sold through partners and licensees.
The BIRCO channel systems for surface drainage and discharge of aggressive liquids are made of concrete, steel, and PE, and cover a wide range of uses – from areas frequented by heavy-duty vehicles to roof terraces. In addition, BIRCO offers an infiltration system which allows the infiltration of stormwater with the use of only little space. Various cover versions are available for all systems. They include slotted cast gratings, cast mesh gratings, mesh gratings with various mesh widths, slotted and perforated gratings, as well as design-gratings such as the „Wave" and „Ellipse" cast gratings.
Product-related or management system-related certifications: DIN EN ISO 9001, DIN EN ISO 14001, interzero recycling certificate, Member of German Sustianable Building Council
Name and location of production site(s): Production site in 76532 Baden-Baden, Warehouse in 76547 Sinzheim, Germany

Product information

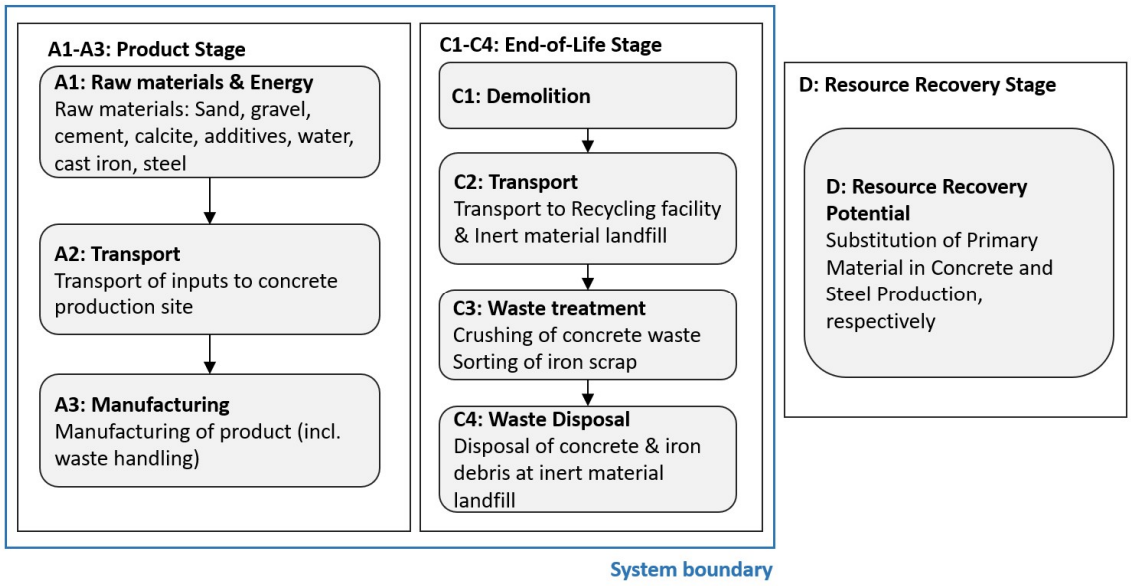
Product name: BIRCOsir NW 200 AS with double slotted grating
Product identification: BIRCOsir NW 200 AS channel 1000 mm height No. 0/0 (article no. 0020226) with double slotted grating class D 400 (article no. 0020274)
Product description: Drainage channel with anchoring system type I – until class D 400, type M until class F 900 according to EN 1433; double slotted grating class D 400 according to EN 1433.
Areas of application: urban development, industrial construction, airports, ports, heavy traffic areas, parking lots also used by lorries, properties with special architectural requirements, based on the broad range of gratings.
The concrete mix is produced at the Baden-Baden site of BIRCO GmbH and cast into drainage channels. The hot-dip galvanized steel frames, the cast grating as well as the stainless-steel screws, which are part of the final product, are purchased as finished components from suppliers.
UN CPC code: 375 Articles of concrete, cement, and plaster.
Geographical scope: The manufacturing stage represents Germany, modules C1-C4 and D represent Europe.

LCA information

Declared unit: The declared unit (DU) is 1 piece of a concrete drainage channel (SIR 200 AS) including hot-dip galvanized steel frames and a cast grating in accordance with EN 15804+A2 chapter 6.3.3.
Reference service life: Not relevant for this EPD.
Time representativeness: Full year of 2022 and 4 months in 2023 for data collected from the factory (primary data) and electricity uses, respectively.
Database(s) and LCA software used: Modelled in Activity-Browser and MS Excel based on Ecoinvent v.3.9.1, system-model 'allocation, cut-off, EN 15804'. Characterisation factors are based on LCIA methods EF v3.1 and EN15804 implemented in Ecoinvent v.3.9.1 with minor modifications to ensure full compliance with EN15804+A2.

Description of system boundaries:
Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D)

System diagram:



Modelling of production stage:

Modules A1-A3 take into account all processes of raw material extraction and preparation, the production of auxiliary materials and additives, the production of packaging material for the drainage channel, all transport associated with the delivery of the raw and auxiliary materials used, the provision of all energy sources and electricity generation, the actual concrete production at the Baden-Baden site, the transport of the finished products to the warehouses at the Sinzheim site, where the drainage channels are stored until they are picked up by customers, the storage of the products, and the treatment of all waste. Module A3 ends at the factory gate at the Sinzheim site.

Energy sources of the electricity used in manufacturing processes:

The electricity used by the manufacturing plant in Baden-Baden is 100% renewable electricity from hydropower. The climate impact of this electricity source was modelled as 0.031 kg CO_2 eq / kWh (GWP-total). This conservatively includes electricity losses during voltage transformation and transmission, and contributions from electricity transmission and transformation infrastructure.

Scenario adopted for modelling the End-of-Life and Resource Recovery Stage

The End-of-Life stage and the Resource Recovery Stage were modelled assuming 56% product deployment in Germany, and 44% in the rest of Europe, and based on the following assumptions:

- Deconstruction / demolition of the drainage channels is carried out with excavators. Diesel is assumed to be the energy source for the working machines. A fuel consumption of 1 L diesel per ton of demolition material is assumed (inclusive of crushing into recycled concrete granulate).
- During the utilization phase and the deconstruction no loss of mass takes place, i.e. the complete mass of the used product is disposed of.
- The total transport distance covered by the demolition material on average is 50 km in Germany and abroad. This includes the transport from the demolition site to a processing plant or a landfill,

as well as the transport between the processing plant and the landfill of the material that is separated as a residual fraction after processing for landfilling.

- Concrete debris are transported by diesel-powered EURO 5 trucks.
- No component of the demolition material can be reused.
- The fraction of demolished concrete processed into recycled concrete granulate is 70%, the recycling fraction of steel is assumed to be 90%
- The remaining 30% of the concrete demolition material and the remaining 10% of the steel will be landfilled.

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	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	Germany			-	-	-	-	-	-	-	-	-	Europe				Europe
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Sand / Gravel	85.4	0	0
Cement	17.2	0	0
Additives	3.9	0	0
Water	3.5	0	0
Steel	5.2	0 *	0
Iron cast	8.4	0 *	0
TOTAL	123.6	0.0	0
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Strapping tape, Polyester	0.002	0.00	0
Packaging film (LDPE)	0.024	0.02	0
TOTAL	0.026	0.02	0

** The assumption of 35% scrap iron input has been used for LCA modelling. This scrap iron input, however, is assumed to be 100% post-industrial material.*

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
none			

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Indicator name and abbreviation (EN)	Unit (EN)	Results per declared unit					
Core environmental impact indicators (MANDATORY)		A1 - A3	C1	C2	C3	C4	D
Global warming potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	4.38E+01	4.24E-01	1.16E+00	6.09E-01	2.09E-01	-1.19E+01
Global warming potential - biogenic (GWP-biogenic)	kg CO_2 eq.	5.24E-02	5.84E-05	3.68E-04	9.81E-04	9.08E-05	-2.82E-03
Global warming potential - land use & land use change (GWP-luluc)	kg CO_2 eq.	2.74E-02	4.76E-05	5.65E-04	3.71E-04	1.26E-04	-3.32E-03
Global warming potential - total (GWP-total)	kg CO_2 eq.	4.39E+01	4.24E-01	1.16E+00	6.11E-01	2.09E-01	-1.19E+01
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	8.76E-07	6.74E-09	2.53E-08	9.65E-09	6.05E-09	-2.83E-07
Acidification potential, accumulated exceedance (AP)	mol H^+ eq.	1.67E-01	3.93E-03	3.79E-03	6.42E-03	1.57E-03	-4.56E-02
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	1.56E-02	1.30E-05	8.14E-05	1.93E-04	1.74E-05	-4.81E-03
Eutrophication potential - marine (EP-marine)	kg N eq.	3.49E-02	1.82E-03	1.30E-03	2.18E-03	6.04E-04	-1.11E-02
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	4.32E-01	1.98E-02	1.38E-02	2.39E-02	6.47E-03	-1.18E-01
Photochemical ozone creation potential (POCP)	kg NMVOC eq.	1.73E-01	5.86E-03	5.67E-03	7.08E-03	2.25E-03	-6.42E-02
Abiotic depletion potential - non-fossil resources (ADPE) *	kg Sb eq.	7.94E-04	1.48E-07	3.82E-06	1.96E-05	2.94E-07	-7.88E-06
Abiotic depletion potential - fossil resources (ADPF) *	MJ	4.03E+02	5.59E+00	1.66E+01	8.16E+00	5.24E+00	-1.25E+02
Water (user) deprivation potential (WDP) *	m^3	1.30E+01	1.38E-02	8.15E-02	7.77E-02	1.63E-02	-8.80E-01

** 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

Indicator name and abbreviation (EN)	Unit (EN)	Results per declared unit					
Additional mandatory environmental impact indicators (MANDATORY)		A1-A3	C1	C2	C3	C4	D
Global warming potential (GWP-GHG)	kg CO_2 eq.	4.39E+01	4.24E-01	1.16E+00	6.11E-01	2.09E-01	-1.19E+01
Additional voluntary environmental impact indicators (OPTIONAL)							
Particulate matter emissions (PM)	Disease incidence	3.01E-06	1.10E-07	9.26E-08	7.04E-07	3.44E-08	-8.51E-07
Ionizing radiation, human health (IRP) **	kBq U235 eq.	3.26E+02	2.63E-03	2.21E-02	3.55E-02	3.29E-03	-1.73E-01
Eco-toxicity - freshwater (ETP-fw) *	CTUe	3.43E+02	2.65E+00	8.14E+00	5.05E+00	2.44E+00	-3.44E+01
Human toxicity, cancer effect (HTP-c) *	CTUh	4.23E-06	1.30E-10	5.30E-10	5.65E-10	8.92E-11	-6.46E-08
Human toxicity, non-cancer effects (HTP-nc) *	CTUh	3.62E-06	9.08E-10	1.17E-08	2.22E-08	1.12E-09	-5.63E-08
Land use related impacts/Soil quality (SQP) *	dimensionless	6.15E+02	3.72E-01	9.82E+00	7.48E+00	1.03E+01	-2.79E+01

Disclaimers:
** 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. The results of this indicator may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.*
*** This impact category mainly deals with the possible effect of low dose ionising radiation on human health in the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents and occupational exposure, nor due to the disposal of radioactive waste in underground facilities. Ionising radiation potentially emitted from soil, radon and certain building materials is also not measured by this indicator.*

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Resource use indicators

Indicator name and abbreviation (EN)	Unit (EN)	Results per declared unit					
Indicators describing resource use (MANDATORY)		A1-A3	C1	C2	C3	C4	D
Use of renewable primary energy as energy carrier (PERE)	MJ	3.77E+01	3.15E-02	2.56E-01	6.81E-01	4.40E-02	-2.77E+00
Use of renewable primary energy resources used as raw materials (PERM)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy (PERT)	MJ	3.77E+01	3.15E-02	2.56E-01	6.81E-01	4.40E-02	-2.77E+00
Use of non-renewable primary energy as energy carrier (PENRE)	MJ	4.01E+02	5.59E+00	1.66E+01	8.16E+00	5.24E+00	-1.25E+02
Use of non-renewable primary energy resources used as raw materials (PENRM) *	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resource (PENRT)	MJ	4.03E+02	5.59E+00	1.66E+01	8.16E+00	5.24E+00	-1.25E+02
Use of secondary material (SM)	kg	4.76E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels (RSF)	MJ	1.15E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels (NRSF) **	MJ	3.27E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (FW)	m^3	2.67E-01	2.99E-04	1.98E-03	2.14E-03	5.42E-03	-1.27E-01

** The contribution of the packaging material (< 0.02 % of total weight) in A1-A3 has been neglected.*
*** The value in A1-A3 originates to 100% from cement production (see Dyckerhoff GmbH (2022)).*

Waste indicators

Indicator name and abbreviation (EN)	Unit (EN)	Results per declared unit					
Environmental information describing waste categories (MANDATORY)		A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	3.37E+00	2.57E-03	1.11E-02	1.21E-02	2.52E-03	-1.05E+00
Non-harzardous waste disposed (NHWD)	kg	5.37E+01	5.12E-02	3.39E-01	7.56E-01	7.53E-02	-2.30E+01
Radioactive waste disposed (RWD)	kg	3.85E-04	6.07E-07	5.36E-06	9.01E-06	7.68E-07	-4.27E-05

Output flow indicators

Indicator name and abbreviation (EN)	Unit (EN)	Results per declared unit					
Environmental information describing output flows (MANDATORY)		A1-A3	C1	C2	C3	C4	D
Components for re-use (CRU)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling (MFR)	kg	4.72E+00	0.00E+00	0.00E+00	8.92E+01	0.00E+00	0.00E+00
Materials for energy recovery (MER)	kg	8.06E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy (EEE)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy (EET)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

References

General Programme Instructions of the International EPD® System. Version 4.0.
PCR 2019:14. Construction Products. Version 1.3.1
c-PCR-003 2019:14 Concrete and concrete elements, Version 2023-01-02
Dyckerhoff GmbH (2022). UMWELT-PRODUKTDEKLARATION; CEM II/A-S 52,5 R; Dyckerhoff GmbH; Werk Neuwied; Institut Bauen und Umwelt e.V. (IBU); EPD-DYK-20210334-IAC1-DE

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