Environmental Product Declaration

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

BERA Gravel Fix® grey

from

BERA BV

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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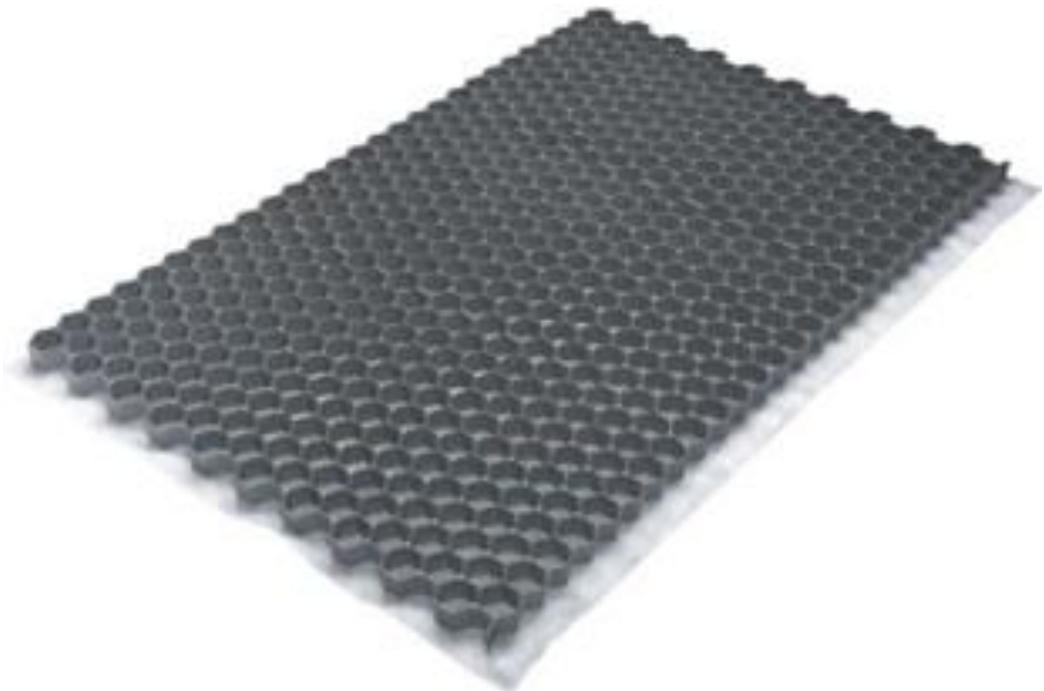
An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



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): *- EPD International PCR - Construction products (2019:14, Version 1.3.4)*
PCR review was conducted by: *- For PCR :The Technical Committee of the International EPD® System. Chair: Massimo Marino*
Life Cycle Assessment (LCA)
LCA accountability: *Luboš Nobilis, nobilis.lubos@gmail.com*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by accredited certification body Third-party verification: doc. Ing. Jan Weinzettel, Ph.D., Building Research Institute – Certification Company Ltd. is an approved certification body accountable for the third-party verification The certification body is accredited by: Czech Accreditation Institute (CAI) under no. 3013
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

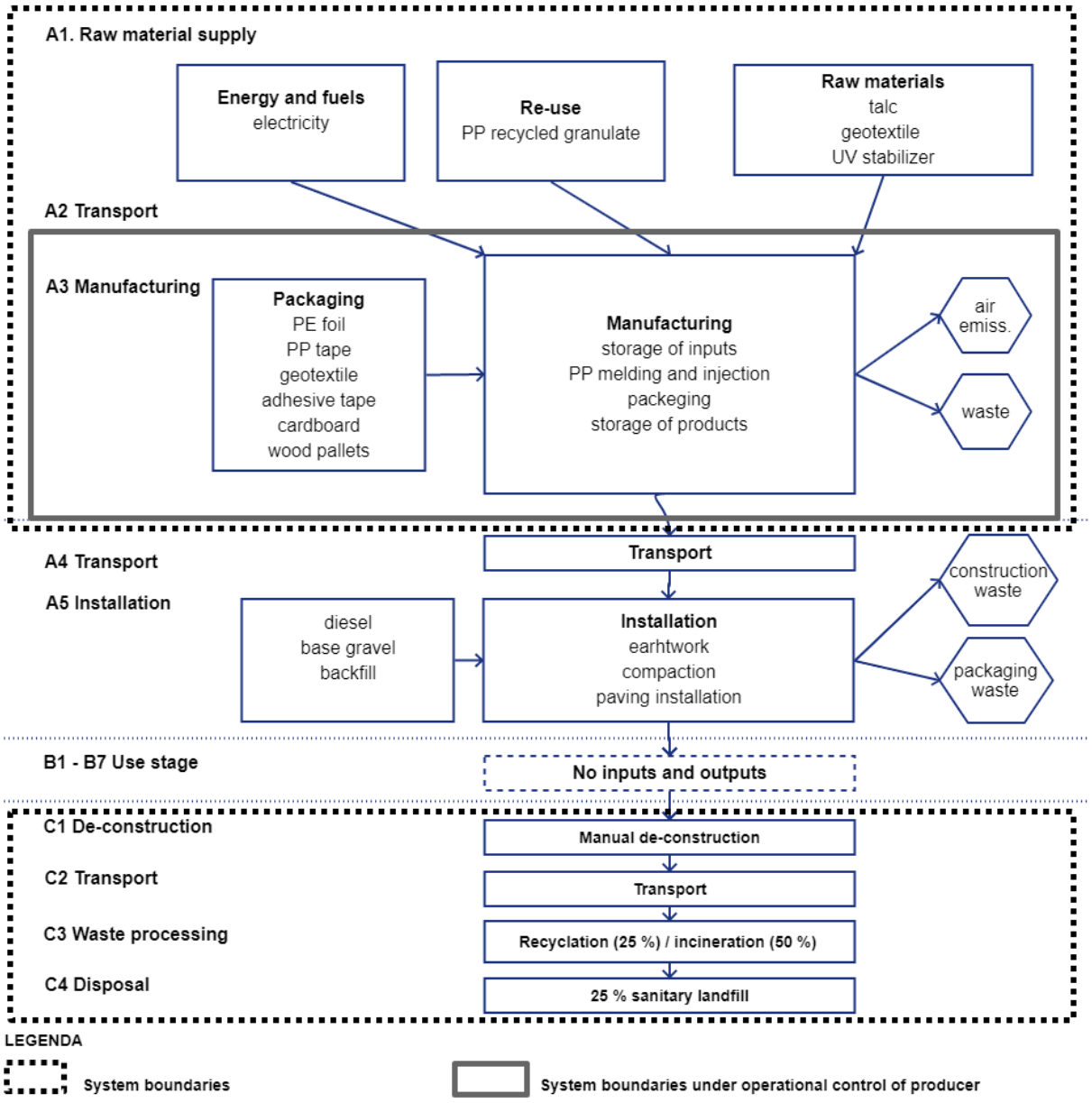
Company information

Owner of the EPD: BERA BV, Middelaarseweg 3A, 3871 KR Hoevelaken, The Netherlands
Contact: Rob Addink, rob@bera-bv.com
Description of the organisation: The company BERA B.V. was founded in the Netherlands in 2009 to develop, manufacture and supply "green" products and system solutions for gardens, parks, urban and landscape projects. Our endeavor is to create and implement projects whose basic feature is sustainability. Both from the point of view of production and subsequent use. During the first five years since its foundation, BERA B.V. has become a leader in the field of gravel stabilization solutions. For one of the supporting products – BERA Gravel Fix® Pro, it received a silver Cradle to Cradle Certificate in 2015. Millions of square meters of Gravel Fix Pro installed in different climates on all continents help return valuable rainwater back to the soil and thus have a positive effect on the ecology of the entire planet.
Product-related or management system-related certifications: ISO9001, REACH, IATF 16949:2016, AZZP
Name and location of production site(s):
Product is produced for BERA BV by:
ČEGAN s.r.o.: Husova 1693/35, 664 51 Šlapanice u Brna, Czech Republic

Product information

Product name: BERA Gravel Fix® grey
Product identification: Gravel Stabilization System
Product description: Plastic tiles (honeycomb structured) with geotextile to stabilize the parkings, driveways and pedestrian areas with gravel and to infiltrate rainwater
All variants of product (Pro, Pro XL, Pro XXL, Lite, Smart) are the same and differ only in size.
UN CPC code: 369 – Other plastic products
Geographical scope: Czech Republic for modules A1-A3, Europe for modules B and C.
Functional unit / declared unit: 1 m^2 of BERA Gravel Fix® grey produced in ČEGAN production site, Czech Republic; weight 1,33 kg per 1 m^2
Reference service life: N/A
Description of the manufacturing processes: Production in manufacturing phase A3 involves melting of plastic granulate (recycled) and its injection into molds. The granulate is stored in textile sacks and bags and its transport and drying are centrally controlled. The production process is digitally monitored and controlled through the MES ACT-IN program, which enables online communication with injection presses, collection of technological parameters, capacity planning or evaluation of production efficiency. The production facilities consist of 19 Arburg and Engel injection molding machines with a clamping force of 40 - 600 t. The machines are equipped with linear and six-axis robots, which ensure the removal of (right/left) parts, removal of sprues, placing parts in packaging, etc.). Conveyor belts enable optimal handling and tempering of parts. The lower polypropylene geotextile is welded to the part on an ultrasonic table.
Time representativeness: 2022

System diagram:



LCA information

Description of system boundaries:

[a) Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D);

Modules A4-A5 are not considered due to lack of data. No inputs, outputs and impacts are assumed in the modules B1-B7.

Infrastructure/capital goods: Are not excluded in phase A3 (production site and technology). Generic data from database used in upstream and downstream processes contain infrastructure.

Excluded processes: The study does not exclude any modules or processes that are stated mandatory in EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances. The analysis incorporates every input and output from unit processes for which data are available. No unit process contributing more than 1% to the overall mass or energy flows is disregarded.

Furthermore, the total disregarded input and output flows specific to each module do not exceed 5% of energy usage or mass.
Database(s) and LCA software used: Ecoinvent 3.9, SimaPro 9
Allocation: Mass allocation of common inputs (electricity, internal transport, packages) and outputs (waste production, air emissions) of the production of all BERA products (BERA Gravel fix, Grass fix, Water fix).
The recycled (post-industrial and post-consumer) polypropylene is the main input to product system (92 % of product weight). The allocation for recycled material was not made because the database process for recycle was used. This process is based on specific production data instead of allocation.
Energy Source and Emission Level for Electricity: Czech residual mix, contains: 53,6 % of fossil fuels, 41 % of nuclear, 5,4 % of renewable sources was used for modelling of electricity an A3 phase.
GWP-GHG from the production of electricity: 0.707 kgCO2eq/kWh
Recycled content impact on GWP-GHG: Recycled polypropylene as a main input for production represents about 49 % of GWP-GHG result. The GWP-GHG intensity of that recycled is 492 kg CO_{2eq} per 1 tonne. The 100 % of this recycled was assumed to come with an environmental burden.

More information:

Information about products and company: https://www.bera-bv.com/

LCA practitioner: Luboš Nobilis, Nesuchyne 12, 270 07 Czech Republic, nobilis.lubos@gmail.com

Summary of assumptions:

Module	Parameter	Assumption	Data source
B1-B7	Inputs and outputs	No inputs and outputs	No maintenance instructions are issued for the use phase
C1	De-construction	Manual de-construction	Manual de-construction is possible and undemanding
C2	Transport of EoL product - distance	50 km	C-PCR-024 (EPD INTERNATIONAL)
C3-C4	EoL processing	50 % incineration with energy recovery, 25 % recycling, 25 % landfilling	Waste management of Czech Republic
D	EoL benefits	Avoided products – electricity and heat (Czech mix), primary PP	Waste management of Czech Republic

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	CZE	CZE	CZE	ND	ND	ND	ND	ND	ND	ND	ND	ND	EUR	EUR	EUR	EUR	CZE/EUR
Specific data used	5-15 %			ND	ND	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0 %			ND	ND	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0 %			ND	ND	-	-	-	-	-	-	-	-	-	-	-	-

Notice: It is not recommended to use the results of modules A1-A3 without considering the results of module C.

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Polypropylene re-granulate (recycled)	1.22	100 %	0 %
Geotextile	0.07	0 %	0 %
Additives	0,04	0 %	0 %
TOTAL	1.33	92 %	0 %
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
PE foil	2.89E-05	2.17%	0
PP	2.78E-06	0.21%	0
wood	4.54E-04	1.71%	9.53E-03
cardboard	2.06E-08	1.61%	1.01E-02
TOTAL	4.86E-04	5.70%	1.96E-02

No SVHC in product to be declared.

Results of the environmental performance indicators

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.

Mandatory impact category indicators according to EN 15804+A2, EF 3.1

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	1.60E+00	0	1.25E-02	2.12E+00	3.37E-02	-1.09 E+00
GWP-biogenic	kg CO_2 eq.	3.62E-02	0	1.13E-05	1.37E-03	2.39E-05	-5.39 E-03
GWP-luluc	kg CO_2 eq.	1.97E-03	0	6.08E-06	1.86E-04	3.28E-06	-7.73 E-04
GWP-total	kg CO_2 eq.	1.64E+00	0	1.25E-02	2.13E+00	3.37E-02	-1.10 E+00
ODP	kg CFC 11 eq.	2.22E-08	0	2.72E-10	1.89E-09	9.34E-11	-1.61 E-08
AP	mol H^+ eq.	6.31E-03	0	4.08E-05	8.20E-04	3.01E-05	-3.63 E-03
EP-freshwater*	kg P eq.	8.99E-04	0	8.76E-07	2.11E-04	5.91E-07	-7.37 E-04
EP-marine	kg N eq.	1.64E-03	0	1.40E-05	2.40E-04	7.10E-04	-8.03 E-04
EP-terrestrial	mol N eq.	1.36E-02	0	1.48E-04	2.12E-03	1.16E-04	-7.16 E-03
POCP	kg NMVOC eq.	5.28E-03	0	6.10E-05	5.97E-04	4.68E-05	-2.78 E-03
ADP-minerals&metals*	kg Sb eq.	2.78E+01	0	1.78E-01	2.25E+00	8.70E-02	-2.43 E+01
ADP fossil*	MJ	8.96E-06	0	4.02E-08	8.95E-07	9.01E-09	-1.87 E-06
WDP*	m^3	3.07E-01	0	7.23E-04	2.58E-02	3.61E-03	-1.41 E-01
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 declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	1.49E+00	0	1.16E-02	2.12E+00	1.53E-02	-1.01 E+00
Particulate matter	disease inc.	7.23E-08	0	9.97E-10	3.22E-09	6.08E-10	-2.17 E-08
Human toxicity, non-cancer*	CTUh	1.71E-08	0	1.25E-10	3.12E-09	9.17E-11	-5.11 E-09
Human toxicity, cancer*	CTUh	1.19E-09	0	5.68E-12	2.82E-10	2.50E-12	-2.23 E-10
Ecotoxicityfreshwater	CTUe	1.29E+01	0	1.75E-01	1.70E+00	3.25E-01	-4.90 E+00
Land use*	Pt	1.28E+01	0	1.06E-01	2.55E-01	1.93E-01	-1.25 E+00
Ionising radiation**	kBq U-235 eq	3.25E-01	0	2.38E-04	5.63E-02	1.37E-04	-1.92 E-01

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.
** 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.*
*** Disclaimer: This impact category deals mainly with the eventual impact of low dose ionising 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 ionising radiation from the soil, from radon and from some construction materials is also not measured by this indicator.*

[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.

Resource use indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	3.11E+00	0	2.75E-03	1.53E-01	1.81E-03	-4.84E-01
PERM	MJ	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.11E+00	0	2.75E-03	1.53E-01	1.81E-03	-4.84E-01
PENRE	MJ	2.95E+01	0	1.89E-01	2.38E+00	9.25E-02	-2.61E+01
PENRM	MJ	0.00E+00	0	0.00E+00	0.00E+00	1.00E+00	0.00E+00
PENRT	MJ	2.95E+01	0	1.89E-01	2.38E+00	1.09E+00	-2.61E+01
SM	kg	1.22E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.40E-02	0	2.16E-05	3.54E-04	3.54E-04	-2.97E-03
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 declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1.27E-02	0	4.39E-06	1.30E-02	4.17E-06	-5.15E-04
Non-hazardous waste disposed	kg	4.44E-01	0	8.67E-03	2.33E-02	3.33E-01	-7.11E-02
Radioactive waste disposed	kg	8.09E-05	0	5.77E-08	1.35E-05	3.31E-08	-4.61E-05

Output flow indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0	0	0	0	0	0
Material for recycling	kg	0	0	0	3.32E-01	0	0
Materials for energy recovery	kg	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	2.31E+00	0	0
Exported energy, thermal	MJ	0	0	0	4.67E+00	0	0

Other environmental performance indicators

None included

Additional environmental information

BERA Gravel Fix® is manufactured in the European Union under stringent Quality and Environmental Control standards, including REACH (EC 1907/2006). The use of recycled raw materials and well developed infrastructure to minimize our delivery carbon footprint, underline our corporate vision in providing environmentally sustainable solutions.

BERA Gravel Fix®, a sustainable product:
Manufactured in Europe using renewable energy sources
Fully recyclable after end of life-cycle
Select 100% recycled raw materials at no extra cost
Safety according REACH (EC1907/2006)
UV and frost resistant
No glue, only ultrasone welded connections
Social awareness policy

Additional social and economic information

None included

Information related to Sector EPD

Not applicable

Differences versus previous versions

- *This EPD is first version*

References

General Programme Instructions of the International EPD® System. Version 4.0.

PCR 2019:14. EPD International (2021) PCR 2019:14 Constructions products and construction services. Version 1.3.4

ISO 14040/44/ DIN EN ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

ISO 14044:2006-10, Environmental Management — Life Cycle Assessment — Requirements and Instructions (ISO 14044:2006); EN ISO 14044:2006

EN EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the construction products product category

ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

/Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

/SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

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