

Environmental Product Declaration (EPD)  
According to ISO 14025 and EN 15804

V1

Calculation number:

ReTHiNK-45145

Issue date:

Valid until:

Declaration owner:

GODEL-BETON GmbH

Publisher:

Kiwa-Ecobility Experts

Program operator:

Kiwa-Ecobility Experts

Status:

in-progress



# 1 General information

## 1.1 PRODUCT

VI

## 1.2 VALIDITY

**Issue date:**

**Valid until:**

## 1.3 OWNER OF THE DECLARATION

**Manufacturer:** GODEL-BETON GmbH

**Address:** Glemsgaustraße 95 A, 70499 Stuttgart

**E-mail:** info@godel-beton.de

**Website:** godel-beton.de

**Production location:** Godel-Beton W29

**Address production location:** Jahnring 35, 22297 Hamburg

## 1.4 VERIFICATION OF THE DECLARATION

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804:2012+A2:2019 serves as the core PCR.

Internal  External

## 1.5 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The programme operator Kiwa-Ecobility Experts shall not be liable with respect to manufacturer data, life cycle assessment data and evidence.

## 1.6 PRODUCT CATEGORY RULES

Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

## 1.7 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804+A2. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPD program operators may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

## 1.8 CALCULATION BASIS

**LCA method R<THiNK:** Ecobility Experts | EN15804+A2

**LCA software\*:** Simapro 9.1

**Characterization method:** EN 15804 +A2 Method v1.0

**LCA database profiles:** EcolInvent version 3.6

**Version database:** v3.17 (2024-05-22)

*\* Simapro is used for calculating the characterized results of the Environmental profiles within R<THiNK.*

## 1.9 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'VI' with the calculation identifier ReTHiNK-45145.

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## 2 Product

### 2.1 PRODUCT DESCRIPTION

Concrete is a mixture of cement, sand, gravel and water, with or without additives and chemical admixtures.

On the construction site fresh concrete will be filled in formwork, compacted and hardens in the desired shape. The hardening process happens throughout hydration of the cement, which turns the mixture into a solid artificial rock.

The declared product is an unreinforced concrete, which is classified as a ready-mixed concrete. Arriving on the construction site it is in a liquid state.

### 2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

Der frische Beton wird i.d.R. innerhalb von 90 min auf die Baustelle geliefert und in die vorgeschalteten Bauteile bzw. die ausgehobenen Schlitzwandelemente gegossen und verdichtet.

### 2.3 REFERENCE SERVICE LIFE

#### RSL PRODUCT

nicht bekannt

#### USED RSL (YR) IN THIS LCA CALCULATION:

100

### 2.4 TECHNICAL DATA

Bohrpfahlbeton mit einer Druckfestigkeitsklasse von C30/37

### 2.5 DESCRIPTION PRODUCTION PROCESS

Die Rohstoffe für die Betonherstellung werden angeliefert, zwischengelagert und dann nach festgelegten Rezepten mit einer vorgeschriebenen Reihenfolge in den Betonmischer dosiert. Im Betonmischer werden alle Rohstoffe gemeinsam für eine festgelegte Zeit vermischt. Das fertige Produkt wird in den untergestellten Fahrmischer verladen und zum Kunden transportiert.

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### 3 Calculation rules

#### 3.1 DECLARED UNIT

##### 1 m<sup>3</sup> concrete

1 m<sup>3</sup> concrete

Reference unit: cubic meter (m<sup>3</sup>)

#### 3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	m <sup>3</sup>
Weight per reference unit	2316.540	kg
Conversion factor to 1 kg	0.000432	m <sup>3</sup>

#### 3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with modules C1-C4 and module D LCA. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

The modules of the EN15804 contain the following:

Module A1 = Raw material supply	Module B5 = Refurbishment
Module A2 = Transport	Module B6 = Operational energy use
Module A3 = Manufacturing	Module B7 = Operational water use
Module A4 = Transport	Module C1 = De-construction / Demolition
Module A5 = Construction - Installation process	Module C2 = Transport
Module B1 = Use	Module C3 = Waste Processing
Module B2 = Maintenance	Module C4 = Disposal
Module B3 = Repair	Module D = Benefits and loads beyond the product system boundaries
Module B4 = Replacement	

#### 3.4 REPRESENTATIVENESS

This EPD is representative for V1, a product of GODEL-BETON GmbH. The results of this EPD are representative for Germany.

#### 3.5 CUT-OFF CRITERIA

In the Life cycle assessment the following cut-off criteria are applied:

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### 3 Calculation rules

#### PRODUCT STAGE (A1-A3)

All input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

#### END OF LIFE STAGE (C1-C4)

All input flows (e.g. energy use for demolition or disassembly, transport to waste processing, etc.) and output flows (e.g. end-of-life waste processing of the product, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

#### BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

All benefits and loads beyond the system boundary resulting from reusable products, recyclable materials and/or useful energy carriers leaving the product system are considered in this LCA.

#### 3.6 ALLOCATION

Allocation has not been applied in this LCA.

#### 3.7 DATA COLLECTION & REFERENCE TIME PERIOD

2023

#### 3.8 GUARANTEES OF ORIGIN

- Strom: Stromrechnung
- Heizöl: Lieferscheine
- Rohstoffe: Lieferscheine

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## 4 Scenarios and additional technical information

### 4.1 DE-CONSTRUCTION, DEMOLITION (C1)

No inputs are needed for the product at the de-construction / demolition phase

### 4.2 TRANSPORT END-OF-LIFE (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
concrete (i.a. elements, brickwork, reinforced concrete) (NMD ID 9)	Lorry (Truck), unspecified (default)   market group for (GLO)	0	100	150	50	0

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

	Value and unit
Vehicle type used for transport	Lorry (Truck), unspecified (default)   market group for (GLO)
Fuel type and consumption of vehicle	not available
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

### 4.3 END OF LIFE (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables. First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
concrete (i.a. elements, brickwork, reinforced concrete) (NMD ID 9)	NL	0	1	0	99	0

## 4 Scenarios and additional technical information

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
concrete (i.a. elements, brickwork, reinforced concrete) (NMD ID 9)	0.000	19.165	0.000	1897.375	0.000
<b>Total</b>	<b>0.000</b>	<b>19.165</b>	<b>0.000</b>	<b>1897.375</b>	<b>0.000</b>

### 4.4 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

Waste Scenario	Net output flow [kg]	Energy recovery [MJ]
concrete (i.a. elements, brickwork, reinforced concrete) (NMD ID 9)	1897.375	0.000
<b>Total</b>	<b>1897.375</b>	<b>0.000</b>

NOT VERIFIED

## 5 Results

For the impact assessment, the characterization factors of the LCIA method EN 15804 +A2 Method v1.0 are used. Long-term emissions (>100 years) are not considered in the impact assessment. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

### 5.1 ENVIRONMENTAL IMPACT INDICATORS PER CUBIC METER

#### CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1- A3	C1	C2	C3	C4	D
AP	mol H+ eqv.	5.01E-1	0.00E+0	2.80E-2	5.29E-1	0.00E+0	9.16E-2	2.34E-2	1.16E-3	-6.96E-2
GWP-total	kg CO2 eqv.	1.38E+2	0.00E+0	4.47E+0	1.42E+2	0.00E+0	1.58E+1	3.75E+0	1.22E-1	-9.68E+0
GWP-b	kg CO2 eqv.	1.74E-1	0.00E+0	8.70E-2	2.61E-1	0.00E+0	7.29E-3	2.16E-2	2.41E-4	-4.43E-2
GWP-f	kg CO2 eqv.	1.38E+2	0.00E+0	4.32E+0	1.42E+2	0.00E+0	1.58E+1	3.73E+0	1.22E-1	-9.62E+0
GWP-luluc	kg CO2 eqv.	2.36E-2	0.00E+0	5.49E-2	7.86E-2	0.00E+0	5.79E-3	7.11E-4	3.41E-5	-1.03E-2
EP-m	kg N eqv.	3.41E-2	0.00E+0	1.01E-2	4.42E-2	0.00E+0	3.23E-2	9.31E-3	3.98E-4	-1.99E-2
EP-fw	kg P eqv.	1.51E-3	0.00E+0	1.79E-4	1.69E-3	0.00E+0	1.59E-4	1.16E-4	1.37E-6	-3.55E-4
EP-T	mol N eqv.	9.72E-1	0.00E+0	1.13E-1	1.08E+0	0.00E+0	3.56E-1	1.03E-1	4.40E-3	-2.31E-1
ODP	kg CFC 11 eqv.	4.26E-6	0.00E+0	7.72E-7	5.04E-6	0.00E+0	3.48E-6	4.84E-7	5.03E-8	-9.61E-7
POCP	kg NMVOC eqv.	2.87E-1	0.00E+0	4.23E-2	3.30E-1	0.00E+0	1.02E-1	2.82E-2	1.28E-3	-6.38E-2
ADP-f	MJ	1.06E+3	0.00E+0	5.99E+1	1.12E+3	0.00E+0	2.38E+2	5.01E+1	3.41E+0	-1.20E+2
ADP-mm	kg Sb-eqv.	1.07E-3	0.00E+0	5.98E-5	1.13E-3	0.00E+0	4.00E-4	1.05E-5	1.12E-6	-4.80E-4
WDP	m3 world eqv.	1.76E+1	0.00E+0	2.54E-1	1.78E+1	0.00E+0	8.52E-1	2.27E-1	1.53E-1	-1.38E+2

**AP**=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)



## 5 Results

### ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1- A3	C1	C2	C3	C4	D
ETP-fw	CTUe	5.17E+2	0.00E+0	4.91E+1	5.66E+2	0.00E+0	2.12E+2	4.06E+1	2.21E+0	-1.94E+2
PM	disease incidence	4.24E-6	0.00E+0	5.93E-7	4.84E-6	0.00E+0	1.42E-6	5.16E-7	2.25E-8	-1.20E-6
HTP-c	CTUh	2.84E-7	0.00E+0	1.48E-9	2.86E-7	0.00E+0	6.89E-9	9.63E-10	5.12E-11	-7.16E-9
HTP-nc	CTUh	6.53E-6	0.00E+0	3.99E-8	6.57E-6	0.00E+0	2.32E-7	2.73E-8	1.57E-9	-2.02E-7
IR	kBq U235 eqv.	3.78E+3	0.00E+0	2.80E-1	3.78E+3	0.00E+0	9.98E-1	1.59E-1	1.40E-2	-4.84E-1
SQP	Pt	1.84E+2	0.00E+0	9.69E+0	1.94E+2	0.00E+0	2.06E+2	8.36E+0	7.15E+0	-1.55E+2

ETP-fw=Ecotoxicity, freshwater (ETP-fw) | PM=Particulate Matter (PM) | HTP-c=Human toxicity, cancer (HTP-c) | HTP-nc=Human toxicity, non-cancer (HTP-nc) | IR=Ionising radiation, human health (IR) | SQP=Land use (SQP)

### CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 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
	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
ILCD type / level 2	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 / level 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

## 5 Results

ILCD classification	Indicator	Disclaimer
	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.

### 5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

#### PARAMETERS DESCRIBING RESOURCE USE

Abbr.	Unit	A1	A2	A3	A1- A3	C1	C2	C3	C4	D
PERE	MJ	1.19E+2	0.00E+0	1.43E+1	1.33E+2	0.00E+0	2.98E+0	2.85E+0	2.76E-2	-8.32E+0
PERM	MJ	6.54E+2	0.00E+0	0.00E+0	6.54E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ	3.04E+1	0.00E+0	1.43E+1	4.48E+1	0.00E+0	2.98E+0	2.85E+0	2.76E-2	-8.32E+0
PENRE	MJ	1.06E+3	0.00E+0	4.48E+1	1.10E+3	0.00E+0	2.53E+2	5.34E+1	3.62E+0	-1.27E+2
PENRM	MJ	2.26E+2	0.00E+0	1.84E+1	2.44E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	MJ	4.47E+2	0.00E+0	6.32E+1	5.10E+2	0.00E+0	2.53E+2	5.34E+1	3.62E+0	-1.27E+2
SM	Kg	6.51E+1	0.00E+0	0.00E+0	6.51E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ	1.48E-1	0.00E+0	0.00E+0	1.48E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	M3	1.68E+0	0.00E+0	2.78E-2	1.71E+0	0.00E+0	2.90E-2	1.67E-2	3.64E-3	-3.23E+0

**PERE**=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water

## 5 Results

### OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	Kg	3.44E-4	0.00E+0	1.32E-4	4.76E-4	0.00E+0	6.03E-4	8.74E-5	5.10E-6	-2.43E-4
NHWD	Kg	1.60E+0	0.00E+0	2.27E-1	1.82E+0	0.00E+0	1.51E+1	6.98E+0	2.32E+1	-1.30E+0
RWD	Kg	3.03E-3	0.00E+0	4.22E-4	3.45E-3	0.00E+0	1.56E-3	2.25E-4	2.24E-5	-5.25E-4

HWD=hazardous waste disposed | NHWD=non hazardous waste disposed | RWD=radioactive waste disposed

### ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.29E+3	0.00E+0	0.00E+0
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	MJ	0.00E+0	0.00E+0	-5.71E+0	-5.71E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	MJ	2.73E-7	0.00E+0	-3.31E+0	-3.31E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

CRU=Components for re-use | MFR=Materials for recycling | MER=Materials for energy recovery | EET=Exported Energy Thermic | EEE=Exported Energy Electric

## 5 Results

### 5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER CUBIC METER

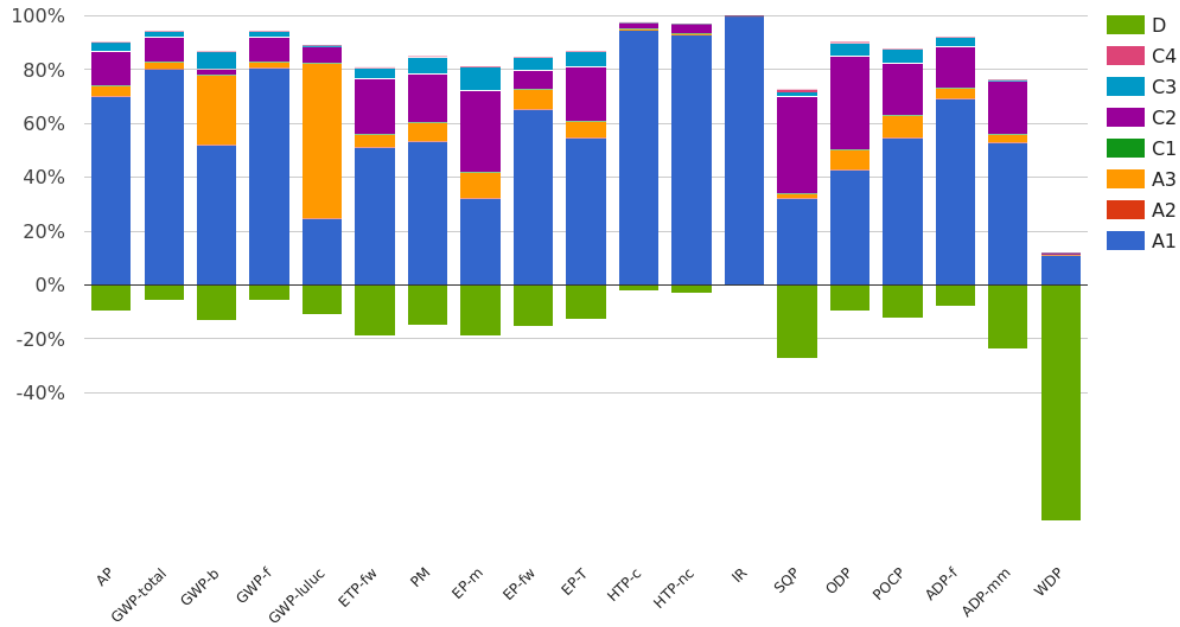
#### BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per cubic meter:

Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0	kg C

NOT VERIFIED

## 6 Interpretation of results



## 7 References

### **ISO 14040**

ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

### **ISO 14044**

ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006

### **ISO 14025**

ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

### **EN 15804+A2**

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

NOT VERIFIED

## 8 Contact information

Owner of declaration

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Kiwa-Ecobility Experts is  
established member of the

