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

Concrete liquid colour containing titanium dioxide

Registration number:	EPD-Kiwa-EE-202626-EN
Issue date:	30-04-2025
Valid until:	30-04-2030
Declaration owner:	REMEI & BPB GmbH & Co. KG
Publisher:	Kiwa-Ecobility Experts
Programme operator:	Kiwa-Ecobility Experts
Status:	verified

1 General information

1.1 PRODUCT

Concrete liquid colour containing titanium dioxide

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-202626-EN

1.3 VALIDITY

Issue date: 30-04-2025

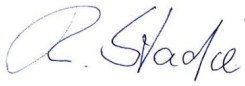
Valid until: 30-04-2030

1.4 PROGRAMME OPERATOR

Kiwa-Ecobility Experts
Wattstraße 11-13
13355 Berlin
DE

Raoul Mancke

(Head of programme operations, Kiwa-Ecobility Experts)



Dr. Ronny Stadie

(Verification body, Kiwa-Ecobility Experts)

1.5 OWNER OF THE DECLARATION

Manufacturer: REMEI & BPB GmbH & Co. KG

Address: Industriestraße 4, 32825 Blomberg, DE

E-mail: info@remei-bpb.de

Website: www.remei.de

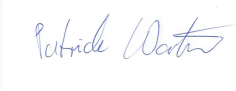
Production location: REMEI & BPB GmbH & Co. KG

Address production location: Industriestraße 4, 32825 Blomberg, DE

1.6 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



Patrick Wortner, PeoplePlanetProfit GmbH & Co. KG.

1.7 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.

1.8 PRODUCT CATEGORY RULES

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

PCR B
Institut Bauen und Umwelt e.V. - Part B: Requirements on the EPD for liquid colorant based on inorganic coloured pigments (various colours) - v6 (2024-08-01)

1.9 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

1 General information

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).

1.10 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: EcoInvent version 3.6

Version database: v3.19 (20250306)

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

1.11 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'Concrete liquid colour containing titanium dioxide' with the calculation identifier ReTHiNK-102626.

2 Product

2.1 PRODUCT DESCRIPTION

This declaration refers to the product “Concrete liquid colour containing titanium dioxide” manufactured by REMEI & BPB GmbH & Co. KG, which is a ready-to-use pigment suspension containing titanium dioxide for coloring cement- and lime-bonded construction materials in accordance with EN 12878.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration EN 12878:2014-07 “Pigments for the colouring of building materials based on cement and/or lime - Specifications and methods of test” and the CE-marking.

For the application and use the respective national provisions apply.

The representative product used in the calculation is available in containers of approximately 800-1000 kg, Big Bags of approximately 1000 kg, Tetra Bags up to 300 kg and cans of approximately 20 kg. All described available packagings were used for the LCA calculation based on the consumption of packagings in 2024. The gross density of the product ist is 1.41 g/ml. The composition of the product is listed in the following table:

Component	Value	Unit
Fresh water	59.1	M.-%
Pigment	40.3	M.-%
Dispersing agent	0.1	M.-%
Remaining materials	0.5	M.-%

2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

The product is used on concrete products, precast concrete elements and ready-mix concrete - both indoors and outdoors.

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

Since the scope of the study does not consider the entire life cycle of concrete liquid colour, the indication of the reference service life (RSL) is voluntary. Concrete liquid colour is used on concrete products, precast concrete elements and ready-mix concrete. According to BBSR Table, the reference service life (RSL) of concrete products is 50 years.

USED RSL (YR) IN THIS LCA CALCULATION:

50

2.4 TECHNICAL DATA

Name	Value	Unit	Harmonized technical specification
Setting time (start of setting process min. 1h)	Approved	-	EN 12878
Compressive strength (mortar 28 days (compare mixture with and without pigment)) (Category B)	< 8	%	
Chloride content (total chloride; Category B max. 0.1%)	< 0.1	%	
Soluble chloride content (Category B max. 0.1%)	< 0.1	%	
Content of water-soluble substances (Category B max. 0.5%)	≤ 0.50	%	

2.5 SUBSTANCES OF VERY HIGH CONCERN

1) This product contains no substance listed in the candidate list exceeding 0.1 % by mass.

2) This product contains no CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 % by mass.

3) Acticide FS (N), a biocidal product in aqueous solution containing CAS: 5395-50-6 (tetramethylolglycoluril, 25-50 %) and CAS: 55965-84-9 (biocide MC490, 0.7 %), is used as an in-can preservative in raw materials.

2 Product

2.6 DESCRIPTION PRODUCTION PROCESS

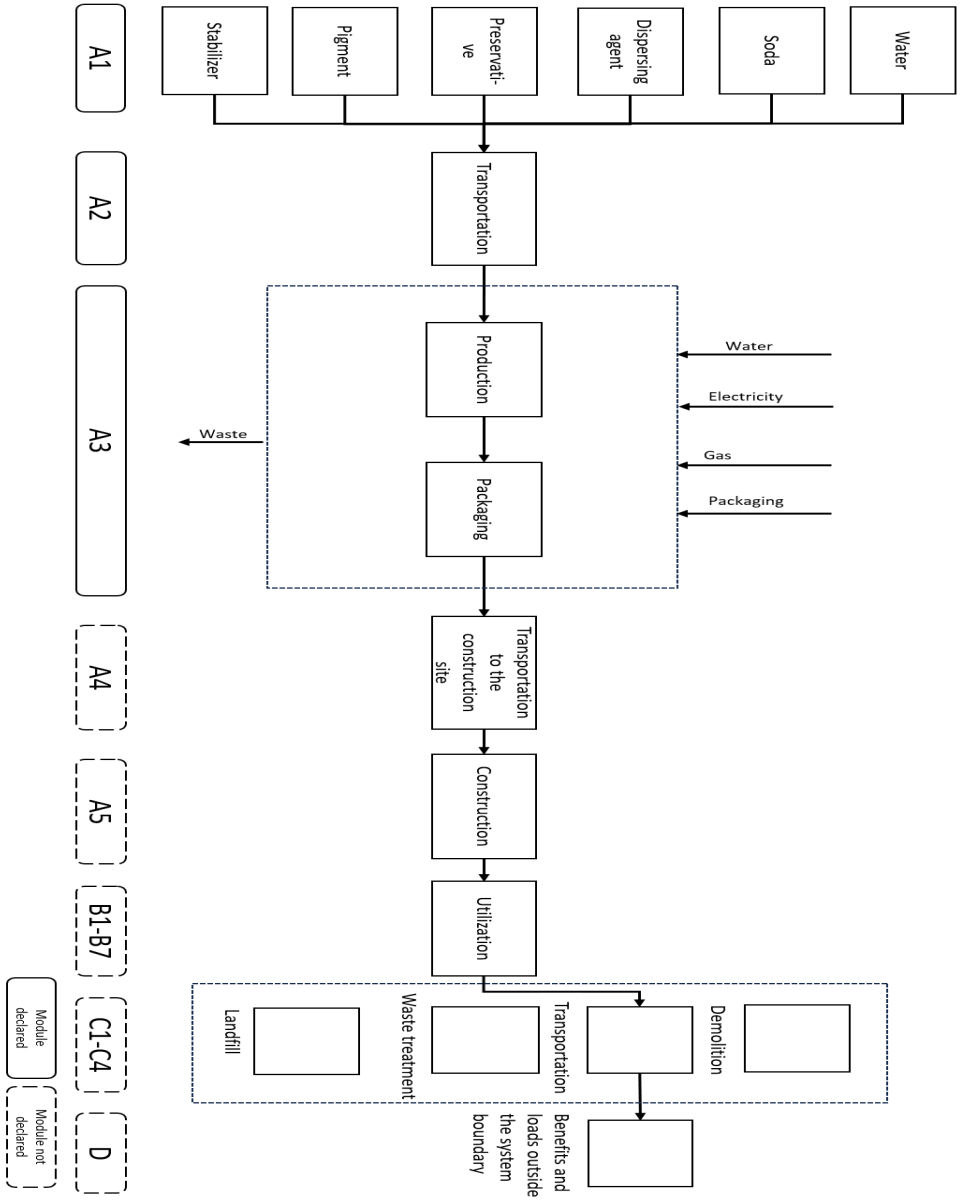
The manufacture of concrete liquid colour containing titanium dioxide takes place in Blomberg, Germany. The production includes the following steps after the delivery of raw materials:

- Preparing the dispersing agent, preservative, soda (or 33 % NaOH), and water (possibly with 33 % defoamer)

- Stiring the mixture

- Adding the pigments into the running mixer

- Adding the stabilizer into the running mixer



3 Calculation rules

3.1 DECLARED UNIT

Reference unit: kilogram (kg)

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	kg
Conversion factor to 1 kg	1.000000	kg

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate EPD. 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	ND	ND	ND	ND	ND

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 Concrete liquid colour containing titanium dioxide, a product of REMEI & BPB GmbH & Co. KG. The results of this EPD are representative for Germany.

3.5 CUT-OFF CRITERIA

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. For each unit process, the cut-off criteria of 1% of the renewable and non-renewable use of primary energy and 1% of the total mass of this unit process are complied with. The total neglected input flows do not exceed the limit of 5 % of energy use and mass.

The following processes are excluded:

- Water and electricity consumption of the building, if not relevant to production
- Manufacturing of equipment used in production, buildings or any other capital asset
- Transportation of personnel to the plant
- The transportation of personnel within the plant
- Research and development activities
- Long-term emissions

3.6 ALLOCATION

The energy consumption is calculated based on the total consumption at the production site in 2024 (for all products manufactured) and are converted into the amount used solely for the production of the declared product. The amount of energy is given per kg of product manufactured.

No allocation is performed with regard to the use of secondary materials or fuels, co-products, plant-specific production processes or multi-input systems.

The polluter pays principle applies to the use of waste as a substitute for primary fuels or materials.

3 Calculation rules

3.7 DATA COLLECTION & REFERENCE PERIOD

All process-specific data are collected for the reference year 2024 (01.01.2024 - 31.12.2024).

3.8 ESTIMATES AND ASSUMPTIONS

For all raw materials used (raw materials, operating materials, packaging), the transportation distance is recorded. A payload factor of 50 % is used for all truck transports (suppliers, disposal transports and internal transports), which corresponds to a full delivery and empty return journey.

As no data are available for the preservative Acticide FS (N), which contains tetramethylolglycoluril and a biocide, a proxy dataset for imidazole production is used to represent this raw material. The syntheses of imidazole and tetramethylolglycoluril are based on the same precursor, glyoxal, and imidazole derivatives are used as preservatives or antimicrobial agents.

The Spitzcontainer 750 (SC) is a reusable packaging material, with an annual reuse frequency of eight cycles per year. This reuse rate is incorporated into the calculation of the packaging material.

Excluded are the manufacturing of capital equipment, construction undertakings, and infrastructure development, along with the maintenance and operation of capital equipment. Additionally, activities related to personnel, as well as energy and water consumption associated with company management and sales, are also excluded.

The declaration of modules C1-C4 and module D is omitted because the product becomes physically integrated with other products during installation, making separation at the end of its lifecycle impossible. Additionally, the product is no longer identifiable at the end of its life cycle due to physical or chemical transformation processes, and it contains no biogenic carbon.

The scenarios included are currently in use and are representative for one of the most likely scenario alternatives.

3.9 DATA QUALITY

The data are based on the annual average of the year 2024. Generic datasets from the Ecoinvent database V3.6 are used for the secondary data, which refers to reference year 2019. This database is regularly maintained and meets the requirements of EN 15804+A2 (background data not older than 10 years). All consistent datasets contained in the ecoinvent database are documented and can be viewed in the online ecoinvent documentation. In the operating data survey all relevant process-specific data could be collected. The quality of the data can be thus considered as good.

The primary data are collected and provided by REMEI & BPB GmbH & Co. KG. Most of the datasets selected in the LCA for raw materials refer to Europe as the geographical reference. The assessment of data quality on the basis of ISO 14044 is presented below.

Aspect	Data quality assessment
Time-related coverage	The primary data represent the current situation of the date of study (2024) or as close as possible (<5 years). The secondary data are updated within last 10 years.
Geographical coverage	All raw material datasets selected for the LCA refer to Europe as the geographical reference, repesenting the average global production.
Technology coverage	The data are representative of the technology used in production processes.
Completeness	Specific data are benchmarked with literature data. Simple validation checks (e.g. mass or energy balances) are performed.
Representativeness	The data fulfill the defined time-related, geographical, and technological scope.
Precision	The data used are as representative as possible. The data are derived from credible sources, and references are provided.
Reproducibility	Information about the method and data (reference source) are provided.
Sources of the data	The data are derived from credible sources, and references are provided.

3.10 POWER MIX

The use of green electricity is included in the calculation of the environmental impacts, which is based on the purchased electricity mix, referring to the market based approach. The residual mix of Germany is used to model the share of electricity without guarantees of origin. The share of green electricity with guarantees of origin in total electricity

3 Calculation rules

consumption is 41.1%. The GWP-total of the electricity is calculated at 0.457 kg CO2 eqv./ kWh.

4 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.

4.1 ENVIRONMENTAL IMPACT INDICATORS PER KILOGRAM

CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3
GWP-total	kg CO_2 eq.	2.03E+0	3.81E-2	3.03E-2	2.10E+0
GWP-f	kg CO_2 eq.	2.01E+0	3.81E-2	3.05E-2	2.08E+0
GWP-b	kg CO_2 eq.	1.29E-2	1.54E-5	-1.50E-4	1.27E-2
GWP-luluc	kg CO_2 eq.	1.12E-3	1.40E-5	7.99E-6	1.15E-3
ODP	kg CFC 11 eq.	1.85E-7	8.42E-9	2.06E-9	1.96E-7
AP	mol H+ eq.	5.69E-2	2.21E-4	7.18E-5	5.72E-2
EP-fw	kg P eq.	1.02E-4	3.84E-7	1.00E-6	1.03E-4
EP-m	kg N eq.	2.61E-3	7.80E-5	1.50E-5	2.71E-3
EP-T	mol N eq.	2.40E-2	8.59E-4	1.78E-4	2.50E-2
POCP	kg NMVOC eq.	9.33E-3	2.45E-4	5.52E-5	9.63E-3
ADP-mm	kg Sb-eq.	3.10E-5	9.66E-7	2.04E-7	3.22E-5
ADP-f	MJ	2.48E+1	5.75E-1	4.82E-1	2.58E+1
WDP	m3 world eq.	3.48E+0	2.06E-3	2.28E-2	3.50E+0

GWP-total=Global Warming Potential total (GWP-total) | **GWP-f**=Global Warming Potential fossil fuels (GWP-fossil) | **GWP-b**=Global Warming Potential biogenic (GWP-biogenic) | **GWP-luluc**=Global Warming Potential land use and land use change (GWP-luluc) | **ODP**=Depletion potential of the stratosperic ozon layer (ODP) | **AP**=Acidification potential, Accumulated Exceedance (AP) | **EP-fw**=Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater) | **EP-m**=Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine) | **EP-T**=Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | **POCP**=Formation potential of tropospheric ozone (POCP) | **ADP-mm**=Abiotic depletion potential for non fossil resources (ADP mm) | **ADP-f**=Abiotic depletion for fossil resources potential (ADP fossil) | **WDP**=Water (user) deprication potential, deprivation-weighted water consumption (WDP)

4 Results

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3
PM	disease incidence	1.87E-7	3.42E-9	4.33E-10	1.91E-7
IR	kBq U235 eq.	8.03E-2	2.41E-3	9.00E-4	8.36E-2
ETP-fw	CTUe	6.35E+1	5.13E-1	1.96E-1	6.42E+1
HTP-c	CTUh	8.12E-9	1.66E-11	1.78E-11	8.16E-9
HTP-nc	CTUh	2.95E-8	5.62E-10	3.09E-10	3.04E-8
SQP	Pt	1.68E+1	4.99E-1	2.79E-1	1.76E+1

PM=Potential incidence of disease due to PM emissions (PM) | **IR**=Potential Human exposure efficiency relative to U235 (IRP) | **ETP-fw**=Potential Comparative Toxic Unit for ecosystems (ETP-fw) | **HTP-c**=Potential Comparative Toxic Unit for humans (HTP-c) | **HTP-nc**=Potential Comparative Toxic Unit for humans (HTP-nc) | **SQP**=Potential soil quality idex (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
ILCD type / level 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	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

4 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.

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

PARAMETERS DESCRIBING RESOURCE USE

Abbr.	Unit	A1	A2	A3	A1-A3
PERE	MJ	3.20E+0	7.20E-3	9.29E-2	3.30E+0
PERM	MJ	0.00E+0	0.00E+0	1.78E-3	1.78E-3
PERT	MJ	3.20E+0	7.20E-3	9.46E-2	3.30E+0
PENRE	MJ	2.66E+1	6.10E-1	4.91E-1	2.77E+1
PENRM	MJ	1.43E-2	0.00E+0	1.52E-2	2.95E-2
PENRT	MJ	2.66E+1	6.10E-1	5.06E-1	2.77E+1
SM	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ	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
FW	m^3	8.52E-2	7.00E-5	6.73E-4	8.60E-2

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 resources | **SM**=Use of secondary material | **RSF**=Use of renewable secondary fuels | **NRSF**=Use of non-renewable secondary fuels | **FW**=Net use of fresh water

4 Results

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1-A3
HWD	Kg	3.05E-5	1.46E-6	9.16E-7	3.28E-5
NHWD	Kg	2.07E+0	3.65E-2	1.89E-3	2.11E+0
RWD	Kg	8.43E-5	3.78E-6	1.16E-6	8.92E-5

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
CRU	Kg	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
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	MJ	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

4 Results

4.3 INFORMATION ON BIOGENIC CARBON CONTENT PER KILOGRAM

BIOGENIC CARBON CONTENT

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

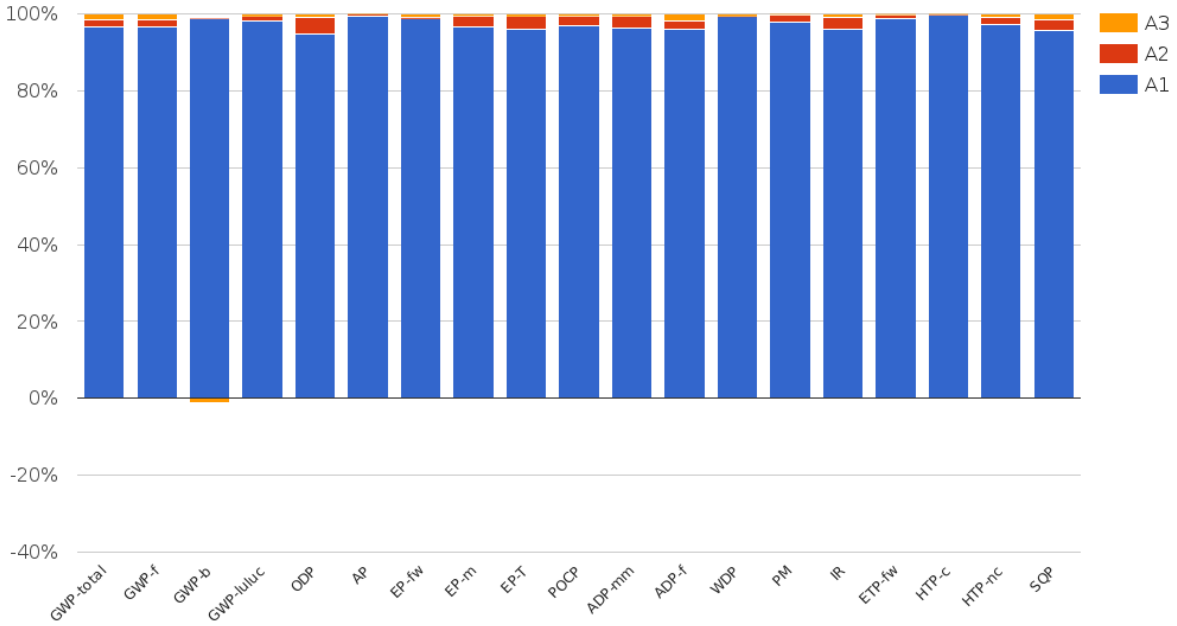
Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	5.078e-5	kg C

UPTAKE OF BIOGENIC CARBON DIOXIDE

The following amount of carbon dioxide uptake is taken into account. Related uptake and release of carbon dioxide in downstream processes are not taken into account in this number although they do appear in the presented results. One kilogram of biogenic Carbon content is equivalent to 44/12 kg of biogenic carbon dioxide uptake.

Uptake Biogenic Carbon dioxide	Amount	Unit
Packaging	0.0001862	kg CO2 (biogenic)

5 Interpretation of results



In most impact categories, the environmental impact of concrete liquid colour containing titanium dioxide is predominantly determined by the extraction and processing of raw materials (Module A1). Among the raw materials (Module A1), pigment results in the largest environmental impact, accounting for 99.4% of the GWP-total.

6 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 14044:2006

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

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

PCR B
Institut Bauen und Umwelt e.V. - Part B: Requirements on the EPD for liquid colorant based on inorganic coloured pigments (various colours) - v6 (2024-08-01)

DIN EN 12878
DIN EN 12878:2014-07: Pigments for the colouring of building materials based on cement and/or lime - Specifications and methods of test

BBSR
BBSR, NBB 2017, Nutzungsdauern_von_Bauteilen Table, 2017-02-24

Ecoinvent
Ecoinvent database version 3.6, Swiss Centre for Life Cycle Inventories (www.ecoinvent.ch) (2019)

7 Contact information

Publisher	Operator	Owner of declaration
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Kiwa-Ecobility Experts is established member of the ECO PLATFORM