ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Sika Corporation
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-SIK-20230176-CBA2-EN
Issue date	22/06/2023
Valid to	21/06/2028

Sika ViscoCrete®-2100

Sika

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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General Information

Sika

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-SIK-20230176-CBA2-EN

This declaration is based on the product category rules:

Concrete admixtures, 06/04/2023
(PCR checked and approved by the SVR)

Issue date

22/06/2023

Valid to

21/06/2028

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Sika ViscoCrete®-2100

Owner of the declaration

Sika Corporation
Polito Avenue 201
07071 Lyndhurst, NJ
United States

Declared product / declared unit

1kg of Sika ViscoCrete®-2100 with a density of 1.08 g/ml

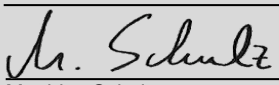
Scope:

This core-EPD relates to 1kg of Sika ViscoCrete®-2100 (admixture group of superplasticizer) applied into the building, manufactured at Sika's plant in Fairless Hills, Pennsylvania 19030, United States and is representative for the year 2021.
The results in this core-EPD were calculated using an LCA-tool verified by IBU in 2023.
The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally



Matthias Schulz,
(Independent verifier)

Product

Product description/Product definition

Sika ViscoCrete®-2100 is a high range water reducing admixture utilizing Sika's ViscoCrete polycarboxylate technology. Sika ViscoCrete®-2100 meets the requirements of *ASTM C494/AASHTO M 194*, Type A & F.
Sika ViscoCrete®-2100 is designed for use in both ready mix and precast applications whenever high plasticity and increased early/ultimate strengths are required. Sika ViscoCrete®-2100 can be used for production of SCC (Self Consolidating Concrete), UHPC (Ultra High-Performance Concrete) as well as for production of conventional slump concrete.
This additive considerably reduces the water content of mixed concrete without detriment to its consistency or enhances its slump with or without change to the water content.
For the purposes of this EPD, Sika's Fairless Hills, Pennsylvania 19030 manufacturing site was selected.
The product needs a declaration of performance taking into consideration *EN 934-2+A1*, Admixtures for concrete, mortar and grout – Part 2: Concrete admixtures – Definitions, requirements, conformity, marking and labelling and the CE-marking. For the application and use the respective national provisions apply.

Application

Sika ViscoCrete®-2100 is used as a constituent material to produce concrete. It can be used in combination with other Sika admixtures and can be successfully used in mix designs utilizing supplementary cementitious materials.

Technical Data

Sika ViscoCrete®-2100 meets the requirements of *ASTM C494/AASHTO M 194*, Type A & F.

Constructional data

Name	Value	Unit
Solid Content (ASTM C494)	40.00 ± 4.80	%
pH (ASTM E70)	4.30 ± 2.00	-
Specific Gravity (ASTM C494)	1.080 ± 0.010	g/cm3
Chloride Content (EN 480-10)	<500	ppm
Air content of fresh concrete (ASTM C494) Type A & F	6.7	%
Water reduction (ASTM C494) Type A	6	%
Water reduction (ASTM C494) Type F	13	%
Intial setting time (ASTM C494) Type A	+ 0:04	hr:min
Intial setting time (ASTM C494) Type F	- 0:06	hr:min
Final setting time (ASTM C494) Type A	+ 0:01	hr:min
Final setting time (ASTM C494) Type F	- 0:10	hr:min

Compressive strength (ASTM C494):

- Type A: at 3 days 126%, at 7 days 125%, at 28 days 111%, at 90 days 109%, at 6 months 111%, and at 1 year 112%
- Type F: at 1 day 190%, at 3 days 160%, at 7 days 151%, at 28 days 131%, at 90 days 134%, at 6 months 141% and at 1 year 141%

Additional technical data are not relevant for the US market.

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 934-2:2009+A1:2012*, Admixtures for concrete, mortar and grout – Part 2: Concrete admixtures – Definitions, requirements, conformity, marking and labelling.

Base materials/Ancillary materials

The raw materials and additives of Sika ViscoCrete®-2100 can be given as follows:

- Water: 60 – 70%
- Polycarboxylate: 30 – 45%
- Additives: 0.5 - 5%

Sika ViscoCrete®-2100 is non-hazardous under the criteria of the Federal *OSHA* Hazard Communication Standard 29CFR 1910.1200. It does not contain any substances that *OSHA* regulates as carcinogens or potential carcinogens, according to Federal *OSHA* Hazard Communication Standard 29CFR 1910.1003, in concentrations of 0.1% or greater.
Sika ViscoCrete®-2100 is a non-chloride-based admixture, it does not contain any intentionally added chlorides.
In particular:

- This product contains substances listed in the candidate list (date: 20.04.2023) exceeding 0.1 percentage by mass: No
- This product contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: No
- Biocide products were added to this construction product orit has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on *Biocide Products No. 528/2012*): No

Reference service life

The durability of concrete admixtures is normally at least as long as the lifetime of the building in which it is used. The experimental data show that the reference life is greater than 50 years.
The documentation of the RSL is not required for the EPDs calculated using the EPD tool from Sika since the entire life cycle is not declared. Only modules A1-A3, A4, A5, C1-C4 and D are considered.

LCA: Calculation rules

Declared Unit

The EPD refers to the declared unit of 1kg of concrete admixture (superplasticizer) applied into the building with a density of 1.08 g/ml in accordance with *IBU PCR 04-2023* part B for concrete admixtures.

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	kg
Gross density	1080	kg/m^3

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System boundary

Declaration type with respect to life cycle stages covered according to clause 5.2 *EN 15804+A2* is cradle to gate with modules C1–C4 and module D (A1–A3, A4, A5, C and D).

Modules taken into account:

- A1 Production of preliminary products
- A2 Transport to the plant
- A3 Production including provision of energy, production of auxiliaries and consumables and waste treatment
- A4 Transport from the construction site to the installation site
- A5 Installation, admixtures applied into the building during A5 phase operations. At this stage, an impact of the production and treatment of installation residue equal to 1% of the product is considered.
- C1-C2-C4-D

The building deconstruction (demolition process) takes place in C1 module which considers energy production and consumption in terms of diesel and all the emissions connected with the fuel-burning process. After the demolition, the admixture is transported to the end-of-life processing (C2 module) where all the impacts related to the transport processes are considered.
One scenario is considered for the final treatment of the waste:

- 100% disposal (C4), modelled by landfill process where admixtures end their life cycle.

Module D accounts for benefits that are beyond the defined system boundaries. Credits are generated during the incineration of the installation scrap in module A5.

Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: United States

Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.
Sphera *LCA for Expert* software (former GaBi) (version 10) and *Managed LCA Content* (2022.2) have been used.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

No biogenic carbon is contained in the product. Since the product is delivered to the installation site in tank trucks, no packaging is considered.

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	-	kg C

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Transport from the gate to the side (A4)

Name	Value	Unit
Transport distance	5000	km
Gross weight	34-40	t
Payload capacity	27	t

Assembly (A5)

Name	Value	Unit
Material loss	0.01	kg
Other resources	-	kg

Material loss regards the amount of product not used during the application phase into the building. This amount is 1 % of the product, impacts related to the production of this part are charged to the A5 module. This percentage is considered as waste to incineration since the product has a calorific value and impacts of its end of life have been considered in the LCA model and declared in A5.

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End of life (C1-C4)

C1: This module considers the use of machinery (7.5E-5 kg of diesel for kg handled) to dismantle the product to enable its subsequent transport.
C2: The concrete demolition waste is transported from the building site to a treatment plant or disposal site by truck and an average distance of 50 km is considered.
C4: The results for the end-of-life are declared for one scenario:

Name	Value	Unit
Landfill percentage	100	%
Material to landfill	1	kg

LCA: Results

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DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End-of-life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	MND	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg of Sika ViscoCrete®-2100

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
GWP-total	kg CO_2 eq	1.26E+00	2.59E-01	2.64E-02	2.92E-04	6.48E-03	4.33E-02	-3E-03
GWP-fossil	kg CO_2 eq	1.25E+00	2.48E-01	2.05E-02	2.8E-04	6.21E-03	4.29E-02	-2.99E-03
GWP-biogenic	kg CO_2 eq	1.12E-02	1.06E-02	5.95E-03	1.2E-05	2.64E-04	4.41E-04	-1.32E-06
GWP-luluc	kg CO_2 eq	1.52E-04	8.18E-06	1.72E-06	9.36E-09	2.04E-07	1.53E-05	-2.04E-07
ODP	kg CFC11 eq	2.91E-12	2.32E-14	3.07E-14	2.65E-17	5.79E-16	6.67E-14	-1.06E-14
AP	mol H^+ eq	2.14E-03	6.51E-04	4.04E-05	3.57E-06	1.79E-05	2.12E-04	-4.18E-06
EP-freshwater	kg P eq	7.17E-06	5.88E-08	7.27E-08	6.72E-11	1.47E-09	1.33E-07	-1.56E-09
EP-marine	kg N eq	7.38E-04	3.2E-04	1.37E-05	1.65E-06	8.83E-06	5.73E-05	-9.25E-07
EP-terrestrial	mol N eq	8.22E-03	3.51E-03	1.57E-04	1.8E-05	9.72E-05	6.3E-04	-9.99E-06
POCP	kg NMVOC eq	2.09E-03	6.22E-04	3.61E-05	4.92E-06	1.7E-05	1.57E-04	-2.65E-06
ADPE	kg Sb eq	5.92E-07	8.1E-08	6.17E-09	9.26E-11	2.02E-09	1.14E-08	-5.81E-10
ADPF	MJ	3.13E+01	3.35E+00	3.67E-01	3.83E-03	8.36E-02	6.22E-01	-4.65E-02
WDP	m^3 world eq deprived	3.47E-01	1.43E-03	4.81E-03	1.64E-06	3.58E-05	2.6E-03	-5.84E-04

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg of Sika ViscoCrete®-2100

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
PERE	MJ	1.85E+00	2.63E-02	1.97E-02	3E-05	6.55E-04	6.01E-02	-9.36E-03
PERM	MJ	0	0	0	0	0	0	0
PERT	MJ	1.85E+00	2.63E-02	1.97E-02	3E-05	6.55E-04	6.01E-02	-9.36E-03
PENRE	MJ	2.69E+01	3.59E+00	3.71E-01	4.11E-03	8.97E-02	6.41E-01	-4.65E-02
PENRM	MJ	4.82E+00	0	0	0	0	0	0
PENRT	MJ	3.17E+01	3.59E+00	3.71E-01	4.11E-03	8.97E-02	6.41E-01	-4.65E-02
SM	kg	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0
FW	m^3	1.06E-02	5.85E-05	1.37E-04	6.69E-08	1.46E-06	9.2E-05	-1.78E-05

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 = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg of Sika ViscoCrete®-2100

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
HWD	kg	2.34E-09	1.19E-11	2.43E-11	1.36E-14	2.96E-13	2.4E-11	-1.95E-12
NHWD	kg	2.36E-02	1.59E-04	2.06E-03	1.82E-07	3.97E-06	1E+00	-1.54E-05
RWD	kg	5.2E-04	9.69E-06	5.48E-06	1.11E-08	2.42E-07	5.63E-06	-4.19E-06
CRU	kg	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0
EEE	MJ	0	0	1.93E-02	0	0	0	0
EET	MJ	0	0	3.49E-03	0	0	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg of Sika ViscoCrete®-2100

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND
IR	kBq U235 eq	ND	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND	ND
SQP	SQP	ND	ND	ND	ND	ND	ND	ND

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

This EPD was created using a software tool.

References

AASHTO M194
Standard Specification for Chemical Admixtures for Concrete

ASTM C494/C494M
Standard Specification for Chemical Admixtures for Concrete

ASTM E70
Standard Test Method for pH of Aqueous Solutions With the Glass Electrode

Clean Air Act (CAA)
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EN 480-10
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EN 15804
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EN 15804
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EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

OSHA 29CFR 1910.1003
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OSHA 29CFR 1910.1200
Code of Federal Regulations Title 29, Subtitle B, Chapter XVII, Part 1910, Subpart Z, Section 1910.1200 Hazard communication.

Further References

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LCA Calculator
LCA Calculator software (version 6). Visualize, Improve and Report on Product Sustainability. https://sphera.com/your-path-to-sustainability/

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Life cycle assessment database, by Sphera Solutions GmbH, Leinfelden-Echterdingen, 2022 https://sphera.com/life-cycle-assessment-lca-database/

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PCR Part B
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