ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	Sika Australia Pty Ltd
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-SIK-20240241-CBA2-EN
Issue date	22/07/2024
Valid to	21/07/2029

SikaRapid®-4

Sika Australia Pty Ltd

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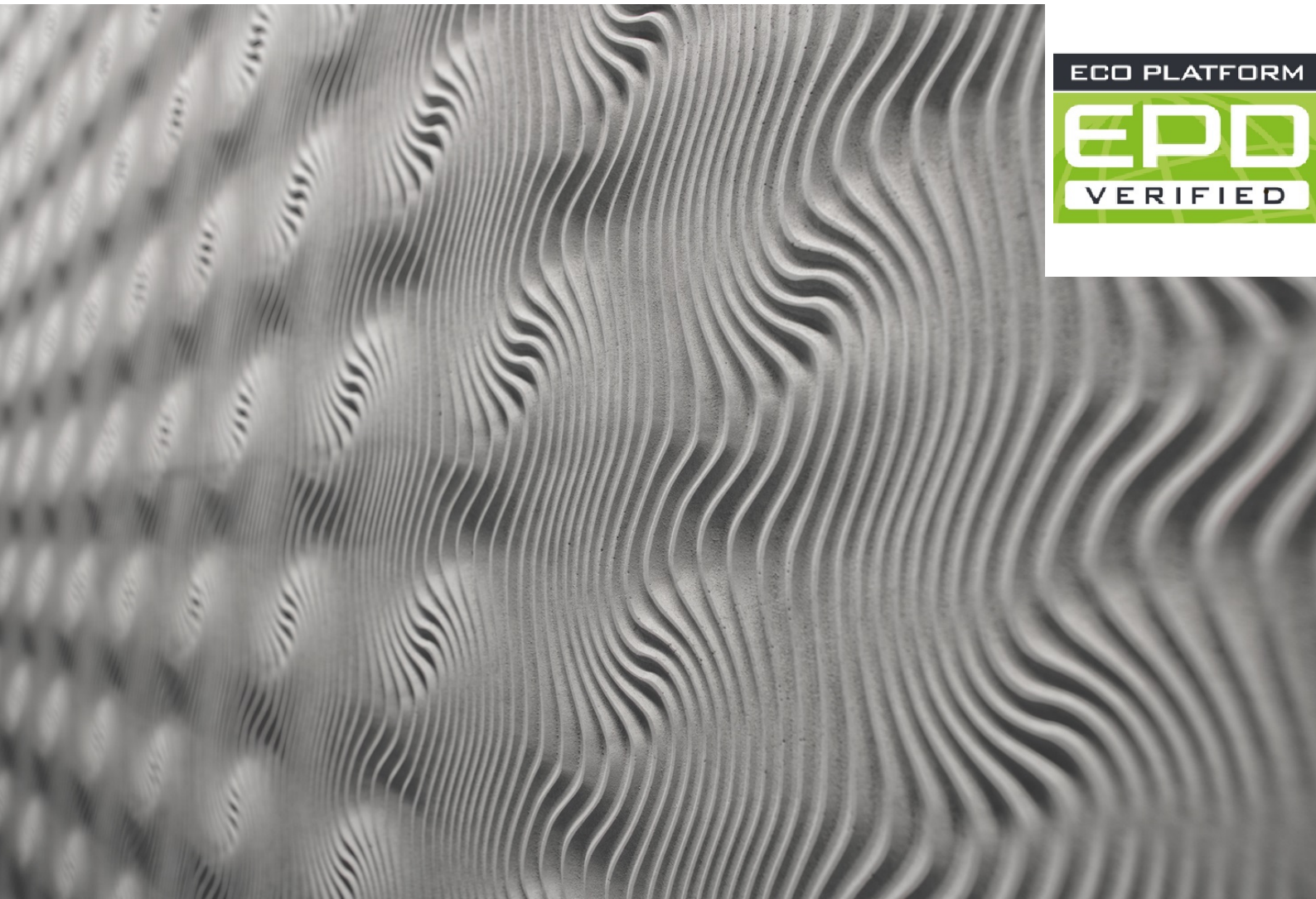

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General Information

Sika Australia Pty Ltd

Programme holder

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

Declaration number

EPD-SIK-20240241-CBA2-EN

This declaration is based on the product category rules:

Concrete admixtures, 01/08/2021
(PCR checked and approved by the SVR)

Issue date

22/07/2024

Valid to

21/07/2029

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

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

SikaRapid®-4

Owner of the declaration

Sika Australia Pty Ltd
Elizabeth Street 55
2164 Wetherill Park, NSW
Australia

Declared product / declared unit

1 kg of SikaRapid®-4 with a density of 1.44 kg/l.

Scope:

This verified EPD relates to 1kg of SikaRapid®-4. It is manufactured at the plants of Sika Australia Pty Ltd in Wetherill Park (NSW 2164), Keysborough (VIC 3173), Pinkenba (QLD 4008), and Bibra Lake (WA 6163) in Australia. The production and transport data are representative for the period from July 2022 to June 2023. The results in this EPD are 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)

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Product

Product description/Product definition

SikaRapid®-4 is produced from specially-selected salt compounds and additives. The admixture is a liquid agent that is introduced into concrete while it is being mixed. Depending on specific application, the typical dosage can range from 400 ml to 2000 ml per 100 kg of total cementitious materials. Optimum dosage should be determined by site trials with the particular concrete mix design and materials. Users shall refer to the most recent Product Data Sheet for more information and advice.

SikaRapid®-4 is accompanied by a declaration of performance, which conforms to the specifications outlined in Australian Standard *AS 1478.1-2000*, type Ac. The product is designed to accelerate the setting and increase the early strength of concrete. It can be used for various applications when there are requirements of early strength, faster finishing of concrete surfaces, and faster slip-form movement or in case of cold climate.

Application

SikaRapid®-4 is used as a constituent material to produce concrete. It can be used in combination with other Sika admixtures. All admixtures must be added separately and trials are recommended before use.

Technical Data

SikaRapid®-4 meets the requirements of *AS 1478.1-2000*, type Ac.

Constructional data

Name	Value	Unit
pH of admixture (AS 1478.1)	7.5–9.5	-
Relative density of admixture (AS 1478.1)	1.42–1.46	kg/l
Non-volatile content of admixture (AS 1478.1)	48.0–52.0	%
Chloride content of admixture (AS 1478.1)	≤ 64	g/l
Water content of concrete as % of control (AS 1478.1)	≤ 105	%
Intial setting time of concrete, deviation from control (AS 1012.18)	-3 to -1	hour
Final setting time of concrete, deviation from control (AS 1012.18)	-3 to -1	hour
Compressive strength of concrete as % of control at 3 days (AS 1012.9)	≥ 100	%
Compressive strength of concrete as % of control at 7 days (AS 1012.9)	≥ 100	%
Compressive strength of concrete as % of control at 28 days (AS 1012.9)	≥ 100	%
Compressive strength of concrete as % of control at 90 days (AS 1012.9)	≥ 90	%

Additional technical data are not relevant for this product.

Base materials/Ancillary materials

The raw materials and additives of SikaRapid®-4 can be given as follows:

Name	Value	Unit
Selected salt compounds (*)	20–50	%
Water	40–70	%
Additives	< 10	%

(*) *Solid*

With respect to international and local regulations:

- This product/article/at least one partial article contains substances listed in the 'Candidate List of Substances of Very High Concern (*SVHC*) for Authorisation' (date: 30/05/2024) exceeding 0.1 percentage by mass: No.
- Biocide products were added to this construction product or it 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.
- Any applicable prohibition, authorisation and restricted use requirements for this product, including for carcinogens referred to in Schedule 10 of the Australian Model Work Health and Safety Regulations (*WHS*): 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 Reference service life 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, C2, C4, and D are considered.

LCA: Calculation rules

Declared Unit

The EPD refers to the declared unit of 1kg of concrete admixture applied into the building with a density of 1.44 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	1440	kg/m^3

Other declared units are allowed if the conversion is shown transparently.

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: Australia

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

The product contains small amounts of a substance with renewable primary energy resources used as raw materials (PERM), however, this is not calculated in the LCA tool and a PERM value of 0 in A1-A3 is declared.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	0.00001	kg C
Biogenic carbon content in accompanying packaging	-	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Transport from the gate to the site (A4)

Name	Value	Unit
Transport distance	153	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.

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

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = 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 SikaRapid®-4

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
GWP-total	kg CO_2 eq	6.87E-01	7.68E-03	1.8E-02	2.82E-04	6.27E-03	4.33E-02	-4.81E-03
GWP-fossil	kg CO_2 eq	6.82E-01	7.35E-03	1.22E-02	2.7E-04	6E-03	4.29E-02	-4.81E-03
GWP-biogenic	kg CO_2 eq	4.4E-03	3.26E-04	5.77E-03	1.21E-05	2.65E-04	4.41E-04	9.05E-07
GWP-luluc	kg CO_2 eq	3.16E-05	1.92E-07	3.86E-07	7.16E-09	1.56E-07	1.53E-05	-2.33E-06
ODP	kg CFC11 eq	1.07E-12	7.23E-16	1.13E-14	2.69E-17	5.88E-16	6.67E-14	-1.67E-14
AP	mol H^+ eq	2.54E-03	2.25E-05	3.2E-05	3.66E-06	2E-05	2.12E-04	-1.59E-05
EP-freshwater	kg P eq	8.44E-07	9.29E-10	8.85E-09	3.47E-11	7.56E-10	1.33E-07	-1.67E-09
EP-marine	kg N eq	8.59E-04	1E-05	1.11E-05	1.65E-06	9.02E-06	5.73E-05	-3.49E-06
EP-terrestrial	mol N eq	8.05E-03	1.1E-04	1.12E-04	1.81E-05	9.93E-05	6.3E-04	-3.79E-05
POCP	kg NMVOC eq	2.05E-03	2.03E-05	2.7E-05	4.96E-06	1.8E-05	1.57E-04	-1.04E-05
ADPE	kg Sb eq	1.1E-07	2.98E-10	1.17E-09	1.11E-11	2.43E-10	1.14E-08	-2.84E-10
ADPF	MJ	7.46E+00	1.02E-01	8.15E-02	3.8E-03	8.29E-02	6.22E-01	-5.12E-02
WDP	m^3 world eq deprived	1.26E-01	6.27E-05	2.48E-03	2.34E-06	5.1E-05	2.6E-03	-1.38E-03

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 SikaRapid®-4

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
PERE	MJ	7.32E-01	5.51E-04	7.8E-03	2.06E-05	4.49E-04	6.01E-02	-1.18E-02
PERM	MJ	0	0	0	0	0	0	0
PERT	MJ	7.32E-01	5.51E-04	7.8E-03	2.06E-05	4.49E-04	6.01E-02	-1.18E-02
PENRE	MJ	6.04E+00	1.02E-01	8.5E-02	3.8E-03	8.3E-02	6.41E-01	-5.12E-02
PENRM	MJ	1.42E+00	0	-3.38E-03	0	0	0	0
PENRT	MJ	7.46E+00	1.02E-01	8.16E-02	3.8E-03	8.3E-02	6.41E-01	-5.12E-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	3.22E-03	1.58E-06	6.06E-05	5.89E-08	1.29E-06	9.2E-05	-3.29E-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 SikaRapid®-4

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
HWD	kg	8.3E-06	2.55E-13	8.3E-08	9.52E-15	2.08E-13	2.4E-11	-4.79E-12
NHWD	kg	7.74E-03	4.22E-06	1.9E-03	1.58E-07	3.44E-06	1E+00	-2.18E-05
RWD	kg	1.86E-04	5.74E-08	2.03E-06	2.14E-09	4.67E-08	5.63E-06	-9.91E-07
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	1.99E-02	0	0	0	0
EET	MJ	0	0	4.12E-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 SikaRapid®-4

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
PM	Disease incidence	3.8E-08	1.25E-10	4.19E-10	1.93E-10	1.08E-10	2.21E-09	-2.18E-10
IR	kBq U235 eq	3.41E-02	3.8E-06	3.55E-04	1.42E-07	3.1E-06	5.17E-04	-6.2E-05
ETP-fw	CTUe	2.51E+00	1.21E-01	2.94E-02	4.5E-03	9.82E-02	3.47E-01	-9.35E-03
HTP-c	CTUh	1.35E-10	1.94E-12	1.95E-12	7.22E-14	1.58E-12	3.35E-11	-8.93E-13
HTP-nc	CTUh	1.16E-08	6.64E-11	1.81E-10	3.5E-12	5.47E-11	3.51E-09	-2.32E-11
SQP	SQP	4.53E-01	3E-04	5.3E-03	1.12E-05	2.45E-04	7.32E-02	-5.08E-03

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

AS 1012.9:2014
Methods of testing concrete - Method 9: Determination of the compressive strength of concrete specimens

AS 1012.18-1996 (R-2014)
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Further References

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