

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	Sika Services AG
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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SikaFiber®-40 Force
SikaFiber® Force-48
SikaFiber® Force-50
SikaFiber® Force-60

Sika Services AG



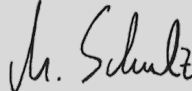
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EPD
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General Information

<p>Sika Services AG</p> <p>Programme holder IBU – Institut Bauen und Umwelt e.V. Hegelplatz 1 10117 Berlin Germany</p> <p>Declaration number EPD-SIK-20220355-CBA1-EN</p> <p>This declaration is based on the product category rules: Reinforcing fibres , 09.2022 (PCR checked and approved by the SVR)</p> <p>Issue date 10.01.2023</p> <p>Valid to 09.01.2028</p> <p></p> <p>Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)</p> <p></p> <p>Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.)</p>	<p>SikaFiber® Force</p> <p>Owner of the declaration Sika Services AG Tüffenwies 16 8048 Zürich</p> <p>Declared product / declared unit 1 kg of SikaFiber® Force</p> <p>Scope: 1 kg of SikaFiber® Force, a macro-polymer fibre for load-bearing purposes in concrete, produced in Troisdorf, Germany.</p> <p>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.</p> <p>The EPD was created according to the specifications of <i>EN 15804+A2</i>. In the following, the standard will be simplified as <i>EN 15804</i>.</p> <p>Verification</p> <p>The standard <i>EN 15804</i> serves as the core PCR</p> <p>Independent verification of the declaration and data according to <i>ISO 14025:2011</i></p> <p><input type="checkbox"/> internally <input checked="" type="checkbox"/> externally</p> <p></p> <p>Matthias Schulz (Independent verifier)</p>
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Product

Product description/Product definition

SikaFiber® Force is a polyolefin macro-polymer fibre for load-bearing purposes in concrete. It distributes stresses in the concrete and reduces the tendency to tear. Beyond that, it reduces or eliminates steel reinforcement.

The products included in the EPD are listed below.

- SikaFiber®-40 Force – 0.73 mm diameter
- SikaFiber® Force-48 – 0.84 mm diameter
- SikaFiber® Force-50 – 0.73 mm diameter
- SikaFiber® Force-60 – 0.84 mm diameter

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 14889-2:2006, Fibres for concrete - Part 2: Polymer fibres - Definitions, specifications and conformity* and the CE-marking.

For the application and use the respective national provisions apply.

Application

For most types of concrete to reduce steel reinforcement, distribute stresses, increase load-bearing capacity or improve abrasion and fire resistance:

- Floor slabs,
- Precast concrete elements,
- Foundations, footings,
- Load-bearing components in building construction and traffic route engineering.

Technical Data

Technical data

Name	Value	Unit
Density	0.901 - 0.91	kg/m ³
Diameter	0.73 - 0.84	mm
Length	40 - 60	mm
Classification acc. to EN 14889-2	Class II: Macro fibres	-
Melting point	164	°C
Tensile strength acc. to EN 14889-2	460 - 490	N/mm ²
Modulus of elasticity in tension acc. to EN 14889-2	8 - 9.5	N/mm ²
Recommended dosage	2.5 - 10	kg/m ³

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 14889-2:2006, Fibres for concrete - Part 2: Polymer fibres - Definitions, specifications and conformity*.

Base materials/Ancillary materials

SikaFiber® Force fibres consist of polypropylene (> 95%) and polyethylen (< 5%).

1) This product/article/at least one partial article contains substances listed in the *ECHA candidate list* (date: 28.09.2022) exceeding 0.1 percentage by mass:
· no

2) This product/article/at least one partial article contains other cancerogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are

not on the *ECHA candidate list*, exceeding 0.1 percentage by mass:
· no

3) 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 REGULATION (EU) No 528/2012:
· no

Reference service life

A reference service life according to the *ISO 15686:1, -2, -7 and -8* standards cannot be declared as the fibres are fully integrated into concrete. Their service life thus depends on the service life of the concrete structure they are used in.

LCA: Calculation rules

Declared Unit

Declared unit

Name	Value	Unit
Declared unit	1	kg

System boundary

Type of the EPD: from the cradle to the factory gate, i.e. A1-A3; in addition the disposal of packaging is declared in module A5.

The content of the modules declared in this EPD are outlined in the next section below. The system boundaries related to non-elementary flows entering or leaving the product system are outlined below:

- Plastic materials that are recycled, reach the end-of-waste state once they are sorted into homogeneous fractions. No further transport or processing is considered.
- For wastes that are incinerated, it is assumed that they are incinerated in a

municipal waste incineration plant with an R-value < 0.6. This means that the incineration process is considered a waste treatment process and included in the calculations. The generated “exported energy” is assumed to have reached the end-of-waste status. However, due to the minimal quantities of the products transported in bags, the declaration of exported energy is disregarded in module D, i.e., no module D is declared.

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.

Ecoinvent v3.8 has been used as the background database.

LCA: Scenarios and additional technical information

Characteristic product properties Information on biogenic carbon

Characteristic product properties Information on biogenic carbon

Name	Value	Unit
Biogenic carbon content in product	0	kg C
Biogenic carbon content in accompanying packaging	0,00365	kg C

load of 495 kg/pallet) is incinerated together with all plastic packaging. The paper bags are integrated as additional fibre input into the concrete, no end-of-life process is considered for the paper bags. Given that the end-of-life scenario could be a permanent storage of the fibres in tunnel applications and in order to ensure a net 0 carbon balance for the biogenic carbon stored in the product, this (permanent) biogenic carbon storage is neglected in line with *EN 15804+A2* (in analogy to biogenic carbon in landfills). No bonding agent is needed during installation.

Module A5* “Disposal of packaging after usage of the product”

This module contains the disposal of the packaging only; it is assumed that the share of the wooden pallet attributed to this transport (assuming 20 uses and a

LCA: Results

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	ND	X	ND	ND	MNR	MNR	MNR	ND	ND	ND	ND	ND	ND	ND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg SikaFiber® Force

Core Indicator	Unit	A1-A3	A5
Global warming potential - total	[kg CO ₂ -Eq.]	2.57E+0	3.45E-2
Global warming potential - fossil fuels	[kg CO ₂ -Eq.]	2.58E+0	3.09E-2
Global warming potential - biogenic	[kg CO ₂ -Eq.]	-3.65E-3	3.65E-3
GWP from land use and land use change	[kg CO ₂ -Eq.]	1.46E-3	2.29E-7
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	7.23E-8	1.07E-10
Acidification potential, accumulated exceedance	[mol H ⁺ -Eq.]	8.40E-3	7.58E-6
Eutrophication, fraction of nutrients reaching freshwater end compartment	[kg P-Eq.]	9.25E-4	9.04E-8
Eutrophication, fraction of nutrients reaching marine end compartment	[kg N-Eq.]	1.64E-3	4.21E-6
Eutrophication, accumulated exceedance	[mol N-Eq.]	1.62E-2	3.61E-5
Formation potential of tropospheric ozone photochemical oxidants	[kg NMVOC-Eq.]	7.16E-3	8.88E-6
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.47E-5	2.54E-9
Abiotic depletion potential for fossil resources	[MJ]	8.07E+1	7.28E-3
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m ³ world-Eq deprived]	1.62E+0	1.85E-4

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg SikaFiber® Force

Indicator	Unit	A1-A3	A5
Renewable primary energy as energy carrier	[MJ]	2.27E+0	2.59E-1
Renewable primary energy resources as material utilization	[MJ]	2.58E-1	-2.58E-1
Total use of renewable primary energy resources	[MJ]	2.53E+0	3.02E-4
Non-renewable primary energy as energy carrier	[MJ]	3.65E+1	3.87E-1
Non-renewable primary energy as material utilization	[MJ]	4.44E+1	-3.80E-1
Total use of non-renewable primary energy resources	[MJ]	8.09E+1	7.29E-3
Use of secondary material	[kg]	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0
Use of net fresh water	[m ³]	2.35E-2	5.04E-5

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg SikaFiber® Force

Indicator	Unit	A1-A3	A5
Hazardous waste disposed	[kg]	1.49E-5	7.85E-8
Non-hazardous waste disposed	[kg]	2.81E-1	9.62E-4
Radioactive waste disposed	[kg]	1.36E-4	6.06E-8
Components for re-use	[kg]	0.00E+0	0.00E+0
Materials for recycling	[kg]	1.00E-3	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	8.29E-2
Exported thermal energy	[MJ]	0.00E+0	1.63E-1

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg SikaFiber® Force

Indicator	Unit	A1-A3	A5
Potential incidence of disease due to PM emissions	[Disease Incidence]	9.08E-8	4.44E-11
Potential Human exposure efficiency relative to U235	[kBq U235-Eq.]	2.03E-1	3.40E-5
Potential comparative toxic unit for ecosystems	[CTUe]	1.43E+1	7.00E-2
Potential comparative toxic unit for humans - cancerogenic	[CTUh]	6.50E-10	1.98E-12
Potential comparative toxic unit for humans - not cancerogenic	[CTUh]	1.70E-8	8.99E-11
Potential soil quality index	[-]	7.88E+0	2.89E-3

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.

References

Product category rules of IBU

IBU (2021)

IBU (2021): General Instructions for the EPD Programme of the Institut Bauen & Umwelt e.V. (General Instructions for the IBU EPD Programme). Version 2.0, Institut Bauen & Umwelt, Berlin.

IBU (2021)

IBU (2021): PCR Part A: Calculation rules for the life cycle assessment and requirements on the project report according to EN 15804+A2. Version 2.1., Institut Bauen & Umwelt, Berlin.

IBU (2022)

IBU (2020): PCR Part B: Requirements on the for reinforcing fibres. Version 2022/09, Institut Bauen & Umwelt, Berlin.

Standards and legal documents

ISO 14025

ISO 14025:2006-07, Environmental labels and declarations - Type III Environmental declarations - Principles and procedures.

ISO 14044

EN ISO 14044:2006-07, Environmental management - Life cycle assessment - Requirements and guidance (ISO 14044:2006); German and English versions
EN ISO 14044:2006.

EN 14889-2

EN 14889-2:2006, Fibres for concrete - Part 2: Polymer fibres - Definitions, specifications and conformity.

ISO 15686

ISO 15686:1, -2, -7 and -8. Service life planning (various parts)

EN 15804

EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works - Environmental product declarations - Core rules for the product category construction products.

ECHA candidate list

The Candidate List of substances of very high concern, available via <https://echa.europa.eu/nl/-/four-news-substances-added-to-the-candidate-list>.

Regulation on biocidal products

REGULATION (EU) No 528/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 May 2012 concerning the making available on the market and use of biocidal products.

Regulation (EU) Nr. 305/2011(CPR)

REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

Additional references

ecoinvent v3.8.

ecoinvent v3.8, Ökobilanzdatenbank, 12/2021. ecoinvent, Zürich.

Weidema et al. (2013)

Weidema, B., C. Bauer, R. Hischier, C. Mutel, T. Nemecek, J. Reinhard, C.O. Vadenbo, G. Wernet (2013): Overview and methodology, Data quality guideline for the ecoinvent database version 3. ecoinvent report no. 1 (v3), St. Gallen (CH).

**Publisher**

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

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@ibu-epd.com
Web www.ibu-epd.com

**Programme holder**

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

Tel +49 (0)30 - 3087748- 0
Fax +49 (0)30 - 3087748 - 29
Mail info@ibu-epd.com
Web www.ibu-epd.com

Dr. Frank Werner

Umwelt & Entwicklung

Author of the Life Cycle**Assessment**

Dr. Frank Werner - Umwelt &
Entwicklung
Kammelenbergstrasse 30
9011 St. Gallen
Switzerland

Tel + 41 (0)44 241 39 06
Fax + 41 (0)44 461 33 28
Mail frank@frankwerner.ch
Web <http://www.frankwerner.ch/>

**Owner of the Declaration**

Sika Services AG
Tüffenwies 16
8048 Zürich
Switzerland

Tel +41 58 436 40 40
Fax -
Mail product.sustainability@ch.sika.com
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Web www.sika.com