ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	CELO Befestigungssysteme GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-CLO-20240120-CAA1-EN
Issue date	03.04.2024
Valid to	16.01.2028

ResiFIX VYSF

CELO Befestigungssysteme GmbH

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General Information

CELO Befestigungssysteme GmbH

Programme holder

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

Declaration number

EPD-CLO-20240120-CAA1-EN

This declaration is based on the product category rules:

Reaction resin products, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

03.04.2024

Valid to

16.01.2028

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

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ResiFIX VYSF

Owner of the declaration

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Declared product / declared unit

The declared product is the two-component reaction resin mortar "ResiFIX VYSF", manufacturated by CELO Befestigungssysteme GmbH. The declared unit is based on 1 kg reaction resin product in the ratio at which the two components must be mixed before use. The packaging is also included in the calculation, since the product is sold by CELO Befestigungssysteme GmbH with its packaging. The declared unit is indicated in [kg].

Scope:

This document covers the two-component reaction resin mortar "ResiFIX VYSF". To prepare the life cycle assessment [*LCA*], specific data were collected from theCELO Befestigungssysteme GmbH manufacturing facility in CELO Befestigungssysteme GmbH, Plant2 Germany. The assessment is based on data from 2020 which correspond to the yearly average. The procedure by which the data are allocated to the declared unit is described in the "Allocation" section.

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

Angela Schindler,
(Independent verifier)

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Product

Product description/Product definition
The declared product ResiFIX VYSF is a two-component reaction resin mortar based on vinyl ester resin that is delivered in a two-component plastic cartridge. The high-performance product is applied through a static mixer using a manual, battery-operated or pneumatic gun. It was specially developed for use in securing threaded rods, rebar or internally threaded sleeves in solid brick, concrete, autoclaved aerated concrete and lightweight concrete. Due to its excellent mechanical strength, it can also be used in perforated brick by using a special perforated sleeve. ResiFIX VYSF mortar has a wide range of possible applications at installation tempeartures as low as -10 °C and operating temperatures of up to 120 °C, and offers high chemical resistance in extreme environments like swimming pools (chlorine) or near the sea (salt). With its broad range of national and international approvals and certifications, it can be used in almost any application.

Marketing of the product in the EU/EFTA (except for Switzerland) is governed by *Regulation (EU) No. 305/2011 (CPR)*. The product requires a Declaration of Performance subject to *ETA-10/0134, ETA-15/0320, ETA-13/0315* and CE marking.

Application
The declared product ResiFIX VYSF is used to reliably secure threaded rods, internally threaded sleeves and post-installed rebar connections in dry and moist concrete or masonry. The ResiFIX VYSF product can also be used for water-filled boreholes. The declared product ResiFIX VYSF has very good mechanical and thermal properties as well as very high chemical resistance. It can be used in aggressive environments. The declared product ResiFIX VYSF emits only a slight odour.

Sample applications

Suitable for securing façades, canopies, wooden structures, metal structures, metal profiles, supports, beams, panels, railings, gratings, plumbing fixtures, pipes, cable trays, post-installed rebar connections (for renovations or reinforcement), etc.

Technical Data
The following construction data are relevant for the declared product ResiFIX VYSF as delivered:

Construction data

Name	Value	Unit
Density acc. to DIN 51757 for mixing the two components	1.6	g/ml
Compressive strength acc. to DIN EN 196 Part 1	100.6	N/mm²
Flexural strength acc. to DIN EN 196 Part 1	14.7	N/mm²

Storage:
Store in a cool, dry and dark place; storage temperature: +5°C to +25°C

Shelf life:
18 months in standard cartridge systems
18 months in foil tube cartridge systems

Gel and working time:
-10°C 90 min.
-5°C 90 min.
0°C 45 min.
+5°C 25 min.
+10°C 15 min.
+20°C 6 min.
+30°C 4 min.
+35°C 2 min.
+40°C 1.5 min.

Curing time in dry substrate:
-10°C 1440 min.
-5°C 840 min.
0°C 420 min.
+5°C 120 min.
+10°C 80 min.
+20°C 45 min.
+30°C 25 min.
+35°C 20 min.
+40°C 15 min.

For more information, please refer to the relevant technical data sheet.

Product performance values in accordance with the Declaration of Performance with regard to its principal charateristics according to *ETA-10/0134, ETA-15/0320 and* ETA-13/0315.

Base materials/Ancillary materials
The declared product ResiFIX VYSF is delivered as a two-component plastic cartridge and consists of a resin component and a curing agent component in a 10:1 volume ratio. The mixing ratio between the resin component and the curing agent component is set automatically as the product is pushed out of the cartridge. Curing begins immediately after the components are mixed.

1) "This product/article/at least one partial article contains substances in the ECHA candidate list of substances of very high concern (SVHC) (10 June 2022) above a concentration of 0.1% by mass: no."

2) "This product/article/at least one partial article contains other CMR substances in categories 1A or 1B which are not on the 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 (EU) Regulation on Biocidal Products No. 528/2012): no"

The product considered in this EPD contains individual components in the following ranges:

Resin component:

Vinyl ester resin: 30 to 40% by weight

Mineral fillers: 50 to 70% by weight

Other components: < 5% by weight

Curing agent component:
Dibenzoyl peroxide: 10 to 15% by weight

Mineral fillers: 40 to 60% by weight

Other components: 10 to 35% by weight

Reference service life
The declared product ResiFIX VYSF may be exposed to a wide range of environmental conditions during the use phase. Its expected reference service life depends on the specific installation situation and on the product's resulting exposure. The main factors influencing service life are weather conditions and mechanical and chemical stresses.

LCA: Calculation rules

Declared Unit
The product declared is a two-component reaction resin mortar manufactured by CELO Befestigungssysteme GmbH with the product name ResiFIX VYSF. The declared unit is based on 1 kg reaction resin product in the ratio at which the two components must be mixed before use.

The mixing ratio between the resin component and the curing agent component is 9:1 [m/m] (volume ratio 10:1). The packaging is also included in the calculation at 0.3013 kg per 1 kg of reaction resin product. The declared unit data are presented in the table below.

Declared unit data

Name	Value	Unit
Declared unit	1	kg

System boundary
Type of EPD: Cradle to factory gate with options. The following information modules are defined as system boundaries in this study:

Production stage (A1- A3):
• A1, Raw material extraction,
• A2, Transport to the manufacturer,
• A3, Manufacturing.

End of life (C1- C4):
C1, Deconstruction/demolition,
C2, Transport,
C3, Waste processing,
C4, Disposal.

Reuse, recovery and recycling potential (D)

To precisely determine the indicators and environmental impacts of the declared unit, a total of 8 information modules are considered. The information modules A1 to A3 describe the material provision, the transport to the production site, as well as the production processes of the product itself.

The precursor products are sourced from Germany, England and France, Transport is mainly done by truck. Only the transport from England is done by rail. The following process diagrams illustrate the underlying production process.

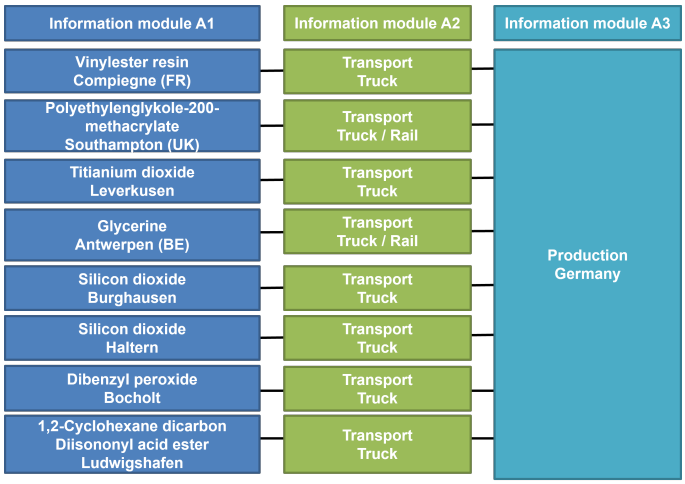

Figure 1 Information modules A 1 to A3 of the product

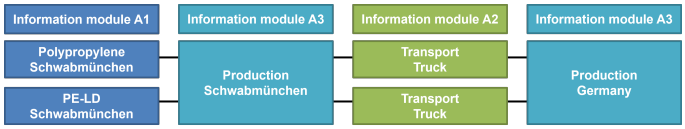

Figure 2 Information modules A 1 to A3 of the packaging

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

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.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon
No renewable raw materials are used in the product or the packaging. The biogenic carbon value is therefore reported as zero.

Packaging per declared unit

Name	Value	Unit
Packaging PP	0.0318	kg
Packaging PA6	0.2696	kg

End of Life (C1-C4)

The product is demolished by using an electric chisel. The electrical energy consumption for this tool is estimated at 0.05 MJ for the declared unit. The power consumption is calculated using a European energy mix. Construcion waste is transported 200 km by truck to a waste treatment facility. At the waste treatment facility, the construction waste is shredded and the disposed of in a landfill.

Name	Value	Unit
Collected as mixed construction waste	1	kg
Shredding	1	kg
Disposal in landfill	1	kg

Reuse, recovery and recycling potential (D), relevant scenario specifications

The product has no reuse, recovery or recycling potential. Information module D is therefore declared and reported as zero.

Name	Value	Unit
Reuse, recovery and recycling potential	0	kg

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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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg ResiFIX VYSF

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq	4.68E+00	5.12E-03	1.51E-02	2.6E-03	1.45E-02	0
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq	4.68E+00	5.12E-03	1.5E-02	2.59E-03	1.45E-02	0
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq	0	0	0	0	0	0
Global Warming Potential luluc (GWP-luluc)	kg CO_2 eq	8E-04	1.08E-06	8.28E-05	1.2E-05	2.67E-05	0
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	6.24E-09	7.5E-14	8.9E-16	3.85E-15	3.4E-14	0
Acidification potential of land and water (AP)	mol H^+ eq	7.09E-03	1.12E-05	4.67E-05	1.34E-05	1.03E-04	0
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	2.57E-05	1.49E-08	4.43E-08	7.43E-09	2.45E-08	0
Eutrophication potential aquatic marine (EP-marine)	kg N eq	2.29E-03	2.52E-06	2.15E-05	6.11E-06	2.62E-05	0
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	2.1E-02	2.65E-05	2.4E-04	6.74E-05	2.88E-04	0
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	6.57E-03	6.82E-06	4.22E-05	1.66E-05	7.97E-05	0
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	1.14E-06	1.4E-09	1.24E-09	2.87E-09	1.48E-09	0
Abiotic depletion potential for fossil resources (ADPF)	MJ	9.01E+01	9.29E-02	1.98E-01	5.06E-02	1.9E-01	0
Water use (WDP)	m^3 world eq deprived	1.49E-01	1.17E-03	1.33E-04	4.99E-04	1.59E-03	0

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg ResiFIX VYSF

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	1.17E+01	5.16E-02	1.13E-02	4.06E-03	2.85E-02	0
Renewable primary energy resources as material utilization (PERM)	MJ	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	1.17E+01	5.16E-02	1.13E-02	4.06E-03	2.85E-02	0
Non renewable primary energy as energy carrier (PENRE)	MJ	6.07E+01	9.3E-02	1.99E-01	5.07E-02	1.9E-01	0
Non renewable primary energy as material utilization (PENRM)	MJ	2.95E+01	0	0	0	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	9.02E+01	9.3E-02	1.99E-01	5.07E-02	1.9E-01	0
Use of secondary material (SM)	kg	0	0	0	0	0	0
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	0	0	0	0	0	0
Use of net fresh water (FW)	m^3	1.33E-02	4.92E-05	1.28E-05	1.42E-05	4.82E-05	0

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg ResiFIX VYSF

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	9.76E-09	8.04E-12	9.53E-13	6.34E-13	9.75E-12	0
Non hazardous waste disposed (NHWD)	kg	8.53E-02	7E-05	2.85E-05	1.34E-05	9.71E-01	0
Radioactive waste disposed (RWD)	kg	1.33E-03	1.49E-05	2.45E-07	6.68E-07	2.11E-06	0
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	0	0	0	0	0	0
Materials for energy recovery (MER)	kg	0	0	0	0	0	0
Exported electrical energy (EEE)	MJ	0	0	0	0	0	0
Exported thermal energy (EET)	MJ	0	0	0	0	0	0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg ResiFIX VYSF

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	ND	ND	ND	ND	ND	ND
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	ND	ND	ND	ND	ND	ND
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	ND	ND	ND	ND	ND	ND
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	ND	ND	ND	ND	ND	ND

Soil quality index (SQP)	SQP	ND	ND	ND	ND	ND	ND

The dataset "DE: Epoxy Resin, Source: Sphera, Reference year: 2021" was updated with reference to the previous EPD. As this dataset has a strong influence on the overall calculation, the results are higher in comparison to the previous EPD from 2015.

References

Standards

DIN 51757
DIN 51757:2011-01
Testing of mineral oils and related materials - Determination of density

EN 196
DIN EN 196-1:2016-11
Test methods for cement - Part 1: Determination of strength
German version EN 196-1:2016

EN 15804
EN 15804:2019-04+A2, Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products.

ISO 14025
DIN EN ISO 14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

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

Further references

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ETA-13/0315
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Regulation (EU) No. 305/2011 (CPR)
Regulation (EU) No. 528/2012 (Biocidal Product Regulation)

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