ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	fischerwerke GmbH & Co. KG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-FIW-20230531-CBA2-EN
Issue date	18.04.2024
Valid to	17.04.2029

FIS V Zero

fischerwerke GmbH & Co. KG

Institut Bauen und Umwelt e.V.

www.ibu-epd.com | https://epd-online.com

ECO PLATFORM EPD VERIFIED



General Information

fischerwerke GmbH & Co. KG

Programme holder

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

Declaration number

EPD-FIW-20230531-CBA2-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

18.04.2024

Valid to

17.04.2029

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

Dr. Martina Bender
(Managing Director Institut Bauen und Umwelt e.V.)

FIS V Zero

Owner of the declaration

fischerwerke GmbH & Co. KG
Klaus-Fischer-Straße 1
72178 Waldachtal
Germany

Declared product / declared unit

fischerwerke GmbH & Co. KG
A COMPANY OF THE FISCHER GROUP OF COMPANIES
Otto-Hahn-Strasse 15
79211 Denzlingen GERMANY

Scope:

The declared unit is 1 kg injection mortar. The declared product is 2-component injection mortar in plastic cartridges which consists of a component A and a component B. The product designation is FIS V Zero in 300 ml, 2 x static mixer, and 360 ml and 2 x static mixer sízes. FIS V Zero and all plastic parts are produced by fischerwerke GmbH & Co. KG in company-owned factories. Data from the production sites in Denzlingen and Horb was used for the lifecycle analysis (LCA).
Denzlingen factory: Otto-Hahn-Strasse 15, 79211 Denzlingen Horb factory: Hindenburgstrasse 81, 72160 Horb am Neckar
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 Klingler,
(Independent verifier)

Product

Product description/Product definition

The declared product is 2-component injection mortar in plastic cartridges which consists of a component A and a hardener component B. In the case of FIS V Zero injection mortar, component A consists of a vinyl ester resin mixture and mineral fillers whilst component B contains polymerisation initiators and mineral fillers. This injection mortar fulfils all occupational safety requirements and is classified as non-toxic according to CLP. FIS V Zero universal mortar contains no dibenzoyl peroxide, which is classified as harmful to the environment, sensitising and an eye irritant and permits safe working by users. The injection mortar to be declared with product designation FIS V Zero is a product average in 300 ml and 360 ml cartridge sizes. EU regulation no. 305/2011/ (CPR) applies for placing the product on the market in the EU/EFTA (with the exception of Switzerland). The product requires a declaration of performance taking into account the following standards:
- *ETA-20/0572* (Bonded anchors for anchoring in concrete),
- *ETA-20/0574* (Injection system for post-installed rebar connections),
- *ETA-21/0267* (Metal injection anchors for anchoring in masonry),
- CE mark.
- The respective national regulations apply to its use.

Application

FIS V Zero is a universal mortar and provides secure fastening in common building materials. This injection mortar is approved for anchorings in concrete and masonry, for post-installed rebar connections and for water-filled boreholes. The possible installation temperatures from -10 to 40°C permit all-year working for univeral deployment. FIS V Zero is approved for the following materials:

- Concrete C20/25 to C50/60, cracked and non-cracked
- Hollow blocks made from lightweight concrete
- Vertically perforated brick
- Perforated sand-lime brick
- Solid sand-lime brick
- Solid brick

Technical Data

The following table shows the technical data of the product examined for this lifecycle assessment.

Technical Data

Name	Value	Unit
Density	1.75	kg/m^3
Tensile shear strength nach DIN EN 14293	-	N/mm^2
Tensile bond strength nach DIN EN 14293	-	N/mm^2

Shear strength and adhesive tensile strength in accordance with DIN EN 14293 are not relevant for this product.

ETA CE	20; 21; 20	DoP: 0238; 0239; 0240
	2873	www.fischer.de/sdb
	fischerwerke GmbH & Co. KG Klaus-Fischer-Straße 1 · 72178 Waldachtal	
EAD 330499-01-0601; EAD 330076-01-0604; EAD 330087-00-0601		
Performance parameters values depending on the base material, adhesive, embedded metal part, environmental conditions and installation		
Bonded fastener for use in cracked or uncracked concrete (option 1) under static or quasi-static actions acc. to ETA-20/0572: $N_{Rk,s}$=13-282kN; $\tau_{Rk,ucr}$=4,5-10N/mm^2; $\tau_{Rk,cr}$=3-4,5N/mm^2; ψ^0_{sus}=0,67-0,75; $c_{ct,N}$=1,5 x h_{ef}; $k_{ct,N}$=7,7; $k_{uct,N}$=11; γ_{inst}=1,4; $c_{ct,sp}$=1 x h_{ef}-2,26 x h_{ef}; c_{min}=40-105mm; s_{min}=40-105mm; h_{min}=100-560mm; max. T_{inst}=10-150Nm; $V^0_{Rk,s}$=8-141kN; $M^0_{Rk,s}$=13-898Nm; k_7=1; k_8=2; d_{nom}=8-25mm; l_f=8-12 x d_{nom}, $\delta_{uct,N0}$=0,04-0,16[mm/(N/mm^2)] x τ_{ED}; $\delta_{uct,Neg}$=0,04-0,16[mm/(N/mm^2)] x τ_{ED}; $\delta_{ct,N0}$=0,04- 0,16[mm/(N/mm^2)] x τ_{ED}; $\delta_{ct,Neg}$=0,04-0,16[mm/(N/mm^2)] x τ_{ED}; δ_{V0}=0,06-0,18mm/kN x V_{ED}; $\delta_{V\infty}$=0,09-0,27mm/kN x V_{ED}; A_5>8% Durability: (gvz) dry internal conditions / (R) CRC III acc. to EN 1993-1-4, (HCR) CRC V acc. to EN 1993-1-4		
Metal injection anchors for use in masonry (base material b,c or d) acc. to ETA-21/0267: $N_{Rk,s}$=10-126kN; $V_{Rk,s}$=5-63kN; $M^0_{Rk,s}$=8-266Nm; $N_{Rk,p}$=0,3-6kN; $N_{Rk,b}$=0,3-6kN; N^g_{Rk}=0,6-10kN; $V_{Rk,b}$=1,2-6,5kN; V^g_{Rk}=1,2-10kN; β=0,45-0,81; c_{cr}=1,5 x h_{ef}mm; c_{min}=100mm; s_{cr}=3 x h_{ef}-500mm; s_{min}=100mm; $\alpha_{g,N}$=1,14-2; $\alpha_{g,V}$=1,26-2; h_{min}= 50-130mm; δ_{N0}=0-0,6mm; $\delta_{N\infty}$=0-0,12mm; δ_{V0}=0,05-1,54mm; $\delta_{V\infty}$=0,08-2,31mm Durability: (gvz) dry internal conditions / (R) CRC III acc. to EN 1993-1-4, (HCR) CRC V acc. to EN 1993-1-4		
System for post-installed rebar connection with mortar for use in concrete acc. to ETA-20/0574: $f_{bd,PIR}$=1,6-2,7N/mm^2; k_b=0,41-1; α_{ib}=1,5; $N_{Rk,s}$=59-270kN; c_{min}=31-50mm; $k_{fl(i)}$=0,0624; θ_{max}=347; $N_{Rk,s,fl}$=0,8-7,1kN		

Technical data as of August 2023. Subject to modification.
The product's performance data corresponding to the declaration of performance in relation to its main characteristics in accordance with:
- *ETA-20/0572* (bonded anchors for anchoring in concrete),
- *ETA-20/0574* (Injection system for post-installed rebar connections),
- *ETA-21/0267* (Metal injection anchors for anchoring in masonry).

Base materials/Ancillary materials

The lifecycle assessment is based on the product system of 1 kg mass of injection mortar. The injection mortar to be declared is a product average in different cartridge sizes.
The main components of the product are:
Cartridge
Static mixer
Mortar mass
Hardener mass
The following compositions for components A and B were included for the lifecycle assessment:

Component A

- 30-40% vinyl ester resin mixture
- 60-70% Mineral fillers
- < 3 % miscellaneous

Component B

- 50-60% mineral fillers
- 50-60% polymerisation initiator
- < 4 % miscellaneous

This product contains no substances on the *Candidate List of substances of very high concern for Authorisation* (Substances of Very High Concern – SVHC) at a concentration above 0.1 % mass.

The product contains no further Category 1A or 1B CMR (carcinogenic, mutagenic or toxic to reproduction) substances which are not on the *ECHA Candidate List* in quantities above 0.1% mass.

No biocide products have been added to this construction product or it has not been treated with biocides (treated goods in terms of EU biocide product ordinance no. 528/2012).

Reference service life

No modules from the use phase have been declared.

LCA: Calculation rules

Declared Unit

In accordance with *PCR Part B* the declared unit is 1 kg of injection mortar. The plastic cartridge filled with two-component injection mortar consists of a component A and a hardener component B. Component A takes up a share of 96 % whilst component B takes up 4 % of the whole finished product. Raw materials which are used in both the mortar and the hardener were attributed to the mortar in the course of the inventory analysis as apportionment was not possible. For this reason the share of the individual components in the overall product can only be estimated.

Declared unit and mass reference

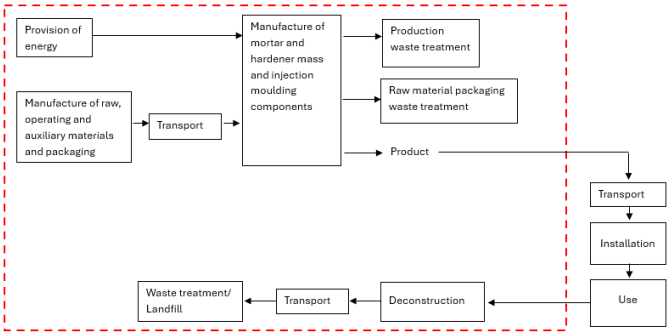
Name	Value	Unit
Declared unit	1	kg
Gross density	1.75	kg/m^3
Mass reference 300ml (without packaging)	0,492	kg/pcs.
Mass reference 360ml (without packaging)	0,615	kg/pcs.

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

The balanced production volume is based on manufacturer information for the reference year and has been converted to the declared unit. Overall, it is assumed that the data is representative and robust.

System boundary

The 'cradle to factory gate - with options' system boundary was selected. The lifecycle is modular in design in accordance with *EN 15804* . The lifecycle assessment on which this EPD is based includes the production stage (A1-A3), the disposal stage (C1-C4) and benefits and Impacts outside of the system boundary (Module D). The Modules A1 (Raw material provision), A2 (Transport) and A3 (Manufacturing) are shown aggregated in the assessment as Module A1-A3.



Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: EU-27 Member 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. The background data was taken from the Manage LCA Content database (formerly GaBi Professional) which is implemented in the LCA for Experts software (Sphera, 2023).

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The biogenic carbon content quantifies the quantity of biogenic carbon in a construction product when it passed through the factory gate. No biogenic carbon is bound up in the construction product itself. Only the wooden or cardboard raw materials and product packaging used indicate approximately 47.7% biogenic carbon for wood and approximately 43 % for cardboard. Since Module A5 is not part of the system boundary, the binding of this carbon was not included in the Global Warming Potential (GWP-biogenic) indicator in Module A1-A3. The following table shows the proportion of biogenic carbon in the packaging related to the declared unit.

Information to describe the biogenic carbon content at the factory gate

Name	Value	Unit
Biogenic carbon content in accompanying packaging	0.058	kg C

Installation in the building (A5)

In the course of the lifecycle assessment both the manufacture of the injection mortar and the plastic cartridges, static mixers and plastic lid (injection moulding parts) are included as these are produced by fischerwerke GmbH & Co KG. Disposal of the injection moulding parts takes place in Module A5 after the product has been used. This module is, however, not included in this study. The information available on disposal of the primary product packaging is purely informative in nature.

Name	Value	Unit
Injection moulding part for disposal	0,1170	kg

End of life (C1-C4)

No manufacturer-specific data is known of for transferral to material and thermal recycling or disposal in landfill. The injection mortar remains in the wall or in the building until it is demolished. For this reason the conventional assumption of 100% disposal of inert material is made.

Name	Value	Unit
Landfilling	1	kg
Electricity consumption	0,0033	kWh
Material loss	0,01	kg

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

Energy recovered from thermal and material recycling of waste (thermal energy and electricity) and the recycling material produced are principally credited in Module D. Since injection mortar is a disposed inert material, no landfill gas is produced in Module C4 which could be available for energy recovery. For this reason, no credits and impacts outside of the system boundary occur for this construction product.

Name	Value	Unit
Exported electric energy	0	kWh
Exported thermal energy	0	MJ

LCA: Results

The results of the inventory analysis and impact assessment for the injection mortar examined are listed in detail in this chapter. The calculations and background data used were performed exclusively by the GaBi software or taken from the associated database (*Sphera*, 2023).

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 Injektionsmörtel

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq	2.36E+00	1.07E-03	8.63E-03	0	1.49E-02	0
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq	2.36E+00	1.06E-03	8.68E-03	0	1.48E-02	0
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq	-6.31E-04	9.25E-06	-1.27E-04	0	0	0
Global Warming Potential luluc (GWP-luluc)	kg CO_2 eq	1.02E-03	1.16E-07	8E-05	0	4.67E-05	0
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	6.01E-12	1.96E-14	1.12E-15	0	3.82E-14	0
Acidification potential of land and water (AP)	mol H^+ eq	4.48E-03	2.27E-06	1.46E-05	0	1.07E-04	0
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	1.41E-05	3.97E-09	3.16E-08	0	3.03E-08	0
Eutrophication potential aquatic marine (EP-marine)	kg N eq	1.07E-03	5.44E-07	5.71E-06	0	2.75E-05	0
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	1.23E-02	5.68E-06	6.55E-05	0	3.03E-04	0
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	3.84E-03	1.45E-06	1.3E-05	0	8.31E-05	0
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	1.17E-07	1.65E-10	5.73E-10	0	6.94E-10	0
Abiotic depletion potential for fossil resources (ADPF)	MJ	5.36E+01	2.24E-02	1.18E-01	0	2E-01	0
Water use (WDP)	m^3 world eq deprived	1.18E+00	2.37E-04	1.04E-04	0	1.65E-03	0

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

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	8.84E+00	1.34E-02	8.56E-03	0	3.26E-02	0
Renewable primary energy resources as material utilization (PERM)	MJ	1.34E+00	0	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	1.02E+01	1.34E-02	8.56E-03	0	3.26E-02	0
Non renewable primary energy as energy carrier (PENRE)	MJ	6.01E+01	2.24E-02	1.18E-01	0	2E-01	0
Non renewable primary energy as material utilization (PENRM)	MJ	1.44E+01	0	0	0	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	7.45E+01	2.24E-02	1.18E-01	0	2E-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	3.36E-02	1.08E-05	9.38E-06	0	5.05E-05	0

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

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	3.32E-08	-1.75E-12	3.66E-13	0	4.36E-12	0
Non hazardous waste disposed (NHWD)	kg	4.11E-02	1.64E-05	1.8E-05	0	1E+00	0
Radioactive waste disposed (RWD)	kg	4.45E-04	3.56E-06	2.21E-07	0	2.28E-06	0
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	1.56E-02	0	0	0	0	0
Materials for energy recovery (MER)	kg	0	0	0	0	0	0
Exported electrical energy (EEE)	MJ	1.11E+00	0	0	0	0	0
Exported thermal energy (EET)	MJ	1.98E+00	0	0	0	0	0

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

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	4.12E-08	1.91E-11	9.68E-11	0	1.31E-09	0
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	5.44E-02	5.93E-04	3.3E-05	0	2.64E-04	0

Comparative toxic unit for ecosystems (ETP-fw)	CTUe	1.58E+01	6.23E-03	8.43E-02	0	1.08E-01	0
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	5.34E-10	3.3E-13	1.71E-12	0	1.68E-11	0
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	1.87E-08	5.25E-12	7.61E-11	0	1.77E-09	0
Soil quality index (SQP)	SQP	2.73E+01	8.79E-03	4.92E-02	0	4.86E-02	0

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

DE102015118134A1
Patent, 2015; Aldimines and ketimines as initiators in hardener systems and corresponding resin compositions for uses including fixing technology; https://patents.google.com/patent/DE102015118134A1/de [accessed on 20/06/2023]

ECHA list
Candidate List of substances of very high concern for authorisation, https://www.echa.europa.eu/candidate-list-table

EN 15804
DIN EN 15804:2022-03: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

EPD-DBC-FIW-20220088-IBE2-DE
Environmental product declaration for methacrylate-based fischer injection mortar (FIS V Plus, FIS VW Plus, FIS VS, FIS HB, FIS SB); EPD-DBC-FIW-20220088-IBE2-DE; IBU 2022.

ETA-20/0572
European technical assessment: Bonded anchors for anchoring in concrete, DiBT, 2021

ETA-20/0574
European technical assessment: Injection system for post-installed rebar connections, DiBT, 2021

ETA-21/0267
European technical assessment: Metal injection anchors for anchoring in masonry, DiBT, 2021

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

ISO 14040
DIN EN ISO 14040:2021-02, Environmental management - Life cycle assessment - Principles and framework

ISO 14044
DIN EN ISO 14044:2021-02, Environmental management - Life cycle assessment - Requirements and guidelines

PCR Part A
Institut Bauen und Umwelt e.V.: Product categories for building-related
Products and services. Part A: Calculation rules for the lifecycle assessment and requirements of the project report in accordance with DIN EN 15804:2022-03, Version 1.3, 2022

PCR Part B
Institut Bauen und Umwelt e.V.: Product categories for building-related
Products and services. Part B: Requirements of the EPD for reaction resin products, 01/08/2021

Programme guidance
Institut Bauen und Umwelt e.V.: Institut Bauen und Umwelt e.V. (IBU) general EPD programme guidance. Version 2.0, 2021

Sphera, 2023
GaBi ts Professional + Extension, Version 10.7.2023. Leinfelden-Echterdingen: Sphera Solutions GmbH

Publisher

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