ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	HILTI AG
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-HIL-20220211-ICA1-EN
Issue date	21.09.2022
Valid to	20.09.2027

Hilti CFS-F-FX

HILTI AG

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1. General Information

HILTI	Hilti CFS-F-FX
Programme holder IBU – Institut Bauen und Umwelt e.V. Hegelplatz 1 10117 Berlin Germany	**Owner of the declaration** Hilti AG Feldkircher Str. 100 FL-9494 Schaan Liechtenstein
Declaration number EPD-HIL-20220211-ICA1-EN	**Declared product / declared unit** The declared product is a HILTI firestop foam CFS-F-FX. The declared unit is one kilogram of reaction resin product in the mixing ratio of the two components necessary for processing. The packaging is also included in the calculation. The declared unit is stated in [kg].
This declaration is based on the product category rules: Reaction resin products, 01.2019 (PCR checked and approved by the SVR) **Issue date** 21.09.2022 **Valid to** 20.09.2027	**Scope:** This document refers to the CFS-F-FX firestop foam with its packaging. Specific data from 2021 were collected from Hilti's manufacturing plant in Kaufering, Germany and used for this environmental Life Cycle Assessment. 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*. 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*.
Hans Peters Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)	**Verification** The standard *EN 15804* serves as the core PCR Independent verification of the declaration and data according to *ISO 14025:2011* ☐ internally ☒ externally
Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.))	Matthias Klingler (Independent verifier)

2. Product

2.1 Product description/Product definition

The declared product of CFS-F FX is a two-component system. These are: a polyol based Component A and a diisocyanate based Component B. Mixing the 2 components A and B in the static mixer initiates the curing (hardening) reaction of both systems to form a cured Polyurethane Foam in the application.
Composite foils are used for the two-component foil pack of CFS-F FX. This kind of packaging serves the following purposes: waste volume reduction, easy storage and transport, and less packaging material. Through legislation and increased public awareness users have increasingly become discerned towards the use of styrene and other highly volatile components with their resulting unpleasant odour and low flash point (flammability).
The reaction resins used in the product contain no styrene, are practically odourless and have a considerably higher flash point, i.e. higher than 100 °C in comparison to 34 °C for styrene-based products.

CFS-F FX is the ultimate easy-to-install flexible firestop foam to help create a fire and smoke barrier around cable and mixed penetrations.
For the placing of the product on the market 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 the following European Technical Approval: *ETA-10/0109* and the CE-marking. For the application and use the respective national provisions apply.

2.2 Application

Hilti CFS-F FX serves to form a penetration seal, which is used to maintain the fire resistance of a concrete, masonry or drywall separating element (wall or floor) when and where services (cables, metal or plastic pipes, etc.) pass through.

2.3 Technical Data

Constructional data

Name	Value	Unit
Density EN ISO 1183-1	1260	kg/m³

Hilti CFS-F FX displays the following characteristics:

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *ETA-10/0109*

Shelf life of 9 months:
Substrate temperature during installation 0 to +40 °C (internal method).

Curing time: approx. 10 min

2.4 Delivery status

The product Hilti CFS-F-FX is available in foil-packages with 325 ml injectable foam in the corresponding mixing ratio. 1 package of CFS-F FX contains 0.41 kg of reaction resin.

2.5 Base materials/Ancillary materials

Hilti CFS-F FX is supplied in the form of a dual component film-wrapped pack comprising a component A and component B at a weight ratio of 3:1. The mixing ratio of resin and curing agent components is automatically set during the injection process. Product curing commences directly after the components are mixed.

The product reviewed in this EPD contains the following component volumes:

Component A:
Polyol: 30-40 %
Intumescent Flame Retardant: 15-25 %
Polymer dispersion: 25-35 %
Fungicide: ≤ 5 %
Manufacturing agent: ≤ 5 %
Other: ≤ 5 %

Component B:
Diisocyanate: 85-95 %
Other: 5-15 %

This product article contains substances listed in the candidate list (date: 07.04.2022) exceeding 0.1 percentage by mass: no.

This product contains other carcinogenic, mutagenic, reprotoxic (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 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.

2.6 Manufacture

Most raw materials are sourced in Europe. The transport is exclusively by truck for the European raw materials, and by truck and by ship for the others. The production of the chemical firestop foam consists of a mixing process and a filling process of the respective single components (A and B) and their subsequent combination in a two-component system (packaging). Here process control technology is used to weigh and mix solid and liquid compounds according to the specification. In the next step both well-mixed components run through an automized filling line in which each of the processed masses is filled into a tubular foil bag. Finally, the single components are combined in one packaging unit. The two-pack foil bags are packed into cardboard boxes and then finally shipped. The manufacturing plant of CFS-F FX, Hilti GmbH Industriegesellschaft für Befestigungstechnik, Hiltistr. 6, 86916 Kaufering, Germany, is certified according to *ISO 9001*. The guideline defines international standards for quality and process management.
The following flowcharts illustrate the underlying production process

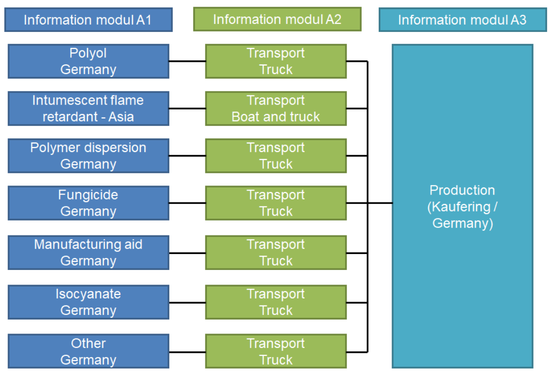

Illustration: Production process of the reaction resin mixture

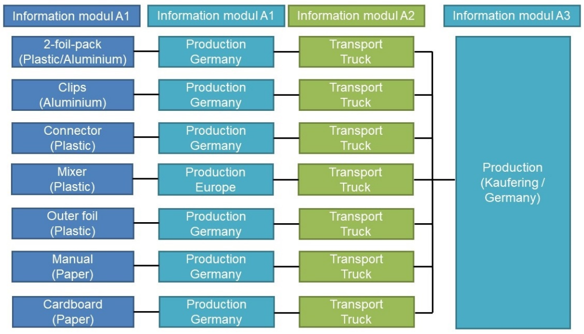

Illustration: Production process of the packaging

2.7 Environment and health during manufacturing

The manufacturing plant of CFS-F FX,Hilti GmbH Industriegesellschaft für Befestigungstechnik, Hiltistr. 6, 86916 Kaufering, Germany, is certified according to *ISO 14001* which defines international standards for sustainable environmental management. The production site is also certified in accordance with *DIN EN ISO 50001* Energy Management Systems.

2.8 Product processing/Installation

The product is delivered with Instructions for Use explaining the basic steps for installation:

1) For safe handling the precautionary measures described in the Safety Data Sheet (SDS) (e.g. hand and eye protection) must be adhered to
2) Insert the cartridge into the black cassette
3) Screw on the mixing nozzle
4) Put the cassette into the dispenser system
5) Inject the foam in the opening to be sealed
6) If necessary, shape the foam by hand

After the curing time, described in Instructions for Use, the application is complete. Foam excesses can be cut and placed in further openings to be sealed.

2.9 Packaging

Hilti CFS-F FX is supplied in the form of a 2-foil-pack system and thus leads to very little waste remaining after use on the construction site. After curing, the product can be disposed of with household waste. Full or only partially emptied cartridges must be disposed of as special waste in accordance with official regulations.
The outer packaging consisting of plastic / aluminium foil and cardboard boxes designed according to the product size can be recycled. Packaging contaminated by the product must be disposed in a safe manner in accordance with local/national regulations.

2.10 Condition of use

During the installation the temperature of the base material must be between 0° C and +40° C. The temperature of the product should be between 5 and 25° C during storage and 10 and 35° C during usage. Hilti literature and official approvals must always be considered. The two components of CFS-F FX are only for use in combination with the defined volume ratio and under the conditions mentioned above.

2.11 Environment and health during use

Refer to the Safety Data Sheet (SDS) for detailed information on handling, storage as well as first aid, firefighting and accidental release measures and disposal considerations. Following the given instructions helps to minimize the risk to health and the environment.

2.12 Reference service life

Hilti CFS-F FX is exposed to a wide variety of environmental factors during the use phase. The anticipated Reference Service Life depends on the specific installation situation and the product exposure scenarios. The main factors influencing the period of use involve weathering as well as mechanical loads and chemical exposure.

2.13 Extraordinary effects

Fire

The CFS-F FX (at cured state) complies with the requirements of the *DIN EN 13501-1* standard for fire classes E and Efl. The product's resistance to fire is detailed in Annex 2 of *ETA 10/0109* approval document.

Fire protection

Name	Value
Building material class	E/Efl
Burning droplets	No performence assessed
Smoke gas development	No performence assessed

Water

The cured product is chemically inert and insoluble in water.

Mechanical destruction

It is recommended to use dust protection during the demolition of the cured foam.

2.14 Re-use phase

The product cannot be re-used. After usage the product can be removed by demolition.

2.15 Disposal

Uncured Hilti CFS-F-FX can be disposed of according to the European waste code 08 04 09* or 20 01 27*.

2.16 Further information

Further information is available on the Hilti website: www.hilti.group

3. LCA: Calculation rules

3.1 Declared Unit

The declared product is a HILTI firestop foam CFS-F FX. The declared unit refers to one kilogram of reaction resin product in the required mixing ratio of the two components. The packaging of 0,267 kg/kg of product is also included in the calculation. 1 package of CFS-F FX contains 0.41kg of reaction resin. The following table shows the data of the declared unit.

Declared unit

Name	Value	Unit
Declared unit	1	kg

3.2 System boundary
The type of EPD is cradle to grave. The following information modules are defined as system boundaries in this study:

A1 – Raw material supply:
Production and packaging of the raw materials to be supplied to the manufacturer. All processes are included from cradle to gate.
A2 – Transport (to manufacturing site):
Transportation of all the raw materials and their packaging between their production site and the manufacturing site, for all transport modes (sea, road).
A3 – Manufacturing:
Production, supply and use of energy sources at the manufacturing sites (electricity, biomass and natural gas). Green electricity from wind turbines is considered for the whole manufacturing process.
Production and transport of production losses, final product packaging and other inputs.
End-of-life of production waste (hazardous, non-hazardous and recyclable), production losses and raw material packaging, including waste and losses transportation, processing and disposal.
A4 – Transport (to construction site)
Transportation of packaged products from the manufacturing site to the construction site, including potential in-betweens (retailer, workshop, etc.).
A5 – Installation-Construction
Electricity consumption for injecting (in case of injection with electrical dispenser).
Production of the construction losses.
Provision and end-of-life of tools and accessories for injectable mortars (manual or electrical dispenser with or without battery and with cartridge holder).
End-of-life of hazardous construction losses and packaging (uncured resin and soiled packaging) and non-hazardous construction losses (cured foam and unsoiled packaging): including waste transportation, processing and disposal.
C1 – Deconstruction/demolition
Diesel for building demolition.
C2 – Transport (to waste processing)
Transportation to waste processing facility.
C4– Waste disposal
Treatment and disposal of plastic to sanitary landfill.

For the environmental impact, the use of green electricity (stage A3) was calculated taking into account the residual electricity mix for the remaining electricity. The proportion of the electricity demand covered by green electricity in the total electricity demand is 100%.

3.3 Estimates and assumptions

In general, background data and electricity mixes are chosen and calculated country-specifically for the production processes. In some cases, assumptions were made because of a lack of primary or secondary data, in particular for the following aspects:

- The synthesis way of raw materials which were not available on the *Ecoinvent* database was used to reconstruct these material's impact
- Some raw material's packaging composition and transportation distances were estimated
- Estimations were made to calculate the energy consumption during installation
- The transportation scenario to the building site is based on french transportation companies' statistics.

3.4 Cut-off criteria
All information modules considered were included in the calculation in such detail that all requirements of *EN 15804* are met. The consumption of additional inputs such as lubricants, oils or solvents used for manufacture is less than 5 % by weight and therefore falls below the cut-off criterion of the total calculation.

3.5 Background data
The source for background data for the LCA calculations is the *ecoinvent 3.8* database.

3.6 Data quality
For the compilation of the life cycle assessment, specific data were collected from the factory Kaufering, in Germany, of the HILTI AG from the year 2018. The background data from the *ecoinvent 3.8* database used was updated in the year 2021. The mass of the different components of the reactive resin mixture come from the information in the recipe. The data quality is classified as appropriate.

3.7 Period under review
Data from the year 2021 are used, which correspond to the annual average.

3.8 Allocation
The used operating tools (stage A5), which are Hilti's manual or electrical dispenser can be used to inject the CFS-F FX as well as other Hilti products. The part of the dispenser's impact allocated to the current product is based on the estimated total mass of injected product each dispenser can be used for. This can be considered a mass allocation.

3.9 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 used background database is given by *ecoinvent 3.8* database, to which this study refers.

4. LCA: Scenarios and additional technical information

Characteristic product properties

Information on biogenic Carbon
The declared product contains 90 g of paper and cardboard (outer packaging and user manual). Since

only these materials contain biogenic carbon, in addition to a neglectable part contained in the raw materials' packaging, all the biogenic carbon capture and release were cancelled to simplify the model. The cancelled emission corresponds to 0,012 kg of biogenic carbon (0,0438 kg of CO_2) for a cancelled capture of 0,022 kg of biogenic carbon (0,0818 kg of CO_2).

The following scenarios were considered for the LCA calculations:

Transport to the building site (A4)

Name	Value	Unit
Transport distance	900	km
Vehicle type	lorry 16-32 metric ton	-
Effective load	21	t
Maximum capacity	24	t
Consumption when unloaded	0,25	L/km
Consumption at full capacity	0,38	L/km
Empty return rate	14	%
Effective consumption	0,019	L/tkm

Installation into the building (A5)

Name	Value	Unit
Water consumption	-	m^3
Electricity consumption	0.0004	kWh
Uncured foam loss	0.04	kg
Cured foam loss	0.00	kg
Total foam loss	0.04	kg
Hazardous waste (soiled packaging)	0.177	kg
Non-hazardous waste for recycling (unsoiled packaging)	0.090	kg

End of life (C1-C4)

Name	Value	Unit
Fuel for building demolition	0,0437	MJ
Distance to sanitary landfill	50	km
Landfilling	1	kg

5. 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	X	X	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg CFS-F-FX

Core Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO_2-Eq.]	3.35E+0	4.03E-2	8.87E-1	7.89E-2	7.56E-1	4.02E-3	4.84E-3	0.00E+0	1.14E-1	0.00E+0
GWP-fossil	[kg CO_2-Eq.]	3.26E+0	4.01E-2	8.72E-1	7.86E-2	7.50E-1	4.02E-3	4.82E-3	0.00E+0	1.14E-1	0.00E+0
GWP-biogenic	[kg CO_2-Eq.]	8.23E-2	1.08E-4	1.35E-2	2.73E-4	5.84E-3	3.65E-6	1.67E-5	0.00E+0	2.85E-4	0.00E+0
GWP-luluc	[kg CO_2-Eq.]	3.01E-3	2.10E-5	1.24E-3	3.14E-5	3.32E-4	4.00E-7	1.93E-6	0.00E+0	2.15E-6	0.00E+0
ODP	[kg CFC11-Eq.]	2.63E-5	8.95E-9	3.13E-7	1.82E-8	1.13E-6	8.59E-10	1.12E-9	0.00E+0	3.10E-9	0.00E+0
AP	[mol H^+-Eq.]	2.64E-2	3.74E-4	4.57E-3	2.23E-4	2.69E-3	4.17E-5	1.37E-5	0.00E+0	7.63E-5	0.00E+0
EP-freshwater	[kg P-Eq.]	1.55E-3	2.45E-6	2.80E-4	5.38E-6	2.43E-4	1.27E-7	3.30E-7	0.00E+0	8.58E-7	0.00E+0
EP-marine	[kg N-Eq.]	4.74E-3	8.24E-5	9.27E-4	4.56E-5	4.61E-4	1.85E-5	2.79E-6	0.00E+0	2.14E-3	0.00E+0
EP-terrestrial	[mol N-Eq.]	3.48E-2	9.13E-4	8.39E-3	4.95E-4	5.84E-3	2.03E-4	3.03E-5	0.00E+0	3.07E-4	0.00E+0
POCP	[kg NMVOC-Eq.]	1.29E-2	2.64E-4	2.79E-3	1.90E-4	1.25E-3	5.57E-5	1.17E-5	0.00E+0	1.12E-4	0.00E+0
ADPE	[kg Sb-Eq.]	7.55E-5	1.26E-7	4.51E-6	2.84E-7	8.69E-6	2.04E-9	1.74E-8	0.00E+0	3.11E-8	0.00E+0
ADPF	[MJ]	6.74E+1	5.74E-1	1.93E+1	1.17E+0	6.57E+0	5.41E-2	7.17E-2	0.00E+0	2.22E-1	0.00E+0
WDP	[m^3 world-Eq deprived]	2.52E+0	2.53E-3	3.67E-1	5.48E-3	2.13E-1	1.45E-4	3.36E-4	0.00E+0	2.30E-3	0.00E+0

Caption	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 CFS-F-FX

Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	4.14E+0	7.53E-3	1.08E+0	1.70E-2	3.45E-1	3.09E-4	1.04E-3	0.00E+0	1.17E-2	0.00E+0
PERM	[MJ]	1.32E-2	0.00E+0	7.33E-1	0.00E+0	2.98E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	4.16E+0	7.53E-3	1.81E+0	1.70E-2	3.74E-1	3.09E-4	1.04E-3	0.00E+0	1.17E-2	0.00E+0
PENRE	[MJ]	4.73E+1	5.74E-1	1.39E+1	1.17E+0	5.51E+0	5.41E-2	7.17E-2	0.00E+0	2.22E-1	0.00E+0
PENRM	[MJ]	2.46E+1	0.00E+0	5.46E+0	0.00E+0	1.24E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	[MJ]	7.19E+1	5.74E-1	1.94E+1	1.17E+0	6.75E+0	5.41E-2	7.17E-2	0.00E+0	2.22E-1	0.00E+0
SM	[kg]	2.52E-2	2.22E-4	9.04E-2	3.98E-4	6.62E-3	2.12E-5	2.44E-5	0.00E+0	8.41E-5	0.00E+0
RSF	[MJ]	4.93E-4	1.86E-6	8.42E-3	4.38E-6	3.90E-4	6.91E-8	2.69E-7	0.00E+0	3.83E-6	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m^3]	7.13E-2	6.64E-5	1.01E-2	1.49E-4	5.59E-3	3.28E-6	9.14E-6	0.00E+0	2.92E-4	0.00E+0

Caption	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 CFS-F-FX

Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	5.59E-1	7.10E-4	6.17E-2	1.33E-3	3.46E-1	7.23E-5	8.16E-5	0.00E+0	3.46E-4	0.00E+0
NHWD	[kg]	6.84E+0	1.07E-2	1.43E+0	2.37E-2	5.40E-1	5.08E-4	1.45E-3	0.00E+0	1.00E+0	0.00E+0
RWD	[kg]	1.54E-4	3.97E-6	3.20E-5	8.05E-6	2.51E-5	3.81E-7	4.93E-7	0.00E+0	1.47E-6	0.00E+0
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	4.69E-4	1.88E-5	3.59E-2	3.67E-6	9.51E-2	7.20E-8	2.25E-7	0.00E+0	1.21E-6	0.00E+0
MER	[kg]	7.17E-6	1.48E-8	5.93E-7	2.95E-8	4.94E-7	1.15E-9	1.81E-9	0.00E+0	5.85E-9	0.00E+0
EEE	[MJ]	4.07E-2	1.15E-4	1.08E-2	2.55E-4	3.58E-3	2.12E-5	1.56E-5	0.00E+0	4.53E-4	0.00E+0
EET	[MJ]	1.42E-1	5.68E-4	3.40E-2	1.06E-3	1.21E-2	2.15E-4	6.49E-5	0.00E+0	1.22E-3	0.00E+0

Caption	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 CFS-F-FX

Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	1.96E-7	2.74E-9	4.66E-8	6.34E-9	2.44E-8	1.12E-9	3.88E-10	0.00E+0	1.62E-9	0.00E+0
IRP	[kBq U235-Eq.]	4.19E-1	2.93E-3	7.83E-2	6.14E-3	4.06E-2	2.48E-4	3.76E-4	0.00E+0	1.48E-3	0.00E+0
ETP-fw	[CTUe]	2.35E+2	4.57E-1	1.55E+1	9.76E-1	2.40E+1	3.25E-2	5.98E-2	0.00E+0	4.83E-1	0.00E+0
HTP-c	[CTUh]	2.87E-8	1.85E-11	6.67E-10	3.00E-11	1.58E-9	1.25E-12	1.84E-12	0.00E+0	7.12E-12	0.00E+0
HTP-nc	[CTUh]	2.84E-7	4.21E-10	1.18E-8	9.56E-10	1.69E-8	2.35E-11	5.86E-11	0.00E+0	1.81E-10	0.00E+0
SQP	[-]	1.22E+1	3.37E-1	6.87E+0	8.31E-1	1.57E+0	7.03E-3	5.09E-2	0.00E+0	5.83E-1	0.00E+0

Caption	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 ionizingradiation on human health of the nuclear fuel cycle. It does not consider effects due to possiblenuclear accidents, occupational exposure or radioactive waste disposal in undergroundfacilities. 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 theuncertainties on these results are high as there is limited experience with the indicator.

6. LCA: Interpretation

The dominance analysis shows that the main causes of environmental impacts and indicators can be found in information module A1. This shows the global warming potential for the provision of material with more than 50 %, based on all information modules. Modules A3 and A5 also represent important parts of the final impact.

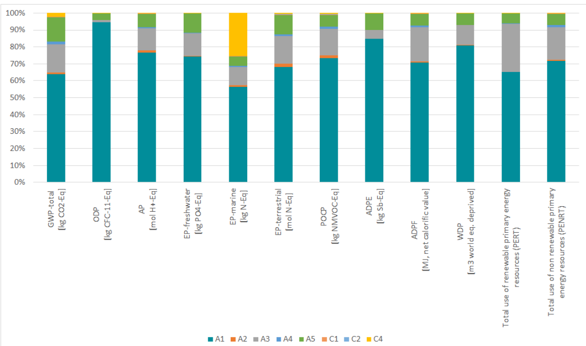

Illustration: Dominance analysis A1- C4

Module A1 is detailed below. Module A3’s global warming impact is mostly constituted by the final product packaging (13 % of the total impact) but also the energy consumption (2 % of the final impact). Most of the global warming impact from module A5 is caused by the product losses (3 % of the final impact) the end-of-life of the soiled product packaging, and treated as hazardous waste (9 % of the final impact).

In the information module A1, the material supply of the reaction resin mixture causes more than 90 % of the global warming potential.

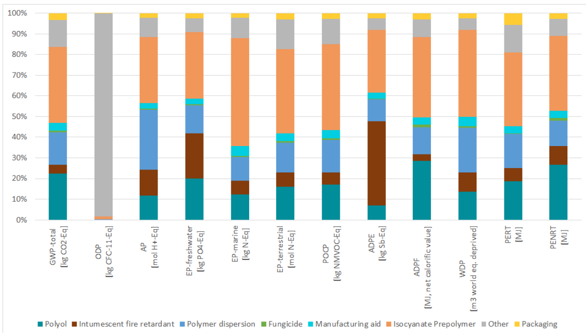

Illustration: Dominance analysis A1

The mass of the individual components of the reaction resin mixture come from the recipe information provided by the manufacturer. According to the manufacturer, this information can be assumed to be highly accurate.

The relevant datasets used to calculate the material availability of the product are highly topical since the raw materials were detailed as much as necessary to find corresponding data in the latest *Ecoinvent* database (2021). The locations were also respected. Since these datasets strongly influence the results, as shown by the dominance analysis, so does the overall computation.

7. Requisite evidence

Hilti CFS-F-FX complies with the requirements of

- AgBB-Scheme for the health evaluation of construction products (2018), in accordance with the eco-Institute test report no. 55493-C006

- Emission class A+ according to the French VOC Labelling regulation and CMR emissions regulation in accordance with the eco-Institute test report no. 55493-C006 III
- Belgian Royal Decree establishing threshold levels for the emissions to the indoor environment from construction products for specific purposes in accordance with the eco-Institute test report no. 55493-C006 II
- CDPH Standard Method V1.2-2017 according to the eco-institut test report no. B55493-B006) from 11.11.2020.

AgBB overview of results (28 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	46	µg/m³
Sum SVOC (C16 - C22)	0 - 5	µg/m³
R (dimensionless)	0.08	-
VOC without NIK	26	µg/m³
Carcinogenic Substances	0 - 1	µg/m³

AgBB overview of results (3 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16)	120	µg/m³
Carcinogenic Substances	0 - 1	µg/m³

8. References

Standards

EN 13501-1
DIN EN 13501-1 : 2018 Fire classification of construction products and building elements.

EN 14293
DIN EN 14293 : 2006 Adhesives - Adhesives for bonding parquet to subfloor - Test methods and minimum requirements

EN 15804
EN 15804:2012+A2:2019, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

EN ISO 604
DIN EN ISO 604:2003-12: Determination of compressive properties

EN ISO 1183-1
DIN 51757:2011-01 Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pyknometer method and titration method

EN ISO 50001
DIN EN ISO 50001: 2018 Energy management systems - Requirements with guidance for use

IBU 2021
Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021
www.ibu-epd.com

ISO 9001
ISO 9001:2015 Quality management systems - Requirements

ISO 14001
ISO 14001:2015 Environmental management systems - Requirements with guidance for use

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

PCR Part A
Institut Bauen und Umwelt e.V, Berlin (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations for Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019, 2021-04

PCR Part B
Institut Bauen und Umwelt e.V, Berlin (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations for Institut Bauen und Umwelt (IBU), Part B: Requirements on the EPD for Reaction resin products, 2019-01

Further References

AFNOR, «FD P01-015» 2006
Qualité environnementale des produits de construction - Fascicule de données énergie et transport

AgBB (2018)
Vorgehensweise bei der gesundheitlichen Bewertung der Emissionen von flüchtigen organischen Verbindungen (VVOC, VOC und SVOC) aus Bauprodukten (2018)

Candidate List of substances of very high concern for Authorisation
European Cheminals Agency (ECHA), in accordance with Article 50(10) of the REACH regulation

CDPH/EHLB/Standard Method V1.2
California CDPH Standard Method is a US standard for evaluating and restricting VOC emissions to indoor air. Developed in California as "Section 01350" Specification, several systems in the US refer to CDPH Standard Method

Comité National Routier (CNR)
Enquête longue distance, PARIS, 2019

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

DIBt (2010)
Grundsätze zur gesundheitlichen Bewertung von Bauprodukten in Innenräumen (Oktober 2010)

Eco-Institute (2020)
Test reports no. 55493-C006, 55493-C006 II and 55493-C006 III

European Waste code
in accordance with the European Waste Catalogue (EWC) (EWC 2014/955/EU) Commission Decision amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council

ETA-10/0109
European Technical Approval Hilti CFS-F-FX

French VOC Directives
Décret no 2011-321 du 23 mars 2011 relatif à l'étiquetage des produits de construction ou de revêtement de mur ou de sol et des peintures et vernis sur leurs émissions de polluants volatils
Arrêté du 19 avril 2011 relatif à l'étiquetage des produits de construction ou de revêtement de mur ou de sol et des peintures et vernis sur leurs émissions de polluants volatils

ICC ESR-4878
International code council (ICC), Evaluation report ESR-4878 HILTI HIT-HY 200 V3 (November 2021)

ICC ESR-4868
International code council (ICC), Evaluation report ESR-4868 HILTI HIT-HY 200 V3 (March 2022)

NSF
NSF/ANSI/CAN 61 Drinking Water System Components - Health Effects

Ordinance on Biocide 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.

Umwelt Bundesamt 2021
Umwelt Bundesamt: Herkunftsnachweisregister (HKNR) — Entwertungsnachweis durch GETECH ENERGIE GMBH für HILTI

Database

Ecoinvent 3.8
ecoinvent Version 3
Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, [online] 21(9), pp.1218–1230. Available at: <http://link.springer.com/10.1007/s11367-016-1087-8> [Accessed in 2021/2022].

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