Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

FIRESAFE FT Acrylic Sealant

Publication Date

2023-08-16

Valid until

2028-08-15

Owner of Declaration

Firesafe AS

LCA practitioner

Hedgehog Company B.V.

Programme

The International EPD® System,
www.environdec.com

Program Operator

EPD International AB

EPD number

S-P-10326

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme	The International EPD® System
Address	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website	www.environdec.com
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
ISO standard ISO 21930 and CEN standard EN 15804 serve as the core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction products, version 1.2.5
PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Complimentary Product Category Rules (cPCR): PCR 2019:14-c-PCR-017 c-PCR-017 Technical-chemical products (for construction sector) (c-PCR to PCR 2019:14) (adopted from EPD Norway 2022-07-08)
cPCR review was conducted by: The Norwegian EPD Foundation (EPD-Norge), The Federation of Norwegian Construction Industries (BNL), Saint-Gobain, Byggevarer AS, Hey'di AS, SIKA Norge AS, Mapei AS.
Life Cycle Assessment (LCA)
LCA accountability: Zoë Tan, Hedgehog Company Zoe@hhc.earth Turbinestraat 6, 1014 AV Amsterdam, The Netherlands
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: Matthew Fishwick, Fishwick Environmental Ltd. Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒No

[Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organised entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier]

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

EPDs of construction products may not be comparable if they do not comply with EN 15804+A2.

Product description

FIRESAFE FT Acrylic sealant is a heat-expanding, one component acrylic-based joint sealant. FIRESAFE FT Acrylic expands two times volumetrically when temperature reaches approximately 180 ℃.

The sealant can be applied as fireproof sealing of large joints and openings; penetration sealing of individual cables and cable bundles. Single penetrations and bundles of plastic electrical cable conduits ⩽ ∅ 16 - 32 mm of PE or PVC-U plastics. Uninsulated pipes in pipes of type PE-X water pipes of plastics ⩽ ∅ 32 mm and single PVC plastic pipes ⩽ ∅ 50 mm. Penetration sealing of insulated aluminium Alu-PEX pipe, insulated copper or steel pipe and smaller non-insulated steel or copper pipe.

FIRESAFE FT Acrylic is generally used for single installation penetrations with maximum opening ⩽ ∅ 15 mm between installation penetrations and construction. For openings ⩾ 15 mm between installation and construction, or with multiple installation penetrations, use FIRESAFE FT Acrylic in combination with FIRESAFE FT Board or FIRESAFE GPG MORTAR.

FIRESAFE FT Acrylic sealant certifications:

- Ensure FIRESAFE FT Acrylic has been tested according to NS-EN 1366-3 (2009) and NS-EN 1366-4 (2009), EN 13501-1 and EN 13501-2.
- Certified according to ETA- 16/0094 - 16/0102.
- Fire resistance EI 30 to EI 240 with extensive applications for walls and floors
- Fire-classified walls according to EN 1363-1: Plasterboard or masonry / cast construction (density 600 - 650 kg/m3) ⩾ 100 mm
- Fire-classified walls according to EN 1363-1: Floors or masonry / cast construction (density 600 - 650 kg/m3) ⩾ 150 mm
- Approved as smoke sealant according to EN 1634-3

The technical specifications of the product are given in table 1. The product is produced in the Netherlands. FIRESAFE AS retails the product in Norway as tubes of 310 ml or foils up to 600 ml. This LCA is based on the 310 ml tube. The product falls in the UN CPC class 3511.

Table 1. Technical specifications of the FIRESAFE FT Acrylic sealant.

Characteristic	Value
Colour	White
Fire resistance (EN 1366-3 + EN 1366-4; EN 13501-1; EN 13501-2)	EI 30 - EI 240, depending on application and configuration
Smoke resistance (EN 1634-3)	Sa - S20 - S200
Acoustic performance (EN 10140-2 + ISO 717-1)	31 dB t/m 60 dB, depending on application and configuration
pH value	8,1
Durability (EAD 350141-00-1106)	Type Z_2
Environmental performance	EMICODE, Indoor Air Comfort Gold, AgBB, Blue Angel, Belgian Regulation, French VOC/CMR
Application conditions	Between +5 ºC and +30 ºC, max. 70% RH
Shrinkage	<20%
Hardness	Shore A: 30-35
Max. movement	12,5%
Dry and curing time	Skin after ± 15 minutes, curing depending on joint size and environmental conditions
Components	Halogen and asbestos Free, SVHC compliant

Company

Firesafe was established in 1981 under the name «Protan Brannsikring». During the decades, the company has grown significantly and today Firesafe is the biggest supplier of passive fire protection to the construction industry in the Nordic countries.

Although passive fire protection accounts for the majority of the business, Firesafe does also supply a wide range of other fire protection products – including extinguishing systems, fire alarms and products for the offshore/marine sector. Today the company has more than 1000 employees. Headquarters is located at Lørenskog, outside Oslo, Norway.

Fire sealing systems has since the start in 1981, and still today, always been an important business area for Firesafe. Today Firesafe can offer a state-of-the-art product range to cover almost all situations/challenges that can occur in the construction project. To meet new regulations, more severe test procedures and new building materials we frequently run new fire tests to have updated documentation to satisfy the market.

Supplier	Firesafe AS
Address, corporate office	Robsrudskogen 15, 1470 Lørenskog, Norway
E-mail	support@firesafe.no
Phone	+47 22 72 20 20
Website	www.firesafe.no
Production Location	Gorinchem, The Netherlands

EPD scope and background

Reference Service Life	N.A.
Declared Unit	1 kg of acrylic sealant, as applied

The data of a 310 ml tube was collected and extrapolated to 1 kg product.

The Ecoinvent v3.8 database is used as a source of secondary data. The study meets the requirements of NEN-EN ISO 14025:2010 [1] and the EN 15804+A2:2019 [2]. This EPD follows the PCR 2019:14 v1.2.5 [3], General Programme Instructions v4.0 [4] and c-PCR-017 Technical-chemical products (for construction sector) [5] from Environdec.. The Ecochain software Mobius version 1.0.23 is used to model the product system. The foreground data is based on the year 2022.

The EPD system boundaries are cradle-to-gate with options, modules A4-A5, B1, C1-C4 and D. The use and end-of-life stages are calculated for the geographical area Europe, since this is the typical market for the product. Operational water and energy use during the use stage are not relevant for this product and are omitted.

Allocation of co-products

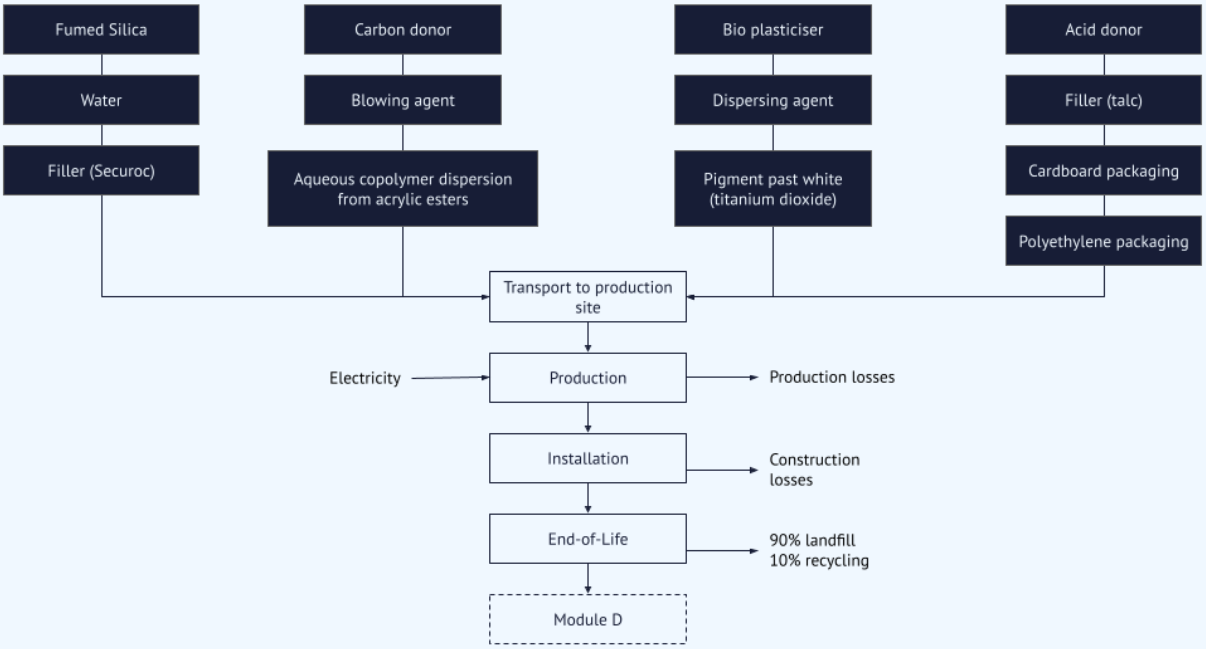
Allocation is avoided when possible. When allocation is necessary, it is based on physical properties when the revenue is low and on economic values in all other cases. Materials flows with specific inherent properties (e.g. biogenic carbon) are allocated according to their physical flows. Avoided impacts from allocated co-products are not declared in module D.

Allocation of end-of-life scenarios

The end-of-life system boundary of the product system is set where outputs of the system have reached the end-of-waste state. Examples of these outputs are materials, products or construction elements. This approach ensures that all waste processing during any module of the products system is included up to the system boundary of the respective module. Potential loads and benefits of secondary material, secondary fuel, or recovered energy leaving the product system are declared in module D. When a secondary material or fuel crosses the system boundary, for example at the end-of-waste state substituting another material or fuel in the following product system, the benefits and/or loads will be calculated based on a specified scenario based on current average practice.

Table 1. Modules considered in this EPD.

Life cycle stage	Module			Geography	Spec. data	Variation - products	Variation - locations
Production stage	A1	x	Raw material supply	RER	9%	0%	0%
	A2	x	Transport	RER			
	A3	x	Production	NL			
Construction stage	A4	x	Transport to site	GLO			
	A5	x	Construction - installation process	RER, GLO, NL, Europe without CH			
Use stage	B1	x	Use	-		-	-
	B2	ND	Maintenance	-		-	-
	B3	ND	Repair	-		-	-
	B4	ND	Replacement	-		-	-
	B5	ND	Refurbishment	-		-	-
	B6	ND	Operational energy use	-		-	-
	B7	ND	Operational water use	-		-	-
End-of-life stage	C1	x	Deconstruction demolition	-		-	-
	C2	x	Transport	GLO		-	-
	C3	x	Waste processing	Europe without CH		-	-
	C4	x	Disposal	Europe without CH		-	-
Benefits and loads beyond the system boundaries	D	x	Reuse - Recovery - Recycling potential	RER		-	-



Data quality assessment

It is assumed that the data quality of the information from the processes at the producer is higher than that of the other processes. Therefore, producer specific data is used when possible. These data are recent (2022), complete and based on one year averaged data. The technological coverage and geographical coverage reflect the physical reality of the product. Furthermore, the economic flows approach reality as closely as possible within practically feasible limits for the LCA practitioner.

The time representativeness of the used references for generic data is accurate, since the difference between the reference year (2022) and the time period for which the data is representative (2019) is <3 years.

The geographical coverage of this study is representative of the geographical scope of the production process. Where possible, specific country specific references are selected. Where this is not possible, region-specific references are selected. The quality level ranges from good to very good.

The technological coverage of this study is representative as specific business, product, and process data of the year 2022 are used to model the product system under study. Therefore, the data quality is very good.

The scenarios in this study are currently in use and are representative for one of the most probable alternatives.

Cut-off criteria and assumptions

All inputs and outputs for which data is available are included in the LCA. Data gaps are filled with conservative assumptions and generic data. The cut-off criteria for data gaps is 1% of renewable and nonrenewable energy usage and 1% of the total mass input of that unit process. The total of excluded input floss per module will not exceed 5% of energy usage and mass input. This LCA uses expert judgement and conservative considerations to determine which inputs comply with these criteria.

Some data gaps were encountered, for example the production of fumed silica, energy use for installation, etc. This section describes how these data gaps were handled.

Fumed silica

There is no database reference for fumed silica available. This study models the main inputs of fumed silica production to replace the missing reference. Fumed silica is produced through pyrogenesis. This entails the heating of silicon tetrachloride, normally through natural gas combustion. The production and combustion of the natural gas is modelled, as well as the silicon tetrachloride production.

Literature about energy consumption of fumed silica production is scarce, so the energy use is based on literature on comparable silica products. Silica can also be produced as silica gel or precipitated silica. According to a report by the European Commission [8], natural gas use for drying silica gel and precipitated silica is 15–24 MJ/kg. Natural gas is also consumed for pyrogenic silica production. It is used for heating hydrogen gas and combustion air, for the evaporation of silicon tetrachloride and for removing residual hydrochloride from the silica surface. Despite the high temperature needed for pyrogenic silica, it does not consume more energy than precipitated silica or silica gel [9]. These two products have a high energy consumption during the necessary drying steps. Thus, this LCA uses a worst case scenario, where the production of fumed (pyrogenic) silica requires 24 MJ/kg.

Exclusion of electricity installation

The installation is typically done with a caulking gun. This can be a manual caulking gun (in 80% of the cases, according to the manufacturer) or an electrical caulking gun (20%). The power of these electric caulking guns is unknown. Typical voltage is 20V, with a battery life of 2 Ah. The ampere is assumed to be 2A, resulting in a power of

0,04 kW. The caulking rate is 1 mm/s at worst. One kilogram of FIRESAFE FT Acrylic sealant can be applied to a 20x15mm joint for 2045 mm. This comes to a duration of 0,57 hours per kilogram. The total electricity use is calculated with the following formula. This results in 0,004 kWh per kilogram of FIRESAFE FT Acrylic sealant. The impact of this input does not exceed 1% of the energy usage of the installation, and was therefore excluded.

$$Electricity\ for\ installation\ =\ duration\ \times\ power\ \times\ share\ electric\ installation$$

Exclusion of installation tools

The actual service life of the tools is unknown, so we assume the tools last 5 years of daily use. This LCA assumes that the tools are used for 8 hours per day, so 14600 hours during its life. The calculated duration of use for the installation of 1 kilogram of FIRESAFE FT Acrylic sealant is 0,57 hours. This results in 3,90E-05 units of caulking gun. We assume that the caulking gun, including the Li-ion battery, weighs 5 kg. This results in <1% of the mass and energy use of the installation, since the mass input of construction losses amounts to 0,05 kg. This input was excluded from the calculation.

Content declaration

The table below shows the material content of 1 kg FIRESAFE FT Acrylic sealant.

The packaging per kg is also included in the table. The packaging is consumer packaging, as it contains a sales unit for the final user.

Table 2. Content of 1 kg FIRESAFE FT Acrylic sealant.

Material	Weight (kg/kg end product)	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/kg
Aqueous copolymer dispersion from acrylic esters	0,319	-	-
Bio plasticizer	0,039	-	-
Pigment paste White (Titanium Dioxide)	0,096	-	-
Water	4,01E-05	-	-
Dispersing Agent	4,91E-04	-	-
Filler 1	0,076	-	-
Filler 2	0,041	-	-
Blowing agent	0,076	-	-
Acid Donor	0,221	-	-
Carbon Donor	0,090	-	-
Thickener	0,004	-	-
Total weight excl. packaging	**1,000**		
Material	Weight (kg/kg end product)	Weight-% (versus product)	Biogenic material, weight-% and kg C/kg
Cardboard	0,016	1,6%	37,95% / 0,006
PE film	0,094	9,4%	0 / 0
Total weight incl. packaging	**1,110**		**0,006 kg C/kg**

Declaration of material content of SVHC

The product does not contain any substances from the Candidate List of Substances of Very High Concern (SVHC) for authorisation in amounts greater than 0,1% (1000 ppm).

Calculation rules

Production stage (A1-A3)

The materials for 1 kg FIRESAFE FT Acrylic sealant are listed in table 1. Lorries of type EURO 6 transport the materials to the production facility. The ingredients are mixed in a dispersing unit at the production site in Gorinchem, the Netherlands. The process consumes grey electricity from natural gas. The electricity was allocated based on the duration of use and power of the dissolver. This was checked against the total energy use of 2022. No production waste occurs.

Construction stage (A4-A5)

The transportation distance is calculated to the storage location in Oslo, Norway. The transportation by truck (1277 km) is modelled with a global average reference. This reference includes various lorry types and emission classes. The table below shows the included lorries as well as the characteristics of a container ship (288 km). The installation of the sealant in the construction is usually done manually, therefore energy during installation is excluded. The installation does not require any ancillary materials, water or other resources. There are no known direct emissions during the installation of the sealant. The production, transportation and waste processing of the default production loss of 5% and of packaging waste are modelled in this life cycle stage.

Table 3. Transportation information per transportation type. The values for lorries are based on averages of vehicles of emission type EURO3-EURO6. The values of the ship are based on a global weighted average for container ships.

Type	Capacity utilisation (%)	Volume capacity utilisation factor	Bulk density product (kg/m3)	Fuel consumption per tkm	Fuel consumption per km
Lorry 3,5-7,5t	Default*	1	1577	0,109-0,111 kg	5,94E-05 kg
Lorry 7,5-16t	Default*	1	1577	0,0472-0,0481 kg	2,57E-05 kg
Lorry 16-32t	Default*	1	1577	0,0366-0,0378 kg	1,86E-05 kg
Lorry >32t	Default*	1	1577	0,0192-0,0196 kg	1,05E-05 kg
Ship	70%	1	1577	0,00252 kg	1,35E-06 kg

* the default value from the ecoinvent reference 'market group for transport, freight, lorry, unspecified | transport, freight, lorry, unspecified | Cutoff, U [GLO]' was used. More information can be found in the ecoinvent v3.8 database.

Table 4. Inputs for the installation of 1 kg sealant.

Installation input	Quantity
Production losses	5% of all materials listed in table 2

Table 5. Construction waste and processing per material.

Construction waste	Collection	Distance to processing	Total waste	Landfill	Incineration	Recycling
Acrylic sealant	Separate	50 km	0,05 kg	0,050 kg	-	-
Cardboard*	Separate	50 km	0,016 kg	1,60E-04 kg	0,016 kg	-
PE film*	Separate	50 km	0,094 kg	9,40E-04	0,093 kg	-

* The waste processing of these materials is modelled with a market group reference. The table is based on the most prevalent market, which is DE for cardboard and PE film.

Use stage (B1)

The emissions of the acrylic sealant are measured in lab conditions after a period of 28 days. The results can be provided upon request by Firesafe AS. This LCA model includes the emissions of VOCs, carcinogenic, mutagenic and reprotoxic (CMR) compounds and aldehydes.

End-of-life stage (C1-C4)

For transport of waste to a waste handling facility, the standard transport distance of 50 km is used, as described in the PCR 2019:14 v1.2.5. Since there is no specific information available from the manufacturer, the standard scenario as prescribed by c-PCR-017 is not used, as the recycling of the sealant is very improbable. The share (10%) of recycling in the default values is replaced by landfilling. It is assumed that the sealant is collected separately.

Table 6. End-of-Life processing of the materials of 1 kg FIRESAFE FT Acrylic Sealant.

Waste Material	Collection	Transport distance	Landfill (kg)	Incineration (kg)	Recycling (kg)	Reuse (kg)
Acrylic sealant	Separate	50 km	100% *1 kg*	0%	0%	0%

Loads and benefits outside the system boundaries (D)

No loads or benefits are calculated in module D, as there is no primary material recycled, energy from incineration, or secondary material lost.

Environmental impact per declared unit (1 kg)

Table 8 shows the complete environmental profile of one kilogram acrylic sealant, as applied. The impact assessment results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The GWP-GHG indicator is required by the PCR v1.2.5 of EPD International. The indicator accounts for all greenhouse gases, with the exception of biogenic carbon dioxide uptake, emissions or storage. It was calculated with the GWP-biogenic and GWP-fossil categories from EF 3.0. In this method, the characterisation factor for biogenic CO_2 is zero. The characterisation factor for fossil CH_4 is 36,8 and for biogenic CH_4 is 34. This impact category is not included in Climate change - total.

Table 8. Environmental impact of 1 kg Acrylic sealant, in the core impact categories.

Impact category	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
GWP-total	2,21E+00	1,91E-01	2,90E-01	5,90E-11	0,00E+00	6,74E-03	0,00E+00	5,55E-02	0,00E+00
GWP-f	2,21E+00	1,90E-01	2,90E-01	5,90E-11	0,00E+00	6,70E-03	0,00E+00	5,55E-02	0,00E+00
GWP-b	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-luluc	3,15E-03	1,33E-03	2,36E-04	0,00E+00	0,00E+00	4,74E-05	0,00E+00	1,08E-05	0,00E+00
ODP	2,61E-07	4,02E-08	1,60E-08	0,00E+00	0,00E+00	1,42E-09	0,00E+00	3,21E-09	0,00E+00
AP	1,06E-02	1,13E-03	6,37E-04	0,00E+00	0,00E+00	3,69E-05	0,00E+00	8,96E-05	0,00E+00
EP-fw	7,92E-05	2,18E-06	4,13E-06	0,00E+00	0,00E+00	7,76E-08	0,00E+00	1,71E-07	0,00E+00
EP-m	1,71E-03	3,89E-04	1,34E-04	0,00E+00	0,00E+00	1,31E-05	0,00E+00	3,04E-05	0,00E+00
EP-t	2,23E-02	4,23E-03	1,54E-03	0,00E+00	0,00E+00	1,42E-04	0,00E+00	3,35E-04	0,00E+00
POCP	6,79E-03	1,21E-03	4,68E-04	4,21E-12	0,00E+00	4,10E-05	0,00E+00	1,07E-04	0,00E+00
ADP-mm [2]	2,39E-05	6,42E-07	1,24E-06	0,00E+00	0,00E+00	2,28E-08	0,00E+00	3,48E-08	0,00E+00
ADP-f [2]	4,45E+01	2,85E+00	2,45E+00	0,00E+00	0,00E+00	1,01E-01	0,00E+00	2,49E-01	0,00E+00
WDP [2]	1,75E+00	1,11E-02	8,98E-02	0,00E+00	0,00E+00	3,96E-04	0,00E+00	1,08E-02	0,00E+00
PM	9,25E-08	2,04E-08	6,75E-09	0,00E+00	0,00E+00	7,29E-10	0,00E+00	1,78E-09	0,00E+00
IR [1]	8,75E-02	1,19E-02	5,24E-03	0,00E+00	0,00E+00	4,22E-04	0,00E+00	9,79E-04	0,00E+00
ETP-fw [2]	5,07E+01	2,53E+00	2,93E+00	3,54E-11	0,00E+00	8,96E-02	0,00E+00	8,66E-01	0,00E+00
HTP-c [2]	1,84E-09	9,18E-11	1,28E-10	6,62E-19	0,00E+00	3,22E-12	0,00E+00	7,76E-12	0,00E+00
HTP-nc [2]	5,74E-08	2,66E-09	3,42E-09	1,33E-18	0,00E+00	9,47E-11	0,00E+00	2,29E-10	0,00E+00

SQP [2]	1,58E+01	2,54E+00	1,01E+00	0,00E+00	0,00E+00	9,08E-02	0,00E+00	5,93E-01	0,00E+00

GWP-total = Climate change [kg CO2 eq]; **GWP-f** = Climate change - Fossil [kg CO2 eq]; **GWP-b** = Climate change - Biogenic [kg CO2 eq]; **GWP-luluc** = Climate change - Land use and LU change [kg CO2 eq]; **ODP** = Ozone depletion [kg CFC11 eq]; **AP** = Acidification [mol H+ eq]; **EP-fw** = Eutrophication, freshwater [kg P eq]; **EP-m** = Eutrophication, marine [kg N eq]; **EP-T** = Eutrophication, terrestrial [mol N eq]; **POCP** = Photochemical ozone formation [kg NMVOC eq]; **ADP-mm** = Resource use, minerals and metals [kg Sb eq]; **ADP-f** = Resource use, fossils [MJ]; **WDP** = Water use [m3 depriv.]; **PM** = Particulate matter [disease inc.]; **IR** = Ionising radiation [kBq U-235 eq]; **ETP-fw** = Ecotoxicity, freshwater [CTUe]; **HTP-c** = Human toxicity - cancer; **HTP-nc =** Human toxicity - non-cancer; **SQP =** Land use [Pt] **1.** This impact category deals mainly with the eventual impact of low dose ionising radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some construction materials is also not measured by this indicator. **2.** The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Table 9. The impact of 1 kg FIRESAFE FT Acrylic sealant in the resource use indicators.

Resource use	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PERE	2,24E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERM	1,73E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	2,27E+00	4,87E-02	1,17E-01	0,00E+00	0,00E+00	1,73E-03	0,00E+00	4,52E-03	0,00E+00
PENRE	4,66E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRM	8,32E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	4,81E+01	3,04E+00	2,64E+00	0,00E+00	0,00E+00	1,07E-01	0,00E+00	2,65E-01	0,00E+00
SM	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	4,64E-02	3,77E-04	2,39E-03	0,00E+00	0,00E+00	1,34E-05	0,00E+00	2,63E-04	0,00E+00

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials [MJ]; **PERM** = Use of renewable primary energy resources used as raw materials [MJ]; **PERT** = Total use of renewable primary energy resources [MJ]; **PENRE** = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials [MJ]; **PENRM** = Use of non-renewable primary energy resources used as raw materials [MJ]; **PENRT** = Total use of non-renewable primary energy resources [MJ]; **SM** = Use of secondary material [kg]; **RSF** = Use of renewable secondary fuels [MJ]; **NRSF** = Use of non-renewable secondary fuels [MJ]; **FW** = Use of net fresh water [m3]

Table 10. The impact of 1 kg FIRESAFE FT Acrylic sealant in the waste indicators.

Waste categories	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
HWD	3,69E-05	7,39E-06	2,50E-06	0,00E+00	0,00E+00	2,63E-07	0,00E+00	3,84E-07	0,00E+00
NHWD	3,81E-01	1,95E-01	1,14E-01	0,00E+00	0,00E+00	6,98E-03	0,00E+00	1,00E+00	0,00E+00
RWD	8,40E-05	1,88E-05	5,54E-06	0,00E+00	0,00E+00	6,63E-07	0,00E+00	1,49E-06	0,00E+00

HWD = Hazardous waste disposed [kg]; **NHWD** = Non-hazardous waste disposed [kg]; **RWD** = Radioactive waste disposed [kg]

Table 11. The impact of 1 kg FIRESAFE FT Acrylic sealant in the output flow indicators.

Output flows	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
CRU	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

CRU = Components for re-use [kg]; **MFR** = Materials for recycling [kg]; **MER** = Materials for energy recovery [kg]; **EEE** = Exported energy, electric [MJ]; **EET** = Exported energy, thermal [MJ]

Table 12. The environmental impact of 1 kg FIRESAFE FT Acrylic sealant on the additional indicator.

Additional indicators	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
GWP-GHG	2,21E+00	1,90E-01	3,05E-01	5,90E-11	0,00E+00	6,70E-03	0,00E+00	5,55E-02	0,00E+00

GWP-GHG = Climate change - greenhouse gases [kg CO2 eq]

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