FIRESAFE /

ECO PLATFORM EPD VERIFIED

EPD®
THE INTERNATIONAL EPD® SYSTEM

Environmental Product Declaration

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

FIRESAFE FIRE COLLAR

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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-11518

Hedgehog Company

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
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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 1.3.1
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.
Life Cycle Assessment (LCA)
LCA accountability: Gloria Carta, Hedgehog Company gloria@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.

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

Product description

This EPD concerns FIRESAFE FIRE COLLAR. The product belongs to the UN CPC group 369. It is made of galvanised steel metal frame, covered inside with a thermal expanding graphite material. The graphite material in FIRESAFE FIRE COLLAR expands at a temperature of 180 °C, to 18 times the original volume and closes openings with flammable pipes. AREAS OF USE FIRESAFE FIRE COLLAR is used for fire protection of plastic pipes type PE / PP / PVC / PP-R / PP-MD 5 4 400 mm. FIRESAFE FIRE COLLAR is used for fire protection of plastic pipes in walls and floors, to ensure a good fire resistance throughout the fire protection construction. FIRESAFE FIRE COLLAR can be installed in small openings as a single fire seal, combined with FIRESAFE FT Acrylic, or installed in large openings, combined with FIRESAFE FT Board or FIRESAFE GPG MORTAR. See Table 1 for the basic technical product specifications. The product is produced by Firesafe in Gorinchem, The Netherlands, and sold per pipe diameter 40 up to 400mm. This EPD studies one product unit with dimensions 35 mm length by 110 mm diameter.

Table 1. Technical specifications of the FIRESAFE FIRE COLLAR.

Characteristic	Value
Fire resistance (EN 1366-2; 1366-3; EN 13501-1; EN 13501-2)	EI 30 up to EI 240, depending on application and configuration
Environmental performance	Indoor Air Comfort Gold, AgBB, Blue Angel, Belgian Regulation, French VOC/CMR, M1
Use category	Y_1, internal use
Application conditions	between +5 ºC and +30 ºC, max. 70% RH
Shelf life	infinite, if stored acc. instructions
Density	Approximately 4658 kg/m3
Components	Formaldehyde and asbestos Free, SVHC free
Size	35 mm (width)
Diameter	110 mm

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 unit of FIRESAFE FIRE COLLAR.

The data of a unit with dimensions 35 mm width by 110 mm diameter was collected and used for the impact assessment.

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 v1.3.1 [3] and General Programme Instructions v4.0 [4] from Environdec. The Ecochain software Mobius version 1.0.224 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. Energy indicators PERE, PERM, PERT, PENRE, PENRM and PENRT are calculated using option A as given by Annex 3 of PCR 2019:14.

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 2. Modules considered in this EPD.

Life cycle stage	Module			Geography	Spec. data	Variation - products	Variation - locations
Production stage	A1	x	Raw material supply	RoW			
	A2	x	Transport	RER	0.47%*	0%	0%
	A3	x	Production	NL			
Construction stage	A4	x	Transport to site	GLO	-	-	-
	A5	x	Construction - installation process	-			
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	-	-	-

*The specific data included in this calculation is the transport data and the electricity consumption data in A1-A3.

x = module included

ND = module not declared

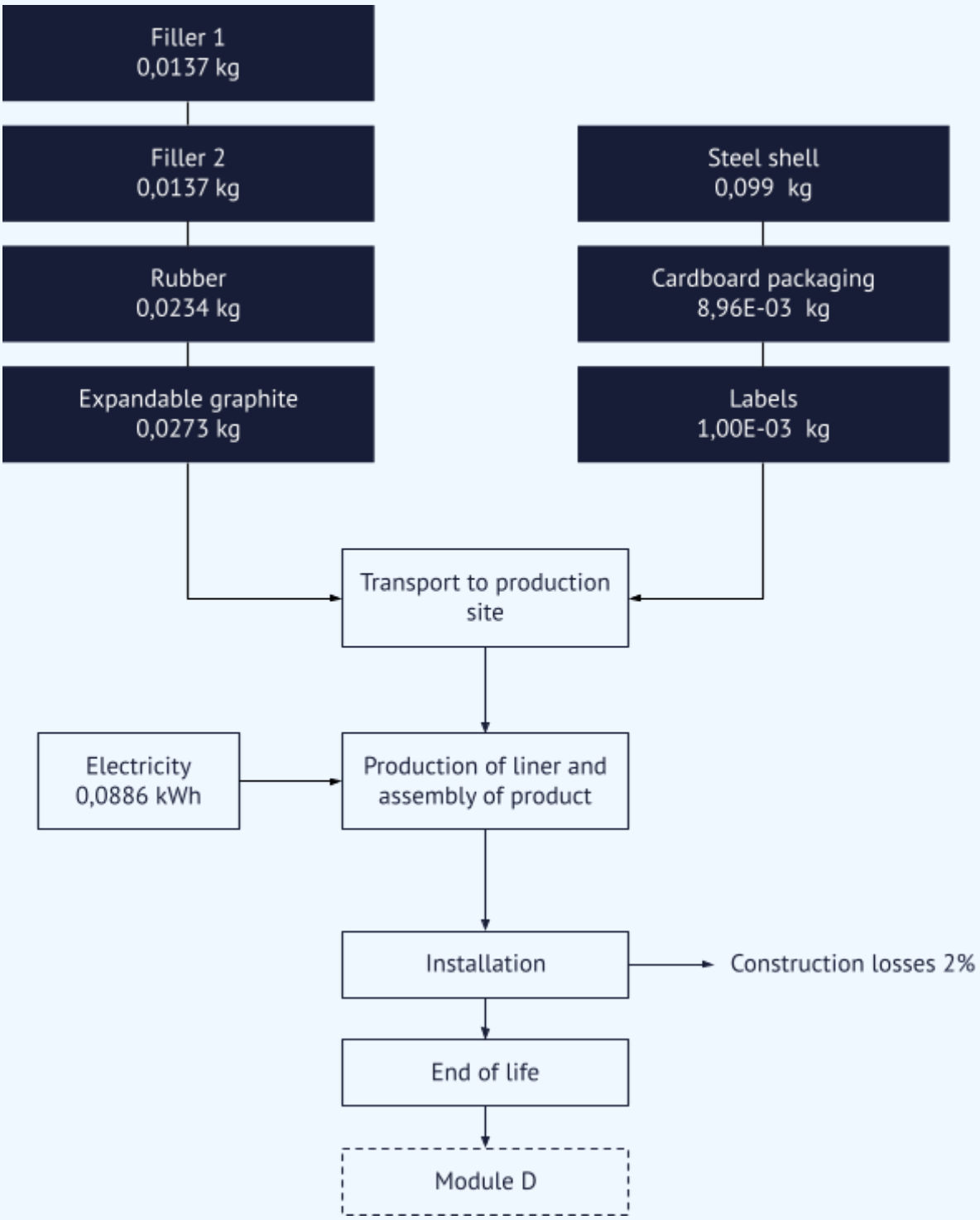

Figure 1. Flowchart of the product system under study, one unit of Collar.

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.

Capital goods and infrastructure could not be excluded from the upstream, core and downstream processes with reasonable effort, as they are integrated in background processes of the database references.

Some data gaps were encountered. This section describes how these data gaps were handled.

Energy from wind

The electricity is given from the manufacturer as wind energy. The origin of this wind energy is European. In this LCA it was assumed that the energy comes from onshore wind farms from Germany in the range 1-3 MW turbine.

Landfill of liner

The liner component is assumed to be landfilled. There is no representative reference for landfill of liner products in the database used, therefore the landfill of the liner was modelled by breaking it down into its components, even though they cannot be separated. It is assumed this approach gives a better representation of the emissions caused in the landfill process of the parts.

Direct emissions

Some of the substances reported in the emissions report were not available as references. Therefore, some adjustments were made:

- Formaldehyde and propionaldehyde are added together and referenced as general aldehydes
- Dibutylphthalate (DBP) was added to the reference for benzene, another CMR (carcinogenic, mutagenic, toxic for reproduction) compound.

- TVOC, TVVOC, TVSOC and carcinogens were added to toluene as the toluene equivalent was given in the report for these compounds.

Content declaration

The table below shows the material content of 1 unit of FIRESAFE FIRE COLLAR.

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 3. Content declaration of 1 unit of Collar.

Material	Weight (kg/kg end product)	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/kg
Rubber component	0,0234	0%	0% / 0 kg
Expandable graphite	0,0273	0%	0% / 0 kg
Filler 1	0,0137	0%	0% / 0 kg
Filler 2	0,0137	0%	0% / 0 kg
Steel shell	0,099	0%	0% / 0 kg
Total weight excl. packaging	**0,177**		**0 kg C/kg**
Material	Weight (kg/kg end product)	Weight-% (versus product)	Biogenic material, weight - % and kg C/kg
Cardboard	0,009	6,7%	41,78% / 3,76E-03
Label	0,001	0%	0% / 0 kg
Total weight incl. packaging	**0,187**		**3,76E-03 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 unit of FIRESAFE FIRE COLLAR are listed in table 3. Lorries of type EURO 6 transport the materials to the production facility. The ingredients for the liner component are mixed, extruded, calendared and sheet rolled at Firesafe's production site in Gorinchem, the Netherlands. The Collar is assembled by manually attaching the liner to a steel tube. The process consumes green electricity from European wind energy (0,02 kg CO2-eq./kWh). The electricity was allocated based on the duration of use and power of the machines, as well as adding the overhead energy used in the production facility which was allocated per product based on the sales unit of the factory. This was checked against the total energy use of 2022. There is no production waste.

Construction stage (A4-A5)

The transportation distance is calculated to the storage location in Oslo, Norway. In addition, 300 km of transport by truck are added to account for the transportation of the product from Oslo to the final consumer. 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 Collar is done manually, therefore there is no energy during installation. The installation does not require any ancillary materials, water or other resources. Packaging is discarded at this stage. There are no known direct emissions during the installation of the Collar. A standard construction waste of 2% was taken into account in module A5.

Table 4. 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	4658	0,109-0,111 kg	5,94E-05 kg
Lorry 7,5-16t	Default*	1	4658	0,0472-0,0481 kg	2,57E-05 kg
Lorry 16-32t	Default*	1	4658	0,0366-0,0378 kg	1,86E-05 kg
Lorry >32t	Default*	1	4658	0,0192-0,0196 kg	1,05E-05 kg
Ship	70%	1	4658	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 5. Distribution of construction waste between waste scenarios for the Collar liner product.

Material	Collection	Distance to processing	Total waste	Landfill	Incineration	Recycling
Cardboard*	Separate	50 km	8,96E-03 kg	8,96E-05 kg	8,87E-03 kg	-
Labels*	Together with cardboard	50 km	0,001 kg	1,00E-05 kg	9,90E-04 kg	-
Liner construction waste 2%	Separate	50 km	1,56E-03 kg	1,56E-03 kg	-	-
Steel construction waste 2%	Together with liner	50 km	1,98E-03 kg	2,97E-04 kg	-	1,68E-03 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. The waste scenario is 1% landfill and 99% municipal incineration.

Use stage (B1)

The emissions of the FIRESAFE FIRE COLLAR are measured in lab conditions after a period of 28 days. The results can be provided upon request by Firesafe. 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. It is assumed that the Collar is collected separately. The steel waste scenario is taken from European averages. [5]

Table 6. Distribution of waste processing for 1 unit of Collar.

Waste Material	Collection	Transport distance	Landfill (kg)	Incineration (kg)	Recycling (kg)	Reuse (kg)
Liner	Separate	50 km	100% *0,078 kg*	0%	0%	0%
Steel shell	Together with the liner	50 km	15% *0,0149 kg*	0%	85% *0,0842 kg*	0%

Loads and benefits outside the system boundaries (D)

The recycling and landfill of steel results in some benefits and burdens at this stage. The benefits and burdens of the steel component are shown in table 6.

Table 7. Benefits and burdens outside the system boundaries.

Benefit	Amount	Primary content	Unit	Quantity of benefit
Steel material recovery from recycling	0,0842 kg	74,21%	kg	0,0624
Burden	**Amount**	**Secondary content**	**Unit**	**Quantity of burden**
Steel material burden	0,0149 kg	25,79%	kg	-3,83E-03

Environmental impact per declared unit (1 unit)

Table 8 shows the complete environmental profile of one unit of Collar. 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 v1.3.1 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.

The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

Table 8. Environmental impact of 1 unit of FIRESAFE FIRE COLLAR, in the core impact categories.

Impact category	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
GWP-total	7,23E-01	3,28E-02	3,65E-02	0,00E+00	0,00E+00	1,20E-03	2,07E-03	4,52E-03	-1,30E-01
GWP-f	7,25E-01	3,25E-02	1,74E-02	0,00E+00	0,00E+00	1,19E-03	2,10E-03	4,51E-03	-1,30E-01
GWP-b	-1,91E-02	8,92E-05	1,90E-02	0,00E+00	0,00E+00	3,31E-06	-3,61E-05	1,13E-05	-4,24E-05
GWP-luluc	1,06E-03	2,27E-04	2,66E-05	0,00E+00	0,00E+00	8,38E-06	4,01E-06	1,37E-06	-8,26E-05
ODP	5,79E-08	6,87E-09	1,37E-09	0,00E+00	0,00E+00	2,51E-10	2,79E-10	2,96E-10	-5,67E-09
AP	5,38E-03	1,93E-04	1,16E-04	0,00E+00	0,00E+00	6,53E-06	2,50E-05	1,00E-05	-5,60E-04
EP-fw	4,13E-05	3,73E-07	8,41E-07	0,00E+00	0,00E+00	1,37E-08	1,02E-07	2,91E-08	-5,47E-06
EP-m	8,29E-04	6,66E-05	2,45E-05	0,00E+00	0,00E+00	2,32E-06	5,52E-06	3,64E-06	-1,12E-04
EP-t	9,27E-03	7,23E-04	2,16E-04	0,00E+00	0,00E+00	2,51E-05	6,35E-05	3,38E-05	-1,27E-03
POCP	3,07E-03	2,08E-04	7,28E-05	1,92E-12	0,00E+00	7,26E-06	1,75E-05	1,06E-05	-5,76E-04
ADP-mm [2]	8,22E-05	1,10E-07	1,65E-06	0,00E+00	0,00E+00	4,04E-09	2,49E-07	3,60E-09	-1,92E-06
ADP-f [2]	9,76E+00	4,88E-01	2,11E-01	0,00E+00	0,00E+00	1,78E-02	2,90E-02	2,58E-02	-1,28E+00
WDP [2]	3,25E-01	1,90E-03	6,79E-03	0,00E+00	0,00E+00	7,01E-05	3,83E-04	9,91E-04	-2,86E-02
PM	5,41E-08	3,49E-09	1,32E-09	0,00E+00	0,00E+00	1,29E-10	3,33E-10	1,82E-10	-1,04E-08
IR [1]	3,21E-02	2,04E-03	7,05E-04	0,00E+00	0,00E+00	7,47E-05	1,45E-04	9,72E-05	-2,12E-03
ETP-fw [2]	5,15E+01	4,32E-01	1,08E+00	6,96E-12	0,00E+00	1,59E-02	1,07E-01	8,47E+00	-4,06E+00

HTP-c [2]	3,31E-09	1,57E-11	6,98E-11	1,81E-19	0,00E+00	5,71E-13	3,59E-12	1,03E-12	-7,97E-10
HTP-nc [2]	4,84E-08	4,55E-10	1,03E-09	2,35E-19	0,00E+00	1,68E-11	1,57E-10	2,25E-11	-3,06E-09
SQP [2]	5,46E+00	4,34E-01	1,24E-01	0,00E+00	0,00E+00	1,61E-02	5,36E-02	5,24E-02	-4,52E-01

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 unit of FIRESAFE FIRE COLLAR in the resource use indicators.

Resource use	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PERE	1,62E+00	0,00E+00	1,56E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERM	1,21E-01	0,00E+00	-1,21E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	1,74E+00	8,33E-03	3,52E-02	0,00E+00	0,00E+00	3,07E-04	4,51E-03	7,89E-04	-1,28E-01
PENRE	1,04E+01	0,00E+00	2,67E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRM	4,23E-02	0,00E+00	-4,23E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	1,04E+01	5,19E-01	2,25E-01	0,00E+00	0,00E+00	1,90E-02	3,08E-02	2,74E-02	-1,36E+00
SM	2,55E-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
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	9,57E-03	6,45E-05	2,01E-04	0,00E+00	0,00E+00	2,38E-06	1,55E-05	2,50E-05	-8,00E-04

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 unit of FIRESAFE FIRE COLLAR in the waste indicators.

Waste categories	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
HWD	2,51E-04	1,26E-06	5,06E-06	0,00E+00	0,00E+00	4,66E-08	8,36E-08	3,55E-08	-9,16E-06
NHWD	1,96E-01	3,33E-02	7,83E-03	0,00E+00	0,00E+00	1,24E-03	8,86E-04	9,32E-02	-5,50E-02
RWD	3,06E-05	3,21E-06	7,08E-07	0,00E+00	0,00E+00	1,17E-07	1,71E-07	1,40E-07	-2,13E-06

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

Table 11. The impact of 1 unit of FIRESAFE FIRE COLLAR 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	8,42E-02	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	1,03E-01	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	4,61E-02	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 unit of FIRESAFE FIRE COLLAR on the additional indicator.

Additional indicators	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
GWP-GHG	7,38E-01	3,25E-02	2,65E-02	0,00E+00	0,00E+00	1,19E-03	2,11E-03	4,52E-03	-1,30E-01

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

References

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