

Environmental Product Declaration

In accordance with 14025 and EN15804 +A2

DAFA Radon Barrier



The Norwegian EPD Foundation

Owner of the declaration:

DAFA Building Solutions A/S
Holmstrupgaardvej 1, DK 8220 Brabrand,
Denmark
dafa-build.com

Product name:

DAFA Radon Barrier

Declared unit:

1 m² of plastic foil

Product category /PCR:

NPCR PART A: Construction products and
services version 2.0, NPCR PART B: Roof
waterproofing version 2.0

Program holder and publisher:

The Norwegian EPD Foundation

Declaration number:

[text]

Registration number:

[text]

Issue date: [text]

Valid to: [text]

General information

Product:

DAFA Radon Barrier 400 µm

DAFA Radon Barrier 500 µm

Type of EPD:

Product Specific

Program Operator:

The Norwegian EPD Foundation

Post Box 5250 Majorstuen, 0303 Oslo, Norway

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Declaration Number:

[From EPD-Norge]

This declaration is based on Product

Category Rules:

NPCR PART A: Construction products and services version 2.0, NPCR PART B: Roof waterproofing version 2.0.

Statements:

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to the manufacturer, life cycle assessment data and evidences.

Declared unit:

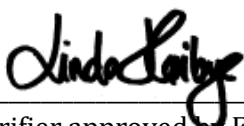
One square meter (1 m²) plastic foil.

Verification:

Independent verification of the declaration and data, according to ISO14025:2010

internal

external



Independent verifier approved by EPD Norway

Linda Høiby

Life Cycle Assessment Consulting

Owner of the declaration:

DAFA Building Solutions A/S

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Manufacturer:

DAFA Building Solutions A/S

Holmstrupgaardvej 1, DK 8220 Brabrand Denmark

Place of production:

Finland

Management system:

ISO 9001, ISO 14001

Organisation no:

41854510

Issue date:

[xx.xx.xxxx]

Valid to:

[xx.xx.xxxx]

Year of study:

2023

Comparability:

The EPD of construction products may not be comparable if they do not comply with EN 15804 and are seen in a building context.

Approve by manager of EPD Norway

Product

Product description:

1 m² installed plastic foil used as a barrier for radon radiation in construction with a technical lifetime of 60 years. Radon Barrier is used under the flooring of the building. DAFA Radon Barrier is manufactured at a production site in Finland and imported to Denmark for storage at two warehouse locations.

Radon Barrier is available in 400 and 500 µm. The material composition of the 500 µm is linear to its 400 µm counterpart, with the exception of packaging which remains constant from the 400 µm to the 500 µm variant. Both product variants are included and reported on individually.

The 500 µm variant targets the Norwegian market. This product is made specially to adhere to the SINTEF certification scheme that requires increased resistance to impact (primary and secondary) cf. EN 12691.

Radon Barrier	Unit	400 µm	500 µm
Declared unit [m ² of plastic foil]	m ²	1	1
Density	kg/m ²	0.372	0.465
Thickness	µm	400	500
Conversion factor to 1 kg	kg	2.69	2.15
Production volume of year of study	kg	26,959	
Total m ² produced in production year	m ²	72,471	
Relative production volume	%	1.5	

Product specification:

DAFA Radon barrier: A barrier that ensures effective airtight radon and moisture-resistant seal. The DAFA Radon barrier is suitable for installation in most types of heated buildings, such as homes, offices, etc. The barrier is used to reduce and mitigate the naturally occurring ingress of radon from the ground into the building. DAFA Radon Barrier is manufactured through an extrusion process.

Materials	400 µm		500 µm	
	LDPE granulates	3.71E-01	99.80 %	4.64E-01
Color resin (LDPE/LLDPE)	2.60E-04	0.07 %	3.25E-04	0.07 %
Pigment color and UV substance	4.84E-04	0.13 %	6.05E-04	0.13 %
Packaging	400 µm		500 µm	
Containerboard	4.49E-02	93.82 %	4.49E-02	93.82 %
Pallet	1.03E-04	0.22 %	1.03E-04	0.22 %
Packaging film	2.85E-03	5.97 %	2.85E-03	5.97 %

Technical data:

The 400 and 500 µm DAFA Radon Barrier is manufactured cf. EN 13967.

In addition, the 500 µm variant is manufactured according to the SINTEF certification scheme that requires increased resistance to impact (primary and secondary) cf. EN 12691.

Technical data can be found through the following link: https://dafa-build.com/media/saajradb/dafa-radonsp%C3%A6rre_uk.pdf

Market:

Denmark

Technical service life

60 years

LCA: Calculation rules

Declared unit:

1 m² installed plastic foil.

Data quality:

Product specific data is delivered by DAFA Building Solution A/S. Product-specific data is sourced from the production site located in Finland, and two warehouses located in Denmark. Generic data is from Ecoinvent 3.8 (2022) "Allocation cut-off by classification". Product-specific data is representative of the year 2021 and was collected in 2022.

Allocation:

Allocation is done in accordance with the provisions of EN 15804+A2. Allocation of energy, water, and waste from production is calculated by a physical allocation factor based on the manufacturer's input. For waste produced at the manufacturing, the benefits for reuse, recycling and recovery are allocated by using this allocation factor.

System boundary:

Figure 1 shows the system boundaries for the analysis. The analysis is a cradle-to-gate, with module options A4, A5, C1, C2, C3, C4, and D. Note: the boundary around A1 indicates processes tied to the production in Finland.

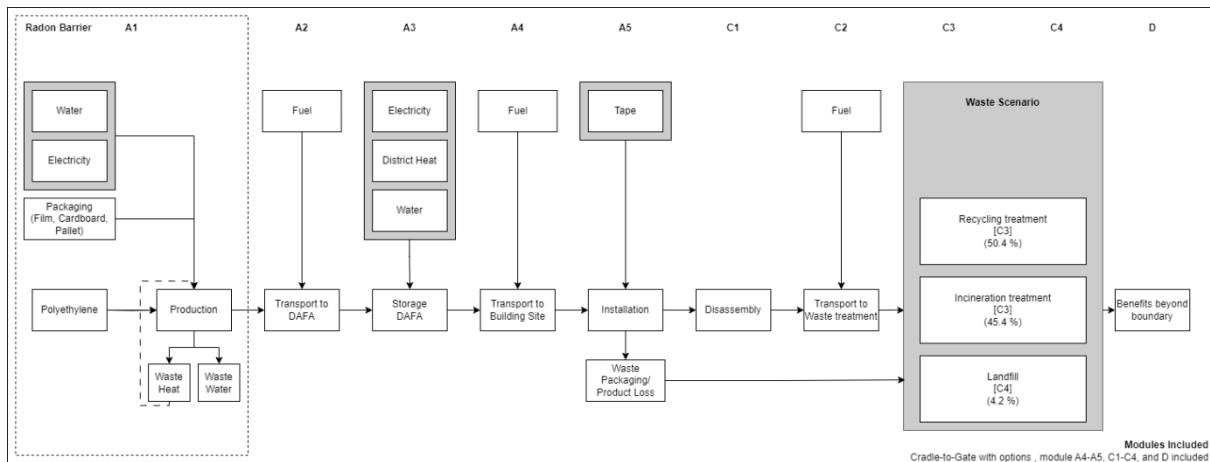


Figure 1: Modules covered in the EPD

Cut-off criteria:

The general rules apply for the exclusion of inputs and outputs in the LCA which complies with 15804:2012+A2:2019. 6.3.6. In cases of insufficient input data or data gaps for a unit process, the cut-off criteria shall be 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input of that. The total neglected input flows, e.g., per module A1-A3, A4-A5, and B1-B5, B6-B7, C1-C4 and module D shall be a maximum of 5 % of energy usage and mass.

All major raw materials and all the essential energy is included. This cut-off rule does not apply for to hazardous materials and substances. The following processes and materials have been excluded based on specified cut-off criteria.

Process excluded from the study	Cut-off criteria	Quantified contribution from process	Exclusion Justification
Module A1: Packaging from RMA, such as reusable big bags, and pallets	Environmental significance	<1%	As the product at this stage is intermediate, it is assumed that the product is moved utilizing pragmatic reusable packaging, i.e. pallets or big bags.
Module A3: Waste generated in operations at DAFA warehouses.	Environmental significance	<1%	As no alternation of either product or product packaging are performed once the product arrives at DAFA's warehouses (A3), the waste generation related to this process is expected to be marginal.
Module A5: Minor installation activities, such as the <i>potential use of an electric staple gun</i> .	Energy significance	<1%	The installation <i>can potentially</i> make use of electric equipment either through an electric, or compressed air staple gun (normal practice is manual stapling). As neither of these is necessary, it has been excluded through cut off.
Module C1: Minor dismantling activities such as the <i>potential use of an electric drill</i>	Energy significance	<1%	The dismantling <i>can potentially</i> make use of electric equipment like an electric drill, or something of the like. None of this is however necessary as manual labor is usually utilized and has therefore excluded through cut off.
Module D: Benefits tied to:), N-olefins (color), polycarboxylates (uv-stabilizer),	Energy significance	<1%	The materials either has a minor contribution within the product and are therefore recycled as "part of the product", or has a very small calorific value which in turn result in an insignificant benefit at energy recovery.

LCA: Scenarios and additional technical information

Product stage (A1-A3)

Module A1 is the manufacturing of DAFA Radon Barrier at the production site located in Finland. DAFA Radon Barrier is manufactured from petrochemical-based virgin polyethylene. DAFA Radon Barrier is manufactured through an extrusion manufacturing process. Packaging of the product is performed at the production site, where the product is rolled onto a cardboard core, and wrapped in packaging film. Raw materials are sourced from within or near Finland with an average transport distance of 500 km. Production in Finland is based on the certified renewable electricity mix and utilize excess heat generated during production for facility heating

Module A2 is transport of DAFA Radon Barrier by truck from the production site located in Finland to DAFA's two warehouse sites in Denmark. Transport data is applied based on communication with suppliers.

Module A3 is DAFA's own warehouse activities This includes water, electricity, and heating-related activities. DAFA Radon Barrier is stored at two warehouses in Brabrand and Stilling, in Denmark. The Danish residual electricity mix is applied for DAFA's own activities. DAFA Does not alter the structure, or packaging of the product once received in Denmark.

Transport from production place to installation/user (A4)

Transport in A4 is based on data from an outsourced logistical company.

Type	Capacity utilization (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption (l/tkm)	value (l/t)
Truck	80	Lorry 16-32 metric ton, EURO5	227	0.00057	0.129

Installation (A5)

The installation of the vapor barrier results in a 10% product loss, which is considered when fulfilling the declared unit of 1 m². Furthermore, tape and staples are needed for the installation.

	Unit	400 µm	500 µm
Tape	kg	1.77E-04	1.77E-04
Material loss	kg	3.72E-02	4.65E-02
Packaging waste	kg	4.78E-02	4.78E-02

End of Life (C1, C3, C4)

The product contributes marginally to C1 and has been included in cut-off. This is because a limited handling is performed during the demolition/dismantling of a structure. The following waste scenario is applied based on national waste statistics for the building sector. Waste sent to recycling is 50.4%, waste sent to energy recovery is 45.4% and waste sent to landfill is 4.2%.

	Unit	400 µm	500 µm
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Sent for recycling	kg	1.88E-01	2.35E-01
Sent for energy recovery	kg	1.69E-01	2.11E-01
Sent to landfill	kg	1.56E-02	1.95E-02

Transport to waste processing (C2)

Module C2 Transport from the building/demolition site to the waste treatment/recycling facility is estimated based on national statistics for transport.

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption (l/tkm)	value (l/t)
Truck	59	lorry >32 metric ton, EURO6	93	0.04	3.74

Benefits and loads beyond the system boundary (D)

The energy recovered mitigates 25% electricity, and 75% heat, with a 5 % loss factored in.

	Unit	400 µm	500 µm
Energy mitigation (Electricity)	kWh/m2	5.77E-01	7.07E-01
Energy mitigation (Thermal)	kWh/m2	2.41E+00	2.71E+00
Recycling mitigation (PE)	kg/m2	2.34E-01	2.93E-01

LCA: Results

LCA calculations are based on data collected during the study period that represent an average tonne (mass-weighted) per declared unit. The results are split into two result sheets, one for Radon Barrier with a thickness of 400 µm and one for the 500 µm variant.

System boundaries (X=included, MND= module not declared)

Product stage			Assembly stage		Use stage							End of life stage				Benefits & loads beyond system boundary
Raw materials	Transport	Manufacturing	Transport	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	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

Radon Barrier 400 µm

Core environmental impact indicators – Radon Barrier 400 µm

Reading example: 9.0 E-03 = 9.0*10⁻³ = 0.009

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1.29E+00	1.89E-02	1.38E-01	0.00E+00	1.13E-02	4.67E-01	2.74E-02	-3.22E-01
GWP-fossil	kg CO2 eq.	1.32E+00	1.89E-02	6.30E-02	0.00E+00	1.13E-02	4.67E-01	2.74E-02	-2.80E-01
GWP-biogenic	kg CO2 eq.	-3.74E-02	5.07E-05	7.54E-02	0.00E+00	3.02E-05	4.40E-05	2.04E-06	-4.19E-02
GWP-LULUC	kg CO2 eq.	3.18E-03	7.55E-06	5.95E-06	0.00E+00	4.51E-06	5.10E-05	1.94E-07	-2.41E-04
ODP	kg CFC11 eq.	1.22E-07	4.38E-09	1.09E-09	0.00E+00	2.61E-09	7.58E-09	7.18E-11	-1.50E-08
AP	mol H ⁺ eq.	5.06E-03	5.37E-05	4.53E-05	0.00E+00	3.20E-05	2.97E-04	5.12E-06	-1.40E-03
EP-freshwater	kg P eq.	2.56E-04	1.24E-06	2.15E-06	0.00E+00	7.38E-07	1.14E-05	4.86E-08	-1.21E-04
EP-marine	kg N eq.	1.04E-03	1.09E-05	7.11E-05	0.00E+00	6.50E-06	1.27E-04	5.45E-06	-4.90E-04
EP-terrestrial	mol N eq.	1.07E-02	1.19E-04	1.58E-04	0.00E+00	7.09E-05	1.05E-03	2.45E-05	-3.44E-03
POCP	kg NMVOC eq.	3.45E-03	3.08E-05	5.22E-05	0.00E+00	1.84E-05	2.59E-04	7.01E-06	-6.69E-04
ADP-M&M	kg Sb eq.	7.45E-06	6.70E-08	5.09E-08	0.00E+00	3.99E-08	4.11E-07	1.40E-09	-1.68E-06
ADP-fossil	MJ	3.78E+01	2.86E-01	1.05E-01	0.00E+00	1.71E-01	7.62E-01	5.92E-03	-3.70E+00
WDP	m ³	2.06E+00	8.72E-04	3.68E-03	0.00E+00	5.20E-04	1.87E-02	1.01E-04	-1.62E-01

GWP-total: Global Warming Potential; **GWP-fossil:** Global Warming Potential fossil fuels; **GWP-biogenic:** Global Warming Potential biogenic; **GWP-LULUC:** Global Warming Potential land use and land use change; **ODP:** Depletion potential of the stratospheric ozone layer; **AP:** Acidification potential, Accumulated Exceedance; **EP-freshwater:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; See “additional Norwegian requirements” for indicator given as PO4 eq. **EP-marine:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-terrestrial:** Eutrophication potential, Accumulated Exceedance; **POCP:** Formation potential of tropospheric ozone; **ADP-M&M:** Abiotic depletion potential for non-fossil resources (minerals and metals); **ADP-fossil:** Abiotic depletion potential for fossil resources; **WDP:** Water deprivation potential, deprivation weighted water consumption

Additional environmental impact indicators - Radon Barrier 400 µm

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	6.89E-08	1.20E-09	5.54E-10	0.00E+00	7.14E-10	4.08E-09	9.23E-11	-3.22E-08
IRP	kBq U235 eq.	1.41E-01	1.48E-03	6.25E-04	0.00E+00	8.80E-04	4.32E-03	2.24E-05	-5.16E-02
ETP-fw	CTUe	1.13E+01	2.25E-01	3.66E-01	0.00E+00	1.34E-01	1.75E+00	2.53E-02	-1.01E+01
HTP-c	CTUh	5.18E-10	7.23E-12	2.15E-11	0.00E+00	4.31E-12	1.63E-10	4.23E-12	-2.31E-10
HTP-nc	CTUh	1.28E-08	2.27E-10	3.73E-10	0.00E+00	1.35E-10	1.49E-09	5.34E-11	-1.80E-08
SQP	Dimensionless	1.72E+01	2.07E-01	9.05E-02	0.00E+00	1.23E-01	6.22E-01	6.31E-03	-5.34E+00

PM: Particulate matter emissions; **IRP:** Ionising radiation, human health; **ETP-fw:** Ecotoxicity (freshwater); **ETP-c:** Human toxicity, cancer effects; **HTP-nc:** Human toxicity, non-cancer effects; **SQP:** Land use related impacts / soil quality

Resource use - Radon Barrier 400 µm

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
RPEE	MJ	3.56E+00	4.09E-03	6.09E-03	0.00E+00	2.44E-03	4.08E-02	1.07E-04	-1,29E+00
RPEM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0,00E+00
TPE	MJ	3.56E+00	4.09E-03	6.09E-03	0.00E+00	2.44E-03	4.08E-02	1.07E-04	-1,29E+00
NRPE	MJ	2.60E+00	6.06E-03	7.85E-03	0.00E+00	3.61E-03	5.79E-02	1.21E-04	-8,67E-01
NRPM	MJ	3.52E+01	2.80E-01	9.71E-02	0.00E+00	1.67E-01	7.04E-01	5.80E-03	-2,83E+00
TRPE	MJ	3.78E+01	2.86E-01	1.05E-01	0.00E+00	1.71E-01	7.62E-01	5.92E-03	-3,70E+00
SM	kg	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	MJ	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	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0,00E+00
W	m3	1.97E+00	8.55E-04	3.60E-03	0.00E+00	5.10E-04	1.81E-02	0.00E+00	-1,60E-01

RPEE Renewable primary energy resources used as energy carrier; **RPEM** Renewable primary energy resources used as raw materials; **TPE** Total use of renewable primary energy resources; **NRPE** Non renewable primary energy resources used as energy carrier; **NRPM** Non renewable primary energy resources used as materials; **TRPE** Total use of non renewable primary energy resources; **SM** Use of secondary materials; **RSF** Use of renewable secondary fuels; **NRSF** Use of non renewable secondary fuels; **W** Use of net fresh water

End of life – Waste - Radon Barrier 400 µm

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HW	KG	2.10E-05	7.48E-07	1.88E-07	0.00E+00	4.46E-07	1.41E-06	3.33E-08	-3.52E-06
NHW	KG	6.77E-01	1.50E-02	3.41E-02	0.00E+00	8.94E-03	3.86E-02	4.75E-03	-7.33E-02
RW	KG	7.63E-05	1.94E-06	4.24E-07	0.00E+00	1.15E-06	2.83E-06	2.67E-08	-1.70E-05

HW Hazardous waste disposed; **NHW** Non hazardous waste disposed; **RW** Radioactive waste disposed

End of life – output flow - Radon Barrier 400 µm

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
CR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	4.53E-02	0.00E+00	0.00E+00	2.34E-01	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	4.07E-02	0.00E+00	0.00E+00	2.10E-01	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	2.69E-01	0.00E+00	0.00E+00	1.27E+00	0.00E+00	0.00E+00
ETE	MJ	0.00E+00	0.00E+00	8.06E-01	0.00E+00	0.00E+00	3.81E+00	0.00E+00	0.00E+00

CR Components for reuse; **MR** Materials for recycling; **MER** Materials for energy recovery; **EEE** Exported electric energy; **ETE** Exported thermal energy

Information describing the biogenic carbon content at the factory gate - Radon Barrier 400 µm

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0
Biogenic carbon content in the accompanying packaging	kg C	2.29E-02

Classification of disclaimers to the declaration of core and additional environmental impact indicators - 400 µm

ILCD classification	Indicator	Disclaimer
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ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
ILCD type / level 2	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2
<p>Disclaimer 1 – 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 nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.</p>		
<p>Disclaimer 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 experienced with the indicator</p>		

Radon Barrier 500 µm

Core environmental impact indicators – Radon Barrier 500 µm

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1.41E+00	1.89E-02	1.38E-01	0.00E+00	1.13E-02	4.67E-01	2.74E-02	-4.04E-01
GWP-fossil	kg CO2 eq.	1.45E+00	1.89E-02	6.30E-02	0.00E+00	1.13E-02	4.67E-01	2.74E-02	-3.51E-01
GWP-biogenic	kg CO2 eq.	-4.12E-02	5.07E-05	7.54E-02	0.00E+00	3.02E-05	4.40E-05	2.04E-06	-5.27E-02
GWP-LULUC	kg CO2 eq.	3.49E-03	7.55E-06	5.95E-06	0.00E+00	4.51E-06	5.10E-05	1.94E-07	-3.02E-04
ODP	kg CFC11 eq.	1.34E-07	4.38E-09	1.09E-09	0.00E+00	2.61E-09	7.58E-09	7.18E-11	-1.89E-08
AP	mol H ⁺ eq.	5.57E-03	5.37E-05	4.53E-05	0.00E+00	3.20E-05	2.97E-04	5.12E-06	-1.76E-03
EP-freshwater	kg P eq.	2.81E-04	1.24E-06	2.15E-06	0.00E+00	7.38E-07	1.14E-05	4.86E-08	-1.52E-04
EP-marine	kg N eq.	1.15E-03	1.09E-05	7.11E-05	0.00E+00	6.50E-06	1.27E-04	5.45E-06	-6.17E-04
EP-terrestrial	mol N eq.	1.18E-02	1.19E-04	1.58E-04	0.00E+00	7.09E-05	1.05E-03	2.45E-05	-4.33E-03
POCP	kg NMVOC eq.	3.80E-03	3.08E-05	5.22E-05	0.00E+00	1.84E-05	2.59E-04	7.01E-06	-8.40E-04
ADP-M&M	kg Sb eq.	8.19E-06	6.70E-08	5.09E-08	0.00E+00	3.99E-08	4.11E-07	1.40E-09	-2.11E-06
ADP-fossil	MJ	4.15E+01	2.86E-01	1.05E-01	0.00E+00	1.71E-01	7.62E-01	5.92E-03	-4.64E+00
WDP	m ³	2.26E+00	8.72E-04	3.68E-03	0.00E+00	5.20E-04	1.87E-02	1.01E-04	-2.05E-01

GWP-total: Global Warming Potential; **GWP-fossil:** Global Warming Potential fossil fuels; **GWP-biogenic:** Global Warming Potential biogenic; **GWP-LULUC:** Global Warming Potential land use and land use change; **ODP:** Depletion potential of the stratospheric ozone layer; **AP:** Acidification potential, Accumulated Exceedance; **EP-freshwater:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; See “additional Norwegian requirements” for indicator given as PO4 eq. **EP-marine:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-terrestrial:** Eutrophication potential, Accumulated Exceedance; **POCP:** Formation potential of tropospheric ozone; **ADP-M&M:** Abiotic depletion potential for non-fossil resources (minerals and metals); **ADP-fossil:** Abiotic depletion potential for fossil resources; **WDP:** Water deprivation potential, deprivation weighted water consumption

Additional environmental impact indicators – Radon Barrier 500 µm

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	7.57E-08	1.20E-09	5.54E-10	0.00E+00	7.14E-10	4.08E-09	9.23E-11	-4.07E-08
IRP	kBq U235 eq.	1.56E-01	1.48E-03	6.25E-04	0.00E+00	8.80E-04	4.32E-03	2.24E-05	-6.47E-02
ETP-fw	CTUe	1.24E+01	2.25E-01	3.66E-01	0.00E+00	1.34E-01	1.75E+00	2.53E-02	-1.27E+01
HTP-c	CTUh	5.70E-10	7.23E-12	2.15E-11	0.00E+00	4.31E-12	1.63E-10	4.23E-12	-2.90E-10
HTP-nc	CTUh	1.41E-08	2.27E-10	3.73E-10	0.00E+00	1.35E-10	1.49E-09	5.34E-11	-2.27E-08
SQP	Dimensionless	1.89E+01	2.07E-01	9.05E-02	0.00E+00	1.23E-01	6.22E-01	6.31E-03	-6.74E+00

PM: Particulate matter emissions; **IRP:** Ionising radiation, human health; **ETP-fw:** Ecotoxicity (freshwater); **ETP-c:** Human toxicity, cancer effects; **HTP-nc:** Human toxicity, non-cancer effects; **SQP:** Land use related impacts / soil quality

Resource use – Radon Barrier 500 µm

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
RPEE	MJ	3.92E+00	4.09E-03	6.09E-03	0.00E+00	2.44E-03	4.08E-02	1.07E-04	-1.62E+00
RPEM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TPE	MJ	3.92E+00	4.09E-03	6.09E-03	0.00E+00	2.44E-03	4.08E-02	1.07E-04	-1.62E+00
NRPE	MJ	2.87E+00	6.06E-03	7.85E-03	0.00E+00	3.61E-03	5.79E-02	1.21E-04	-1.09E+00
NRPM	MJ	3.87E+01	2.80E-01	9.71E-02	0.00E+00	1.67E-01	7.04E-01	5.80E-03	-3.55E+00
TRPE	MJ	4.15E+01	2.86E-01	1.05E-01	0.00E+00	1.71E-01	7.62E-01	5.92E-03	-4.64E+00
SM	kg	2.94E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	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	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
W	m3	2.17E+00	8.55E-04	3.60E-03	0.00E+00	5.10E-04	1.81E-02	0.00E+00	-2.02E-01

RPEE Renewable primary energy resources used as energy carrier; **RPEM** Renewable primary energy resources used as raw materials; **TPE** Total use of renewable primary energy resources; **NRPE** Non renewable primary energy resources used as energy carrier; **NRPM** Non renewable primary energy resources used as materials; **TRPE** Total use of non renewable primary energy resources; **SM** Use of secondary materials; **RSF** Use of renewable secondary fuels; **NRSF** Use of non renewable secondary fuels; **W** Use of net fresh water

End of life – Waste – Radon Barrier 500 µm

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HW	KG	2.31E-05	7.48E-07	1.88E-07	0.00E+00	4.46E-07	1.41E-06	3.33E-08	-4.42E-06
NHW	KG	7.44E-01	1.50E-02	3.41E-02	0.00E+00	8.94E-03	3.86E-02	4.75E-03	-9.17E-02
RW	KG	8.40E-05	1.94E-06	4.24E-07	0.00E+00	1.15E-06	2.83E-06	2.67E-08	-2.13E-05

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

End of life – output flow – Radon Barrier 500 µm

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
CR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	5.00E-02	0.00E+00	0.00E+00	2.92E-01	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	4.50E-02	0.00E+00	0.00E+00	2.57E-01	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	3.19E-01	0.00E+00	0.00E+00	1.59E+00	0.00E+00	0.00E+00
ETE	MJ	0.00E+00	0.00E+00	9.57E-01	0.00E+00	0.00E+00	4.77E+00	0.00E+00	0.00E+00

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

Information describing the biogenic carbon content at the factory gate - Radon Barrier 500 µm

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0
Biogenic carbon content in the accompanying packaging	kg C	2.29E-02

Classification of disclaimers to the declaration of core and additional environmental impact indicators – 500 µm

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
ILCD type / level 2	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – 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 nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some

construction materials is also not measured by this indicator.

Disclaimer 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 experienced with the indicator

Additional Norwegian requirements

Greenhouse gas emissions from the use of electricity in the manufacturing phase
A national residual mix has been applied for the original manufacturing (A1) and DAFA-specific activities (A3). The manufacturing company in Finland is supplied by certified green electricity.

Electricity mixes		Data Source	Amount	Unit
Electricity, medium voltage {FI_RECS}	A1	Ecoinvent 3.8	0.054	kg CO2 eq./kWh
Electricity, Low voltage {DK_Residual}	A3	Ecoinvent 3.8	0.523	kg CO2 eq./kWh

Additional environmental impact indicators required in NPCR Part A for construction products

In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

GWP-IOBC - Radon Barrier 400 µm

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-IOBC	kg CO2 eq.	1.32E+00	1.89E-02	6.31E-02	0.00E+00	1.13E-02	4.67E-01	2.74E-02	-2.80E-01

GWP-IOBC Global warming potential calculated according to the principle of instantaneous oxidation.

GWP-IOBC - Radon Barrier 500 µm

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-IOBC	kg CO2 eq.	1.46E+00	1.89E-02	6.31E-02	0.00E+00	1.13E-02	4.67E-01	2.74E-02	-3.52E-01

GWP-IOBC Global warming potential calculated according to the principle of instantaneous oxidation.

Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Documentation available upon request to EPD owner.

- The product contains no substances given by the REACH Candidate list or the Norwegian priority list.
- The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskitfen, Annex III), see table.

Name	CAS no.	Amount
-	-	-

Indoor environment






Not relevant

Carbon Footprint

Carbon footprint according to ISO 14067 has not been worked out for the product.

Bibliography

- ISO 14025:2010 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
- ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
- EN 15804 +A2:2019 Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products
- ISO 21930:2007 Sustainability in building construction - Environmental declaration of building products
- The Norwegian EPD foundation (2021) NPCR PART A: Construction products and services version 2.0
- The Norwegian EPD foundation (2022) NPCR PART B: Roof waterproofing version 2.0
- Ecoinvent v3.8, 2022, Allocation, cut-off by classification. Swiss Centre of Life Cycle Inventories.
- Association of issuing bodies 2021, European Residual Mixes 2021: <https://www.aib-net.org/facts/european-residual-mix>
- District heating mix, Kredslob, 2022: <https://www.kredslob.dk/professionel/produkter-og-services/fjernvarme/miljoedeklaration-emissionsdata>
- Statistics Denmark, Transport: <https://www.statistikbanken.dk/NVG1>
- Statistics Denmark, Transport: <https://www.statistikbanken.dk/NVG41>
- Statistics Denmark, Waste: <https://www.statistikbanken.dk/20294>

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