

Environmental Product Declaration

In accordance with ISO14025:2006 and EN15804:2012+A2:2019

Rad X



Owner of the declaration:
Sustinera AS

Product name:
Rad X, radon and moisture barrier

Declared unit:
1 m²

Product category /PCR:
NPCR 022:2022 Part B for roof
waterproofing

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
NEPD-6319-5576-EN

Registration Number:
NEPD-6319-5576-EN

Issue date: 22.03.2024

Valid to: 22.03.2029

General information

Product:

Rad X, radon and moisture barrier

Program holder:

The Norwegian EPD Foundation
 Post Box 5250 Majorstuen, 0303 Oslo, Norway
 Phone: +47 23 08 80 00
 E-mail: post@epd-norge.no

Declaration Number:

NEPD-6319-5576-EN

This declaration is based on Product Category Rules:

NPCR 022:2022 Part B for roof waterproofing

Statements:

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

Declared unit:

1 m² of Rad X

Declared unit with option:

1 m² of Rad X, cradle- to- gate with option A1-A3, A4, A5, C1, C2, C3, C4, D

Verification:

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

Internal

External



Alexander Borg, Asplan Viak AS

Independent verifier approved by EPD Norway

Owner of the declaration:

Sustinera AS
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Manufacturer:

Sustinera AS
 Øvre Kluge 6, 4334 Ålgård

Place of production:

Belgium

Management system:

Miljøfyrtårn

Organisation no:

984 952 724

Issue date:

22.03.2024

Valid to:

22.03.2029

Year of study:

2024

Comparability:

EPDs from other programmes than The Norwegian EPD Foundation may not be comparable.

The EPD has been worked out by:

Ghazal Moshiri, Aase Teknikk AS



Approved



Manager of EPD Norway

Product

Product description:

RAD X is a highly robust and advanced membrane with a strong barrier against radon gas (class B/C). It boasts puncture resistance and gas-tightness against a wide range of gases, including radon, methane, oxygen, and pentane. Additionally, RAD X provides protection against moisture. Comprising seven layers of polyethylene (PE), the membrane has a total thickness of 0.3 mm.

One of the most notable advantages of RAD X is its thinness and elasticity, measuring just 0.3 mm, which makes it easy to work with and shape. Moreover, the membrane is exceptionally manageable even at low temperatures.

RAD X stands out in the market as one of the few transparent options, facilitating easy quality assurance of joints and penetrations.

Product specification:

Rad X is a 7-layer membrane made of polyethylene (PE) only.

Materials	kg	%
Polyethylene (mix of LDPE og MDPE)	0,2784	100 %

Packaging	kg
Plastic	0,0255
Wood	0,0069

Technical data:

	Rad X
Color	Orange
Transparency	Transparent
Thickness	0,3 mm
Weight	278,4 g/m ²

	Test method	Control limits	Unit
Radon penetration	SP method 3872	0,5*10 ⁻⁹	m/s
Radon resistance		2,0*10 ⁹	s/m
Air tightness – construction	NBI method 167/01	<= 3,9	l/min
Water vapor resistance	EN ISO 12572:2001	> 770*10 ⁹	m ² sPa/kg
		>= 150	m ekv. luftlag

Market:

Norway

Reference service life, product:

60 years

Reference service life, building:

60 years

LCA: Calculation rules

Declared unit:

1 m² of Rad X

Cut-off criteria:

According to PCR Part B, EN 15804 and EPD Norway GPI. All major raw materials and all the essential energy use is included. The production process for raw materials and energy flows that are included with very small amounts (<1%) are not included. This cut-off rule does not apply for hazardous materials and substances.

Allocation:

The allocation is made in accordance with the provisions of NPCR 022:2022 Part B for roof waterproofing and EN 15804. Where allocation has been necessary, incoming energy and water and waste production in-house has been economically allocated among all products. Effects of primary production of recycled materials is allocated to the main product in which the material was used.

Data quality:

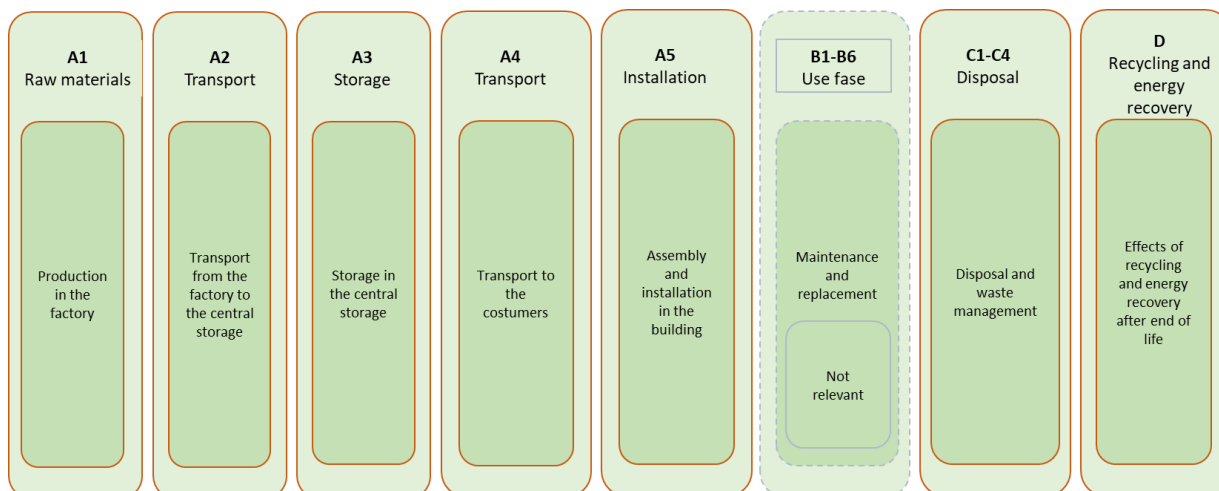
The data quality is in accordance with the guidelines for use of specific and generic data given by NPCR 022:2022 Part B for roof waterproofing and EN 15804. The data used fulfils the requirements for technological, geographical, and temporal representativeness/coverage of data.

Data for resource use, waste, and transport in A1-A3 is based on specific data. The collected data is representative of the production year in 2023. Generic data is obtained from Ecoinvent v3.9.1 (2023) and SimaPro v 9.5. All generic data is < 10 years old. Characterisation factors from EN15804:2012 + A2 2019.

System boundary:

A1-A3, A4, A5, C1, C2, C3, C4, D

Flow chart:



LCA: Scenarios and additional technical information

The following information describes the scenarios in different modules of the EPD.

Transport from production place to assembly/user (A4)

Type	Capacity utilization including returns (%)	Type of vehicle	Distance (km)	Fuel/Energy consumption(l/tkm)	Value (l/t)
Truck 16-32 t	36,7 % (Ecoinvent process)	Euro 5	350	0,04503	15,76

The product is transported by truck. 350 km is assumed based on the distance between the Sustinera's central storage to the biggest market for the product in Norway.

Assembly (A5)

	Unit	Value
Auxiliary materials: Tape	kg	0,0306
Water consumption	m3	0
Electricity consumption	kWh	0
Other energy carriers	MJ	0
Material loss (Assumed 5% of the total amount)	kg	0,0139
Output materials to waste treatment	kg	0,0325
Dust in air	kg	0

The product is installed using suitable tape. Also, the installation phase incorporates an assumed 5% material loss, as indicated by the representative PCR. The packaging is waste treated in A5. It is assumed that the packaging is burned with energy recovery.

End of life (C1, C3, C4)

	Unit	Value
Hazardous waste disposed	kg	0
Collected as mixed construction waste	kg	0
Reuse	kg	0
Recycling	kg	0
Incineration with energy recovery	kg	0,309
Landfilled	kg	0

Module C1, although included, is assumed to have zero significance, given its minor role in the overall building demolition process. The product is presumed to undergo incineration with energy recovery in C3. The benefits of substituting energy (both heat and electricity) are accounted for in module D.

Transport to the waste processing (C2)

Type	Capacity utilization including returns (%)	Type of vehicle	Distance (km)	Fuel/Energy consumption(l/tkm)	Value (l/t)
Truck 16-32 t	36,7 % (Ecoinvent process)	Euro 5	50	0,04503	2,51

It is assumed 50 km distance and euro 5 truck to the waste processing facility.

Benefits and loads beyond the system boundary (D)

	Enhet	Value
Substitution of electricity, in Norway (kWh)	kWh	0,09
Substitution of thermal energy, district heating, in Norway (MJ)	MJ	11,11

LCA: Results

Results are shown per declared unit, 1 m² Rad X.

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

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	MNR	MNR	MNR	MNR	MNR	MNR	MNR	X	X	X	X	X

Core environmental impact indicators – Rad X

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP - total	kg CO2 eq.	7,18E-01	2,11E-02	2,60E-01	0,00E+00	3,00E-03	9,29E-01	9,61E-02	-1,11E-01
GWP - fossil	kg CO2 eq.	7,16E-01	2,10E-02	2,50E-01	0,00E+00	2,99E-03	9,29E-01	9,60E-02	-7,39E-02
GWP - biogenic	kg CO2 eq.	2,44E-03	5,35E-05	1,07E-02	0,00E+00	7,60E-06	2,87E-05	2,87E-05	-3,70E-02
GWP - luluc	kg CO2 eq.	4,04E-04	1,00E-05	1,08E-04	0,00E+00	1,42E-06	2,22E-06	1,76E-07	-3,19E-04
ODP	kg CFC11 eq.	5,40E-09	4,45E-10	2,39E-09	0,00E+00	6,32E-11	4,88E-10	7,90E-12	-1,96E-09
AP	mol H ⁺ eq.	2,63E-03	6,68E-05	5,88E-04	0,00E+00	9,49E-06	1,04E-04	1,27E-05	-7,35E-04

EP-freshwater	kg P eq.	1,55E-05	1,64E-07	3,33E-06	0,00E+00	2,33E-08	8,98E-08	1,18E-08	-4,12E-06
EP-marine	kg N eq.	4,74E-04	2,27E-05	1,11E-04	0,00E+00	3,22E-06	4,62E-05	6,26E-06	-2,15E-04
EP-terrestrial	mol N eq.	5,18E-03	2,43E-04	1,20E-03	0,00E+00	3,45E-05	5,37E-04	5,80E-05	-2,47E-03
POCP	kg NMVOC eq.	1,39E-03	6,14E-05	3,17E-04	0,00E+00	8,72E-06	1,23E-04	1,37E-05	-5,82E-04
ADP-M&M ²	kg Sb eq.	3,70E-06	6,58E-08	1,39E-06	0,00E+00	9,34E-09	1,40E-08	1,60E-09	-3,11E-06
ADP-fossil ²	MJ	2,58E+01	2,90E-01	3,74E+00	0,00E+00	4,12E-02	4,47E-02	5,72E-03	-1,12E+00
WDP ²	m ³	7,78E-01	1,20E-03	8,83E-02	0,00E+00	1,70E-04	2,10E-03	9,93E-05	-2,69E-02

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; **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

Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009

Additional environmental impact indicators– Rad X

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	2,06E-08	1,32E-09	7,26E-09	0,00E+00	1,87E-10	7,64E-10	5,89E-11	-3,88E-08
IRP ¹	kBq U235 eq.	4,16E-02	1,46E-04	4,64E-03	0,00E+00	2,07E-05	6,24E-05	1,19E-05	-1,12E-02
ETP-fw ²	CTUe	8,68E-01	1,23E-01	8,22E-01	0,00E+00	1,75E-02	3,12E-02	2,75E-01	-5,43E-01
HTP-c ²	CTUh	7,50E-11	4,93E-12	3,48E-11	0,00E+00	7,00E-13	7,82E-11	2,02E-11	-6,72E-11
HTP-nc ²	CTUh	2,04E-09	8,33E-11	4,62E-10	0,00E+00	1,18E-11	1,21E-10	6,79E-10	-2,09E-09
SQP ²	Dimension less	2,03E+00	1,80E-01	5,27E-01	0,00E+00	2,55E-02	1,18E-02	8,14E-03	-1,62E+01

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.

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.

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

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

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
ILCD type / level 2	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	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>		

Resource use – Rad X

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
RPEE	MJ	8,38E-01	4,51E-03	1,49E-01	0,00E+00	6,40E-04	2,49E-03	4,15E-04	-6,58E+00
RPEM	MJ	1,43E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	9,81E-01	4,51E-03	1,49E-01	0,00E+00	6,40E-04	2,49E-03	4,15E-04	-6,58E+00
NRPE	MJ	1,08E+01	2,90E-01	3,74E+00	0,00E+00	4,12E-02	4,47E-02	5,72E-03	-1,12E+00
NRPM	MJ	1,49E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TRPE	MJ	2,58E+01	2,90E-01	3,74E+00	0,00E+00	4,12E-02	4,47E-02	5,72E-03	-1,12E+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	9,85E-03	4,14E-05	1,79E-03	0,00E+00	5,88E-06	2,64E-04	5,57E-06	-2,28E-02

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** Nonrenewable primary energy resources used as energy carrier; **NRPM** Nonrenewable 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 – Rad X

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HW	kg	9,48E-06	1,85E-06	7,59E-06	0,00E+00	2,63E-07	4,02E-07	2,21E-08	-3,71E-06
NHW	kg	3,24E-02	1,42E-02	1,27E-02	0,00E+00	2,02E-03	1,38E-03	1,12E-02	-3,14E-02
RW	kg	3,42E-05	9,44E-08	3,50E-06	0,00E+00	1,34E-08	4,26E-08	7,60E-09	-5,25E-06

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

End of life – Output Flows – Rad X

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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	1,16E-03	0,00E+00	4,64E-02	0,00E+00	0,00E+00	3,09E-01	0,00E+00	0,00E+00
EEE	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
ETE	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

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

Biogenic carbon content	Enhets	Verdi
Biogenic carbon content in product	kg C	0
Biogenic carbon content in the accompanying packaging	kg C	1,14E-02

Additional requirements

Location based electricity mix from the use of electricity in manufacturing

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (foreground/core) per functional unit.

National electricity grid	Data source	Foreground / core [kWh]	GWP _{total} [kg CO ₂ - eq/kWh]	SUM [kg CO ₂ - eq]
<i>Electricity, low voltage {BE} market for electricity, low voltage Cut-off, U</i>	Ecoinvent 3	0,167	0,228	0,038

Guarantees of origin from the use of electricity in the manufacturing process

In this context, a market-based approach has not been used. Hence, a location-based approach is employed to assess the environmental impact of electricity.

Additional environmental impact indicators required for construction products

In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is used 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.

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-IOBC	kg	7,30E-01	2,11E-02	2,49E-01	0,00E+00	3,00E-03	9,29E-01	9,61E-02	-1,11E-01

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

Hazardous substances






- 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 contains dangerous substances, more than 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 (Avfallsforskriften, Annex III), see table.

Indoor environment

Not relevant

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 15804:2012+A2:2019	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products.
NS-EN 16449:2014	Wood and wood-based products — Calculation of the biogenic carbon content of wood and conversion to carbon dioxide
EPD-Norge 2021	NPCR Part A:2021 Construction products and services
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SSB (2021) Tabell 04727	Fjernvarmebalanse (GWh), etter fjernvarme, statistikkvariabel og år. For år 2020
SSB (2021) Tabell 04730	Forbruk av brensel til bruttoproduksjon av fjernvarme (GWh), etter energitype, statistikkvariabel og år. For år 2020
SSB (2021) Tabell 09469	Nettoproduksjon av fjernvarme, etter varmesentral, statistikkvariabel og år. For år 2020.
Moshiri and Skullestad (2024)	LCA-report for Rad X, Aase Teknikk AS

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