Environmental Product Declaration



EPD[®]

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

Nofisol Extreme & High Value Sound Insulation Barriers

EPD of multiple products, based on worst-case results



Programme: Programme operator: EPD registration number: Publication date: Valid until: The International EPD® System, <u>www.environdec.com</u> EPD International AB S-P-12983 2024-03-12 2029-03-12

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 | | | | | | | |
|------------|---|--|--|--|--|--|--|--|
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Accountabilities for PCR, LCA and independent, third-party verification

Product Category Rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR): PCR 2019:14 Construction products (EN 15804:A2) (1.3.2.) (2023-12-08) c-PCR-014 Acoustical ceiling and wall solutions (2022-01-28)

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 <u>www.environdec.com/contact</u>.

Life Cycle Assessment (LCA)

LCA accountability: Eco Intelligent Growth, Barcelona (Spain) T. (+34) 934 199 080 info@ecointelligentgrowth.net

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: Marcel Gomez Ferrer, Marcel Gomez Consultoria Ambiental Phone: +34 630 64 35 93, Email: info@marcelgomez.com

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

□ Yes 🛛 No

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.

Comparability between EPDs is only achievable if the following performance characteristics are equivalent: declared unit, containment level, level of working width, assumed service life, geographic region and fulfilment of the same requirements of the applicable standard (EN 13964:2014).



Company information

<u>Owner of the EPD:</u> NOFISOL Europe BV <u>Contact:</u> Iris van Vliet <u>europe@nofisol.com</u>

Description of the organisation:

NOFISOL, established in April 2006 . NOFISOL stands for NOISE FIRE SOLUTIONS.

NOFISOL provides acoustic materials and sound barriers, sealed-in stone wool, sealed-in glass wool, acoustic overlay tiles, trapezoidal blocks and a myriad of other solutions to improve the acoustic climate in your building.

NOFISOL® products are Cradle to Cradle Certified®. NOFISOL® has been a member of the C2C Building Group since 2017, to contribute with fellow companies and design offices further to the Cradle to Cradle philosophy.

Product-related or management system-related certifications:

NOFISOL® products have been tested by CSTB France for VOC emissions and are classified by CSTB as A+.

NOFISOL® products are also:

- Cradle to Cradle Certified® Silver v 4.0.
- Eurofins Indoor Air Comfort Gold certified according to EN 16516. Certificate number IACG-466-01-03-2022

See related norms at Reference section.

Name and location of production site(s):

Nofisol Europe BV Everdenberg 9-d 4902 TT Oosterhout (NB) The Netherlands

Product information

<u>Product name:</u> The NOFISOL sound insulation barriers included in this declaration are panels with the following commercial references:

| NOFISOL® HIGH VALUE dB BARRIERS | Rw (dB) | Kg/m2 |
|---------------------------------|---------|-------|
| NOFISOL® 38 HIGH VALUE dB | 38 | 13,27 |
| NOFISOL® 39 HIGH VALUE dB | 39 | 16,97 |
| NOFISOL® 40 HIGH VALUE dB | 40 | 17,77 |
| NOFISOL® 45 HIGH VALUE dB | 45 | 24,77 |

| NOFISOL® eXtreme BARRIERS | Rw (dB) | Kg/m2 |
|---------------------------|---------|-------|
| NOFISOL® eXtreme 40-H | 40 | 18,77 |
| NOFISOL® eXtreme 47 | 47 | 28,77 |





Both commercial families can be grouped in the same EPD since they have the same function, same production process and materials, and the only difference is the EPDM rubber layer grammage. NOFISOL Barriers are standard available in 3 sizes (1200x600 / 1200x1000 / 1200x2000mm).

Product identification:

The NOFISOL® High Value and NOFISOL® eXtreme Barriers are faced with a special glassfiber reinforced aluminium foil. At site the self-adhesive NOFISOL® EP Alu foil has to be applied, single or double sided depending on the barrier type. The thickness off the base soundbarrier is 66 mm while the needed NOFISOL® EP ALU Foil can vary between 4.5 kg/m2 to 8 kg/m2. The thickness of the NOFISOL® base barriers is honed to the standard 100 mm bandraster that is applied frequently and provides for a simple, well-connecting installation of the barriers on the underlying structure.

| Product | Rw dB | Cradle To Cradle | Eurofins Indoor Air | Indoor Fire Air Resistance Climate [min] | | Fire Integrity [min] | Smoke Resistance NEN 6075-2011 | Smoke Permeability NEN 6075-2020 |
|---------------------------|----------|------------------------|------------------------|--|-------|----------------------------|--------------------------------------|--|
| NOFISOL® 38 High Value dB | 38 | Silver \lor 4.0 | Comfort GOLD | A+ | EI 45 | E 120 | 202 | Sa, S200 |
| NOFISOL® 39 High value dB | 39 | Silver \lor 4.0 | Comfort GOLD | A+ | EI 45 | E 120 | 202 | Sa, S200 |
| NOFISOL® 40 High Value dB | 40 | Silver \lor 4.0 | Comfort GOLD | A+ | EI 60 | E 120 | 202 | Sa, S200 |
| NOFISOL® 45 High Value dB | 33 | Silver v 4.0 | Comfort GOLD | A+ | EI 60 | E 120 | 202 | Sa, S200 |

Figure 1. NOFISOL High Value barriers characteristics

| Product | Rw dB | Cradle To Cradle | Eurofins Indoor Air | Indoor Air Climate | Fire Resistance [min] | Fire Integrity [min] | Smoke Resistance NEN 6075-2011 | Smoke Permeability NEN 6075-2020 |
|-----------------------|----------|------------------------|------------------------|--------------------------|-----------------------------|----------------------------|--------------------------------------|--|
| NOFISOL® eXtreme 40-H | 40 | Silver \lor 4.0 | Comfort GOLD | A+ | EI 45 | E 120 | 202 | Sa, S200 |
| NOFISOL® eXtreme 47 | 47 | Silver v 4.0 | Comfort GOLD | A+ | EI 60 | E 120 | 202 | Sa, S200 |

Figure 2. NOFISOL eXtreme barriers characteristics

Product description:

This Environmental Product Declaration describes the environmental impacts of 1 m² of sound barrier.

NOFISOL® Sound Barriers are specifically developed to seal the gaps above lightweight partition walls and below raised floors. The use improves fire and smoke resistance, and the longitudinal noise insulation of a building.







Installed vertically on top of the ceiling directly on top of a partition wall to improve the sound insulation. Also these product's does not only improves the sound insulation but also improves fire resistance (EI classification) and the smoke permeability (Sa, S200) of a construction.

More information available at: <u>www.nofisol.com</u>

<u>UN CPC code:</u> 37990 Non-metallic mineral products n.e.c. (including mineral wool, expanded mineral materials, worked mica, articles of mica, non-electrical articles of graphite or other carbon and articles of peat).

Geographical scope: Europe



Content information

NOFISOL eXtreme and High Value Barrier worst-case corresponds to NOFISOL[®] eXtrem 47. Raw material composition of 1 m2 of NOFISOL[®] 47 and its packaging is presented in the following table:

| Product components | Weight, kg | Post-consumer material, weight-% | Biogenic material, weight- % and kg C/ kg |
|--|------------|----------------------------------|---|
| Stone wool-Base barrier | 8,400 | 1% | - |
| Aluminium laminate | 0,160 | - | - |
| Naturel glas tissue | 0,150 | - | - |
| Construction glue | 0,024 | - | - |
| HF Strip | 0,036 | - | - |
| EP folie- Adhesive layer | 0,240 | - | - |
| EP folie- EPDM (ethylene propylene diene monomer) | 19,600 | - | - |
| EP folie- Aluminium laminate | 0,160 | - | - |
| TOTAL | 28,77 | - | - |
| Packaging materials | Weight, kg | Weight-% (versus the product) | Weight biogenic carbon, kg C/ kg |
| Plastic film | 0,005 | 0,06% | - |
| Cardboard (corner protectors) | 0,034 | 0,39% | 0,5 |
| Pallets | 0,159 | 1,81% | 0,455 |
| TOTAL | 0,198 | 2,26% | 0,5 |

The product does not contain any REACH SVHC substances in amounts greater than 0,1% (1000 ppm).

The Stone wool-Base barrier has 8% pre-consumer material and 1% post-consumer material.

Biogenic Carbon Content

| Product's biogenic carbon content at the factory gate | | | | | | | | |
|---|--------|--|--|--|--|--|--|--|
| Biogenic carbon content in product, kg C | = 0 | | | | | | | |
| Biogenic carbon content in packaging, kg C | = 0,09 | | | | | | | |





LCA information

Functional unit:

The functional unit is 1m² of sound barriers for ceiling/wall during 50 years with a sound reduction index of 47 dB.

Reference service life:

Reference service life of NOFISOL Barriers is 50 years according to the default value established in the c-PCR C for acoustic systems.

<u>Time representativeness</u>: All inventory data was collected using year 2022 as a reference year. Secondary data based on Ecoinvent database, processes correspond to the latest available in the Ecoinvent v3.8 with time representativeness for 2011 - 2021.

Database(s) and LCA software used: SimaPro 9.4, ecoinvent 3.8 cut-off system model.

Description of system boundaries:

The scope of this EPD is set to be Cradle to grave.

All major materials, production energy use and waste are included for product stages A1-A3, A4-A5, C1-C4, and D. Stages B1-B7 are also included, however there is no impact related to usage stage since it is assumed that there is no maintenance, replacement or repair during its lifetime, and no direct emissions related to this kind of products.

System diagram:







PRODUCT LIFE CYCLE:

A1 - Raw material supply

This module represents the extraction and processing of raw materials used in NOFISOL barriers. Among them are the main raw materials such as stone wool, aluminium, glass tissue and EPDM rubber.

A2 - Transport to production sites

Raw materials are transported totally by road with a distance not higher than 1.100 km for all providers (providers based in Netherlands, Germany and Italy).

A3 - Manufacturing

This stage is taking into consideration the final assembly, cutting and packaging carried out at NOFISOL facilities. Total annual inputs (packaging, energy and water) and outputs (products and wastes) have been allocated per m2 produced in the manufacturing plant in 2022.

A 100% renewable electricity mix is used for the assembly site. NOFISOL plant at Oosterhout (Netherlands) has a Green certificate of Origen from the electricity supplier: wind production (100%).

This renewable mix represented emissions of 0.07 kg of CO2 eq/kWh.

A4 - Transport

This module includes transport from NOFISOL facilities to the building site. Transport is calculated on the basis of a scenario with the parameters described in the following table and the distances by road are weighted to different destinations of the NOFISOL customers in the analyzed period.

TECHNICAL PARAMETERS A4

| Scenario parameter | Value |
|---|----------------------------------|
| Specific transport CO ₂ e emissions, kg CO ₂ e / tkm Lorry, 16-32t, EURO5 | 0,09 |
| Average transport distance, km | 217 |
| Capacity utilization (including empty return) % | Default value from Ecoinvent 3.8 |
| Bulk density of transported products | N/A |
| Volume capacity utilization factor | ≈ 1 |

A5 - Installation

This module includes wastes generated during the installation of NOFISOL panels.

Scenarios of waste treatments of packaging is based on Eurostat statistics on Packaging waste (Eurostat, 2020): 64,4% recycled; 15,8% incineration with energy recovery; 19,8% landfill.

It is assumed that no energy is consumed during installation of acoustic barriers since it is a manual installation where no tools and/or machines are needed.

Materials to fix the panels are out of the scope since panels are taking advantage of other constructions structures and no specific support is required.

| Scenario parameter | Value |
|--------------------|-------|
| | |



| Materials and energy consumption for installation | None |
|--|---|
| Quantitative description of the type of energy (regional mix) and its consumption during the installation process. | None |
| Waste of packaging materials during the installation of the product: | Cardboard, plastic, wooden pallet: 64,4% recycled; 15,8% incineration with energy recovery; 19,8% landfill |
| Direct emissions to air, soil or water | Considered negligible |

B1-B7- Use stage

The product does not require any maintenance, repair or replacement during the reference life. Furthermore, no direct emission during the working life could be identified. There are no contribution on impact categories of this stage. CSTB France for VOC emissions classified as A+ or A and Eurofins Indoor Air Comfort Gold certificates support this statement.

C1 - De-construction

Module C1 assumes the scenario described by Santos et al., (2021): demolition 10 kWh Diesel / ton of construction material.

C2 - Transport to waste processing

The transport distance to the nearest waste processing plant is estimated at 50km and the mode of transport is assumed to be truck which is most common. (ref. EeBGuide)

C3 - Waste processing for reuse, recovery and/or recycling

NOFISOL sytems are considered to be landfilled without reuse, recovery or recycling. Therefore, there is no contribution in the impact categories for this module related to product.

C4 - Final disposal

The most likely disposal route for NOFISOL systems is a treatment as inert waste in landfill since a very high percentage of the materials involved are minerals. The amount of waste generated sent to final disposal is the same as that shown in the composition table.

| Scenario parameter C1-C4 | Value |
|-----------------------------------|---|
| C1-De-construction | 10 kWh Diesel / ton of construction material = 10*28,77/1000= 0,288kWh |
| Recovery system specified by type | 0% recycling, 0% reuse, 0% recovery |
| Specified discharge by type (C4) | 100% landfill |
| Transport to disposal site (C2) | 50 km by 16-32 ton Euro 5 trucks to the final treatment or disposal site. |

D - Reuse, recovery or recycling potential

This module includes only benefits and loads of packaging recycling and incineration with energy recovery.





Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

| | Pro | duct st | age | Const proc sta | ruction cess age | | Use stage | | | | End of life stage | | | ge | Resource recovery stage | | |
|-------------------------|---------------------|-----------|---------------|----------------------|---------------------------|-----|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|-------------------------------|----------|--|
| | Raw material supply | Transport | Manufacturing | Transport | Construction installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling- potential |
| Module | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | В5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Modules declared | х | x | x | x | x | x | x | x | x | x | x | x | х | x | x | x | x |
| Geography | EU | EU | NL | EU | EU | EU | EU | EU | EU | EU | EU | EU | EU | EU | EU | EU | EU |
| Specific data used | | <30% | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – products | | 15-60% | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – sites | | 0% | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

X= Declared module

ND= Module not declared





CUT-OFF RULES

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances.

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. Inventory flows from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process are excluded from the life cycle inventory (LCI). The module specific total neglected input and output flows do not exceed 5% of energy usage or mass.

ALLOCATION

Modularity and polluter payer principles have been followed. General allocation principles were applied according to EN 15804:2012+A2:2019. The acoustic barriers are produced only in one plant. Incoming energy, water and waste production are allocated equally among all products through a m2 allocation. According to recorded production, the material and energy consumption in manufacturers' data is indicated per m2.

The panels are essentially stone wool with some reinforcing laminate, and they already arrive at the NOFISOL plant in that format (stone wool manufacturers always sell in this format) where they are only assembled and cut to the necessary standard size and packaged. For this reason, the assignment in m2 is considerate adequate since it is common to any of the products of the NOFISOL plant.

DATA QUALITY

Primary data refers to year 2022. For the data, which is not influenced by the manufacturer, generic data was used. The secondary data was taken from the database Ecolnvent cut-off system model v3.8. Regionally specific datasets were used to model electricity consumption.

For the processes of transport, production of raw materials or end-of-life, datasets were chosen according to their technological and geographical representation of the actual process.

The technological and geographical representativeness of 80% of the processes included in the LCA is guaranteed. The data quality is good, because all process specific data could be documented and modelled by using the generic data.

ESTIMATES AND ASSUMPTIONS

Main estimates and assumptions are given below:

- Modules A2, A4 & C2: The vehicle capacity utilization volume factor is the one set by ecoinvent by default, including empty returns.
- Module A4: Transport does not cause losses because the products are properly packaged.
- Module A5: Weight loss due to the cutting process during installation is assumed to be negligible since panels are cutted in standarized sizes at NOFISOL facilities. It is assumed that no energy or materials are consumed during installation.
- Modules B1-B7: Impacts of usage are negligible since there is no maintenance, replacement, weight loss or emission.
- Long term emissions are not included.





Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804+A2 (based on EF package 3.0)

NOFISOL eXtreme and High Value Barrier worst-case corresponds to NOFISOL® eXtrem 47.

Results of 1 m2 of NOFISOL® eXtreme 47 (28,77 kg) and its packaging (0,2kg).

Valid also for the other High Value and eXtreme barriers references: NOFISOL® 38 HIGH VALUE dB, NOFISOL® 39 HIGH VALUE dB, NOFISOL® 40 HIGH VALUE dB, NOFISOL® 45 HIGH VALUE dB, NOFISOL® eXtreme 40-H.

The estimated impact results for the thermal insulation material are only relative statements that do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins, or risks.

| | Results per Functional unit | | | | | | | | | | | | | | | |
|-------------------------------|-----------------------------|-----------|----------|----------|----|----|------------|----|----|----|----|----------|----------|----------|----------|-----------|
| Indicator | Unit | A1-A3 | A4 | A5 | B1 | B2 | B 3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| GWP-fossil | kg CO ₂ eq. | 7,46E+01 | 1,05E+00 | 7,12E-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,52E-02 | 2,39E-01 | 0,00E+00 | 3,03E-01 | -6,32E-02 |
| GWP- biogenic | kg CO ₂ eq. | -3,27E-01 | 0,00E+00 | 3,27E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| GWP-luluc | kg CO ₂ eq. | 7,47E-02 | 4,11E-04 | 2,34E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,50E-06 | 9,39E-05 | 0,00E+00 | 3,07E-04 | -1,32E-04 |
| GWP-total | kg CO ₂ eq. | 7,43E+01 | 1,05E+00 | 3,34E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,52E-02 | 2,39E-01 | 0,00E+00 | 3,03E-01 | -6,33E-02 |
| ODP | kg CFC 11 eq. | 1,55E-05 | 2,42E-07 | 8,12E-10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,04E-08 | 5,53E-08 | 0,00E+00 | 9,21E-08 | -5,54E-08 |
| AP | mol H⁺ eq. | 4,60E-01 | 4,25E-03 | 4,06E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,89E-04 | 9,70E-04 | 0,00E+00 | 2,56E-03 | -3,68E-04 |
| EP- freshwater | kg P eq. | 2,41E-02 | 6,74E-05 | 1,21E-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,95E-06 | 1,54E-05 | 0,00E+00 | 8,79E-05 | -2,89E-05 |
| EP-marine | kg N eq. | 6,94E-02 | 1,28E-03 | 2,67E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,38E-04 | 2,92E-04 | 0,00E+00 | 8,80E-04 | -7,64E-05 |
| EP- terrestrial | mol N eq. | 7,90E-01 | 1,40E-02 | 1,65E-04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,80E-03 | 3,19E-03 | 0,00E+00 | 9,59E-03 | -7,77E-04 |
| POCP | kg NMVOC eq. | 3,30E-01 | 4,28E-03 | 4,52E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,32E-03 | 9,78E-04 | 0,00E+00 | 2,77E-03 | -2,51E-04 |
| ADP- minerals & metals* | kg Sb eq. | 1,18E-03 | 3,64E-06 | 1,21E-08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,90E-08 | 8,31E-07 | 0,00E+00 | 9,90E-07 | -2,58E-07 |





| ADP-fossil* | MJ | 1,89E+03 | 1,58E+01 | 6,98E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,31E+00 | 3,61E+00 | 0,00E+00 | 7,12E+00 | -1,05E+00 |
|-------------|--|---|--|---|---|---|---|--|--|---|---|--|---|--|---|---|
| WDP* | m ³ | 4,11E+01 | 4,74E-02 | 6,30E-04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,04E-03 | 1,08E-02 | 0,00E+00 | 3,10E-01 | -2,25E-02 |
| Acronyms | GWP-fossil = ODP = Deple reaching fres Accumulated depletion for | Global Warming Pote etion potential of the st shwater end compartm Exceedance; POCP = fossil resources poten | ential fossil fue ratospheric oz ent; EP-marine = Formation po tial; WDP = W | s; GWP-bioger one layer; AP = e = Eutrophicat otential of tropo ater (user) dep | nic = 6 = Acidi ion po spheri rivatio | Blobal M ficatior tential, c ozon n potei | Warmi poter fractio e; ADI ntial, d | ng Pot ntial, A on of n P-mine eprivat | ential l ccumu utrient erals&r tion-we | bioger Ilated I s reac netals eightee | nic; GV Exceed hing m = Abio d wate | VP-luluc = Glob dance; EP-fres parine end com ptic depletion p r consumption | bal Warming Po hwater = Eutro partment; EP-to otential for nor | otential land us ophication poten terrestrial = Eur o-fossil resource | e and land use ntial, fraction of trophication po es; ADP-fossil | change; nutrients tential, = Abiotic |

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Additional mandatory and voluntary impact category indicators

| | Results per Functional unit | | | | | | | | | | | | | | | |
|--|-----------------------------|----------|----------|----------|----|----|----|----|----|-----------|----|----------|----------|----------|----------|-----------|
| Indicator | Unit | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| GWP-GHG | kg CO ₂ eq. | 7,31E+01 | 1,04E+00 | 9,04E-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,43E-02 | 2,37E-01 | 0,00E+00 | 2,98E-01 | -6,20E-02 |
| Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017 | | | | | | | | | | | | | | | | |

Resource use indicators

| | Results per Functional unit | | | | | | | | | | | | | | | |
|-----------|-----------------------------|----------|----------|----------|----|----|------------|----|----|-----------|----|----------|----------|----------|----------|-----------|
| Indicator | Unit | A1-A3 | A4 | A5 | B1 | B2 | B 3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| PERE | MJ | 1,04E+02 | 2,23E-01 | 3,63E-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,34E-03 | 5,09E-02 | 0,00E+00 | 1,22E-01 | -7,48E-01 |
| PERM | MJ | 3,76E+00 | 0,00E+00 | 0,00E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PERT | MJ | 1,08E+02 | 2,23E-01 | 3,63E-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,34E-03 | 5,09E-02 | 0,00E+00 | 1,22E-01 | -7,48E-01 |

¹ This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO₂ is set to zero.



| PENRE | MJ | 1,89E+03 | 1,58E+01 | 7,00E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,31E+00 | 3,61E+00 | 0,00E+00 | 7,12E+00 | -1,05E+00 |
|-------|----|----------|----------|----------|---|---|---|---|---|---|---|----------|----------|----------|----------|-----------|
| PENRM | MJ | 2,15E-01 | 0,00E+00 | 0,00E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PENRT | MJ | 1,89E+03 | 1,58E+01 | 7,00E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,31E+00 | 3,61E+00 | 0,00E+00 | 7,12E+00 | -1,05E+00 |
| SM | kg | 7,56E-01 | 0,00E+00 | 0,00E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 0 | 0 | 0 | 0 | 0 | 0 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| FW | m³ | 1,12E+00 | 1,65E-03 | 4,60E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,58E-05 | 3,77E-04 | 0,00E+00 | 7,42E-03 | -8,64E-04 |

'EPD®

Acronyms PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable primary energy resources; SM = Use of non-renewable secondary fuels; RSF = Use of non-renewable secondary fuels; RSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

Waste indicators

| | Results per Functional unit | | | | | | | | | | | | | | | |
|--|-----------------------------|----------|----------|----------|----|----|----|------------|----|-----------|----|----------|----------|----------|----------|-----------|
| Indicator | Unit | A1-A3 | A4 | A5 | B1 | B2 | B3 | B 4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Hazardous waste disposed | kg | 2,86E-03 | 4,13E-05 | 1,44E-07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,58E-06 | 9,44E-06 | 0,00E+00 | 1,10E-05 | -1,41E-06 |
| Non- hazardous waste disposed | kg | 1,02E+01 | 8,16E-01 | 4,27E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,81E-03 | 1,86E-01 | 0,00E+00 | 2,88E+01 | -4,84E-03 |
| Radioactive waste disposed | kg | 7,94E-03 | 1,07E-04 | 4,10E-07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,02E-06 | 2,44E-05 | 0,00E+00 | 4,25E-05 | -2,62E-06 |





Output flow indicators

| | Results per Functional unit | | | | | | | | | | | | | | | |
|-------------------------------------|-----------------------------|----------|----------|----------|----|----|----|----|----|------------|----|----|----|----|----|---|
| Indicator | Unit | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B 6 | B7 | C1 | C2 | C3 | C4 | D |
| Components for re-use | kg | 0,00E+00 | 0,00E+00 | 1,26E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Material for recycling | kg | 4,61E-01 | 0,00E+00 | 2,08E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Materials for energy recovery | kg | 0,00E+00 | 0,00E+00 | 1,20E-04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Exported energy, electricity | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Exported energy, thermal | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |



LCA Interpretation

The life cycle impacts of the NOFISOL® Standard barriers are predominantly influenced by the A1 stage of the product across all impact categories. A1 represents the highest impacts across all categories, ranging from 99% (Resource use – Minerals and metals and Eutrophication, freshwater) to 92% (Global Warming Potential).

Following A1, stage A2 holds the second -highest contributors in the life cycle impacts of the family. The remaining stages (A3, A4, A5, and C modules) exhibit relatively low impact potentials, collectively contributing less than 10% to the total impact of the products.







Additional environmental information

None

Additional social and economic information

None

Information related to Sector EPD

This EPD is not sectoral.

Differences versus previous versions

This is the first EPD for these products.





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