

Environmental Product Declaration

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

DANVÆRN

Lightweight Aluminium Glass Railings



Eksklusivt forhandlet af ATO Supply ApS

The Norwegian
EPD Foundation

Owner of the declaration:
ATO Supply ApS

Product name:
RAVNKILDEVÆRNET

Declared unit:
1 kg of Aluminium railing with
packaging excluding glass panel

Product category /PCR:
NPCR PART A "Construction
products and services" Version 2,0
NPCR 013 Part B for Steel and
Aluminium Construction Products
Version 4,0

**Program holder and
publisher:**
The Norwegian EPD
Foundation

Declaration number:
NEPD-5910-5184-EN

Registration number:
NEPD-5910-5184-EN

Issue date: 31.01.2024

Valid to: 31.01.2029

General information

Product:

RAVNKILDEVÆRNET
Lightweight Aluminium Railings

Program operator:

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

Declaration number:

NEPD-5910-5184-EN

This declaration is based on Product Category Rules:

EN 15804:2012+A2:2019
NPCR PART A "Construction products and services" Version 2,0
NPCR 013 Part B for Steel and Aluminium Construction Products Version 4,0

Statement of liability:

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.

Functional unit:

1 kg of Aluminium railing with packaging excluding glass panel

Verification:

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

internal external



Silvia Vilčeková

Independent verifier approved by EPD Norway

Owner of the declaration:

ATO supply APS
Contact person: Paw Thomas Andersen
Phone: +45 20 89 96 09
e-mail: pta@a2supply.dk

Manufacturer:

ATO supply APS
Bygaden 10, st. 1 · Ravnkilde DK-9610 Noerager
Phone: +45 20 89 96 09
e-mail: pta@a2supply.dk

Place of production:

Ravnkilde, Denmark

Management system:

None

Organisation no:

CVR. Num. 41 3306 78

Issue date:

31.01.2024

Valid to:

31.01.2029

Year of study:

2022

Comparability:

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

The EPD has been worked out by:

Srikanth Panda, Carbonzero AB

Approved



Manager of EPD Norway

Product

Product Description:

The Danvaern (Traditional baluster glass guard railing) is an aluminum glass railing system with three standard configurations B1, B2, and B3 (for more information contact ATO Supply ApS). It provides a robust and tested guard railing, emphasizing sustainability, easy installation, aesthetic appeal, and recyclability. The profiles undergo either anodization or powder coating for versatile use indoors and outdoors. Engineered for straightforward installation, it minimizes the reliance on heavy machinery, allowing manual handling while maintaining a sturdy, lightweight structure.

Product specification:

Manufactured in Denmark from high-quality EN AW-6060, it incorporates a minimum of 75 % post-consumer scrap aluminum, reaching up to 100 % depending on availability. To obtain the impact of a specific product, the reported impacts are to be multiplied by the weight of the product installed as per the model selected. This study covers three products and the results were computed based on the worst-case scenario as the composition of products as the impacts differed by < 10 % based on the products' weight.

Aluminium railing with packaging excluding glass panel: 1 kg

| Materials (product) | Value | Unit |
|-----------------------|---------|------|
| Aluminium | 86 - 89 | % |
| Stainless steel | 3 - 4 | % |
| Zinc | 7 - 10 | % |
| EPDM | 0 - 1 | % |
| Total | 100 | % |
| Materials (packaging) | Value | Unit |
| Cardboard | 0,27 | kg |
| Wooden Pallet | 0,01 | kg |
| PVC film | 0,07 | kg |

No substances that appear in the REACH candidate list of SVHC (Candidate List of Substances of Very High Concern) are present or used in the product concerning this EPD.

Technical data:

Calculated and tested to cope with required strength needed for building types in the categories Eurocode 1991-1-1: 2007 NA (A, B, C1, C2-C4, D1, D2), category C5 to be calculated individually.

Market:

Europe

Reference service life, product:

According to NPCR 013:2019 Part B, reference service life has been declared as equal to the building service life.

Technical/actual lifespan, product:

60 years, equal to the building service life

LCA: Calculation rules

Declared unit:

1 kg of Aluminium railing with packaging excluding the glass panel

Cut-off criteria:

The following procedures were followed for the exclusion of inputs and output.

- All input and output flows in a unit process were considered i.e., taking into account the value of all flows in the unit process and the corresponding LCI where data was available.
- Data gaps were filled by conservative assumptions with average or generic data. Any assumptions in such cases were documented.
- The use of cut-off criterion on mass inputs and primary energy at the unit process level (1 %) and at the information module level (5 %).

All hazardous and toxic materials and substances are included in the inventory and the cut-off rules do not apply.

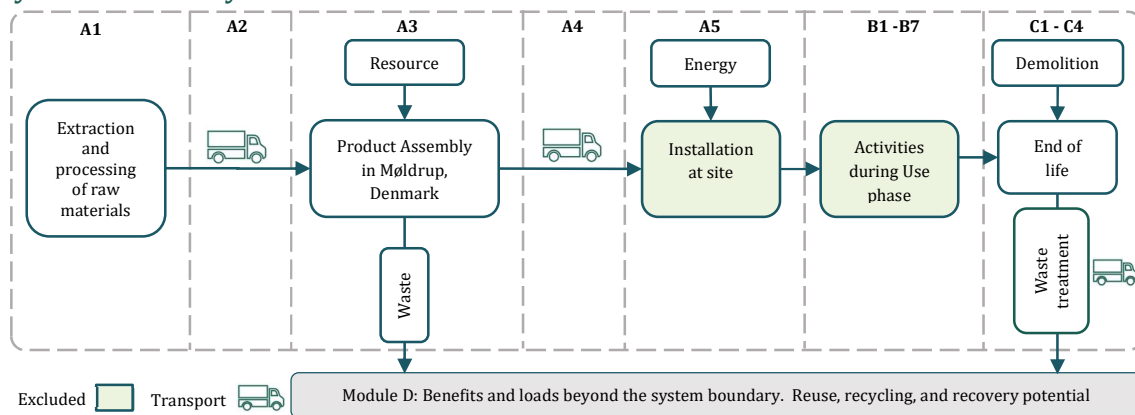
Allocation:

Allocation is not relevant as there are no co-products.

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 | MND | MND | MND | MND | MND | MND | MND | X | X | X | X | X |

System boundary:



LCA: Scenarios and additional technical information

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

Transport from production place to assembly/user (A4)

| Type | Type of vehicle | Capacity utilisation (incl. return) / % | Distance /km | Fuel/Energy consumption / l/tkm |
|-------|---|---|--------------|---------------------------------|
| Truck | Truck-trailer, Euro 0 - 6 mix, 34 - 40t gross weight / 27t payload capacity | 85 | 1100 | 2,52E-02 |

End of Life (C1, C3, C4)

| | Value | Unit |
|--|-------|------|
| Hazardous waste disposed | 0 | kg |
| Reuse of Product Components | 0 | % |
| Collected as mixed construction waste* | 96 | % |
| Processing efficiency** | 95 | % |

*Collection efficiency of 96 % was assumed at the end-of-life of the product.

**Processing efficiency of 95 % was assumed to account for the material loss that can happen during the shredding and recycling of products. The lost material from collection, sorting, and shredding was assumed to be landfilled.

Recycling and incineration of materials includes material and energy recovery and the credits of avoided production of recovered material and energy are allocated to module D.

The end-of-life treatment of individual materials was as per the table below.

| Materials (product) | Landfill rate/% | Incineration rate/% | Recycling rate/% |
|---------------------|-----------------|---------------------|------------------|
| Aluminium | 0 | 0 | 100 |
| Stainless steel | 0 | 0 | 100 |
| Zinc | 0 | 0 | 100 |
| EPDM | 0 | 45 | 55 |
| Cardboard | 0 | 100 | 0 |
| Wooden Pallet | 0 | 100 | 0 |
| PVC film | 0 | 45 | 55 |

Transport to waste processing (C2)

| Type | Type of vehicle | Capacity utilisation (incl. return) % | Distance (km) | Fuel/Energy consumption / l/tkm |
|-------|---|---------------------------------------|---------------|---------------------------------|
| Truck | Truck-trailer, Euro 0 - 6 mix, 34 - 40t gross weight / 27t payload capacity | 85 | 100 | 2,52E-02 |

LCA: Results

Aluminium railing with packaging excluding glass panel: 1 kg

Core environmental impact indicators

| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
|-------------------------|----------------|-----------|-----------|----------|----------|-----------|----------|-----------|-----------|
| GWP - total | kg CO2 eq | 1,95E+00 | 2,32E-02 | 1,35E-02 | 0,00E+00 | 9,59E-03 | 5,03E-01 | 3,01E-02 | -3,61E+00 |
| GWP - fossil | kg CO2 eq | 2,78E+00 | 2,33E-02 | ND | 0,00E+00 | 9,65E-03 | 1,34E-01 | 3,04E-02 | -3,61E+00 |
| GWP - biogenic | kg CO2 eq | -8,81E-01 | -3,43E-04 | 1,35E-02 | 0,00E+00 | -1,43E-04 | 8,68E-01 | -3,76E-04 | 9,14E-04 |
| GWP - luluc | kg CO2 eq | 4,11E-02 | 2,15E-04 | ND | 0,00E+00 | 8,91E-05 | 5,87E-06 | 3,09E-05 | -3,77E-04 |
| ODP | kg CFC11 eq | 1,69E-07 | 2,25E-15 | ND | 0,00E+00 | 8,43E-16 | 2,52E-13 | 5,03E-14 | -3,12E-10 |
| AP | molc H+ eq | 1,47E-02 | 4,09E-05 | ND | 0,00E+00 | 1,83E-05 | 1,44E-04 | 9,75E-05 | -6,36E-03 |
| EP- freshwater | kg P eq | 5,67E-05 | 8,50E-08 | ND | 0,00E+00 | 3,52E-08 | 1,50E-07 | 2,75E-08 | -3,16E-06 |
| EP -marine | kg N eq | 2,52E-03 | 1,65E-05 | ND | 0,00E+00 | 7,52E-06 | 4,78E-05 | 2,45E-05 | -1,68E-03 |
| EP - terrestrial | molc N eq | 2,76E-02 | 1,89E-04 | ND | 0,00E+00 | 8,60E-05 | 6,20E-04 | 2,70E-04 | -1,83E-02 |
| POCP | kg NMVOC eq | 8,61E-03 | 3,62E-05 | ND | 0,00E+00 | 1,62E-05 | 1,27E-04 | 7,67E-05 | -5,35E-03 |
| ADP-M&M ² | kg Sb-Eq | 1,27E-04 | 1,51E-09 | ND | 0,00E+00 | 6,25E-10 | 2,14E-09 | 8,34E-10 | -3,17E-06 |
| ADP-fossil ² | MJ | 4,27E+01 | 3,17E-01 | ND | 0,00E+00 | 1,31E-01 | 3,92E-01 | 4,55E-01 | -5,49E+01 |
| WDP ² | m ³ | 5,92E-01 | 2,78E-04 | ND | 0,00E+00 | 1,11E-04 | 5,95E-02 | -4,13E-04 | -2,43E-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

*Module A5 is only partially declared, GWP biogenic arising due to packaging material in A1-A3 stages are balanced in A5, where it exits the product system boundary.

ND – Not Declared; Reading example: 9,0 E-03 = 9,0*10⁻³ = 0,009

Additional environmental impact indicators

| Indicator | Unit | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
|---------------------|-------------------|----------|----------|----------|----------|----------|----------|-----------|
| PM | Disease incidence | 1,79E-07 | 2,53E-10 | 0,00E+00 | 1,10E-10 | 9,71E-10 | 1,05E-09 | -1,29E-07 |
| IRP ¹ | kBq U235 eq. | 3,29E-01 | 1,09E-04 | 0,00E+00 | 2,45E-05 | 6,27E-03 | 7,82E-04 | -5,34E-02 |
| ETP-fw ² | CTUe | 3,94E+01 | 2,22E-01 | 0,00E+00 | 9,22E-02 | 1,31E-01 | 1,35E-01 | -1,11E+01 |
| HTP-c ² | CTUh | 5,04E-08 | 4,51E-12 | 0,00E+00 | 1,85E-12 | 8,20E-12 | 1,61E-11 | -3,53E-10 |
| HTP-nc ² | CTUh | 7,02E-08 | 1,98E-10 | 0,00E+00 | 8,20E-11 | 2,93E-10 | 1,53E-09 | -1,54E-08 |
| SQP ² | Dimensionless | 6,57E+01 | 1,33E-01 | 0,00E+00 | 5,46E-02 | 1,27E-01 | 4,25E-02 | -1,23E+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

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

Resource use

| Parameter | Unit | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
|-----------|----------------|----------|----------|----------|----------|----------|----------|-----------|
| RPEE | MJ | 2,47E+01 | 2,34E-02 | 0,00E+00 | 9,26E-03 | 1,62E-01 | 4,09E-02 | -5,82E+00 |
| RPEM | MJ | 2,75E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| TPE | MJ | 2,50E+01 | 2,34E-02 | 0,00E+00 | 9,26E-03 | 1,62E-01 | 4,09E-02 | -5,82E+00 |
| NRPE | MJ | 4,27E+01 | 3,17E-01 | 0,00E+00 | 1,31E-01 | 3,92E-01 | 4,55E-01 | -5,50E+01 |
| NRPM | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| TRPE | MJ | 4,27E+01 | 3,17E-01 | 0,00E+00 | 1,31E-01 | 3,92E-01 | 4,55E-01 | -5,50E+01 |
| SM | kg | 1,54E+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 |
| NRSF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| W | m ³ | 7,43E-02 | 2,63E-05 | 0,00E+00 | 1,02E-05 | 1,46E-03 | 5,12E-06 | -4,75E-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

| Parameter | Unit | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
|-----------|------|----------|----------|----------|----------|-----------|----------|-----------|
| HW | kg | 1,66E-03 | 9,29E-13 | 0,00E+00 | 4,85E-13 | -8,32E-12 | 3,76E-11 | -4,88E-08 |
| NHW | kg | 1,02E+00 | 4,71E-05 | 0,00E+00 | 1,89E-05 | 2,85E-02 | 6,51E-01 | -1,89E-01 |
| RW | kg | 1,73E-03 | 8,42E-07 | 0,00E+00 | 1,70E-07 | 3,87E-05 | 5,29E-06 | -6,99E-04 |

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

End of life – output flow

| Parameter | Unit | A1-A3 | A4 | 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 |
| MR | kg | 7,10E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,39E+01 | 0,00E+00 | -6,28E+00 |
| MER | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| EEE | MJ | 1,48E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,20E-01 | 0,00E+00 | 1,20E-01 |
| ETE | MJ | 2,65E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,15E+00 | 0,00E+00 | 2,78E-01 |

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* | Unit | Value |
|---|------|----------|
| Biogenic carbon content in product | kg C | 0,00E+00 |
| Biogenic carbon content in the accompanying packaging | kg C | 1,22E-01 |

**44/12 is the ratio between the molecular mass of CO2 and C molecules*

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

| Parameter | Unit | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
|-----------|-----------|----------|----------|----------|----------|----------|----------|-----------|
| GWP-IOBC | kg CO2 eq | 2,83E+00 | 2,36E-02 | 0,00E+00 | 9,77E-03 | 1,34E-01 | 3,05E-02 | -3,61E+00 |
| GWP-GHG | kg CO2 eq | 1,94E+00 | 2,28E-02 | 0,00E+00 | 9,46E-03 | 5,01E-01 | 2,94E-02 | -3,56E+00 |

GWP-IOBC is calculated according to the principle of instantaneous oxidation. 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.

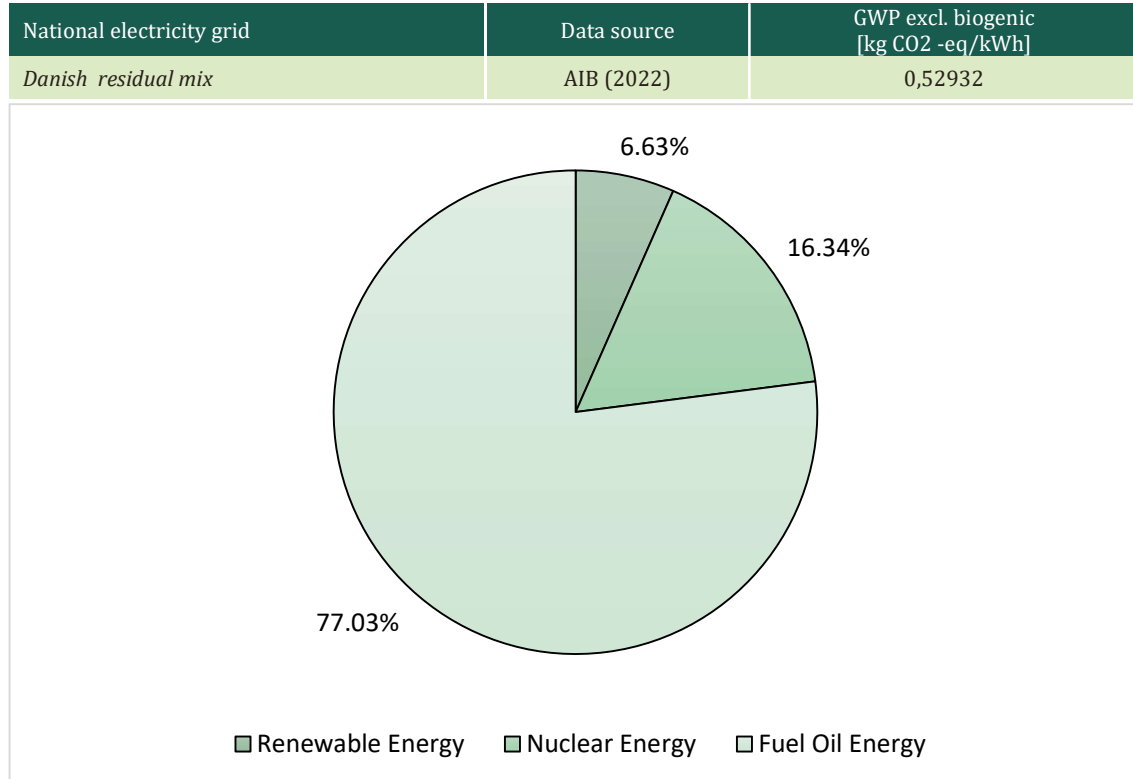
GWP-GHG indicator supports comparability with EPDs based on the previous version of EN 15804 (EN 15804:2012+A1:2013)

The values provided above are for the representative Product B2 with the highest impacts in all lifecycle stages. It is discouraged to use the results of modules A1-A3 (A1-A5 for services) without considering the results of module C.

Additional requirements

Location-based electricity mix from the use of electricity in manufacturing

The manufacturing process has been modeled and calculated according to the national residual mix with data retrieved from the Association of Issuing Bodies (2022).






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 is available upon request to the EPD owner.

- The product contains no substances given by the REACH Candidate list.
- The product contains substances given by the REACH Candidate 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, see table.
- The product contains no substances given by the REACH Candidate list.
- The product is classified as hazardous waste, see table.

Bibliography

| | |
|-------------------------------|--|
| Association of Issuing Bodies | European Residual Mixes 2021 (2022) https://www.aib-net.org/sites/default/files/assets/facts/residual-mix/2021/AIB_2021_Residual_Mix_Results_1_1.pdf (Retrieved 2023-09-20) |
| EN 15804:2012+A2:2019 | Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products |
| NPCR Part A | NPCR Part A: Construction products and services v2.0 |
| NPCR 013:2019 Part B | NPCR 013:2019 Part B for steel and aluminium construction products v4.0 |
| EPD-Norge GPI | The Norwegian EPD Foundation/EPD-Norge, General Programme Instructions 2019. Version 3.0 dated 2019.04.24 |
| ISO 14020:2022 | Environmental statements and programmes for products — Principles and general requirements |
| 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 |
| ISO 21930:2007 | Sustainability in building construction - Environmental declaration of building products |
| Statistics Denmark | https://www.statbank.dk/AFFALD (Accessed 17-11-2023) |

| | | | |
|--|--|----------------------------|--|
|  Global Program Operator | Program Operator | | |
| | The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo Norway | Tlf E-Post: Web | +47 23 08 80 00 post@epd-norge.no www.epd-norge.no |
| | Publisher | | |
|  Global Program Operator | The Norwegian EPD Foundation Post Box 5250 Majorstuen, 0303 Oslo Norway | Tlf E-Post: Web | +47 23 08 80 00 post@epd-norge.no www.epd-norge.no |
| | Owner of the declaration | | |
| | Paw Thomas Andersen ATO supply APS Bygaden 10, st. 1 · CVR.Nr. 41 33 06 78 Ravnkilde DK-9610 Noerager | Tlf E-Post: Web | +45 51 89 96 09 pta@a2supply.dk www.a2supply.dk |
|  | Author of the life cycle assessment | | |
| | Srikanth Panda CarbonZero AB Tåstrupgatan 2, 262 32, Ängelholm, Sweden | Tlf E-Post: Web | +46 431 70 70 7 info@eando.se www.eando.se |
| | ECO PLATFORM  | ECO Platform ECO Portal | Web Web |