

# Environmental product declaration

in accordance with ISO 14025 and EN 15804+A2

XCC-X2-NU, X2-015-VR



**TROX®** TECHNIK  
The art of handling air

The Norwegian EPD Foundation

**Owner of the declaration:**

TROX Group

**Product:**

XCC-X2-NU, X2-015-VR

**Declared unit:**

1 pcs

**This declaration is based on Product Category Rules:**

CEN Standard EN 15804:2012+A2:2019 serves as core PCR

NPCR 030:2021 Part B for ventilation components

**Program operator:**

The Norwegian EPD Foundation

**Declaration number:**

**Registration number:**

**Issue date:**

**Valid to:**

**EPD Software:**

LCA.no EPD generator ID: 152223

## General information

### Product

XCC-X2-NU, X2-015-VR

### Program operator:

Post Box 5250 Majorstuen, 0303 Oslo, Norway  
The Norwegian EPD Foundation  
Phone: +47 23 08 80 00  
web: [post@epd-norge.no](mailto:post@epd-norge.no)

### Declaration number:

### This declaration is based on Product Category Rules:

CEN Standard EN 15804:2012+A2:2019 serves as core PCR  
NPCR 030:2021 Part B for ventilation components

### 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 manufacturer information, life cycle assessment data and evidences.

### Declared unit:

1 pcs XCC-X2-NU, X2-015-VR

### Declared unit with option:

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

### Functional unit:

### General information on verification of EPD from EPD tools:

Independent verification of data, other environmental information and the declaration according to ISO 14025:2010, § 8.1.3 and § 8.1.4. Verification of each EPD is made according to EPD-Norway's guidelines for verification and approval requiring that tools are i) integrated into the company's environmental management system, ii) the procedures for use of the EPD tool are approved by EPD-Norway, and iii) the process is reviewed annually by an independent third party verifier. See Appendix G of EPD-Norway's General Programme Instructions for further information on EPD tools

### Verification of EPD tool:

Independent third party verification of the EPD tool, background data and test-EPD in accordance with EPDNorway's procedures and guidelines for verification and approval of EPD tools.

Third party verifier:

Alexander Borg, Asplan Viak AS

(no signature required)

### Owner of the declaration:

TROX Group  
Contact person: Alina Buchner  
Phone: +49 2845 2020  
e-mail: [productsustainability-de@troxgroup.com](mailto:productsustainability-de@troxgroup.com)

### Manufacturer:

TROX Group  
Heinrich-Trox-Platz 1  
47506 Neukirchen-Vluyn, Germany

### Place of production:

TROX GmbH - Werk Anholt  
Gendringer Str. 85  
46419 Isselburg, Germany

### Management system:

ISO 9001, ISO 14001:2015, ISO 50001:2018

### Organisation no:

DE 120250070

### Issue date:

### Valid to:

### Year of study:

2022

### Comparability:

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

### Development and verification of EPD:

The declaration is created using EPD tool lca.tools ver EPD2022.03, developed by LCA.no. The EPD tool is integrated in the company's management system and has been approved by EPD Norway.

Developer of EPD: Klaus Niklas

Reviewer of company-specific input data and EPD: Alina Buchner

### Approved:

## Product

### Product description:

TROX X-CUBE X2 Compact Unit Air handling unit (AHU) with a plug&play compact design for conditioning and process air. Energy label certification according to the AHU Directive 01 and Eurovent.

AHUs can be customized to meet the needs of different applications. Due to the small size and the variable versions with vertical or horizontal duct connection, installation is possible in the smallest of spaces. The slim units fit largely through standard doors and are easy to transport. With the help of the rotary heat exchanger, the product achieves particular efficiency.

The units are supplied ready for connection and can be configured and commissioned via X-CUBE control.

### Product specification

XCC-X2-NU, X2-015-VR

Vertical compact unit with heat recovery wheel, integrated heater, ODA/ETH filter, EC-fans, outside ODA/EHH damper.

Factory mounted control components complete with wiring and tubing. Housing with double-walled sandwich panels made of galv. sheet metal, dimensionally stabilised and inlay-reinforced, as well as being powder-coated as described.

This EPD deals with a special configuration of an AHU. It includes the environmental data of the product series XCC-X2NU.

Due to the possibility of customised configuration, other variants may have different material compositions and a different total weight. The following represents a representative dataset of the most sold variant in the declared sales year (X2-015-VR).

| Materials                                       | kg     | %     |
|-------------------------------------------------|--------|-------|
| Adhesive and sealant                            | 5,30   | 1,47  |
| Electronic - Cable                              | 0,88   | 0,24  |
| Electronic - Sensor                             | 0,96   | 0,27  |
| Electronic - Switch                             | 0,24   | 0,07  |
| Electronic - Unspecified                        | 27,00  | 7,52  |
| Extruded Polystyrene (XPS)                      | 0,43   | 0,12  |
| Filter, mineral based                           | 0,87   | 0,24  |
| Insulation, Mineral based                       | 10,09  | 2,81  |
| Metal - Aluminium                               | 26,92  | 7,49  |
| Metal - Brass                                   | 0,71   | 0,20  |
| Metal - Copper                                  | 3,20   | 0,89  |
| Metal - Galvanized Steel                        | 254,87 | 70,94 |
| Metal - Stainless steel                         | 7,05   | 1,96  |
| Metal - Steel                                   | 0,86   | 0,24  |
| Motor                                           | 1,18   | 0,33  |
| Plastic - Acrylonitrile butadiene styrene (ABS) | 2,50   | 0,70  |
| Plastic - Nylon (PA)                            | 0,19   | 0,05  |
| Plastic - Polyamide                             | 0,10   | 0,03  |
| Plastic - Polycarbonate (PC)                    | 0,18   | 0,05  |
| Plastic - Polyoxymethylene (POM)                | 0,01   | 0,00  |
| Plastic - Polypropylene (PP)                    | 0,07   | 0,02  |
| Plastic - Polystyrene (PS)                      | 0,73   | 0,20  |
| Plastic - Polyurethane (PUR)                    | 0,82   | 0,23  |
| Plastic - Polyvinyl chloride (PVC)              | 0,21   | 0,06  |
| Powder coating                                  | 11,83  | 3,29  |
| Product label - supercalendered                 | 0,01   | 0,00  |
| Rubber, natural (Latex)                         | 0,02   | 0,01  |
| Rubber, synthetic                               | 2,01   | 0,56  |
| Textile - Cotton                                | 0,02   | 0,01  |
| Total                                           | 359,26 |       |

| Packaging             | kg     | %     |
|-----------------------|--------|-------|
| Packaging - Pallet    | 30,00  | 90,91 |
| Packaging - Plastic   | 3,00   | 9,09  |
| Total incl. packaging | 392,26 |       |

### Technical data:

Nominal size (B,H,L) 776x1543x1638

Nominal volume flow 1700 m³/h

Duct connection 450x300

Nominal data fan 230 V, 50 Hz, 0,5 kW, 1,8 A

Fan typ: EC

### Market:

Europe

## Reference service life, product

20-25 years.

## Reference service life, building or construction works

60 years.

## LCA: Calculation rules

### Declared unit:

1 pcs XCC-X2-NU, X2-015-VR

### Cut-off criteria:

All major raw materials and all the essential energy is included. The production processes for raw materials and energy flows with very small amounts (less than 1%) are not included. These cut-off criteria do not apply for hazardous materials and substances.

### Allocation:

The allocation is made in accordance with the provisions of EN 15804. Energy, water and waste production in-house is allocated equally among all products through mass allocation. Effects of primary production of recycled materials is allocated to the main product in which the material was used. The recycling process and transportation of the material is allocated to this analysis.

### Data quality:

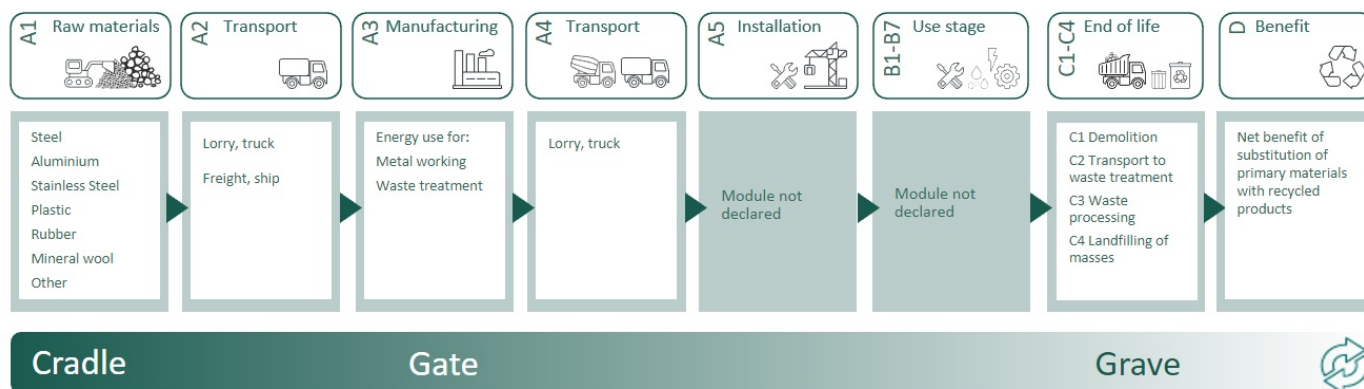
Specific data for the product composition are provided by the manufacturer. The data represent the production of the declared product and were collected for EPD development in the year of study. Background data is based on EPDs according to EN 15804 and different LCA databases. The data quality of the raw materials in A1 is presented in the table below.

| Materials                                       | Source                              | Data quality             | Year |
|-------------------------------------------------|-------------------------------------|--------------------------|------|
| Adhesive and sealant                            | ecoinvent 3.6                       | Database                 | 2019 |
| Electronic - Cable                              | ecoinvent 3.6                       | Database                 | 2019 |
| Electronic - Switch                             | ecoinvent 3.6                       | Database                 | 2019 |
| Electronic - Unspecified                        | ecoinvent 3.6                       | Database                 | 2019 |
| Extruded Polystyrene (XPS)                      | ecoinvent 3.6                       | Database                 | 2019 |
| Filter, mineral based                           | ecoinvent 3.6                       | Database                 | 2019 |
| Insulation, Mineral based                       | ecoinvent 3.6                       | Database                 | 2019 |
| Metal - Aluminium                               | ecoinvent 3.6                       | Database                 | 2019 |
| Metal - Brass                                   | ecoinvent 3.6                       | Database                 | 2019 |
| Metal - Copper                                  | ecoinvent 3.6                       | Database                 | 2019 |
| Metal - Stainless steel                         | ecoinvent 3.6                       | Database                 | 2019 |
| Metal - Steel                                   | ecoinvent 3.6                       | Database                 | 2019 |
| Packaging - Pallet                              | ecoinvent 3.6                       | Database                 | 2019 |
| Packaging - Plastic                             | ecoinvent 3.6                       | Database                 | 2019 |
| Plastic - Acrylonitrile butadiene styrene (ABS) | ecoinvent 3.6                       | Database                 | 2019 |
| Plastic - Nylon (PA)                            | ecoinvent 3.6                       | Database                 | 2019 |
| Plastic - Polyamide                             | ecoinvent 3.6                       | Database                 | 2019 |
| Plastic - Polycarbonate (PC)                    | ecoinvent 3.6                       | Database                 | 2019 |
| Plastic - Polyoxymethylene (POM)                | ecoinvent 3.6                       | Database                 | 2019 |
| Plastic - Polypropylene (PP)                    | ecoinvent 3.6                       | Database                 | 2019 |
| Plastic - Polystyrene (PS)                      | ecoinvent 3.6                       | Database                 | 2019 |
| Plastic - Polyurethane (PUR)                    | ecoinvent 3.6                       | Database                 | 2019 |
| Plastic - Polyvinyl chloride (PVC)              | ecoinvent 3.6                       | Database                 | 2019 |
| Powder coating                                  | ecoinvent 3.6                       | Database                 | 2019 |
| Product label - supercalendered                 | ecoinvent 3.6                       | Database                 | 2019 |
| Rubber, natural (Latex)                         | ecoinvent 3.6                       | Database                 | 2019 |
| Rubber, synthetic                               | ecoinvent 3.6                       | Database                 | 2019 |
| Textile - Cotton                                | ecoinvent 3.6                       | Database                 | 2019 |
| Metal - Galvanized Steel                        | ecoinvent 3.6                       | Database                 | 2020 |
| Motor                                           | Modified ecoinvent 3.6              | Database                 | 2019 |
| Electronic - Sensor                             | Product composition + ecoinvent 3.6 | Supplier data + database | 2019 |

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

| Product stage |           |               | Construction installation stage | Use stage |     |             |        |             |               |                        |                       | End of life stage          |           |                  |          | Beyond the system boundaries        |
|---------------|-----------|---------------|---------------------------------|-----------|-----|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|------------------|----------|-------------------------------------|
| 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                               | MND       | MND | MND         | MND    | MND         | MND           | MND                    | MND                   | X                          | X         | X                | X        | X                                   |

### System boundary:



### Additional technical information:

The devices in the X-CUBE X2 series are the ideal solution for volume flows of 600 to 25,000 m<sup>3</sup>/h (0.17 to 6.9 m<sup>3</sup>/s). They are freely configurable and can be used for all air treatment processes. The compact, pre-configured X-CUBE X2 compact models in 12 sizes also impress with their technical features.

The X-CUBE X2 can be equipped with a rotary heat exchanger, a plate heat exchanger or a KV system.

Excellent design - available in white or anthracite.

Vibration-damped base frame (optional) eliminates the need for costly insulation on site.

High stability and appliance base strength.

Low weight facilitates transport and installation.

Excellent hygiene properties thanks to smooth interior surfaces and small gaps.

Robust and flexible locking system for doors and inspection panels.

The X-CUBE X2 is equipped with the new control software X-CUBE control 2.0 control software. The device can be operated via a high-performance touch panel and connected to the TROX systems X-AIRCONTROL, TROXNETCOM and X-TAIRMINAL.

The monitoring functions of X-CUBE control 2.0 with their automatic status messages enable convenient system control around the clock. Via BACnet IP or Modbus TCP/IP, the X-CUBE X2 is seamlessly integrated into the building management system. Thanks to this universal networking capability, the performance of the air handling unit can be controlled as required. Optimum comfort is combined with maximum energy savings.

## LCA: Scenarios and additional technical information

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

| Transport from production place to user (A4)                                                                | Capacity utilisation (incl. return) % | Distance (km) | Fuel/Energy Consumption | Unit  | Value (Liter/tonne) |
|-------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------|-------------------------|-------|---------------------|
| Truck, 16-32 tonnes, EURO 6 (km)                                                                            | 36,7 %                                | 800           | 0,043                   | l/tkm | 34,40               |
| De-construction demolition (C1)                                                                             | Unit                                  | Value         |                         |       |                     |
| Demolition of building per kg of ventilation product (kg)                                                   | kg/DU                                 | 359,26        |                         |       |                     |
| Transport to waste processing (C2)                                                                          | Capacity utilisation (incl. return) % | Distance (km) | Fuel/Energy Consumption | Unit  | Value (Liter/tonne) |
| Truck, 16-32 tonnes, EURO 6 (km)                                                                            | 36,7 %                                | 50            | 0,043                   | l/tkm | 2,15                |
| Waste processing (C3)                                                                                       | Unit                                  | Value         |                         |       |                     |
| Materials to recycling (kg)                                                                                 | kg                                    | 266,57        |                         |       |                     |
| Waste treatment per kg Bulk iron waste, excluding reinforcement, sorting plant (kg)                         | kg                                    | 1,18          |                         |       |                     |
| Waste treatment per kg Electronic scrap, incineration (kg)                                                  | kg                                    | 28,21         |                         |       |                     |
| Waste treatment per kg Hazardous waste, incineration (kg)                                                   | kg                                    | 8,57          |                         |       |                     |
| Waste treatment per kg Non-hazardous waste, incineration (kg)                                               | kg                                    | 0,02          |                         |       |                     |
| Waste treatment per kg of waste cable, manual treatment (kg)                                                | kg                                    | 0,88          |                         |       |                     |
| Waste treatment per kg plastic, industrial electronics, municipal incineration with fly ash extraction (kg) | kg                                    | 1,25          |                         |       |                     |
| Waste treatment per kg Plastics, incineration (kg)                                                          | kg                                    | 1,23          |                         |       |                     |
| Waste treatment per kg Polyethylene (PE), incineration (kg)                                                 | kg                                    | 0,23          |                         |       |                     |
| Waste treatment per kg Polyethylene terephthalate (PET), incineration with fly ash extraction (kg)          | kg                                    | 0,15          |                         |       |                     |
| Waste treatment per kg Polyoxymethylene (POM), incineration with fly ash extraction (kg)                    | kg                                    | 0,00          |                         |       |                     |
| Waste treatment per kg Polypropylene (PP), incineration (kg)                                                | kg                                    | 0,03          |                         |       |                     |
| Waste treatment per kg Polyvinylchloride (PVC), incineration with fly ash extraction (kg)                   | kg                                    | 0,11          |                         |       |                     |
| Waste treatment per kg Rubber, municipal incineration with fly ash extraction (kg)                          | kg                                    | 1,12          |                         |       |                     |

| Disposal (C4)                                                                                                                           | Unit | Value |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------|------|-------|--|--|--|
| Landfilling of ashes from incineration of Electronic scrap, process of ashes and residues (kg)                                          | kg   | 19,79 |  |  |  |
| Landfilling of ashes from incineration of Non-hazardous waste, process per kg ashes and residues (kg)                                   | kg   | 0,01  |  |  |  |
| Landfilling of ashes from incineration of Plastics, process per kg ashes and residues (kg)                                              | kg   | 0,06  |  |  |  |
| Landfilling of ashes from incineration of Polyethylene (PE), process per kg ashes and residues (kg)                                     | kg   | 0,01  |  |  |  |
| Landfilling of ashes from incineration of Polyethylene terephthalate (PET), process per kg ashes and residues (kg)                      | kg   | 0,00  |  |  |  |
| Landfilling of ashes from incineration of Polyoxymethylene (POM), process per kg ashes and residues (kg)                                | kg   | 0,00  |  |  |  |
| Landfilling of ashes from incineration of Polypropylene (PP), process per kg ashes and residues (kg)                                    | kg   | 0,00  |  |  |  |
| Landfilling of ashes from incineration of Polyvinylchloride (PVC), process per kg ashes and residues (kg)                               | kg   | 0,02  |  |  |  |
| Landfilling of ashes from incineration of Rubber, municipal incineration with fly ash extraction (kg)                                   | kg   | 0,06  |  |  |  |
| Landfilling of ashes from incineration per kg Hazardous waste, from incineration (kg)                                                   | kg   | 1,62  |  |  |  |
| Landfilling of ashes from incineration per kg plastic, industrial electronics, From municipal incineration with fly ash extraction (kg) | kg   | 0,08  |  |  |  |
| Substitution of primary steel with net scrap (kg)                                                                                       | kg   | 0,05  |  |  |  |
| Waste treatment per kg Brass slag, to landfill, residual material landfill (kg)                                                         | kg   | 0,07  |  |  |  |
| Waste treatment per kg Copper slag, to landfill, residual material landfill (kg)                                                        | kg   | 0,39  |  |  |  |
| Waste, aluminium, to landfill (kg)                                                                                                      | kg   | 1,89  |  |  |  |
| Waste, hazardous waste, to landfill (kg)                                                                                                | kg   | 8,56  |  |  |  |
| Waste, mineral wool, to landfill (kg)                                                                                                   | kg   | 10,96 |  |  |  |
| Waste, plastic, mixture, to landfill (kg)                                                                                               | kg   | 3,53  |  |  |  |
| Waste, scrap steel, to landfill (kg)                                                                                                    | kg   | 26,32 |  |  |  |

| Benefits and loads beyond the system boundaries (D)   | Unit | Value |  |  |  |
|-------------------------------------------------------|------|-------|--|--|--|
| Substitution of electricity (MJ)                      | MJ   | 4,38  |  |  |  |
| Substitution of primary aluminium with net scrap (kg) | kg   | 25,13 |  |  |  |
| Substitution of primary Brass with net scrap (kg)     | kg   | 0,32  |  |  |  |
| Substitution of primary copper with net scrap (kg)    | kg   | 2,56  |  |  |  |
| Substitution of primary steel with net scrap (kg)     | kg   | 57,91 |  |  |  |
| Substitution of thermal energy, district heating (MJ) | MJ   | 66,24 |  |  |  |

## LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document.

| Environmental impact                                                                                               |                        |          |          |          |          |          |          |           |  |
|--------------------------------------------------------------------------------------------------------------------|------------------------|----------|----------|----------|----------|----------|----------|-----------|--|
| Indicator                                                                                                          | Unit                   | A1-A3    | A4       | C1       | C2       | C3       | C4       | D         |  |
|  GWP-total                        | kg CO <sub>2</sub> -eq | 3,00E+03 | 5,13E+01 | 4,74E-01 | 3,21E+00 | 6,04E+01 | 5,47E+00 | -3,00E+02 |  |
|  GWP-fossil                       | kg CO <sub>2</sub> -eq | 2,96E+03 | 5,13E+01 | 4,74E-01 | 3,20E+00 | 6,03E+01 | 5,45E+00 | -2,95E+02 |  |
|  GWP-biogenic                     | kg CO <sub>2</sub> -eq | 3,11E+01 | 2,12E-02 | 8,88E-05 | 1,33E-03 | 8,90E-02 | 5,72E-03 | -1,10E+00 |  |
|  GWP-luluc                        | kg CO <sub>2</sub> -eq | 7,18E+00 | 1,82E-02 | 3,73E-05 | 1,14E-03 | 6,06E-03 | 1,71E-02 | -4,29E+00 |  |
|  ODP                              | kg CFC11 -eq           | 2,95E-04 | 1,16E-05 | 1,02E-07 | 7,26E-07 | 2,36E-06 | 3,30E-07 | -2,80E-02 |  |
|  AP                               | mol H <sup>+</sup> -eq | 2,51E+01 | 1,47E-01 | 4,96E-03 | 9,21E-03 | 4,15E-02 | 1,62E-02 | -2,99E+00 |  |
|  EP-FreshWater                    | kg P -eq               | 2,21E-01 | 4,10E-04 | 1,72E-06 | 2,56E-05 | 5,00E-04 | 1,16E-04 | -2,05E-02 |  |
|  EP-Marine                        | kg N -eq               | 3,12E+00 | 2,92E-02 | 2,19E-03 | 1,82E-03 | 1,14E-02 | 4,30E-03 | -3,06E-01 |  |
|  EP-Terrestrial                   | mol N -eq              | 6,25E+01 | 3,26E-01 | 2,40E-02 | 2,04E-02 | 1,23E-01 | 4,27E-02 | -3,53E+00 |  |
|  POCP                             | kg NMVOC -eq           | 1,13E+01 | 1,25E-01 | 6,60E-03 | 7,81E-03 | 3,24E-02 | 1,58E-02 | -1,23E+00 |  |
|  ADP-minerals&metals <sup>1</sup> | kg Sb -eq              | 1,43E+00 | 1,42E-03 | 7,27E-07 | 8,85E-05 | 8,07E-05 | 2,34E-05 | -1,48E-02 |  |
|  ADP-fossil <sup>1</sup>          | MJ                     | 4,25E+04 | 7,75E+02 | 6,52E+00 | 4,84E+01 | 9,66E+01 | 4,05E+01 | -3,45E+03 |  |
|  WDP <sup>1</sup>                 | m <sup>3</sup>         | 2,61E+05 | 7,50E+02 | 1,39E+00 | 4,69E+01 | 3,53E+02 | 1,66E+02 | -1,24E+05 |  |

GWP-total = Global Warming Potential total; 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 marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

"Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed

1. 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

## Remarks to environmental impacts



### Additional environmental impact indicators

| Indicator                                                                                             | Unit              | A1-A3    | A4       | C1       | C2       | C3       | C4       | D         |
|-------------------------------------------------------------------------------------------------------|-------------------|----------|----------|----------|----------|----------|----------|-----------|
|  PM                  | Disease incidence | 2,10E-04 | 3,14E-06 | 1,31E-07 | 1,96E-07 | 5,08E-07 | 2,49E-07 | -2,34E-05 |
|  IRP <sup>2</sup>    | kgBq U235 -eq     | 1,70E+02 | 3,39E+00 | 2,79E-02 | 2,12E-01 | 4,25E-01 | 1,26E-01 | -1,23E+01 |
|  ETP-fw <sup>1</sup> | CTUe              | 1,33E+05 | 5,75E+02 | 3,56E+00 | 3,59E+01 | 5,06E+02 | 1,31E+03 | -1,76E+04 |
|  HTP-c <sup>1</sup>  | CTUh              | 1,02E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,14E-08 | 1,97E-08 | -1,02E-06 |
|  HTP-nc <sup>1</sup> | CTUh              | 1,61E-04 | 6,28E-07 | 3,23E-09 | 3,92E-08 | 3,99E-07 | 8,41E-07 | -1,29E-05 |
|  SQP <sup>1</sup>    | dimensionless     | 1,78E+04 | 5,42E+02 | 8,27E-01 | 3,39E+01 | 3,71E+01 | 8,76E+01 | -2,36E+02 |

PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Potential Soil Quality Index (dimensionless)

"Reading example: 9,0 E-03 =  $9,0 \cdot 10^{-3}$  = 0,009"

\*INA Indicator Not Assessed

1. 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

2. 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.

| Resource use                                                                            |                |          |          |          |          |           |          |           |  |
|-----------------------------------------------------------------------------------------|----------------|----------|----------|----------|----------|-----------|----------|-----------|--|
| Indicator                                                                               | Unit           | A1-A3    | A4       | C1       | C2       | C3        | C4       | D         |  |
|  PERE  | MJ             | 5,08E+03 | 1,11E+01 | 3,53E-02 | 6,93E-01 | 1,56E+01  | 8,44E+00 | -1,13E+03 |  |
|  PERM  | MJ             | 6,21E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -6,21E-02 | 0,00E+00 | 0,00E+00  |  |
|  PERT  | MJ             | 5,50E+03 | 1,11E+01 | 3,53E-02 | 6,93E-01 | 1,55E+01  | 8,44E+00 | -1,13E+03 |  |
|  PENRE | MJ             | 4,22E+04 | 7,75E+02 | 6,52E+00 | 4,84E+01 | 9,67E+01  | 4,05E+01 | -3,45E+03 |  |
|  PENRM | MJ             | 2,98E+02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -2,60E+02 | 0,00E+00 | 0,00E+00  |  |
|  PENRT | MJ             | 4,26E+04 | 7,75E+02 | 6,52E+00 | 4,84E+01 | -1,64E+02 | 4,05E+01 | -3,45E+03 |  |
|  SM    | kg             | 2,31E+02 | 0,00E+00 | 3,20E-03 | 0,00E+00 | 1,30E-05  | 1,86E-01 | 1,69E+00  |  |
|  RSF   | MJ             | 1,28E+02 | 3,97E-01 | 8,68E-04 | 2,48E-02 | 3,47E-01  | 4,81E-02 | 2,02E+00  |  |
|  NRSF  | MJ             | 5,79E+02 | 1,42E+00 | 1,28E-02 | 8,87E-02 | -1,76E-02 | 1,74E+00 | 6,68E+01  |  |
|  FW    | m <sup>3</sup> | 3,92E+01 | 8,29E-02 | 3,36E-04 | 5,18E-03 | 1,53E-01  | 7,57E-02 | -5,97E+00 |  |

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 used as raw materials; PENRT = 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; FW = Net use of fresh water

\*Reading example: 9,0 E-03 = 9,0\*10<sup>-3</sup> = 0,009"

\*INA Indicator Not Assessed

### End of life - Waste

| Indicator                                                                              | Unit | A1-A3    | A4       | C1       | C2       | C3       | C4       | D         |
|----------------------------------------------------------------------------------------|------|----------|----------|----------|----------|----------|----------|-----------|
|  HWD  | kg   | 1,93E+01 | 4,00E-02 | 1,92E-04 | 2,50E-03 | 9,37E-02 | 9,29E+00 | 5,26E-01  |
|  NHWD | kg   | 7,16E+02 | 3,77E+01 | 7,72E-03 | 2,36E+00 | 2,19E+01 | 5,85E+01 | -9,45E+01 |
|  RWD  | kg   | 1,49E-01 | 5,28E-03 | 4,53E-05 | 3,30E-04 | 5,38E-05 | 6,60E-05 | -1,16E-02 |

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed

\*Reading example: 9,0 E-03 =  $9,0 \cdot 10^{-3}$  = 0,009"

\*INA Indicator Not Assessed

### End of life - Output flow

| Indicator                                                                             | Unit | A1-A3    | A4       | C1       | C2       | C3       | C4       | D         |
|---------------------------------------------------------------------------------------|------|----------|----------|----------|----------|----------|----------|-----------|
|  CRU | kg   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
|  MFR | kg   | 7,51E-01 | 0,00E+00 | 3,14E-03 | 0,00E+00 | 2,67E+02 | 7,53E-04 | -8,41E-02 |
|  MER | kg   | 2,99E-02 | 0,00E+00 | 9,75E-06 | 0,00E+00 | 1,15E+01 | 1,19E-05 | -1,09E-02 |
|  EEE | MJ   | 2,16E-02 | 0,00E+00 | 3,34E-05 | 0,00E+00 | 2,03E+01 | 5,34E-04 | -3,33E-02 |
|  EET | MJ   | 3,27E-01 | 0,00E+00 | 5,06E-04 | 0,00E+00 | 3,06E+02 | 8,08E-03 | -5,03E-01 |

CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported energy electrical; EET = Exported energy thermal

\*Reading example: 9,0 E-03 =  $9,0 \cdot 10^{-3}$  = 0,009"

\*INA Indicator Not Assessed

### Biogenic Carbon Content

| Indicator                                         | Unit | At the factory gate |
|---------------------------------------------------|------|---------------------|
| Biogenic carbon content in product                | kg C | 2,10E-03            |
| Biogenic carbon content in accompanying packaging | kg C | 0,00E+00            |

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO<sub>2</sub>

## Additional requirements

### Greenhouse gas emissions from the use of electricity in the manufacturing phase

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 (A3).

| Electricity mix                         | Data source   | Amount | Unit                      |
|-----------------------------------------|---------------|--------|---------------------------|
| Electricity, market mix (kWh) - Germany | ecoinvent 3.6 | 585,93 | g CO <sub>2</sub> -eq/kWh |

### Dangerous substances

The product contains no substances on the REACH Candidate list at or above 100 ppm, 0,01 % by weight.

### Indoor environment

## Additional Environmental Information

| Additional environmental impact indicators required in NPCR Part A for construction products |                        |          |          |          |          |          |          |           |
|----------------------------------------------------------------------------------------------|------------------------|----------|----------|----------|----------|----------|----------|-----------|
| Indicator                                                                                    | Unit                   | A1-A3    | A4       | C1       | C2       | C3       | C4       | D         |
| GWPIOBC                                                                                      | kg CO <sub>2</sub> -eq | 2,99E+03 | 5,13E+01 | 4,74E-01 | 3,21E+00 | 6,04E+01 | 5,45E+00 | -3,18E+02 |

GWPIOBC: Global warming potential calculated according to the principle of instantaneous oxidation. 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.

## 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 Environmental product declaration - Core rules for the product category of construction products.

ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products.

ecoinvent v3, Allocation, cut-off by classification, Swiss Centre of Life Cycle Inventories.

Iversen et al., (2021) eEPD v2021.09 Background information for EPD generator tool system verification, LCA.no Report number: 07.21

Graafland and Iversen (2022) EPD generator for NPCR 030 Ventilation components, Background information for EPD generator application and LCA data, LCA.no report number: 12.22

NPCR Part A: Construction products and services. Ver. 2.0. April 2021, EPD-Norge.

NPCR 030 Part B for Ventilation components, Ver. 1.0, 18.05.2021, EPD Norway.

EN ISO 9001:2015 - Quality management systems.

EN ISO 14001:2015 - Environmental management systems.

EN ISO 50001:2018 - Energy management systems.

|                                                                                     |                                                                                                                      |                                                                                                       |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
|                                                                                     | <b>Program operator and publisher</b><br>The Norwegian EPD Foundation<br>Post Box 5250 Majorstuen, 0303 Oslo, Norway | Phone: +47 23 08 80 00<br>e-mail: post@epd-norge.no<br>web: www.epd-norge.no                          |
|    | <b>Owner of the declaration:</b><br>TROX Group<br>Heinrich-Trox-Platz 1, 47506 Neukirchen-Vluyn                      | Phone: +49 2845 2020<br>e-mail: productsustainability-de@troxgroup.com<br>web: https://www.trox.de/en |
|    | <b>Author of the Life Cycle Assessment</b><br>LCA.no AS<br>Dokka 6B, 1671                                            | Phone: +47 916 50 916<br>e-mail: post@lca.no<br>web: www.lca.no                                       |
|   | <b>Developer of EPD generator</b><br>LCA.no AS<br>Dokka 6B, 1671 Kråkerøy                                            | Phone: +47 916 50 916<br>e-mail: post@lca.no<br>web: www.lca.no                                       |
|  | ECO Platform<br>ECO Portal                                                                                           | web: www.eco-platform.org<br>web: ECO Portal                                                          |