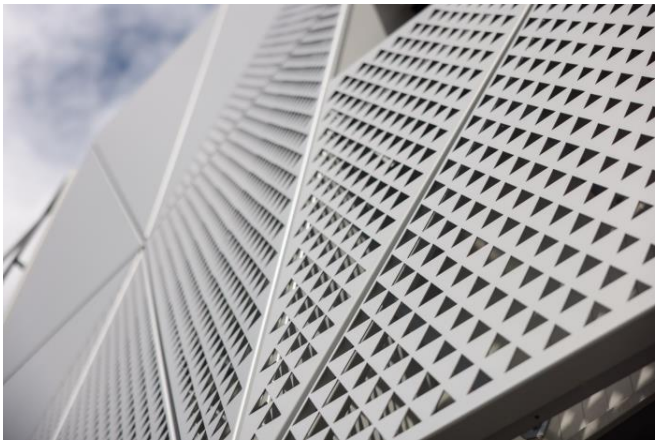
**Environmental**
**Product**
**Declaration**
According to ISO14025 and EN15804+A2
(+indicators A1)

This declaration is for:
**Aldowa low carbon aluminium cassette ventilated facade system – powder coated**

Provided by:
**Aldowa B.V.**



program operator
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**1.1.00729.2024**
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**27-11-2029**

## COMPANY INFORMATION

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## PRODUCT

Aldowa low carbon aluminium cassette ventilated facade system – powder coated.

## DECLARED UNIT/FUNCTIONAL UNIT

1 m²

## DESCRIPTION OF PRODUCT

Aldowa low carbon aluminium cassette ventilated facade system – powder coated is made of aluminium EN AW 5005. The environmental impact has been calculated of representative dimensions of 3000 x 1000 mm, and has been converted to 1 m².

## MRPI® REGISTRATION

1.1.00729.2024

## DATE OF ISSUE

27-11-2024

## EXPIRY DATE

27-11-2029

## VISUAL PRODUCT

## SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Gert-Jan Vroege, Eco Intelligence. The LCA study has been done by Benthe Vermaas, LBP|SIGHT. The certificate is based on an LCA-dossier according to EN15804+A2 (+indicators A1). It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPD's of construction products may not be comparable if they do not comply with EN15804+A2. Declaration of SVHC that are listed on the 'Candidate list of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

## MORE INFORMATION

https://aldowa.nl/en/aldowa-green/

## PROGRAM OPERATOR

Stichting MRPI®
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**Ing. L. L. Oosterveen MSc. MBA**
**Managing Director MRPI**

| DEMONSTRATION OF VERIFICATION |
|---|
| CEN standard EN15804 serves as the core PCR(a) |
| Independent verification of the declaration an data according to ISO14025 and EN15804+A2 (+indicators A1)<br>internal: external: x |
| Third party verifier: Gert-Jan Vroege, Eco Intelligence |
| [a] PCR = Product Category Rules |

## DETAILED PRODUCT DESCRIPTION

1 m² Aldowa low carbon aluminium cassette ventilated facade system - powder coated, with representative dimensions of 3000 x 1000 converted to 1 m². Custom-made facade cassette system designed according to different principles:

1. Cassettes with a single flange, invisibly attached with the bed hook system to omega profiles (included);
2. Cassettes with a double flange, screwed onto profiles (included).

Cassettes are made of 3 mm thick EN AW 5005 aluminium and equipped with reinforcement profiles where necessary. Mounting materials and substructure are included. Wall brackets are not included, making the environmental statement representative for adjustment spaces of up to 10 mm.

The product card is scalable to the length and width (in mm) of the panel and the number of reinforcements per m² (depending on the width). For an overview of the number of reinforcements to be applied, and a detailed explanation of how to use the scaling, see the section “Scaling”. The reference product has a size of 3000 x 1000 mm (converted to 1 m²) and a weight of 13.2 kg/m².

**Production processes**

Aldowa purchases EN AW 5005 AlMg1 aluminium plates. The aluminium panels, reinforcement profiles and omega profiles are produced from the aluminium plates by cutting, punching, bending and welding. Purchased EPDM hoses are cut to size.

The production processes use natural gas, electricity and rolling oil. The aluminium facade systems are packed with LDPE film and EPS.

After production at the Aldowa production location, the aluminium facade systems are transported to the surface treatment company, where they are powder coated.

| Technical properties of AW5005 AlMg1 | Value | Unit | Standard |
|---|---|---|---|
| Thickness | 1.5-3 | mm | VMRG , ISO9001 |
| Yield strength | 120 | Mpa | VMRG , ISO9001 |
| Tensile strength | 145-185 | Mpa | VMRG , ISO9001 |
| Elongation | 3 | % | VMRG , ISO9001 |
| Bending radius | 2.5t | 180°t | VMRG , ISO9001 |

**Material composition**

The Aldowa low carbon aluminium cassette ventilated facade systems – powder coated are produced in various dimensions. The material composition varies with varying dimensions, due to the relation between the flanges and the reinforcement profiles, and the width and length of the aluminium panels. Thereby, the material composition of the reference product (3000 x 1000 mm) is given in the table below.

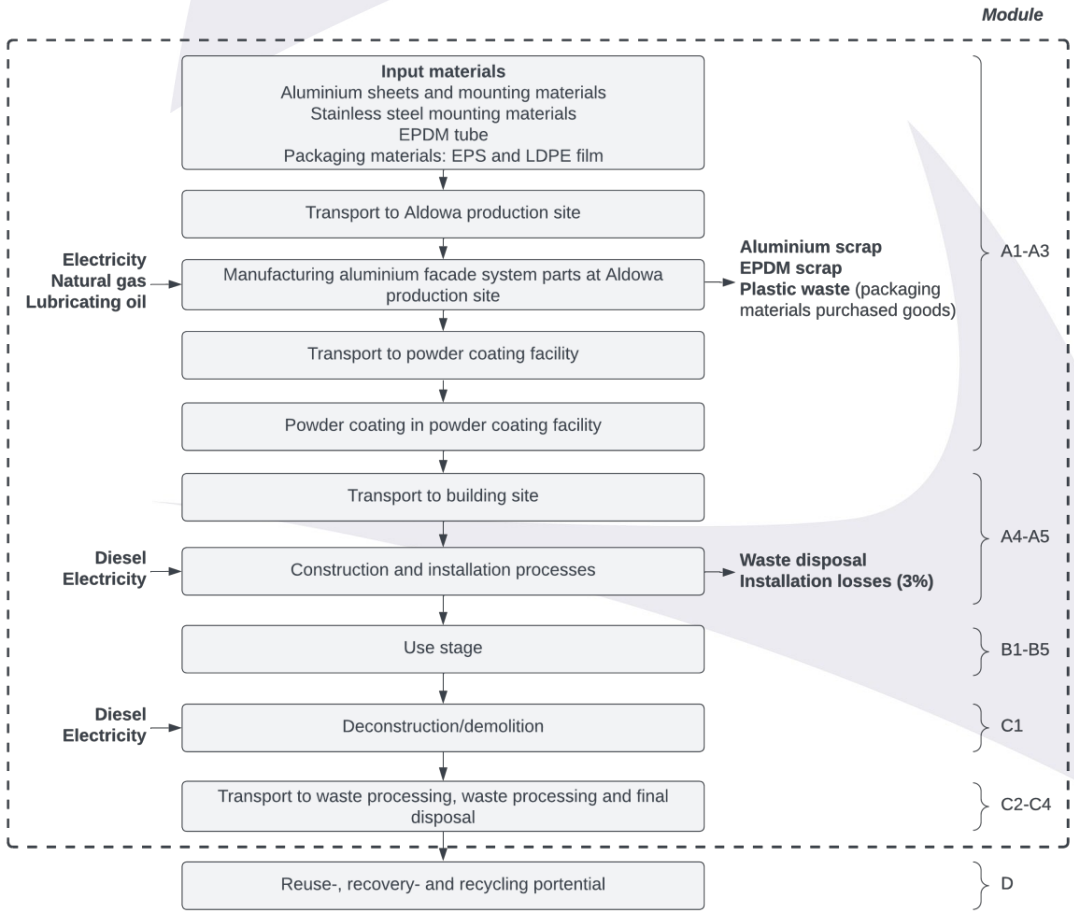
| Component (> 1% ) | % |
|---|---|
| Aluminum (AlMg1) | 99% |
| Stainless steel | 1% |
| EPDM | >1% |

## SCOPE AND TYPE

This EPD is based on a Cradle-to-Grave LCA of Aldowa aluminium cassette ventilated facade systems – powder coated, produced in a single Aldowa B.V. production site in Rotterdam. The façade systems are installed in the Netherlands and at its end-of-life, it is treated according to the Dutch end-of-life scenarios. As a result, the EPD is representative for the Dutch market.

Company-specific data for the production stage has been collected by Aldowa B.V. The LCI data has been evaluated by the LCA-practitioner and checked by the EPD verifier. Generic data has been used for the background processes, originating from the Ecoinvent 3.6 Cut-off database. For the calculation of the LCA results, the software program SimaPro 9.6.0.1 has been used.

| PRODUCT STAGE | | | CONSTRUCTION PROCESS STAGE | | USER STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw material supply | Transport | Manufacturing | Transport gate to site | 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 | X | X | X | X | X | ND | ND | X | X | X | X | X |
| X= Modules Assessed<br>ND= Not Declared | | | | | | | | | | | | | | | | |




## REPRESENTATIVENESS

The data used for the LCA is representative for the production of the Aldowa low carbon aluminium cassette ventilated facade systems – powder coated, manufactured by Aldowa B.V. in Rotterdam, the Netherlands.

## ENVIRONMENT IMPACT per functional unit or declared unit (core indicators A1)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADPE | kg Sb eq. | | | | 1,80 E-03 | 6,97 E-06 | 5,61 E-05 | 0,00 E+00 | 4,10 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 8,08 E-07 | 2,54 E-06 | 1,70 E-05 | 7,44 E-07 | -3,53 E-04 |
| ADPF | MJ | | | | 1,87 E+03 | 4,17 E+00 | 5,90 E+01 | 0,00 E+00 | 3,89 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,16 E+00 | 1,52 E+00 | 4,15 E+00 | 5,02 E-01 | -1,36 E+03 |
| GWP | kg CO2 eq. | | | | 1,43 E+02 | 2,73 E-01 | 5,46 E+00 | 0,00 E+00 | 2,43 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,41 E-01 | 9,92 E-02 | 3,20 E-01 | 5,95 E-02 | -1,06 E+02 |
| ODP | Kg CFC11 eq. | | | | 9,09 E-06 | 4,84 E-08 | 2,99 E-07 | 0,00 E+00 | 3,39 E-07 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,02 E-08 | 1,76 E-08 | 3,79 E-08 | 3,98 E-09 | -5,91 E-06 |
| POCP | Kg ethene eq. | | | | 8,42 E-02 | 1,65 E-04 | 2,66 E-03 | 0,00 E+00 | 1,82 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,05 E-04 | 5,99 E-05 | 2,67 E-04 | 2,51 E-05 | -5,90 E-02 |
| AP | kg SO2 eq. | | | | 7,88 E-01 | 1,20 E-03 | 2,47 E-02 | 0,00 E+00 | 1,36 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 7,97 E-04 | 4,36 E-04 | 2,98 E-03 | 2,10 E-04 | -6,33 E-01 |
| EP | kg (PO4 ) 3- eq. | | | | 6,71 E-02 | 2,36 E-04 | 2,25 E-03 | 0,00 E+00 | 2,93 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,70 E-04 | 8,57 E-05 | 3,80 E-04 | 2,95 E-05 | -4,82 E-02 |
| Toxicity indicators for Dutch market | | | | | | | | | | | | | | | | | | | |
| HTP | kg DCB-Eq | | | | 1,90 E+02 | 1,15 E-01 | 5,81 E+00 | 0,00 E+00 | 1,15 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 5,62 E-02 | 4,18 E-02 | 3,68 E-01 | 2,23 E-02 | -1,63 E+02 |
| FAETP | kg DCB-Eq | | | | 1,81 E+00 | 3,35 E-03 | 6,67 E-02 | 0,00 E+00 | 1,26 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 8,24 E-04 | 1,22 E-03 | 6,84 E-03 | 5,84 E-04 | -9,02 E-01 |
| MAETP | kg DCB-Eq | | | | 8,14 E+03 | 1,21 E+01 | 2,65 E+02 | 0,00 E+00 | 5,98 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,84 E+00 | 4,39 E+00 | 2,97 E+01 | 1,97 E+00 | -6,54 E+03 |
| TETP | kg DCB-Eq | | | | 4,11 E-01 | 4,06 E-04 | 1,33 E-02 | 0,00 E+00 | 5,54 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 8,46 E-04 | 1,48 E-04 | 1,15 E-03 | 8,72 E-05 | -2,94 E-01 |
| ECI | euro | | | | 2,92 E+01 | 3,29 E-02 | 9,54 E-01 | 0,00 E+00 | 3,89 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,76 E-02 | 1,20 E-02 | 6,85 E-02 | 6,40 E-03 | -2,39 E+01 |
| ADPF | kg Sb eq. | | | | 9,00 E-01 | 2,01 E-03 | 2,84 E-02 | 0,00 E+00 | 1,87 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,04 E-03 | 7,30 E-04 | 1,99 E-03 | 2,41 E-04 | -6,54 E-01 |

ADPE = Abiotic Depletion Potential for non-fossil resources
ADPF = Abiotic Depletion Potential for fossil resources
GWP = Global Warming Potential
ODP = Depletion potential of the stratospheric ozone layer
POCP = Formation potential of tropospheric ozone photochemical oxidants
AP = Acidification Potential of land and water
EP = Eutrophication Potential
HTP = Human Toxicity Potential
FAETP = Fresh water aquatic ecotoxicity potential
MAETP = Marine aquatic ecotoxicity potential
TETP = Terrestrial ecotoxicity potential
ECI = Environmental Cost Indicator
ADPF = Abiotic Depletion Potential for fossil resources expressed in [kg Sb-eq.]

## ENVIRONMENT IMPACT per functional unit or declared unit (core indicators A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP-total | kg CO2 eq. | | | | 7,87 E+01 | 2,75 E-01 | 3,53 E+00 | 0,00 E+00 | 2,52 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,43 E-01 | 1,00 E-01 | 3,24 E-01 | 6,04 E-02 | -5,10 E+01 |
| GWP-fossil | kg CO2 eq. | | | | 7,80 E+01 | 2,75 E-01 | 3,50 E+00 | 0,00 E+00 | 2,46 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,43 E-01 | 1,00 E-01 | 3,23 E-01 | 6,03 E-02 | -5,03 E+01 |
| GWP-biogenic | kg CO2 eq. | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| GWP-luluc) | kg CO2 eq. | | | | 7,74 E-01 | 1,01 E-04 | 2,33 E-02 | 0,00 E+00 | 6,01 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,23 E-05 | 3,67 E-05 | 3,43 E-04 | 2,77 E-05 | -7,54 E-01 |
| ODP | kg CFC11 eq. | | | | 6,75 E-06 | 6,07 E-08 | 2,35 E-07 | 0,00 E+00 | 3,91 E-07 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,46 E-08 | 2,21 E-08 | 4,40 E-08 | 4,76 E-09 | -4,37 E-06 |
| AP | mol H+ eq. | | | | 5,59 E-01 | 1,60 E-03 | 1,83 E-02 | 0,00 E+00 | 1,81 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,10 E-03 | 5,80 E-04 | 3,72 E-03 | 2,64 E-04 | -4,40 E-01 |
| EP-freshwater | kg PO4 eq. | | | | 1,95 E-02 | 2,78 E-06 | 5,89 E-04 | 0,00 E+00 | 8,01 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,96 E-06 | 1,01 E-06 | 2,09 E-05 | 1,31 E-06 | -1,85 E-02 |
| EP-marine | kg N eq. | | | | 7,44 E-02 | 5,62 E-04 | 2,82 E-03 | 0,00 E+00 | 6,60 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 4,46 E-04 | 2,04 E-04 | 8,20 E-04 | 6,41 E-05 | -5,22 E-02 |
| EP-terrestrial | mol N eq. | | | | 8,03 E-01 | 6,20 E-03 | 3,05 E-02 | 0,00 E+00 | 6,67 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 4,91 E-03 | 2,25 E-03 | 9,52 E-03 | 7,25 E-04 | -5,48 E-01 |
| POCP | kg NMVOC eq. | | | | 2,61 E-01 | 1,77 E-03 | 9,59 E-03 | 0,00 E+00 | 1,82 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,36 E-03 | 6,44 E-04 | 2,60 E-03 | 2,10 E-04 | -1,75 E-01 |
| ADP-minerals & metals | kg Sb eq. | | | | 3,34 E-04 | 6,97 E-06 | 1,22 E-05 | 0,00 E+00 | 4,09 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 8,08 E-07 | 2,54 E-06 | 1,70 E-05 | 7,44 E-07 | 9,24 E-04 |
| ADP-fossil | MJ, net calorific value | | | | 7,95 E+02 | 4,15 E+00 | 2,67 E+01 | 0,00 E+00 | 3,69 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,10 E+00 | 1,51 E+00 | 4,25 E+00 | 4,73 E-01 | -4,61 E+02 |
| WDP | m3 world eq. Deprived | | | | 2,20 E+01 | 1,48 E-02 | 6,79 E-01 | 0,00 E+00 | 5,95 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,06 E-02 | 5,40 E-03 | 4,30 E-02 | 1,48 E-02 | -7,50 E+00 |

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 Exceedence
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 Exceedence
POCP = Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals&metals = Abiotic Depletion Potential for non-fossil resources [2]
ADP-fossil = Abiotic Depletion for fossil resources potential [2]
WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

## ENVIRONMENT IMPACT per functional unit or declared unit (additional indicators A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM | Disease incidence | | | | 6,82 E-06 | 2,47 E-08 | 2,35 E-07 | 0,00 E+00 | 3,41 E-07 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,60 E-08 | 8,99 E-09 | 4,67 E-08 | 4,11 E-09 | -2,94 E-06 |
| IRP | kBq U235 eq. | | | | 5,43 E+00 | 1,74 E-02 | 1,72 E-01 | 0,00 E+00 | 1,08 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 6,96 E-03 | 6,32 E-03 | 2,12 E-02 | 1,85 E-03 | -4,53 E+00 |
| ETP-fw | CTUe | | | | 2,06 E+03 | 3,70 E+00 | 7,21 E+01 | 0,00 E+00 | 5,07 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,65 E+00 | 1,35 E+00 | 1,83 E+01 | 2,45 E+02 | -1,34 E+03 |
| HTP-c | CTUh | | | | 1,80 E-07 | 1,20 E-10 | 5,57 E-09 | 0,00 E+00 | 1,88 E-09 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 9,54 E-11 | 4,37 E-11 | 4,46 E-10 | 6,41 E-11 | -1,26 E-07 |
| HTP-nc | CTUh | | | | 2,75 E-06 | 4,05 E-09 | 8,75 E-08 | 0,00 E+00 | 4,93 E-08 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,38 E-09 | 1,47 E-09 | 2,12 E-08 | 1,43 E-09 | -2,17 E-06 |
| SQP | ---- | | | | 2,39 E+02 | 3,60 E+00 | 8,11 E+00 | 0,00 E+00 | 1,41 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,33 E-01 | 1,31 E+00 | 8,55 E+00 | 6,98 E-01 | -1,21 E+02 |

PM = Potential incidence of disease due to PM emissions
IRP = Potential Human exposure efficiency relative to U235 [1]
ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
HTP-c = Potential Comparative Toxic Unit for humans [2]
HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
SQP = Potential soil quality index [2]

Disclaimer [1]
- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste.

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

## OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 / A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HWD | kg | | | | 2,78 E-01 | 1,05 E-05 | 8,36 E-03 | 0,00 E+00 | 7,32 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 5,26 E-06 | 3,82 E-06 | 1,28 E-05 | 8,23 E-07 | -2,66 E-01 |
| NHWD | kg | | | | 5,34 E+01 | 2,63 E-01 | 1,69 E+00 | 0,00 E+00 | 1,74 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 5,14 E-03 | 9,57 E-02 | 1,25 E-01 | 4,20 E-01 | -4,65 E+01 |
| RWD | kg | | | | 3,41 E-03 | 2,73 E-05 | 1,16 E-04 | 0,00 E+00 | 1,42 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,02 E-05 | 9,91 E-06 | 2,52 E-05 | 2,24 E-06 | -2,49 E-03 |
| CRU | kg | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| MFR | kg | | | | 4,61 E-01 | 0,00 E+00 | 4,35 E-01 | 0,00 E+00 | 5,16 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 4,87 E-05 | 0,00 E+00 | 1,24 E+01 | 0,00 E+00 | 0,00 E+00 |
| MER | kg | | | | 1,31 E+00 | 0,00 E+00 | 3,59 E-01 | 0,00 E+00 | 3,00 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,83 E-06 | 0,00 E+00 | 5,33 E-03 | 0,00 E+00 | 0,00 E+00 |
| EEE | MJ | | | | 1,01 E+01 | 0,00 E+00 | 2,72 E+00 | 0,00 E+00 | 2,03 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,92 E-04 | 0,00 E+00 | 2,61 E-02 | 0,00 E+00 | -4,43 E-04 |
| ETE | MJ | | | | 1,73 E+01 | 0,00 E+00 | 4,68 E+00 | 0,00 E+00 | 3,50 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 3,30 E-04 | 0,00 E+00 | 4,49 E-02 | 0,00 E+00 | -4,86 E-03 |

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

## RESOURCE USE per functional unit or declared unit (A1 / A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | | | | 5,77 E+02 | 5,20 E-02 | 1,74 E+01 | 0,00 E+00 | 3,75 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,38 E-02 | 1,89 E-02 | 6,66 E-01 | 3,50 E-02 | -5,53 E+02 |
| PERM | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| PERT | MJ | | | | 5,77 E+02 | 5,20 E-02 | 1,74 E+01 | 0,00 E+00 | 3,75 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,38 E-02 | 1,89 E-02 | 6,66 E-01 | 3,50 E-02 | -5,53 E+02 |
| PENRE | MJ | | | | 8,28 E+02 | 4,41 E+00 | 2,78 E+01 | 0,00 E+00 | 3,96 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,25 E+00 | 1,60 E+00 | 4,51 E+00 | 4,83 E-01 | -4,55 E+02 |
| PENRM | MJ | | | | 1,74 E-01 | 0,00 E+00 | 5,22 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| PENRT | MJ | | | | 8,28 E+02 | 4,41 E+00 | 2,78 E+01 | 0,00 E+00 | 3,96 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,25 E+00 | 1,60 E+00 | 4,51 E+00 | 4,83 E-01 | -4,55 E+02 |
| SM | kg | | | | 2,45 E+00 | 0,00 E+00 | 7,36 E-02 | 0,00 E+00 | 1,54 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,45 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| RSF | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| NRSF | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| FW | m3 | | | | 3,51 E+00 | 5,06 E-04 | 1,06 E-01 | 0,00 E+00 | 1,48 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 3,68 E-04 | 1,84 E-04 | 2,04 E-03 | 1,49 E-04 | -3,11 E+00 |

PERE = Use of renewable energy excluding renewable primary energy resources
PERM = Use of renewable energy resources used as raw materials
PERT = Total use of renewable primary energy resources
PENRE = Use of non-renewable primary energy resources excluding non-renewable 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 = Use of net fresh water

## BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 / A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BBCpr | Kg C | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| BCCpa | kg C | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging

## CALCULATION RULES

The reference year of this study is 2022. The LCA was carried out in accordance with the requirements and guidelines of the NMD "Bepalingsmethode Milieuprestatie Bouwwerken" (Environmental Performance Assessment Method for Construction Works) (version 1.1, March 2022) and the NMD-Verification protocol (version 1.2, August 2024). The NMD-Assessment method is based on ISO 14040 - ISO14044 and NEN-EN 15804:2012 + A2 (2019).

**Allocation**

Since it's impossible to gather individual energy consumption data for each product manufactured in the plant, allocation methods are employed. These allocations rely on the annual production rate and are executed with high accuracy and precision. To determine the values per 1 kg of the considered product, the total product weight per annual production is taken into account. As the factory manufactures various types of aluminium panels, of which the production processes are similar, the annual production percentages are utilized for allocation purposes. This involves allocating the annual total energy consumption (both natural gas and electricity), oil usage, and waste generation per product based on the ratio of the declared product's annual production to the factory's total annual production. Due to the fixed formulation of the product, there's no need to allocate raw materials considering the total annual production.

**Cut-off**

In line with paragraph 6.3.6 of the EN15804:A2, all significant input and output streams must be included in the calculations.
- A cut-off process may not contribute to more than 1% of the energy usage and may not exceed 1% of the mass. Processes excluded from the calculations may not contribute to more than 5% of the total energy usage or total mass.
- The sum of the processes excluded from the calculations, may not contribute to more than 5% of the total energy usage or total mass.

In line with EN 15804 the following processes are not considered within the system boundaries of this LCA:
- Overhead processes, like office departments, personal transportation, etc.
- Production, maintenance and the end-of-life stage of capital goods like buildings, machinery, etc.

It is not to be expected for the above-mentioned processes to contribute significantly to the environmental profile of the Aldowa aluminium facade systems.

## SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

**Production processes, A1-A3**

Aldowa purchases EN AW 5005 aluminium plates. The aluminium panels, reinforcement profiles and omega profiles are produced from the aluminium plates by cutting, punching, bending and welding. Purchased EPDM hoses are cut to size.

The production processes use natural gas, electricity and rolling oil. The aluminium facade systems are packed with LDPE film and EPS.

After production at the Aldowa production location, the aluminium facade systems are transported to the surface treatment company, where they are powder coated.

Construction and installation, A4-A5

In line with the Bepalingsmethode, the façade systems are transported by freight lorry and cover a distance of 150 km.

In accordance with the Bepalingsmethode, it is assumed that 3% of the facade systems are lost during the construction stage. The packaging material released during the installation stage is processed in this stage, in accordance with the prescribed set of scenario values for the end-of-life stage by the Bepalingsmethode (see table below).

Electric and diesel-powered equipment is used for the installation of the facade systems.

**Usage, B1-B5**

No emissions are released during the use stage. The facade systems must be cleaned once a year. The anodized systems can be cleaned with just water, the powder-coated systems must also be cleaned with a cleaning agent.

**End of life, C1-C4**

At the end of the lifespan of the facade systems, the products are dismantled and collected in containers. The products are then transported to a sorting location, where they are dismantled and the individual materials are sorted. The individual materials can be recycled, incinerated or landfilled.

The Bepalingsmethode prescribes standard values for end-of-life processing scenarios for individual products. The fixed scenarios of the NMD have been adopted in this LCA, and are shown in the table below.

**Environmental costs and benefits outside the system boundary, D**
This life stage is based on the end-of-life processing scenarios, and is in line with the requirements and guidelines as stated in the Bepalingsmethode. The recycling/incineration loads and benefits, after reaching end-of-waste, of the product materials, losses during construction and that of the packaging materials (A5) are included in module D.

| Material for waste processing and disposal | Landfill (%) | Incineration (%) | Recycling (%) | C2 transport distance (km) |
|---|---|---|---|---|
| Aluminium | 3 | 3 | 94 | 54,5 |
| Stainless steel | 1 | 0 | 99 | 50,5 |
| EPDM | 10 | 85 | 5 | 140 |
| LDPE (packaging material) | 10 | 85 | 5 | 140 |
| EPS (packaging material) | 0 | 35 | 65 | 85 |

## DECLARATION OF SVHC
The product does not contain materials listed in the “Candidate list of Substances of Very High Concern for authorization”.

## REFERENCES
[1] The NMD "Bepalingsmethode Milieuprestatie Bouwwerken" (Environmental Performance Assessment Method for Construction Works) (version 1.1, March 2022) and the NMD-Verification protocol (version 1.2, August 2024).
[2] NEN-EN 15804 Duurzaamheid van bouwwerken - Milieuverklaringen van producten - Basisregels voor de productgroep bouwproducten;
[3] ISO, 2006. “Environmental management. Life cycle assessment - Principles and framework”. ISO 14040:2006;
[4] ISO, 2006. “Environmental management. Life cycle assessment – Requirements and Guidelines”. ISO 14044:2006;
[5] International Organization for Standardization, ISO/TR 14025, “Environmental labels and declarations – Type III environmental declarations”, ISO/TR 14025:2000.

## REMARKS
None.

## SCALING

Aldowa produces custom-made aluminium facade systems. Due to the wide variety of dimensions that are produced, the environmental declarations of the aluminium facade systems are scalable to the dimensions (length and width) of the panels. The minimal length and width of the aluminium panels is both 150 mm, the maximum length is 3800 mm, and the maximum width is 2800 mm. The reference dimension of which the environmental profile above is calculated, is 3000 x 1000 mm.

The environmental declarations of the aluminium facade systems are composed of three environmental profiles:
1. A non-scalable environmental profile for 1 m² of facade system, which is independent of the dimensions.
2. A scalable environmental profile for the flanges in kg. The mass of the flanges per m² depends on the length and width of the panel.
3. A scalable environmental profile for the number of reinforcements per square meter of panel in amount of reinforcements, which is dependent on the width of the panel.

How to calculate the environmental profile for a specific dimension
To obtain the environmental profile of a specific dimension, one must sum the three individual environmental profiles based on the specific dimensions. Therefore,
EPT, specific = EPNon-scalable + EPS, specific + EPR, specific,
With EPT, specific the total environmental profile of the facade system of the specific dimensions, EPNon-scalable the non-scalable environmental profile, EPS, specific the environmental profile of the flanges for specific dimensions, and EPR, specific the environmental profile of the reinforcements for specific dimensions. All three environmental profiles are given in tables below.

**Non-scalable environmental profile**
The non-scalable environmental profile is independent of the dimensions of the panel, and therefore always has to be applied once.

**Flanges**
The weight of the flanges is 0,813 kg per meter in width, plus 1,220 kg per meter in length. Therefore, to calculate the environmental profile of the flanges, one must use the following formula:
EPS, specific = EPS, 1 kg x (0,813 x w (mm) + 1,220 x l (mm),
Where EPS, 1 kg the environmental profile for 1 kg of flange, w = width of panel in mm, and l the length of the panel in mm.

**Reinforcements**
When a building is higher than 15 m, and/or when the width of the panel is at least 800 mm, a reinforcement profile is applied per 600 mm in width. This means that extra materials are used for the production of the facade system. To apply the environmental impact of this material surcharge in the environmental profile of the aluminium facade systems, the number of reinforcements per square meter of panel must be multiplied by the environmental profile of one reinforcement. Therefore,
EPR, specific = EPR, one * n,
Where EPR, one is the environmental profile of one reinforcement, and n the number of reinforcements per m². The table below shows the number of reinforcements per square meter of panel that must be entered in the scaling module.

| Width (mm) | Amount of reinforcements per panel | Amount of reinforcements per m² |
|---|---|---|
| <800 | 0 | 0,000 |
| 800 | 1 | 1,250 |
| 900 | 1 | 1,111 |
| 1000 | 1 | 1,000 |
| 1100 | 1 | 0,909 |
| 1200 | 2 | 1,667 |
| 1300 | 2 | 1,538 |
| 1400 | 2 | 1,429 |
| 1500 | 2 | 1,333 |
| 1600 | 2 | 1,250 |
| 1700 | 2 | 1,176 |
| 1800 | 3 | 1,667 |
| 1900 | 3 | 1,579 |
| 2000 | 3 | 1,500 |
| 2100 | 3 | 1,429 |
| 2200 | 3 | 1,364 |
| 2300 | 3 | 1,304 |
| 2400 | 4 | 1,667 |
| 2500 | 4 | 1,600 |
| 2600 | 4 | 1,538 |

## RESULTS FOR NON-SCALABLE PROFILE

### ENVIRONMENTAL IMPACT of 1 m² non-scalable environmental profile (A1)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADPE | kg Sb eq. | | | | 1,36 E-03 | 5,25 E-06 | 4,26 E-05 | 0,00 E+00 | 4,10 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 8,08 E-07 | 1,91 E-06 | 1,27 E-05 | 6,88 E-07 | -2,60 E-04 |
| ADPF | MJ | | | | 1,42 E+03 | 3,14 E+00 | 4,53 E+01 | 0,00 E+00 | 3,89 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,16 E+00 | 1,14 E+00 | 3,09 E+00 | 4,13 E-01 | -1,02 E+03 |
| GWP | kg CO2 eq. | | | | 1,08 E+02 | 2,05 E-01 | 4,15 E+00 | 0,00 E+00 | 2,43 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,41 E-01 | 7,47 E-02 | 2,34 E-01 | 5,43 E-02 | -7,93 E+01 |
| ODP | Kg CFC11 eq. | | | | 6,95 E-06 | 3,65 E-08 | 2,34 E-07 | 0,00 E+00 | 3,39 E-07 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,02 E-08 | 1,33 E-08 | 2,83 E-08 | 3,35 E-09 | -4,42 E-06 |
| POCP | Kg ethene eq. | | | | 6,39 E-02 | 1,24 E-04 | 2,05 E-03 | 0,00 E+00 | 1,82 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,05 E-04 | 4,51 E-05 | 1,99 E-04 | 2,11 E-05 | -4,41 E-02 |
| AP | kg SO2 eq. | | | | 5,96 E-01 | 9,04 E-04 | 1,89 E-02 | 0,00 E+00 | 1,36 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 7,97 E-04 | 3,29 E-04 | 2,22 E-03 | 1,82 E-04 | -4,73 E-01 |
| EP | kg (PO4 ) 3- eq. | | | | 5,10 E-02 | 1,78 E-04 | 1,75 E-03 | 0,00 E+00 | 2,93 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,70 E-04 | 6,46 E-05 | 2,84 E-04 | 2,55 E-05 | -3,61 E-02 |
| Toxicity indicators for Dutch market | | | | | | | | | | | | | | | | | | | |
| HTP | kg DCB-Eq | | | | 1,40 E+02 | 8,65 E-02 | 4,30 E+00 | 0,00 E+00 | 1,15 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 5,62 E-02 | 3,15 E-02 | 2,74 E-01 | 1,99 E-02 | -1,20 E+02 |
| FAETP | kg DCB-Eq | | | | 1,49 E+00 | 2,53 E-03 | 5,42 E-02 | 0,00 E+00 | 1,26 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 8,24 E-04 | 9,19 E-04 | 5,10 E-03 | 5,19 E-04 | -6,73 E-01 |
| MAETP | kg DCB-Eq | | | | 6,15 E+03 | 9,09 E+00 | 2,01 E+02 | 0,00 E+00 | 5,98 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,84 E+00 | 3,30 E+00 | 2,22 E+01 | 1,80 E+00 | -4,89 E+03 |
| TETP | kg DCB-Eq | | | | 3,06 E-01 | 3,06 E-04 | 1,01 E-02 | 0,00 E+00 | 5,54 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 8,46 E-04 | 1,11 E-04 | 8,53 E-04 | 7,68 E-05 | -2,20 E-01 |
| ECI | euro | | | | 21,75 | 0,02 | 0,72 | 0,00 E+00 | 0,39 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,02 | 0,01 | 0,05 | 0,01 | - 17,68 |
| ADPF | kg Sb eq. | | | | 6,83 E-01 | 1,51 E-03 | 2,18 E-02 | 0,00 E+00 | 1,87 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,04 E-03 | 5,50 E-04 | 1,49 E-03 | 1,99 E-04 | -4,89 E-01 |

ADPE = Abiotic Depletion Potential for non-fossil resources
ADPF = Abiotic Depletion Potential for fossil resources
GWP = Global Warming Potential
ODP = Depletion potential of the stratospheric ozone layer
POCP = Formation potential of tropospheric ozone photochemical oxidants
AP = Acidification Potential of land and water
EP = Eutrophication Potential
HTP = Human Toxicity Potential
FAETP = Fresh water aquatic ecotoxicity potential
MAETP = Marine aquatic ecotoxicity potential
TETP = Terrestrial ecotoxicity potential
ECI = Environmental Cost Indicator
ADPF = Abiotic Depletion Potential for fossil resources expressed in [kg Sb-eq.]

## ENVIRONMENTAL IMPACT of 1 m² non-scalable environmental profile (core indicators A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP-total | kg CO2 eq. | | | | 6,00 E+01 | 2,07 E-01 | 2,71 E+00 | 0,00 E+00 | 2,52 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,43 E-01 | 7,54 E-02 | 2,37 E-01 | 5,50 E-02 | -3,79 E+01 |
| GWP-fossil | kg CO2 eq. | | | | 5,95 E+01 | 2,07 E-01 | 2,69 E+00 | 0,00 E+00 | 2,46 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,43 E-01 | 7,54 E-02 | 2,37 E-01 | 5,50 E-02 | -3,73 E+01 |
| GWP-biogenic | kg CO2 eq. | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| GWP-luluc) | kg CO2 eq. | | | | 5,81 E-01 | 7,59 E-05 | 1,75 E-02 | 0,00 E+00 | 6,01 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,23 E-05 | 2,76 E-05 | 2,56 E-04 | 2,36 E-05 | -5,65 E-01 |
| ODP | kg CFC11 eq. | | | | 5,20 E-06 | 4,57 E-08 | 1,86 E-07 | 0,00 E+00 | 3,91 E-07 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,46 E-08 | 1,66 E-08 | 3,28 E-08 | 3,99 E-09 | -3,26 E-06 |
| AP | mol H+ eq. | | | | 4,25 E-01 | 1,20 E-03 | 1,42 E-02 | 0,00 E+00 | 1,81 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,10 E-03 | 4,37 E-04 | 2,77 E-03 | 2,29 E-04 | -3,29 E-01 |
| EP-freshwater | kg PO4 eq. | | | | 1,47 E-02 | 2,09 E-06 | 4,43 E-04 | 0,00 E+00 | 8,01 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,96 E-06 | 7,60 E-07 | 1,56 E-05 | 1,15 E-06 | -1,38 E-02 |
| EP-marine | kg N eq. | | | | 5,64 E-02 | 4,24 E-04 | 2,24 E-03 | 0,00 E+00 | 6,60 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 4,46 E-04 | 1,54 E-04 | 6,11 E-04 | 5,51 E-05 | -3,90 E-02 |
| EP-terrestrial | mol N eq. | | | | 6,09 E-01 | 4,67 E-03 | 2,43 E-02 | 0,00 E+00 | 6,67 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 4,91 E-03 | 1,70 E-03 | 7,09 E-03 | 6,25 E-04 | -4,09 E-01 |
| POCP | kg NMVOC eq. | | | | 1,99 E-01 | 1,33 E-03 | 7,62 E-03 | 0,00 E+00 | 1,82 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,36 E-03 | 4,85 E-04 | 1,94 E-03 | 1,80 E-04 | -1,30 E-01 |
| ADP-minerals & metals | kg Sb eq. | | | | 2,64 E-04 | 5,25 E-06 | 9,76 E-06 | 0,00 E+00 | 4,09 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 8,08 E-07 | 1,91 E-06 | 1,27 E-05 | 6,88 E-07 | 6,96 E-04 |
| ADP-fossil | MJ, net calorific value | | | | 6,15 E+02 | 3,13 E+00 | 2,11 E+01 | 0,00 E+00 | 3,69 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,10 E+00 | 1,14 E+00 | 3,17 E+00 | 3,92 E-01 | -3,44 E+02 |
| WDP | m3 world eq. Deprived | | | | 1,72 E+01 | 1,12 E-02 | 5,32 E-01 | 0,00 E+00 | 5,95 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,06 E-02 | 4,07 E-03 | 3,20 E-02 | 1,43 E-02 | -5,52 E+00 |

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 Exceedence
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 Exceedence
POCP = Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals&metals = Abiotic Depletion Potential for non-fossil resources [2]
ADP-fossil = Abiotic Depletion for fossil resources potential [2]
WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

## ENVIRONMENTAL IMPACT of 1 m² non-scalable environmental profile (additional indicators A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM | Disease incidence | | | | 5,14 E-06 | 1,86 E-08 | 1,84 E-07 | 0,00 E+00 | 3,41 E-07 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,60 E-08 | 6,77 E-09 | 3,48 E-08 | 3,46 E-09 | -2,19 E-06 |
| IRP | kBq U235 eq. | | | | 4,12 E+00 | 1,31 E-02 | 1,33 E-01 | 0,00 E+00 | 1,08 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 6,96 E-03 | 4,76 E-03 | 1,58 E-02 | 1,57 E-03 | -3,39 E+00 |
| ETP-fw | CTUe | | | | 1,57 E+03 | 2,79 E+00 | 5,54 E+01 | 0,00 E+00 | 5,07 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,65 E+00 | 1,01 E+00 | 1,36 E+01 | 1,84 E+02 | -9,97 E+02 |
| HTP-c | CTUh | | | | 1,33 E-07 | 9,04 E-11 | 4,16 E-09 | 0,00 E+00 | 1,88 E-09 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 9,54 E-11 | 3,29 E-11 | 3,32 E-10 | 5,85 E-11 | -9,22 E-08 |
| HTP-nc | CTUh | | | | 2,08 E-06 | 3,05 E-09 | 6,67 E-08 | 0,00 E+00 | 4,93 E-08 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,38 E-09 | 1,11 E-09 | 1,58 E-08 | 1,28 E-09 | -1,63 E-06 |
| SQP | ---- | | | | 1,83 E+02 | 2,71 E+00 | 6,26 E+00 | 0,00 E+00 | 1,41 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,33 E-01 | 9,86 E-01 | 6,37 E+00 | 5,92 E-01 | -9,00 E+01 |

PM = Potential incidence of disease due to PM emissions
IRP = Potential Human exposure efficiency relative to U235 [1]
ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
HTP-c = Potential Comparative Toxic Unit for humans [2]
HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
SQP = Potential soil quality index [2]

Disclaimer [1]
- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste.

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

## OUTPUT FLOWS AND WASTE CATEGORIES of 1 m² non-scalable environmental profile (A1 and A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HWD | kg | | | | 2,09 E-01 | 7,92 E-06 | 6,26 E-03 | 0,00 E+00 | 7,32 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 5,26 E-06 | 2,88 E-06 | 9,56 E-06 | 7,14 E-07 | -1,99 E-01 |
| NHWD | kg | | | | 4,00 E+01 | 1,98 E-01 | 1,27 E+00 | 0,00 E+00 | 1,74 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 5,14 E-03 | 7,21 E-02 | 9,28 E-02 | 3,18 E-01 | -3,47 E+01 |
| RWD | kg | | | | 2,61 E-03 | 2,05 E-05 | 9,11 E-05 | 0,00 E+00 | 1,42 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,02 E-05 | 7,46 E-06 | 1,88 E-05 | 1,87 E-06 | -1,87 E-03 |
| CRU | kg | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| MFR | kg | | | | 3,46 E-01 | 0,00 E+00 | 3,25 E-01 | 0,00 E+00 | 5,16 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 4,87 E-05 | 0,00 E+00 | 9,26 E+00 | 0,00 E+00 | 0,00 E+00 |
| MER | kg | | | | 9,80 E-01 | 0,00 E+00 | 2,68 E-01 | 0,00 E+00 | 3,00 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,83 E-06 | 0,00 E+00 | 2,66 E-03 | 0,00 E+00 | 0,00 E+00 |
| EEE | MJ | | | | 7,51 E+00 | 0,00 E+00 | 2,02 E+00 | 0,00 E+00 | 2,03 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,92 E-04 | 0,00 E+00 | 1,30 E-02 | 0,00 E+00 | -3,32 E-04 |
| ETE | MJ | | | | 1,29 E+01 | 0,00 E+00 | 3,49 E+00 | 0,00 E+00 | 3,50 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 3,30 E-04 | 0,00 E+00 | 2,25 E-02 | 0,00 E+00 | -3,64 E-03 |

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

## RESOURCE USE of 1 m² non-scalable environmental profile (A1 and A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | | | | 4,33 E+02 | 3,91 E-02 | 1,31 E+01 | 0,00 E+00 | 3,75 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,38 E-02 | 1,42 E-02 | 4,97 E-01 | 3,13 E-02 | -4,14 E+02 |
| PERM | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| PERT | MJ | | | | 4,33 E+02 | 3,91 E-02 | 1,31 E+01 | 0,00 E+00 | 3,75 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,38 E-02 | 1,42 E-02 | 4,97 E-01 | 3,13 E-02 | -4,14 E+02 |
| PENRE | MJ | | | | 6,40 E+02 | 3,32 E+00 | 2,20 E+01 | 0,00 E+00 | 3,96 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,25 E+00 | 1,21 E+00 | 3,36 E+00 | 3,97 E-01 | -3,39 E+02 |
| PENRM | MJ | | | | 8,70 E-02 | 0,00 E+00 | 2,61 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| PENRT | MJ | | | | 6,41 E+02 | 3,32 E+00 | 2,20 E+01 | 0,00 E+00 | 3,96 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 2,25 E+00 | 1,21 E+00 | 3,36 E+00 | 3,97 E-01 | -3,39 E+02 |
| SM | kg | | | | 1,83 E+00 | 0,00 E+00 | 5,48 E-02 | 0,00 E+00 | 1,54 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 1,45 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| RSF | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| NRSF | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| FW | m3 | | | | 2,65 E+00 | 3,81 E-04 | 8,01 E-02 | 0,00 E+00 | 1,48 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 3,68 E-04 | 1,38 E-04 | 1,51 E-03 | 1,28 E-04 | -2,33 E+00 |

PERE = Use of renewable energy excluding renewable primary energy resources
PERM = Use of renewable energy resources used as raw materials
PERT = Total use of renewable primary energy resources
PENRE = Use of non-renewable primary energy resources excluding non-renewable 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 = Use of net fresh water

## BIOGENIC CARBON CONTENT of 1 m² non-scalable environmental profile (A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BBCpr | Kg C | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| BCCpa | kg C | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging

## RESULTS FOR SCALABLE FLANGES PROFILE

### ENVIRONMENTAL IMPACT of 1 kg of flanges - scalable (A1)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADPE | kg Sb eq. | | | | 1,28 E-04 | 5,13 E-07 | 3,93 E-06 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,86 E-07 | 1,29 E-06 | 1,72 E-08 | -2,59 E-05 |
| ADPF | MJ | | | | 1,36 E+02 | 3,07 E-01 | 4,13 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,12 E-01 | 3,14 E-01 | 2,71 E-02 | -1,04 E+02 |
| GWP | kg CO2 eq. | | | | 1,05 E+01 | 2,01 E-02 | 3,93 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 7,29 E-03 | 2,29 E-02 | 1,58 E-03 | -8,20 E+00 |
| ODP | Kg CFC11 eq. | | | | 6,46 E-07 | 3,56 E-09 | 1,99 E-08 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,29 E-09 | 2,87 E-09 | 1,93 E-10 | -4,53 E-07 |
| POCP | Kg ethene eq. | | | | 6,11 E-03 | 1,21 E-05 | 1,86 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 4,40 E-06 | 2,02 E-05 | 1,23 E-06 | -4,50 E-03 |
| AP | kg SO2 eq. | | | | 5,81 E-02 | 8,83 E-05 | 1,77 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 3,21 E-05 | 2,25 E-04 | 8,49 E-06 | -4,84 E-02 |
| EP | kg (PO4 ) 3- eq. | | | | 4,84 E-03 | 1,73 E-05 | 1,50 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 6,30 E-06 | 2,88 E-05 | 1,22 E-06 | -3,69 E-03 |
| Toxicity indicators for Dutch market | | | | | | | | | | | | | | | | | | | |
| HTP | kg DCB-Eq | | | | 1,33 E+01 | 8,45 E-03 | 4,03 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 3,07 E-03 | 2,78 E-02 | 7,28 E-04 | -1,19 E+01 |
| FAETP | kg DCB-Eq | | | | 9,51 E-02 | 2,47 E-04 | 3,72 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 8,96 E-05 | 5,18 E-04 | 1,86 E-05 | -6,91 E-02 |
| MAETP | kg DCB-Eq | | | | 6,01 E+02 | 8,88 E-01 | 1,94 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 3,22 E-01 | 2,25 E+00 | 4,99 E-02 | -5,01 E+02 |
| TETP | kg DCB-Eq | | | | 2,97 E-02 | 2,99 E-05 | 9,02 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,09 E-05 | 8,66 E-05 | 3,20 E-06 | -2,26 E-02 |
| ECI | euro | | | | 2,08 | 0,00 | 0,07 | 0,00 E+00 | 0,00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 | 0,00 | 0,01 | 0,00 | -1,78 |
| ADPF | kg Sb eq. | | | | 6,54 E-02 | 1,48 E-04 | 1,99 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 5,36 E-05 | 1,51 E-04 | 1,30 E-05 | -5,00 E-02 |

ADPE = Abiotic Depletion Potential for non-fossil resources
ADPF = Abiotic Depletion Potential for fossil resources
GWP = Global Warming Potential
ODP = Depletion potential of the stratospheric ozone layer
POCP = Formation potential of tropospheric ozone photochemical oxidants
AP = Acidification Potential of land and water
EP = Eutrophication Potential
HTP = Human Toxicity Potential
FAETP = Fresh water aquatic ecotoxicity potential
MAETP = Marine aquatic ecotoxicity potential
TETP = Terrestrial ecotoxicity potential
ECI = Environmental Cost Indicator
ADPF = Abiotic Depletion Potential for fossil resources expressed in [kg Sb-eq.]

## ENVIRONMENTAL IMPACT of 1 kg of flanges - scalable (core indicators A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP-total | kg CO2 eq. | | | | 5,58 E+00 | 2,03 E-02 | 2,45 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 7,36 E-03 | 2,19 E-02 | 1,64 E-03 | -3,97 E+00 |
| GWP-fossil | kg CO2 eq. | | | | 5,51 E+00 | 2,02 E-02 | 2,42 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 7,35 E-03 | 2,32 E-02 | 1,62 E-03 | -3,90 E+00 |
| GWP-biogenic | kg CO2 eq. | | | | 1,33 E-02 | 9,35 E-06 | 3,57 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 3,40 E-06 | -1,33 E-03 | 1,80 E-05 | -1,20 E-02 |
| GWP-luluc) | kg CO2 eq. | | | | 5,91 E-02 | 7,42 E-06 | 1,77 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,70 E-06 | 2,60 E-05 | 1,26 E-06 | -5,79 E-02 |
| ODP | kg CFC11 eq. | | | | 4,67 E-07 | 4,47 E-09 | 1,46 E-08 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,62 E-09 | 3,33 E-09 | 2,35 E-10 | -3,35 E-07 |
| AP | mol H+ eq. | | | | 4,01 E-02 | 1,17 E-04 | 1,23 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 4,27 E-05 | 2,81 E-04 | 1,07 E-05 | -3,36 E-02 |
| EP-freshwater | kg PO4 eq. | | | | 1,48 E-03 | 2,04 E-07 | 4,44 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 7,42 E-08 | 1,58 E-06 | 4,84 E-08 | -1,42 E-03 |
| EP-marine | kg N eq. | | | | 5,34 E-03 | 4,14 E-05 | 1,71 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,50 E-05 | 6,20 E-05 | 2,73 E-06 | -3,99 E-03 |
| EP-terrestrial | mol N eq. | | | | 5,75 E-02 | 4,56 E-04 | 1,84 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,66 E-04 | 7,20 E-04 | 3,05 E-05 | -4,18 E-02 |
| POCP | kg NMVOC eq. | | | | 1,85 E-02 | 1,30 E-04 | 5,85 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 4,73 E-05 | 1,97 E-04 | 9,21 E-06 | -1,33 E-02 |
| ADP-minerals & metals | kg Sb eq. | | | | 1,55 E-05 | 5,13 E-07 | 5,67 E-07 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,86 E-07 | 1,29 E-06 | 1,72 E-08 | 7,22 E-05 |
| ADP-fossil | MJ, net calorific value | | | | 5,35 E+01 | 3,05 E-01 | 1,66 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,11 E-01 | 3,22 E-01 | 2,47 E-02 | -3,51 E+01 |
| WDP | m3 world eq. Deprived | | | | 1,45 E+00 | 1,09 E-03 | 4,42 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 3,97 E-04 | 3,24 E-03 | 1,50 E-04 | -6,02 E-01 |

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 Exceedence
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 Exceedence
POCP = Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals&metals = Abiotic Depletion Potential for non-fossil resources [2]
ADP-fossil = Abiotic Depletion for fossil resources potential [2]
WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

## ENVIRONMENTAL IMPACT of 1 kg of flanges - scalable (additional indicators A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM | Disease incidence | | | | 5,03 E-07 | 1,82 E-09 | 1,54 E-08 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 6,61 E-10 | 3,53 E-09 | 1,99 E-10 | -2,23 E-07 |
| IRP | kBq U235 eq. | | | | 3,94 E-01 | 1,28 E-03 | 1,20 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 4,65 E-04 | 1,60 E-03 | 8,64 E-05 | -3,48 E-01 |
| ETP-fw | CTUe | | | | 1,44 E+02 | 2,72 E-01 | 4,98 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 9,89 E-02 | 1,38 E+00 | 1,87 E+01 | -1,03 E+02 |
| HTP-c | CTUh | | | | 1,21 E-08 | 8,83 E-12 | 3,68 E-10 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 3,21 E-12 | 3,37 E-11 | 1,71 E-12 | -9,23 E-09 |
| HTP-nc | CTUh | | | | 2,00 E-07 | 2,98 E-10 | 6,19 E-09 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,08 E-10 | 1,60 E-09 | 4,59 E-11 | -1,68 E-07 |
| SQP | ---- | | | | 1,63 E+01 | 2,65 E-01 | 5,42 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 9,62 E-02 | 6,47 E-01 | 3,23 E-02 | -9,15 E+00 |

PM = Potential incidence of disease due to PM emissions
IRP = Potential Human exposure efficiency relative to U235 [1]
ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
HTP-c = Potential Comparative Toxic Unit for humans [2]
HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
SQP = Potential soil quality index [2]

Disclaimer [1]
- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste.

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

## OUTPUT FLOWS AND WASTE CATEGORIES of 1 kg of flanges - scalable (A1 and A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HWD | kg | | | | 2,14 E-02 | 7,74 E-07 | 6,41 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,81 E-07 | 9,70 E-07 | 3,29 E-08 | -2,04 E-02 |
| NHWD | kg | | | | 3,96 E+00 | 1,94 E-02 | 1,25 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 7,04 E-03 | 9,40 E-03 | 3,08 E-02 | -3,53 E+00 |
| RWD | kg | | | | 2,42 E-04 | 2,00 E-06 | 7,52 E-06 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 7,28 E-07 | 1,90 E-06 | 1,12 E-07 | -1,91 E-04 |
| CRU | kg | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| MFR | kg | | | | 3,54 E-02 | 0,00 E+00 | 3,30 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 9,40 E-01 | 0,00 E+00 | 0,00 E+00 |
| MER | kg | | | | 9,96 E-02 | 0,00 E+00 | 2,72 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| EEE | MJ | | | | 7,63 E-01 | 0,00 E+00 | 2,06 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | -3,40 E-05 |
| ETE | MJ | | | | 1,31 E+00 | 0,00 E+00 | 3,54 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | -3,73 E-04 |

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

## RESOURCE USE of 1 kg of flanges - scalable (A1 and A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | | | | 4,35 E+01 | 0,00 E+00 | 1,30 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | -4,30 E+01 |
| PERM | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| PERT | MJ | | | | 4,36 E+01 | 3,82 E-03 | 1,31 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,39 E-03 | 5,04 E-02 | 1,14 E-03 | -4,24 E+01 |
| PENRE | MJ | | | | 5,11 E+01 | 0,00 E+00 | 1,53 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | -4,28 E+01 |
| PENRM | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| PENRT | MJ | | | | 5,55 E+01 | 3,24 E-01 | 1,72 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,18 E-01 | 3,41 E-01 | 2,63 E-02 | -3,46 E+01 |
| SM | kg | | | | 1,85 E-01 | 0,00 E+00 | 5,55 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| RSF | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| NRSF | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| FW | m3 | | | | 2,63 E-01 | 3,72 E-05 | 7,90 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,35 E-05 | 1,53 E-04 | 6,46 E-06 | -2,39 E-01 |

PERE = Use of renewable energy excluding renewable primary energy resources
PERM = Use of renewable energy resources used as raw materials
PERT = Total use of renewable primary energy resources
PENRE = Use of non-renewable primary energy resources excluding non-renewable 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 = Use of net fresh water

## BIOGENIC CARBON CONTENT of 1 kg of flanges - scalable (A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BBCpr | Kg C | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| BCCpa | kg C | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging

## RESULTS FOR SCALABLE PROFILE OF REINFORCEMENTS

### ENVIRONMENTAL IMPACT of one piece of reinforcement per m² - scalable (A1)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ADPE | kg Sb eq. | | | | 2,80 E-04 | 1,09 E-06 | 8,61 E-06 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 3,97 E-07 | 2,75 E-06 | 3,53 E-08 | -6,13 E-05 |
| ADPF | MJ | | | | 2,84 E+02 | 6,54 E-01 | 8,64 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,38 E-01 | 6,71 E-01 | 5,56 E-02 | -2,15 E+02 |
| GWP | kg CO2 eq. | | | | 2,20 E+01 | 4,28 E-02 | 8,25 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,55 E-02 | 5,74 E-02 | 3,28 E-03 | -1,70 E+01 |
| ODP | Kg CFC11 eq. | | | | 1,34 E-06 | 7,59 E-09 | 4,14 E-08 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,76 E-09 | 6,14 E-09 | 3,96 E-10 | -9,35 E-07 |
| POCP | Kg ethene eq. | | | | 1,28 E-02 | 2,58 E-05 | 3,88 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 9,38 E-06 | 4,32 E-05 | 2,52 E-06 | -9,37 E-03 |
| AP | kg SO2 eq. | | | | 1,21 E-01 | 1,88 E-04 | 3,68 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 6,83 E-05 | 4,82 E-04 | 1,74 E-05 | -1,00 E-01 |
| EP | kg (PO4 ) 3- eq. | | | | 1,01 E-02 | 3,70 E-05 | 3,15 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,34 E-05 | 6,17 E-05 | 2,51 E-06 | -7,65 E-03 |
| Toxicity indicators for Dutch market | | | | | | | | | | | | | | | | | | | |
| HTP | kg DCB-Eq | | | | 3,37 E+01 | 1,80 E-02 | 1,02 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 6,54 E-03 | 5,94 E-02 | 1,49 E-03 | -2,83 E+01 |
| FAETP | kg DCB-Eq | | | | 2,02 E-01 | 5,26 E-04 | 7,90 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,91 E-04 | 1,11 E-03 | 4,15 E-05 | -1,44 E-01 |
| MAETP | kg DCB-Eq | | | | 1,25 E+03 | 1,89 E+00 | 4,05 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 6,87 E-01 | 4,81 E+00 | 1,05 E-01 | -1,04 E+03 |
| TETP | kg DCB-Eq | | | | 6,90 E-02 | 6,37 E-05 | 2,09 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,31 E-05 | 1,85 E-04 | 6,56 E-06 | -4,62 E-02 |
| ECI | euro | | | | 4,89 | 0,01 | 0,16 | 0,00 E+00 | 0,00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 | 0,01 | 0,00 | -4,01 |
| ADPF | kg Sb eq. | | | | 1,37 E-01 | 3,15 E-04 | 4,16 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,14 E-04 | 3,23 E-04 | 2,67 E-05 | -1,03 E-01 |

ADPE = Abiotic Depletion Potential for non-fossil resources
ADPF = Abiotic Depletion Potential for fossil resources
GWP = Global Warming Potential
ODP = Depletion potential of the stratospheric ozone layer
POCP = Formation potential of tropospheric ozone photochemical oxidants
AP = Acidification Potential of land and water
EP = Eutrophication Potential
HTP = Human Toxicity Potential
FAETP = Fresh water aquatic ecotoxicity potential
MAETP = Marine aquatic ecotoxicity potential
TETP = Terrestrial ecotoxicity potential
ECI = Environmental Cost Indicator
ADPF = Abiotic Depletion Potential for fossil resources expressed in [kg Sb-eq.]

## ENVIRONMENTAL IMPACT of one piece of reinforcement per m² - scalable (core indicators A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP-total | kg CO2 eq. | | | | 1,19 E+01 | 4,32 E-02 | 5,21 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,57 E-02 | 5,80 E-02 | 3,36 E-03 | -8,29 E+00 |
| GWP-fossil | kg CO2 eq. | | | | 1,17 E+01 | 4,32 E-02 | 5,18 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,57 E-02 | 5,79 E-02 | 3,36 E-03 | -8,18 E+00 |
| GWP-biogenic | kg CO2 eq. | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| GWP-luluc) | kg CO2 eq. | | | | 1,21 E-01 | 1,58 E-05 | 3,63 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 5,74 E-06 | 5,55 E-05 | 2,58 E-06 | -1,18 E-01 |
| ODP | kg CFC11 eq. | | | | 9,82 E-07 | 9,53 E-09 | 3,07 E-08 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 3,46 E-09 | 7,13 E-09 | 4,83 E-10 | -6,93 E-07 |
| AP | mol H+ eq. | | | | 8,48 E-02 | 2,50 E-04 | 2,61 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 9,09 E-05 | 6,02 E-04 | 2,20 E-05 | -7,00 E-02 |
| EP-freshwater | kg PO4 eq. | | | | 3,04 E-03 | 4,35 E-07 | 9,13 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,58 E-07 | 3,37 E-06 | 9,90 E-08 | -2,90 E-03 |
| EP-marine | kg N eq. | | | | 1,14 E-02 | 8,82 E-05 | 3,65 E-04 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 3,20 E-05 | 1,33 E-04 | 5,62 E-06 | -8,36 E-03 |
| EP-terrestrial | mol N eq. | | | | 1,23 E-01 | 9,72 E-04 | 3,94 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 3,53 E-04 | 1,54 E-03 | 6,26 E-05 | -8,78 E-02 |
| POCP | kg NMVOC eq. | | | | 3,95 E-02 | 2,78 E-04 | 1,25 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,01 E-04 | 4,21 E-04 | 1,89 E-05 | -2,80 E-02 |
| ADP-minerals & metals | kg Sb eq. | | | | 5,04 E-05 | 1,09 E-06 | 1,73 E-06 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 3,97 E-07 | 2,75 E-06 | 3,53 E-08 | 1,39 E-04 |
| ADP-fossil | MJ, net calorific value | | | | 1,15 E+02 | 6,51 E-01 | 3,56 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,36 E-01 | 6,88 E-01 | 5,08 E-02 | -7,39 E+01 |
| WDP | m3 world eq. Deprived | | | | 3,06 E+00 | 2,33 E-03 | 9,32 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 8,46 E-04 | 7,02 E-03 | 3,15 E-04 | -1,24 E+00 |

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 Exceedence
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 Exceedence
POCP = Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals&metals = Abiotic Depletion Potential for non-fossil resources [2]
ADP-fossil = Abiotic Depletion for fossil resources potential [2]
WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

## ENVIRONMENTAL IMPACT of one piece of reinforcement per m² - scalable (additional indicators A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM | Disease incidence | | | | 1,07 E-06 | 3,88 E-09 | 3,27 E-08 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,41 E-09 | 7,54 E-09 | 4,08 E-10 | -4,73 E-07 |
| IRP | kBq U235 eq. | | | | 8,18 E-01 | 2,73 E-03 | 2,50 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 9,90 E-04 | 3,42 E-03 | 1,77 E-04 | -7,14 E-01 |
| ETP-fw | CTUe | | | | 3,09 E+02 | 5,80 E-01 | 1,07 E+01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,11 E-01 | 2,96 E+00 | 3,83 E+01 | -2,18 E+02 |
| HTP-c | CTUh | | | | 3,14 E-08 | 1,88 E-11 | 9,55 E-10 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 6,84 E-12 | 7,21 E-11 | 3,50 E-12 | -2,21 E-08 |
| HTP-nc | CTUh | | | | 4,28 E-07 | 6,35 E-10 | 1,33 E-08 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,31 E-10 | 3,42 E-09 | 9,40 E-11 | -3,33 E-07 |
| SQP | ---- | | | | 3,58 E+01 | 5,65 E-01 | 1,19 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,05 E-01 | 1,38 E+00 | 6,64 E-02 | -1,99 E+01 |

PM = Potential incidence of disease due to PM emissions
IRP = Potential Human exposure efficiency relative to U235 [1]
ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
HTP-c = Potential Comparative Toxic Unit for humans [2]
HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
SQP = Potential soil quality index [2]

Disclaimer [1]
- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste.

Disclaimer [2]
- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

## OUTPUT FLOWS AND WASTE CATEGORIES of one piece of reinforcement per m² - scalable (A1 and A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HWD | kg | | | | 4,37 E-02 | 1,65 E-06 | 1,31 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 5,99 E-07 | 2,08 E-06 | 6,76 E-08 | -4,18 E-02 |
| NHWD | kg | | | | 8,58 E+00 | 4,13 E-02 | 2,71 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,50 E-02 | 2,03 E-02 | 6,42 E-02 | -7,48 E+00 |
| RWD | kg | | | | 5,07 E-04 | 4,27 E-06 | 1,58 E-05 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 1,55 E-06 | 4,07 E-06 | 2,30 E-07 | -3,94 E-04 |
| CRU | kg | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| MFR | kg | | | | 7,25 E-02 | 0,00 E+00 | 7,03 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 2,01 E+00 | 0,00 E+00 | 0,00 E+00 |
| MER | kg | | | | 2,12 E-01 | 0,00 E+00 | 5,81 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 2,66 E-03 | 0,00 E+00 | 0,00 E+00 |
| EEE | MJ | | | | 1,63 E+00 | 0,00 E+00 | 4,39 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 1,30 E-02 | 0,00 E+00 | -6,94 E-05 |
| ETE | MJ | | | | 2,80 E+00 | 0,00 E+00 | 7,56 E-01 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 2,25 E-02 | 0,00 E+00 | -7,63 E-04 |

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

## RESOURCE USE of one piece of reinforcement per m² - scalable (A1 and A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | | | | 9,02 E+01 | 8,15 E-03 | 2,71 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,96 E-03 | 1,08 E-01 | 2,33 E-03 | -8,71 E+01 |
| PERM | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| PERT | MJ | | | | 9,02 E+01 | 8,15 E-03 | 2,71 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,96 E-03 | 1,08 E-01 | 2,33 E-03 | -8,71 E+01 |
| PENRE | MJ | | | | 1,19 E+02 | 6,91 E-01 | 3,70 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,51 E-01 | 7,29 E-01 | 5,40 E-02 | -7,29 E+01 |
| PENRM | MJ | | | | 8,70 E-02 | 0,00 E+00 | 2,61 E-03 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| PENRT | MJ | | | | 1,19 E+02 | 6,91 E-01 | 3,70 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,51 E-01 | 7,29 E-01 | 5,40 E-02 | -7,29 E+01 |
| SM | kg | | | | 4,01 E-01 | 0,00 E+00 | 1,20 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| RSF | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| NRSF | MJ | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| FW | m3 | | | | 5,39 E-01 | 7,93 E-05 | 1,62 E-02 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 2,88 E-05 | 3,37 E-04 | 1,34 E-05 | -4,89 E-01 |

PERE = Use of renewable energy excluding renewable primary energy resources
PERM = Use of renewable energy resources used as raw materials
PERT = Total use of renewable primary energy resources
PENRE = Use of non-renewable primary energy resources excluding non-renewable 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 = Use of net fresh water

## BIOGENIC CARBON CONTENT of one piece of reinforcement per m² - scalable (A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BBCpr | Kg C | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |
| BCCpa | kg C | | | | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | ND | ND | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 | 0,00 E+00 |

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging