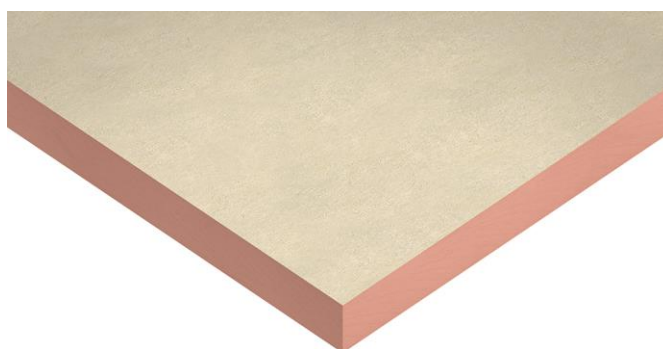


B-EPD .BE

23-0191-009-
01.00.01

Kingspan Insulation BV
Kooltherm[®] K20



ISSUED 20.04.2023
VALID UNTIL 20.04.2028

THIRD PARTY VERIFIED
in accordance with EN 15804+A2, EN16783
and NBN/DTD B08-001

MODULES DECLARED

1 m² thermal insulation board with a thickness of 70 mm
with an R_b-value of 3,30 m²·K/W

Cradle to gate with options

| A123 | A4 | A5 | B2 B4 | C | D |
|------|----|----|-------|---|---|
| x | x | x | | x | x |

The intended use of this EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings. This EPD is only valid when registered on www.b-epd.be. The FPS Public Health cannot be held responsible for the information provided by the owner of the EPD.

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1 PRODUCT DESCRIPTION

1.1 Product name

Kooltherm® K20 Concrete Sandwich Board

1.2 Product description and intended use

The Kingspan Kooltherm® K20 is a premium performance insulation board with a fibre-free rigid thermoset phenolic core, faced on both sides with a glass tissue based facing that is autohesively bonded to the insulation core during manufacture.

Phenolic foam is produced by the use of phenolic resin, a catalyst, additives and blowing agent. The cell structure is formed in the resin under the influence of heat released during the chemical reaction. Hereby, the blowing agent is incorporated into the material which forms a solid and very fine cell structure, which is nearly 100% closed.

This is a specific EPD from a single company, Kingspan insulation BV.

Kooltherm® K20 is suitable for use as exterior wall insulation underneath applicable render systems.

1.3 Reference flow / declared unit

1 m² thermal insulation with a thickness of 70 mm which gives a R_D-value of 3,30 m²K/W.

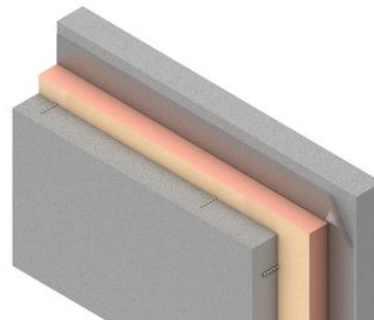
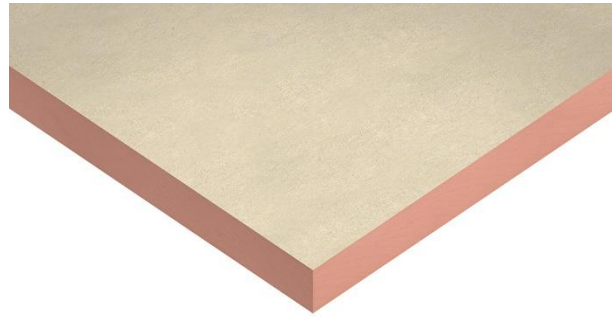
The results in this environmental product declaration (EPD) can be converted to other thicknesses (and corresponding R_D value) using the formula in chapter 14 of this EPD.

The R_D-range of Kooltherm® K20 is 0,95 m²K/W (20mm) to 9,5 m²K/W (200mm).

Packaging is included .

The weight per reference flow is 2,45 kg.

The density of the product is 35 kg / m³.



1.4 Installation

Materials for fixation and installation are not included. Regarding installation this EPD only includes the environmental impact related to the product itself. It also includes the loss of material during construction. The additional needed production, transport and end-of-life of the lost material during construction is included. The end-of-life of packaging material up to the end-of-waste state is also included.

For installing the product following scenarios are possible: Pierced/loose hanging. This may lead to the need of additional products and materials for which the impact is not included in this EPD and which shall be taken into account at building level.

For questions about installation please contact our Technical Service Department: Techline.be@kingspan.com

In chapter 15 an overview is given on the qualitative assessment of the reversibility of Kooltherm® K20.

1.5 Composition and content

| Components | Composition / content / ingredients | Quantity |
|--------------------|--|---|
| Product | <ul style="list-style-type: none">– PF core– Glass tissue facer | <ul style="list-style-type: none">– 2,310 kg– 0,140 kg |
| Fixation materials | Not included in the EPD ('as produced') | |
| Jointing materials | Not included in the EPD ('as produced') | |
| Treatments | NA | |
| Packaging | <ul style="list-style-type: none">– PE-foil– EPS skids | <ul style="list-style-type: none">– 0,0118 kg– 0,0441 kg |

The product does not contain materials listed in the "Candidate list of Substances of Very High Concern for authorization" exceeding 0,1% by mass.

1.6 Reference service life

The reference service life is estimated at 75 years.

The RSL is based on the OVAM rapport "Technische levensduur van gebouwcomponenten" (published 30.11.2018).

The conditions under which this RSL is valid are as following: natural ageing conditions

1.7 Description of geographical representativity

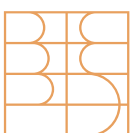
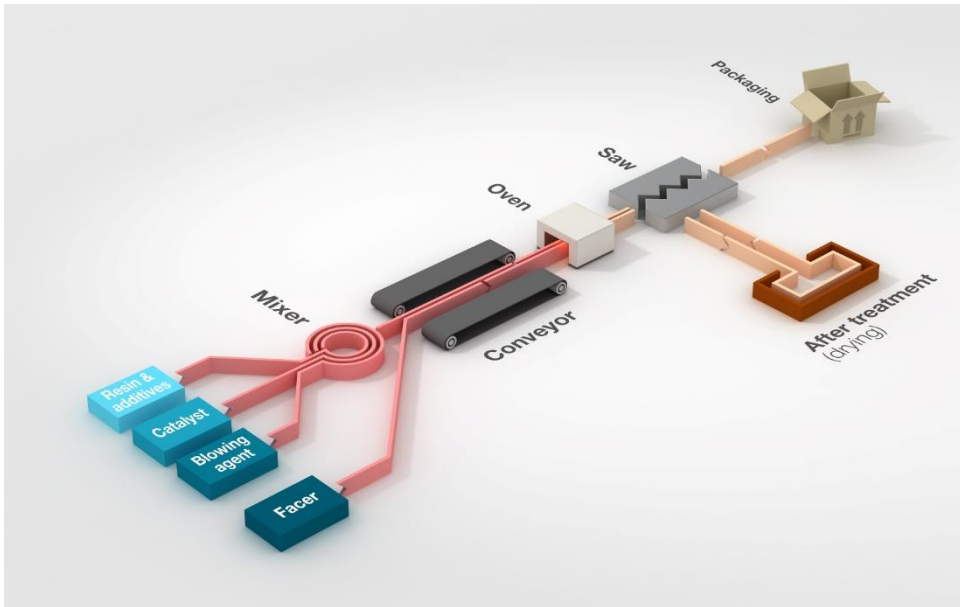
The EPD is representative for the Belgian market.

Kooltherm® K20 is produced by Kingspan Insulation B.V. at the manufacturing facility in Tiel, the Netherlands.



1.8 Description of the production process and technology

Kingspan Kooltherm® is made through a manufacturing process in which a foam forms an insulating core between two facing elements. At the start of the process a mix of chemicals is added directly to the bottom layer of facing and then expands to meet the top layer of facing. As it dries, the foam becomes tacky and adheres itself to the facing, top and bottom. Once it has reached the necessary thickness the foam is cooked under pressure. It is then moved onto a secondary oven to cure and harden, becoming bright pink in colour. The insulation boards are then cut into the necessary sizes, packaged and sent to the loading bay for collection.



2 TECHNICAL DATA / PHYSICAL CHARACTERISTICS

| Technical property | Value | Unit | Comment |
|---|-------|---------------------|---------|
| Thickness | 70 | mm | |
| Density | 35 | kg / m ³ | |
| Thermal conductivity λ_d acc. to EN 13166 | 0,021 | W/m·K | |
| R _D -value | 3,30 | m ² ·K/W | |
| | | | |
| | | | |

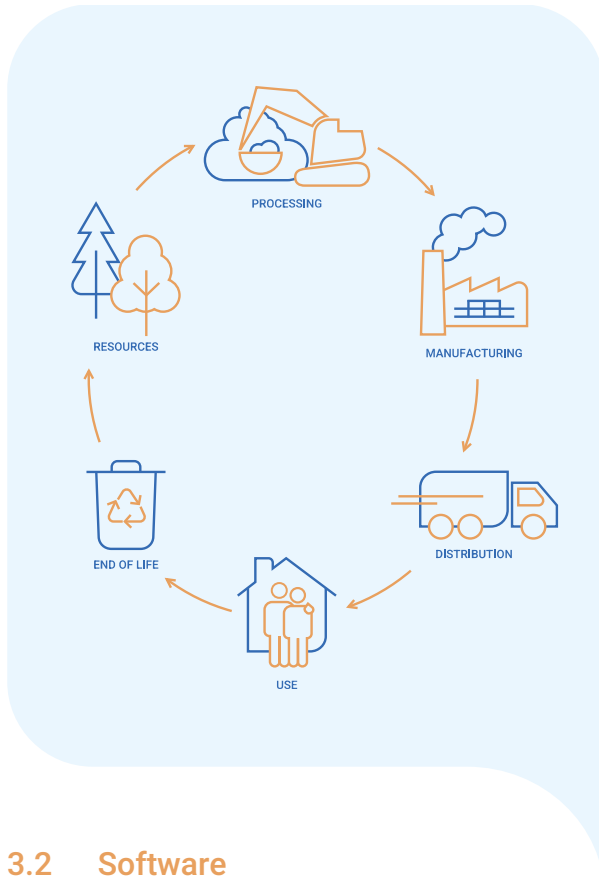
More technical properties can be found in the Declaration of Performance (DoP) of the product. DoP's of the products of Kingspan are available at: <https://www.kingspan.com/blx/fr-be> and <https://www.kingspan.com/be/nl/>



3 LCA-STUDY

3.1 Date of LCA-study

August 2022



3.2 Software

For the calculation of the LCA results, the software program SimaPro 9.1.1 has been used.

3.3 Information on allocation

Different types of Kooltherm® insulation boards are produced at the production plant in Tiel (NL). For the use of energy there is only data available for the total site. This data has been allocated to Kooltherm® K20 based on physical properties. Production waste was allocated similarly.

3.4 Informatie on cut off

The total of neglected input flows per module is less than 5% of energy usage and mass as prescribed by EN15804+A2.

3.5 Information on excluded processes

Following processes were excluded for the inventory:

- Impact of infrastructures
- Consumables necessary for the functioning of the process, production, maintenance and end-of-life of equipment
- Environmental impacts caused by the personnel of the production plants are not included in the LCA, e.g. waste from the cafeteria and sanitary installations or environmental effects caused by commuter traffic. Heating or cooling of the plants in order to ensure a comfortable indoor climate for the personnel could not be distinguished during the data collection and is therefore included.



3.6 Information on biogenic carbon modelling

The total mass of biogenic carbon containing materials is less than 5 % of the total mass of the product and accompanying packaging.

3.7 Information on carbon offsetting

Carbon offsetting is not allowed in the EN 15804 and hence not taken into account in the calculations.

3.8 Additional or deviating characterization factors

The characterization factors from EC-JRC were applied. No additional or deviating characterization factors were used.

3.9 Description of the variability

The declared unit in this EPD is 1 m² thermal insulation with a thickness of 70 mm which gives a R_D-value of 3,30 m²·K/W. Kingspan Kooltherm® K20 can be produced in all thicknesses between 20 and 200mm (single layer product) and covers a R_D range of 0.95 – 9.50. The results in this EPD can be used to recalculate to other thicknesses / R_D-values. Where the foam-core is the scalable part and the facer the non-scalable part.



3.10 Specificity

The data used for the LCA are specific for this product which is manufactured by a single manufacturer in a single production site.

3.11 Period of data collection

Manufacturer specific data for the location Tiel have been collected for the year 2019.

3.12 Information on data collection

Company specific data for the product stage have been collected by Kingspan Insulation and were provided to Nibe (R<Think application)

3.13 Database used for background data

The Ecoinvent v3.6 database (2019) is used for background data

3.14 Energy mix

All electricity used during production comes from renewable sources.

By generating energy on-site with PV panels and with procured energy from fully certified renewable sources (Guarantees of Origin).



4 PRODUCTION SITES

Manufacturing site located in Tiel (the Netherlands)

5 SYSTEM BOUNDARIES











| Product stage | | | Construction installation stage | | Use stage | | | | | | | End of life stage | | | | Beyond the system boundaries |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Raw materials | Transport | Manufacturing | Transport | Construction installation stage | 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 |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

X = included in the EPD
 □ = module not declared














6 POTENTIAL ENVIRONMENTAL IMPACTS PER REFERENCE FLOW

Foam core (without glass tissue facer)

| | Production | | | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | D Reuse, recovery, recycling |
|---|-----------------|--------------|------------------|----------------------------|-----------------|-----------|----------------|-----------|----------------|------------------|---------------------------|--------------------------|--------------------------------|--------------|---------------------|-------------|------------------------------|
| | A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | |
|  GWP total (kg CO2 equiv/FU) | 3,65E+00 | 1,27E-01 | 1,24E+00 | 7,10E-02 | 2,88E-01 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 4,91E-02 | 5,15E+00 | 1,33E-02 | -1,19E+00 |
| GWP fossil (kg CO2 equiv/FU) | 8,91E-03 | 2,54E-04 | -1,72E-03 | 3,79E-05 | 1,47E-04 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 2,62E-05 | 4,63E-04 | 1,42E-05 | -6,35E-03 |
| GWP biogenic (kg CO2 equiv/FU) | 3,64E+00 | 1,27E-01 | 1,24E+00 | 7,10E-02 | 2,87E-01 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 4,91E-02 | 5,15E+00 | 1,33E-02 | -1,19E+00 |
| GWP luluc (kg CO2 equiv/FU) | 9,19E-04 | 8,47E-05 | 2,10E-04 | 2,48E-05 | 3,20E-05 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,72E-05 | 9,04E-05 | 4,13E-07 | -9,48E-04 |
|  ODP (kg CFC 11 equiv/FU) | 2,70E-07 | 2,43E-08 | 1,09E-07 | 1,61E-08 | 1,03E-08 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,12E-08 | 3,57E-08 | 3,89E-10 | -1,89E-07 |
|  AP (mol H+ eq/FU) | 1,34E-02 | 1,32E-03 | 2,47E-03 | 2,90E-04 | 4,17E-04 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 2,01E-04 | 1,35E-03 | 9,84E-06 | -1,51E-03 |
|  EP - freshwater (kg (PO4)3- equiv/FU) | 6,17E-05 | 2,45E-06 | 1,52E-05 | 5,57E-07 | 1,82E-06 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 3,86E-07 | 3,53E-06 | 1,39E-08 | -1,02E-05 |
|  EP - marine (kg (PO4)3- equiv/FU) | 2,39E-03 | 4,02E-04 | 4,87E-04 | 8,61E-05 | 9,29E-05 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 5,95E-05 | 5,60E-04 | 1,73E-05 | -3,80E-04 |
|  EP - terrestrial (kg (PO4)3- equiv/FU) | 2,96E-02 | 4,46E-03 | 5,55E-03 | 9,52E-04 | 1,09E-03 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 6,58E-04 | 6,06E-03 | 3,95E-05 | -4,40E-03 |
|  POCP (kg Ethene equiv/FU) | 1,12E-02 | 1,21E-03 | 2,17E-03 | 2,91E-04 | 3,72E-04 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 2,02E-04 | 1,55E-03 | 1,40E-05 | -1,37E-03 |
|  ADP Elements (kg Sb equiv/FU) | 2,69E-05 | 2,21E-06 | 8,42E-06 | 1,92E-06 | 9,19E-07 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,33E-06 | 1,41E-06 | 9,62E-09 | -1,15E-06 |
|  ADP fossil fuels (MJ/FU) | 1,17E+02 | 1,86E+00 | 2,01E+01 | 1,07E+00 | 2,92E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 7,40E-01 | 1,06E+00 | 3,00E-02 | -2,90E+01 |
|  WDP (m³ water eq deprived /FU) | 1,73E+00 | 9,23E-03 | 2,60E-01 | 2,98E-03 | 4,33E-02 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 2,06E-03 | 6,19E-02 | 1,48E-04 | -1,86E-01 |

Glass tissue facer

| Production | | | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | D Reuse, recovery, recycling | |
|--|--------------|------------------|----------------------------|-----------------|-----------|----------------|-----------|----------------|------------------|---------------------------|--------------------------|--------------------------------|--------------|---------------------|-------------|------------------------------|----------|
| A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | | |
|  GWP total (kg CO2 equiv/FU) | 3,03E-01 | 1,51E-03 | 0,00E+00 | 4,20E-03 | 1,24E-02 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 2,98E-03 | 3,12E-01 | 8,08E-04 | 0,00E+00 |
|  GWP fossil (kg CO2 equiv/FU) | 2,79E-03 | 6,98E-07 | 0,00E+00 | 2,24E-06 | 5,63E-05 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,59E-06 | 2,81E-05 | 8,61E-07 | 0,00E+00 |
|  GWP biogenic (kg CO2 equiv/FU) | 3,00E-01 | 1,51E-03 | 0,00E+00 | 4,20E-03 | 1,23E-02 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 2,98E-03 | 3,12E-01 | 8,07E-04 | 0,00E+00 |
|  GWP luluc (kg CO2 equiv/FU) | 2,65E-04 | 5,54E-07 | 0,00E+00 | 1,47E-06 | 5,44E-06 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,04E-06 | 5,48E-06 | 2,50E-08 | 0,00E+00 |
|  ODP (kg CFC 11 equiv/FU) | 2,82E-08 | 3,34E-10 | 0,00E+00 | 9,54E-10 | 6,27E-10 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 6,76E-10 | 2,16E-09 | 2,36E-11 | 0,00E+00 |
|  AP (mol H+ eq/FU) | 2,31E-03 | 8,77E-06 | 0,00E+00 | 1,72E-05 | 4,83E-05 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,22E-05 | 8,16E-05 | 5,96E-07 | 0,00E+00 |
|  EP - freshwater (kg (PO4)3- equiv/FU) | 1,21E-05 | 1,52E-08 | 0,00E+00 | 3,30E-08 | 2,48E-07 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 2,34E-08 | 2,14E-07 | 8,42E-10 | 0,00E+00 |
|  EP - marine (kg (PO4)3- equiv/FU) | 4,44E-04 | 3,09E-06 | 0,00E+00 | 5,09E-06 | 9,72E-06 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 3,61E-06 | 3,40E-05 | 1,05E-06 | 0,00E+00 |
|  EP - terrestrial (kg (PO4)3- equiv/FU) | 4,96E-03 | 3,41E-05 | 0,00E+00 | 5,63E-05 | 1,08E-04 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 3,99E-05 | 3,68E-04 | 2,40E-06 | 0,00E+00 |
|  POCP (kg Ethene equiv/FU) | 1,36E-03 | 9,72E-06 | 0,00E+00 | 1,72E-05 | 2,95E-05 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,22E-05 | 9,37E-05 | 8,50E-07 | 0,00E+00 |
|  ADP Elements (kg Sb equiv/FU) | 1,46E-05 | 3,83E-08 | 0,00E+00 | 1,14E-07 | 2,96E-07 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 8,05E-08 | 8,56E-08 | 5,83E-10 | 0,00E+00 |
|  ADP fossil fuels (MJ/FU) | 4,68E+00 | 2,28E-02 | 0,00E+00 | 6,33E-02 | 9,62E-02 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 4,49E-02 | 6,43E-02 | 1,82E-03 | 0,00E+00 |
|  WDP (m³ water eq deprived /FU) | 7,89E-02 | 8,16E-05 | 0,00E+00 | 1,76E-04 | 1,66E-03 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,25E-04 | 3,75E-03 | 8,99E-06 | 0,00E+00 |

GWP TOTAL = TOTAL GLOBAL WARMING POTENTIAL (CLIMATE CHANGE); GWP-LULUC = GLOBAL WARMING POTENTIAL (CLIMATE CHANGE) LAND USE AND LAND USE CHANGE; ODP = OZONE DEPLETION POTENTIAL; AP = ACIDIFICATION POTENTIAL FOR SOIL AND WATER; EP = EUTROPHICATION POTENTIAL; POCP = PHOTOCHEMICAL OZONE CREATION; ADPE = ABIOTIC DEPLETION POTENTIAL – ELEMENTS; ADPF = ABIOTIC DEPLETION POTENTIAL – FOSSIL FUELS; WDP = WATER USE (WATER (USER) DEPRIVATION POTENTIAL, DEPRIVATION-WEIGHTED WATER CONSUMPTION)

7 RESOURCE USE

Foam core (without glass tissue facer)

| | Production | | | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | D Reuse, recovery, recycling |
|------------------------------------|-----------------|--------------|------------------|----------------------------|-----------------|-----------|----------------|-----------|----------------|------------------|---------------------------|--------------------------|--------------------------------|--------------|---------------------|-------------|------------------------------|
| | A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | |
| PERE (MJ/FU, net calorific value) | 1,77E+00 | 6,49E-02 | 5,66E+00 | 1,51E-02 | 1,55E-01 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,04E-02 | 2,81E-02 | 1,27E-03 | -1,39E+00 |
| PERM (MJ/FU, net calorific value) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PERT (MJ/FU, net calorific value) | 1,77E+00 | 6,49E-02 | 5,66E+00 | 1,51E-02 | 1,57E-01 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,04E-02 | 9,54E-02 | 1,51E-03 | -1,39E+00 |
| PENRE (MJ/FU, net calorific value) | 1,22E+02 | 1,97E+00 | 1,96E+01 | 1,14E+00 | 3,09E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 7,86E-01 | 2,89E+00 | 1,08E-01 | -3,02E+01 |
| PENRM (MJ/FU, net calorific value) | 5,49E+01 | 0,00E+00 | 4,45E+00 | 0,00E+00 | 1,19E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -6,57E-01 |
| PENRT (MJ/FU, net calorific value) | 1,77E+02 | 1,97E+00 | 2,40E+01 | 1,14E+00 | 4,21E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 7,86E-01 | 1,13E+00 | 3,17E-02 | -3,08E+01 |
| SM (kg/FU) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| RSF (MJ/FU, net calorific value) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| NRSF (MJ/FU, net calorific value) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| FW (m³ water eq/FU) | 7,00E-01 | 4,13E-04 | 3,31E-02 | 1,13E-04 | 1,48E-02 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 7,80E-05 | 2,53E-03 | 3,39E-05 | -5,31E-03 |

Glass tissue facer

| | Production | | | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | D Reuse, recovery, recycling |
|------------------------------------|-----------------|--------------|------------------|----------------------------|-----------------|-----------|----------------|-----------|----------------|------------------|---------------------------|--------------------------|--------------------------------|--------------|---------------------|-------------|------------------------------|
| | A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | |
| PERE (MJ/FU, net calorific value) | 3,81E-01 | 2,85E-04 | 0,00E+00 | 8,94E-04 | 7,68E-03 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 6,33E-04 | 1,70E-03 | 7,71E-05 | 0,00E+00 |
| PERM (MJ/FU, net calorific value) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PERT (MJ/FU, net calorific value) | 3,81E-01 | 2,85E-04 | 0,00E+00 | 8,94E-04 | 7,76E-03 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 6,33E-04 | 5,78E-03 | 9,15E-05 | 0,00E+00 |
| PENRE (MJ/FU, net calorific value) | 5,04E+00 | 2,42E-02 | 0,00E+00 | 6,72E-02 | 1,06E-01 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 4,76E-02 | 1,75E-01 | 6,55E-03 | 0,00E+00 |
| PENRM (MJ/FU, net calorific value) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PENRT (MJ/FU, net calorific value) | 5,04E+00 | 2,42E-02 | 0,00E+00 | 6,72E-02 | 1,04E-01 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 4,76E-02 | 6,84E-02 | 1,92E-03 | 0,00E+00 |
| SM (kg/FU) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| RSF (MJ/FU, net calorific value) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| NRSF (MJ/FU, net calorific value) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| FW (m³ water eq/FU) | 3,06E-03 | 2,78E-06 | 0,00E+00 | 6,67E-06 | 6,44E-05 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 4,73E-06 | 1,53E-04 | 2,05E-06 | 0,00E+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 MATERIAL; RSF = USE OF RENEWABLE SECONDARY FUELS; NRSF = USE OF NON-RENEWABLE SECONDARY FUELS; FW = NET USE OF FRESH WATER

8 WASTE CATEGORIES & OUTPUT FLOWS

Foam core (without glass tissue facer)







| | Production | | | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | D Reuse, recovery, recycling |
|---------------------------------------|-----------------|--------------|------------------|----------------------------|-----------------|-----------|----------------|-----------|----------------|------------------|---------------------------|--------------------------|--------------------------------|--------------|---------------------|-------------|------------------------------|
| | A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | |
| Hazardous waste disposed (kg/FU) | 3,41E-05 | 4,00E-06 | 2,45E-05 | 2,81E-06 | 1,57E-06 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,94E-06 | 3,78E-06 | 3,64E-08 | -2,12E-05 |
| Non-hazardous waste disposed (kg/FU) | 2,39E-01 | 7,49E-02 | 7,74E-02 | 5,12E-02 | 1,92E-02 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 3,54E-02 | 4,46E-02 | 1,16E-01 | -2,96E-02 |
| Radioactive waste disposed (kg/FU) | 4,96E-05 | 1,20E-05 | 1,08E-05 | 7,30E-06 | 2,14E-06 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 5,05E-06 | 3,90E-06 | 2,06E-07 | -1,58E-04 |
| Components for re-use (kg/FU) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Materials for recycling (kg/FU) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,57E-02 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Materials for energy recovery (kg/FU) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Exported energy (MJ/FU) | 0,00E+00 | 0,00E+00 | -6,26E-01 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | -1,64E+01 |

Glass tissue facer







| | Production | | | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | D Reuse, recovery, recycling |
|---------------------------------------|-----------------|--------------|------------------|----------------------------|-----------------|-----------|----------------|-----------|----------------|------------------|---------------------------|--------------------------|--------------------------------|--------------|---------------------|-------------|------------------------------|
| | A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | |
| Hazardous waste disposed (kg/FU) | 5,03E-06 | 5,78E-08 | 0,00E+00 | 1,66E-07 | 1,09E-07 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,18E-07 | 2,29E-07 | 2,20E-09 | 0,00E+00 |
| Non-hazardous waste disposed (kg/FU) | 3,50E-02 | 1,45E-03 | 0,00E+00 | 3,03E-03 | 9,66E-04 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 2,14E-03 | 2,70E-03 | 7,01E-03 | 0,00E+00 |
| Radioactive waste disposed (kg/FU) | 1,68E-05 | 1,50E-07 | 0,00E+00 | 4,32E-07 | 3,51E-07 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 3,06E-07 | 2,36E-07 | 1,25E-08 | 0,00E+00 |
| Components for re-use (kg/FU) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Materials for recycling (kg/FU) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Materials for energy recovery (kg/FU) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Exported energy (MJ/FU) | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |

9 IMPACT CATEGORIES ADDITIONAL TO EN 15804

Foam core (without glass tissue facer)

| | | Production | | | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | |
|--|--|-----------------|--------------|------------------|----------------------------|-----------------|-----------|----------------|-----------|----------------|------------------|---------------------------|--------------------------|--------------------------------|--------------|---------------------|-------------|------------------------------|
| | | A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | D Reuse, recovery, recycling |
|  | PM (disease incidence) | 1,34E-07 | 9,76E-09 | 1,82E-08 | 4,95E-09 | 4,04E-09 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 3,42E-09 | 9,29E-09 | 2,01E-10 | -6,85E-09 |
|  | IRHH (kg U235 eq/FU) | 1,07E-01 | 8,62E-03 | 1,06E-02 | 4,68E-03 | 3,13E-03 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 3,24E-03 | 4,33E-03 | 1,61E-04 | -1,82E-01 |
|  | ETF (CTUe/FU) | 1,01E+02 | 1,70E+00 | 1,10E+01 | 8,57E-01 | 2,88E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 5,93E-01 | 1,40E+01 | 5,78E-02 | -5,40E+00 |
|  | HTCE (CTUh/FU) | 2,58E-09 | 7,85E-11 | 4,42E-10 | 2,41E-11 | 1,04E-10 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,67E-11 | 1,02E-09 | 7,76E-13 | -1,40E-10 |
|  | HTnCE (CTUh/FU) | 3,17E-08 | 1,84E-09 | 8,00E-09 | 9,35E-10 | 1,28E-09 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 6,46E-10 | 9,78E-09 | 2,39E-11 | -2,57E-09 |
|  | Land Use Related impacts (dimensionless) | -5,55E+01 | 1,34E+00 | -7,38E-01 | 7,38E-01 | -1,01E+00 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 5,10E-01 | 3,58E-01 | 6,99E-02 | -3,95E+00 |

Glass tissue facer

| | | Production | | | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | |
|--|--|-----------------|--------------|------------------|----------------------------|-----------------|-----------|----------------|-----------|----------------|------------------|---------------------------|--------------------------|--------------------------------|--------------|---------------------|-------------|------------------------------|
| | | A1 Raw material | A2 Transport | A3 manufacturing | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use | B7 Operational water use | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | D Reuse, recovery, recycling |
|  | PM (disease incidence) | 1,46E-08 | 1,36E-10 | 0,00E+00 | 2,93E-10 | 3,10E-10 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 2,07E-10 | 5,63E-10 | 1,22E-11 | 0,00E+00 |
|  | IRHH (kg U235 eq/FU) | 1,94E-02 | 9,55E-05 | 0,00E+00 | 2,77E-04 | 3,99E-04 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,96E-04 | 2,62E-04 | 9,73E-06 | 0,00E+00 |
|  | ETF (CTUe/FU) | 3,17E+00 | 2,03E-02 | 0,00E+00 | 5,07E-02 | 8,16E-02 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 3,59E-02 | 8,49E-01 | 3,50E-03 | 0,00E+00 |
|  | HTCE (CTUh/FU) | 2,96E-10 | 6,59E-13 | 0,00E+00 | 1,43E-12 | 7,19E-12 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 1,01E-12 | 6,19E-11 | 4,70E-14 | 0,00E+00 |
|  | HTnCE (CTUh/FU) | 1,78E-08 | 2,22E-11 | 0,00E+00 | 5,53E-11 | 3,70E-10 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 3,92E-11 | 5,93E-10 | 1,45E-12 | 0,00E+00 |
|  | Land Use Related impacts (dimensionless) | 9,08E-01 | 1,98E-02 | 0,00E+00 | 4,37E-02 | 1,97E-02 | MND | MND | MND | MND | MND | MND | MND | 0,00E+00 | 3,09E-02 | 2,17E-02 | 4,24E-03 | 0,00E+00 |

HTCE = HUMAN TOXICITY – CANCER EFFECTS; HTNCE = HUMAN TOXICITY – NON CANCER EFFECTS; ETF = ECOTOXICITY – FRESHWATER; (POTENTIAL COMPARATIVE TOXIC UNIT)

PM = PARTICULATE MATTER (POTENTIAL INCIDENCE OF DISEASE DUE TO PM EMISSIONS);

IRHH = IONIZING RADIATION – HUMAN HEALTH EFFECTS (POTENTIAL HUMAN EXPOSURE EFFICIENCY RELATIVE TO U235);

9.1 Environmental impact categories explained

| | | |
|--|---|--|
| | <p>Global Warming Potential</p> | <p>The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.</p> <p>It is split up in 4:</p> <ul style="list-style-type: none"> – Global Warming Potential total (GWP-total) which is the sum of GWP-fossil, GWP-biogenic and GWP-luluc – Global Warming Potential fossil fuels (GWP-fossil) : The global warming potential related to greenhouse gas (GHG) emissions to any media originating from the oxidation and/or reduction of fossil fuels by means of their transformation or degradation (e.g. combustion, digestion, landfilling, etc). – Global Warming Potential biogenic (GWP-biogenic) : The global warming potential related to carbon emissions to air (CO₂, CO and CH₄) originating from the oxidation and/or reduction of aboveground biomass by means of its transformation or degradation (e.g. combustion, digestion, composting, landfilling) and CO₂ uptake from the atmosphere through photosynthesis during biomass growth - i.e. corresponding to the carbon content of products, biofuels or above ground plant residues such as litter and dead wood. – Global Warming Potential land use and land use change (GWP-luluc): The global warming potential related to carbon uptakes and emissions (CO₂, CO and CH₄) originating from carbon stock changes caused by land use change and land use. This sub-category includes biogenic carbon exchanges from deforestation, road construction or other soil activities (including soil carbon emissions). |
| | <p>Ozone Depletion</p> | <p>Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules.</p> |
| | <p>Acidification potential</p> | <p>Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.</p> |
| | <p>Eutrophication potential</p> | <p>The potential to cause over-fertilization of water and soil, which can result in increased growth of biomass and following adverse effects.</p> <p>It is split up in 3:</p> <ul style="list-style-type: none"> – Eutrophication potential - freshwater: The potential to cause over-fertilization of freshwater, which can result in increased growth of biomass and following adverse effects. – Eutrophication potential - marine: The potential to cause over-fertilization of marine water, which can result in increased growth of biomass and following adverse effects. – Eutrophication potential - terrestrial: The potential to cause over-fertilization of soil, which can result in increased growth of biomass and following adverse effects. |
| | <p>Photochemical ozone creation</p> | <p>Chemical reactions brought about by the light energy of the sun creating photochemical smog. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.</p> |
| | <p>Abiotic depletion potential for non-fossil resources</p> | <p>Consumption of non-renewable resources, thereby lowering their availability for future generations. Expressed in comparison to Antimony (Sb).</p> <p>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.</p> |
| | <p>Abiotic depletion potential for fossil resources</p> | <p>Measure for the depletion of fossil fuels such as oil, natural gas, and coal. The stock of the fossil fuels is formed by the total amount of fossil fuels, expressed in Megajoules (MJ).</p> <p>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.</p> |



| | | |
|--|---|--|
| | Ecotoxicity for aquatic fresh water | <p>The impacts of chemical substances on ecosystems (freshwater).</p> <p>The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.</p> |
| | Human toxicity (carcinogenic effects) | <p>The impacts of chemical substances on human health via three parts of the environment: air, soil and water.</p> <p>The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.</p> |
| | Human toxicity (non-carcinogenic effects) | <p>The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.</p> |
| | Particulate matter | <p>Accounts for the adverse health effects on human health caused by emissions of Particulate Matter (PM) and its precursors (NOx, SOx, NH3)</p> |
| | Resource depletion (water) | <p>Accounts for water use related to local scarcity of water as freshwater is a scarce resource in some regions, while in others it is not.</p> <p>The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.</p> |
| | Ionizing radiation - human health effects | <p>This impact category deals mainly with the eventual impact on human health of low dose ionizing radiation of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.</p> |
| | Land use related impacts | <p>The indicator is the "soil quality index" which is the result of an aggregation of following four aspects:</p> <ul style="list-style-type: none"> - Biotic production - Erosion resistance - Mechanical filtration - Groundwater <p>The aggregation is done based on a JRC model. The four aspects are quantified through the LANCA model for land use.</p> <p>The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.</p> |



10 DETAILS OF THE UNDERLYING SCENARIOS USED TO CALCULATE THE IMPACTS

10.1 A1 - raw material supply

This module takes into account the extraction and processing of all raw materials and energy which occur upstream to the studied manufacturing process.

10.2 A2 – transport to the manufacturer

The raw materials are transported to the manufacturing site.

10.3 manufacturing

This module takes into account the production process.

10.4 A4 – transport to the building site

| | | | |
|---|--|--|--|
| Fuel type and consumption of vehicle or vehicle type used for transport | Truck 16-32 ton 0,256 l diesel / km | | |
| Distance | 180 km | | |
| Capacity utilisation (including empty returns) | 50% | | |
| Bulk density of transported products | Ecoinvent | | |
| Volume capacity utilisation factor | Ecoinvent | | |

Kooltherm® K20 is only sold on a project basis. Kooltherm will therefore only be delivered directly to construction sites.

The following transport scenario applies:

- 100% directly to the construction site over 180 km with a 16-32 ton lorry (ecoinvent record: 'Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U')



10.5 A5 – installation in the building

At the construction site, packaging materials are released. Also 2% material losses have been taken into account

| Parts of the installation | quantity | Description |
|---------------------------|--|--|
| Material losses | 0,049 kg Kooltherm K20 | THE QUANTITY OF MATERIAL LOST DUE TO CUTTING IT IN THE RIGHT SHAPE |
| Packaging | 0,0118 kg PE foil 0,0441 kg EPS Skids | THE PACKAGING WASTE AT THE CONSTRUCTION SITE |



10.6 C: End of life

The default scenario for synthetic isolation materials in the NBN/DTD B08-001 states 5% of the waste treatment consists of landfilling, the other 95% consists of incineration and/or energetic valorisation.

Module C2 – Transport to waste processing

| Type of vehicle (truck/boat/etc.) | Fuel consumption (litres/km) | Distance (km) | Capacity utilisation (%) | Density of products (kg/m ³) | Assumptions |
|-----------------------------------|------------------------------|---------------|--------------------------|--|--------------------|
| Truck 16-32 ton | 0,256 l diesel/km | 30 | 50% | Ecoinvent scenario | Ecoinvent scenario |
| Truck 16-32 ton | 0,256 l diesel/km | 50 | 50% | Ecoinvent scenario | Ecoinvent scenario |
| Truck 16-32 ton | 0,256 l diesel/km | 10 | 50% | Ecoinvent scenario | Ecoinvent scenario |

End-of-life modules – C3 and C4

| Parameter | Value (kg) |
|--|------------|
| Wastes collected separately | 0 |
| Wastes collected as mixed construction waste | 2,45 |
| Waste for re-use | 0 |
| Waste for recycling | 0 |
| Waste for energy recovery | 2,33 |
| Waste for final disposal | 0,12 |

10.7 D – Benefits and loads beyond the system boundaries

| | |
|---|---|
| QUANTITATIVE DESCRIPTION OF THE LOADS BEYOND THE SYSTEM BOUNDARIES | No loads |
| QUANTITATIVE DESCRIPTION OF THE BENEFITS BEYOND THE SYSTEM BOUNDARIES | <p>Avoided production of 12,1 MJ of heat using natural gas</p> <p>Avoided production of 6,1 MJ of Belgian electricity mix</p> |



11 RELEASE OF DANGEROUS SUBSTANCES TO INDOOR AIR, SOIL AND WATER DURING THE USE STAGE

11.1 Indoor air

The product is not intended for indoor use and hence no specific VOC emission tests are performed.

11.2 Soil and water

The product does not come in contact with soil or water.



12 DEMONSTRATION OF VERIFICATION

EN 15804+A2 serves as the core PCR

Independent verification of the environmental declaration and data according to standard EN ISO 14025:2010

Internal External

Third party verifier:

Vinçotte nv

Ramses Sterckx

Jan Olieslagerslaan 35 1800 Vilvoorde

rsterckx@vincotte.be



13 LCA INTERPRETATION

All impact categories are mainly determined by the raw materials supply in A1. For GWP (and to less extend also the values for ODP, FAETP and MAETP) also the incineration emissions at the end of life have a significant environmental impact. The potential credits for thermal and electrical energy are declared in module D and result in negative values for most of the impact categories.



14 APPLICATION UNIT

This paragraph gives information on Kooltherm® K20 and how the reference flow and table with impacts relate to different applications.

Application: exterior walls

Thickness range: 20 – 200 mm

Ratio to the declared unit of 1 m² (based on the standard thickness): 1

The results of chapter 6 to 9 in this EPD can be converted to other thicknesses (and corresponding R_D value) using the following formula:

LCA results new thickness = LCA result foam core 70 mm * (new thickness (mm) / 70 mm) + LCA result glass tissue facer



15 ADDITIONAL INFORMATION ON REVERSIBILITY

| Description | Type of fixing | Level of reversibility | Simplicity of disassembly | Speed of disassembly | Ease of handling | Robustness of material |
|---|----------------|----------------------------|--|--|---|---|
| Insulation for concrete prefab applications | Pierced | Non reversible connections | More complex - requires specific tools and/or skills | Disassembly is slow (due to dimensions, weight and/or fixation method) | Easy to manipulate by hand: one worker should be sufficient | Disassembly is possible but will likely cause damage to the material due to the type of assembly or and tools used and the presence of additional layers. |



16 BIBLIOGRAPHY

ISO 14040:2006: Environmental Management-Life Cycle Assessment-Principles and framework.

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ISO 14025:2006: Environmental labels and Declarations-Type III Environmental Declarations-Principles and procedures.

NBN EN 15804+A2:2019

NBN/DTD B 08-001 (BE-PCR)

EN 16783:2017 Thermal insulation products - Product category rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations

EN 13166:2012+A2:2016: Thermal insulation products for buildings. Factory made phenolic foam (PF) products.

OVAM: Technische levensduur van gebouwcomponenten publicatiedatum / 30.11.2018

General information

Owner of the EPD, Responsible for the data,
LCA and information



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Author(s) of the LCA and EPD

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Version NIBE's EPD Application: v2.0

Project report: EPD-NIBE-20220801-29169





Verifier

Ramses Sterckx Vincotte nv

Date of verification: 25.01.2023

External independent verification of the declaration and data according to EN ISO 14025 and relevant PCR documents

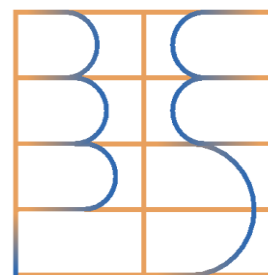
Comparing EPDs is not possible unless they are conform to the same PCR and taking into account the building context.
The program operator cannot be held responsible for the information supplied by the owner of the EPD nor LCA practitioner.



B-EPD program operator
**Federal Public Service (FPS) of Health,
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