

Environmental Product Declaration



of multiple products based on a representative product of the product group.

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

Kooltherm K3 Floorboard

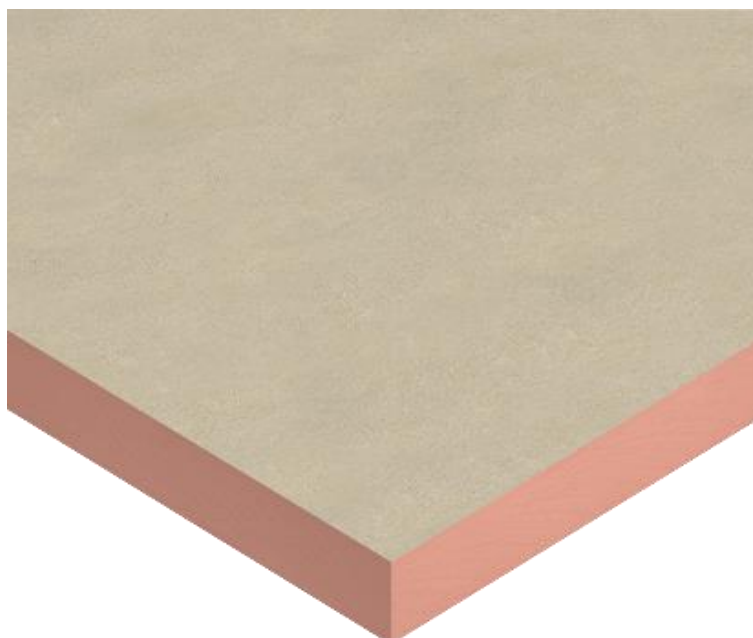
from

Kingspan Insulation Pty Ltd (Australia)



| | |
|--------------------------|---|
| Programme: | The International EPD® System, www.environdec.com |
| Programme operator: | EPD International AB |
| Regional Programme: | EPD Australasia, www.epd-australasia.com |
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



Version History

Version

| | |
|---------------|--|
| Version | 2 |
| Revision Date | 21 March 2025 (valid until 12 December 2029) |

Version differences

| Version | Amendment summary |
|---------|---|
| 1 | Original Version |
| 2 | Typo errors are corrected. Descriptions of the product have been updated. There are no changes to the environmental results. |

General Information

Programme information

| | | | |
|---|--|---|--|
| Declaration Owner | | Kingspan Insulation Pty Ltd (Australia) Somerton, Victoria, Australia W: https://www.kingspan.com/au | |
| <div></div> | | | |
| Geographical Scope | | Australia | |
| Reference Year for Data | | 1 January 2022 - 31 December 2022 | |
| EPD programme operator: | | EPD Australasia Limited epd-australasia.com info@epd-australasia.com Australasia Limited 315a Hardy Street Nelson 7010, New Zealand | EPD International AB info@environdec.com EPD International AB Box 210 60, SE-100 31 Stockholm, Sweden |
| <div><div> EPD® ENVIRONMENTAL PRODUCT DECLARATION</div><div> EPD® THE INTERNATIONAL EPD® SYSTEM</div></div> | | | |
| PRODUCT CATEGORY RULES (PCR) | | | |
| CEN standard EN 15804 served as the core Product Category Rules (PCR) | | | |
| Product Category Rules (PCR): | | PCR 2019.14 Construction Products, version 1.3.4 | |
| PCR review was conducted by: | | The Technical Committee of the International EPD® System. See www.environdec.com for a list of members | |
| Review Chair: | | Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact | |
| LIFE CYCLE ASSESSMENT (LCA) | | | |
| EPD Prepared by: | | Sazal Kundu, Weiqi Xing, Lilia Caballero Edge Environment Pty Limited Greenhouse, Level 3, 180 George Street, Sydney NSW 2000 W: www.edgeimpact.global E: info@edgeimpact.global | |
| <div></div> | | | |
| THIRD-PARTY VERIFICATION | | | |
| Independent verification of the declaration and data, according to ISO 14025:2006 | | <input checked="" type="checkbox"/> EPD verification by accredited certification body | |
| Third Party Verifier | | Epsten Group, Inc. 101 Marietta St. NW, Suite 2600, Atlanta, Georgia 30303, USA www.epstengroup.com Accredited by: A2LA, Certificate #3142.03 | |
| <div></div> | | | |
| Procedure for follow-up of data during EPD validity involved third-party verifier | | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | |

An Environmental Product Declaration (EPD) is a standardised and verified way of quantifying the environmental impacts of a product based on a consistent set of rules known as Product Category Rules (PCR). This is a specific EPD. The EPD owner has the sole ownership, liability, and responsibility for this EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/declared units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company Information

Owner of the EPD: Kingspan Insulation Pty Ltd (Australia)

Contact: Danny Leahy – Sustainability, Innovation, & Commercialization Officer

Danny.leahy@kingspan.com

Description of the organisation: Kingspan is a global manufacturer of insulation and building envelope solutions. Kingspan focus on innovation that makes a difference, offering rigid insulation, flexible insulation and building wraps.

Name and location of production site(s): Somerton, Victoria, Australia

Product Information

Kooltherm K3 Floorboard

Product description:

Kooltherm K3 Floorboard is a thin underfloor insulation board. It can be used under concrete slabs and is ideal for both new build and refurbishment projects.

Product highlights:

- Australian made
- NCC and AS/NZS 4859.1:2018 compliant
- Fibre-free, closed cell insulation core
- Resistant to the passage of water vapour
- Easy to handle and install
- Ideal for new build and refurbishment

Application:

Kooltherm K3 Floorboard is approved for use as floor insulation.

Dimensions:

Board Size: 2400mm x 1200mm (2.88m²)

Nominal Product Thickness: 25, 50mm

Product sustainability:

| Aspect | Characteristic |
|--------------|--|
| Re-usability | Re-usable if removed with care (long term service provided) |
| Water Use | No water used in Kingspan Insulation's manufacturing process |

Product covered by this EPD:

This is an EPD for multiple products, based on a representative product (RP), valid for 1 m² of Kooltherm K3 floor insulation boards in 25mm and 50mm sizes produced at Kingspan's site in Somerton, Victoria, Australia. The rationale for choosing the RP is that it is the most sold product from its range. Table 1 lists the products included in this EPD and identifies the representative product. The environmental impacts of this RP are shown in the Environmental Performance section, while the conversion factors for the other product are provided in the Additional Environmental Information section of this EPD.

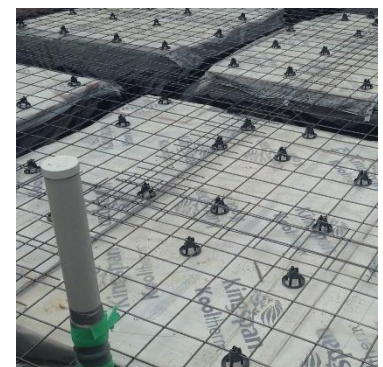
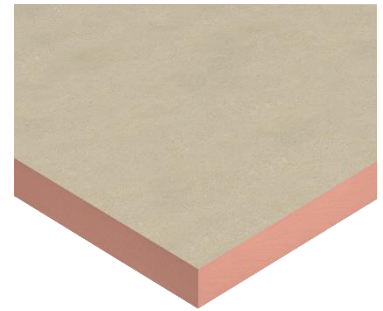


Table 1: Products Included

| Product Type | Description | Declared Unit | Products Included |
|------------------|-----------------------------|------------------------------------|------------------------|
| Floor insulation | Underfloor insulation board | 1 m ² installed product | Kooltherm K3 25mm (RP) |
| | | | Kooltherm K3 50mm |

LCA Information

Declared unit: 1 m² of installed Kooltherm K3 Floorboard 25mm, manufactured in Somerton, Victoria, Australia.

Technical service life: 50 years

Time representativeness: The LCA study was conducted on the calendar year 2022 (01 Jan 2022 to 31 Dec 2022) production data

Database(s) and LCA software used:

The inventory data for the process are entered into the SimaPro (v9.6) LCA software program and linked to the pre-existing data for the upstream feedstocks and services selected in order of preference from:

- For Australia, the Australian Life Cycle Inventory (AusLCI) v1.42 compiled by the Australian Life Cycle Assessment Society ((ALCAS), 2023). The AusLCI database at the time of this report was less than 1 year old.
- Other authoritative sources (e.g., ecoinvent v3.10, (Wernet, et al., 2023)), where necessary adapted for relevance to Australian conditions (energy sources, transport distances and modes and so on, and documented to show how the data is adapted for national relevance). At the time of reporting, the ecoinvent v3.10 database was less than 1 year old.
- Other sources with sensitivity analysis reported to show the significance of this data for the results and conclusions drawn.

Description of system boundaries:

The scope of the LCA was cradle to gate with options, modules A4-A5, modules C1–C4 and module D. The geographical scope of this EPD is Australia, New Zealand and Asia.

This EPD has been produced in conformance with the requirements of PCR2019:14, General Program Instructions (GPI) and EN 15804.

It is discouraged to use the results of modules A1-A3 without considering the results of module C.

Table 2: Life Cycle of building products: stages and modules included in this EPD

| | Product stage | | | Construction process stage | | Use stage | | | | | | | End of life stage | | | | Resource recovery stage |
|----------------------|---------------------|-----------|---------------|----------------------------|---------------------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|--------------|------------------|--------------|------------------------------------|
| | Raw material supply | Transport | Manufacturing | Transport | Construction installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential |
| Module | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Modules declared | x | x | x | x | x | ND | ND | ND | ND | ND | ND | ND | x | x | x | x | x |
| Geography | AU | AU | AU | AU, NZ, Asia | AU, NZ, Asia | - | - | - | - | - | - | - | AU, NZ, Asia | AU, NZ, Asia | AU, NZ, Asia | AU, NZ, Asia | AU, NZ, Asia |
| Specific data used | <10% | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – products | <67% | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – sites | 0% | | | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

ND = not declared (such a declaration shall not be regarded as an indicator of zero result).

The following life cycle stages have not been declared, as they are deemed not applicable for Kingspan product ranges: Material emissions from usage (B1); Maintenance (B2); Repair (B3); Replacement (B4); Refurbishment (B5); Operational energy use (B6), and Operational water use (B7).

System Diagram:

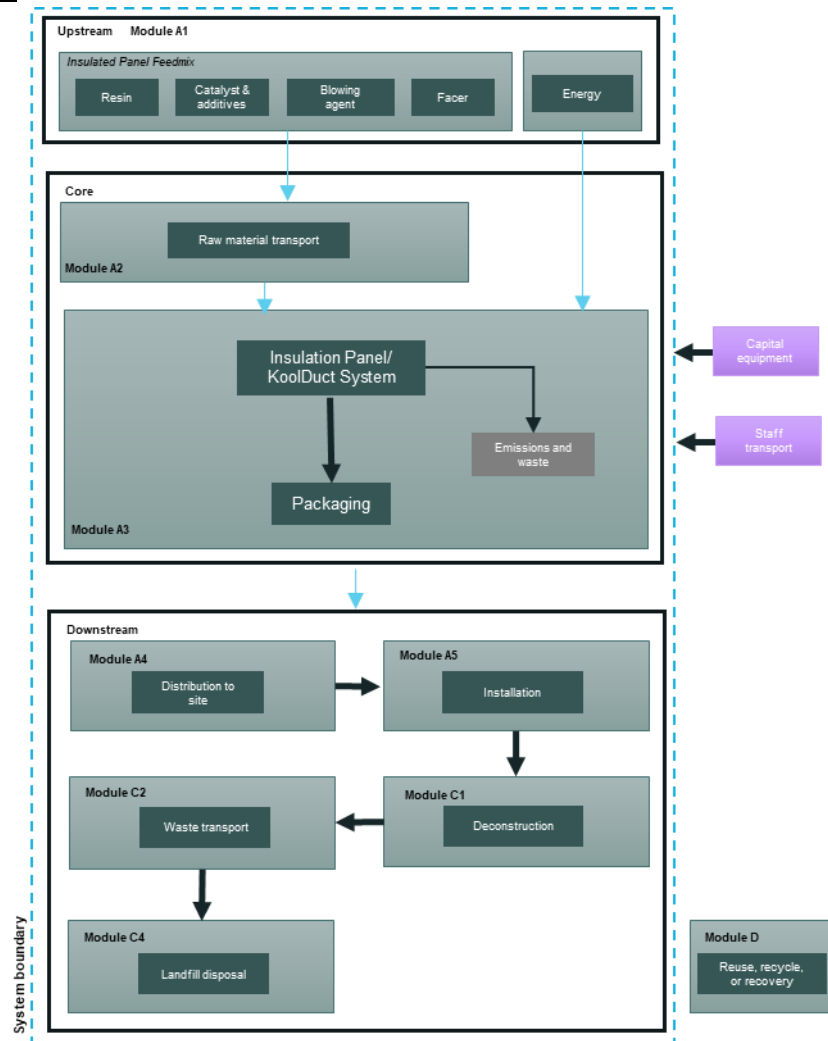


Figure 1: Kingspan Insulation EPD system boundary

Upstream Processes

The upstream processes include those involved in Module A1 – Raw material supply. This module includes:

- Extraction, transport and manufacturing of raw materials.
- Generation of electricity from primary and secondary energy resources, also including their extraction, refining and transport for Modules A1.
- Processing up to the end-of-waste state or disposal of final residues including any packaging not leaving the factory gate with the product.

Core Processes

The core processes include those involved in Module A2 and Module A3, including:

- External transportation of materials to the core processes and internal transport.
- Manufacturing of the Kingspan Insulation products.
- Packaging materials.
- Processing of waste to landfill and recycling.

Downstream Processes

The downstream processes include those involved in Module A4 to C4, including:

- Transportation from the production gate to the construction site.
- Transport of waste generated from the construction site.
- Installation of the product on the site.
- Wastage of construction products (additional production processes to compensate for the loss of construction products included in module A1-A3).
- Waste processing of the waste from product wastage during the construction processes up to the end-of-waste state or disposal of final residues.
- Transport of equipment and use of materials for deconstruction at the end of life.
- Transport of waste generated at the end of life.
- Treatment of waste generated at the end of life.

Cut-off rules and Exclusion of Small Amounts

It is common practice in LCA/LCI protocols to propose exclusion limits for inputs and outputs that fall below a threshold % of the total, but with the exception that where the input/output has a “significant” impact it should be included. According to the PCR 2019:14 v1.3.4, Life cycle inventory data shall according to EN 15804 A2 include a minimum of 95% of total inflows (mass and energy) per module. Inflows not included in the LCA shall be documented in the EPD. Data gaps in included stages in the downstream modules shall be reported in the EPD, including an evaluation of their significance. In accordance with the PCR 2019:14 v1.3.4, the following system boundaries are applied to manufacturing equipment and employees:

- Environmental impact from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process are not accounted for in the LCI. Capital equipment and buildings typically account for less than a few percent of nearly all LCIs and this is usually smaller than the error in the inventory data itself. For this project, it is assumed that capital equipment makes a negligible contribution to the impacts as per Frischknecht et al. (Frischknecht, 2007) with no further investigation.
- Personnel-related impacts, such as transportation to and from work, are also not accounted for in the LCI. The impacts of employees are also excluded from inventory impacts on the basis that if they were not employed for this production or service function, they would be employed for another. It is very hard to decide what proportion of the impacts from their whole lives should count towards their employment. For this project, the impacts of employees are excluded.

Allocation

In a process step where more than one type of product is generated, it is necessary to allocate the environmental stressors (inputs and outputs) from the process to the different products (functional outputs) in order to get product-based inventory data instead of process-based data. An allocation problem also occurs for multi-input processes. In an allocation procedure, the sum of the allocated inputs and outputs to the products shall be equal to the unallocated inputs and outputs of the unit process.

The following stepwise allocation principles shall be applied for multi-input/output allocations:

- The initial allocation step includes dividing up the system sub-processes and collecting the input and output data related to these sub-processes.
- The first (preferably) allocation procedure step for each sub-process is to partition the inputs and outputs of the system into their different products in a way that reflects the underlying physical relationships between them.
- The second (worst case) allocation procedure step is needed when physical relationship alone cannot be established or used as the basis for allocation. In this case, the remaining environmental inputs and outputs from a sub-process must be allocated between the products in a way that reflects other relationships between them, such as the economic value of the products.

Data Quality and Validation

The primary data used for the study (core module) is based on direct utility bills or feedstock quantities from the Kingspan Insulation's procurement records. Primary data was carefully reviewed in order to ensure completeness, accuracy and representativeness of the data supplied. Contribution analysis was used to focus on the key pieces of data contributing to the environmental impact categories. The data was benchmarked against relevant benchmark data in ecoinvent. Overall, the data was deemed to be of high quality for the core module. The data quality ranking is as follows: geographical representativeness – good; technical representativeness – good and time representativeness – very good.

Assumptions, Choices, and Limitations

Table 3: Key assumptions, choices and limitation for this EPD

| Assumption or limitation | Impact on LCA results | Discussion |
|---|-----------------------|---|
| Insulation material ingredient composition. | Minor | Information obtained from Kingspan Production Team. The Kingspan team gave the entire composition of the insulation material. No proxy data was used for insulation material. |
| Board distribution | Minor | Information obtained from Kingspan Production Team. The Kingspan team gave the weighted average distance for each type of transport. The transport include road transport (via small and large truck), sea transport (local and overseas). Relevant background database was used for each type of weighted average distance. There were four weighted average data: road small truck, road large truck, sea local, sea international. |
| Construction energy | Minor | The insulation boards are manufactured in one plant in Somerton, VIC, Australia. Mass and energy data have been sourced from the manufacturing plant by Kingspan Insulation. Mass data was collected for individual insulation boards in CY2022. Energy and utility used as well as waste generated during the production of insulation boards in CY2022 are allocated to insulation boards using mass allocation method. |
| Exclusion of employees, capital good and infrastructure | Minor | Personnel-related impacts, such as transportation to and from work, are also not accounted for in the LCI. The impacts of employees are also excluded from inventory impacts on the basis that if they were not employed for this production or service function, they would be employed for another. It is very hard to decide what proportion of the impacts from their whole lives should count towards their employment. For this project, the impacts of employees are excluded. |

Compliance with Standards

The methodology and report format has been modified to comply with:

- ISO 14040:2006+A1:2020 and ISO14044:2006+A2:2020 which describe the principles, framework, requirements and provides guidelines for life cycle assessment (LCA).
- ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations - Principles and procedures, which establishes the principles and specifies the procedures for developing Type III environmental declaration programmes and Type III environmental declarations.
- EN 15804:2012+A1:2013; Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- EN 15804:2012+A2:2019; Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- Product Category Rules (PCR) 2019:14, v1.3.4 – Construction products – Hereafter referred to as PCR 2019:14.
- General Programme Instructions (GPI) for the International EPD System v5.0 – containing instructions regarding methodology and the content that must be included in EPDs registered under the International EPD System.
- Instructions of EPD Australasia V4.2 – a regional annex to the general programme instructions of the International EPD System.

Environmental Performance Related Information

The potential environmental impacts, use of resources and waste categories included in this EPD were calculated using the SimaPro v9.6 tool and are listed in Table 4. The characterisation factors applied to the calculation of potential environmental impacts (Table 4) are based on version 3.1 of the reference package for CFs used in the Product Environmental Footprint (PEF) framework (EF 3.1). The impact results of the biogenic carbon and energy resource use are coherent with the guidance and requirement in Annex 2 and Annex 3 - Option A of PCR 2019:14

All tables from this point will contain the abbreviation only. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Table 4: Life Cycle Impact, Resource and Waste Assessment Categories, Measurements and Methods in accordance with EN15804+A2

| Impact Category | Abbreviation | Measurement Unit | Assessment Method and Implementation |
|--|----------------|---|--|
| Potential Environmental Impacts | | | |
| Total global warming potential | GWP - Total | kg CO ₂ equivalents (GWP100) | Baseline model of 100 years of the IPCC based on IPCC 2021 |
| Global warming potential (fossil) | GWP - Fossil | kg CO ₂ equivalents (GWP100) | Baseline model of 100 years of the IPCC based on IPCC 2021 |
| Global warming potential (biogenic) | GWP - Biogenic | kg CO ₂ equivalents (GWP100) | Baseline model of 100 years of the IPCC based on IPCC 2021 |
| Land use/ land transformation | GWP - Luluc | kg CO ₂ equivalents (GWP100) | Baseline model of 100 years of the IPCC based on IPCC 2021 |

| | | | |
|---|------------------|------------------------------------|--|
| Ozone depletion potential | ODP | kg CFC 11 equivalents | Steady-state ODPs, WMO 2014 |
| Acidification potential | AP | mol H ⁺ eq. | Accumulated Exceedance, Seppälä et al. 2006, Posch et al., 2008 |
| Eutrophication – aquatic freshwater | EP - freshwater | kg P equivalent | EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe |
| Eutrophication – aquatic marine | EP - marine | kg N equivalent | EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe |
| Eutrophication – terrestrial | EP – terrestrial | mol N equivalent | Accumulated Exceedance, Seppälä et al. 2006, Posch et al. |
| Photochemical ozone creation potential | POCP | kg NMVOC equivalents | LOTOS-EUROS, Van Zelm et al., 2008, as applied in ReCiPe |
| Abiotic depletion potential (elements)* | ADPE | kg Sb equivalents | CML (v4.8) |
| Abiotic depletion potential (fossil fuels)* | ADPF | MJ net calorific value | CML (v4.8) |
| Water Depletion Potential* | WDP | m ³ equivalent deprived | Available Water Remaining (AWARE) Boulay et al., 2016 (includes Australia flows calculated using 36 Australian catchments) |
| Resource use | | | |
| Use of renewable primary energy excluding renewable primary energy resources used as raw materials | PERE | MJ, net calorific value | Manual for direct inputs ¹ |
| Use of renewable primary energy resources used as raw materials | PERM | MJ, net calorific value | Manual for direct inputs ² |
| Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) | PERT | MJ, net calorific value | ecoinvent version 3.8 and expanded by PRé Consultants ³ |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials | PENRE | MJ, net calorific value | Manual for direct inputs ⁴ |
| Use of non-renewable primary energy resources used as raw materials | PENRM | MJ, net calorific value | Manual for direct inputs ⁵ |
| Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) | PENRT | MJ, net calorific value | ecoinvent version 3.8 and expanded by PRé Consultants ⁶ |
| Use of secondary material | SM | kg | Manual for direct inputs |
| Use of renewable secondary fuels | RSF | MJ, net calorific value | Manual for direct inputs |
| Use of non-renewable secondary fuels | NRSF | MJ, net calorific value | Manual for direct inputs |

¹ PERE = PERT - PERM

² Calculated based on the lower heating value of renewable raw materials. LHV is taken from <https://phyllis.nl/>, as recommended by SimaPro in compliance with EN15804+A2: <https://support.simapro.com/s/article/How-to-calculate-EN-15804-A2-indicators-in-desktop-SimaPro>

³ Calculated as sum of renewables, biomass; renewable, wind, solar and geothermal, and renewable, water.

⁴ PENRE = PENRT - PENRM

⁵ Calculated based on the lower heating value (LHV) of non-renewable raw materials. LHV is taken from <https://phyllis.nl/>, as recommended by SimaPro in compliance with EN15804+A2: <https://support.simapro.com/s/article/How-to-calculate-EN-15804-A2-indicators-in-desktop-SimaPro>

⁶ Calculated as sum of non-renewables, fossil and non-renewable, nuclear.

| | | | |
|--|--|--|---|
| Use of net fresh water | FW | m ³ | ReCiPe 2016 |
| Waste categories | | | |
| Hazardous waste disposed | HWD | kg | EDIP 2003 (v1.05) |
| Non-hazardous waste disposed | NHWD | kg | EDIP 2003 (v1.05) ⁷ |
| Radioactive waste disposed/stored | RWD | kg | EDIP 2003 (v1.05) |
| Output flow categories | | | |
| Components for re-use | CRU | kg | Manual for direct inputs |
| Material for recycling | MFR | kg | Manual for direct inputs |
| Materials for energy recovery | MERE | kg | Manual for direct inputs |
| Exported energy - electricity | EE - e | MJ per energy carrier | Manual for direct inputs |
| Exported energy – thermal | EE – t | MJ per energy carrier | Manual for direct inputs |
| Additional environmental impact indicators | | | |
| Global warming potential, excluding biogenic uptake, emissions and storage | GWP-GHG | kg CO ₂ equivalents (GWP100) | Baseline model of 100 years of the IPCC based on IPCC 2021 ⁸ |
| Particulate matter | Potential incidence of disease due to PM emissions (PM) | Disease incidence | SETAC-UNEP, Fantke et al. 2016 |
| Ionising radiation - human health** | Potential Human exposure efficiency relative to U235 (IRP) | kBq U-235 eq | Human Health Effect model |
| Eco-toxicity (freshwater)* | Potential Comparative Toxic Unit for ecosystems (ETP-fw) | CTUe | USEtox |
| Human toxicity potential - cancer effects* | Potential Comparative Toxic Unit for humans (HTP-c) | CTUh | USEtox |
| Human toxicity potential - non cancer effects* | Potential Comparative Toxic Unit for humans (HTP-nc) | CTUh | USEtox |
| Soil quality* | Potential soil quality index (SQP) | dimensionless | Soil quality index (LANCA [®]) |
| Potential Environmental Impacts – Indicators According to EN 15804+A1 | | | |
| Global warming potential | GWP | kg CO ₂ equivalents | CML (v4.02) based on IPCC AR4 |
| Ozone layer depletion | ODP | kg CFC-11 equivalents | CML (v4.02) based on WMO 1999 |
| Acidification | AP | kg SO ₂ equivalents | CML (v4.02) |
| Eutrophication | EP | kg PO ₄ ³⁻ equivalents | CML (v4.02) |
| Photochemical oxidation | POCP | kg C ₂ H ₄ equivalents | CML (v4.02) |
| Abiotic depletion | ADPE | kg Sb equivalents | CML (v4.02) |
| Abiotic depletion (fossil fuels) | ADPF | MJ, net calorific value | CML (v4.02) |

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

**Disclaimer – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

⁷ Calculated as sum of Bulk waste and Slags/ash.

⁸ This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO₂ is set to zero.

Content Information

Kooltherm K3 Floorboards are available in 2 different thicknesses described in **Table 5**. Kooltherm K3 25mm was selected as the representative product, and the mass factors of Kooltherm K3 50mm is also included in this table.

Table 5: Products included in EPD.

| Product Type | Description | Declared Unit | Products Included | Weight (Kg) | Mass factor (%) |
|------------------|--|------------------------------------|-------------------|-------------|-----------------|
| Floor insulation | Kooltherm K3 Floorboard is a thin underfloor insulation board. It can be used under concrete slabs and is ideal for both new build and refurbishment projects. | 1 m ² installed product | Kooltherm K3 25mm | 1.121 | - |
| | | | Kooltherm K3 50mm | 1.900 | 169 |

Product Stage (Modules A1 – A3)

Modules A1 – A3 covers the extraction and transport of raw materials, and the production stage of Kooltherm K3 Floorboard products.

The primary raw materials for Kooltherm K3 are resin, acid and facing materials and chemicals.

Kooltherm K3 products are manufactured in Somerton, VIC, Australia. In the modelling of electricity related impacts, self-production through photovoltaic (PV) modules and purchased GreenPower from a local electricity supplier are identified. Large-scale generation certificate sources of GreenPower from local electricity supplier, Origin, are documented as 69% wind, 29% solar PV, 1% hydro, and 1% biomass⁹. The carbon emissions of PV modules and green power are 0.14 and 3.94E-04 kg CO₂ eq./kWh (GWP-GHG), respectively.

Kooltherm K3 products are manufactured at Somerton in Victoria. The raw materials are transported by truck and ship from United Kingdom, India, China, Malaysia, Netherlands, USA, and only by road within Australia.

The manufacturing process of Kingspan board products involves several steps. First, the Laydown/Dispensing stage mixes a blend of liquid chemicals, laying it onto a moving bottom facer. The foam expands as it meets the top facer, bonding auto-adhesively without additional adhesive. Conveyor adjustments determine board thickness. During the Curing phase, boards are stacked and transferred to ovens for uniform curing, eliminating distortion and moisture, with curing times ranging from 1 to 12 hours based on thickness. In the Cutting phase, boards are cut to size. Finally, in Packaging, boards are re-stacked, wrapped, sealed, and moved to the warehouse.

Packaging materials such as shrink wrap and EPS skids are used to protect Kooltherm K3 boards during distribution. These EPS skids and shrink wraps are designed for single-use purposes. During the manufacturing process, various wastes are generated, including packaging waste, resin waste, and chemicals and solvents. Depending on the type of waste, they are directed to municipal landfills, or municipal recycling facilities.

All waste materials collected at the Kingspan manufacturing site are handled by relevant third parties. Materials sent to landfill do not have any specific end-of-life uses. In contrast, materials destined for

⁹ National GreenPower Accreditation Program - Table 5. (2023).
<https://www.greenpower.gov.au/documents/2022-greenpower-annual-audit-report>

recycling are repurposed for specific purposes, have a market, and comply with all national and local laws and regulations.

Table 6 and Table 7 show the materials used in manufacturing and packaging related data.

Table 6: Content declaration for 1 m² of installed Kooltherm K3 Floorboard

| Product components | Weight | | Post-consumer recycled material, weight-% of product | Biogenic material, weight-% of product | Biogenic material, kg C/product or declared unit |
|--------------------------------|-----------------------------|------------------------------|--|--|--|
| | RP: Kooltherm K3 25 mm (kg) | Kooltherm K3 40 mm (factors) | | | |
| Resin | 0.88 | 1.73 | 0 | 0 | 0 |
| Acid | 0.20 | 1.70 | 0 | 0 | 0 |
| Facing materials and chemicals | 0.30 | 1.50 | 0 | 0 | 0 |
| Sum | 1.38 | 1.68 | 0 | 0 | 0 |

Table 7: Content declaration of packaging for 1 m² of installed Kooltherm K3 Floorboard

| Product components | Weight | | Weight-% (versus the product) | Biogenic material, kg C/product or declared unit |
|--------------------|-----------------------------|------------------------------|-------------------------------|--|
| | RP: Kooltherm K3 25 mm (kg) | Kooltherm K3 40 mm (factors) | | |
| Shrink-wrap | 0.020 | 1 | 0 | 0 |
| EPS skids | 0.003 | 1 | 0 | 0 |
| Sum | 0.023 | 1 | 0 | 0 |

Additional information on the release of dangerous substances to indoor air, soil and water

The products are highly inert and are used predominantly in outdoor applications. They do not release any dangerous substances to indoor air, soil, or water.

None of the products contain one or more substances that are listed in the “Candidate List of Substances of Very High Concern for authorisation”. Based on available information and safety data sheet, Kooltherm K3 boards are Not classified as Hazardous according to Safe Work Australia criteria and No signal of hazard or precautionary statements have been allocated according to the GHS classification.

Distribution Stage (Module A4)

Kooltherm K3 boards are distributed across Australia, New Zealand and Asia with a market share of 91%, 4.9% and 4.1% respectively. Transport distances were calculated based on primary data from Kingspan's percentage of total products shipped to each location. According to Kingspan's historic data there is no reported losses during the transport to construction site. The transport is volume constrained that volume utilization is <1. It's assumed that all products are transported in a medium size truck (16-32t) from manufacturing plants to sites. It's assumed that the return trip is empty. The utilization rate for the truck is 50%. Based on the information, the estimated A4 transport distances were calculated and summarized in Table 8.

Table 8: Distribution distance for Kooltherm K3 Floorboard

| | % Mix of Sales per State/Country | Road Distance from Somerton | Shipping Distance from Somerton |
|----------------|----------------------------------|-----------------------------|---------------------------------|
| State/ Country | K3 | (km) | (km) |
| NT | 0.1% | 3863 | 0 |
| VIC | 57.8% | 100 | 0 |
| TAS | 1.8% | 850 | 0 |
| SA | 10.3% | 835 | 0 |
| WA | 4.5% | 40 | 3529 |
| QLD | 3.1% | 1840 | 0 |
| NSW | 11.2% | 943 | 0 |
| ACT | 2.2% | 685 | 0 |
| SINGAPORE | 4.1% | 40 | 6000 |
| NZ | 4.9% | 40 | 2640 |

Installation Stage (Module A5)

Energy required for machinery used during the construction has been included in the assessment. There are no cut-offs produced during installation since all products are cut to size and all waste is used. The installation procedures are the same across all board products.

- Diesel fuel consumption for installation has been calculated based on the gravitational potential energy required to lift a typical board 10m above ground, assuming 15% diesel energy conversion into effective work.
- The product packaging disposed of in the commingled waste to landfill because no market exists for it.

Table 9 Installation inputs and outputs per 1 m² produced

| Input | Unit | Kooltherm K3 25 mm | Kooltherm K3 50 mm |
|------------------------|------|--------------------|--------------------|
| Energy from Diesel | MJ | 5.07E-04 | 1.11E-03 |
| Outputs | Unit | Kooltherm K3 25 mm | Kooltherm K3 50 mm |
| Offcuts | kg | 0 | 0 |
| Packaging - Shrinkwrap | kg | 2.02E-02 | 2.02E-02 |
| Packaging - EPS skids | kg | 3.16E-03 | 3.16E-03 |

Deconstruction and End of Life (Modules C1 – C4)

Following the use of the boards, Kingspan has limited evidence of what the end-of-life fate for their boards. The recommended cradle to grave environmental profile will be based on the most common scenario as boards are deconstructed and transported to disposal. The aluminium foil from the facer cannot be manually separated from the product during the dismantling activities for recycling. Therefore, the whole product is disposed of in landfill.

The following assumptions have been used in this study to model board deconstruction and end of life scenarios:

- Diesel fuel consumption for deconstruction has been calculated based on the gravitational potential energy required to lift a typical board 10m above ground, assuming 15% diesel energy conversion into effective work.
- 6% of boards are assumed to be deconstruction loss during the waste collection.
- 50km delivery distance to landfill is assumed for waste collection process.

Benefits and loads beyond the system boundary (Module D)

As the whole product is sent to landfill, there is no environmental benefits or burden claimed from Module D.

Environmental Performance

Table 10: Primary environmental impacts per m² of installed Kooltherm K3 Floorboard 25mm

| Environmental Impacts | | | | | | | | | | |
|--|----------------|-----------------------------|----------|----------|-----------|-----------|----------|----------|----------|----------|
| Indicator | Abbreviation | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Global warming potential - fossil | GWP - Fossil | kg CO ₂ eq. | 5.43E+00 | 6.59E-02 | 2.22E-03 | 6.25E-03 | 1.14E-02 | 0.00E+00 | 4.02E-03 | 0.00E+00 |
| Global warming potential - biogenic | GWP - Biogenic | kg CO ₂ eq. | 3.87E-03 | 3.52E-06 | 1.57E-06 | 4.50E-06 | 6.31E-07 | 0.00E+00 | 1.97E-06 | 0.00E+00 |
| Global warming potential - land use/ land transformation | GWP - Luluc | kg CO ₂ eq. | 2.78E-03 | 2.20E-07 | 1.20E-07 | 3.40E-07 | 5.38E-09 | 0.00E+00 | 1.67E-09 | 0.00E+00 |
| Global warming potential - total | GWP - Total | kg CO ₂ eq. | 5.43E+00 | 6.59E-02 | 2.22E-03 | 6.25E-03 | 1.14E-02 | 0.00E+00 | 4.02E-03 | 0.00E+00 |
| Ozone depletion potential | ODP | kg CFC 11 eq. | 1.24E-07 | 9.44E-09 | 7.46E-12 | 1.94E-11 | 1.80E-09 | 0.00E+00 | 5.51E-10 | 0.00E+00 |
| Acidification potential | AP | mol H ⁺ eq. | 2.92E-02 | 7.08E-04 | 2.46E-06 | 5.85E-06 | 1.00E-04 | 0.00E+00 | 1.06E-05 | 0.00E+00 |
| Eutrophication – freshwater | EP - F | kg P eq. | 9.49E-04 | 5.02E-08 | 1.93E-08 | 5.44E-08 | 1.17E-09 | 0.00E+00 | 4.62E-09 | 0.00E+00 |
| Eutrophication – marine | EP - M | kg N eq. | 4.68E-03 | 2.07E-04 | 4.95E-05 | 1.42E-04 | 3.15E-05 | 0.00E+00 | 1.89E-06 | 0.00E+00 |
| Eutrophication – terrestrial | EP - T | mol N eq. | 4.97E-02 | 2.27E-03 | 1.08E-05 | 2.49E-05 | 3.45E-04 | 0.00E+00 | 2.06E-05 | 0.00E+00 |
| Photochemical ozone creation potential | POCP | kg NMVOC eq. | 2.49E-02 | 5.67E-04 | 4.00E-06 | 9.63E-06 | 8.41E-05 | 0.00E+00 | 5.48E-06 | 0.00E+00 |
| Abiotic depletion potential - minerals and metals* | ADP | kg Sb eq. | 6.28E-06 | 8.55E-11 | 9.19E-11 | 2.59E-10 | 2.36E-12 | 0.00E+00 | 7.42E-13 | 0.00E+00 |
| Abiotic depletion potential - fossil fuels* | ADPF | MJ | 1.13E+02 | 8.92E-01 | 6.38E-03 | 1.66E-02 | 1.56E-01 | 0.00E+00 | 5.53E-02 | 0.00E+00 |
| Water Depletion Potential* | WDP | m ³ eq. deprived | 9.50E+00 | 5.24E-03 | -3.74E-03 | -1.07E-02 | 1.00E-03 | 0.00E+00 | 3.81E-04 | 0.00E+00 |

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

Table 11: Resource use per m² of installed Kooltherm K3 Floorboard 25mm

| Resource Use | | | | | | | | | | |
|--|--------------|----------------|----------|----------|-----------|-----------|----------|----------|----------|----------|
| Indicator | Abbreviation | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Use of renewable primary energy excluding renewable primary energy resources used as raw materials | PERE | MJ | 4.83E+00 | 1.33E-03 | 6.31E-05 | 1.78E-04 | 2.24E-04 | 0.00E+00 | 7.31E-04 | 0.00E+00 |
| Use of renewable primary energy resources used as raw materials | PERM | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Primary renewable energy - total | PERT | MJ | 4.83E+00 | 1.33E-03 | 6.31E-05 | 1.78E-04 | 2.24E-04 | 0.00E+00 | 7.31E-04 | 0.00E+00 |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials | PENRE | MJ | 1.12E+02 | 8.92E-01 | 9.43E-01 | 1.66E-02 | 1.56E-01 | 0.00E+00 | 5.53E-02 | 0.00E+00 |
| Use of non-renewable primary energy resources used as raw materials | PENRM | MJ | 9.36E-01 | 0.00E+00 | -9.36E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Primary nonrenewable energy - total | PENRT | MJ | 1.13E+02 | 8.92E-01 | 6.38E-03 | 1.66E-02 | 1.56E-01 | 0.00E+00 | 5.53E-02 | 0.00E+00 |
| Use of secondary material | SM | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Use of renewable secondary fuels | RSF | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Use of non-renewable secondary fuels | NRSF | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Use of net fresh water | FW | m ³ | 2.21E-01 | 1.22E-04 | -8.69E-05 | -2.50E-04 | 2.32E-05 | 0.00E+00 | 8.37E-06 | 0.00E+00 |

Table 12: Waste production per m² of installed Kooltherm K3 Floorboard 25mm

| Waste Production | | | | | | | | | | |
|-----------------------------------|--------------|------|----------|----------|----------|----------|----------|----------|----------|----------|
| Indicator | Abbreviation | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Hazardous waste disposed | HWD | kg | 1.25E-03 | 5.94E-07 | 4.14E-08 | 1.07E-07 | 3.70E-08 | 0.00E+00 | 1.15E-08 | 0.00E+00 |
| Non-hazardous waste disposed | NHWD | kg | 6.50E-02 | 3.81E-05 | 2.34E-02 | 6.73E-02 | 7.07E-06 | 0.00E+00 | 2.05E-05 | 0.00E+00 |
| Radioactive waste disposed/stored | RWD | kg | 4.50E-05 | 3.76E-09 | 1.21E-09 | 3.40E-09 | 9.61E-12 | 0.00E+00 | 3.05E-12 | 0.00E+00 |

Table 13: Output flow per m² of installed Kooltherm K3 Floorboard 25mm

| Output Flows | | | | | | | | | | |
|-------------------------------|--------------|------|----------|----------|----------|----------|----------|----------|----------|----------|
| Indicator | Abbreviation | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Components for reuse | CRU | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Materials for recycling | MFR | kg | 4.14E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Materials for energy recovery | MFRE | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Exported energy - electricity | EE - e | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Exported energy - thermal | EE - t | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Table 14: Additional environmental impacts per m² of installed Kooltherm K3 Floorboard 25mm

| Additional Environmental Impact Indicators | | | | | | | | | | |
|--|--------------|-----------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Indicator | Abbreviation | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Global warming potential, excluding biogenic uptake, emissions and storage | GWP-GHG | kg CO ₂ eq | 5.43E+00 | 6.59E-02 | 2.22E-03 | 6.25E-03 | 1.14E-02 | 0.00E+00 | 4.02E-03 | 0.00E+00 |
| Particulate matter | PM | disease incidence | 2.87E-07 | 3.08E-09 | 5.81E-11 | 1.32E-10 | 5.63E-10 | 0.00E+00 | 6.40E-11 | 0.00E+00 |
| Ionising radiation - human health** | IRP | kBq U-235 eq | 1.83E-01 | 1.72E-05 | 4.98E-06 | 1.40E-05 | 2.73E-07 | 0.00E+00 | 8.46E-08 | 0.00E+00 |
| Ecotoxicity – freshwater* | ETP - fw | CTUe | 9.11E+01 | 1.83E-01 | 8.11E-02 | 2.33E-01 | 3.45E-02 | 0.00E+00 | 1.07E-02 | 0.00E+00 |
| Human toxicity potential - cancer effects* | HTP - c | CTUh | 7.97E-08 | 1.28E-12 | 4.46E-13 | 1.27E-12 | 4.89E-14 | 0.00E+00 | 5.90E-14 | 0.00E+00 |
| Human toxicity potential - non cancer effects* | HTP - nc | CTUh | 1.85E-08 | 1.84E-11 | 5.20E-11 | 1.49E-10 | 9.32E-13 | 0.00E+00 | 4.85E-13 | 0.00E+00 |
| Soil quality* | SQP | Pt | 4.86E+00 | 3.78E-03 | 1.28E-02 | 3.67E-02 | 7.02E-04 | 0.00E+00 | 2.01E-03 | 0.00E+00 |

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

**Disclaimer – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Table 15: Potential environmental impacts (EN15804+A1:2013) per m² of installed Kooltherm K3 Floorboard 25mm

| Potential Environmental Impact - Indicators According to EN15804+A1:2013 | | | | | | | | | | |
|--|--------------|-------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Indicator | Abbreviation | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Global warming potential | GWP | kg CO ₂ eq | 5.44E+00 | 6.59E-02 | 2.23E-03 | 6.28E-03 | 1.14E-02 | 0.00E+00 | 4.01E-03 | 0.00E+00 |
| Ozone layer depletion | ODP | kg CFC-11 eq | 1.02E-07 | 7.45E-09 | 5.91E-12 | 1.54E-11 | 1.42E-09 | 0.00E+00 | 4.35E-10 | 0.00E+00 |
| Acidification | AP | kg SO ₂ eq | 2.45E-02 | 4.40E-04 | 1.79E-06 | 4.29E-06 | 5.54E-05 | 0.00E+00 | 7.08E-06 | 0.00E+00 |
| Eutrophication | EP | kg PO ₄ ³⁻ eq | 4.57E-03 | 7.54E-05 | 2.10E-05 | 6.00E-05 | 1.17E-05 | 0.00E+00 | 9.99E-07 | 0.00E+00 |
| Photochemical oxidation | POCP | kg C ₂ H ₄ eq | 2.48E-03 | 2.30E-05 | 3.72E-07 | 1.05E-06 | 3.59E-06 | 0.00E+00 | 3.66E-07 | 0.00E+00 |
| Abiotic depletion | ADPE | kg Sb eq | 6.79E-06 | 1.43E-10 | 9.23E-11 | 2.60E-10 | 1.34E-11 | 0.00E+00 | 4.58E-12 | 0.00E+00 |
| Abiotic depletion (fossil fuels) | ADPF | MJ | 3.28E+01 | 7.91E-01 | 4.83E-04 | 1.37E-03 | 1.52E-01 | 0.00E+00 | 5.60E-02 | 0.00E+00 |

Additional Environmental Information

This EPD is declared as 1m² of installed Kooltherm K3 boards with a thickness of 25mm. As per section 5.4.6.1 of PCR, to allow for obtaining the results for different thicknesses (e.g. 50mm) of Kooltherm K3 boards, the conversion factors are applied to this EPD for the results of declared modules.

Table 16: Conversion factors of Primary environmental impact indicators for Kooltherm K3 Floorboard 50mm

| Conversion factors for K3 Underfloor Board 50mm | | | | | | | | | |
|--|----------------|-------|------|------|------|------|------|------|------|
| Indicator | Abbreviation | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Global warming potential - fossil | GWP - Fossil | 1.66 | 1.68 | 1.02 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Global warming potential - biogenic | GWP - Biogenic | 1.23 | 1.68 | 1.00 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Global warming potential - land use/ land transformation | GWP - Luluc | 1.45 | 1.68 | 1.01 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Global warming potential - total | GWP - Total | 1.66 | 1.68 | 1.02 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Ozone depletion potential | ODP | 1.69 | 1.68 | 1.10 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Acidification potential | AP | 1.64 | 1.68 | 1.18 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Eutrophication – freshwater | EP - F | 1.62 | 1.68 | 1.02 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Eutrophication – marine | EP - M | 1.64 | 1.68 | 1.00 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Eutrophication – terrestrial | EP - T | 1.63 | 1.68 | 1.21 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Photochemical ozone creation potential | POCP | 1.67 | 1.68 | 1.17 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Abiotic depletion potential - minerals and metals* | ADP | 1.38 | 1.68 | 1.02 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Abiotic depletion potential - fossil fuels* | ADPF | 1.70 | 1.68 | 1.10 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Water Depletion Potential* | WDP | 2.31 | 1.68 | 1.00 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |

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

Table 17: Conversion factors of resource use indicators for Kooltherm K3 Floorboard 50mm

| Conversion factors for K3 50mm | | | | | | | | | |
|--|--------------|-------|------|------|------|------|------|------|------|
| Indicator | Abbreviation | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Use of renewable primary energy excluding renewable primary energy resources used as raw materials | PERE | 1.85 | 1.68 | 1.02 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Use of renewable primary energy resources used as raw materials | PERM | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Primary renewable energy - total | PERT | 1.85 | 1.68 | 1.02 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials | PENRE | 1.70 | 1.68 | 1.00 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Use of non-renewable primary energy resources used as raw materials | PENRM | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Primary nonrenewable energy - total | PENRT | 1.70 | 1.68 | 1.10 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Use of secondary material | SM | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Use of renewable secondary fuels | RSF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Use of non-renewable secondary fuels | NRSF | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Use of net fresh water | FW | 2.32 | 1.68 | 1.00 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |

Table 18: Conversion factors of waste production indicators for Kooltherm K3 Floorboard 50mm

| Conversion factors for K3 50mm | | | | | | | | | |
|-----------------------------------|--------------|-------|------|------|------|------|------|------|------|
| Indicator | Abbreviation | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Hazardous waste disposed | HWD | 1.66 | 1.68 | 1.10 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Non-hazardous waste disposed | NHWD | 1.14 | 1.68 | 1.00 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Radioactive waste disposed/stored | RWD | 1.64 | 1.68 | 1.03 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |

Table 19: Conversion factors of output flow indicators for Kooltherm K3 Floorboard 50mm

| Conversion factors for K3 50mm | | | | | | | | | |
|--------------------------------|--------------|-------|------|------|------|------|------|------|------|
| Indicator | Abbreviation | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Components for reuse | CRU | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Materials for recycling | MFR | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Materials for energy recovery | MFRE | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Exported energy - electricity | EE - e | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Exported energy - thermal | EE - t | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

Table 20: Conversion factors of additional environmental impacts indicators for Kooltherm K3 Floorboard 50mm

| Conversion factors for K3 50mm | | | | | | | | | |
|--|--------------|-------|------|------|------|------|------|------|------|
| Indicator | Abbreviation | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Global warming potential, excluding biogenic uptake, emissions and storage | GWP-GHG | 1.66 | 1.68 | 1.02 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Particulate matter | PM | 1.60 | 1.68 | 1.22 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Ionising radiation - human health** | IRP | 1.65 | 1.68 | 1.03 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Ecotoxicity – freshwater* | ETP - fw | 1.70 | 1.68 | 1.00 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Human toxicity potential - cancer effects* | HTP - c | 1.71 | 1.68 | 1.01 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Human toxicity potential - non cancer effects* | HTP - nc | 1.64 | 1.68 | 1.00 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Soil quality* | SQP | 1.66 | 1.68 | 1.00 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |

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

**Disclaimer – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Table 21: Conversion factors of potential environmental impact indicators (EN15804+A1:2013) for Kooltherm K3 Floorboard 50mm

| Conversion factors for K3 50mm | | | | | | | | | |
|----------------------------------|--------------|-------|------|------|------|------|------|------|------|
| Indicator | Abbreviation | A1-A3 | A4 | A5 | C1 | C2 | C3 | C4 | D |
| Global warming potential | GWP | 1.66 | 1.68 | 1.02 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Ozone layer depletion | ODP | 1.68 | 1.68 | 1.10 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Acidification | AP | 1.65 | 1.68 | 1.18 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Eutrophication | EP | 1.62 | 1.68 | 1.00 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Photochemical oxidation | POCP | 1.69 | 1.68 | 1.02 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Abiotic depletion | ADPE | 1.46 | 1.68 | 1.02 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |
| Abiotic depletion (fossil fuels) | ADPF | 1.66 | 1.68 | 1.02 | 1.69 | 1.69 | 1.00 | 1.69 | 1.00 |

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