

# KNAUF

## KNAUF PLASTERBOARD ENVIRONMENTAL PRODUCT DECLARATION

### WETSTOP 13 mm

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



AUSTRALASIA **EPD**<sup>®</sup>  
ENVIRONMENTAL PRODUCT DECLARATION

**EPD**<sup>®</sup>  
THE INTERNATIONAL EPD<sup>®</sup> SYSTEM

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**Valid until:** 2029-08-30

**Geographical scope:** Australia

*An EPD should provide current information and may be updated if conditions change. This EPD is of multiple products, based on the average results of the product group. The product groups are the product type produced at the three different sites: Camellia, NSW; Port Melbourne, VIC; and Pinkenba, QLD. The averaging is based on the weighted average production of these sites. The stated validity is therefore subject to the continued registration and publication at [www.epd-australasia.com](http://www.epd-australasia.com)*



# PROGRAM-RELATED INFORMATION AND VERIFICATION

|                                                                                                                                                               |                                                                                                                                                                                                 |                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Declaration owner</b>                                                                                                                                      | <b>Knauf Gypsum Pty Ltd</b><br>3 Thackeray Street<br>Camellia, NSW, 2142<br>knauf.com<br>tecassist@knauf.com                                                                                    |                                                                                                                          |
| <b>Geographical Scope</b>                                                                                                                                     | Australia                                                                                                                                                                                       |                                                                                                                          |
| <b>Reference Year for Data</b>                                                                                                                                | 1 January 2022 - 30 December 2022                                                                                                                                                               |                                                                                                                          |
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|  <b>EPD</b> <sup>®</sup><br>AUSTRALASIA<br>ENVIRONMENTAL PRODUCT DECLARATION |  <b>EPD</b> <sup>®</sup><br>THE INTERNATIONAL EPD <sup>®</sup> SYSTEM                                          |                                                                                                                          |
| <b>PRODUCT CATEGORY RULES (PCR)</b>                                                                                                                           |                                                                                                                                                                                                 |                                                                                                                          |
| <b>CEN standard EN 15804 served as the core Product Category Rules (PCR)</b>                                                                                  |                                                                                                                                                                                                 |                                                                                                                          |
| <b>Product Category Rules (PCR):</b>                                                                                                                          | PCR 2019.14 Construction Products, version 1.3.3                                                                                                                                                |                                                                                                                          |
| <b>PCR review was conducted by:</b>                                                                                                                           | The Technical Committee of the International EPD <sup>®</sup> System.<br>See <a href="http://www.environdec.com">www.environdec.com</a> for a list of members.                                  |                                                                                                                          |
| <b>Review Chair:</b>                                                                                                                                          | <b>Claudia A. Peña, University of Concepción, Chile.</b><br>The review panel may be contacted via the Secretariat<br><a href="http://www.environdec.com/contact">www.environdec.com/contact</a> |                                                                                                                          |
| <b>LIFE CYCLE ASSESSMENT (LCA)</b>                                                                                                                            |                                                                                                                                                                                                 |                                                                                                                          |
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|                                                                            |                                                                                                                                                                                                 |                                                                                                                          |
| <b>THIRD-PARTY VERIFICATION</b>                                                                                                                               |                                                                                                                                                                                                 |                                                                                                                          |
| <b>Independent verification of the declaration and data, according to ISO 14025:2006</b>                                                                      | <input checked="" type="checkbox"/> EPD verification by individual verifier                                                                                                                     |                                                                                                                          |
| <b>Third party verifier:</b>                                                                                                                                  | <b>Rob Rouwette</b><br>start2see Pty Ltd<br>Rob.Rouwette@start2see.com.au                                                                                                                       |                                                                                                                          |
| <b>Verifier approved by:</b>                                                                                                                                  | EPD Australasia                                                                                                                                                                                 |                                                                                                                          |
| <b>Procedure for follow-up of data during EPD validity involved third-party verifier</b>                                                                      | <input type="checkbox"/> yes<br><input checked="" type="checkbox"/> no                                                                                                                          |                                                                                                                          |



***Build  
on us.***

# WHAT IS AN ENVIRONMENTAL PRODUCT DECLARATION?

An Environmental Product Declaration (EPD) is a standardised document that provides detailed, quantified environmental data of a product, based on a life cycle assessment (LCA). It outlines the environmental impact of a product throughout its lifecycle, from raw material extraction and processing, through to its use, and disposal or recycling. This includes impacts like greenhouse gas emissions, water use, and resource depletion.

Through this EPD, Knauf Gypsum Australia shines a light on key elements of its plasterboard product, from materials to manufacturing and disposal.

## HOW TO USE THE EPD

An Environmental Product Declaration (EPD) is different to a product eco-label in that it doesn't tell you if a product is good or bad. Instead, it provides the independent and verified data required to understand the environmental performance of Knauf Gypsum plasterboard products in your project.

Knauf Gypsum Australia has developed this EPD as part of its commitment to provide transparency on the potential environmental impacts of its plasterboard products over their life cycle.

Using EPDs in the context of a life cycle assessment (LCA) for a whole structure or development can help enable better environmental optimisation in the built environment.

This EPD may contribute to the achievement of credit points under the Green Star rating tool of the Green Building Council Australia (GBCA), the Infrastructure Sustainability (IS) Rating and other leading green building rating schemes.

The data presented in this EPD can be quite technical, so if you need help interpreting the data, please contact [tecASSIST@knauf.com](mailto:tecASSIST@knauf.com)



# CONTENT.

## NAVIGATING THE ENVIRONMENTAL PRODUCT DECLARATION (EPD)

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Knauf’s business philosophy is driven by performance, our partnerships and sustainability. By combining these elements, we deliver high-quality solutions that set new standards in the building materials industry.

# **WORK SMARTER DO MORE BUILD BETTER**

*with Knauf*



## **ABOUT KNAUF**

The Knauf Group is one of the world's leading manufacturers of modern insulation materials, dry lining systems, plasters and accessories, thermal insulation composite systems, floor screed, floor systems, and construction equipment and tools. With more than 300 production facilities and sales organisations in over 90 countries, 42,000 employees worldwide, and sales of €12.6 billion, the Knauf Group is one of the largest players in the industry, holding market share in Europe, the United States (US), South America, Asia, Africa, and Australia.

The Knauf Group believes that the best innovations start with a purpose; a focus on why the innovation is needed and who will benefit from it. The business's focus is to deliver innovations that help companies in the construction sector to work smarter, do more, and build better. This is achieved through investing in purposeful innovation, expanding into different markets and constantly searching for new ways to increase performance and productivity. This commitment to innovation and focus on customers is inspired by a desire to empower architects, contractors, and workers alike to improve the way societies live by changing the way buildings are designed and built. Knauf is committed to delivering only the best to its customers and partners.

**For more information on Knauf, refer to [knauf.com](https://www.knauf.com)**

# PURPOSE, STRATEGY AND VALUES

## OUR PURPOSE

WHAT DRIVES US

## MAKE TOMORROW A HOME FOR ALL OF US

Knauf 100 – four ambitions for sustainable success on our road to 2032

## OUR STRATEGY

WHAT LEADS US

We are a great employer for great **people**

We enable our **customers** to capture the best value

We act with **future generations** in mind

We achieve superior **performance**

## OUR VALUES

WHAT UNITES US

### MENSCHLICHKEIT

Everything we do, every decision we take, we have the well-being of everyone in society in mind.

### PARTNERSHIP

We act as a team, and support and trust each other. We grow together.

### COMMITMENT

We are committed to our work, our colleagues, and our community. We take responsibility and always go the extra mile.

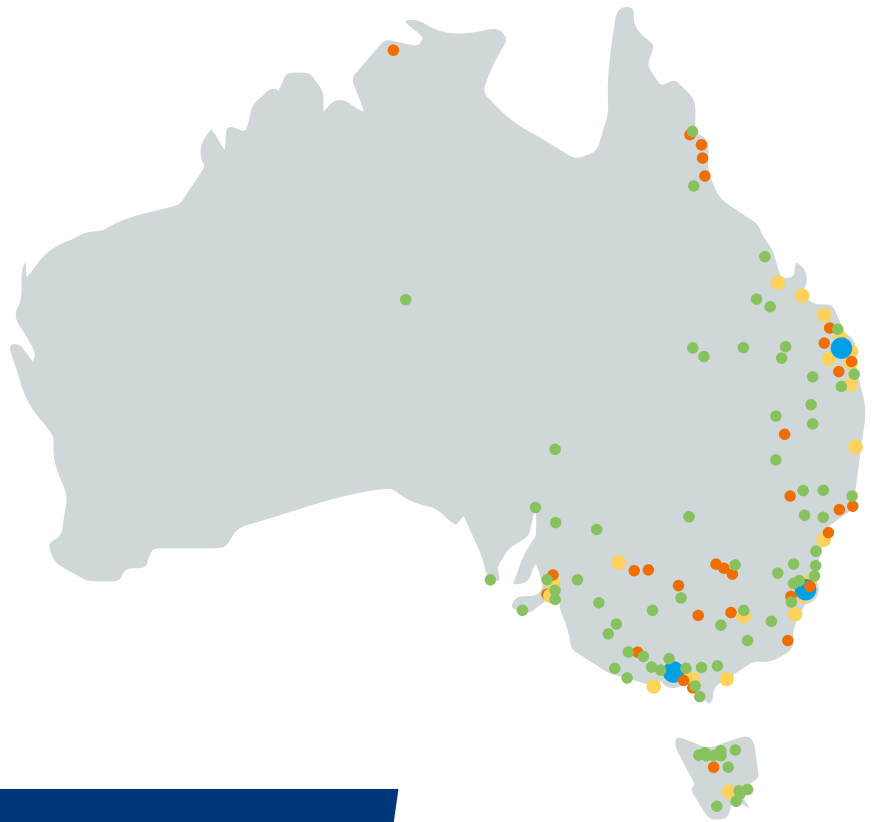
### ENTREPRENEURSHIP

Our continued success is driven by a spirit of pioneering, innovation, and change. We take initiatives and deliver the best results.

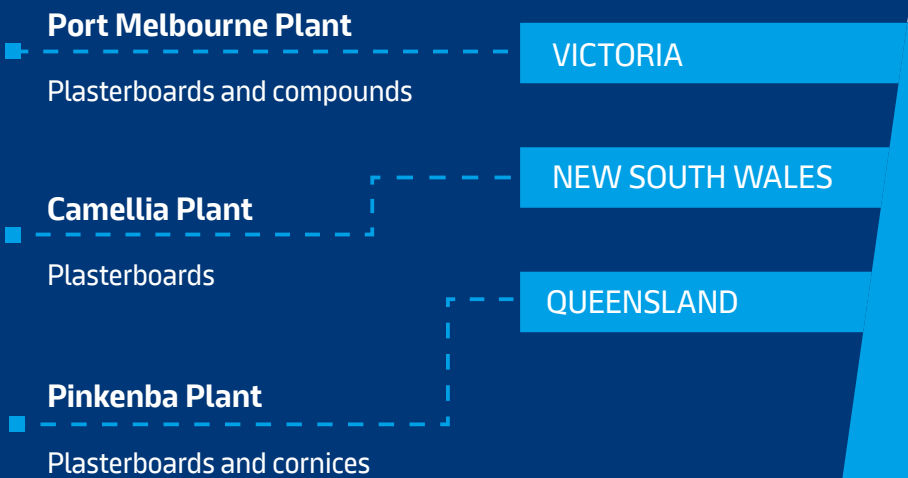


# KNAUF GYPSUM'S FOOTPRINT IN AUSTRALIA

- 3 Distribution Centres
- 26 Knauf Fulfilment Centres
- 62 Distributors
- Re-Seller Network:  
600+ Hardware Stores



## KNAUF MANUFACTURING PLANTS



### Quality assurance

Knauf is a Quality Endorsed Company (Lic No 0400) conforming to AS/NZS ISO 9001 quality management systems requirements. All Australian Knauf plasterboard production facilities are certified under ISO 9002 quality systems, the model for quality assurance in production, installation, and servicing. Knauf plasterboard is machine-made under a continuous process to the requirements of AS/NZS 2588 gypsum plasterboard.



# KNAUF'S SUSTAINABILITY PATHWAY

Thinking in generations and working sustainably have been key attributes of the Knauf family business from the very start. As a result, the Knauf Group is free to make bold decisions, even when the benefits will extend beyond our lifetime and be felt by our children and grandchildren.

Knauf has embraced this challenge with the ambition to become an industry leader in sustainable construction. The business's goal is to reach net-zero by 2045 – five years ahead of the Paris agreement. When Knauf turns 100 in 2032, the company aims globally to cut directly controlled CO<sub>2</sub> emissions in half (baseline taken in 2021).

The Knauf family of businesses goes beyond providing construction materials. Sustainable solutions live in homes and workplaces – the places people call 'home'.

Knauf only uses 100 per cent recycled paper liners on its plasterboard. Knauf plasterboard is highly durable, simple to recycle, and does not deteriorate naturally.

## 2032

*CO<sub>2</sub> emissions  
cut in half*

## 2045

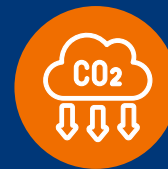
*Net-zero  
achieved*



Over the next two decades, Knauf will decarbonise operations in a cost-efficient way, reduce water withdrawals by a fifth, and eliminate waste production from all plants, quarries, and mines.



Beyond these targets, Knauf is integrating sustainability into its culture, its operations, and its solutions.



The gypsum in our products is naturally formed and essential to creating low-emissions buildings. Knauf plasterboard products are GECA certified.

# RESEARCH AND DEVELOPMENT

From its inception in Iphofen, Germany, the Knauf Group has made ongoing research and development a core component of the company. Knauf is committed to finding new materials and methods that support long-term sustainability.

Not only does Knauf look for environmentally viable solutions in creating and sourcing materials, but the company also actively engages in research to develop ecologically sound structures. This includes the development of seismic resistance systems and materials. Quality management systems play a major role in maintaining consistently excellent products and solutions. The Knauf Group is certified by LGA InterCert and meets all the requirements of ISO 9001:2008.



# ENVIRONMENT AND HEALTH CONSIDERATIONS

At Knauf, health and safety are core values. The company's aim is to always be injury-free. A target of zero accidents at work for employees, visitors, and contractors is set by the business. In all aspects of the company's activities, the health and safety rules and relevant regulations must be complied with. In addition, there are a number of definitive company safety procedures that determine the minimum standards expected by the company. To achieve the company's safety objectives, Knauf ensures close cooperation with representatives from relevant enforcement agencies. Documented safety management systems are implemented both on-site and in central functions. These systems involve the systematic identification of hazards, risk assessment, and the development of safe work practices aimed at minimising or eliminating risks to an acceptable level. Audits and inspections are used to monitor standards of safety management, adherence to the law, and company procedures.

# PRODUCT DESCRIPTION

**WETSTOP™** water-resistant plasterboard has a water-resistant core, designed to satisfy regulatory requirements for wet area applications in non-fire-rated systems. Ideal for internal lining of wet areas in bathrooms, showers, and laundries, WETSTOP™ can also be used as a lining for garage ceilings, alfresco areas, and other external protected ceilings.



**Table 1: Product information**

| PRODUCT       | SITE                |
|---------------|---------------------|
| WETSTOP 13 mm | Camellia, NSW       |
| WETSTOP 13 mm | Port Melbourne, VIC |
| WETSTOP 13 mm | Pinkenba, QLD       |

**Table 2: Industry classification**

| PRODUCT       | CLASSIFICATION | CODE  | CATEGORY                                                |
|---------------|----------------|-------|---------------------------------------------------------|
| WETSTOP 13 mm | UN CPC Ver.2   | 37530 | Articles of plaster or of compositions based on plaster |
|               | ANZSIC 2006    | 2032  | Plaster Product Manufacturing                           |

## DECLARED UNIT

The declared unit for the EPD is 1 m<sup>2</sup> of plasterboard.

**Table 3: Conversion table mass (kg) per m<sup>2</sup>**

| PRODUCT       | KG/M <sup>2</sup> |
|---------------|-------------------|
| WETSTOP 13 mm | 9.2               |

## CONTENT DECLARATION

The composition of plasterboard products is given in Table 4 and Table 5. Due to the confidential nature of the composition, upper and lower limits are given per ingredient. Recycled material and biogenic material is also measured as the low and upper limits for all Knauf plasterboard products.

**Table 4: Content declaration**

| PRODUCT COMPONENTS | WEIGHT, KG        | POST-CONSUMER RECYCLED MATERIAL, WEIGHT-% OF PRODUCT | BIOGENIC MATERIAL, WEIGHT-% OF PRODUCT | BIOGENIC MATERIAL, KG C/DECLARED UNIT |
|--------------------|-------------------|------------------------------------------------------|----------------------------------------|---------------------------------------|
| Gypsum             | 4.60–16.5         |                                                      |                                        |                                       |
| Paper              | 0.345–0.466       | 2.26–5.87                                            | 2.26–5.87                              | 1.13–2.93                             |
| Microsilica        | 0–0.969           |                                                      |                                        |                                       |
| Starch             | 0.0210–0.0830     |                                                      | 0.357–0.401                            | 0.179–0.201                           |
| Fibreglass         | 0–0.145           |                                                      |                                        |                                       |
| Other additives    | 0.0356–0.252      |                                                      |                                        |                                       |
| Water              | 0.782–2.40        |                                                      |                                        |                                       |
| <b>Total</b>       | <b>5.88–20.7*</b> | <b>2.26–5.87</b>                                     | <b>2.62–6.27</b>                       | <b>1.31–3.13</b>                      |

\* Range across our plasterboard products. This mass per declared unit for the products included in this EPD is provided in table 3.

**Table 5: Content declaration of packaging**

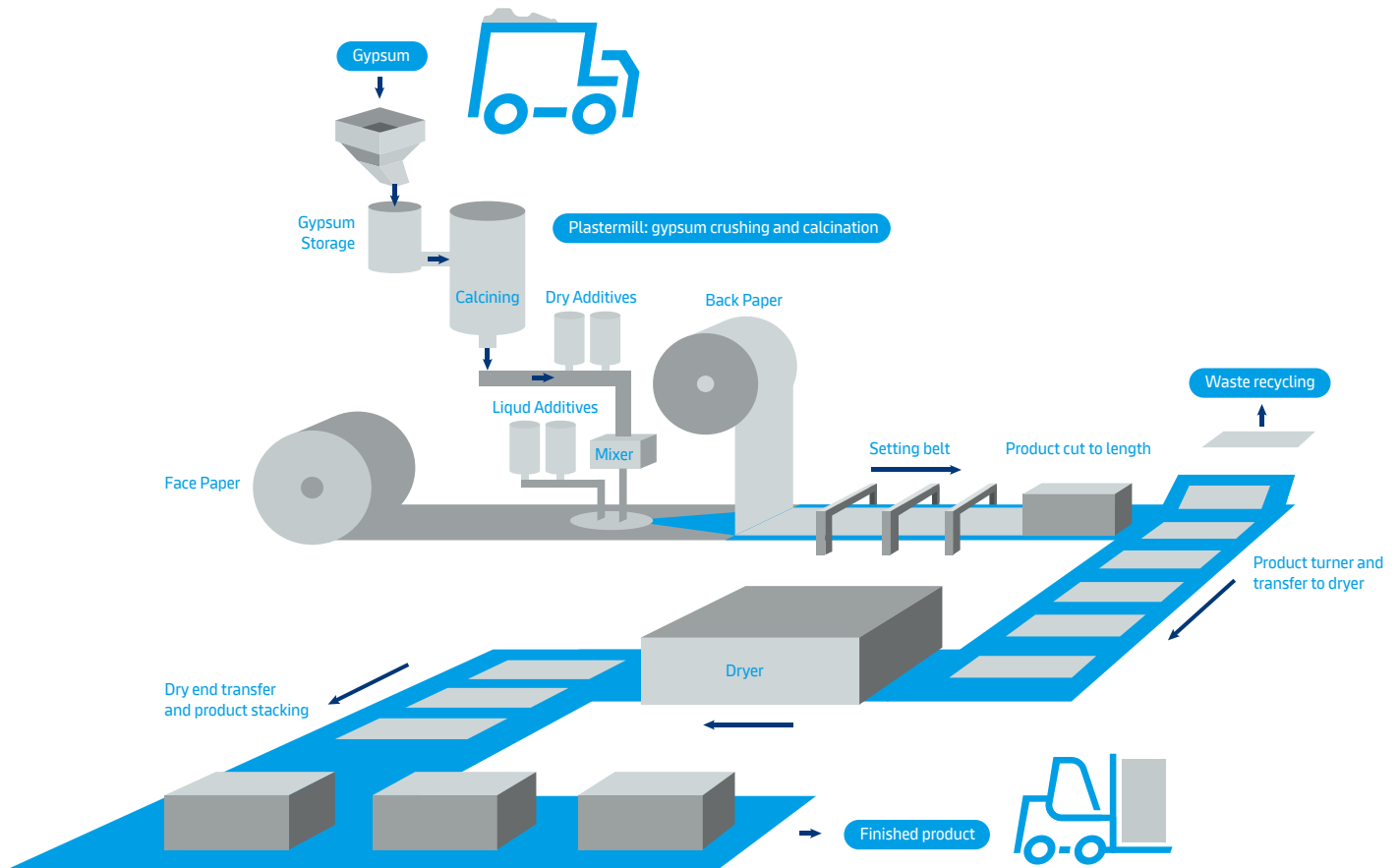
Knauf plasterboard does not use packaging.

| PACKAGING MATERIALS | WEIGHT, KG | WEIGHT-% | WEIGHT BIOGENIC CARBON, KG C/DECLARED UNIT |
|---------------------|------------|----------|--------------------------------------------|
| Packaging           | 0          | 0        | Not applicable                             |
| Total               | 0          | 0        | Not applicable                             |

## DANGEROUS SUBSTANCES FROM THE CANDIDATE LIST OF SVHC FOR AUTHORISATION

None of the materials in this EPD are on the Candidate List of substances of very high concern (SVHC), by the European REACH Regulation at a concentration greater than 0.1% by mass.

# THE PRODUCTION SYSTEM



## Knauf plasterboard is manufactured using a continuous production process.

Raw materials are homogeneously mixed to form a gypsum slurry that is spread via hose outlets onto a paper liner on a moving belt conveyor. A second paper line is fed onto the production line from above to form the plasterboard. The plasterboard continues along the production line where it is finished, dried, and cut to size.

Apart from natural gypsum and recycled paper, the key inputs in the plasterboard manufacturing process are natural gas and water. Knauf aims to reduce its water withdrawals by 2 per cent yearly.

## Installation

Knauf plasterboards are typically installed in Knauf wall and ceiling systems with Knauf jointing compound products and accessories. The type and number of layers of Knauf plasterboards used influences the structural, fire, acoustic, and thermal performance of the system.

All products must be installed in accordance with Knauf's recommendations and the current recommendations of AS/NZS 2589 Gypsum linings – applications and finishing.

## Product use and maintenance

When used in wall lining and ceiling systems, Knauf plasterboards provide a smooth and stable base for paint and other decorative finishes.

In normal use, no maintenance is generally required.

## Recycling

Plasterboard waste can be recycled into new plasterboard or as soil conditioner.



# SYSTEM BOUNDARIES

As shown in the table below, this EPD is of the type: Cradle to gate with options, modules C1–C4, module D and with optional modules A4–A5. Other life cycle stages (Modules B1–B7) are dependent on particular scenarios and best modelled at the building level.

**Table 6: Modules included in the scope of the EPD**

|                            | PRODUCT STAGE       |                            |               | CONSTRUCTION PROCESS STAGE |                             | USE STAGE |             |        |             |               |                        |                       | END OF LIFE STAGE           |                               |                  |          | RESOURCE RECOVERY STAGE                  |
|----------------------------|---------------------|----------------------------|---------------|----------------------------|-----------------------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|-----------------------------|-------------------------------|------------------|----------|------------------------------------------|
|                            | Raw material supply | Transport of raw materials | Manufacturing | Transport to customer      | Construction / Installation | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction / demolition | Transport to waste processing | Waste processing | Disposal | Reuse – Recovery – Recycling – potential |
|                            | A1                  | A2                         | A3            | A4                         | A5                          | B1        | B2          | B3     | B4          | B5            | B6                     | B7                    | C1                          | C2                            | C3               | C4       | D                                        |
|                            | X                   | X                          | X             | X                          | X                           | ND        | ND          | ND     | ND          | ND            | ND                     | ND                    | X                           | X                             | X                | X        | X                                        |
| <b>GEOGRAPHY</b>           | AU                  | AU                         | AU            | AU                         | AU                          |           |             |        |             |               |                        |                       | AU                          | AU                            | AU               | AU       | AU                                       |
| <b>SPECIFIC DATA</b>       | 82 %                |                            |               | -                          |                             | -         | -           | -      | -           | -             | -                      | -                     | -                           | -                             | -                | -        | -                                        |
| <b>VARIATION: PRODUCTS</b> | <10%                |                            |               | -                          |                             | -         | -           | -      | -           | -             | -                      | -                     | -                           | -                             | -                | -        | -                                        |
| <b>VARIATION: SITES</b>    | <10%                |                            |               | -                          |                             | -         | -           | -      | -           | -             | -                      | -                     | -                           | -                             | -                | -        | -                                        |

X = included in the EPD;

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

The processes hereafter are included in the product system to be studied. For modules beyond A3, the scenarios included are currently in use and are representative for one of the most probable alternatives.

# PRODUCT STAGE (MODULE A1 - A3)

Plasterboard is manufactured by heating gypsum in a plaster mill (known as calcination) to remove moisture and produce stucco. The dry stucco powder is then mixed with water and additives to give each board its desired properties. The mixture is rolled out to a uniform thickness and paper is added to the top and bottom faces. The board is then dried and cut to size ready for distribution to customer.

**Module A1** (raw material supply) includes the mining of gypsum in Australia, production of paper in Australia, production of additives, generation and transmission of electricity in Australia, and generation of thermal energy from natural gas.

**Module A2** (transportation) includes transport of gypsum via road to port and shipping in a bulk carrier via sea to Camellia, NSW, Port Melbourne, VIC, and Pinkenba, QLD. Transport from port to production plant is via truck. Transport for paper and all other additives is a mixture of truck and sea freight.

**Module A3** (manufacturing) includes production of stucco, the handling of raw materials on site and plasterboard production.

Since Module C is included in the EPD, the use of Module A1-A3 results without considering the results of Module C is discouraged.

Knauf plasterboards products were tested in accordance with the NSW EPA Recovered Plasterboard Order and meet all requirements.





# CONSTRUCTION STAGE (MODULE A4, A5)

**Module A4** (distribution) includes distribution from Knauf manufacturing sites to its distribution centres. An average distribution model is applied, which includes the distribution through Knauf’s distribution centres across Australia.

**Module A5** (installation) includes the materials used to install the plasterboard (jointing compound, jointing tape, and screws) and the production of plasterboard offcuts from installation, which are assumed to be landfilled. The installation of 1 m<sup>2</sup> of plasterboard requires the production of 1.15 m<sup>2</sup> of plasterboard (declared unit + offcuts). Module A1–A3 represents production of 1.15 m<sup>2</sup> plasterboard, and module A4 includes transport of 1.15 m<sup>2</sup> plasterboard to the construction site. The impacts of the 15% offcuts in module A5 are limited to the handling and processing of the waste.

**Table 7: Transport to building site**

| SCENARIO INFORMATION                                                                                        | UNIT<br>(expressed per functional unit or per declared unit)                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vehicle type used for transport e.g. long distance truck, boat etc.                                         | Truck: <ul style="list-style-type: none"> <li>- Bed-trucks: Truck, Euro 0 - 6 mix, 14 - 20t gross weight / 11.4t payload capacity</li> <li>- Semis: Truck, Euro 0 - 6 mix, 20 - 26t gross weight / 17.3t payload capacity</li> <li>- B-doubles: Truck, Euro 0 - 6 mix, more than 32t gross weight / 24.7t payload capacity</li> </ul> Ship: <ul style="list-style-type: none"> <li>- Bulk commodity carrier, 5,000 to 200,000 dwt payload capacity, ocean going</li> </ul> |
| Distance (weighted average per site)                                                                        | NSW, truck: 78 km (45% semis, 45% bed-trucks, 10% b-doubles)<br>VIC, truck: 281 km (70% semis, 30% b-doubles)<br>VIC, ship: 28 km<br>QLD, truck: 223 km (20% semis, 80% b-doubles)                                                                                                                                                                                                                                                                                         |
| Capacity utilisation (including empty returns)                                                              | Trucks: 45%<br>Ship: 90%                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bulk density of transported products                                                                        | 708 kg/m <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Volume capacity utilisation factor<br>(factor: =1 or < 1 or ≥ 1 for compressed or nested packaged products) | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

**Table 8: Installation of the product in the building**

| SCENARIO INFORMATION                                                                                                                                     | UNIT<br>(expressed per functional unit or per declared unit)                                                                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Jointing compound (Gypsum plaster)                                                                                                                       | 0.28 kg/m <sup>2</sup>                                                                                                        |
| Jointing tape (paper tape)                                                                                                                               | 0.006 kg/m <sup>2</sup>                                                                                                       |
| Screws (stainless steel)                                                                                                                                 | 0.024 kg/m <sup>2</sup>                                                                                                       |
| Water use                                                                                                                                                | 0 m <sup>3</sup>                                                                                                              |
| Quantitative description of energy type and consumption during the installation process                                                                  | 0 MJ (Assumed manual installation)                                                                                            |
| Waste materials on the building site before waste processing, generated by the product's installation                                                    | 15% of plasterboard is assumed to be offcut<br>15% of jointing compound and tape are assumed to be wasted                     |
| Output materials as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route) | 15% of plasterboard is assumed to be sent to landfill<br>15% of jointing compound and tape are assumed to be sent to landfill |
| Direct emissions to ambient air, soil and water                                                                                                          | n/a                                                                                                                           |

## END OF LIFE (MODULE C)

At the end of the building's life, it is anticipated that Knauf plasterboards will be removed from the building.

**Module C1** (deconstruction/demolition) includes demolition of the whole building including plasterboards, using a 100-kW construction excavator. Fuel consumption is calculated at 0.172 kg diesel input per tonne of material.

**Module C2** (transport to end-of-life) includes the transport by truck of waste plasterboard to landfill after building's demolition. The estimated transport distance by truck is 50 km with a capacity utilisation of 45%.

**Module C3** (waste processing) does not present impact as the plasterboard waste is assumed to be landfilled in the main scenario.

**Module C4** (disposal) includes plasterboard end-of-life in the landfill. An emission related to the landfill of construction products and paper is calculated. All biogenic carbon in paper is modelled as released at this stage.

Note: these values have been applied based on the mass of the declared unit.

**Table 9: End of life scenarios for products**

| PROCESS                                     | UNIT<br>(expressed per functional unit or per declared unit of components products or materials and by type of material) |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Collection process specified by type</b> | 0% collected separately                                                                                                  |
|                                             | 100% collected with mixed construction waste                                                                             |
| <b>Recovery system specified by type</b>    | 0% of plasterboard for re-use                                                                                            |
|                                             | 0% of plasterboard for recycling                                                                                         |
|                                             | 0% of plasterboard for energy recovery                                                                                   |
| <b>Disposal specified by type</b>           | 100% of materials in plasterboard to landfill                                                                            |

# RECOVERY AND RECYCLING POTENTIAL (MODULE D)

**Module D** (reuse-recovery-recycling-potential) includes the energy recovered from the landfill of paper in plasterboard. For every 1 kg of paper in landfill, 0.513 MJ of electricity recovered from gas was considered. In the case of 1 kg of starch, 0.439 MJ of electricity is recovered.

## LIFE CYCLE INVENTORY (LCI) DATA AND ASSUMPTIONS

All primary data represent an annual average from Knauf's 2022 calendar year (1 Jan 2022 to 31 Dec 2022). As such, all primary data fall within the mandatory five-year period required under EN 15804 and the PCR.

Sphera Solutions LCA for Experts (LCAFE) software version 10.8 was used. Data for all energy inputs, transport processes, packaging and raw materials are from Managed LCA Content (MLC) database version 2023.1 (Sphera, 2023). The reference year for the data ranges from 2019–2022 and therefore all datasets are within the 10-year limit allowable for generic data under EN 15804 and the PCR. Details for data used in the background system are given in section 3.4.

### Upstream data

Australia-specific datasets have been used where available, including Australian electricity mix, diesel, and natural gas. Water inputs are modelled as tap water, regionalised for Australia.

The upstream production impacts for materials used in the plasterboard products were calculated based on the quantities in the BOM, uplifted for any production waste, and using dataset-specific impacts extracted from Sphera databases.

### Electricity

The modelling of direct use of electricity considered the option of 'Residual electricity mix of the electricity supplier on the market', since Knauf sites use electricity from the grid without guarantee of origin. However, as residual mix composition in Australia (or states/territories) are not publicly available, we assumed a conservative scenario for the residual electricity mix. Conservative scenario means that all renewable electricity has been consumed and the remaining non-renewable sources are used in the mix.

The mix of electricity in the residual AU grid is 53.9 per cent hard coal, 26.3 per cent natural gas, 17.3 per cent brown coal, and 2.5 per cent heavy fuel oil. This results in an emission factor of 1.05 kg CO<sub>2</sub>-eq/kWh for indicators GWP-GHG and GWP-GHG (IPCC AR5). However, since the Australian National Greenhouse Accounts Factors (Department of Climate Change, Energy, the Environment and Water, 2023) published a Residual Mix Factor (RMF) of 0.91 kg CO<sub>2</sub>-eq/kWh, with all GWP-related indicators manually adjusted to correspond to the RMF.

### Recycling and recycled inputs

Knauf has secondary material inputs from the use of paper (i.e. 80 per cent post-consumer recycled) in the production of plasterboard products. For the other raw materials inputs, no secondary inputs are used. All the paper in plasterboard is assumed to be landfilled at the end-of-life (modules A5 and C).

Gypsum in plasterboard is from primary sources.

## Transport

Transport data was collected from Knauf for all input materials to all sites. The transport data included the transport modes and distances from suppliers. Transport distances were mapped against each line of Bill of Materials (BOM) data and used to calculate upstream transport impacts using the calculated input volumes. Where transport data was not available, a standard value of 50 km was used.

## Explanation of Average / Representative Products & Variation

This EPD is of multiple products, based on the average results of the product group. The product groups are the product type produced at the three different sites: Camellia, NSW; Port Melbourne, VIC; and Pinkenba, QLD. The averaging is based on the weighted average production of these sites.

## Cut off criteria

Personnel is excluded as per section 4.3.2 in the PCR (EPD International, 2024). Capital goods and infrastructure are excluded from this EPD. thinkstep-anz consistently excludes environmental impacts from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process, ('capital goods') regardless of potential significance. An important exception is the inclusion of capital goods for electricity generation, where the capital goods are very important for modelling of changes towards more renewable generation. Capital goods related to electricity generation are included.

For the processes within the system boundary, all available energy and material flow data have been included in the model. In cases where no matching life cycle inventories are available to represent a flow, proxy data have been applied based on conservative assumptions regarding environmental impacts.

## Allocation

Where subdivision of processes was not possible, allocation rules listed in PCR section 4.5 have been applied.

Site level data for electricity, diesel for mobile plant (e.g. loaders), water, and lubricant usage are allocated by mass, based on the annual production of each plant.

For all refinery products, allocation by mass and net calorific value has been applied. The specific manufacturing route of every refinery product is modelled, and the impacts associated with the production of these products are calculated individually. Materials and chemicals needed in the manufacturing process are modelled using the allocation rule most suitable for the respective product. Specifically, some materials used in plasterboard products are relevant regarding allocation:

- Paper: for all cases, Knauf sources paper with label FSC Mix 80, so paper with 80% recycling content was assumed. The GWP-GHG impacts for Paper is 0.225 kg CO<sub>2</sub>-eq/kg; Recycled paper input is sourced from pre-consumer and post-consumer waste material. No burden is associated with this material when it enters our lifecycle.
- Microsilica: Data for Microsilica used the dataset 'silica sand (flour)' from MCL databases. Possibly microsilica used by Knauf is from silica fume, in which case allocation would be relevant. This data should be reassessed using a more representative dataset upon EPD update.

End of life allocation for the landfill scenario follows an avoided burden approach: in cases where materials are sent to landfills, they are linked to an inventory that accounts for waste composition, regional leachate rates, landfill gas capture as well as utilisation rates (flaring vs. power production). A credit is assigned for power output using the regional grid mix.

## Assumptions

Assumptions made during the LCI collection and modelling process are as follows:

- Cut-off criteria, as per the PCR 2019:14 v1.3.3 (EPD International, 2024), are reasonable in the context of the overall impacts of plasterboard production.
- Accuracy of the measured data falls within normal industrial weighing systems accuracy limits of +/-5%.
- Where specific life cycle inventory data were unavailable, proxy data were used.
- Data for microsilica used the dataset 'silica sand (flour)' from MCL databases. Possibly this data should be reassessed using a more representative dataset in future updates of this LCA.
- Site utilities and waste (e.g. water, wastewater, electricity, thermal energy, and waste) are allocated based on the stucco used for wet plasterboard production (i.e. all products have the same impact per kg stucco used).
- Off-cuts from installation are assumed to be landfilled (main scenario) or recycled (gypsum share only; additional scenario). Paper in plasterboard and installation materials are assumed to be landfilled.
- The plasterboard end-of-life includes demolition using excavator, transportation, and landfilling (main scenario) or recycling (gypsum share only; additional scenario). Similarly to installation, paper in plasterboard and installation materials are assumed to be landfilled.



# DEFINITIONS: ENVIRONMENTAL IMPACT INDICATORS

|                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Climate change (global warming potential) (GWP-total, GWP-fossil, GWP-biogenic, GWP-luluc)</b> | Measures the impact of greenhouse gases on global warming, where: <ol style="list-style-type: none"> <li>1. GWP-total is the total global warming potential.</li> <li>2. GWP-fossil measures the impact of greenhouse gases originating from fossil fuels</li> <li>3. GWP-biogenic assesses the impact of greenhouse gases from plant based materials and other biogenic sources.</li> <li>4. GWP-luluc evaluates the impact of greenhouse gases due to land use and land use change.</li> </ol> |
| <b>Ozone depletion potential (ODP)</b>                                                            | Measures the potential impact of a product on stratospheric ozone depletion.                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Acidification potential (AP)</b>                                                               | Is an indicator of a product's potential to increase environmental acidity in soil and water. It indicates the products ability to release hydrogen ions (H+), resulting in decreased pH.                                                                                                                                                                                                                                                                                                        |
| <b>Eutrophication potential (EP-fw, EP-m, EP-t)</b>                                               | Measures the potential for a product to contribute to excessive nutrients (typically nitrogen and phosphorus) in soil and water environments.                                                                                                                                                                                                                                                                                                                                                    |
| <b>Photochemical ozone formation potential (POFP)</b>                                             | Assesses the potential for volatile organic compounds (VOCs) and nitrogen oxides (NOx) to form ground-level ozone. POFP indicates a product's contribution to air pollution.                                                                                                                                                                                                                                                                                                                     |
| <b>Abiotic resource depletion (ADP-mm, ADP-f)</b>                                                 | Is the potential for a product to contribute to the depletion of non-living (abiotic) resources This indicator is divided into:<br>Abiotic resource depletion (minerals and metals which measures the depletion of non-renewable mineral resources<br>Abiotic resource depletion (fossil fuels) which measures the depletion of fossil fuel resources.                                                                                                                                           |
| <b>Water depletion potential (WDP)</b>                                                            | Is an indicator that assesses the potential for a product to contribute to water resource depletion.                                                                                                                                                                                                                                                                                                                                                                                             |

## ASSESSMENT INDICATORS

The results tables describe the different environmental indicators for each product per declared unit, for each declared module. The EN 15804 reference package based on EF 3.0 is used.

**Table 10** contains the core environmental impact indicators in accordance with EN 15804:2012+A2:2019, describing the potential environmental impacts of the product.

**Table 11** shows the life cycle inventory indicators for resource use.

**Table 12** displays the life cycle inventory indicators for waste and other outputs.

**Table 13** provides additional environmental impact indicators in accordance with EN 15804:2012+A2:2019.

**Table 14** displays biogenic carbon content indicators

**Table 15** contains results for environmental impact indicators in accordance with EN 15804:2012+A1:2013 to aid backward comparability.

**Table 18** contains core environmental impact indicators

**Table 19** shows use of resources

**Table 20** provides waste production and output flows

**Table 21** contains additional environmental impact indicators

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.

Energy indicators (MJ) are always given as net calorific value.



## ENVIRONMENTAL PERFORMANCE

Results for 1 m<sup>2</sup> of plasterboard WETSTOP 13 mm.

**Table 10: EN15804+A2 Core environmental impact indicators**

| PARAMETER             | UNIT                              | A1-A3    | A4       | A5       | C1       | C2       | C3 | C4       | D         |
|-----------------------|-----------------------------------|----------|----------|----------|----------|----------|----|----------|-----------|
| <b>GWP-total</b>      | kg CO <sub>2</sub> eq.            | 2.24     | 0.228    | 0.346    | 0.00581  | 0.0555   | 0  | 1.30     | -0.0423   |
| <b>GWP-fossil</b>     | kg CO <sub>2</sub> eq.            | 2.88     | 0.228    | 0.152    | 0.00581  | 0.0555   | 0  | 0.130    | -0.0423   |
| <b>GWP-biogenic</b>   | kg CO <sub>2</sub> eq.            | -0.639   | 4.49E-05 | 0.193    | 1.21E-06 | 1.09E-05 | 0  | 1.17     | -3.38E-06 |
| <b>GWP-luluc</b>      | kg CO <sub>2</sub> eq.            | 0.00157  | 2.96E-06 | 1.50E-04 | 7.44E-08 | 7.21E-07 | 0  | 3.35E-04 | -5.31E-07 |
| <b>ODP</b>            | kg CFC 11 eq.                     | 2.63E-12 | 1.93E-14 | 6.90E-13 | 4.84E-16 | 4.69E-15 | 0  | 3.00E-13 | -4.80E-13 |
| <b>AP</b>             | mol H <sup>+</sup> eq.            | 0.0104   | 4.13E-04 | 9.01E-04 | 2.93E-05 | 9.89E-05 | 0  | 9.89E-04 | -2.21E-04 |
| <b>EP-freshwater</b>  | kg P eq.                          | 1.91E-05 | 3.71E-08 | 3.43E-07 | 9.32E-10 | 9.04E-09 | 0  | 2.25E-07 | -2.95E-09 |
| <b>EP-marine</b>      | kg N eq.                          | 0.00396  | 1.77E-04 | 1.45E-04 | 1.40E-05 | 4.25E-05 | 0  | 2.75E-04 | -4.51E-05 |
| <b>EP-terrestrial</b> | mol N eq.                         | 0.0413   | 0.00195  | 0.00160  | 1.53E-04 | 4.67E-04 | 0  | 0.00302  | -4.93E-04 |
| <b>POCP</b>           | kg NMVOC eq.                      | 0.0100   | 4.11E-04 | 4.83E-04 | 3.92E-05 | 9.82E-05 | 0  | 0.00107  | -1.26E-04 |
| <b>ADP-m&amp;m*</b>   | kg Sb eq.                         | 5.05E-06 | 8.26E-10 | 3.39E-06 | 2.08E-11 | 2.01E-10 | 0  | 5.22E-09 | -1.54E-09 |
| <b>ADP-fossil*</b>    | MJ                                | 42.1     | 3.09     | 2.08     | 0.0777   | 0.753    | 0  | 1.68     | -0.441    |
| <b>WDP*</b>           | m <sup>3</sup> world eq. deprived | 0.298    | 9.12E-04 | 0.0225   | 2.29E-05 | 2.22E-04 | 0  | 0.0168   | -0.0170   |

\* Disclaimer: 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.

**Table 11: Life cycle inventory indicators on use of resource**

| PARAMETER | UNIT           | A1-A3  | A4       | A5       | C1       | C2       | C3 | C4       | D         |
|-----------|----------------|--------|----------|----------|----------|----------|----|----------|-----------|
| PERE      | MJ             | 10.5   | 0.0112   | 0.553    | 2.82E-04 | 0.00273  | 0  | 0.251    | -0.164    |
| PERM      | MJ             | 7.39   | 0        | 1.11     | 0        | 0        | 0  | 6.28     | 0         |
| PERT      | MJ             | 17.9   | 0.0112   | 1.66     | 2.82E-04 | 0.00273  | 0  | 6.53     | -0.164    |
| PENRE     | MJ             | 42.1   | 3.09     | 2.08     | 0.0777   | 0.753    | 0  | 1.68     | -0.441    |
| PENRM     | MJ             | 0      | 0        | 0        | 0        | 0        | 0  | 0        | 0         |
| PENRT     | MJ             | 42.1   | 3.09     | 2.08     | 0.0777   | 0.753    | 0  | 1.68     | -0.441    |
| SM        | kg             | 0.366  | 0        | 0.00563  | 0        | 0        | 0  | 0        | 0         |
| RSF       | MJ             | 0      | 0        | 0        | 0        | 0        | 0  | 0        | 0         |
| NRSF      | MJ             | 0      | 0        | 0        | 0        | 0        | 0  | 0        | 0         |
| FWT       | m <sup>3</sup> | 0.0144 | 1.81E-05 | 6.98E-04 | 4.55E-07 | 4.41E-06 | 0  | 4.82E-04 | -2.36E-04 |

**Table 12: Waste production and output flows**

| PARAMETER | UNIT | A1-A3    | A4       | A5       | C1       | C2       | C3 | C4       | D         |
|-----------|------|----------|----------|----------|----------|----------|----|----------|-----------|
| HWD       | kg   | 1.10E-05 | 2.24E-12 | 1.71E-09 | 5.62E-14 | 5.45E-13 | 0  | 3.60E-11 | 1.63E-12  |
| NHWD      | kg   | 0.163    | 6.68E-05 | 2.08     | 1.68E-06 | 1.63E-05 | 0  | 7.41     | -1.51E-04 |
| RWD       | kg   | 2.92E-04 | 4.50E-07 | 5.55E-05 | 1.13E-08 | 1.10E-07 | 0  | 1.76E-05 | -7.35E-08 |
| CRU       | kg   | 0        | 0        | 0        | 0        | 0        | 0  | 0        | 0         |
| MFR       | kg   | 0        | 0        | 0        | 0        | 0        | 0  | 0        | 0         |
| MER       | kg   | 0        | 0        | 0        | 0        | 0        | 0  | 0        | 0         |
| EEE       | MJ   | 3.55E-05 | 0        | 0.0266   | 0        | 0        | 0  | 0.153    | 0         |
| EET       | MJ   | 0        | 0        | 0        | 0        | 0        | 0  | 0        | 0         |





**Table 13: EN15804+A2 Additional Environmental Impact Indicators**

| PARAMETER           | UNIT                   | A1-A3    | A4       | A5       | C1       | C2       | C3 | C4       | D         |
|---------------------|------------------------|----------|----------|----------|----------|----------|----|----------|-----------|
| GWP-GHG             | kg CO <sub>2</sub> -eq | 2.89     | 0.228    | 0.321    | 0.00581  | 0.0555   | 0  | 1.10     | -0.0422   |
| GWP-GHG (IPCC AR5)  | kg CO <sub>2</sub> -eq | 2.88     | 0.228    | 0.308    | 0.00579  | 0.0554   | 0  | 1.02     | -0.0422   |
| PM                  | Disease incidences     | 1.35E-07 | 3.13E-09 | 1.52E-08 | 3.37E-10 | 7.21E-10 | 0  | 1.09E-08 | -2.21E-09 |
| IR <sup>2</sup>     | kBq U235 eq.           | 0.0484   | 5.62E-05 | 0.00749  | 1.41E-06 | 1.37E-05 | 0  | 0.00202  | -9.64E-06 |
| ETP-fw <sup>1</sup> | CTUe                   | 11.1     | 1.32     | 0.795    | 0.0333   | 0.322    | 0  | 0.847    | -0.0638   |
| HTP-c <sup>1</sup>  | CTUh                   | 1.65E-09 | 2.21E-11 | 3.66E-08 | 5.55E-13 | 5.39E-12 | 0  | 1.28E-10 | -4.18E-12 |
| HTP-nc <sup>1</sup> | CTUh                   | 1.62E-07 | 7.74E-10 | 5.29E-09 | 2.73E-11 | 1.88E-10 | 0  | 1.40E-08 | -1.18E-10 |
| SQP <sup>1</sup>    | Dimensionless          | 52.4     | 0.00569  | 0.648    | 1.43E-04 | 0.00139  | 0  | 0.356    | -0.00617  |

**Disclaimer 1:** The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

**Disclaimer 2:** This impact category deals mainly with the eventual impact of low dose ionising 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 ionising radiation from the soil, from radon and some construction materials, is also not measured by this indicator.

**Table 14: Biogenic Carbon Content**

| PARAMETER | UNIT | A1-A3 |
|-----------|------|-------|
| BCC-prod  | kg C | 0.198 |
| BCC-pack  | kg C | 0     |

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

**Table 15: EN15804+A1 Environmental Impact Indicators**

| PARAMETER | UNIT                                 | A1-A3    | A4        | A5       | C1       | C2        | C3 | C4       | D         |
|-----------|--------------------------------------|----------|-----------|----------|----------|-----------|----|----------|-----------|
| GWP       | kg CO <sub>2</sub> eq.               | 2.18     | 0.225     | 0.290    | 0.00573  | 0.0548    | 0  | 0.990    | -0.0417   |
| ODP       | kg CFC-11 eq.                        | 3.10E-12 | 2.27E-14  | 8.12E-13 | 5.70E-16 | 5.53E-15  | 0  | 3.53E-13 | -5.65E-13 |
| AP        | kg SO <sub>2</sub> eq.               | 0.00774  | 2.95E-04  | 7.58E-04 | 2.04E-05 | 7.07E-05  | 0  | 7.78E-04 | -1.82E-04 |
| EP        | kg PO <sub>4</sub> <sup>3-</sup> eq. | 0.00155  | 6.01E-05  | 5.43E-05 | 4.70E-06 | 1.44E-05  | 0  | 9.53E-05 | -1.53E-05 |
| POCP      | kg C <sub>2</sub> H <sub>4</sub> eq. | 5.11E-04 | -5.32E-05 | 7.12E-05 | 1.91E-06 | -1.30E-05 | 0  | 2.15E-04 | -9.41E-06 |
| ADPE      | kg Sb eq.                            | 5.05E-06 | 8.29E-10  | 3.38E-06 | 2.08E-11 | 2.02E-10  | 0  | 5.33E-09 | -1.54E-09 |
| ADPF      | MJ                                   | 41.1     | 3.08      | 1.90     | 0.0775   | 0.751     | 0  | 1.62     | -0.439    |



## SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

The main differences from the main scenario are that plasterboard is assumed to reach module C3 with separation of gypsum share and paper share. Gypsum is assumed to be recycled into agricultural gypsum, while paper is assumed to be landfilled. Plasterboard recycling as a soil ameliorant is allowed in all states in Australia and is managed in accordance with local regulations.

### INSTALLATION STAGE (MODULE A5)

**Module A5** (installation) includes the materials used to install the plasterboard (jointing compound, jointing tape, and screws) and the production of plasterboard offcuts from installation. The difference from the main scenario is that offcuts are assumed to be recycled. Paper in plasterboards or jointing tape is assumed to be landfilled.

**Table 16: Installation of the product in the building**

| SCENARIO INFORMATION                                                                                                                                     | UNITS<br>(expressed per functional unit or per declared unit)                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Jointing compound (gypsum plaster)                                                                                                                       | 0.28 kg/m <sup>2</sup>                                                                                                                                                |
| Jointing tape (paper tape)                                                                                                                               | 0.006 kg/m <sup>2</sup>                                                                                                                                               |
| Screws (stainless steel)                                                                                                                                 | 0.024 kg/m <sup>2</sup>                                                                                                                                               |
| Water use                                                                                                                                                | 0 m <sup>3</sup>                                                                                                                                                      |
| Quantitative description of energy type and consumption during the installation process                                                                  | 0 kWh or MJ                                                                                                                                                           |
| Waste materials on the building site before waste processing, generated by the product's installation                                                    | 15% of plasterboard is assumed to be offcut                                                                                                                           |
|                                                                                                                                                          | 15% of jointing compound and tape are assumed to be wasted                                                                                                            |
| Output materials as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route) | 15% of plasterboard is assumed to be sent to recycling. The gypsum share is assumed to be recovered while the paper share is assumed to be landfilled.                |
|                                                                                                                                                          | 15% of jointing compound and tape are assumed to be sent to recycling. The gypsum share is assumed to be recovered while the paper share is assumed to be landfilled. |
| Direct emissions to ambient air, soil and water                                                                                                          | n/a                                                                                                                                                                   |

## END OF LIFE (MODULE C)

**Module C1** (deconstruction/demolition) includes demolition of the whole building including plasterboards, using a 100-kW construction excavator. Fuel consumption is calculated at 0.172 kg diesel input per tonne of material.

**Module C2** (transport to end-of-life) includes the transport by truck of waste plasterboard to recovery of plasterboard into recycled gypsum. The estimated transport distance by truck is 50 km with a capacity utilisation of 45%.

**Module C3** (waste processing) includes the processing of plasterboard waste for recycling. Energy use is estimated as 0.0034 kWh of electrical energy from the Australian grid to process 1 kg of waste. The end of waste of gypsum is after the plasterboard was separated from the paper composition.

**Module C4** (disposal) includes the end-of-life of paper in plasterboard in landfill. An emission related to the landfill of paper is calculated. All biogenic carbon in paper is modelled as released at this stage.

Note: these values have been applied based on the mass of the declared unit.

**Table 17: End of life scenarios for products**

| PROCESS                                     | UNIT<br>(expressed per functional unit or per declared unit of components products or materials and by type of material) |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Collection process specified by type</b> | 0% collected separately                                                                                                  |
|                                             | 100% collected with mixed construction waste                                                                             |
| <b>Recovery system specified by type</b>    | 0% of plasterboard for re-use                                                                                            |
|                                             | 100% of gypsum in plasterboard for recycling                                                                             |
|                                             | 0% of plasterboard for energy recovery                                                                                   |
| <b>Disposal specified by type</b>           | 100% of paper in plasterboard to landfill                                                                                |

**Table 18: EN15804+A2 Core environmental impact indicators**

| PARAMETER             | UNIT                              | A5       | C1       | C2       | C3       | C4       | D         |
|-----------------------|-----------------------------------|----------|----------|----------|----------|----------|-----------|
| <b>GWP-total</b>      | kg CO <sub>2</sub> eq.            | 0.316    | 0.00581  | 0.0555   | 0.0103   | 1.19     | -0.0952   |
| <b>GWP-fossil</b>     | kg CO <sub>2</sub> eq.            | 0.122    | 0.00581  | 0.0555   | 0.0103   | 0.0239   | -0.0951   |
| <b>GWP-biogenic</b>   | kg CO <sub>2</sub> eq.            | 0.194    | 1.21E-06 | 1.09E-05 | 1.63E-07 | 1.17     | -1.32E-05 |
| <b>GWP-luluc</b>      | kg CO <sub>2</sub> eq.            | 5.67E-05 | 7.44E-08 | 7.21E-07 | 1.02E-07 | 5.48E-06 | -1.20E-06 |
| <b>ODP</b>            | kg CFC 11 eq.                     | 6.13E-13 | 4.84E-16 | 4.69E-15 | 7.95E-16 | 3.06E-14 | -4.26E-13 |
| <b>AP</b>             | mol H <sup>+</sup> eq.            | 6.87E-04 | 2.93E-05 | 9.89E-05 | 5.00E-05 | 2.37E-04 | -4.92E-04 |
| <b>EP-freshwater</b>  | kg P eq.                          | 2.82E-07 | 9.32E-10 | 9.04E-09 | 2.05E-10 | 1.15E-08 | -1.22E-08 |
| <b>EP-marine</b>      | kg N eq.                          | 9.02E-05 | 1.40E-05 | 4.25E-05 | 1.07E-05 | 8.07E-05 | -1.75E-04 |
| <b>EP-terrestrial</b> | mol N eq.                         | 9.90E-04 | 1.53E-04 | 4.67E-04 | 1.18E-04 | 8.83E-04 | -0.00191  |
| <b>POCP</b>           | kg NMVOC eq.                      | 3.16E-04 | 3.92E-05 | 9.82E-05 | 2.99E-05 | 4.86E-04 | -4.92E-04 |
| <b>ADP-m&amp;m</b>    | kg Sb eq.                         | 3.38E-06 | 2.08E-11 | 2.01E-10 | 3.21E-11 | 3.36E-10 | -1.56E-09 |
| <b>ADP-fossil</b>     | MJ                                | 1.68     | 0.0777   | 0.753    | 0.113    | 0.271    | -1.17     |
| <b>WDP</b>            | m <sup>3</sup> world eq. deprived | 0.0192   | 2.29E-05 | 2.22E-04 | 0.00198  | 0.00517  | -0.0151   |

**Table 19: Use of resources**

| PARAMETER | UNIT           | A5       | C1       | C2       | C3       | C4       | D         |
|-----------|----------------|----------|----------|----------|----------|----------|-----------|
| PERE      | MJ             | 0.488    | 2.82E-04 | 0.00273  | 3.67E-04 | 0.0212   | -0.146    |
| PERM      | MJ             | 1.11     | 0        | 0        | 6.28     | 0        | 0         |
| PERT      | MJ             | 1.60     | 2.82E-04 | 0.00273  | 6.28     | 0.0212   | -0.146    |
| PENRE     | MJ             | 1.68     | 0.0777   | 0.753    | 0.113    | 0.271    | -1.17     |
| PENRM     | MJ             | 0        | 0        | 0        | 0        | 0        | 0         |
| PENRT     | MJ             | 1.68     | 0.0777   | 0.753    | 0.113    | 0.271    | -1.17     |
| SM        | kg             | 0.00563  | 0        | 0        | 0        | 0        | 0         |
| RSF       | MJ             | 0        | 0        | 0        | 0        | 0        | 0         |
| NRSF      | MJ             | 0        | 0        | 0        | 0        | 0        | 0         |
| FWT       | m <sup>3</sup> | 5.96E-04 | 4.55E-07 | 4.41E-06 | 2.75E-05 | 1.26E-04 | -2.11E-04 |

**Table 20: Waste production and output flows**

| PARAMETER | UNIT | A5       | C1       | C2       | C3       | C4       | D         |
|-----------|------|----------|----------|----------|----------|----------|-----------|
| HWD       | kg   | 1.70E-09 | 5.62E-14 | 5.45E-13 | 1.93E-12 | 5.29E-12 | 8.99E-13  |
| NHWD      | kg   | 0.0727   | 1.68E-06 | 1.63E-05 | 2.64E-05 | 0.353    | -1.47E-04 |
| RWD       | kg   | 5.10E-05 | 1.13E-08 | 1.10E-07 | 6.85E-09 | 1.55E-06 | -1.53E-07 |
| CRU       | kg   | 0        | 0        | 0        | 0        | 0        | 0         |
| MFR       | kg   | 2.01     | 0        | 0        | 7.05     | 0        | 0         |
| MER       | kg   | 0        | 0        | 0        | 0        | 0        | 0         |
| EEE       | MJ   | 0.0266   | 0        | 0        | 0        | 0.153    | 0         |
| EET       | MJ   | 0        | 0        | 0        | 0        | 0        | 0         |

**Table 21: EN15804+A2 Additional Environmental Impact Indicators**

| PARAMETER          | UNIT                   | A5       | C1       | C2       | C3       | C4       | D         |
|--------------------|------------------------|----------|----------|----------|----------|----------|-----------|
| GWP-GHG            | kg CO <sub>2</sub> -eq | 0.291    | 0.00581  | 0.0555   | 0.0103   | 0.990    | -0.0951   |
| GWP-GHG (IPCC AR5) | kg CO <sub>2</sub> -eq | 0.278    | 0.00579  | 0.0554   | 0.0102   | 0.918    | -0.0949   |
| PM                 | Disease incidences     | 1.25E-08 | 3.37E-10 | 7.21E-10 | 4.90E-10 | 1.71E-09 | -1.46E-08 |
| IR                 | kBq U235 eq.           | 0.00696  | 1.41E-06 | 1.37E-05 | 1.13E-06 | 1.63E-04 | -1.94E-05 |
| ETP-fw             | CTUe                   | 0.575    | 0.0333   | 0.322    | 0.0185   | 0.0775   | -0.349    |
| HTP-c              | CTUh                   | 3.66E-08 | 5.55E-13 | 5.39E-12 | 7.14E-13 | 9.78E-12 | -8.56E-12 |
| HTP-nc             | CTUh                   | 1.58E-09 | 2.73E-11 | 1.88E-10 | 2.74E-11 | 1.00E-09 | -3.61E-10 |
| SQP                | Dimensionless          | 0.551    | 1.43E-04 | 0.00139  | 2.68E-04 | 0.0134   | -24.7     |



## GENERAL INFORMATION

An Environmental Product Declaration, or EPD, is a standardised and verified way of quantifying the environmental impacts of a product based on a consistent set of rules known as a PCR (Product Category Rules).

Knauf has the sole ownership, liability, and responsibility for the 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/functional 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.

The results for EN15804+A1 compliant EPDs are not comparable with EN15804+A2 compliant studies as the methodologies are different. Results that are EN15804+A1 compliant are given in this document to assist comparability with older EPDs.

# EPD GLOSSARY FOR TABLES

| <b>ENVIRONMENTAL IMPACT</b>                          | <b>ABB.</b>         |
|------------------------------------------------------|---------------------|
| Climate change - total                               | GWP-total           |
| Climate change - fossil                              | GWP-fossil          |
| Climate change - biogenic                            | GWP-biogenic        |
| Climate change - land use and land use change        | GWP-luluc           |
| Ozone Depletion                                      | ODP                 |
| Acidification                                        | AP                  |
| Eutrophication aquatic freshwater                    | EP-freshwater       |
| Eutrophication aquatic marine                        | EP-marine           |
| Eutrophication terrestrial                           | EP-terrestrial      |
| Photochemical ozone formation                        | POCP                |
| Depletion of abiotic resources - minerals and metals | ADP-minerals&metals |
| Depletion of abiotic resources - fossil fuels        | ADP-fossil          |
| Water use                                            | WDP                 |

| <b>RESOURCE USE</b>                                        | <b>ABB.</b> |
|------------------------------------------------------------|-------------|
| Renewable primary energy as energy carrier                 | PERE        |
| Renewable primary energy resources as material utilisation | PERM        |
| Total use of renewable primary energy resources            | PERT        |
| Non-renewable primary energy as energy carrier             | PENRE       |
| Non-renewable primary energy as material utilisation       | PENRM       |
| Total use of non-renewable primary energy resources        | PENRT       |
| Use of secondary material                                  | SM          |
| Use of renewable secondary fuels                           | RSF         |
| Use of non-renewable secondary fuels                       | NRSF        |
| Use of net fresh water                                     | FW          |

| <b>WASTE CATEGORIES AND OUTPUT FLOWS</b> | <b>ABB.</b> |
|------------------------------------------|-------------|
| Hazardous waste disposed                 | HWD         |
| Non-hazardous waste disposed             | NHWD        |
| Radioactive waste disposed               | RWD         |
| Components for re-use                    | CRU         |
| Materials for recycling                  | MFR         |
| Materials for energy recovery            | MER         |
| Exported electrical energy               | EEE         |
| Exported thermal energy                  | EET         |

| <b>BIOGENIC CARBON CONTENT</b>      | <b>ABB.</b> |
|-------------------------------------|-------------|
| Biogenic carbon content - product   | BCC-prod    |
| Biogenic carbon content - packaging | BCC-pack    |

| <b>ADDITIONAL INDICATORS</b>            | <b>ABB.</b> |
|-----------------------------------------|-------------|
| PCR GWP-GHG                             | GWP-GHG     |
| Respiratory inorganics                  | PM          |
| Ionising radiation - human health       | IRP         |
| Eco-toxicity - freshwater               | ETP-fw      |
| Human toxicity, cancer                  | HTPc        |
| Human toxicity, non-canc.               | HTPnc       |
| Land use related impacts / soil quality | SQP         |

| <b>ENVIRONMENTAL IMPACT</b>                          | <b>ABB.</b> |
|------------------------------------------------------|-------------|
| Global warming potential                             | GWP         |
| Depletion potential of the stratospheric ozone layer | ODP         |
| Acidification potential of land and water            | AP          |
| Eutrophication potential                             | EP          |
| Photochemical ozone creation potential               | POCP        |
| Abiotic depletion potential - elements               | ADPE        |
| Abiotic depletion potential - fossil fuels           | ADPF        |

| <b>ENVIRONMENTAL IMPACT - ALTERNATIVE SCENARIO (RECYCLING)</b> | <b>ABB.</b>         |
|----------------------------------------------------------------|---------------------|
| Climate change - total                                         | GWP-total           |
| Climate change - fossil                                        | GWP-fossil          |
| Climate change - biogenic                                      | GWP-biogenic        |
| Climate change - land use and land use change                  | GWP-luluc           |
| Ozone Depletion                                                | ODP                 |
| Acidification                                                  | AP                  |
| Eutrophication aquatic freshwater                              | EP-freshwater       |
| Eutrophication aquatic marine                                  | EP-marine           |
| Eutrophication terrestrial                                     | EP-terrestrial      |
| Photochemical ozone formation                                  | POCP                |
| Depletion of abiotic resources - minerals and metals           | ADP-minerals&metals |
| Depletion of abiotic resources - fossil fuels                  | ADP-fossil          |
| Water use                                                      | WDP                 |

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