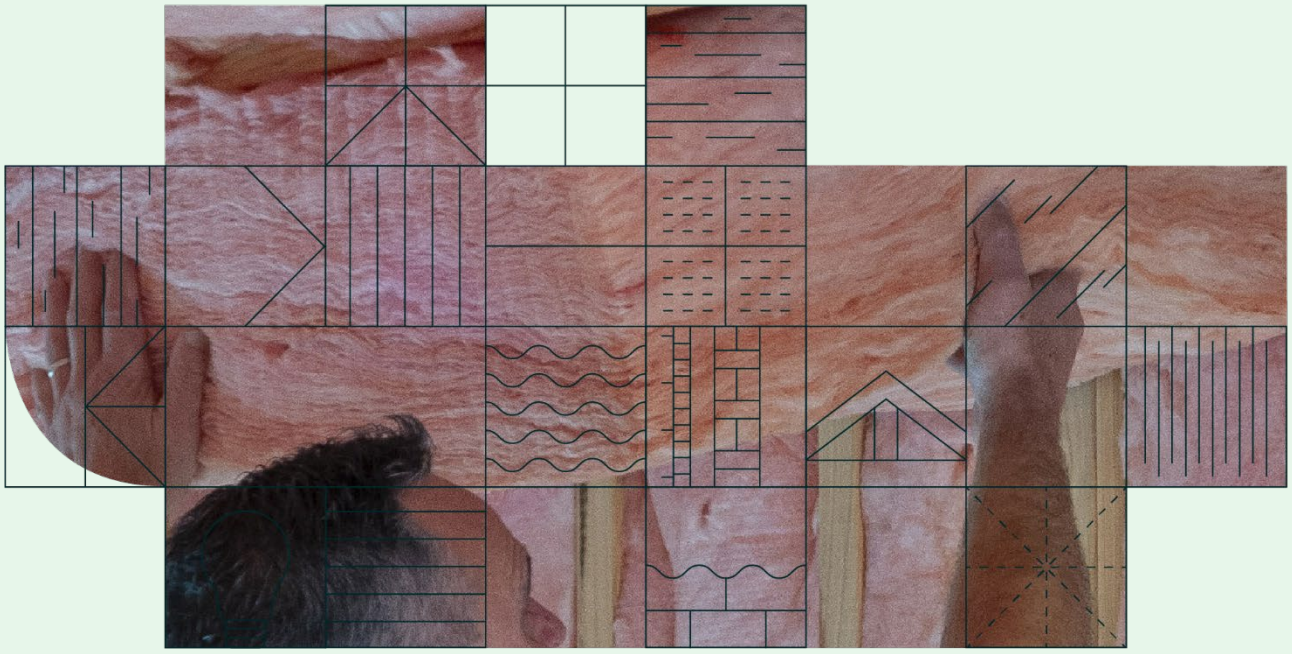
Fletcher Insulation

Building Better, Together

Environmental Product Declaration

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

Pink® Batts, FirmaSoft® and Soundbreak™ ceiling insulation



EPD INTERNATIONAL EPD SYSTEM

AUSTRALASIA EPD® INTERNATIONAL EPD SYSTEM

ECO PLATFORM EPD VERIFIED

Programme	The International EPD® System, www.environdec.com
Programme operator	EPD International AB
Regional programme operator	EPD Australasia, www.epd-australasia.com
EPD registration number	EPD-IES-0023073:001
Date of publication (issue)	2025-06-11
Date of validity	2030-06-10
Geographical scope of EPD	Australia

EPD of multiple products based on a representative product within the group. The products covered in the EPD are listed on page 9.

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

1. Company Introduction

Fletcher Insulation is an Australian based business that makes its products in Melbourne Australia. Our business shares a heritage steeped in insulation manufacturing dating back to the 1930s. It started with the Sisalation brand and through a number of amalgamations including Insulco and ACI. These businesses were bought by Fletcher Building and in 2005 Fletcher Insulation was formed. Fletcher Insulation focuses solely on insulation and stands as a leading Australian manufacturer, distributor, and technical support provider for the building construction industry in insulation.

Fletcher Insulation owns and distributes a number of key brands such as Pink Batts, Sisalation, Permastop, Permatuff, Fletcher Protect into the Australian and International building material markets.

Our business is owned by Fletcher Building an $8 billion building materials conglomerate that also owns Australian brands like Stramit, Iplex and Laminex.

Our purpose is crystal clear: we make the world better through cutting-edge insulation and an unwavering commitment to innovation, delivered with simplicity. This approach allows for a seamless integration of solutions into projects, ultimately contributing to a more efficient and sustainably built environment.

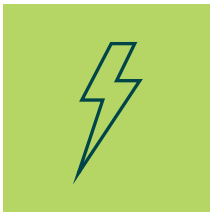
Our business proudly achieved a number of certifications including: Codemark and is ISO Accredited to ISO 9001 and ISO 17205 for our Nata Accredited Laboratory. (reference: https://insulation.com.au/download-categories/certification/).

Our parent business continues to invest in more sustainable, local manufacturing, with over $800 million invested in more productive assets and sustainable manufacturing in New Zealand, Australia, and across the Pacific over the past five years.

In looking to adapt our business to be more resilient to climate change, we have benefitted from ongoing analysis of our physical climate-related risks and impacts, which we began in Financial Year (FY) 2020.

In regard to mitigation, we are actively working to reduce our emissions, with a focus on our cement operations, electricity use in Australia, and process heat and transport in New Zealand. Our '30 by 30' Science-Based Target to reduce Scope 1 and 2 GHG emissions by 30% by 2030 from a 2018 baseline underscores our commitment. (reference: https://fletcherbuilding.com/assets/1A-sustainability/Documents/Fletcher-Building-Climate-Statements-2024.pdf).

2. Business values



BE BOLD

Being Bold is about innovating and growing and in order to do this we need to create an environment where everyone can share ideas and have a go.

BETTER TOGETHER

We have diverse skills, ideas, and experiences that together can create better results than we ever expected.

CUSTOMER LEADING

Customer Leading means listening, understanding, knowing our competitors and giving our customers products and services that they value.

PROTECT

Protect is a value because safety and protecting people has to stand out. Safety is a focus for everyone across our organisation. It must start with a belief that all injuries are preventable so we can strive toward zero injuries. We should all expect to go home free from harm every single day and this is down to all of us.

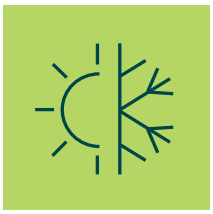
3. Manufacturing location

Fletcher Insulation 127 Frankston - Dandenong Rd, Dandenong South VIC 3175

4. Product insights

ENERGY EFFICIENCY

Glasswool products offer significant benefits in making the building envelope more energy efficient. The better the building envelope performs, the lower the cost of the mechanical ventilation required to keep the building within comfort levels. (Refer Sustainability Victoria. (2018). Energy Smart Housing Manual).



THERMAL PERFORMANCE

Glasswool products trap air, which is one of the poorest conductors of heat, making glasswool a cost effective methods of achieving thermal performance.

FIRE RESISTANCE

Glasswool is deemed as non combustible under AS1530.1 and can be used as a constituent of fire rated walls under 1530.4. (refer Etex Australia Pty Ltd. (2025). Siniat Blueprint Lightweight Construction manual that incorporates Fletcher Insulation).

ACOUSTIC PERFORMANCE

Glasswool products also improve thermal performance of walls, floors and ceilings. The addition of the mass of glasswool will improve acoustic performance (refer Etex Australia Pty Ltd. (2025). Siniat Blueprint Lightweight Construction manual for actual summaries of systems – refer Rw improvements from no insulated walls to insulated walls).

RECYCLED

Fletcher Insulation glasswool contains up to 80% recycled glass content.

AUSTRALIAN MANUFACTURER

Fletcher insulation manufactures its products in Australia reducing the need to import material.

5. Product information

5.1. General

Fletcher Insulation glasswool products are available in a number of options from batts to boards to rolls and come in various sizes. The density of the products vary and dictate the thermal and acoustic performance of the individual products.

The main constituent of the glasswool comes from the form of glass and Fletcher insulation uses up to 80% recycled glass in all its manufactured glasswool products. The raw materials are melted in a furnace and a bound together with Fletcher Insulation next generation binder. This binder technology ensures rigidity of product to aid in installation performance to ensure easier fitting and installation and that products hold in place after installation.

Our products are used in both residential and commercial buildings in the building envelope for thermal, acoustic, fire and condensation control.

Table 1: Industry classification

Product	Classification	Code	Category
Fletcher Insulation Glasswool	UN CPC Ver2.1	88539	Other non-metallic mineral product manufacturing services n.e.c.
	ANZSIC 2006	2090	Other Non-Metallic Mineral Product Manufacturing
	Australian/New Zealand Standards	AS4859.1	Thermal insulation materials for buildings

5.2. Declared Unit

The declared unit for the EPD is 1 m^2 of glass wool insulation product with a specific R-value as placed on the market intended to be used for ceilings in buildings.

Results per m^2 of representative insulation product are also provided together with conversion factors to enable results to be calculated for other products covered by this EPD.

5.3. Content Declaration

According to the General Programme Instructions, the EPD shall include a content declaration with a list of materials and chemical substances including information on their hazardous properties.

The content declaration for this EPD of multiple products is based on the representative product. All Fletcher insulation products have the same material composition, as presented in Table 2. The weight of representative product is 1.72 kg/m^2.

1 kg of insulation product is packaged with high-density polyethylene (HDPE) (0.0196 kg), low-density polyethylene (LDPE) (0.007 kg) packaging and paper label (0.002 kg). Packaging composition of Fletcher Insulation products is showed in Table 3.

Table 2: Content declaration for glasswool insulation products (by mass)

Product components	Weight-% of product	Post-consumer recycled material, weight-% of product	Biogenic material, weight-% of product	Biogenic material, kg C/product or declared unit
Fiberised bio-soluble glass				
Recycled glass	72.9	72.9	0	0
Feldspar sand	3.41	0	0	0
Dolomite sand	3.06	0	0	0
Glass grade silica sand	5.33	0	0	0
Soda ash	3.68	0	0	0
Borax	7.11	0	0	0
Heat cured resin*	4.50	0	0	0
Sum	100	72.9	0	0

*Heat cured resin is made from phenol formaldehyde/urea formaldehyde resin, formaldehyde, ammonium sulphate, oil emulsion, urea, silane and dye.

Table 3: Content declaration of packaging for 1 kg of glasswool insulation products

Packaging materials	Weight, kg	Weight-% (versus the product)	Biogenic material, kg C/product or declared unit
LDPE bags	0.0196	1.96	0
HDPE sleeves	0.007	0.700	0
Label*	0.002	0.200	0
Sum	0.0286	2.86	0

*The biogenic carbon content in packaging material is 0.092%, which is less than the 5% threshold stated in PCR 2019:14 v1.3.4 (EPD International, 2024b). Therefore, it is not declared.

5.3.1. Dangerous substances from the candidate list of SVHC for Authorisation

Hazardous properties for Hazardous Substances and New Organisms (HSNO classifications) and Globally Harmonized System (GHS) classifications are reproduced from vendor SDS or OECD's global portal to information on chemical substances available at: https://www.echemportal.org/echemportal/substance-search. No products declared within this EPD contain substances exceeding the limits for registration according to the European Chemicals Agency's 'Candidate List of Substances of Very High Concern for authorisation'.

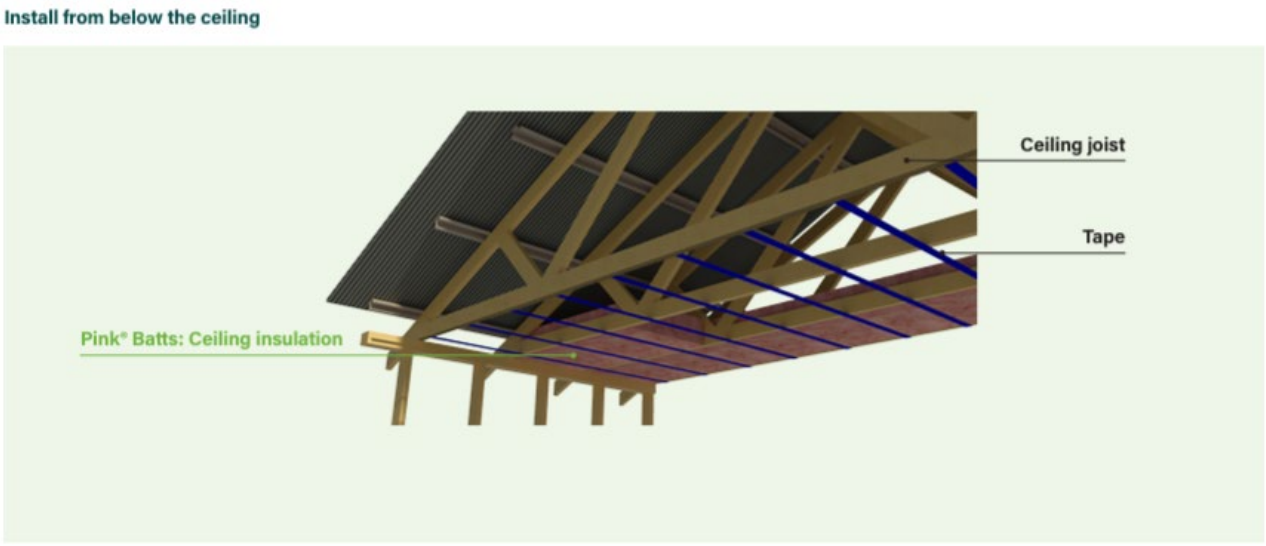
5.4. Product(s) covered by EPD

5.4.1. Pink® Batts and FirmaSoft® ceiling EPD

Pink Batts and Firmasoft insulation batts are commonly used in constructing new homes or retrofitting existing buildings for increased thermal efficiency The batt ranges are available in various thermal R-values and dimensions ensuring there is an effective and efficient product solution for ceilings, walls and floor applications between studs, ceiling and floor joists.

The batts are made from flexible and resilient glasswool for thermal and acoustic insulation of residential ceilings.

Diagram 1: Typical residential ceiling insulation installation



EPD of multiple products based on a representative product within the group. The products covered in the EPD are listed on page 9.

This study adopts the option of “EPD of multiple products, based on a representative product”. The declared GWP-GHG results of representative product for modules A1-A3 may differ by more than 10% compared to the GWP-GHG results of other included products in each group. This is due to the differences in mass per square meter of different insulation products. This should not affect the grouping of similar insulation products. The representative product has been chosen based on it having the highest production rate and therefore being the most popular purchased product in each group according to production data.

Table 4: Representative product for grouping

Product group	Representative product	
Ceiling insulation products	Pink Batts R4.1 1160X580X215 10PK	

5.4.2. Products

Pink Batts and Firmasoft ceiling EPD covers the following products:

Table 5: Ceiling insulation products information

Area of application	Designation*	Product	Product code	R-value	Mass per square meter (kg /m^2)	Density (kg/m^3)
Ceiling, roof, floor	VR	Firmasoft Ceiling R3.5 1160X430X175 16P	4006079	3.50	1.40	8.00
Ceiling, roof, floor	VR	Firmasoft Ceiling R3.5 1160X580X175 10P	4006080	3.50	1.40	8.00
Ceiling, roof, floor	VR	Firmasoft Ceiling R4.1 1160X430X215 10P	4006081	4.10	1.72	8.00
Ceiling, roof, floor	VR	Firmasoft Ceiling I R4.1 1160X580X215 10P	4006082	4.10	1.72	8.00
Ceiling, roof, floor	VR	Firmasoft Ceiling R5.0 1200X600X220 8P	4006083	5.00	2.64	12.0
Ceiling, roof, floor	VR	Firmasoft Ceiling R5.0 1160X580X220 8P	4006084	5.00	2.64	12.0
Ceiling, roof, floor	VR	Pink Batts R2.5 1160X430X130 16PK	4006098	2.50	1.04	8.00
Ceiling, roof, floor	VR	Pink Batts R2.5 1160X580X130 16PK	4006099	2.50	1.04	8.00
Ceiling, roof, floor	VR	Pink Batts R3.5 1160X430X175 16PK	4006102	3.50	1.40	8.00
Ceiling, roof, floor	VR	Pink Batts R3.5 1160X580X175 10PK	4006103	3.50	1.40	8.00
Ceiling, roof, floor	VR	Pink Batts R4.1 1160X430X215 10PK	4006039	4.10	1.72	8.00
Ceiling, roof, floor	**VR**	**Pink Batts R4.1 1160X580X215 10PK**	**4006040**	**4.10**	**1.72**	**8.00**

Area of application	Designation*	Product	Product code	R-value	Mass per square meter (kg /m^2)	Density (kg/m^3)
Ceiling, roof, floor	VR	Pink Batts R5.0 1160X430X220 8PK	4006041	5.00	2.35	10.7
Ceiling, roof, floor	VR	Pink Batts R5.0 1160X580X220 8PK	4006042	5.00	2.35	10.7
Ceiling, roof, floor	VR	Pink Batts R6.0 1160X430X250 6PK	4006043	6.00	3.00	12.0
Ceiling, roof, floor	VR	Pink Batts R6.0 1160X580X250 6PK	4006044	6.00	3.00	12.0
Ceiling, roof, floor	VR	Pink Batts R7.0 1160X580X285 4PK	4006046	7.00	2.41	13.0

* The area of application and designation are determined according to EN16783:2024 (CEN, 2024).

5.4.3. Examples of product end use

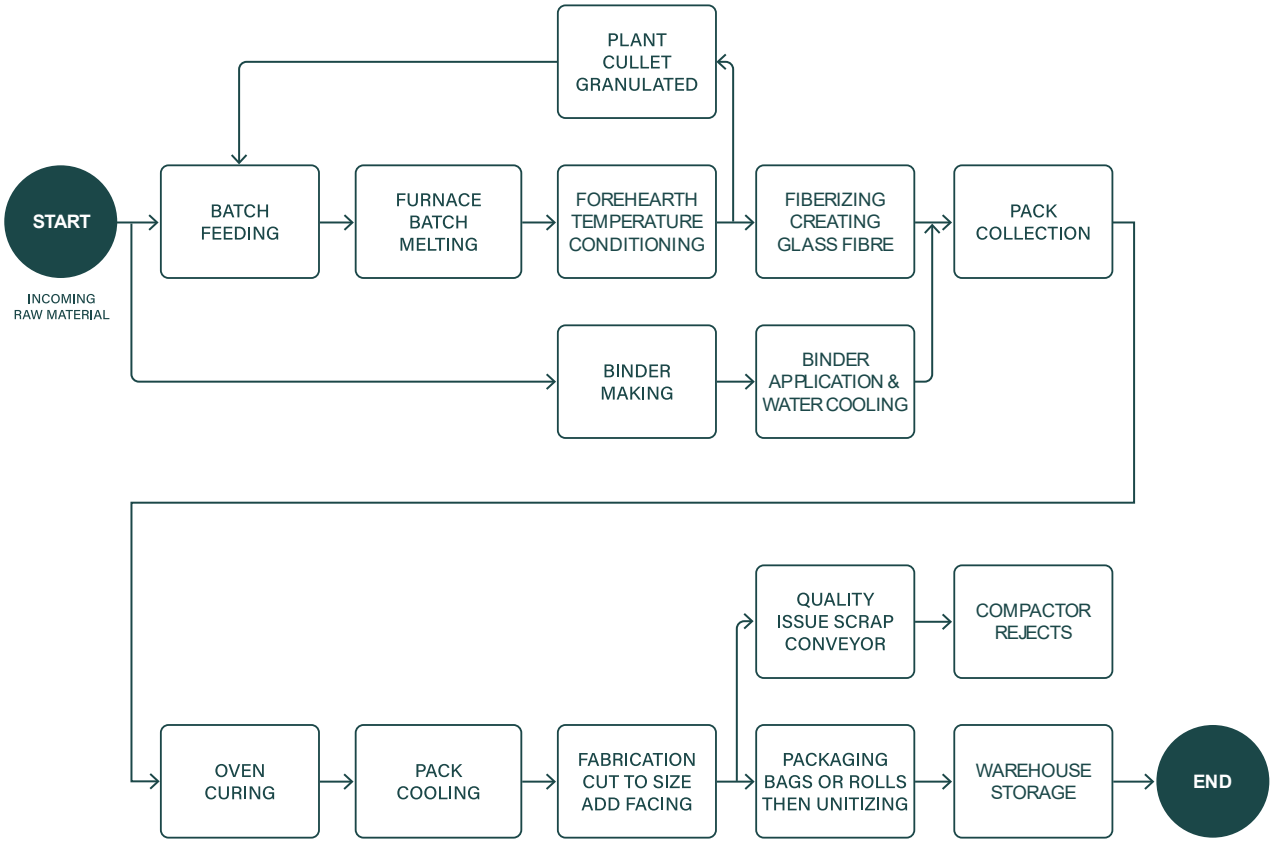
Pink Batts and Firmasoft ranges are used in the construction of new homes or retrofitting existing buildings for increased thermal efficiency. The ranges are available in various thermal R-values and dimensions ensuring there is an effective and efficient product solution for every application. The batts renowned for their firmness, are low itch, easy to cut and friction fit standard joists to make homes feel cooler in summer, warmer in winter and provide energy savings all year round.

6. Manufacturing process

The primary operation performed by Fletcher Insulation at its Dandenong site is the manufacture of FBS-1 - Fibre Biosolubility Glasswool Insulation from recycled glass. This process includes:

- Mixing of dry raw materials for glass manufacture
- Melting of glass and spinning of glass fibre
- Adding binder to the spun glass fibres, forming of these fibres and subsequent curing in an oven
- Cutting, packing and dispatching of finished products
- Product is packaged in polyethylene bags.

Diagram 2: Glasswool manufacturing process flow



7. System boundaries

As shown in the table below, this EPD is of the type Cradle to gate with options, modules A4, A5, C1–C4 and module D (A1–A3, A4, A5 + C + D);

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
Geography	GLO	GLO	AU	AU	AU	-	-	-	-	-	-	-	AU	AU	AU	AU	AU
Share of Specific Data*	78%					-	-	-	-	-	-	-	-	-	-	-	-
Variation: Products	+74%/-40%					-	-	-	-	-	-	-	-	-	-	-	-
Variation: Sites	0%					-	-	-	-	-	-	-	-	-	-	-	-

X = included in the EPD; ND = Module not declared (such a declaration shall not be regarded as an indicator result of zero)

*specific data material transport (batch and binder materials), and energy use for all processes including manufacturing.

The processes below 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.

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

7.1. Product stage (Modules A1–A3)

Product stage includes the extraction and processing of raw materials, such as batch, binder and packaging materials. This includes the collection and processing of waste crushed glass which is an input into insulation products.

Energy needed for raw material supply and energy for manufacturing in core process is also included in module A1-A3. This incorporates impacts associated with the generation and use of electricity from primary energy resources, including their extraction, refining and transport.

7.2. Construction stage (Module A4, A5)

The construction stage includes the distribution of insulation products (A4) from the manufacturing facility to distribution centres where it is assumed customers will collect the product. Calculated using the weighted average distances from the manufacturing site in Dandenong, VIC to the different distribution destinations in Australia were calculated based on the percentage of national sales (Table 7).

This is an average scenario that may not be representative for any given customer. Customers should individually establish the transport requirements between distribution centre and their site rather than relying on the average.

Installation of Fletcher Insulation product during construction (A5) is normally carried out by hand requiring no energy or further material input. Due to its easy-to-use nature, limited insulation product waste is generated during construction and installation. Therefore, this study assumes there is no product waste generated in this process. Packaging of insulation products is recycled or disposed using end-of-life assumptions (Table 8).

7.2.1. Packaging end-of-life

Packaging impacts are included in construction waste. Recycling and landfill are the two main end-of-life pathways in Australia. According to the Department of Climate Change, Energy, the Environment and Water (DCCEEW), the recycling rates of plastic and paper are 13% and 62% in 2020-2021 in Australia (DCCEEW, 2022). Therefore, packaging end-of-life is based on assumptions, using best available data:

- Label is assumed to be 62% recycled, and 38% landfilled.
- LDPE and HDPE plastic bags and wraps are assumed to be 13% recycled, and 87% landfilled.

Table 7: Transport to building site (representative product)

Scenario information	Unit (expressed per declared unit)
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat etc.	Litre of fuel type per distance or vehicle type, Commission Directive 2007/37/EC (European Emission Standard)
Distance	519 km
Capacity utilisation (including empty returns)	19.8%
Volume capacity utilisation factor (factor: =1 or < 1 o r ≥ 1 for compressed or nested packaged products)	39.6%

Table 8: Installation of the product in the building

Scenario information	Unit (expressed per declared unit)
Waste materials on the building site before waste processing, generated by the product's installation (specified by type	Packaging material only includes – LDPE plastic bags – HDPE sleeves – Paper label The mass of packaging material can be found in Table 2
Output materials (specified by type) as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route)	Packaging material only Recycling – 62% for paper – 13% for plastic Landfill – 38% for paper – 87% of plastic
Direct emissions to ambient air, soil and water	None specified

7.3. End of Life (Module C)

When a building reaches its end-of-life it will be demolished (C1) and the demolition waste transported to a processing facility (C2). The waste processing (C3) includes the separation and processing of recyclable waste from other building materials. All used Fletcher Insulation products will be disposed (C4).

According to the latest report, about 80% of construction and demolition waste are recycled in Australia (DCCEEW, 2022). However, these construction and demolition waste is concentrated on concrete, bricks and rubble. Recycling and reuse data of glass wool insulation materials is not available in the report. The European Union Guidance on PEF identifies an R2 value of 0% for glasswool (European Commission, 2020). Therefore, a conservative assumption has been made that all used insulation materials will be landfilled in the end-of-life regardless of their applications. This scenario is currently in use and is representative for one of the most likely scenario alternatives.

Table 9: End of life scenarios for products

Process	Unit (expressed per functional unit or per declared unit)
Collection process specified by type	1 m^2 of Fletcher Insulation products collected with mixed construction waste
Recovery system specified by type	100% for landfill*
Disposal specified by type	100% modelled as inert materials in landfill
Assumptions for scenario development, e.g. transportation	C1 - Demolition with an excavator (Safe Work Australia, 2018). Modelled by excavator operation dataset in ecoinvent. C2 - 50 km of transport by truck. C4 - Landfill of glass wool insulation. Modelled as inert materials in landfill

*The European Union Guidance on PEF identifies an R2 value of 0% for glasswool (European Commission, 2020).

7.4. Recovery and Recycling potential (Module D)

No material is considered in Module D

8. Life cycle inventory (LCI) data and assumptions

Specific data was used for all manufacturing operations up to the factory gate, including upstream data for waste glass collected. Generic data was collected for all products within this EPD manufactured by Fletcher insulation for the 12-month period between 2022-07-01 to 2023-06-30. No changes to production technology have occurred since the data collection period and hence the data continues to be representative of current practice.

8.1. Upstream data

Generic data was used for input materials sourced from different suppliers. Supporting generic data specific to the country of origin of the raw materials was used whenever possible. When such generic data was not available, global or regional datasets were used as proxy. All electricity and water data were regionalised for VIC,

8.2. LCA software and database

Generic data for raw materials, energy, and transportation are all from the ecoinvent v3.10 database (Wernet, 2016) with reference years between 2020-2023. Both specific and generic data fall within the EN 15804 and PCR requirements of 10 years for generic data and 5 years for producer specific data.

The LCA was conducted in Microsoft Excel. The LCA utilises life cycle inventory data from ecoinvent, Allocation, cut-off, EN15804, ecoinvent database version 3.10 (Wernet, 2016) for several of the raw and process materials obtained from the background system. In addition, the electricity residual mix is modelled based on AusLCI version 2.44 (ALCAS, 2024). The ecoinvent datasets have not been adapted as they are provided in Excel and have not been used in conjunction with an LCA software. The emission factors of electricity residual mix are calculated by using SimaPro developed by PRé Sustainability. Then the emission factors of electricity residual mix are imported to Excel to finish the calculation.

8.3. Electricity

The residual electricity grid mix of Victoria is modelled based on SimaPro and AusLCI Database version 2.44 (ALCAS, 2024). The composition of the residual electricity grid mix of Victoria is modelled based on published data for the financial year 1st July 2022 – 30st June 2023 (Australian Government, 2024). The Victorian residual electricity mix is made up of lignite (64.2%), natural gas (2.14%), biomass (0.04%), biogas (0.66%), hydro (5.83%), wind (14.37%) and solar (7.41%). Of the remaining electricity, 2.38% is imported from Southern Australia, 1.56% is imported from Tasmania, and 1.43% is imported from New South Wales. Onsite consumption (5.57%) is calculated based on the same source as the grid mix (Australian Government, 2024). The low voltage (<1kV) grid's transmission and distribution losses (5.25%) are calculated based on data from the Australian Energy Market Operator (AEMO, 2022). Detailed explanation can be found in the published report on Australian electricity residual supply mixes (thinkstep-anz, 2024).

The emission factor for the Victoria residual grid mix for the GWP-GHG indicator is 1.08 kg CO_2e/kWh (based on EF3.1).

8.4. Recycling and recycled inputs

Material recycling (cut-off approach): Any open scrap inputs into manufacturing remain unconnected. The system boundary at end-of-life is drawn after scrap collection to account for the collection rate, which generates an open scrap output for the product system. The processing and recycling of the scrap is associated with the subsequent product system and is not considered in this study.

Fletcher Insulation is responsible for the environmental impacts of the collecting and processing of crushed glass. The end-of-waste state for waste glass input into the product system is deemed to occur immediately prior to collecting the waste glass.

8.5. Transport

Average transportation distances and modes of transport are included for the transport of the raw materials, operating materials, and auxiliary materials to manufacturing facilities.

Transportation was modelled using the ecoinvent global transportation datasets. Fuels were modelled using the geographically appropriate (AU) datasets.

Table 10: Transportation and road fuel datasets

Mode / fuels	Location	Dataset
Truck	AU	transport, freight, lorry, all sizes, EURO4 to generic market for transport, freight, lorry, unspecified [Rest-of-World]
Container ship	Global	transport, freight, sea, container ship [Global]

8.6. Explanation of Representative Products & Variation

The declared GWP-GHG results of representative product for modules A1-A3 may differ by more than 10% compared to the GWP-GHG results of other included products in this EPD. This is due to the differences in mass per square meter of different insulation products. Pink Batts R4.1 1160X580X215 10PK has been selected as the representative product in this EPD. This representative product has been chosen as it represents the product with the highest production rate and therefore is the most popular purchased product in this EPD according to production data.

Variation of GWP-GHG results within this EPD has been presented in previous sections. Detailed variation of core environmental indicator results for module A-C will be presented in environmental performance.

8.7. Cut off criteria

Personnel-related processes are excluded as per section 4.3.2 in the PCR (EPD International, 2023).

Infrastructure have been included in the background datasets as provided by ecoinvent (Wernet, 2016). It is not possible, within reasonable effort, to subtract the data on infrastructure/capital goods from these datasets[1].

All other reported data were incorporated and modelled using the best available life cycle inventory data.

[1] The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, non-cancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes. (CEN, 2019).

8.8. Allocation

Post-consumer scrap, i.e., crushed glass, is a main input to the Fletcher Insulation product system. Fletcher Insulation pays for the waste glass inputs, then crush the glass waste and feed into batch mix. Therefore, in line with the polluter pays principle, Fletcher Insulation becomes responsible for environmental impacts of the collecting and processing of waste glass while the production of glass waste is excluded in the system boundary. Therefore, the glass waste is considered burden free when it enters the system boundary. This is in line with the provisions of Allocation of Waste in PCR 2019:14 v1.3.4 (section 4.5.2)

Multi-output allocation generally follows the requirements PCR 2019:14 v1.3.4 (EPD International, 2024b) section 4.5.1.

At Fletcher Insulation products are grouped into wall, ceiling, commercial partitions, roofing and HVAC insulation products. These products have different dimensions and thicknesses, with similar density and binder content per cubic metre for each group. On average 93% of the total mass of product output from Fletcher Insulation is insulation batts, such as wall, ceiling and commercial partition insulation products. The roofing, HVAC and other insulation products contribute to the remaining 7% of the total product output. Electricity and water consumption data was unavailable separately for Fletcher Insulation products, therefore, electricity and water consumption are allocated according to the production volume by weight of each product.

End-of-Life allocation generally follows the requirements of ISO 14044, section 4.3.4.3 (ISO, 2006b) and the requirements of section 4.5.2 in PCR 2019:14 v1.3.4 (EPD International, 2024b). It also generally follows the polluter pays principle.

Material recycling (cut-off approach): Any open scrap inputs into manufacturing remain unconnected. The system boundary at end-of-life is drawn after scrap collection to account for the collection rate, which generates an open scrap output for the product system. The processing and recycling of the scrap is associated with the subsequent product system and is not considered in this study.

Landfilling (cut-off approach): Any open scrap inputs into manufacturing remain unconnected. The system boundary includes landfilling processes following the polluter-pays-principle. 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). No credits for power or heat production are assigned.

8.8.1. Assumptions

All assumptions align with the goal and scope of the study and are not seen as limitations to the validity of the results. These assumptions are:

- Average binder content was adopted for each product group.
- Energy and water usage was allocated based on the mass of product produced for the FY2022/23.
- Use of any required secondary data from outside Australia is sufficiently representative of the impacts of the material. Where the geography is expected to have an impact on the results, this is indicated as a geographical proxy.
- It was assumed that no insulation productions are recycled at the end-of-life stage.

9. Assessment Indicators

The results tables describe the different environmental indicators per product per declared unit, for each declared module. The EN 15804 reference package based on EF 3.1 is used.

- Table 11 contains the core environmental impact indicators in accordance with EN 15804:2012+A2:2019, describing the potential environmental impacts of the product.
- Table 12 shows the life cycle inventory indicators for resource use.
- Table 13 displays the life cycle inventory indicators for waste and other outputs.
- Table 14 provides additional environmental impact indicators in accordance with EN 15804:2012+A2:2019.
- Table 15 displays biogenic carbon content 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.

Resource indicators were calculated according to Option B from Annex 3 of PCR 2019:14 (EPD International, 2024b).

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

Long-term emissions (> 100 years) are not taken into consideration in the impact estimate.

Table 11: EN15804+A2 Core Environmental Impact Indicators

Impact category	Abbreviation	Unit
Climate change – total	GWP-total	kg CO_2-eq.
Climate change – fossil	GWP-fossil	kg CO_2-eq.
Climate change – biogenic	GWP-biogenic	kg CO_2-eq.
Climate change – land use and land use change	GWP-luluc	kg CO_2-eq.
Ozone depletion	ODP	kg CFC11-eq.
Acidification	AP	Mole of H^+ eq.
Eutrophication aquatic freshwater	EP-freshwater	kg P eq.
Eutrophication aquatic marine	EP-marine	kg N eq.
Eutrophication terrestrial	EP-terrestrial	Mole of N eq.
Photochemical ozone formation	POCP	kg NMVOC eq.
Depletion of abiotic resources – minerals and metals	ADP-m&m	kg Sb-eq.
Depletion of abiotic resources – fossil fuels	ADP-fossil	MJ
Water use	WDP	m^3 world equiv.

Table 12: Life cycle inventory indicators on use of resources

Indicator	Abbreviation	Unit
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE	MJ
Use of renewable primary energy resources used as raw materials	PERM	MJ
Total use of renewable primary energy resources	PERT	MJ
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE	MJ
Use of non-renewable primary energy resources used as raw materials	PENRM	MJ
Total use of non-renewable primary energy resources	PENRT	MJ
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ
Use of non-renewable secondary fuels	NRSF	MJ
Total use of net fresh water	FW	m^3

Table 13: Life cycle inventory indicators on waste categories and output flows

Indicator	Abbreviation	Unit
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	RWD	kg
Components for reuse	CRU	kg
Materials for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported electrical energy	EEE	MJ
Exported thermal energy	EET	MJ

Table 14: EN15804+A2 Additional Environmental Impact Indicators

Indicator	Abbreviation	Unit
Climate Change	GWP-GHG	kg CO_2-eq
Climate Change	GWP-GHG (IPCC AR5)	kg CO_2-eq
Particulate Matter emissions	PM	Disease incidences
Ionising Radiation – human health	IRP	kBq U235 eq.
Eco-toxicity (freshwater)	ETP-fw	CTUe
Human Toxicity, cancer	HTP-c	CTUh
Human Toxicity, non-cancer	HTP-nc	CTUh
Land use related impacts / soil quality	SQP	Dimensionless

Table 15: Biogenic carbon content indicators

Indicator	Abbreviation	Unit
Biogenic carbon content - product	BCC-prod	kg
Biogenic carbon content - packaging	BCC-pack	kg

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2

Table 16: EN15804+A1 environmental indicators

Indicator	Abbreviation	Unit
Global warming potential (total)	GWP (EN15804+A1)	kg CO_2-eq.
Depletion potential of the stratospheric ozone layer	ODP (EN15804+A1)	kg CFC11-eq.
Acidification potential of land and water	AP (EN15804+A1)	kg SO_2-eq.
Eutrophication potential	EP (EN15804+A1)	kg PO_4^{3-}- eq.
Photochemical ozone creation potential	POCP (EN15804+A1)	kg C_2H_4-eq.
Abiotic depletion potential – elements	ADPE (EN15804+A1)	kg Sb-eq.
Abiotic depletion potential – fossil fuels	ADPF (EN15804+A1)	MJ

10. Environmental performance

Results for one 1 m^2 of representative product (declared unit)

The reported impact categories represent impact potentials, i.e., they are approximations of environmental impacts that could occur if the emissions would (a) follow the underlying impact pathway and (b) meet certain conditions in the receiving environment while doing so. The environmental impact results are therefore relative expressions only and do not predict actual impacts, the exceeding of thresholds, safety margins, or risks.

To support backwards comparability and compatibility, environmental performance results have also been provided for the indicators required in EN 15804:2012+A1:2013 (CEN, 2013), although the study does not claim compliance with this standard. The indicators and characterisation methods are from EN 15804:2012+A1:2013, but other LCA rules (system boundaries, allocation, etc.) are according to EN 15804:2012+A2:2019 with JRC characterisation factors EF 3.1 (published on 2022-08) (European Commission, 2022); i.e., the results of the “A1 indicators” shall not be claimed to be compliant with EN 15804:2012+A1:2013.

Since Module C is included in the EPD, the use of Module A1-A3 (A1-A5 for services) results without considering the results of Module C is discouraged.

Table 17: EN15804+A2 Core environmental impact indicators

Parameter	Unit	A1–A3	A4	A5	C1	C2	C3	C4	D	Max variation – Absolute (%)
GWP-total	kg CO_2 eq.	5.02E+00	4.96E-01	3.01E-02	1.25E-01	1.30E-02	0.00E+00	1.08E-02	0.00E+00	75.4%
GWP-fossil	kg CO_2 eq.	4.85E+00	4.95E-01	2.38E-03	1.25E-01	1.30E-02	0.00E+00	1.08E-02	0.00E+00	75.4%
GWP-biogenic	kg CO_2 eq.	3.32E-02	1.58E-05	2.77E-02	1.15E-05	6.15E-07	0.00E+00	1.38E-06	0.00E+00	74.4%
GWP-luluc	kg CO_2 eq.	1.41E-01	2.01E-04	7.14E-07	1.37E-05	5.33E-06	0.00E+00	5.59E-06	0.00E+00	74.4%
ODP	kg CFC 11 eq.	3.85E-08	7.73E-09	1.89E-11	1.79E-09	1.96E-10	0.00E+00	3.11E-10	0.00E+00	76.3%
AP	mol H^+ eq.	4.32E-02	2.06E-03	8.28E-06	1.11E-03	5.38E-05	0.00E+00	7.62E-05	0.00E+00	74.2%
EP-freshwater	kg P eq.	4.73E-04	3.90E-05	3.07E-06	5.32E-06	1.04E-06	0.00E+00	8.93E-07	0.00E+00	75.7%
EP-marine	kg N eq.	4.04E-03	7.51E-04	5.77E-05	5.09E-04	1.95E-05	0.00E+00	2.90E-05	0.00E+00	72.5%
EP-terrestrial	mol N eq.	8.55E-02	8.18E-03	2.70E-05	5.57E-03	2.12E-04	0.00E+00	3.17E-04	0.00E+00	73.3%
POCP	kg NMVOC eq.	1.60E-02	3.00E-03	1.55E-05	1.66E-03	7.56E-05	0.00E+00	1.14E-04	0.00E+00	73.5%
ADP-m&m[1, 5]	kg Sb eq.	1.78E-04	1.36E-06	2.48E-09	5.60E-08	4.03E-08	0.00E+00	1.67E-08	0.00E+00	74.6%
ADP-fossil[1]	MJ	3.39E+01	7.23E+00	1.78E-02	1.63E-00	1.85E-01	0.00E+00	2.64E-01	0.00E+00	76.5%
WDP[1]	m^3 world eq. deprived	5.13E+00	4.51E-02	2.93E-05	6.37E-03	1.09E-03	0.00E+00	1.17E-02	0.00E+00	74.6%

Table 18: Use of resources

Parameter	Unit	A1–A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.58E+01	9.50E-02	4.66E-04	1.36E-02	2.50E-03	0.00E+00	2.45E-03	0.00E+00
PERM	MJ	5.18E-03	0.00E+00	-3.21E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.59E+01	9.50E-02	-2.75E-03	1.36E-02	2.50E-03	0.00E+00	2.45E-03	0.00E+00
PENRE	MJ	2.99E+01	7.23E+00	1.78E-02	1.63E-00	1.85E-01	0.00E+00	2.64E-01	0.00E+00
PENRM	MJ	3.96E+00	0.00E+00	-2.53E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.39E+01	7.23E+00	-2.35E-01	1.63E-00	1.85E-01	0.00E+00	2.64E-01	0.00E+00
SM	kg	1.49E+00	3.07E-03	6.44E-06	1.17E-03	8.24E-05	0.00E+00	6.63E-05	0.00E+00
RSF	MJ	3.21E-03	3.91E-05	1.01E-07	1.94E-06	1.05E-06	0.00E+00	1.37E-06	0.00E+00
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
FW	m^3	1.26E-01	1.10E-03	7.16E-07	1.56E-04	2.66E-05	0.00E+00	2.75E-04	0.00E+00

Table 19: Waste production and output flows

Parameter	Unit	A1–A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	9.10E-02	1.23E-02	4.42E-05	2.92E-03	3.24E-04	0.00E+00	2.93E-04	0.00E+00
NHWD	kg	3.57E+00	2.28E-01	2.05E-01	3.77E-02	6.09E-03	0.00E+00	1.73E+00	0.00E+00
RWD	kg	2.29E-05	3.12E-06	1.77E-08	4.59E-07	7.83E-08	0.00E+00	8.20E-08	0.00E+00
CRU	kg	1.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	2.33E-01	0.00E+00	6.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	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
EEE	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
EET	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 20: EN15804+A2 Additional Environmental Impact Indicators

Parameter	Unit	A1–A3	A4	A5	C1	C2	C3	C4	D	Max variation – Absolute
GWP-GHG[2]	kg CO_2-eq	5.02E+00	4.96E-01	2.42E-02	1.25E-01	1.30E-02	0.00E+00	1.08E-02	0.00E+00	75.4%
GWP-GHG (IPCC AR5)[3]	kg CO_2-eq	5.02E+00	4.96E-01	2.29E-02	1.25E-01	1.30E-02	0.00E+00	1.08E-02	0.00E+00	75.4%
PM	Disease incidences	4.11E-07	5.07E-08	1.23E-10	3.12E-08	1.15E-09	0.00E+00	1.73E-09	0.00E+00	73.4%
IRP[4]	kBq U235 eq.	5.00E-02	6.38E-03	3.61E-05	9.32E-04	1.60E-04	0.00E+00	1.68E-04	0.00E+00	76.3%
ETP-fw[1,5]	CTUe	2.01E+01	1.74E+00	4.01E-01	3.48E-01	4.82E-02	0.00E+00	3.61E-02	0.00E+00	75.5%
HTP-c[1,5]	CTUh	1.09E-08	2.48E-09	5.94E-12	8.32E-10	6.64E-11	0.00E+00	4.86E-11	0.00E+00	75.5%
HTP-nc[1,5]	CTUh	4.42E-08	4.78E-09	1.93E-10	2.75E-10	1.20E-10	0.00E+00	4.74E-11	0.00E+00	76.6%
SQP[1]	Dimension-less	1.32E+01	7.28E+00	2.78E-02	1.24E-01	1.41E-01	0.00E+00	5.19E-01	0.00E+00	94.4%

Table 21: Biogenic Carbon Content

Parameter	Unit	A1–A3
BCC-prod	kg	0.00E+00
BCC-pack	kg	0.00E+00

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2

Table 22: EN15804+A1 Environmental Impact Indicators

Parameter	Unit	A1–A3	A4	A5	C1	C2	C3	C4	D
GWP (EN15804+A1)	kg CO_2-eq.	4.97E+00	4.88E-01	1.85E-02	1.23E-01	1.28E-02	0.00E+00	1.05E-02	0.00E+00
ODP (EN15804+A1)	kg CFC11-eq.	3.99E-03	5.32E-09	1.30E-11	1.25E-09	1.35E-10	0.00E+00	2.15E-10	0.00E+00
AP (EN15804+A1)	kg SO_2-eq.	1.10E-02	1.45E-03	5.73E-06	7.60E-04	3.77E-05	0.00E+00	5.32E-05	0.00E+00
EP (EN15804+A1)	kg PO_4^{3-}-eq.	2.68E-03	3.75E-04	3.44E-05	1.88E-04	9.81E-06	0.00E+00	1.26E-05	0.00E+00
POCP (EN15804+A1)	kg $C2H_4$-eq.	4.09E+00	1.04E-03	6.94E-06	3.37E-04	2.51E-05	0.00E+00	3.76E-05	0.00E+00
ADPE (EN15804+A1)	kg Sb-eq.	1.44E-03	1.36E-06	2.48E-09	5.60E-08	4.03E-08	0.00E+00	1.67E-08	0.00E+00
ADPF (EN15804+A1)	MJ	3.26E+01	7.23E+00	1.78E-02	1.63E+00	1.85E-01	0.00E+00	2.64E-01	0.00E+00

Disclaimers

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.

2 This indicator should be identical to GWP-total except that the CF for biogenic CO_2 is set to zero. It has been included in the EPD following the PCR (EPD International, 2024b). In this study it is calculated by subtracting the value of Climate change – biogenic (GWP-biogenic) from the value of Climate change – total (GWP-total) since the ecoinvent Excel LCIA results do not include the indicator.

3 GWP-GHG (IPCC AR5) is an additional GWP100 indicator that is aligned with the Intergovernmental Panel on Climate Change (IPCC) 2013 Fifth Assessment Report (AR5) (IPCC 2013), national greenhouse gas reporting frameworks in Australia and New Zealand and previous versions of the Construction Products PCR (PCR2019:14v1.11). It excludes biogenic carbon and indirect radiative forcing.

4 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 some construction materials, is also not measured by this indicator.

5 The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

10.1. Range/variability

According to the assessment results, variations for core environmental indicator results are aggregated over all included modules (from A to C). This is mainly due to the differences in mass per square meter of different insulation products. The detailed variation of each core environmental impact indicator result has been provided in the environmental performance.

10.2. Material Circularity Indicators (MCIs)

Material Circularity Indicator (MCI) is a method for measuring how well a product performs in the context of a circular economy and aligns with ISO 59020 (ISO, 2024). It measures the degree to which a product system keeps materials in circulation at their highest form of value. It provides a common metric that applies to all of the different circular economy strategies including avoidance, durability, reuse, remanufacturing, recycling, regenerative sourcing, composting and energy recovery. The MCI can be reported as an MCI Score or as a percentage circularity (% MCI).

MCI Score: a value between 0 and 1 in which a score of 0.1 represents a linear system that uses only virgin, non-renewable materials and produces only non-recoverable waste and a score of 1 represents a perfectly circular system that uses only non-virgin or renewable materials and produces only recoverable waste. Values between 0 and 0.1 are reserved for products that consume more material, typically due to a lower utility than an average product.

%MCI: is calculated using the same methodology and assumptions as the MCI Score but reports circularity on a scale from 0% (Linear) to 100% (Perfectly Circular) that is easier to understand and communicate.

The MCI has been reported as both an MCI Score and a percentage circularity (% MCI) in this EPD to support comparability. Although the methodology for MCI Score and %MCI is the same, the score cannot be directly transposed but needs to be converted per the methodology described by the Ellen MacArthur Foundation (Ellen MacArthur Foundation, 2019/2024). MCI results are summarised in Table 23 below.

Table 23: MCI results for insulation products

Product group	MCI	MCI (%)
Ceiling insulation products	0.414	34.9%

Table 24: Sources of feedstock for insulation products

Fraction of feedstock from recycled sources	69.8%
Fraction of feedstock from virgin sources	30.2%
Fraction of feedstock from reused sources	0%
Fraction of feedstock from biological sources	0%

10.3. Conversion factors

Conversion factors are provided in Table 25 to enable results to be calculated for other products **(representative product has been bolded.)**

Table 25: Conversion factors for insulation products

Product name	Product code	Conversion factor
Firmasoft Ceiling R3.5 1160X430X175 16P	4006079	0.814
Firmasoft Ceiling R3.5 1160X580X175 10P	4006080	0.814
Firmasoft Ceiling R4.1 1160X430X21510P	4006081	1.00
Firmasoft Ceiling R4.1 1160X580X21510P	4006082	1.00
Firmasoft Ceiling R5.0 1160X430X220 8P	4006083	1.53
Firmasoft Ceiling R5.0 1160X580X220 8P	4006084	1.53
Pink Batts R2.5 1160X430X130 16PK	4006098	0.605
Pink Batts R2.5 1160X580X130 16PK	4006099	0.605
Pink Batts R3.5 1160X430X175 16PK	4006102	0.814
Pink Batts R3.5 1160X580X175 10PK	4006103	0.814
Pink Batts R4.1 1160X430X215 10PK	4006039	1.00
Pink Batts R4.1 1160X580X215 10PK	**4006040**	**1.00**
Pink Batts R5.0 1160X430X220 8PK	4006041	1.37
Pink Batts R5.0 1160X580X220 8PK	4006042	1.37
Pink Batts R6.0 1160X430X250 6PK	4006043	1.74
Pink Batts R6.0 1160X580X250 6PK	4006044	1.74
Pink Batts R7.0 1160X580X285 4PK	4006046	1.40

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12. Programme 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).

Fletcher Insulation 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.

To support backwards comparability and compatibility, environmental performance results have also been provided for the indicators required in EN 15804:2012+A1:2013 (CEN, 2013), although the study does not claim compliance with this standard. The indicators and characterisation methods are from EN 15804:2012+A1:2013, but other LCA rules (system boundaries, allocation, etc.) are according to EN 15804:2012+A2:2019 with JRC characterisation factors EF 3.1 (published on 2022-08) (European Commission, 2022); i.e., the results of the “A1 indicators” shall not be claimed to be compliant with EN 15804:2012+A1:2013.

Declaration owner Fletcher Insulation Building Better, Together	Fletcher Insulation Pty Ltd Web: insulation.com.au Email: Info@insulation.com.au Post: 2 Foundation Place Prospect NSW 2148
Geographical Scope	Australia
Reference Year for Data	2022-07-01 to 2023-06-30
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Product Category Rules (PCR)
CEN standard EN 15804 served as the core Product Category Rules (PCR)

Product Category Rules (PCR)	c-PCR-005 for thermal insulation products (EN16783:2024) (published on 2024-05-30) PCR 2019.14 Construction Products, version 1.3.4 (published on 2024-04-30, valid until 2025-06-20)
PCR review was conducted by	The Technical Committee of the International EPD® System. See www.environdec.com for a list of members.
Review Chair	The most recent review chair: Claudia Peña, PINDA LCT SpA. The review panel may be contacted via the Secretariat: www.environdec.com/contact
Life cycle assessment (LCA) **LCA accountability** thinkstep anz	thinkstep Pty Ltd Barbara Nebel Joel Edwards, Kasia Pitman Haoran Lei Web: www.thinkstep-anz.com Email: info@thinkstep-anz.com Post: 25 Jubilee Street, Perth, Western Australia 6151, Australia

Third-party verification
Independent verification of the declaration and data, according to ISO 14025:2006, via:

☑ EPD verification by individual verifier

Third party verifier	Claudia A. Peña, PINDA LCT SpA pinda.lct@gmail.com
Verifier approved by	EPD Australasia
Procedure for follow-up of data during EPD validity involved third-party verifier	☐ Yes ☑ No