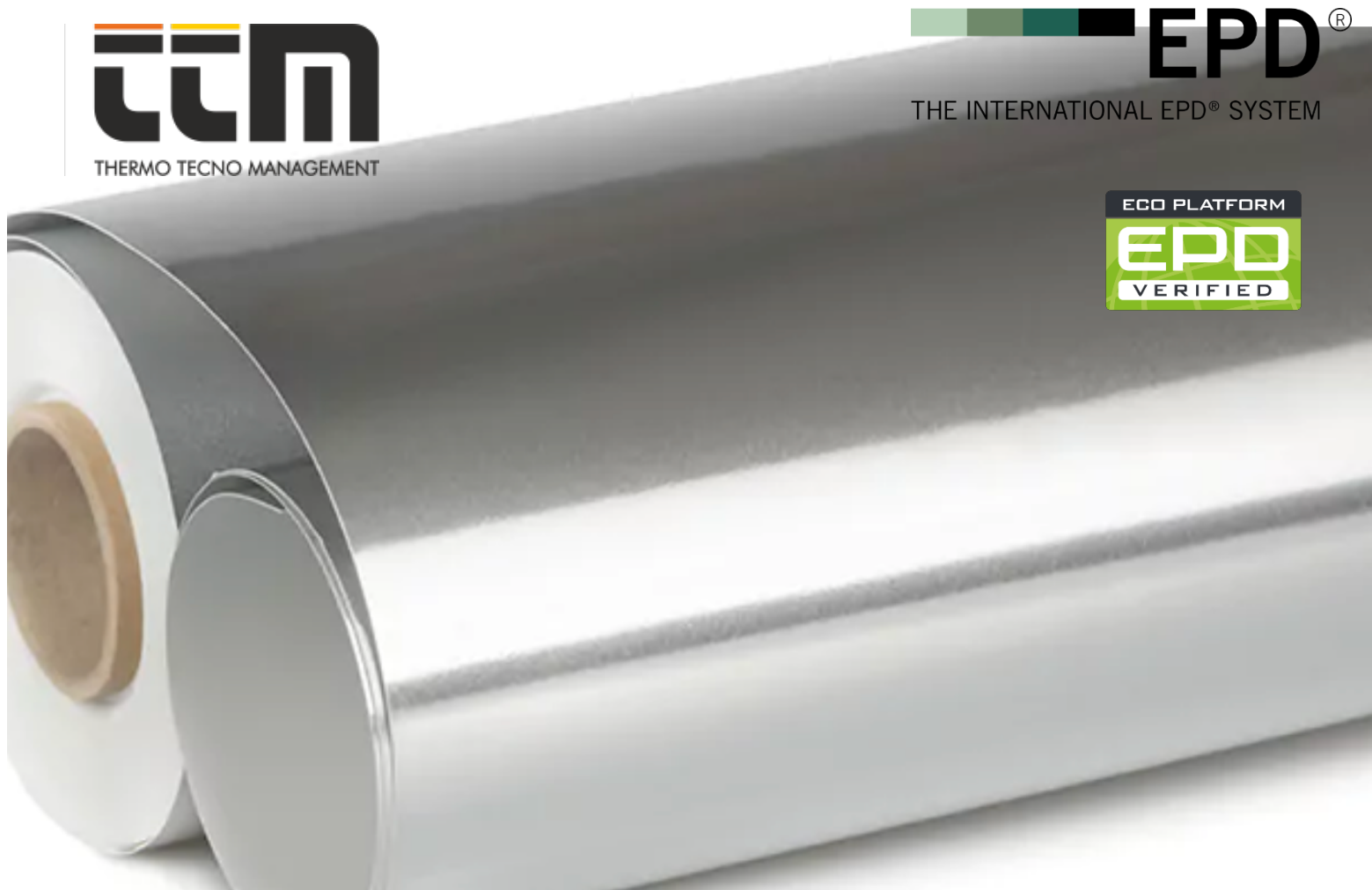




Environmental Product Declaration

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

Isopak ALU – Rigid UV-ALU-PVC Jacketing film for insulation

From **TTM Srl**

EPD of multiple products, based on a representative product.

Included products:

- Isopak ALU 230
- Isopak ALU 280
- Isopak ALU 350
- Isopak ALU 500

Programme:

The International EPD[®] System, www.environdec.com

Programme operator:

EPD International AB

EPD registration
number:

S-P- 12407

Publication date:

2024-07-11

Valid until:

2029-07-10

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

General Information

Programme Information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

Accountabilities for PCR and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): Construction Products, 2019:14, version 1.3.2 and c-PCR-005 Thermal Insulation products (EN 16783)
PCR (2019:14) review was conducted by: Technical Committee of the International EPD® System. The review panel may be contacted via info@environdec.com
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:
☒ EPD verification by accredited certification body
Third-party verification: DNV Business Assurance Italy Srl is an approved certification body accountable for the third-party verification
The certification body is accredited by: ACCREDIA with accreditation n. 008H
Procedure for follow-up of data during EPD validity involves third party verifier:
☐ Yes ☒ No

The EPD owner 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.

About TTM -Thermo Tecno Management

TTM – Thermo Tecno Management is a family-owned business based in Alto Adige South Tyrol which is steadily increasing since 45 years and has been working in the field of technical insulation, especially in jacketing and cladding, since 1977.

Thanks to its extensive sales network, they distribute insulations products for a wide variety of industrial applications in the global market.

As one of the European market leaders in the production and distribution of technical insulating films, in particular jacketing and cladding materials for technical insulation, technical adhesive tapes and aluminum and caps, TTM aggregate a professional production backed by high-level consultancy, innovation and know-how leading to a higher satisfaction for customers.



TTM is able to ensure optimal management of large amounts in a small space, this allows a continuous, transparent and effective supply chain. At the same time, it is important for the company to constantly encourage their employees, which are the platform for the development of TTM. Its products and their service allow TTM to have customers throughout Europe, Asia, North and Sud America.



TTM is a bridge that connects the manufactures of materials for technical insulation and the industry. The company not only sales films and accessories for insulations products, but also plays a role as consultant, who can understand the requirements of each individual project and proposes/provides the most suitable products in order to solve all the relevant issues.



In 2020, TTM acquires the ISO 9001 Certification for Quality Management System (No.24593/0) and ISO 14001 Certification for Environmental Management System (No.04120/0).

Thanks to the photovoltaic system installed on the plant's roof, in 2022 TTM has produced a quantity of electricity greater than its needs. The electricity surplus, produced during the summer months, has been introduced into the electricity grid.

The major advantage of TTM: the whole production cycle is followed in house.

Lamination: TTM decides what kind of raw material is the most suitable for the type of jacketing film they are producing and the characteristics it should have, and they know how to combine different kinds of materials to guarantee the best performance. In particular, the lamination process of Isolpak ALU takes place at a subcontractor in Austria.

Coating: its long-lasting cooperation of more than 40 years with one of the major European tape producers has enabled TTM to build a wide know-how what technical tapes is concerned. The company applies this know-how by coating its self-adhesive jacketing film.

Quality Control: during the whole production process, TTM can make several quality checks at each stage of production

to guarantee the best quality of our cladding products.

Converting / Cutting: TTM is the sole producer able to cut the film in house, as it does with its technical tapes.

Customizing / Packaging OEM: TTM is able to provide its customer with individually customized packaging solutions according to their needs.

1-Stop Shop Accessories: TTM has a complete range of accessories for all its cladding products, to guarantee a 100% protection for insulation.

The Plant

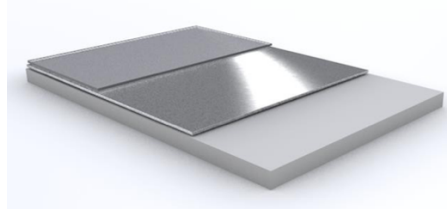
TTM plant is situated in Via Pineta 102/A 39026 Prato allo Stelvio (Bz) Italy.

Product information

Product name: ISOLPAK ALU – Rigid UV-ALU-PVC Jacketing film for insulation.

Product identification: TTM ISOLPAK ALU is a multilayer laminate of aluminium, coated with a special UV protection film and a PVC backing. This system is highly punctured and tear resistant as well as flame retardant and can be used for exterior and interior facing of hot and cold insulation. It combines a vapor barrier with water tightness. It is an easily useable material for rapid covering, and it is extremely resistant to damaging environmental effects.

Geographical scope: A1-A2 European, A3 Italian, A4-A5 and C1-C4 European
UN CPC code: UN CPC Code: 36390 and HS 2007 3921



Product description: ISOLPAK is an innovative insulation Jacketing film for indoor as well as for outdoor. The multilayer construction of ISOLPAK combines the technical advantages of plastic and aluminium.

Physical properties, 100% permeability, resistance against climatic influences, easy installation and durability: ISOLPAK guarantees a 360° protection for insulation.

Characteristics

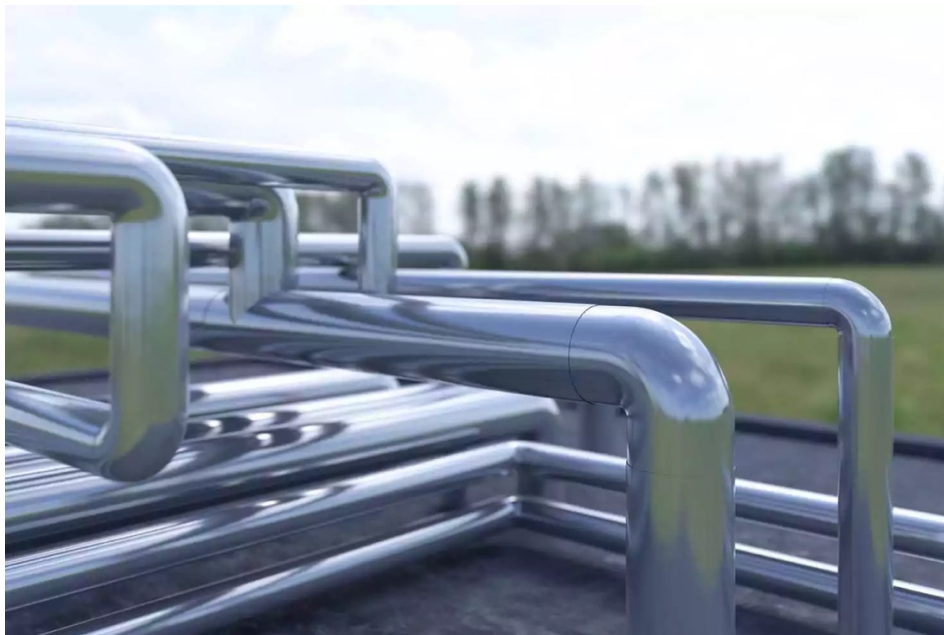
- The UV-ALU-PVC film is self-extinguishing by its nature. TTM produce normal and low inflammable types of this film.
- Acid-, alkali-, salt solution-, fat-, oil-, bacterium- and fungus resistance.
- Physical features, such as flexibility and elasticity.
- No special care or maintenance required due to antistatic components.
- Surface: smooth with dull finish on one side.

ISOLPAK Benefits

- Isolpak ALU can be simply fastened with rivets and special UV-protection tapes
- Isolpak ALU can be used without any restriction in food processing plants.
- The standard rolls of 1m x 25m only weigh about 12.5 kg.
- The foil does not use any heavy metals.

Packaging

Compact, space-saving packaging, required storage space per pallet: app. 1 m². The films are rolled on cardboard cores with 5 mm wall thickness and 50mm internal diameter. The industrial versions are on 76mm paper core with a maximum outer diameter of the roll of 600mm.



The present EPD covers 4 products of the ISOLPAK ALU family, which differ from each other only in PVC foil thickness:

- Isolpak ALU 230
- Isolpak ALU 280
- Isolpak ALU 350
- Isolpak ALU 500

According to the General Programme Instructions (GPI) v. 4.0 and the PCR 2019:14 "Construction products" v.1.3.2, the results for each category of impact are represented for the product ISOLPAK ALU, identified as representative. This product is the model of the ISOLPAK ALU family with the highest sales volumes.

Technical Data

Property	Norm	Unit	Isolpak ALU 230	Isolpak ALU 280	Isolpak ALU 350	Isolpak ALU 500
Total weight ¹	-	g/m ²	335	411	505	700
Thickness appr.	-	mm	0,230	0,280	0,350	0,500
Thickness tolerance	-	mm	± 0,05	± 0,05	± 0,05	± 0,05
Width	-	mm	1000/1065	1000	1000/1065/1200	1000/1065/1225
Width tolerance	-	mm	± 2	± 2	± 2	± 2
Tensile strength MD	EN ISO 527-3	N/15 mm	200	210	290	300
Elongation at break	EN ISO 527-3	%	48	40	35	40
Tear strength	EN ISO 527-3	N	70	82	90	202
Puncture Ø 3,0mm	prEN 14 477	N	23	100	110	125
LOI [Limited oxygen index]	-	% O ²	35,5	40	45	34,5
UV Stability (internal weatherometer-test)	-	years	App. 8	App. 11	App. 10	App. 10
Sd-Value	-	-	1300	>1500	>1600	>1500
Temperature resist.	-	°C	-25 to +65	-25 to +75	-25 to +65	-25 to +65
Reflectivity	-	%	35	35	35	35
Emissivity	-	-	0,65	0,65	0,65	0,65

Content information (referred to 1 m² of Isolpak ALU 280)

Product	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg	Variation range of included products (%)
PVC	0,280	0	0 resp. 0	-18.5/+70.3
Stretched polyethylene	0,028	0	0 resp. 0	0
Aluminium	0,027	0	0 resp. 0	0
Stabilizers and modifiers	0,034	0	0 resp. 0	-18.5/+70.3
Fillers	0,015	0	0 resp. 0	-18.5/+70.3
2K-PU glue	0,010	0	0 resp. 0	0
Pigments	0,009	0	0 resp. 0	-18.5/+70.3
Additives	0,008	0	0 resp. 0	-18.5/+70.3
TOTAL	0,411	0	0 resp. 0	-18.5/+70.3
Packaging materials	Weight, kg	Weight-% (versus the product)		Weight biogenic carbon, kg C/kg
Wood (pallet)	0,0135	0		0 resp. 0
Cardboard	0,0104	0		0 resp. 0
PP	0,0002	0		0 resp. 0
LDPE	0,0001	0		0 resp. 0
TOTAL	0,0242	0		0 resp. 0

Data referred to a m² of the representative product Isolpak ALU 280.

Note: The share of biobased/recycled material is unknown so, in accordance with PCR 2019:14 v.1.3.2, this part of the content declaration is declared as 0% (a conservative estimate).

¹ The values reported in the technical data sheet may be slightly different, due to the tolerance value attributable to the quantity of 2K-PU glue.

The product does not contain substances on the "Candidate List of Substances of

Very High Concern for Authorization" under the REACH regulation.

LCA Information

Methodology: The quantification of the environmental performance was carried out in accordance with the Life Cycle Assessment (LCA - Life Cycle Assessment) methodology regulated by the ISO 14040, ISO 14044 and ISO 14025 standards and following the specific product requirements PCR 2019: 14 Construction Products Version 1.3.2.

The LCA methodology allows you to determine the environmental impacts of a product or service in terms of resource consumption and emissions into the environment, as well as waste production, from a life cycle perspective.

Declared unit: The declared unit is **1 m²** of installed Isolpak ALU.

Thermal conductivity of 0,17 W/(m K).

The declared unit defines the way in which the functions identified by the performance characteristics (capability) of the product are quantified. This is a reference by which material flows, Life Cycle Analysis (LCA) results and any other information are normalized.

Time representativeness: The LCA study is conducted in 2023/2024 with data relating to 2022.

Database and LCA software: The Ecoinvent database v.3.9.1 (www.ecoinvent.org) provides the life cycle inventory data for the raw and process materials obtained from the background system. The EF (Environmental Footprint) database provides the life cycle inventory data for the production only of the following

substances, stabilizers and pigment. LCA software used is SimaPro 9.5.

Cut-off rules: 1% cut-off is applied. According to PCR 2019:14 v.1.3.2, data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included. In particular, the production of packaging of raw materials less significant in weight is excluded: additives, stabilizers, pigments, fillers and 2K-PU glue.

Infrastructure/capital goods for all modules are excluded.

Quality data: Specific data are used for raw materials, electricity, waste data, average distances and means of transport in modules. Specific data derived from the Ecoinvent v.3.9.1 database are used for the following phases: production of raw materials, fuels and electricity.

Proxy data do not contribute to the potential environmental impacts by more than 10% for each impact category.

Environmental impact method:

For environmental performance indicators: EN 15804 + A2 based on EF 3.1 characterisation factors (JRC Website)

To determine the use of renewable and non-renewable resources, the CED (Cumulative Energy Demand LHV) v.1.11 method is used.

Description of the system boundaries: Cradle to gate with options (A1-A3, A4, A5, C1-C4, D).

Module B is not relevant for the product. Modules declared, geographical scope, share of specific data (in GWP-GHG

results) and data variation (in GWP-GHG results).

	Product stage			Construction process stage			Use stage							End of life stage			Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EU	EU	IT	EU	EU	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-16,1/+54,4%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X=Declared module, ND= Non declared, EU=European, GLO=Global, IT=Italy

Life Cycle Stages

A1, raw material supply. This module includes the extraction and processing of all raw materials and energy which occur upstream from the manufacturing process. The module also contains the lamination process which takes place at the subcontractor in Austria. In particular, for the production of PVC foil an electricity consumption of 0.43 kWh/m² was considered. PVC and aluminum waste equal to 1.65% are considered. The module includes the production of PVC foil and aluminum packaging.

Module A1 includes the heat form district heating (98.68% from wood chips and 1.32% from fuel oil) and electricity purchased from local energy supplier. Specifically, the electricity consumed purchased from the local supplier is equal to 31.3% of TTM total consumption. The local supplier's mix was modeled with the Italian Residual Mix 2022 (Source: AIB, "European Residual Mixes - Results of the

calculation of Residual Mixes for the calendar year 2022). Electrical consumption value referred to m² is 0.009 kWh/m² (for the Italian residual mix). The GWP-GHG emission factor is 552 gCO₂/kWh.

A2, transport to the manufacturer. The raw materials are transported to the manufacturing site. The modelling includes road transportations of each raw material. For each component/material shipped to TTM, the distance from the supplier to the TTM plant has been calculated. Instead, for raw materials used by the subcontractor, hypotheses were made: 200 km for glue and 1727.7 km for aluminum. the distance for aluminum was calculated considering the country of origin of the raw material. Raw materials are transported by truck (7.5-16 tons).

A3, manufacturing. This module includes energy and raw materials consumption entering and leaving the TTM system and the manufacture of packaging. The processing of any waste arising from this stage is also included. The 68.7% of the electricity used in the TTM plant is self-produced by photovoltaic panels. The electrical consumption (from self-production) value referred to m^2 is 0.017 kWh/m^2 . The GWP-GHG emission factor is $2.19 \cdot 10^{-3} \text{ gCO}_2/\text{kWh}$. This value derives from the emissions generated for the production of the panel.

In 2022, 100% of plastic, paper and wood waste (from packaging) was sent for recycling, as declared by the company that collects the waste. This waste also includes ISOLPAK ALU scrap due to cutting for changing packaging. For these output flows, only transport from the TTM plant to the treatment plant (50 km) was considered. In addition to packaging waste, factory waste with code 070299 (unspecified waste, similar to municipal waste) which is sent for disposal was also considered.

A4, transport to the building site. This module includes transport from the production gate to the installation site. The average distribution distance is calculated based on the sales of the product Isolpak ALU 280 in the year 2022. Shipments to Italy and Europe took place by truck (7.5-16 tons with an average load factor of 3,29 ton and a gross vehicle weight of 9.29 ton). The weighted average distance is 1254.3 km. An average distance of 300 km is assumed from the distribution site to the installation site.

A5, installation into the building. This module includes all material and energy inputs and outputs required for the

installation of the Isolpak ALU. The installation is manually without the consumption of energy or water. Specifically, this module includes the end of life of the product packaging, an average installation waste (12%), production and transport of rivets and UV protection tape. An use of 2 rivets per m^2 (0.1 g/m^2) was considered and a consumption of 23.6 g/m^2 of adhesive tape. The end-of-life scenario for packaging is modelled for an European scenario according to Eurostat (2021 dataset, as it is the latest data set available).

For the installation scrap, the scenario reported in modules C3 and C4 was used.

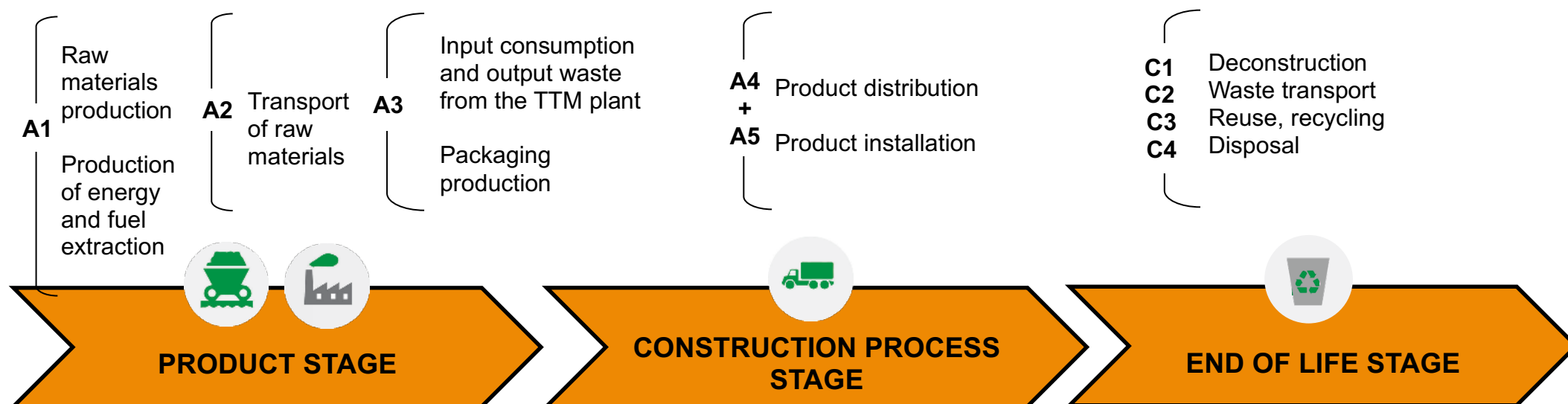
C1, de-construction. This stage includes the impacts during the dismantling of Isolpak ALU 280 from the building. It is assumed that no energy and additional material are needed for the dismantling of the product. This module has a contribution of 0 to all environmental indicators.

C2, waste transport. This stage includes the transportation of uninstalled product to the waste processing/disposal area. 50 km distance by trucks is assumed.

C3, waste processing. This module includes the collection of waste fractions from the deconstruction and waste processing of material flows intended for reuse, recycling and energy recovery. For Europe, it is assumed a material recycling rate of 50% according to PCR Part A for Building-Related Products and Services v.4 of UL Environment framework.

C4, waste disposal. Waste disposal including physical pre-treatment and management of the disposal site. According to European scenario of PCR Part A for Building-Related Products and Services v.4 of UL Environment framework the following scenario was applied: 37% in landfill and 13% in incineration. No energy recovery is considered in the incineration process.

D, reuse, recycling and energy recovery potentials. Module D includes the avoided impacts of all net end-of-life flows. Avoided impacts linked to the % of material sent for recycling in modules A5 and C3 are included. Materials that are recycled are assumed to substitute the use of virgin metals. Benefits of heat recovery from the incineration are excluded.



Results of the environmental performance indicators²

Mandatory impact category indicators according to EN 15804³

Results referred to 1 m ² (Isolpak ALU 280, representative product)									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	1,61E+00	1,31E-01	3,51E-01	0	4,23E-03	0	1,21E-01	-4,33E-01
GWP-biogenic	kg CO ₂ eq.	2,14E-01	3,93E-05	5,51E-02	0	1,27E-06	0	4,35E-04	2,56E-03
GWP-luluc	kg CO ₂ eq.	6,91E-03	2,55E-06	2,82E-03	0	8,20E-08	0	4,81E-05	-2,87E-03
GWP-total	kg CO ₂ eq.	1,83E+00	1,31E-01	4,08E-01	0	4,23E-03	0	1,21E-01	-4,33E-01
ODP	kg CFC 11 eq.	7,58E-07	2,81E-09	1,02E-07	0	9,05E-11	0	1,59E-08	-4,14E-07
AP	mol H ⁺ eq.	9,06E-03	3,29E-04	1,79E-03	0	1,06E-05	0	1,58E-04	-1,79E-03
EP-freshwater	kg P eq.	1,02E-04	1,02E-07	1,80E-05	0	3,29E-09	0	1,38E-06	-1,74E-05
EP-marine	kg N eq.	2,01E-03	1,27E-04	3,51E-04	0	4,10E-06	0	4,21E-05	-3,08E-04
EP-terrestrial	mol N eq.	1,90E-02	1,35E-03	3,45E-03	0	4,34E-05	0	4,20E-04	-3,08E-03
POCP	kg NMVOC eq.	5,32E-03	5,33E-04	1,15E-03	0	1,72E-05	0	1,25E-04	-1,34E-03
ADP-minerals&metals	kg Sb eq.	1,72E-06	4,47E-09	2,23E-07	0	1,44E-10	0	1,11E-08	-9,25E-08
ADP-fossil*	MJ	3,04E+01	1,73E+00	6,13E+00	0	5,57E-02	0	3,52E-01	-1,06E+01
WDP*	m ³ eq	1,49E+00	1,58E-03	2,31E-01	0	5,10E-05	0	2,53E-02	-5,61E-01
Acronyms		GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption							

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

² 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" is missing.

³ It is important to consider the results of modules A1-A3 while also evaluating the results of module C.

Additional mandatory and voluntary impact category indicators

Results referred to 1 m ² (Isolpak ALU 280, representative product)									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG ⁴	kg CO ₂ eq.	1,66E+00	1,31E-01	3,60E-01	0	4,23E-03	0	1,21E-01	-4,38E-01

Resource use indicators

Results referred to 1 m ² (Alupak ALU 280, representative product)									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE**	MJ	2,32E+00	3,94E-03	8,32E-01	0	1,27E-04	0	3,47E-02	-9,65E-01
PERM**	MJ	2,77E+00	6,12E-04	3,57E-01	0	1,97E-05	0	5,80E-03	-2,32E-01
PERT**	MJ	5,09E+00	4,55E-03	1,19E+00	0	1,46E-04	0	4,05E-02	-1,20E+00
PENRE	MJ	2,01E+01	1,59E+00	4,39E+00	0	5,12E-02	0	3,43E-01	-5,80E+00
PENRM	MJ	1,06E+01	1,39E-01	1,78E+00	0	4,46E-03	0	8,41E-03	-4,82E+00
PENRT	MJ	3,07E+01	1,73E+00	6,16E+00	0	5,57E-02	0	3,52E-01	-1,06E+01
SM	kg	0	0	0	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
FW	m ³	2,47E-01	7,23E-05	3,39E-02	0	2,33E-06	0	6,83E-04	-8,95E-03
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water								

** The indicators PERE, PERM and PERT were calculated according to method B of the Annex 3 (PCR 2019:14 v.1.3.2)

⁴ This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO₂ is set to zero.

Waste indicators

Results referred to 1 m ² (Isolpak ALU 280, representative product)									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1,14E-03	1,24E-05	1,40E-03	0	3,99E-07	0	8,22E-03	-2,22E-04
Non-hazardous waste disposed	kg	4,22E-05	8,53E-05	6,09E-02	0	2,75E-06	0	1,64E-01	-3,71E-02
Radioactive waste disposed	kg	9,89E-02	1,48E-07	1,27E-05	0	4,78E-09	0	9,19E-07	-2,00E-05

Output flow indicators

Results referred to 1 m ² (Isolpak ALU 280, representative product)									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0	0	0
Material for recycling	kg	6,61E-03	0	2,57E-01	0	0	2,05E-01	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0	0	0

Additional environmental indicators

Results referred to 1 m ² (Isolpak ALU 280, representative product)									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Particulate matter emissions (PM)	Disease inc.	7,65E-08	7,44E-09	1,77E-08	0	2,39E-10	0	1,50E-09	-1,75E-08
Ionizing radiation, human health (IRP)***	kBq U235 eq.	6,02E-02	2,75E-04	1,68E-02	0	8,86E-06	0	1,31E-03	-2,50E-02
Eco-toxicity -freshwater (ETP-fw)*	CTUh	2,29E+01	1,53E+00	5,66E+00	0	4,92E-02	0	1,44E+01	-3,37E+00
Human toxicity - cancer effects (ETP-c) *	CTUh	3,55E-09	1,70E-11	9,67E-10	0	5,48E-13	0	5,88E-11	-8,62E-10
Human toxicity - non - cancer effects (ETP-nc)*	CTUh	4,09E-08	1,59E-09	1,03E-08	0	5,12E-11	0	9,55E-10	-1,13E-08
Land use related impacts/Soil quality (SQP)*	-	1,58E+01	3,29E-03	2,00E+00	0	1,06E-04	0	6,82E-02	-1,09E+00

*The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator. *** This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

GWP-GHG results of the “Best-Case Product”

The following table shows the GWP-GHG indicator for isolpak ALU 230 product, the best-case product.

Results referred to 1 m ² (Isolpak ALU 230, best-case product)									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ eq.	1,40E+00	1,06E-01	3,56E-01	0	3,42E-03	0	9,93E-02	-3,59E-01

GWP-GHG results of the “Worst-Case Product”

The following table shows the GWP-GHG indicator for Isolpak ALU 500 product, the worst-case product.

Results referred to 1 m ² (isolpak ALU 500, worst-case product)									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ eq.	2,56E+00	2,23E-01	3,74E-01	0	7,19E-03	0	2,06E-01	-7,45E-01

Variation of environmental indicators among included products

The following table shows the range of variability for each module and for each category of impact.

Module	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GWP	-16,1/+54,4%	-18,5/+70,3%	-1,1/+4,5%	0	-18,5/+70,3%	0	-18,5/+70,3%	-18,5/+70,3%
GWP-total	-16,3/+56,1%	-18,5/+70,3%	-2,6/+9,9%	0	-18,5/+70,3%	0	-18,5/+70,3%	-18,5/+70,3%
ODP	-7,3/+32,8%	-18,5/+70,3%	-0,4/+1,4%	0	-18,5/+70,3%	0	-18,5/+70,3%	-18,5/+70,3%
AP	-15,1/+57,3%	-18,5/+70,3%	-0,2/+1%	0	-18,5/+70,3%	0	-18,5/+70,3%	-18,5/+70,3%
EP-freshwater	-14,9/+62,3%	-18,5/+70,3%	-0,2/+0,7%	0	-18,5/+70,3%	0	-18,5/+70,3%	-18,5/+70,3%
EP-marine	-17/+60,1%	-18,5/+70,3%	-0,4/+1,6%	0	-18,5/+70,3%	0	-18,5/+70,3%	-18,5/+70,3%
EP-terrestrial	-17,1/+59,4%	-18,5/+70,3%	-0,4/+1,6%	0	-18,5/+70,3%	0	-18,5/+70,3%	-18,5/+70,3%
POCP	-16,5/+52,3%	-18,5/+70,3%	-0,3/+1,4%	0	-18,5/+70,3%	0	-18,5/+70,3%	-18,5/+70,3%
ADP-minerals&metals	-14,4/+60,1%	-18,5/+70,3%	-0,1/+0,5%	0	-18,5/+70,3%	0	-18,5/+70,3%	-18,5/+70,3%
ADP-fossil	-15,7/+56,2%	-18,5/+70,3%	-0,2/+0,6%	0	-18,5/+70,3%	0	-18,5/+70,3%	-18,5/+70,3%
WDP	-16,7/+69%	-18,5/+70,3%	-0,3/+1%	0	-18,5/+70,3%	0	-18,5/+70,3%	-18,5/+70,3%

Conversion factors

Conversion coefficients are given for the environmental impact of the declared unit, 1 m². For each module of the life cycle, the environmental impacts of the product concerned are calculated by multiplying the impacts of the declaration corresponding to the reference product by the conversion coefficient. The "Total" column should be calculated by adding the environmental impacts of each

stage of the life cycle. An error of less than 5% is estimated in all impact categories analyzed.

Indicator	ALUPAK ALU 230								ALUPAK ALU 350								ALUPAK ALU 500							
	A1-A3	A4	A5	C1	C2	C3	C4	D	A1-A3	A4	A5	C1	C2	C3	C4	D	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	0,84	0,81	0,99	1,00	0,81	1,00	0,82	0,82	1,16	1,28	1,01	1,00	1,28	1,00	1,28	1,28	1,54	1,70	1,04	1,00	1,70	1,00	1,70	1,70
GWP-biogenic	0,82	0,81	0,88	1,00	0,81	1,00	0,82	0,82	1,22	1,28	1,15	1,00	1,28	1,00	1,28	1,28	1,73	1,70	1,45	1,00	1,70	1,00	1,70	1,70
GWP-luluc	0,95	0,81	1,00	1,00	0,81	1,00	0,82	0,81	1,08	1,28	1,00	1,00	1,28	1,00	1,28	1,28	1,25	1,70	1,00	1,00	1,70	1,00	1,70	1,70
GWP-total	0,84	0,81	0,97	1,00	0,81	1,00	0,82	0,82	1,17	1,28	1,03	1,00	1,28	1,00	1,28	1,28	1,56	1,70	1,10	1,00	1,70	1,00	1,70	1,70
GWP-GHG	0,84	0,81	0,99	1,00	0,81	1,00	0,82	0,82	1,16	1,28	1,01	1,00	1,28	1,00	1,28	1,28	1,54	1,70	1,04	1,00	1,70	1,00	1,70	1,70
ODP	0,93	0,81	1,00	1,00	0,81	1,00	0,81	0,82	1,10	1,28	1,00	1,00	1,28	1,00	1,28	1,28	1,33	1,70	1,01	1,00	1,70	1,00	1,70	1,70
AP	0,85	0,81	1,00	1,00	0,81	1,00	0,82	0,82	1,18	1,28	1,00	1,00	1,28	1,00	1,28	1,28	1,57	1,70	1,01	1,00	1,70	1,00	1,70	1,70
EP-freshwater	0,85	0,81	1,00	1,00	0,81	1,00	0,81	0,82	1,20	1,28	1,00	1,00	1,28	1,00	1,28	1,28	1,62	1,70	1,01	1,00	1,70	1,00	1,70	1,70
EP-marine	0,83	0,81	1,00	1,00	0,81	1,00	0,82	0,82	1,18	1,28	1,00	1,00	1,28	1,00	1,28	1,28	1,60	1,70	1,02	1,00	1,70	1,00	1,70	1,70
EP-terrestrial	0,83	0,81	1,00	1,00	0,81	1,00	0,82	0,82	1,18	1,28	1,00	1,00	1,28	1,00	1,28	1,28	1,59	1,70	1,02	1,00	1,70	1,00	1,70	1,70
POCP	0,84	0,81	1,00	1,00	0,81	1,00	0,82	0,82	1,15	1,28	1,00	1,00	1,28	1,00	1,28	1,28	1,52	1,70	1,01	1,00	1,70	1,00	1,70	1,70
ADP-minerals&metals	0,86	0,81	1,00	1,00	0,81	1,00	0,81	0,82	1,19	1,28	1,00	1,00	1,28	1,00	1,28	1,28	1,60	1,70	1,00	1,00	1,70	1,00	1,70	1,70
ADP-fossil	0,84	0,81	1,00	1,00	0,81	1,00	0,82	0,82	1,17	1,28	1,00	1,00	1,28	1,00	1,28	1,28	1,56	1,70	1,01	1,00	1,70	1,00	1,70	1,70
WDP	0,83	0,81	1,00	1,00	0,81	1,00	0,81	0,82	1,22	1,28	1,00	1,00	1,28	1,00	1,28	1,28	1,69	1,70	1,01	1,00	1,70	1,00	1,70	1,70

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