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EPD
ENVIRONMENTAL PRODUCT DECLARATION

ECO PLATFORM EPD VERIFIED

Environmental Product Declaration

for Hot Spray-applied Polyureas by ISOMAT

Programme	Programme operator	EPD registration Number	Publication date	Valid until	Geographical scope
The International EPD® System, www.environdec.com	EPD International AB	EPD-IES-0016839	2024-10-17	2029-10-16	Global

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

EPD of multiple products, based on the weighted average results of the product group

ISOMAT-PUA 1240
ISOMAT-PUA 1360
ISOMAT-PUA 2230

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.

EPD owner	isomat building quality for a sustainable future	**ISOMAT S.A.** **BUILDING CHEMICALS, MORTARS & PAINTS** 17th km Thessaloniki – Ag. Athanasios Road, P.O. BOX 1043, 570 03 Ag. Athanasios, Greece **export@isomat.eu| www.isomat.eu**
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Accredited by	The International EPD® system	

Independent third-party verification of the declaration and data, according to ISO 14025:2006:
☐ EPD process certification ☒ EPD verification

Procedure for follow-up of data during EPD validity involves third party verifier:
☐Yes ☒ No

Product category rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR).

Product category rules (PCR): PCR 2019:14 Construction products, version 1.3.4. Published on 2024.04.30, valid until: 2025.06.20.

CPC CODE: 351, Paints ,varnishes and other related products.

PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

The EPD owner has the sole ownership, liability, and responsibility of the EPD.

EPDs within the same product category but registered in different EPD programs 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 characterization factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

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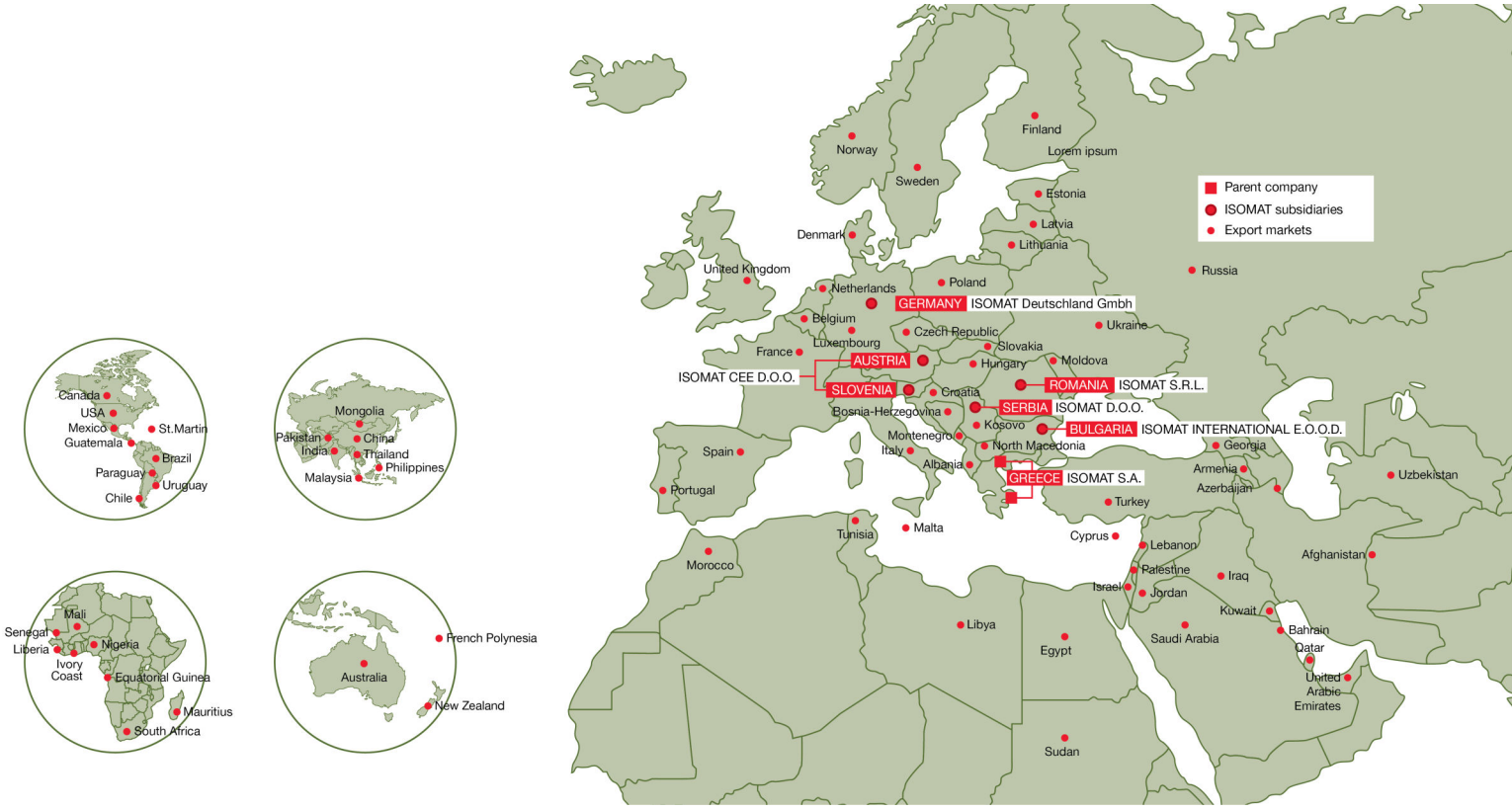
Company Info

ISOMAT is a multinational Group specializing in the development and manufacture of building chemicals, mortars and paints. For 45 years, **ISOMAT** has been making a history of quality, reliability, deep expertise and continuous business growth. It has 3 production plants; one in the parent company in Greece and two in its subsidiaries in Romania and Serbia. In addition, it has 3 commercial subsidiaries in Germany, Slovenia, and Bulgaria and exports to over 80 countries worldwide.



The **ISOMAT** Group produces and distributes an extensive range of high-quality products falling into the following 8 categories:

- Waterproofing
- External Thermal Insulation
- Paints & Surface Protection
- Tile & Natural Stone Installation
- Concrete Admixtures & Repair Products
- Masonry Construction & Repair
- Industrial Floorings
- Microcement Coatings & Decorative Floorings

Staying true to its vision of being a leading partner to the global construction industry by providing reliable and innovative integrated solutions, **ISOMAT** invests in Research and Development with sustainability at the core of new product development and existing product improvement. Drawing on scientific knowledge, its dedicated team of experts at 7 R&D centers and 3 Quality Control labs (in Greece and its subsidiaries in Serbia and Romania) develops numerous pioneering products each year, while optimizing existing ones to align with the ever-evolving market demands and the latest technological advancements in the construction industry.

Energy, Quality and Social Responsibility Policies

For **ISOMAT**, its people are the most valuable asset, and investing in them is a key factor in its continuous evolution. The primary focus areas include ensuring safe and healthy working conditions and offering ongoing training through technical and educational seminars. Furthermore, **ISOMAT** actively engages in corporate social responsibility, supporting socially vulnerable groups, public benefit foundations, hospitals, educational institutions, and public services. Moreover, with a strong customer-centric approach, **ISOMAT** adeptly addresses its customers' ever-changing needs while delivering an exceptional service experience.

ISOMAT adheres to legislative requirements, the ISO 9001 standard, and other international standards, which underpin its product certifications. The effectiveness of the Quality Management System is consistently improved, with measurable quality targets set and reviewed on an annual basis. These objectives are outlined in the annual quality review.

Sustainability is a strategic priority for the **ISOMAT** Group. **ISOMAT** implements Energy and Environmental Management systems, certified according to ISO 50001 and ISO 14001, to reduce the consumption of available natural resources, including water, and save energy and associated emissions during the production process. **ISOMAT** has incorporated the processes of both the Energy and the Environmental Management systems into its standard operating procedures by investing in high energy efficiency equipment which enable producing its products with minimal impact on the environment and ensure compliance with the National and European environmental legislation. Staying true to its commitment to reducing its carbon footprint, **ISOMAT** installed a 1MW rooftop solar PV power system at its headquarters in Thessaloniki, Greece. In addition, **ISOMAT**'s new EPS (expanded polystyrene) production unit, is the first in Greece and currently the only one of its kind operating with zero direct carbon dioxide emissions. The unit also features a zero waste EPS recycling system. Moving towards a circular economy, **ISOMAT** joined the “In the Loop” environment-driven platform in May 2022, systematically separating and collecting its plastic waste so that new, sustainable products can be produced. Last but not least, aiming towards a more sustainable future, **ISOMAT** is continuously developing and producing premium-quality products that contribute to a healthy living and working environment. These products have received internationally recognized certifications for both their technical characteristics and their friendliness towards applicators, end-users, and the environment.

PREMISES

Product Info

In this EPD, weighted average results (based on the production masses of each product) of three polyurea products (ISOMAT-PUA 1240, ISOMAT-PUA 1360 & ISOMAT-PUA 2230) will be presented. The products are manufactured in ISOMAT premises in Agios Athanasios, Greece.

Hot-Spray Applied Polyureas
ISOMAT-PUA 1240
ISOMAT-PUA 1360
ISOMAT-PUA 2230

ISOMAT-PUA 1240

ISOMAT-PUA 1240 is a two-component, highly reactive, ultra fast-curing, hot spray-applied, hybrid polyurea membrane. ISOMAT-PUA 1240 is a 100% solids waterproofing membrane obtained from the reaction of an aromatic, isocyanate prepolymer with a blend of amine-polyol resin. Thanks to its special composition, the reaction takes place within seconds and the final product delivers excellent mechanical strength and chemical resistance to any kind of substrate. It is applied with a special high-pressure and high temperature spray gun, offering the following advantages:

- Forms a jointless, seamless surface.
- Excellent physical-mechanical properties: ultimate tensile stress, crack-bridging ability, abrasion resistance, high elasticity, etc.
- Rapid reaction; gel time in seconds.
- The waterproofed area can be returned to service immediately. Pedestrian use may begin within minutes after application.
- ~100% solids and odorless or nearly odorless.
- Thanks to its fast-curing time, it may be safely applied to vertical surfaces, too.
- Good adhesion to almost any substrate.

ISOMAT-PUA 1240 has been successfully tested by a third-party laboratory for resistance to root penetration, according to CEN/TS 14416:2014.

ISOMAT-PUA 1360

ISOMAT-PUA 1360 is a two-component, highly elastic, ultra fast-curing, 100% solids, hot spray-applied, pure polyurea membrane, obtained from the reaction of an aromatic, isocyanate prepolymer with an amine resin. Thanks to its special composition, the reaction takes place within seconds and the final product delivers excellent mechanical and chemical resistance to any substrate type. It is applied with a special two-component, high pressure and high temperature spray equipment offering the following advantages:

- Very high elasticity that allows application even in extreme climatic conditions or complex architectural structures.
- Very quick reaction; gel time in seconds.
- Areas can be returned to service immediately. Pedestrian use may begin within minutes after application.
- Low to no sensitivity to atmospheric conditions, such as relative humidity and temperature.
- ~100% solids and odorless or nearly odorless.
- Excellent physical-mechanical properties: ultimate tensile stress, crack-bridging ability, abrasion resistance, etc.
- Very high chemical resistance. Recommended for use in cases of heavy chemical loads.
- Thermal stability at very high temperatures.
- Wide range of layer thickness in one application.
- After curing, a vapor-permeable membrane is formed, preventing moisture accumulation.
- Forms a jointless and seamless, monolithic surface.
- Can also be safely applied to vertical surfaces.

ISOMAT-PUA 1360 complies with all the requirements established in Royal Decree 140/2003, modified by RD 314/2016 and RD 902/2018, which establishes sanitary criteria for the quality of water for human consumption. Water tanks must be thoroughly washed prior to filling with potable water. ISOMAT-PUA 1360 has been successfully tested by a third-party laboratory for resistance to root penetration, according to CEN/TS 14416:2014.

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ISOMAT-PUA 2230

ISOMAT-PUA 2230 is a two-component, highly resistant, ultra fast-curing, 100% solids, hot spray applied, pure polyurea membrane obtained from reaction of an aromatic, isocyanate prepolymer with an amine resin. Thanks to its special composition, the reaction takes place within seconds and the final product delivers excellent mechanical and chemical resistance to any kind of substrate. It is applied with a special two-component, high pressure and temperature spray gun, offering the following advantages:

- Very high tensile strength (≥ 20 N/mm^2) at high elongation.
- High resistance to aging and abrasion.
- Very quick reaction; gel time in seconds.
- Areas can be returned to service immediately. Pedestrian use may begin within minutes after application.
- Low to no sensitivity to atmospheric conditions, such as relative humidity and temperature.
- ~100% solids and odorless or nearly odorless.
- Excellent physical-mechanical properties: elasticity, crack-bridging ability, abrasion resistance, etc.
- Very high chemical resistance. Recommended for use in cases of heavy chemical loads.
- Thermal stability at very high temperatures.
- Wide range of layer thickness in one application.
- After curing, a vapor-permeable membrane is formed, preventing moisture accumulation.
- Forms a jointless and seamless monolithic surface.
- Can also be safely applied to vertical surfaces.

Technical Specifications			
Specification	**ISOMAT-PUA 1240**	**ISOMAT-PUA 1360**	**ISOMAT-PUA 2230**
Form	Component A: Liquid Component B: Liquid	Component A: Liquid Component B: Liquid	Component A: Liquid Component B: Liquid
Color	Component A: Yellowish Component B: White/Grey	Component A: Yellowish Component B: White/Grey	Component A: Yellowish Component B: White/Grey
Density	Component A: 1,11 kg/l Component B: 1,03 kg/l	Component A: 1,06 kg/l Component B: 1,06 kg/l	Component A: 1,11 kg/l Component B: 1,04 kg/l
Viscosity	Component A: 1000 mPa*s Component B: 1000 mPa*s	Component A: 900-1,100 mPa*s Component B: 500-700 mPa*s	Component A: 1,050 mPa*s Component B: 850 mPa*s
Mixing ratio (A:B)	1 : 0,95 per weight	1:1 per weight	1:1 per weight
Tensile strength (ISO 37)	13 ± 1 N/mm^2	14 ± 1 N/mm^2	22 ± 1 N/mm^2
Elongation at break (ISO 37)	350 ± 50%	500 ± 50%	350 ± 50%

According to the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) Regulation, the product does not contain any substance included in the Candidate List of Substances of Very High Concern (SVHCs) for authorization with concentrations higher than 0.1% weight by weight (w/w).

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Weighted average product			Composition (kg per kg of product/ component)	Biogenic carbon content (kg C per kg of product)
Raw materials	Component A	Methylene diphenyl diisocyanate	0,30-0,60	-
		Polyether polyol	0,40-0,70	-
	Component B	Polyether amine	0,35-0,55	-
		Diamine	0,10-0,30	-
		Polyether polyol	0,15-0,35	-
		Titanium dioxide	0,05-0,10	-
		Other	<0,05	-
Packaging materials		Steel drums	6,15E-02	-

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System Boundaries

	Product stage			Construction stage		Use stage							End-of-life stage				Resource recovery stage
	Raw Materials Supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction and demolition	Transport	Waste processing for re-use, recovery and/or recycling	Disposal	Re-use-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	X	X	X	X	X	X	X	X	X	X	X	X
Geography	EU	EU	GR	GR	GR	GLO	GLO	GLO	GLO	GLO	GLO	GLO	EU	EU	EU	EU	EU
GWP-GHG share of Specific data used	15,5%			—	—	—	—	—	—	—	—	—	—	—	—	—	—
Variation-products	Up to 4,17% from the declared average, in GWP-GHG			—	—	—	—	—	—	—	—	—	—	—	—	—	—
Variation-sites	0%			—	—	—	—	—	—	—	—	—	—	—	—	—	—

Product stage (A1-A3)

Product stage (modules A1-A3) includes raw material supply, transportation, and manufacturing.

A1: Raw Material Supply

Production starts with the material supply. This module includes the mining and pretreatment processes before production (processing of raw materials, generation of electricity and fuels required for the manufacturing). Diisocyanates, polyol, amine, diamine and gia pigments are the main raw materials for ISOMAT-PUA 1240, ISOMAT-PUA 2230 & ISOMAT-PUA 1360 production. Furthermore, electricity & fuels (LPG) production and transmission is included in this module.

A2: Transportation of raw materials to manufacturer

Transportation is relevant to the delivery of raw materials from the supplier to the gate of manufacturing plant. Raw materials are transported to the manufacturing site of ISOMAT in Agios Athanasios, Greece from suppliers located mainly in Central Europe. A EURO5 lorry 16-32 metric ton was assumed for road transportation and a bulk carrier for dry goods for sea transportation.

A3: Manufacturing

This module incorporates all impacts related to the manufacturing stage of products. Waste management and direct emissions (if any) are included here. Personnel-related activities, such as transportation of employees to and from work, and production of infrastructure and capital goods are not included in the scope of this study.

The manufacturing process includes the following steps:

- **Quality Control:** The raw materials undergo rigorous testing to ensure they meet the company's quality standards.
- **Storage:** Materials are stored in controlled environments to prevent contamination or degradation before use.
- **Batch Preparation:** Raw materials are weighed and measured according to precise formulations.
- **Mixing:** The materials are then mixed in industrial mixers to achieve a homogeneous blend.
- **Packaging:** The final product is packed into steel drums.

Construction/Installation stage (A4-A5)

Modules A4 & A5 are also included in the study. The scenarios included are currently in use and are representative for one of the most probable alternatives. Additional declaration of representative mixes for the relevant region is permissible.

A4 : Transport

This stage incorporates all impacts related to the transportation of final products to the construction/installation stage. It is assumed that the final products cover an average distance of 500 km from the manufacturing site of Agios Athanasios to the construction site. ISOMAT takes on projects from all over Greece (and mainly Athens), so this assumption is quite representative.

Scenario information	Unit (expressed per functional unit or per declared unit)
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat etc.	EURO 5 truck, diesel
Distance	500 km
Capacity utilization (including empty returns)	100%
Bulk density of transported products	Not applicable
Volume capacity utilization factor (factor: =1 or <1 or ~1 for compressed or nested packaged products)	Not applicable

A5: Construction installation

This module in general includes the impacts during the installation of polyurea products into the building (from electricity required), as well as the treatment of packaging materials (steel drums) after the installation. In polyurea (PUA) products, a spray machine is used, which consumes 1,38 kWh/kg. The machine has a power of 5500 Watt and operates for a period of 15 minutes, which is required for heating it and the materials, as well as spraying-application of the polyurea.

Finally, for waste packaging treatment, it is assumed that 85% of steel packaging is going to be recycled and 15% is going to be landfilled, according to the 7th Global study of World Steel Association. (https://worldsteel.org/wp-content/uploads/Life-cycle-inventory-LCI-study-2020-data-release.pdf)

Scenario information	Unit (expressed per functional unit or per declared unit)
Ancillary materials for installation (specified by material);	Not applicable
Water use	Not applicable
Other resource use	Not applicable
Quantitative description of energy type and consumption during the installation process	Greek electricity grid mix: 1,38 kWh
Waste materials on the building site before waste processing, generated by the product's installation (specified by type)	Not applicable
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)	Waste packaging materials (steel drums): 6,15E-02 kg
Direct emissions to ambient air, soil and water	Not applicable

Use stage (B)

Modules B (B1-B7) incorporate all possible emissions during the use stage, including operation energy and water use during the product's life span, refurbishment, replacement, repair and maintenance. In this project, although these modules are taken into account, it is assumed that they have zero environmental impact.

End of life stage (C1-C4)

The end-of-life stages begin with the deconstruction and demolition from the installation site and then the waste is transferred for disposal of the product. The scenarios included are currently in use and are representative for one of the most probable alternatives. Additional declaration of representative mixes for the relevant region is permissible.

C1: De-construction and demolition

This stage concerns the impact arising from energy required during demolition process. It is assumed that the energy needed for the de-construction of final products is the same as module A5.

C2: Transportation to waste processing

This module includes the transportation of the discarded product to landfills for final disposal. A distance of 50 km by lorry 16-32 tonnes from construction/demolition sites to scrap dealers and disposal sites has been chosen as a conservative assumption.

C3: Waste processing for reuse, recovery and/or recycling

This module includes the impacts arising from potential recycling/reuse of final products after their life cycle. As an assumption and worst-case scenario, final products are going to be 100% disposed after their life cycle. Thus, environmental impacts in C3 module are considered to be zero.

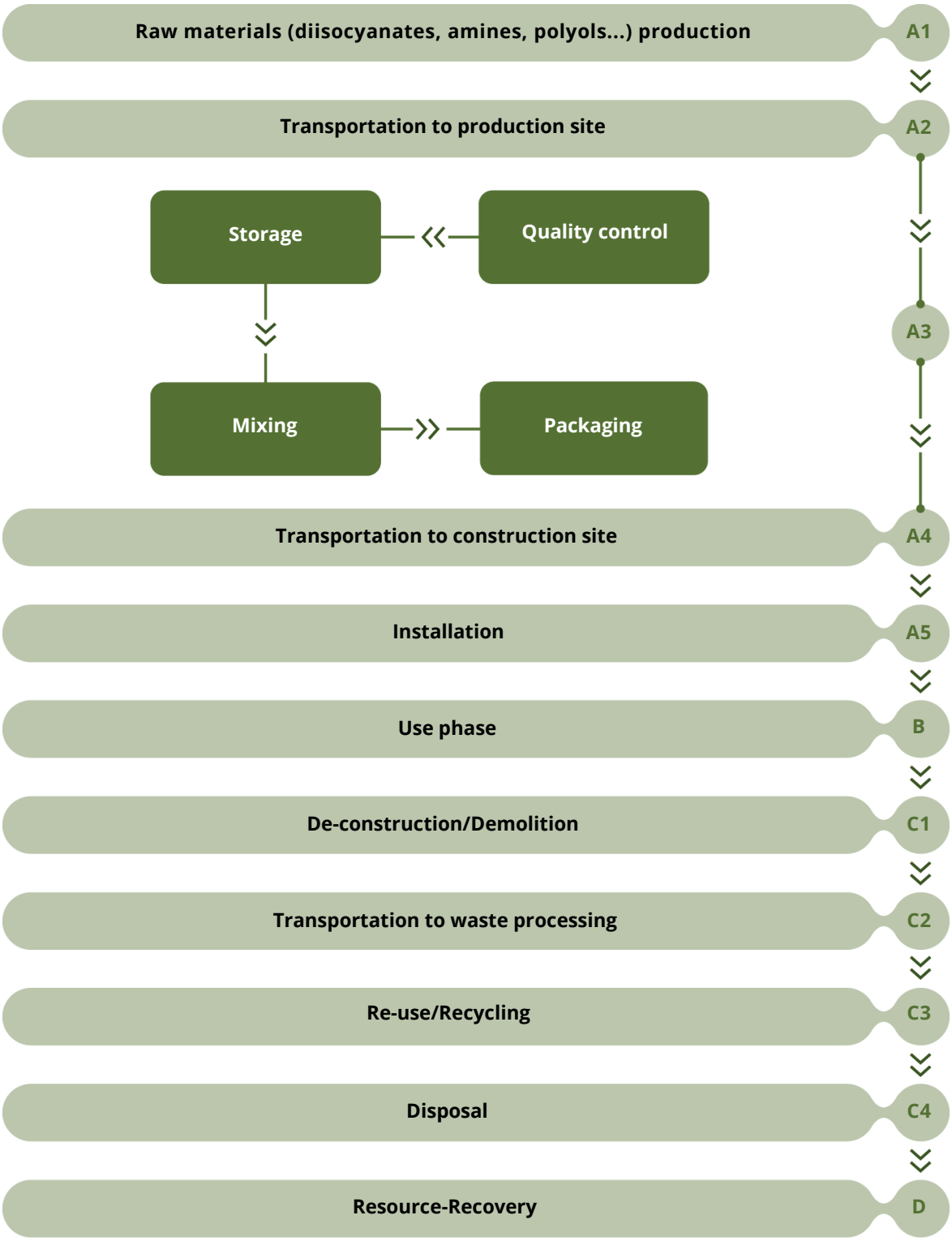
C4: Disposal

As an assumption and worst-case scenario, final products are going to be 100% disposed after their life cycle.

Resource and recovery stage (D)

D: Reuse-Recovery-Recycling-potential

Module D generally includes potential avoided burdens related to the potential reuse and/or recycling of the product after its end-of-life stage. In this case, since the product is assumed to be 100% landfilled, only the environmental benefits from the reuse of the part of steel drums (for packaging) that is recycled is taken into account .



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LCA Information

Declared unit:
The declared unit is 1 kg of weighted average polyurea products (ISOMAT-PUA 1240, ISOMAT-PUA 1360 & ISOMAT-PUA 2230). The produced quantities of each product for 2023 are used for the weighting. The case is that each of the three PUAs are composed of two components, (A) & (B), with a certain mixing ratio. The components (A) and (B) are not standalone products.

ISOMAT-PUA 1240:
Mixing ratio (A:B): 1 : 0,95. So, the declared unit of ISOMAT-PUA 1240 means 0,513 kg of component (A) and 0,487 kg of component (B).

ISOMAT-PUA 1360:
Mixing ratio (A:B): 1 : 1. So, the declared unit of ISOMAT-PUA 1360 means 0,5 kg of component (A) and 0,5 kg of component (B).

ISOMAT-PUA 2230:
Mixing ratio (A:B): 1 : 1. So, the declared unit of ISOMAT-PUA 2230 means 0,5 kg of component (A) and 0,5 kg of component (B).

Goal and Scope:
This EPD evaluates the environmental impacts of the production of 1 kg of weighted average polyurea products (ISOMAT-PUA 1240, ISOMAT-PUA 1360 & ISOMAT-PUA 2230) from cradle to gate (modules A1-A3) with options (A4-A5, B1-B7, C1-C4 and modules D)-Type b EPD.

System Boundary:
The system boundaries are set to be cradle to gate (modules A1-A3) with options (A4-A5, B1-B7, C1-C4 and modules D).

Cut-off rules:
The cut-off criteria adopted is as stated in "EN 15804:2012+A2:2019". Where there is insufficient data for a unit process, the cut-off criteria are 1% of the total mass of input of that process. The total of neglected input flows per module is a maximum of 5% of energy usage and mass. In this case, no cut-off was applied to any stream.

Allocations:
Allocation rules have been performed in accordance with the requirements of ISO 14044:2006. Where allocation cannot be avoided, the inputs and outputs of the system were partitioned between its different products or functions in a way that reflects the underlying physical or economic relationships between them. Mass allocation is applied to energy carriers (electricity and LPG) and waste produced during the manufacturing process, based on the mass of the final polyurethanic products studied and total quantities of polyurethanic production line.

Data quality:
ISO 14044 was applied in terms of data collection and quality requirements. The impact of the production of raw materials recovered from Ecoinvent database v.3.9.1+EN 15804 add-on. The data concerning the modules A2 (Transportation) and A3 (Product manufacturing) were provided by ISOMAT and concerns the full year 2023. These data were the quantities of all input and output materials extracted from the company's SAP system and products recipes, the consumed utilities (energy) and the distances and means of transport for each input stream. Regarding electricity mix, the latest (2023) national residual electricity mix as published in DAPEEP SA was utilized. In 2023, ISOMAT consumed both electricity derived from grid and electricity from solar panels. The climate impact of electricity from grid is 0,4987 kg CO_2 eq./kWh according to DAPEEP, while impact for the production of solar energy is 0,046 kg CO_2 eq./kWh, according to a representative dataset from Ecoinvent. Also, LPG is used for the manufacturing process. The direct emissions from the combustion of this LPG are calculated through NCV (TJ/ton) and emission actor (in t CO_2/TJ) based on NIR (National Inventory Report). Background data for this stage are retrieved from Ecoinvent v.3.9.1+EN 15804 add-on.

Geographical Scope:
Worldwide

Time representativeness:
Data obtained refer to the year 2023

Software used:
OpenLCA v.2.1

Reference package (JRC):
Based on characterization factors from EF 3.1.

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Environmental Performance

The results of life cycle assessment for 1 kg of the weighted average product of ISOMAT-PUA 1240, ISOMAT-PUA 1360 & ISOMAT-PUA 2230 are presented below. The deviations of each product from the declared average are presented in Appendix. The use of the results of modules A1-A3 (A1-A5 for services) is discouraged without considering the results of module C. 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

IMPACTS	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	4.92E+00	9.43E-02	9.73E-01	0.00E+00	9.71E-01	1.89E-02	0.00E+00	1.03E-01	-2.91E-02
GWP-fossil	kg CO_2 eq	4.82E+00	9.41E-02	9.73E-01	0.00E+00	9.72E-01	1.88E-02	0.00E+00	1.03E-01	-2.87E-02
GWP-biogenic	kg CO_2 eq	9.14E-02	8.23E-05	0.00E+00	0.00E+00	-4.45E-04	1.65E-05	0.00E+00	7.30E-05	-4.06E-04
GWP-luluc	kg CO_2 eq	1.63E-03	4.57E-05	7.98E-05	0.00E+00	7.78E-05	9.14E-06	0.00E+00	8.65E-06	-3.66E-05
GWP-GHG[1]	kg CO_2 eq	4.82E+00	9.42E-02	9.73E-01	0.00E+00	9.72E-01	1.88E-02	0.00E+00	1.03E-01	-2.87E-02
ODP	kg CFC-11 eq	1.50E-07	2.05E-09	3.86E-08	0.00E+00	3.86E-08	4.10E-10	0.00E+00	2.78E-10	-3.85E-10
AP	mol H+ eq	2.67E-02	3.07E-04	4.00E-03	0.00E+00	3.98E-03	6.14E-05	0.00E+00	8.37E-05	-1.29E-04
EP-freshwater	kg P eq	1.04E-03	6.59E-06	9.05E-04	0.00E+00	9.04E-04	1.32E-06	0.00E+00	1.53E-06	-1.59E-05
EP-marine	kg N eq	8.34E-03	1.06E-04	7.61E-04	0.00E+00	7.57E-04	2.11E-05	0.00E+00	3.13E-05	-2.84E-05
EP-terrestrial	mol N eq	4.75E-02	1.11E-03	6.36E-03	0.00E+00	6.32E-03	2.23E-04	0.00E+00	3.34E-04	-2.91E-04
POCP	kg NMVOC eq	1.83E-02	4.59E-04	2.46E-03	0.00E+00	2.44E-03	9.17E-05	0.00E+00	1.38E-04	-9.43E-05
ADPe[2]	kg Sb eq	4.05E-05	3.09E-07	5.90E-07	0.00E+00	5.06E-07	6.19E-08	0.00E+00	2.52E-08	-1.65E-07
ADPf[2]	MJ	9.92E+01	1.34E+00	1.37E+01	0.00E+00	1.37E+01	2.69E-01	0.00E+00	2.57E-01	-4.18E-01
WDP[2]	m3 eq	4.80E+00	6.59E-03	7.33E-02	0.00E+00	7.30E-02	1.32E-03	0.00E+00	1.44E-03	-1.53E-02

[1] GWP-GHG indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide emissions and uptake and biogenic carbon stored in the product, with characterization factors (CFs) based on IPCC (2013).

[2] The results of this environmental impact indicators of ADPf, ADPe and WDP shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

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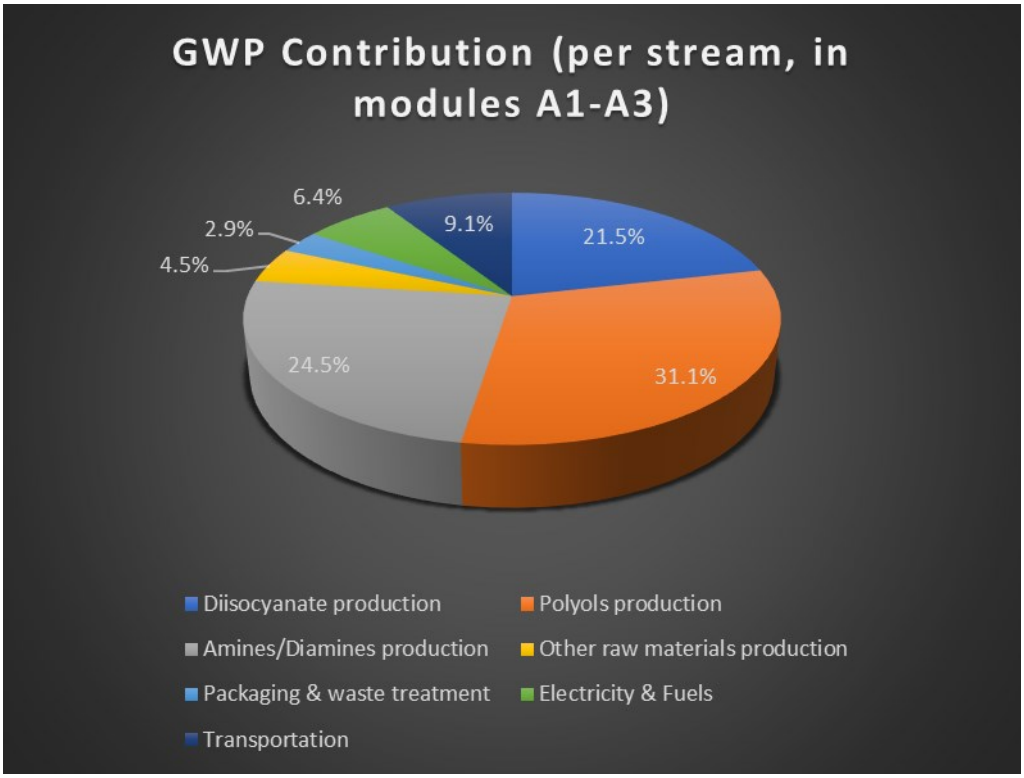
RESOURCE USE	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PERE	MJ	4.81E+00	2.07E-02	5.63E-01	0.00E+00	5.60E-01	4.14E-03	0.00E+00	4.60E-03	-5.89E-02
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	4.81E+00	2.07E-02	5.63E-01	0.00E+00	5.60E-01	4.14E-03	0.00E+00	4.60E-03	-5.89E-02
PENRE	MJ	9.13E+01	1.23E+00	1.33E+01	0.00E+00	1.33E+01	2.46E-01	0.00E+00	2.35E-01	-4.06E-01
PENRM	MJ	7.93E+00	1.17E-01	4.26E-01	0.00E+00	4.25E-01	2.33E-02	0.00E+00	2.19E-02	-1.13E-02
PENRT	MJ	9.92E+01	1.34E+00	1.37E+01	0.00E+00	1.37E+01	2.69E-01	0.00E+00	2.57E-01	-4.18E-01
SM	kg	1.46E-01	1.46E-03	5.61E-02	0.00E+00	3.70E-03	2.91E-04	0.00E+00	2.40E-04	-6.30E-02
RSF	MJ	6.04E-02	3.93E-04	9.49E-04	0.00E+00	9.11E-04	7.86E-05	0.00E+00	5.46E-05	-2.03E-03
NRSF	MJ	1.49E-01	7.72E-04	1.85E-03	0.00E+00	1.80E-03	1.54E-04	0.00E+00	1.35E-04	-2.23E-03
FW	m^3	1.12E-01	1.60E-04	1.65E-03	0.00E+00	1.64E-03	3.21E-05	0.00E+00	2.58E-04	-4.87E-04

OUTPUT FLOWS AND WASTE	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD	kg	2.05E-01	1.25E-03	1.43E-02	0.00E+00	1.42E-02	2.49E-04	0.00E+00	3.42E-04	-1.98E-02
NHWD	kg	5.51E-01	6.40E-02	3.08E-02	0.00E+00	2.11E-02	1.28E-02	0.00E+00	1.00E+00	-2.99E-03
RWD	kg	6.08E-05	4.34E-07	4.41E-06	0.00E+00	4.37E-06	8.67E-08	0.00E+00	8.83E-08	-1.96E-06
CRU	kg	-4.56E-21	-5.36E-23	-9.36E-22	0.00E+00	-9.36E-22	-1.07E-23	0.00E+00	2.95E-23	1.42E-22
MFR	kg	1.27E-01	1.32E-03	3.61E-03	0.00E+00	3.53E-03	2.64E-04	0.00E+00	1.73E-04	-4.01E-03
MER	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	0.00E+00
EE	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	0.00E+00

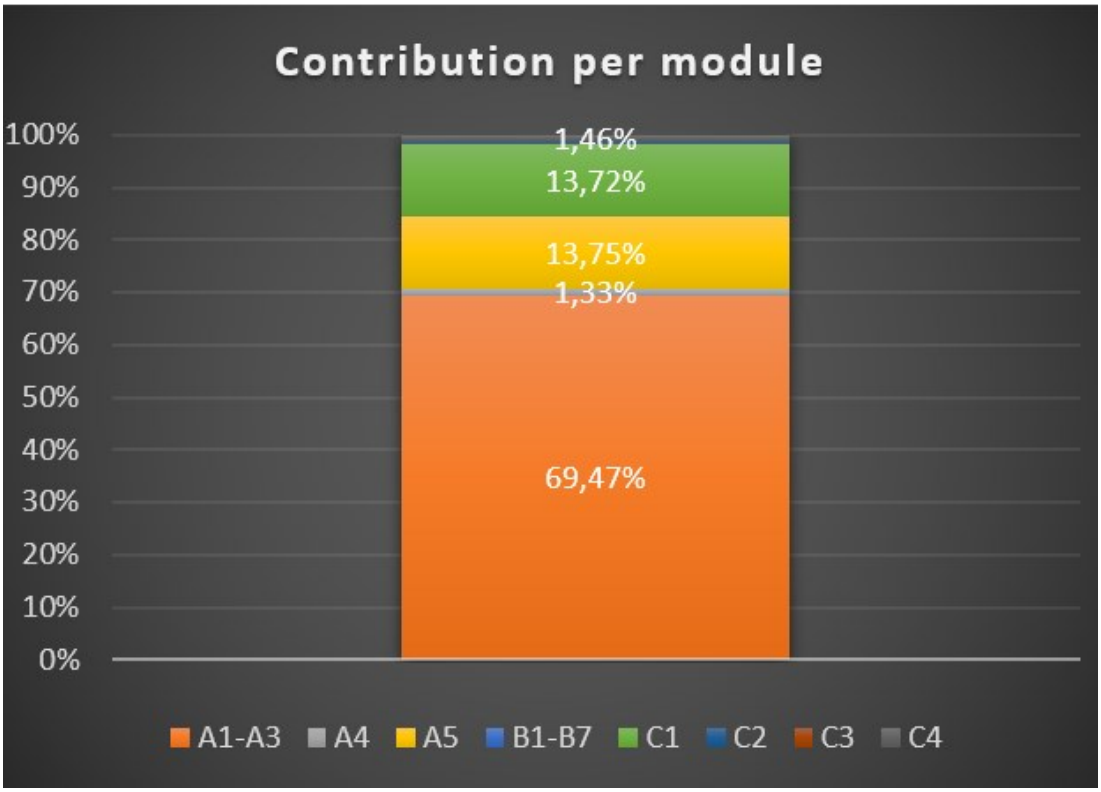
ADDITIONAL IMPACTS	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PM	Disease incidence	5.52E-07	7.49E-09	6.87E-09	0.00E+00	6.65E-09	1.50E-09	0.00E+00	1.80E-09	-2.92E-09
IRP[3]	kBq U235 eq	2.38E-01	1.79E-03	1.84E-02	0.00E+00	1.82E-02	3.57E-04	0.00E+00	3.64E-04	-7.67E-03
ETP-FW	CTUe	1.12E-01	6.59E-01	2.27E+00	0.00E+00	2.25E+00	1.32E-01	0.00E+00	1.33E-01	-2.95E-01
HTP-c	CTUh	2.61E-08	4.29E-11	2.14E-10	0.00E+00	2.12E-10	8.58E-12	0.00E+00	1.32E-11	-1.41E-09
HTP-nc	CTUh	6.17E-08	9.47E-10	6.93E-09	0.00E+00	6.84E-09	1.89E-10	0.00E+00	2.30E-10	-7.23E-10
SQP	dimension less	9.22E+00	7.94E-01	8.49E-01	0.00E+00	8.14E-01	1.59E-01	0.00E+00	5.80E-01	-1.36E-01

[3] Ionizing radiation potential (IRP) 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.

Interpretation



As it is presented above, polyols and amines/diamines production (module A1) contribute the most for the production of PUA products, accounting for 31,1% and 24,5% respectively. Next most important stream is diisocyanate production (module A1), accounting for 21,5%. Transportation of raw and packaging materials to ISOMAT manufacturing site (module A2) accounts for 9,1%, while production of electricity and fuels (module A1) (and direct emissions due to combustion) (module A3) is responsible for 6,4%. Packaging and waste treatment (module A3) are less important, with a contribution of 2,9%.



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List of abbreviations

LCA	Life Cycle assessment
EPD	Environmental Product Declaration
PCR	Product category rules
GLO	Global
RER	Europe
RoW	Rest of the world
GWP-total	Global Warming Potential total
GWP-fossil	Global Warming Potential fossil
GWP-biogenic	Global Warming Potential biogenic
GWP-luluc	Global Warming Potential land use and land use change
ODP	Ozone Depletion Potential
AP	Acidification Potential
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 photochemical oxidants
ADPe	Abiotic depletion potential for non-fossil resources
ADPf	Abiotic depletion potential for fossil resources
WDP	Water use
PERE	Use of renewable primary energy excluding 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 resources used as raw materials
PENRM	Use of non-renewable primary energy resources used as raw materials
PENRT	Total use of non-renewable primary energy resources
SM	Use of secondary material
RSF	Use of renewable secondary fuels

NRSF	Use of non-renewable secondary fuels
FW	Use of net fresh water
HWD	Hazardous waste disposed
NHWD	Non-hazardous waste disposed
RWD	Radioactive waste disposed
CRU	Components for re-use
MFR	Materials for recycling
MER	Materials for energy recovery
EE	Exported Energy
PM	Particulate matter emissions
IRP	Ionizing radiation, human health
ETP-FW	Ecotoxicity, freshwater
HTP-c	Human toxicity, cancer
HTP-nc	Human toxicity, non-cancer
SQP	Land use related impacts/Soil quality

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Appendix

	Deviations of each product from the declared average			
		ISOMAT-PUA 1240	ISOMAT-PUA 1360	ISOMAT-PUA 2230
GWP-total	kg CO2 eq	0.44%	-0.09%	-4.94%
GWP-fossil	kg CO2 eq	0.53%	-0.16%	-4.17%
GWP-biogenic	kg CO2 eq	-4.95%	3.73%	-73.11%
GWP-luluc	kg CO2 eq	9.51%	-6.50%	11.65%
GWP-GHG	kg CO2 eq	0.53%	-0.17%	-4.17%
ODP	kg CFC-11 eq	12.56%	-8.29%	-4.38%
AP	mol H+ eq	2.71%	-1.55%	0.73%
EP-freshwater	kg P eq	4.63%	-2.87%	4.75%
EP-marine	kg N eq	2.26%	-2.02%	18.95%
EP-terrestrial	mol N eq	1.65%	-0.79%	-4.02%
POCP	kg NMVOC eq	2.91%	-1.62%	-0.98%
ADPe	kg Sb eq	2.61%	-1.10%	-13.27%
ADPf	MJ	1.07%	-0.45%	-13.27%
WDP	m3 eq	-1.29%	1.30%	-25.25%

Deviations from declared average (1)

RESOURCE USE	Unit	ISOMAT-PUA 1240	ISOMAT-PUA 1360	ISOMAT-PUA 2230
PERE	MJ	2.12%	-0.63%	-21.35%
PERM	MJ	0.00%	0.00%	0.00%
PERT	MJ	2.12%	-0.63%	-21.35%
PENRE	MJ	1.18%	-0.52%	-4.45%
PENRM	MJ	-0.27%	0.30%	-5.07%
PENRT	MJ	1.07%	-0.45%	-4.50%
SM	kg	11.09%	-7.81%	13.55%
RSF	MJ	14.38%	-10.59%	13.55%
NRSF	MJ	5.37%	-5.83%	43.80%
FW	m3	-1.06%	1.20%	-26.23%

Deviations from declared average (2)

OUTPUT FLOWS AND WASTE CATEGORIES	Unit	ISOMAT-PUA 1240	ISOMAT-PUA 1360	ISOMAT-PUA 2230
HWD	kg	0.78%	-0.51%	2.44%
NHWD	kg	1.64%	-1.45%	14.45%
RWD	kg	13.58%	-9.80%	11.74%
CRU	kg	12.83%	-9.71%	21.93%
MFR	kg	12.16%	-8.62%	12.42%
MER	kg	0.00%	0.00%	0.00%
EE	MJ	0.00%	0.00%	0.00%

Deviations from declared average (3)

ADDITIONAL IMPACTS	Unit	ISOMAT-PUA 1240	ISOMAT-PUA 1360	ISOMAT-PUA 2230
PM	Disease incidence	-3.72%	2.88%	-48.48%
IRP	kBq U235 eq	13.51%	-9.74%	11.85%
ETP-FW	CTUe	-1.06%	1.20%	-26.23%
HTP-c	CTUh	16.64%	-11.75%	-10.63%
HTP-nc	CTUh	6.65%	-3.72%	-9.56%
SQP	dimensionless	5.58%	-3.85%	13.87%

Deviations from declared average (4)

Additional information

The EPD does not give information on release of dangerous substances to soil, water and indoor air because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonized test methods according to the provisions of the respective technical committees for European product standards are not available.