

ENVIRONMENTAL PRODUCT DECLARATION

No. 01-04/2024

Thermal insulation systems

Kreisel - Technika Budowlana Sp. z o.o.



Declaration owner:

Program Owner:

Program Name

Release Date:

Declaration valid

until:

Kreisel – Technika Budowlana Sp. z o.o.

*Łukasiewicz Institute of Ceramics and Building Materials Centre for
Environmental Engineering*

Environmental Product Declarations – B2B



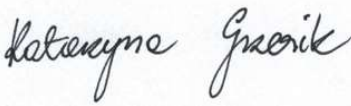
22.04.2024

22.04.2029

1. OVERVIEW

<p>Declaration owner:</p> <p>Kreisel – Building Technology Sp. z o.o.</p>	<p>Products covered by the declaration:</p> <p>Thermal insulation systems (ETICS)</p>
<p>Program Owner:</p> <p>Łukasiewicz Institute of Ceramics and Building Materials, Centre for Environmental Engineering in Opole. http://www.icimb.pl/opole/</p>	<p>Declaration owner:</p> <p>Kreisel – <i>Technika Budowlana</i> Sp. z o.o. Szarych Szeregów 23 23-462 Poznań Phone: +48 618467900 Address: Email: sekretariat@kreisel.pl https://www.kreisel.pl/</p>
<p>Date of issue:</p> <p>22.04.2024</p>	<p>Declared Unit:</p> <p>1 m2 of thermal insulation system. The calculations were made for an insulating layer of expanded polystyrene with a thickness of 150 mm</p>
<p>Declaration valid until:</p> <p>22.04.2029</p>	<p>Scope:</p> <p>The declaration covers the following products: KREISEL thermal insulation systems: Turbo, Turbo S, Turbo SA, Turbo SO, Turbo SiSi, Turbo - So Protect, Turbo - Max Protect, Turbo - Eco Protect manufactured in the plants of Kreisel – Technika Budowlana Sp. z o.o.;</p> <ul style="list-style-type: none"> • 23 Szarych Szeregów Street, 23-462 Poznań, Poland, • Bory 41A Street, 42-504 Będzin, • 141 Kaliska Street, 87-840 Lubień Kujawski, • 11 Listopada Street, 97-225 Ujazd. <p>It contains information on the environmental impact of the declared products. All data on the production cycle were collected by Kreisel – Technika Budowlana Sp. z o.o. from 01.01.2022 to 31.12.2022 (12months) and correspond to the production technology of the time.</p> <p>Components for 8 different products, i.e. insulation systems: Turbo, Turbo S, Turbo SA, Turbo SO, Turbo SiSi, Turbo - So Protect, Turbo - Max Protect, Turbo - Eco Protect are manufactured in 4 plants of Kreisel - Technika Budowlana Sp. z o. o.:</p> <ul style="list-style-type: none"> • ul. Szarech Szeregów 23, 23-462 Poznań, • ul. Bory 41A, 42-504 Będzin, • ul. Kaliska 141, 87-840 Lubień Kujawski, • ul. 11 Listopada, 97-225 Ujazd. <p>These components include:</p> <ul style="list-style-type: none"> • plaster compounds, plaster primers, paints, mortars for gluing polystyrene and mortars for embedding mesh, produced in the Ujazd plant. • mortars for gluing polystyrene and mortar for embedding mesh, produced in plants in Poznań, Będzin and Lubień Kujawski • insulating materials, fiberglass meshes, and dowels are produced by other manufacturers.

	<p>The environmental declaration is based on average data provided by the manufacturer for four production plants for individual components included in the products covered by the declaration manufactured by Kreisel – Technika Budowlana Sp. z o. o.</p> <p>The average values of the input and output streams were calculated based on data provided by the manufacturer from four production plants from the period from January 1, 2022 to December 31, 2022. For components that are not manufactured by Kreisel – Technika Budowlana Sp. z o. o. data obtained from the Ecoinvent v. 3.9.2 database. The Life Cycle Assessment has been developed in accordance with the requirements of PN-EN ISO 15804+A2:2020, PN-EN ISO 14025 and PN-EN ISO 14040. The rules for categorization of the product have been adopted in accordance with the PN-EN 15804 standard. The Łukasiewicz Institute of Ceramics and Building Materials of the Centre for Environmental Engineering in Opole is not responsible for manufacturer's information and life cycle assessment data and evidence. Declarations that are the result of different programs or that are not made in accordance with the standard may not be comparable.</p>
Product Categorization (PCR) Rules	PN-EN 15804+A2:2020-03 Sustainability of construction works. Environmental Product Declarations. Basic Principles of Categorization of Construction Products, ICIMB-PCR A.
Representativeness:	Polish product, year 2022
Declared durability:	50 years
Reasons for performing LCA:	B2B
Life Cycle Analysis (LCA):	A1-A3, A4, A5, C1-C4 and D (Cradle-to-Gate with options)
<p>The Łukasiewicz Research Network Institute of Ceramics and Building Materials Centre for Environmental Engineering provides access to the Type III Environmental Declaration for Complete Thermal Insulation Systems (ETICS) of Kreisel – Technika Budowlana Sp. z o.o. to interested parties.</p>	

<p>Authors' team:</p> <p>Katarzyna Kiprian, M.Sc. Ewa Głodek-Bucyk, Ph.D. Patryk Okoń, M.Sc.</p> <p>Approved: Joanna Poluszyńska, PhD</p> <p></p> <p>Director of the Center for Environmental Engineering</p> <p>Ewa Głodek-Bucyk, Ph.D.</p> <p></p> <p>Leader of the Process Engineering Research Group</p>	<p>Review:</p> <p>CEN standard PN-EN 15804+A2 serves as the main PCR document. Independent verification of declarations and data according to EN ISO 14025:2010</p> <p><input type="checkbox"/> Internal <input checked="" type="checkbox"/> External</p> <p></p> <p>Katarzyna Grzesik, PhD, DSc</p>
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MANUFACTURER & PRODUCT INFORMATION

KREISEL-Construction Technology is one of the leading manufacturers of building materials in Poland.

We have been in the construction chemicals industry for over 30 years and our priority is to provide our customers with a modern product that meets the requirements of European standards. All products are conscientiously and thoroughly checked at every stage of their preparation. This is done by certified laboratories located in every KREISEL factory. The quality of our products is confirmed by many certificates.

One of the very important assumptions of the company is to focus on building partner relations with buyers. KREISEL also owes its market success to the involvement of customers in shaping mutual relations. He actively listens to their suggestions and then, after careful analysis, consistently implements them. In this way, it proves that the customer is a key link in this complex organism.

We pay special attention to the high quality of our products, as well as a diversified offer tailored to individual customer groups. This is one of the reasons why we have gained recognition and trust among our customers.

We are perceived as a reliable and worthy partner, providing high-quality construction chemicals.

Our contribution to sustainability is also worth mentioning. In the Ecological Cloning 2023 project, we planted 1055 red maples. Our trees have bloomed all over Poland, benefiting the community and the environment around us.

With the end of this project, our mission does not end. As we look to the future, we are committed to continuing to protect the environment and create sustainable communities.



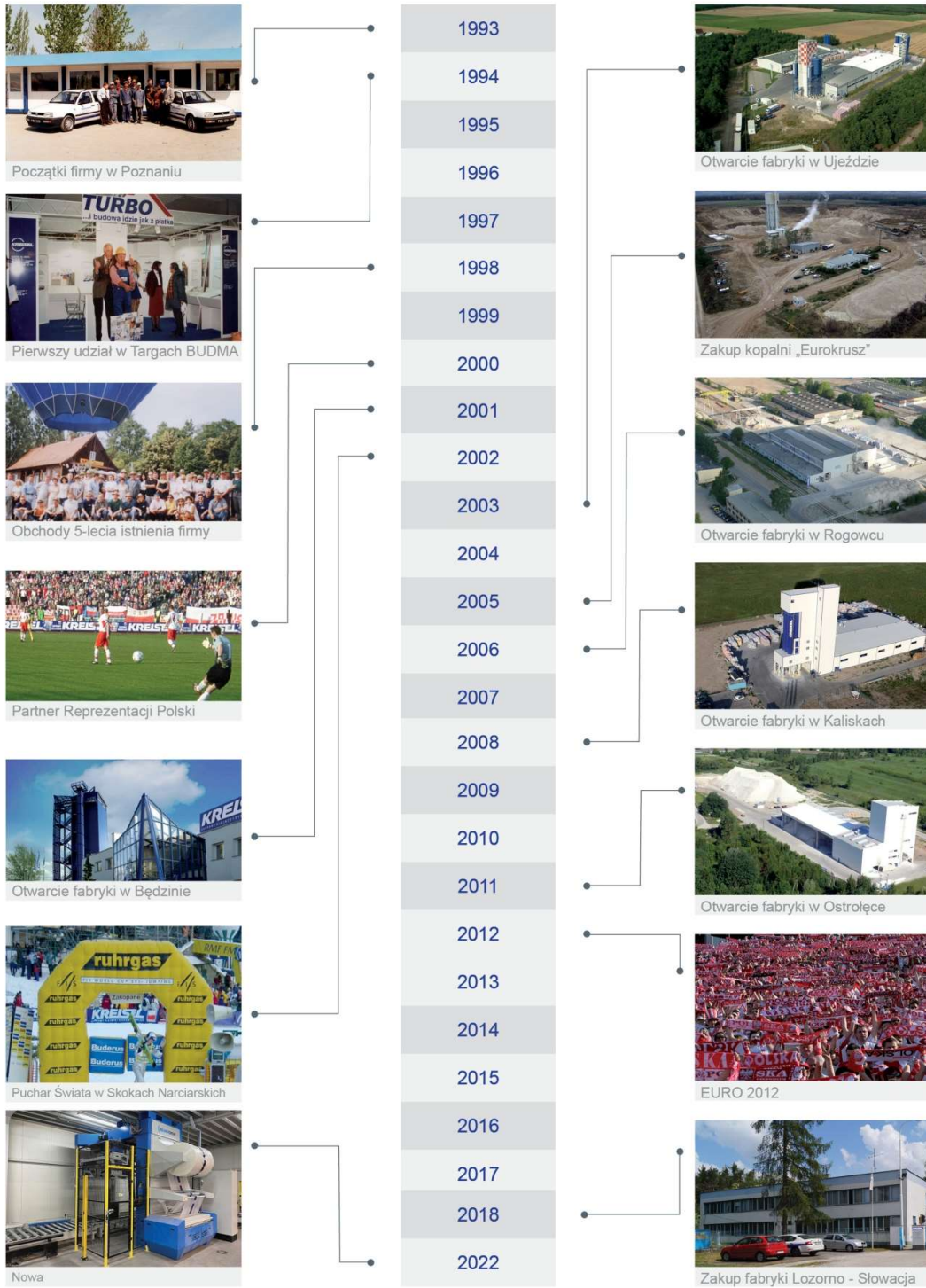
At the moment, we are focusing on strengthening our online image and increasing brand recognition. Our goal is to continuously invest in research and development to create innovative products and technological innovations that will provide healthy, safe and attractive living spaces.

Sustainable development is an integral part of our activities. Our decisions have a real impact on the environment, which is why we implement conscious actions to reduce CO2 emissions, increase energy efficiency and support the local community.

Michael Kraus
Ceo

Mateusz Siekierczak
Member of the Management Board,
Chief Financial Officer

Historical overview



Wall insulation system by Kreisel – Technika Budowlana Sp. z o.o. is a TURBO system, based on polystyrene as thermal insulation. It consists of: LEPSTYR 210 polystyrene adhesive mortar, dowels, STYRLEP 220 mesh embedding mortar, 145g fiberglass mesh, TYNKOLIT plaster primer and plaster mass: mineral (POZTYNK-SZ 061, 062), acrylic (AKRYTYNK 010), silicate (SILIKATYNK 020), silicate-silicone (SISITYNK 040) and BIOTYNK 042. We draw contractors' attention to flexible mortars such as LEPSTYR 210 FLEXIBLE or STYRLEP 220 FLEXIBLE, which have improved technical and functional properties. In winter, it is worth using winter products that allow you to safely carry out work in low temperatures. These systems are characterized by high resistance to impact, biological corrosion, low water absorption, hydrophobicity in their class. Plaster coatings are available in several hundred colours, in two types of textures: "scratched" and "lamb structures", and several types of grain size: 1.0; 1.5; 2.0; 3.0 mm. includes products manufactured at the Kreisel – Technika Budowlana Sp. z o.o. plant in Ujazd, such as plaster compounds, plaster primers, paints, mortars for gluing polystyrene and mortars for embedding mesh. In addition, the Kreisel – Technika Budowlana Sp. z o.o. plants in Poznań, Będzin and Lubień Kujawski produce mortars for gluing polystyrene and mortar for embedding mesh. Other materials such as insulating materials, fibreglass meshes and dowels are produced by other manufacturers.

Illustrative diagram of the thermal insulation system – Kreisel Technika Budowlana Sp. z o.o. Figure 1 is shown:

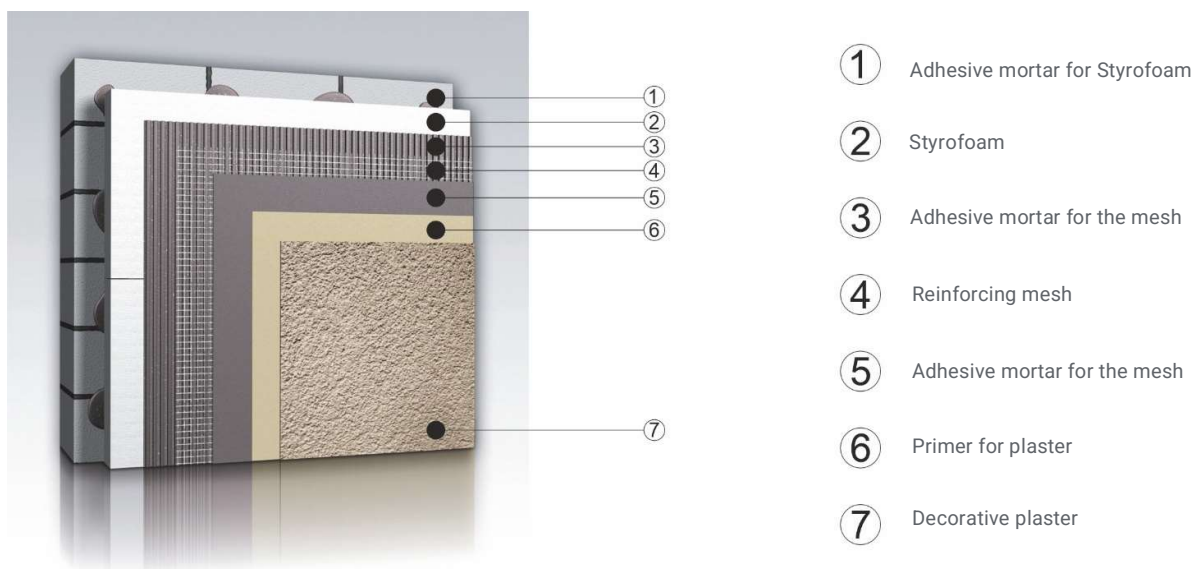









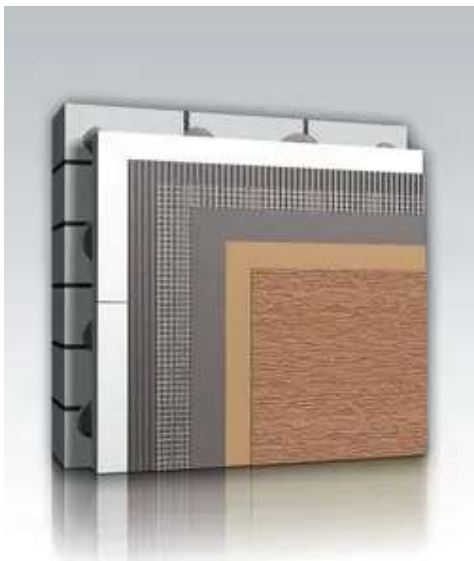
Figure 1. Overview diagram of the thermal insulation system – Kreisel Technika Budowlana Sp. z o.o.

The composition of sets of thermal insulation systems manufactured by Kreisel – Technika Budowlana Sp. z o.o. is presented in Table 1:

Table 1. Components of thermal insulation systems Kreisel – Technika Budowlana Sp. z o.o.:

							
STYROPIAN	●	●	●	●	●	●	●
LEPSTYR 210	●	●	●		●	●	●
LEPSTYR 210 ELASTYCZNY	●	●	●		●	●	●
LEPSTYR-Z 211				●			
LEPSTYR-W 230							
STYRLEP 220	●	●	●		●	●	●
STYRLEP 220 EXTRA	●	●	●		●	●	●
STYRLEP 220 ELASTYCZNY	●	●	●		●	●	●
STYRLEP-Z 221				●			
STYRLEP-B 225	●	●	●		●	●	●
STYRLEP-W 240							
KLEJ DO STYROPIANU 250	●	●	●		●	●	●
STYRLEP RTU 251							
TYNKOLIT-T 330	●	●					
TYNKOLIT-U 340	●	●	●		●	●	●
POZTYNK-SZ 061 /062	●						
AKRYTYNK 010		●					
SILIKATYNK 020			●				
NANOTYNK 031						●	
TYNK SILIKONOWY 031						●	
SISITYNK 040					●		
BIOTYNK 042							●

KREISEL TURBO thermal insulation system



Properties:

waterproof, frost resistant, traditional, economical, resistant to fouling, eliminates thermal bridges.

Use:

For the execution of thermal insulation systems in residential, public and industrial buildings. For new and modernized buildings.

Composition:

- LEPSTYR 210/ LEPSTYR 210 ELASTIC/ STYRLEP 220/ STYRLEP EXTRA 220 GEL/ STYRLEP 220 ELASTIC/ STYRLEP-B 225
- Polystyrene, mechanical fasteners, reinforcing mesh
- STYRLEP 220 / STYRLEP EXTRA 220 GEL / STYRLEP 220 ELASTIC/ STYRLEP-B 225
- TYNCOLIT-T 330/TYNCOLIT-U 340
- POZTYNK-SZ 061/062, SILICATE PAINT 002, SILICONE 003, SISI 004, NANOTECH 006, BIOPAINT 008, ECO PAINT 009

Specifications:	
Thickness	50-300mm
Thermal conductivity coefficient λ	0.2 m2K/W
Reaction to Fire, Class	B-s1, d0
Adhesion (Concrete)	≥ 0.25 MPa
Adhesion (polystyrene)	≥ 0.08 MPa
Compressive strength	> 3 J
Water absorption	< 0.5kg/m2

KREISEL TURBO S thermal insulation system



Properties:

waterproof, frost resistant, traditional, economical, high mechanical strength, flexible coating, rich colors, eliminates thermal bridges.

Use:

For the execution of thermal insulation systems in residential, public and industrial buildings. For new and modernized buildings.

Composition:

- LEPSTYR 210/ LEPSTYR 210 ELASTIC/ STYRLEP 220/ STYRLEP EXTRA 220 GEL/ STYRLEP 220 ELASTIC/ STYRLEP-B 225
- Polystyrene, mechanical fasteners, reinforcing mesh
- STYRLEP 220 / STYRLEP EXTRA 220 GEL / STYRLEP 220 ELASTIC/ STYRLEP-B 225
- TYNCOLIT-T 330
- ACRITYN 010

Specifications:	
Thickness	50-300mm
Reaction to Fire, Class	B-s1, d0
Adhesion (Concrete)	≥0.25 MPa
Adhesion (polystyrene)	≥0.08 MPa
Water absorption	< 0.5kg/m ²

KREISEL TURBO SA thermal insulation system



Properties:

waterproof, frost-resistant, hydrophobic, high mechanical strength, resistance to fouling, eliminates thermal bridges, vapour-permeable plaster.

Use:

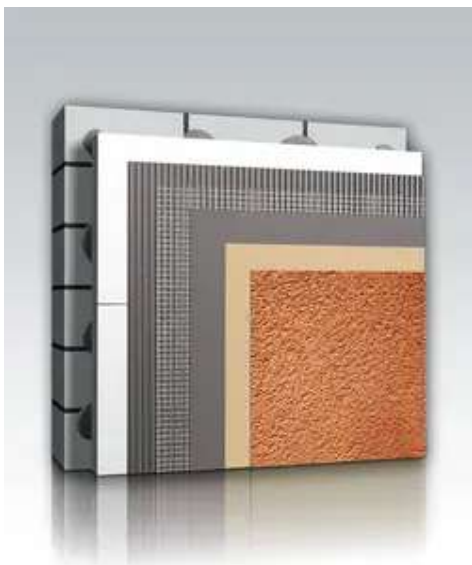
For the execution of thermal insulation systems in residential, public and industrial buildings. For new and modernized buildings.

Composition:

- LEPSTYR 210/ LEPSTYR 210 ELASTIC/ STYRLEP 220/ STYRLEP EXTRA 220 GEL/ STYRLEP 220 ELASTIC/ STYRLEP-B 225
- Polystyrene, mechanical fasteners, reinforcing mesh
- STYRLEP 220 / STYRLEP EXTRA 220 GEL / STYRLEP 220 ELASTIC/ STYRLEP-B 225
- TYNCOLIT-U 340
- SILICATENE 020

Specifications:	
Thickness	50-300mm
Reaction to Fire, Class	B-s1, d0
Adhesion (Concrete)	≥0.25 MPa
Adhesion (polystyrene)	≥0.08 MPa
Water absorption	< 0.5kg/m ²

KREISEL TURBO SISI thermal insulation system



Properties:

waterproof, frost resistant, flexible coating, high abrasion resistance, rich colors, resistance to fouling, eliminates thermal bridges, vapour-permeable plaster, resistant to UV rays.

Use:

For the execution of thermal insulation systems in residential, public and industrial buildings. For new and modernized buildings. It is particularly suitable for buildings in the vicinity of trees, parks, forests, water reservoirs, coastal areas, industrial and urban agglomerations.

Composition:

- LEPSTYR 210/ LEPSTYR 210 ELASTIC/ STYRLEP 220/ STYRLEP EXTRA 220 GEL/ STYRLEP 220 ELASTIC/ STYRLEP-B 225
- Polystyrene, mechanical fasteners, reinforcing mesh
- STYRLEP 220 / STYRLEP EXTRA 220 GEL / STYRLEP 220 ELASTIC/ STYRLEP-B 225

- TYNCOLIT-U 340
- SISITYNK 040

Specifications:	
Thickness	50-300mm
Reaction to Fire, Class	B-s1, d0
Adhesion (Concrete)	≥0.25 MPa
Adhesion (polystyrene)	≥0.08 MPa
Water absorption	< 0.5kg/m ²

KREISEL TURBO – SO PROTECT thermal insulation system



Properties:

waterproof, frost-resistant, flexible coating, high mechanical strength, rich colors, resistance to fouling, eliminates thermal bridges, vapour-permeable plaster, resistant to UV rays, self-cleaning.

Use:

For the execution of thermal insulation systems in residential, public and industrial buildings. For new and modernized buildings.

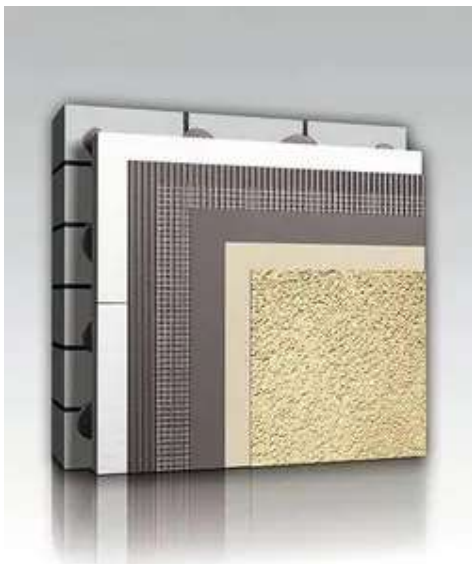
It is particularly suitable for buildings in the vicinity of trees, water reservoirs and industrial agglomerations. TURBO systems are also designed to perform thermal modernization of existing thermal insulation systems based on polystyrene, the so-called insulation on insulation.

Composition:

- LEPSTYR 210/ LEPSTYR 210 ELASTIC/ STYRLEP 220/ STYRLEP EXTRA 220 GEL/ STYRLEP 220 ELASTIC/ STYRLEP-B 225
- Polystyrene, mechanical fasteners, reinforcing mesh
- STYRLEP 220 / STYRLEP EXTRA 220 GEL / STYRLEP 220 ELASTIC/ STYRLEP-B 225
- TYNCOLIT-U 340
- SILIKON PROTECT 031

Specifications:	
Thickness	50-300mm
Reaction to Fire, Class	B-s1, d0
Adhesion (Concrete)	≥0.25 MPa
Adhesion (polystyrene)	≥0.08 MPa
Water absorption	< 0.5kg/m ²

KREISEL TURBO – MAX PROTECT thermal insulation system



Properties:

waterproof, frost-resistant, hydrophobic, high mechanical strength, resistance to fouling, eliminates thermal bridges, vapour-permeable plaster.

Use:

For the execution of thermal insulation systems in residential, public and industrial buildings. For new and modernized buildings.

It is particularly suitable for buildings in the vicinity of trees, water reservoirs and industrial agglomerations.

Composition:

- LEPSTYR 210/ LEPSTYR 210 ELASTIC/ STYRLEP 220/ STYRLEP EXTRA 220 GEL/ STYRLEP 220 ELASTIC/ STYRLEP-B 225
- Polystyrene, mechanical fasteners, reinforcing mesh
- STYRLEP 220 / STYRLEP EXTRA 220 GEL STYRLEP 220 ELASTIC/ STYRLEP-B 225
- TYNCOLIT-U 340
- MAX PROTECT 042 (BIOTYNK 042)

Specifications:	
Thickness	50-300mm
Reaction to Fire, Class	B-s1, d0
Adhesion (Concrete)	≥0.25 MPa
Adhesion (polystyrene)	≥0.08 MPa
Water absorption	< 0.5kg/m ²

Loose products – adhesives and plasters

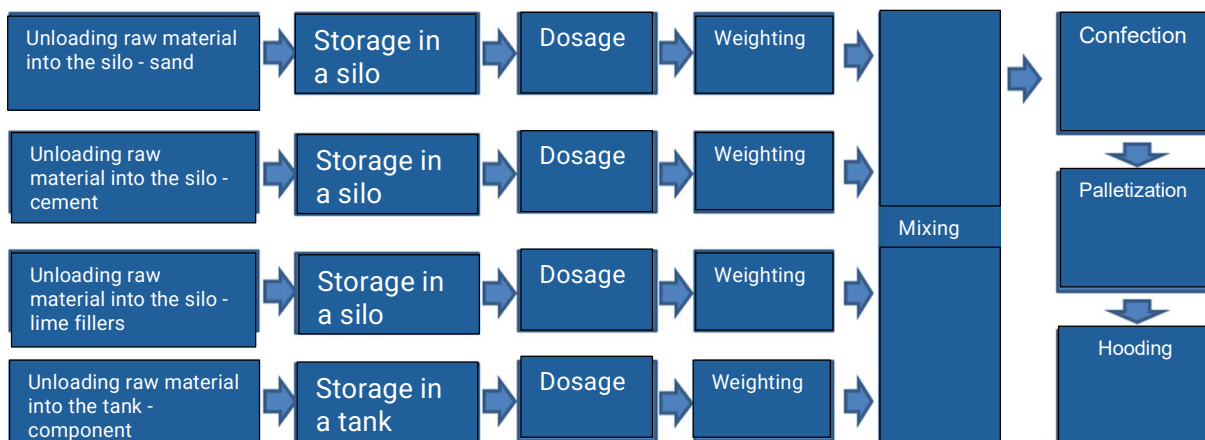
The following products are produced in the plants of Kreisel – Technika Budowlana Sp. z o.o. in Poznań, Będzin, Lubień Kujawski and Ujazd:

- adhesives for polystyrene LEPSTYR 210, LEPSTYR 210 EXTRA, LEPSTYR 210 FLEXIBLE,
- adhesives for embedding mesh STYRLEP 220, STYRLEP EXTRA 220, STYRLEP 220 FLEXIBLE, STYRLEP-B 225.

In addition, the Kreisel – Technika Budowlana Sp. z o.o. plant in Ujazd produces:

- decorative plaster POZTYNK-SZ 061, POZTYNK-SZ 062.

Detailed information on the products (Declaration of Performance, Safety Data Sheets and Technical Data Sheets) can be found on the manufacturer's website www.kreisel.pl



Approximate material compositions of individual groups of loose products are presented in Tables 2,3

The basic physical properties of loose products are presented in Table 5

Table 2 Mass composition of mortars

Adhesive for polystyrene	
Material:	Mass participation:
Portland Cement	34 - 42
Quartz sand	44 - 62
Carbonate filler	4,8 - 5,0
Hydrated lime	2,0 - 4,5
Rheology thickeners and modifiers	0,15 - 0,30
Chromium reducer	0,08 - 0,1
Aeration agents	0 - 0,1
Cellulose fibres	0 - 0,2
Polyacrylonitrile fibers	0 - 0,2
Redispersible polymer	0 - 1

Table 3 Bulk composition of decorative plaster

Decorative plaster	
Material:	Mass participation:
Water	7,8 - 12
Aqueous polymer dispersion	9,5 - 13
Titanium dioxide	0 - 2,2
Carbonate filler	24 - 58
Carbonate texture aggregate	35 - 50
Sodium hydroxide	0 - 0,005
Cellulose fibres	0,2 - 0,5
Polyacrylonitrile fibers	0 - 0,15
Rheology thickeners and modifiers	0,15 - 0,35
Preservative	0 - 0,1
Fungicide/algicide	0 - 0,25
Defoamer	0,1 - 0,2
Hydrophobic agents	3 - 12
Dispersants	0,1 - 0,2
Coalescers	0 - 0,2
Potassium water glass	0 - 2

Table 4 Physical properties of adhesive mortars and decorative plaster

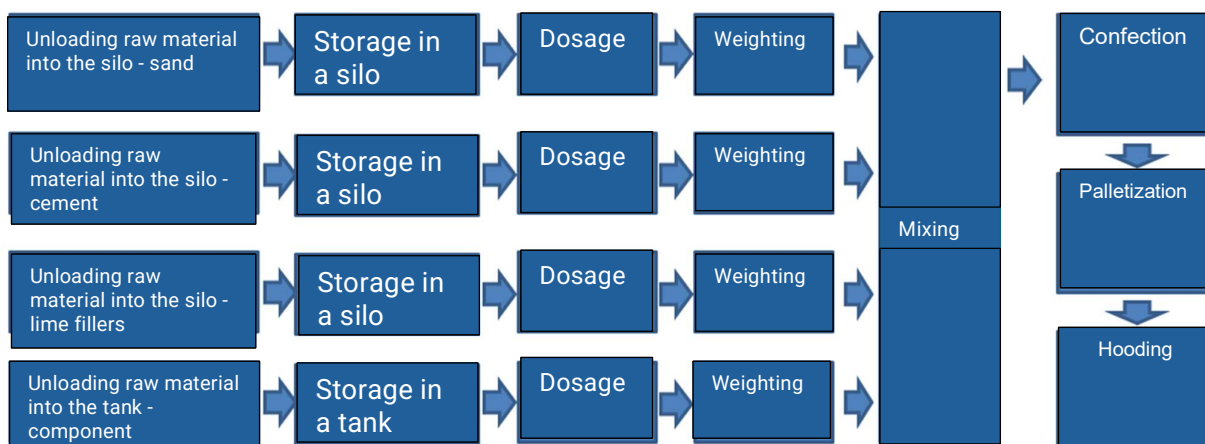
PRODUCT	DESTINY	PHYSICAL PROPERTIES				
		Bulk density [kg/m ³]	Bulk density [kg/m ³]	Ash content at 450°C [%]	Adhesion to concrete in the dry	Adhesion to EPS in dry condition
LEPSTYR 210 LEPSTYR 210 EXTRA LEPSTYR ELASTIC 210	Adhesive mortar for polystyrene	1260-1540	1575-1925	98,0-99,0	≥0.25	≥0.08
STYRLEP-B 225	Adhesive and reinforcing mortar for polystyrene	1080-1320	1485-1815	97,5-99,0	≥0.25	≥0.08
STYRLEP 220 STYRLEP 220 EXTRA FLEXIBLE STYRLEP 220	Adhesive and reinforcing mortar for polystyrene	1278-1562	1575-1925	96,8-97,4	≥0.25	≥0.08
POZTYNK-SZ 061 POZTYNK-SZ 062	Mineral decorative plaster with a scratched and lamb structure for finishing the thermal insulation system	1080-1320	1530-1870	98,0-99,2	-	-

Wet products – primers for plasters and decorative plasters

in the plant of Kreisel – Technika Budowlana Sp. z o.o. in Ujazd the following wet products are produced:

- plaster primers TYNKOLIT-T 330, TYNKOLIT-U 340,
- decorative plasters AKRYTYNK 010, BIOTYNK 042, ECOTYNK 022, NANOPLASTER 031, SILICATYNEK 020, SISITYNK 040, SILICOTYNEK 030.

Detailed information on the products (Declaration of Performance, Safety Data Sheets and Technical Data Sheets) can be found on the manufacturer's website www.kreisel.pl.



Approximate material compositions of individual groups of loose products are presented in Table 5,6.

The basic physical properties of wet products are shown in Table 7.

Table 5 Mass composition of plaster primer

Primer for plaster	
Material:	Mass participation:
Water	32- 34
Aqueous polymer dispersion	12 - 13
Titanium dioxide	0,5 - 0,7
Carbonate filler	37 - 39
Sodium hydroxide	0,01
Mineral Functional Fillers	0 - 2
Rheology thickeners and modifiers	0,3 - 0,5
Preservative	0,10
Defoamer	0,10
Hydrophobic agents	0,40
Dispersants	0,1 - 0,15
Quartz filler	13 - 14

Table 6 Mass composition of decorative plaster

Decorative plaster	
Material:	Mass participation:
Water	7,8 - 12
Aqueous polymer dispersion	9,5 - 13
Titanium dioxide	0 - 2,2
Carbonate filler	24 - 58
Carbonate texture aggregate	35 - 50
Sodium hydroxide	0 - 0,005
Cellulose fibres	0,2 - 0,5
Polyacrylonitrile fibers	0 - 0,15
Rheology thickeners and modifiers	0,15 - 0,35
Preservative	0 - 0,1
Fungicide/algicide	0 - 0,25
Defoamer	0,1 - 0,2
Hydrophobic agents	3 - 12
Dispersants	0,1 - 0,2
Coalescers	0 - 0,2
Potassium water glass	0 - 2

Table 7 Physical properties of primers and decorative plasters

PRODUCT	DESTINY	PHYSICAL PROPERTIES		
		Bulk density [kg/m ³]	Ash content at 450°C [%]	Dry matter at temp. 105°C/200°C [%]
TYNCOLIT-T 330	Primer for mineral and mosaic plasters	1350-1650	85,8-91,1	60,7-69,2
TYNCOLIT-U 340	Primer for thin-layer and mosaic plasters	1386-1694	85,8-91,1	57,7-66,8
ACRITYN 010	Acrylic decorative plaster for finishing the thermal insulation system	1710-2090	88,5-95,0	75,6-92,4
SILICATENE 020	Decorative silicate plaster for finishing the thermal insulation system	1800-2200	88,5-95,0	75,6-92,4
SILICOTINE 030	Silicone decorative plaster for finishing the thermal insulation system	1746-2134	88,5-95,0	75,6-92,4
SISITYNK 040	Silicate-silicone decorative plaster for finishing the thermal insulation system	1647-2013	88,5-95,0	75,6-92,4
NANOPLASTER SIILIKON Protect 031	Silicone decorative plaster for finishing the thermal insulation system	1710-2090	88,5-95,0	75,6-92,4
BIOTYNK MAX PROTECT 042	Polysilicone decorative plaster for finishing the thermal insulation system	1710-2090	88,5-95,0	75,6-92,4
ECO TYNK 022 ECO PROTECT	Ecological decorative plaster for finishing the thermal insulation system	1647-2013	88,5-95,0	75,6-92,4

Wet products – exterior paints

The Kreisel – Technika Budowlana Sp. z o.o. plant in Ujazd also produces:

- exterior paints – ACRYLIC PAINT 001, SILICATE PAINT 002, SILICONE PAINT 003, NANOTECH PAINT 006, BIBIOPAINT 008, SISI PAINT 004, ECO PAINT 009.

Detailed information on the products (Declaration of Performance, Safety Data Sheets and Technical Data Sheets) can be found on the manufacturer's website www.kreisel.pl

Approximate material compositions of individual groups of loose products are presented in Table 8.

The basic physical properties of exterior paints are shown in Table 9.

Table 8 Mass composition of exterior paints

Exterior paint	
Material:	Mass participation:
Water	20 - 32
Aqueous polymer dispersion	14 - 22
Titanium dioxide	0 - 95
Carbonate filler	28 - 49
Sodium hydroxide	0 - 0,02
Mineral Functional Fillers	1 - 15
Rheology thickeners and modifiers	0,25 - 0,52
Preservative	0- 0,1
Fungicide/algicide	0 - 0,7
Defoamer	0,1 - 0,3
Hydrophobic agents	0,3 - 3,0
Dispersants	0,1 - 0,3
Coalescers	0- 1,6
Potassium water glass	0 - 9,0

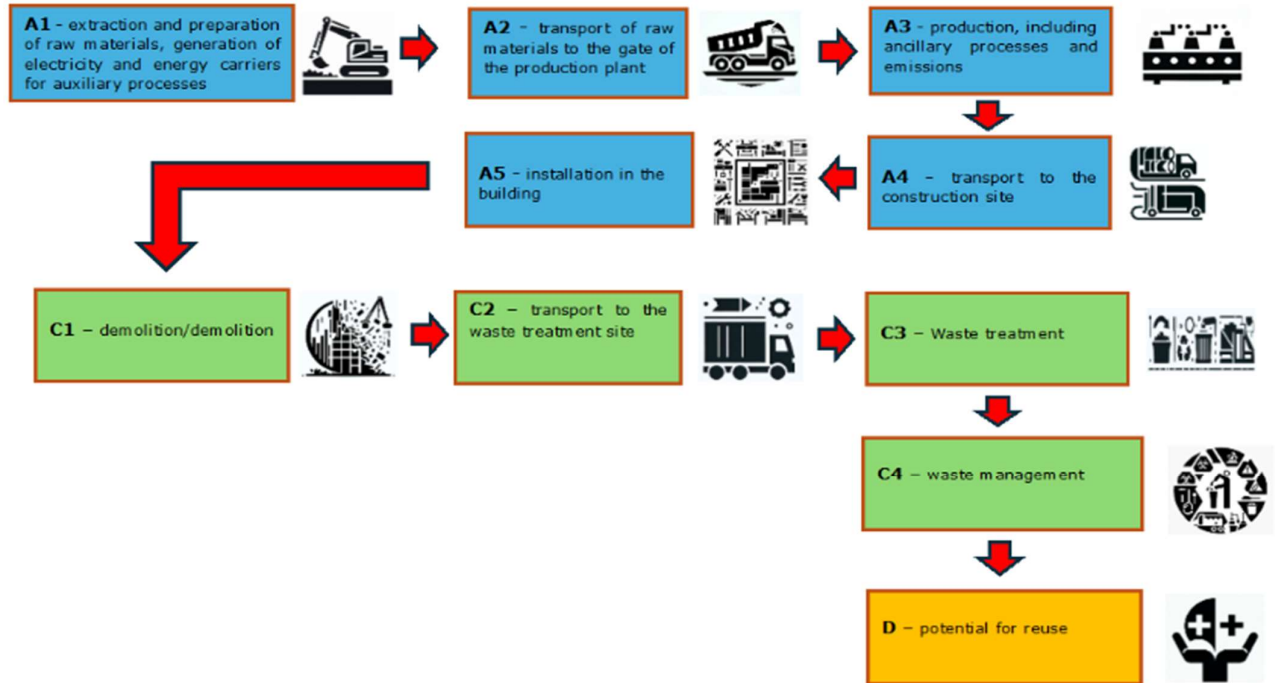
Table 9 Physical Properties of Exterior Paints

PRODUCT	DESTINY	PHYSICAL PROPERTIES		
		Bulk density [kg/m ³]	Ash content at 450°C [%]	Dry matter at 105°C/200°C [%]
ACRYLIC PAINT 001	Façade paint for traditional substrates	1260-1540	80,0-87,0	49,5-60,5
SILICATE PAINT 002	Façade silicate paint for mineral substrates	1350-1650	80,0-87,0	48,6-59,4
SILICONE PAINT 003	Silicone façade paint for mineral substrates	1350-1650	80,0-87,0	54,0-66,0
NANOTECH 006 PAINT	Nanosilicone façade paint for mineral substrates	1350-1650	80,0-87,0	55,8-68,2
BIOPAINT 009	Polysilicone façade paint for mineral substrates	1350-1650	80,0-87,0	55,8-68,2
SISI PAINT 004	Silicate-silicone façade paint for mineral substrates	1350-1650	80,0-87,0	49,5-60,5
ECO PAINT 009	Eco-friendly façade paint with silver ions for mineral substrates	1350-1650	80,0-87,0	49,5-60,5
ACRYLIC PAINT 001	Façade paint for traditional substrates	1260-1540	80,0-87,0	49,5-60,5
SILICATE PAINT 002	Façade silicate paint for mineral substrates	1350-1650	80,0-87,0	48,6-59,4

2. LCA: SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

System Limitations

The life cycle analysis of the tested products includes modules A1-A3, A4, A5, C1-C4 and D (Cradle to Gate with options) in accordance with PN-EN 15804.



Duration of data collection

The data on the production process is from 2022 (period from 01.01.22 to 31.12.22).

Declared Unit

1 m² thermal insulation system

Assumptions

A1 – extraction and consumption of raw materials refers to specific mass shares in the production process, attributable to the declared unit of the product,

A2 – distances from the place of obtaining raw materials to the production plant individual for each raw material, means of transport differentiated due to the method of delivery of raw materials,

A3 – CO₂, NO_x, SO₂ and dust emission values from the production process obtained as a result of measurements carried out on the premises of the plant, the rest estimated on the basis of fuel consumption.

A4 – transport of materials (components of thermal insulation systems) to the construction site is carried out according to the developed scenario.

It assumes the method of transport and the distance over which the materials are transported.

A5 – installation of thermal insulation systems is carried out according to the developed scenario. It determines the consumption of energy and materials, as well as the amount of waste generated by the assembly process.

C1 – dismantling/demolition of the material. The data is collected based on the developed scenario. At the demolition site, the waste is pre-sorted. Dismantling of thermal insulation systems does not require energy and material expenditures, it is possible to demolish them manually or with the use of power tools. The impact of these operations is so small that the environmental impact resulting from module C1 is negligible.

C2 – pre-sorted waste from the demolition of thermal insulation systems is transported to the waste treatment plant according to the scenario. Module C2 also takes into account the transport of waste resulting from the activities resulting from module A5.

C3 – takes into account the environmental impact of the treatment of construction and demolition waste. It is assumed that all waste generated as a result of activities in modules A5 and C1 goes to a waste treatment plant. The calculations are made based on the developed scenario.

C4 – describes the processes of neutralization of waste generated as a result of the installation and demolition of thermal insulation systems. The calculations are made on the basis of the developed scenario.

D – refers to the impact and effects of the use of secondary material. Thermal utilization of packaging materials for part of polystyrene waste is assumed. It is also assumed that the insulation material (polystyrene) will be partially recovered from the waste fraction. The calculations are made based on the developed scenario.

Cut-off criteria

99% of all bulk streams involved in the production process were taken into account. All the energy used in the process was taken into account in the environmental declaration.

General data

The data for the calculations come from Ecoinvent v. 3.9.2 and KOBiZE. The emission factors for electricity were determined using the actual KOBiZE data. The applied emission factor of Polish electricity (Ecoinvent supplemented with current national data KOBiZE) is 0.685 kg CO₂/kWh. A detailed analysis of data quality was part of an external audit.

Allocation

All data on components manufactured in 4 plants of Kreisel – Technika Budowlana Sp. z o.o. in Poznań, Będzin, Lubień Kujawski and Ujazd were provided by the manufacturer and were referred to the declared unit (DU) of the product – **1 m²** of the thermal insulation system. Data on the production of components from outside the Kreisel – Technika Budowlana Sp. z o.o. plant were taken from the EcoInvent database. In this case, the allocation was made on the basis of the consumption of external components per declared unit, which was provided by the manufacturer of the thermal insulation systems. The allocation rules used in this EPD are based on the general principles of ICIMB-PCR A.

4. LCA: SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

For the life cycle analysis of the products covered by the environmental declaration in the field of "Cradle to gate with options", scenarios were developed for modules A4, A5 and C1-C4 and D:

Module A4: - *Transport to the construction site* – Transport is carried out with the use of trucks with a load capacity of 16-32 tonnes that meet the EURO 6 emission standards. The average distance from the plant to the customer is 250 km.

Module A5 – *Installation in the building* - It was assumed that power tools would be used to prepare components for assembly. The electricity consumption for this process is taken into account. Packaging waste from components included in thermal insulation systems has been taken into account, and the whole is directed to the waste treatment plant (Module C3).

Module C1 – *Demolition/Demolition* – Manual dismantling of thermal insulation systems and initial sorting on site were adopted. The consumption of energy and other raw materials in this module has been omitted due to negligible values. The separated fractions of construction debris and insulating material (EPS) are sent to the waste treatment plant.

Module C2 – *Transport* – Waste is sent to a waste treatment plant. From there, after separating the recyclable fraction, the fraction for thermal transformation and the fraction for landfill, the appropriate quantities are directed to further processes.

The transport is carried out by trucks with a load capacity of 7.5-16 tons, meeting the EURO 6 emission standards. The material is transported to a waste management plant at a distance of 100 km from the demolition site. Transport to the landfill takes place at a distance of 100 km from the waste treatment plant. Transport to the waste incineration plant takes place at a distance of 100 km from the waste treatment plant.

Module C3 *Waste treatment, e.g. collection of waste fractions from demolition and processing of material streams for reuse, recycling and energy recovery* - All assembly and demolition waste (A5 and C1) goes to the waste treatment plant. Per 1 kg of waste, electricity consumption is 0.03 kWh/kg, and energy for internal transport vehicles is 0.3 MJ/kg.

Module C4 - Storage of part of the waste separated in the processing process (module C3) and thermal utilization of part of the waste fraction were adopted. As a result of thermal utilization, energy is released, which is partially recovered as heat and electricity. It was assumed that the average calorific value of polystyrene is 37 MJ/kg. The efficiency of heat recovery from waste incineration is 32.0%, while the efficiency of electricity production is 11.2%. The benefits of incineration of waste are included in Module D as exported energy.

Module D – Potential for material reuse, the benefits resulting from the thermal treatment of waste and the recovery of part of the raw materials for the production of polystyrene panels from EPS waste have been taken into account here.

Safety and environmental protection

The conditions for the safe application and use of thermal insulation systems are presented in the safety data sheets available on the manufacturer's website for each product separately.

5. LCA: RESULTS

The table below shows the LCA modules taken into account in the calculation of the environmental impact categories for the products covered by the declaration.

DESCRIPTION OF SYSTEM BOUNDARIES (X – INCLUDED IN LCA, MND – UNDECLARED MODULE)																
Production Stage			Construction phase		Stage of use							End of Life Stage				Benefits and flows beyond system boundaries
Mining & Sourcing in raw materials	Transport	Production	Transport	Construction Process	Usufruct	Maintenance	Repair	Exchange	Renovation	Energy consumption	Water consumption	Demolition	Transport	Waste Treatment	Waste management	Potential for reuse
A1-A3			A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X			X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

The following tables present the results of the LCA analysis for the thermal insulation system.

Explanations of the abbreviations used to describe the impact categories are given below:

- GWP-total** Total Global Warming Potential
- GWP-fossil** Greenhouse Potential: Fossil Fuels
- GWP-biogenic** Global Warming Potential: Biogenic
- GWP-luluc** Global Warming Potential: Land Use and Conversion
- A:** Stratospheric ozone depletion potential
- AP** Acidification potential
- EP-freshwater** Eutrophication potential of freshwater environments
- EP-marine** Eutrophication potential of saltwater environments
- EP-terrestrial** Potential for eutrophication of terrestrial environments
- POCP** Tropospheric ozone formation potential
- ADP-minerals&metals** Potential for abiotic depletion of non-fossil fuels
- ADP-fossil** Potential for abiotic depletion of fossil fuel feedstocks
- WDP** Water deprivation potential (user),
- PM** Potential incidence of diseases caused by particulate emissions
- IRP** Ionising radiation (potential human exposure efficacy to U235)
- ETP-fw** Potential Comparison Unit of Ecosystem Toxicity
- HTP-c** Potential comparative unit toxic to humans, neoplastic diseases
- HTP-nc** Potential comparative human toxic unit, non-cancer diseases
- SQP** Indicator of potential soil quality
- PERE** Consumption of renewable energy resources, excluding renewable energy resources used as raw material

PERMIAN	Consumption of renewable energy resources used as raw material
PERT	Total consumption of renewable, primary energy resources
PEN-RE	Consumption of non-renewable primary energy resources, excluding non-renewable primary energy resources used as feedstock
RE	Consumption of non-renewable energy resources used as raw material
PENRT	Total consumption of non-renewable, primary energy resources
SM	Consumption of secondary materials
RSF	Consumption of renewable alternative fuels
NRSF	Consumption of non-renewable alternative fuels
FW	Fresh water consumption

MAIN IMPACT INDICATORS: 1 m ² Kreisel TURBO thermal insulation system 150mm									
Indicator	Unit	Life Cycle Stage							
		A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1,76E+01	2,66E+00	1,69E+00	0,00E+00	1,34E+00	1,53E-01	5,32E-02	-1,80E+00
GWP-fossil	kg CO2 eq.	1,78E+01	2,66E+00	1,61E+00	0,00E+00	1,34E+00	1,50E-01	5,31E-02	-1,78E+00
GWP-biogenic	kg CO2 eq.	-3,18E-01	2,49E-03	7,53E-02	0,00E+00	1,08E-03	2,99E-03	1,48E-04	-1,96E-02
GWP-luluc	kg CO2 eq.	6,36E-02	1,29E-03	1,53E-03	0,00E+00	6,06E-04	7,00E-05	7,02E-06	-5,74E-04
A:	kg CFC11 eq.	3,32E-06	5,64E-08	2,34E-09	0,00E+00	2,86E-08	1,43E-09	8,30E-10	-3,15E-08
AP	mol H+ eq.	1,12E-01	5,66E-03	7,26E-03	0,00E+00	2,70E-03	1,07E-03	4,72E-04	-1,01E-02
EP-freshwater	kg PO4 eq.	3,30E-03	1,84E-04	2,05E-03	0,00E+00	9,06E-05	8,35E-05	1,61E-06	-1,03E-03
EP-marine	kg N eq.	4,83E-02	1,43E-03	1,29E-03	0,00E+00	6,72E-04	4,13E-04	2,18E-04	-1,01E-03
EP-terrestrial	mol N eq.	3,20E-01	1,45E-02	9,94E-03	0,00E+00	6,80E-03	4,33E-03	2,37E-03	-9,16E-03
POCP	kg NMVOC eq.	1,47E-01	8,78E-03	2,79E-03	0,00E+00	4,23E-03	1,28E-03	7,04E-04	-8,13E-03
ADP-minerals & metals	kg Sb eq.	6,70E-05	8,46E-06	1,51E-06	0,00E+00	4,19E-06	8,90E-08	2,07E-08	-6,17E-07
ADP-fossil	MJ	2,91E+02	3,68E+01	1,67E+01	0,00E+00	1,85E+01	1,76E+00	6,79E-01	-1,45E+01
WDP	WDP (m3) world. EKW	8,49E+00	1,54E-01	7,72E-02	0,00E+00	7,10E-02	5,48E-03	1,50E-03	-5,65E-02
ADDITIONAL IMPACT INDICATORS: 1 m ² Kreisel TURBO thermal insulation system 150 mm									
Indicator	Unit	Life Cycle Stage							
		A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	7,72E-07	1,93E-07	1,37E-08	0,00E+00	8,20E-08	2,23E-08	1,34E-08	-9,41E-08
IRP	kBq U235 eq.	6,50E-01	4,98E-02	1,40E-02	0,00E+00	2,99E-02	1,08E-03	4,03E-04	-8,12E-03
ETP-fw	CTUe	3,30E-03	1,84E-04	2,05E-03	0,00E+00	9,06E-05	8,35E-05	1,61E-06	-1,03E-03
http-c	CTUh	2,19E-09	6,19E-10	5,70E-11	0,00E+00	2,73E-10	1,65E-11	8,73E-12	-7,87E-09
http-nc	CTUh	5,32E-08	9,52E-09	1,48E-09	0,00E+00	4,44E-09	4,78E-10	2,66E-10	-5,86E-08
SQP	-	8,07E+01	2,22E+01	2,89E+00	0,00E+00	9,47E+00	1,88E-01	8,40E-01	-3,03E+00
INDICATORS DESCRIBING THE CONSUMPTION OF RESOURCES: 1 m ² Kreisel TURBO thermal insulation system 150mm									

Indicator	Unit	Life Cycle Stage							
		A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2.14E+01	5.79E-01	1,54E+00	0,00E+00	3.23E-01	6.69E-02	2.00E-02	-6.17E-01
PERMIAN	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
PERT	MJ	2.14E+01	5.79E-01	1,54E+00	0,00E+00	3.23E-01	6.69E-02	2.00E-02	-6.17E-01
PEN-RE	MJ	2,97E+02	3,84E+01	2,25E+01	0,00E+00	1.91E+01	2,05E+00	7.11E-01	-1.99E+01
RE	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
PENRT	MJ	2,97E+02	3,84E+01	2,25E+01	0,00E+00	1.91E+01	2,05E+00	7.11E-01	-1.99E+01
SM	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	8.42E-02	5.83E-03	3.29E-02	0,00E+00	4.06E-03	1.34E-03	2.38E-05	-1.06E-02

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 m² Kreisel TURBO thermal insulation system 150mm

Indicator	Unit (referenced to DU)	Life Cycle Stage							
		A1-A3	A4	A5	C1	C2	C3	C4	D
Amount of hazardous waste	Kg	2.42E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of non-hazardous waste	Kg	3.04E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of radioactive waste	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
Reusable components	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
Recyclable Materials	Kg	5.41E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	2.53E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ/energy carrier	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.71E+00

BIOGENIC CARBON

Biogenic carbon content of the product (kg C_{org})	1.67E-02
Biogenic carbon content in the package (kg C_{org})	5.80E-01

MAIN IMPACT INDICATORS: 1 m ² Kreisel TURBO S thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1,85E+01	2,66E+00	1,69E+00	0,00E+00	1,34E+00	1,53E-01	5,49E-02	-1,80E+00
GWP-fossil	kg CO2 eq.	1,88E+01	2,66E+00	1,61E+00	0,00E+00	1,34E+00	1,50E-01	5,48E-02	-1,78E+00
GWP-biogenic	kg CO2 eq.	-3,46E-01	2,49E-03	7,53E-02	0,00E+00	1,08E-03	2,99E-03	1,53E-04	-1,96E-02
GWP-luluc	kg CO2 eq.	4,66E-02	1,29E-03	1,53E-03	0,00E+00	6,06E-04	7,00E-05	7,24E-06	-5,74E-04
A:	kg CFC11 eq.	9,84E-06	5,64E-08	2,34E-09	0,00E+00	2,86E-08	1,43E-09	8,56E-10	-3,15E-08
AP	mol H+ eq.	1,30E-01	5,66E-03	7,26E-03	0,00E+00	2,70E-03	1,07E-03	4,86E-04	-1,01E-02
EP-freshwater	kg PO4 eq.	3,80E-03	1,84E-04	2,05E-03	0,00E+00	9,06E-05	8,35E-05	1,66E-06	-1,03E-03
EP-marine	kg N eq.	5,03E-02	1,43E-03	1,29E-03	0,00E+00	6,72E-04	4,13E-04	2,25E-04	-1,01E-03
EP-terrestrial	mol N eq.	3,37E-01	1,45E-02	9,94E-03	0,00E+00	6,80E-03	4,33E-03	2,44E-03	-9,16E-03
POCP	kg NMVOC eq.	1,54E-01	8,78E-03	2,79E-03	0,00E+00	4,23E-03	1,28E-03	7,26E-04	-8,12E-03
ADP-minerals & metals	kg Sb eq.	8,10E-05	8,46E-06	1,51E-06	0,00E+00	4,19E-06	8,90E-08	2,14E-08	-6,17E-07
ADP-fossil	MJ	3,14E+02	3,68E+01	1,67E+01	0,00E+00	1,85E+01	1,76E+00	7,00E-01	-1,45E+01
WDP	WDP (m3) world. EKW	1,04E+01	1,54E-01	7,72E-02	0,00E+00	7,10E-02	5,48E-03	1,55E-03	-5,65E-02
ADDITIONAL IMPACT INDICATORS: 1 m ² Kreisel TURBO S thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	8,68E-07	1,93E-07	1,37E-08	0,00E+00	8,20E-08	2,23E-08	1,38E-08	-9,41E-08
IRP	kBq U235 eq.	9,47E-01	4,98E-02	1,40E-02	0,00E+00	2,99E-02	1,08E-03	4,16E-04	-8,12E-03
ETP-fw	CTUe	3,80E-03	1,84E-04	2,05E-03	0,00E+00	9,06E-05	8,35E-05	1,66E-06	-1,03E-03
http-c	CTUh	2,60E-09	6,19E-10	5,70E-11	0,00E+00	2,73E-10	1,65E-11	9,01E-12	-7,87E-09
http-nc	CTUh	7,03E-08	9,52E-09	1,48E-09	0,00E+00	4,44E-09	4,78E-10	2,75E-10	-5,86E-08
SQP	-	9,27E+01	2,22E+01	2,89E+00	0,00E+00	9,47E+00	1,88E-01	8,66E-01	-3,03E+00
INDICATORS DESCRIBING RESOURCE CONSUMPTION: 1 m ² Kreisel TURBO S thermal insulation system 150 mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2,45E+01	5,79E-01	1,54E+00	0,00E+00	3,23E-01	6,69E-02	2,06E-02	-6,17E-01
PERMIAN	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
PERT	MJ	2,45E+01	5,79E-01	1,54E+00	0,00E+00	3,23E-01	6,69E-02	2,06E-02	-6,17E-01
PEN-RE	MJ	3,19E+02	3,84E+01	2,25E+01	0,00E+00	1,91E+01	2,05E+00	7,33E-01	-1,99E+01
RE	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
PENRT	MJ	3,19E+02	3,84E+01	2,25E+01	0,00E+00	1,91E+01	2,05E+00	7,33E-01	-1,99E+01
SM	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	m3	1,35E-01	5,83E-03	3,29E-02	0,00E+00	4,06E-03	1,34E-03	2,45E-05	-1,06E-02
INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 m ² Kreisel TURBO S thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit (referenced to DU)	A1-A3	A4	A5	C1	C2	C3	C4	D
Amount of hazardous waste	Kg	2,42E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of non-hazardous waste	Kg	3,07E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of radioactive waste	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
Reusable components	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
Recyclable Materials	Kg	5,41E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	2,53E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ/energy carrier	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,71E+00

BIOGENIC CARBON

Biogenic carbon content of the product (kg C_{org})	2.05E-02
Biogenic carbon content in the package (kg C_{org})	5.80E-01

MAIN IMPACT INDICATORS: 1 m² Kreisel TURBO SA thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1.84E+01	2,66E+00	1.69E+00	0,00E+00	1,34E+00	1.53E-01	5.42E-02	-1.80E+00
GWP-fossil	kg CO2 eq.	1,86E+01	2,66E+00	1.61E+00	0,00E+00	1,34E+00	1.50E-01	5.40E-02	-1.78E+00
GWP-biogenic	kg CO2 eq.	-3.38E-01	2.49E-03	7.53E-02	0,00E+00	1.08E-03	2.99E-03	1.51E-04	-1.96E-02
GWP-luluc	kg CO2 eq.	4.57E-02	1.29E-03	1.53E-03	0,00E+00	6.06E-04	7.00E-05	7.14E-06	-5.74E-04
A:	kg CFC11 eq.	1.95E-05	5.64E-08	2.34E-09	0,00E+00	2.86E-08	1.43E-09	8.45E-10	-3.15E-08
AP	mol H+ eq.	1.28E-01	5.66E-03	7.26E-03	0,00E+00	2.70E-03	1.07E-03	4.80E-04	-1.01E-02
EP-freshwater	kg PO4 eq.	3.47E-03	1.84E-04	2.05E-03	0,00E+00	9.06E-05	8.35E-05	1.64E-06	-1.03E-03
EP-marine	kg N eq.	4.97E-02	1.43E-03	1.29E-03	0,00E+00	6.72E-04	4.13E-04	2.22E-04	-1.01E-03
EP-terrestrial	mol N eq.	3.34E-01	1.45E-02	9.94E-03	0,00E+00	6.80E-03	4.33E-03	2.41E-03	-9.16E-03
POCP	kg NMVOC eq.	1.53E-01	8.78E-03	2.79E-03	0,00E+00	4.23E-03	1.28E-03	7.17E-04	-8.12E-03
ADP-minerals & metals	kg Sb eq.	7.51E-05	8.46E-06	1.51E-06	0,00E+00	4.19E-06	8.90E-08	2.11E-08	-6.17E-07
ADP-fossil	MJ	3.16E+02	3,68E+01	1,67E+01	0,00E+00	1,85E+01	1.76E+00	6.91E-01	-1.45E+01
WDP	WDP (m3) world. Ekw	9,59E+00	1.54E-01	7.72E-02	0,00E+00	7.10E-02	5.48E-03	1.53E-03	-5.65E-02
ADDITIONAL IMPACT INDICATORS: 1 m² Kreisel TURBO SA thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	8.68E-07	1.93E-07	1.37E-08	0,00E+00	8.20E-08	2.23E-08	1.36E-08	-9.41E-08
IRP	kBq U235 eq.	7.45E-01	4.98E-02	1.40E-02	0,00E+00	2.99E-02	1.08E-03	4.10E-04	-8.12E-03
ETP-fw	CTUe	3.47E-03	1.84E-04	2.05E-03	0,00E+00	9.06E-05	8.35E-05	1.64E-06	-1.03E-03
http-c	CTUh	3.10E-09	6.19E-10	5.70E-11	0,00E+00	2.73E-10	1.65E-11	8.89E-12	-7.87E-09
http-nc	CTUh	6.00E-08	9.52E-09	1.48E-09	0,00E+00	4.44E-09	4.78E-10	2.71E-10	-5.86E-08
SQP	-	8,85E+01	2,22E+01	2,89E+00	0,00E+00	9,47E+00	1,88E-01	8,55E-01	-3,03E+00
INDICATORS DESCRIBING THE CONSUMPTION OF RESOURCES: 1 m² Kreisel TURBO SA thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2,28E+01	5,79E-01	1,54E+00	0,00E+00	3,23E-01	6,69E-02	2,03E-02	-6,17E-01
PERMIAN	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
PERT	MJ	2,28E+01	5,79E-01	1,54E+00	0,00E+00	3,23E-01	6,69E-02	2,03E-02	-6,17E-01
PEN-RE	MJ	3,23E+02	3,84E+01	2,25E+01	0,00E+00	1,91E+01	2,05E+00	7,24E-01	-1,99E+01
RE	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
PENRT	MJ	3,23E+02	3,84E+01	2,25E+01	0,00E+00	1,91E+01	2,05E+00	7,24E-01	-1,99E+01
SM	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	m3	9,93E-02	5,83E-03	3,29E-02	0,00E+00	4,06E-03	1,34E-03	2,42E-05	-1,06E-02

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 m ² Kreisel TURBO SA thermal insulation system 150mm									
Indicator	Unit (referenced to DU)	Life Cycle Stage							
		A1-A3	A4	A5	C1	C2	C3	C4	D
Amount of hazardous waste	Kg	2.42E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of non-hazardous waste	Kg	2.64E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of radioactive waste	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
Reusable components	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
Recyclable Materials	Kg	5.41E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	2.53E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ/energy carrier	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.71E+00

BIOGENIC CARBON

Biogenic carbon content of the product (kg C_{org})

2.19E-02

Biogenic carbon content in the package (kg C_{org})

5.80E-01

MAIN IMPACT INDICATORS: 1 m ² Kreisel TURBO SISI thermal insulation system 150mm									
Indicator	Unit	Life Cycle Stage							
		A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1,85E+01	2,66E+00	1.69E+00	0,00E+00	1,34E+00	1.53E-01	5.42E-02	-1.80E+00
GWP-fossil	kg CO2 eq.	1,88E+01	2,66E+00	1.61E+00	0,00E+00	1,34E+00	1.50E-01	5.40E-02	-1.78E+00
GWP-biogenic	kg CO2 eq.	-3.34E-01	2.49E-03	7.53E-02	0,00E+00	1.08E-03	2.99E-03	1.51E-04	-1.96E-02
GWP-luluc	kg CO2 eq.	4.61E-02	1.29E-03	1.53E-03	0,00E+00	6.06E-04	7.00E-05	7.14E-06	-5.74E-04
A:	kg CFC11 eq.	1.65E-05	5.64E-08	2.34E-09	0,00E+00	2.86E-08	1.43E-09	8.45E-10	-3.15E-08
AP	mol H+ eq.	1.37E-01	5.66E-03	7.26E-03	0,00E+00	2.70E-03	1.07E-03	4.80E-04	-1.01E-02
EP-freshwater	kg PO4 eq.	3.64E-03	1.84E-04	2.05E-03	0,00E+00	9.06E-05	8.35E-05	1.64E-06	-1.03E-03
EP-marine	kg N eq.	5.00E-02	1.43E-03	1.29E-03	0,00E+00	6.72E-04	4.13E-04	2.22E-04	-1.01E-03
EP-terrestrial	mol N eq.	3.35E-01	1.45E-02	9.94E-03	0,00E+00	6.80E-03	4.33E-03	2.41E-03	-9.16E-03
POCP	kg NMVOC eq.	1.54E-01	8.78E-03	2.79E-03	0,00E+00	4.23E-03	1.28E-03	7.17E-04	-8.12E-03
ADP-minerals & metals	kg Sb eq.	7.86E-05	8.46E-06	1.51E-06	0,00E+00	4.19E-06	8.90E-08	2.11E-08	-6.17E-07
ADP-fossil	MJ	3.12E+02	3,68E+01	1,67E+01	0,00E+00	1,85E+01	1,76E+00	6,91E-01	-1,45E+01
WDP	WDP (m3) world. Ekw	1,00E+01	1.54E-01	7.72E-02	0,00E+00	7.10E-02	5.48E-03	1.53E-03	-5.65E-02

ADDITIONAL IMPACT INDICATORS: 1 m ² Kreisel TURBO SISI thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	8.92E-07	1.93E-07	1.37E-08	0,00E+00	8.20E-08	2.23E-08	1.36E-08	-9.41E-08
IRP	kBq U235 eq.	8.31E-01	4.98E-02	1.40E-02	0,00E+00	2.99E-02	1.08E-03	4.10E-04	-8.12E-03
ETP-fw	CTUe	3.64E-03	1.84E-04	2.05E-03	0,00E+00	9.06E-05	8.35E-05	1.64E-06	-1.03E-03
HTP-c	CTUh	2.60E-09	6.19E-10	5.70E-11	0,00E+00	2.73E-10	1.65E-11	8.89E-12	-7.87E-09
HTP-nc	CTUh	6.93E-08	9.52E-09	1.48E-09	0,00E+00	4.44E-09	4.78E-10	2.71E-10	-5.86E-08
SQP	-	9.17E+01	2.22E+01	2,89E+00	0,00E+00	9,47E+00	1.88E-01	8.55E-01	-3.03E+00
INDICATORS DESCRIBING THE CONSUMPTION OF RESOURCES: 1 m ² Kreisel TURBO SISI thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2.37E+01	5.79E-01	1,54E+00	0,00E+00	3.23E-01	6.69E-02	2.03E-02	-6.17E-01
PERMIAN	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
PERT	MJ	2.37E+01	5.79E-01	1,54E+00	0,00E+00	3.23E-01	6.69E-02	2.03E-02	-6.17E-01
PEN-RE	MJ	3.18E+02	3,84E+01	2,25E+01	0,00E+00	1.91E+01	2,05E+00	7.24E-01	-1.99E+01
RE	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
PENRT	MJ	3.18E+02	3,84E+01	2,25E+01	0,00E+00	1.91E+01	2,05E+00	7.24E-01	-1.99E+01
SM	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	1.13E-01	5.83E-03	3.29E-02	0,00E+00	4.06E-03	1.34E-03	2.42E-05	-1.06E-02
INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 m ² Kreisel TURBO SISI thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit (referenced to DU)	A1-A3	A4	A5	C1	C2	C3	C4	D
Amount of hazardous waste	Kg	2.42E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of non-hazardous waste	Kg	2.64E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of radioactive waste	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
Reusable components	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
Recyclable Materials	Kg	5.41E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	2.53E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ/energy carrier	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.71E+00

BIOGENIC CARBON

Biogenic carbon content of the product (kg C_{org})	2.09E-02
Biogenic carbon content in the package (kg C_{org})	5.80E-01

MAIN IMPACT INDICATORS: 1 m² Kreisel TURBO SO PROTECT thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1,75E+01	2,66E+00	1,69E+00	0,00E+00	1,34E+00	1,53E-01	4,88E-02	-1,80E+00
GWP-fossil	kg CO2 eq.	1,77E+01	2,66E+00	1,61E+00	0,00E+00	1,34E+00	1,50E-01	4,87E-02	-1,78E+00
GWP-biogenic	kg CO2 eq.	-2,68E-01	2,49E-03	7,53E-02	0,00E+00	1,08E-03	2,99E-03	1,36E-04	-1,96E-02
GWP-luluc	kg CO2 eq.	4,51E-02	1,29E-03	1,53E-03	0,00E+00	6,06E-04	7,00E-05	6,44E-06	-5,74E-04
A:	kg CFC11 eq.	9,81E-06	5,64E-08	2,34E-09	0,00E+00	2,86E-08	1,43E-09	7,61E-10	-3,15E-08
AP	mol H+ eq.	1,19E-01	5,66E-03	7,26E-03	0,00E+00	2,70E-03	1,07E-03	4,33E-04	-1,01E-02
EP-freshwater	kg PO4 eq.	3,20E-03	1,84E-04	2,05E-03	0,00E+00	9,06E-05	8,35E-05	1,48E-06	-1,03E-03
EP-marine	kg N eq.	4,64E-02	1,43E-03	1,29E-03	0,00E+00	6,72E-04	4,13E-04	2,00E-04	-1,01E-03
EP-terrestrial	mol N eq.	3,11E-01	1,45E-02	9,94E-03	0,00E+00	6,80E-03	4,33E-03	2,17E-03	-9,17E-03
POCP	kg NMVOC eq.	1,43E-01	8,78E-03	2,79E-03	0,00E+00	4,23E-03	1,28E-03	6,46E-04	-8,13E-03
ADP-minerals & metals	kg Sb eq.	7,21E-05	8,46E-06	1,51E-06	0,00E+00	4,19E-06	8,90E-08	1,90E-08	-6,18E-07
ADP-fossil	MJ	2,97E+02	3,68E+01	1,67E+01	0,00E+00	1,85E+01	1,76E+00	6,23E-01	-1,45E+01
WDP	WDP (m3) world. EKW	9,21E+00	1,54E-01	7,72E-02	0,00E+00	7,10E-02	5,48E-03	1,37E-03	-5,65E-02
ADDITIONAL IMPACT INDICATORS: 1 m² Kreisel TURBO SO PROTECT thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidency	8,04E-07	1,93E-07	1,37E-08	0,00E+00	8,20E-08	2,23E-08	1,23E-08	-9,42E-08
IRP	kBq U235 eq.	7,18E-01	4,98E-02	1,40E-02	0,00E+00	2,99E-02	1,08E-03	3,70E-04	-8,12E-03
ETP-fw	CTUe	3,20E-03	1,84E-04	2,05E-03	0,00E+00	9,06E-05	8,35E-05	1,48E-06	-1,03E-03
HTP-c	CTUh	2,30E-09	6,19E-10	5,70E-11	0,00E+00	2,73E-10	1,65E-11	8,01E-12	-7,88E-09
HTP-nc	CTUh	5,93E-08	9,52E-09	1,48E-09	0,00E+00	4,44E-09	4,78E-10	2,44E-10	-5,87E-08
SQP	-	7,91E+01	2,22E+01	2,89E+00	0,00E+00	9,47E+00	1,88E-01	7,70E-01	-3,03E+00
INDICATORS DESCRIBING RESOURCE CONSUMPTION: 1 m² Kreisel TURBO SO PROTECT thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2,10E+01	5,79E-01	1,54E+00	0,00E+00	3,23E-01	6,69E-02	1,83E-02	-6,17E-01
PERMIAN	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
PERT	MJ	2,10E+01	5,79E-01	1,54E+00	0,00E+00	3,23E-01	6,69E-02	1,83E-02	-6,17E-01
PEN-RE	MJ	3,03E+02	3,84E+01	2,25E+01	0,00E+00	1,91E+01	2,05E+00	6,52E-01	-1,99E+01
RE	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
PENRT	MJ	3,03E+02	3,84E+01	2,25E+01	0,00E+00	1,91E+01	2,05E+00	6,52E-01	-1,99E+01
SM	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	m3	9,33E-02	5,83E-03	3,29E-02	0,00E+00	4,06E-03	1,34E-03	2,18E-05	-1,06E-02

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 m ² Kreisel TURBO SO PROTECT thermal insulation system 150mm									
Indicator	Unit (referenced to DU)	Life Cycle Stage							
		A1-A3	A4	A5	C1	C2	C3	C4	D
Amount of hazardous waste	Kg	2.42E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of non-hazardous waste	Kg	2.64E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of radioactive waste	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
Reusable components	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
Recyclable Materials	Kg	5.41E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	2.53E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ/energy carrier	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,72E+00

BIOGENIC CARBON

Biogenic carbon content of the product (kg C_{org})	1.78E-02
Biogenic carbon content in the package (kg C_{org})	5.80E-01

MAIN IMPACT INDICATORS: 1 m ² Kreisel TURBO MAX PROTECT thermal insulation system 150mm									
Indicator	Unit	Life Cycle Stage							
		A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1,92E+01	2,66E+00	1,69E+00	0,00E+00	1,34E+00	1,53E-01	5,42E-02	-1,80E+00
GWP-fossil	kg CO2 eq.	1,94E+01	2,66E+00	1,61E+00	0,00E+00	1,34E+00	1,50E-01	5,40E-02	-1,78E+00
GWP-biogenic	kg CO2 eq.	-3,23E-01	2,49E-03	7,53E-02	0,00E+00	1,08E-03	2,99E-03	1,51E-04	-1,96E-02
GWP-luluc	kg CO2 eq.	4,66E-02	1,29E-03	1,53E-03	0,00E+00	6,06E-04	7,00E-05	7,14E-06	-5,74E-04
A:	kg CFC11 eq.	4,42E-05	5,64E-08	2,34E-09	0,00E+00	2,86E-08	1,43E-09	8,45E-10	-3,15E-08
AP	mol H+ eq.	1,40E-01	5,66E-03	7,26E-03	0,00E+00	2,70E-03	1,07E-03	4,80E-04	-1,01E-02
EP-freshwater	kg PO4 eq.	3,81E-03	1,84E-04	2,05E-03	0,00E+00	9,06E-05	8,35E-05	1,64E-06	-1,03E-03
EP-marine	kg N eq.	5,07E-02	1,43E-03	1,29E-03	0,00E+00	6,72E-04	4,13E-04	2,22E-04	-1,01E-03
EP-terrestrial	mol N eq.	3,42E-01	1,45E-02	9,94E-03	0,00E+00	6,80E-03	4,33E-03	2,41E-03	-9,16E-03
POCP	kg NMVOC eq.	1,56E-01	8,78E-03	2,79E-03	0,00E+00	4,23E-03	1,28E-03	7,17E-04	-8,12E-03
ADP-minerals & metals	kg Sb eq.	8,28E-05	8,46E-06	1,51E-06	0,00E+00	4,19E-06	8,90E-08	2,11E-08	-6,17E-07
ADP-fossil	MJ	3,23E+02	3,68E+01	1,67E+01	0,00E+00	1,85E+01	1,76E+00	6,91E-01	-1,45E+01
WDP	WDP (m3) world. EKW	1,03E+01	1,54E-01	7,72E-02	0,00E+00	7,10E-02	5,48E-03	1,53E-03	-5,65E-02

ADDITIONAL IMPACT INDICATORS: 1 m ² Kreisel TURBO MAX PROTECT thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	9.36E-07	1.93E-07	1.37E-08	0,00E+00	8.20E-08	2.23E-08	1.36E-08	-9.41E-08
IRP	kBq U235 eq.	8.74E-01	4.98E-02	1.40E-02	0,00E+00	2.99E-02	1.08E-03	4.10E-04	-8.12E-03
ETP-fw	CTUe	3.81E-03	1.84E-04	2.05E-03	0,00E+00	9.06E-05	8.35E-05	1.64E-06	-1.03E-03
HTP-c	CTUh	2.90E-09	6.19E-10	5.70E-11	0,00E+00	2.73E-10	1.65E-11	8.89E-12	-7.87E-09
HTP-nc	CTUh	7.86E-08	9.52E-09	1.48E-09	0,00E+00	4.44E-09	4.78E-10	2.71E-10	-5.86E-08
SQP	-	9,40E+01	2.22E+01	2,89E+00	0,00E+00	9,47E+00	1.88E-01	8.55E-01	-3.03E+00
INDICATORS DESCRIBING THE CONSUMPTION OF RESOURCES: 1 m ² Kreisel TURBO MAX PROTECT thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2,44E+01	5.79E-01	1,54E+00	0,00E+00	3.23E-01	6.69E-02	2.03E-02	-6.17E-01
PERMIAN	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
PERT	MJ	2,44E+01	5.79E-01	1,54E+00	0,00E+00	3.23E-01	6.69E-02	2.03E-02	-6.17E-01
PEN-RE	MJ	3,30E+02	3,84E+01	2,25E+01	0,00E+00	1.91E+01	2,05E+00	7.24E-01	-1.99E+01
RE	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
PENRT	MJ	3,30E+02	3,84E+01	2,25E+01	0,00E+00	1.91E+01	2,05E+00	7.24E-01	-1.99E+01
SM	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	1.18E-01	5.83E-03	3.29E-02	0,00E+00	4.06E-03	1.34E-03	2.42E-05	-1.06E-02
INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 m ² Kreisel TURBO MAX PROTECT thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit (referenced to DU)	A1-A3	A4	A5	C1	C2	C3	C4	D
Amount of hazardous waste	Kg	2.42E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of non-hazardous waste	Kg	2.64E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of radioactive waste	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
Reusable components	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
Recyclable Materials	Kg	5.41E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	2.53E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ/energy carrier	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.71E+00

BIOGENIC CARBON

Biogenic carbon content of the product (kg C_{org})	2.13E-02
Biogenic carbon content in the package (kg C_{org})	5.80E-01

MAIN IMPACT INDICATORS: 1 m² Kreisel TURBO ECO PROTECT thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1.84E+01	2,66E+00	1.69E+00	0,00E+00	1,34E+00	1.53E-01	5.42E-02	-1.80E+00
GWP-fossil	kg CO2 eq.	1.87E+01	2,66E+00	1.61E+00	0,00E+00	1,34E+00	1.50E-01	5.40E-02	-1.78E+00
GWP-biogenic	kg CO2 eq.	-3.36E-01	2.49E-03	7.53E-02	0,00E+00	1.08E-03	2.99E-03	1.51E-04	-1.96E-02
GWP-luluc	kg CO2 eq.	4.60E-02	1.29E-03	1.53E-03	0,00E+00	6.06E-04	7.00E-05	7.14E-06	-5.74E-04
A:	kg CFC11 eq.	1.63E-05	5.64E-08	2.34E-09	0,00E+00	2.86E-08	1.43E-09	8.45E-10	-3.15E-08
AP	mol H+ eq.	1.35E-01	5.66E-03	7.26E-03	0,00E+00	2.70E-03	1.07E-03	4.80E-04	-1.01E-02
EP-freshwater	kg PO4 eq.	3.62E-03	1.84E-04	2.05E-03	0,00E+00	9.06E-05	8.35E-05	1.64E-06	-1.03E-03
EP-marine	kg N eq.	5.00E-02	1.43E-03	1.29E-03	0,00E+00	6.72E-04	4.13E-04	2.22E-04	-1.01E-03
EP-terrestrial	mol N eq.	3.34E-01	1.45E-02	9.94E-03	0,00E+00	6.80E-03	4.33E-03	2.41E-03	-9.16E-03
POCP	kg NMVOC eq.	1.53E-01	8.78E-03	2.79E-03	0,00E+00	4.23E-03	1.28E-03	7.17E-04	-8.12E-03
ADP-minerals & metals	kg Sb eq.	7.79E-05	8.46E-06	1.51E-06	0,00E+00	4.19E-06	8.90E-08	2.11E-08	-6.17E-07
ADP-fossil	MJ	3.11E+02	3,68E+01	1,67E+01	0,00E+00	1,85E+01	1.76E+00	6.91E-01	-1.45E+01
WDP	WDP (m3) world. Ekw.	9,94E+00	1.54E-01	7.72E-02	0,00E+00	7.10E-02	5.48E-03	1.53E-03	-5.65E-02
ADDITIONAL IMPACT INDICATORS: 1 m² Kreisel TURBO ECO PROTECT thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	8.84E-07	1.93E-07	1.37E-08	0,00E+00	8.20E-08	2.23E-08	1.36E-08	-9.41E-08
IRP	kBq U235 eq.	8.23E-01	4.98E-02	1.40E-02	0,00E+00	2.99E-02	1.08E-03	4.10E-04	-8.12E-03
ETP-fw	CTUe	3.62E-03	1.84E-04	2.05E-03	0,00E+00	9.06E-05	8.35E-05	1.64E-06	-1.03E-03
http-c	CTUh	2.60E-09	6.19E-10	5.70E-11	0,00E+00	2.73E-10	1.65E-11	8.89E-12	-7.87E-09
http-nc	CTUh	6.85E-08	9.52E-09	1.48E-09	0,00E+00	4.44E-09	4.78E-10	2.71E-10	-5.86E-08
SQP	-	9.13E+01	2.22E+01	2,89E+00	0,00E+00	9,47E+00	1.88E-01	8.55E-01	-3.03E+00
INDICATORS DESCRIBING THE CONSUMPTION OF RESOURCES: 1 m² Kreisel TURBO ECO PROTECT thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2,36E+01	5.79E-01	1,54E+00	0,00E+00	3.23E-01	6.69E-02	2.03E-02	-6.17E-01
PERMIAN	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
PERT	MJ	2,36E+01	5.79E-01	1,54E+00	0,00E+00	3.23E-01	6.69E-02	2.03E-02	-6.17E-01
PEN-RE	MJ	3.18E+02	3,84E+01	2,25E+01	0,00E+00	1.91E+01	2,05E+00	7.24E-01	-1.99E+01
RE	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
PENRT	MJ	3.18E+02	3,84E+01	2,25E+01	0,00E+00	1.91E+01	2,05E+00	7.24E-01	-1.99E+01
SM	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	m3	1.12E-01	5.83E-03	3.29E-02	0,00E+00	4.06E-03	1.34E-03	2.42E-05	-1.06E-02

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 m ² Kreisel TURBO ECO PROTECT thermal insulation system 150mm									
	Life Cycle Stage								
Indicator	Unit (referenced to DU)	A1-A3	A4	A5	C1	C2	C3	C4	D
Amount of hazardous waste	Kg	2.42E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of non-hazardous waste	Kg	2.64E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of radioactive waste	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
Reusable components	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
Recyclable Materials	Kg	5.41E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	2.53E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ/energy carrier	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.71E+00

BIOGENIC CARBON

Biogenic carbon content of the product (kg C_{org})	1.99E-02
Biogenic carbon content in the package (kg C_{org})	5.80E-01

MAIN IMPACT INDICATORS: 1 m ² Kreisel TURBO SO thermal insulation system 150mm									
	Life Cycle Stage								
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1.84E+01	2,66E+00	1.69E+00	0,00E+00	1,34E+00	1.53E-01	5.42E-02	-1.80E+00
GWP-fossil	kg CO2 eq.	1.87E+01	2,66E+00	1.61E+00	0,00E+00	1,34E+00	1.50E-01	5.40E-02	-1.78E+00
GWP-biogenic	kg CO2 eq.	-3.36E-01	2.49E-03	7.53E-02	0,00E+00	1.08E-03	2.99E-03	1.51E-04	-1.96E-02
GWP-luluc	kg CO2 eq.	4.57E-02	1.29E-03	1.53E-03	0,00E+00	6.06E-04	7.00E-05	7.14E-06	-5.74E-04
A:	kg CFC11 eq.	1.89E-05	5.64E-08	2.34E-09	0,00E+00	2.86E-08	1.43E-09	8.44E-10	-3.15E-08
AP	mol H+ eq.	1.27E-01	5.66E-03	7.26E-03	0,00E+00	2.70E-03	1.07E-03	4.80E-04	-1.01E-02
EP-freshwater	kg PO4 eq.	3.47E-03	1.84E-04	2.05E-03	0,00E+00	9.06E-05	8.35E-05	1.64E-06	-1.03E-03
EP-marine	kg N eq.	4.97E-02	1.43E-03	1.29E-03	0,00E+00	6.72E-04	4.13E-04	2.22E-04	-1.01E-03
EP-terrestrial	mol N eq.	3.33E-01	1.45E-02	9.94E-03	0,00E+00	6.80E-03	4.33E-03	2.41E-03	-9.16E-03
POCP	kg NMVOC eq.	1.53E-01	8.78E-03	2.79E-03	0,00E+00	4.23E-03	1.28E-03	7.16E-04	-8.12E-03
ADP-minerals & metals	kg Sb eq.	7.51E-05	8.46E-06	1.51E-06	0,00E+00	4.19E-06	8.90E-08	2.11E-08	-6.17E-07
ADP-fossil	MJ	3.16E+02	3,68E+01	1,67E+01	0,00E+00	1,85E+01	1.76E+00	6.90E-01	-1.45E+01
WDP	WDP (m3) world. Ekw	9.61E+00	1.54E-01	7.72E-02	0,00E+00	7.10E-02	5.48E-03	1.52E-03	-5.65E-02

ADDITIONAL IMPACT INDICATORS: 1 m ² Kreisel TURBO SO thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	8.68E-07	1.93E-07	1.37E-08	0,00E+00	8.20E-08	2.23E-08	1.36E-08	-9.41E-08
IRP	kBq U235 eq.	7.48E-01	4.98E-02	1.40E-02	0,00E+00	2.99E-02	1.08E-03	4.10E-04	-8.12E-03
ETP-fw	CTUe	3.47E-03	1.84E-04	2.05E-03	0,00E+00	9.06E-05	8.35E-05	1.64E-06	-1.03E-03
http-c	CTUh	3.11E-09	6.19E-10	5.70E-11	0,00E+00	2.73E-10	1.65E-11	8.88E-12	-7.87E-09
http-nc	CTUh	6.00E-08	9.52E-09	1.48E-09	0,00E+00	4.44E-09	4.78E-10	2.71E-10	-5.86E-08
SQP	-	8.84E+01	2.22E+01	2,89E+00	0,00E+00	9,47E+00	1.88E-01	8.54E-01	-3.03E+00
INDICATORS DESCRIBING THE CONSUMPTION OF RESOURCES: 1 m ² Kreisel TURBO SO thermal insulation system 150 mm									
Life Cycle Stage									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2,28E+01	5.79E-01	1,54E+00	0,00E+00	3.23E-01	6.69E-02	2.03E-02	-6.17E-01
PERMIAN	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
PERT	MJ	2,28E+01	5.79E-01	1,54E+00	0,00E+00	3.23E-01	6.69E-02	2.03E-02	-6.17E-01
PEN-RE	MJ	3,24E+02	3,84E+01	2,25E+01	0,00E+00	1.91E+01	2,05E+00	7.23E-01	-1.99E+01
RE	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
PENRT	MJ	3,24E+02	3,84E+01	2,25E+01	0,00E+00	1.91E+01	2,05E+00	7.23E-01	-1.99E+01
SM	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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	9.98E-02	5.83E-03	3.29E-02	0,00E+00	4.06E-03	1.34E-03	2.42E-05	-1.06E-02
INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 m ² Kreisel TURBO SO thermal insulation system 150mm									
Life Cycle Stage									
Indicator	Unit (referenced to DU)	A1-A3	A4	A5	C1	C2	C3	C4	D
Amount of hazardous waste	Kg	2.42E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of non-hazardous waste	Kg	2.64E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Amount of radioactive waste	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
Reusable components	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
Recyclable Materials	Kg	5.41E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	2.53E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ/energy carrier	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.71E+00

BIOGENIC CARBON	
Biogenic carbon content of the product (kg C_{org})	2.19E-02
Biogenic carbon content in the package (kg C_{org})	5.80E-01

6. INTERPRETATION OF RESULTS

Figures 2, 3, 4, 5, 6, 7, 8 and 9 show graphs of the share of individual life cycle modules into the basic impact categories for thermal insulation systems – *Kreisel TURBO*, *Kreisel TURBO S*, *Kreisel TURBO SA*, *Kreisel TURBO SISI*, *Kreisel TURBO SO PROTECT*, *Kreisel TURBO MAX PROTECT*, *Kreisel TURBO ECO PROTECT*, *Kreisel TURBO SO*:

Fig. 2 Shares of life cycle modules on the main categories of influences - *Kreisel TURBO*

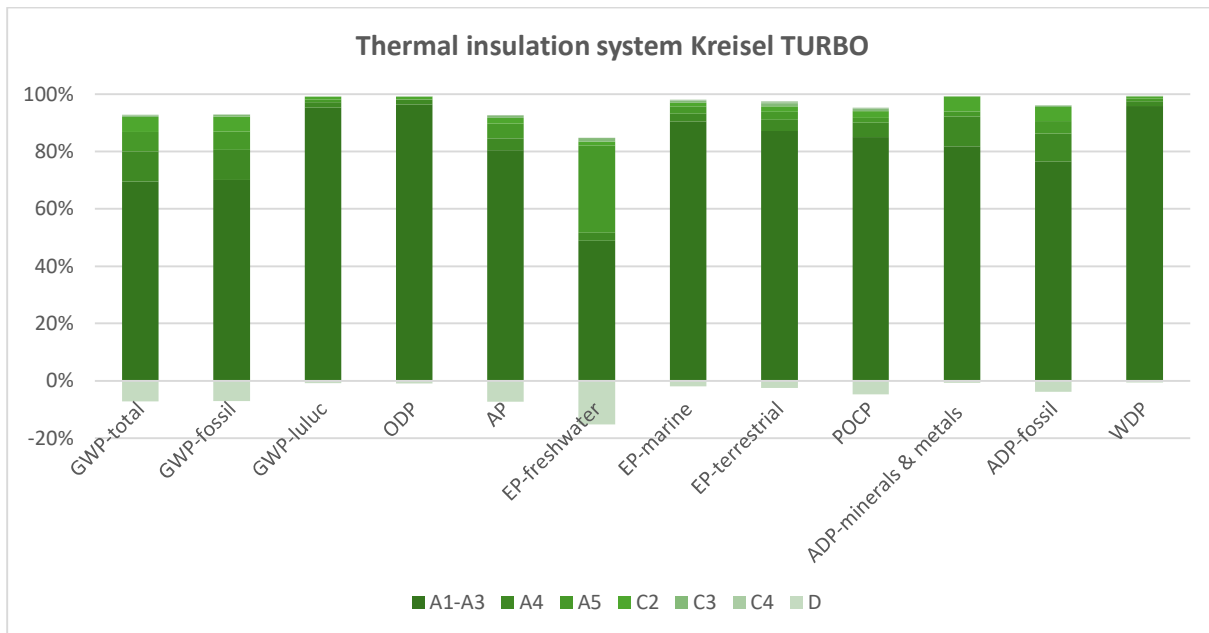


Fig. 3 Shares of life cycle modules on the main categories of influences – Kreisel TURBO S

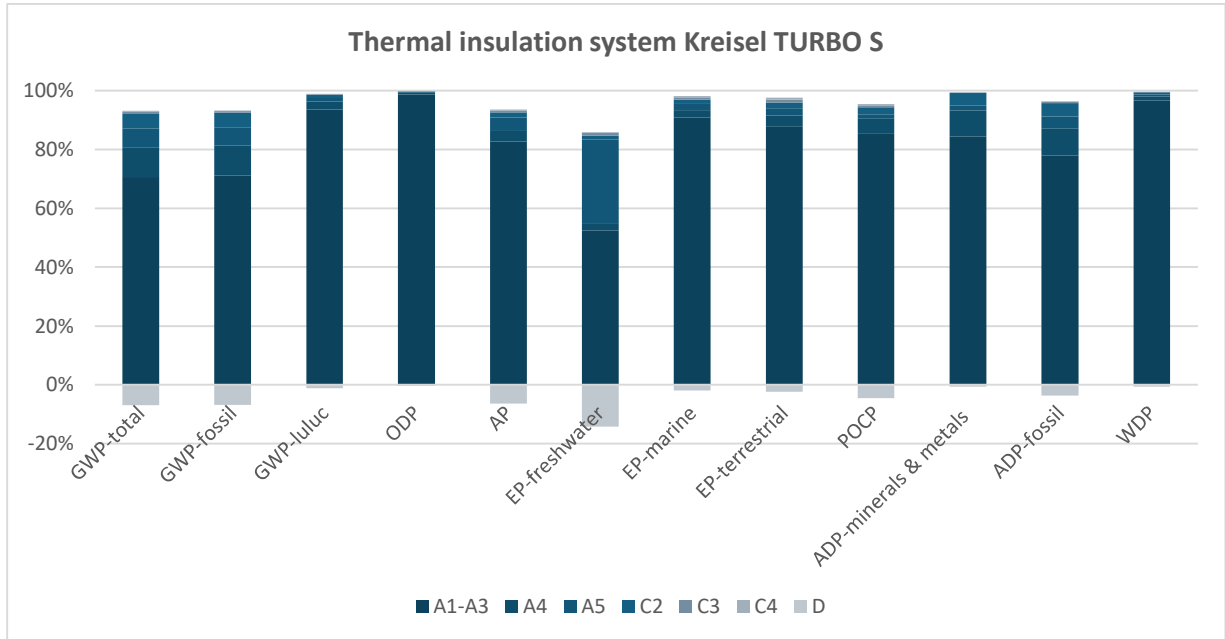


Fig. 4 Shares of life cycle modules on the main categories of influences – Kreisel TURBO SA

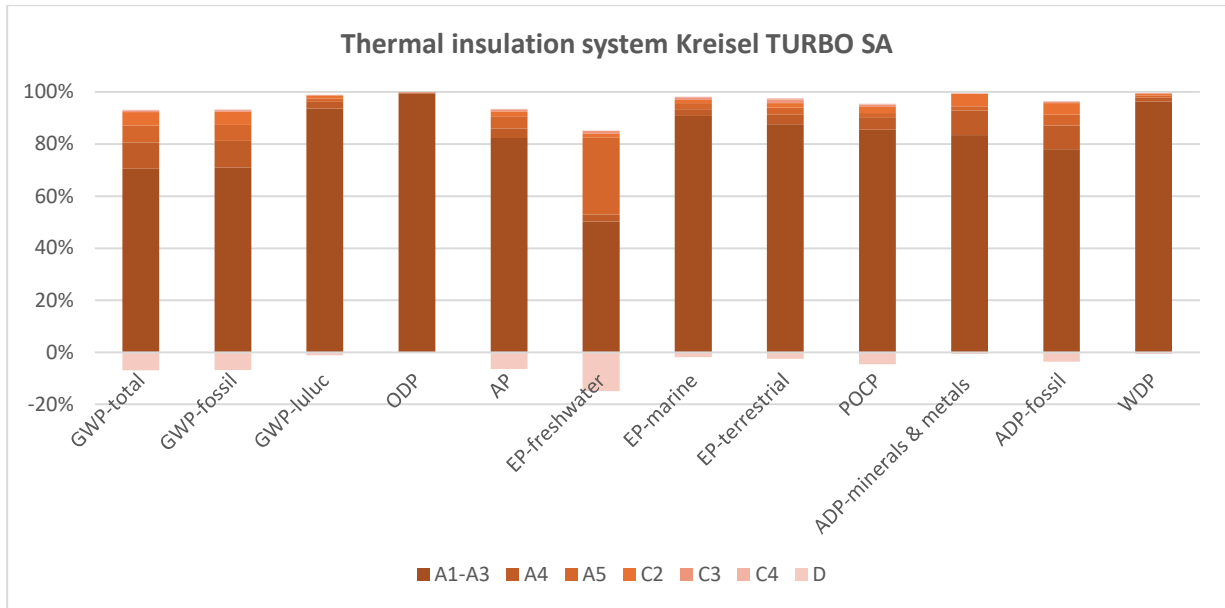


Fig. 5 Shares of life cycle modules on the main categories of influences - Kreisel TURBO SISI

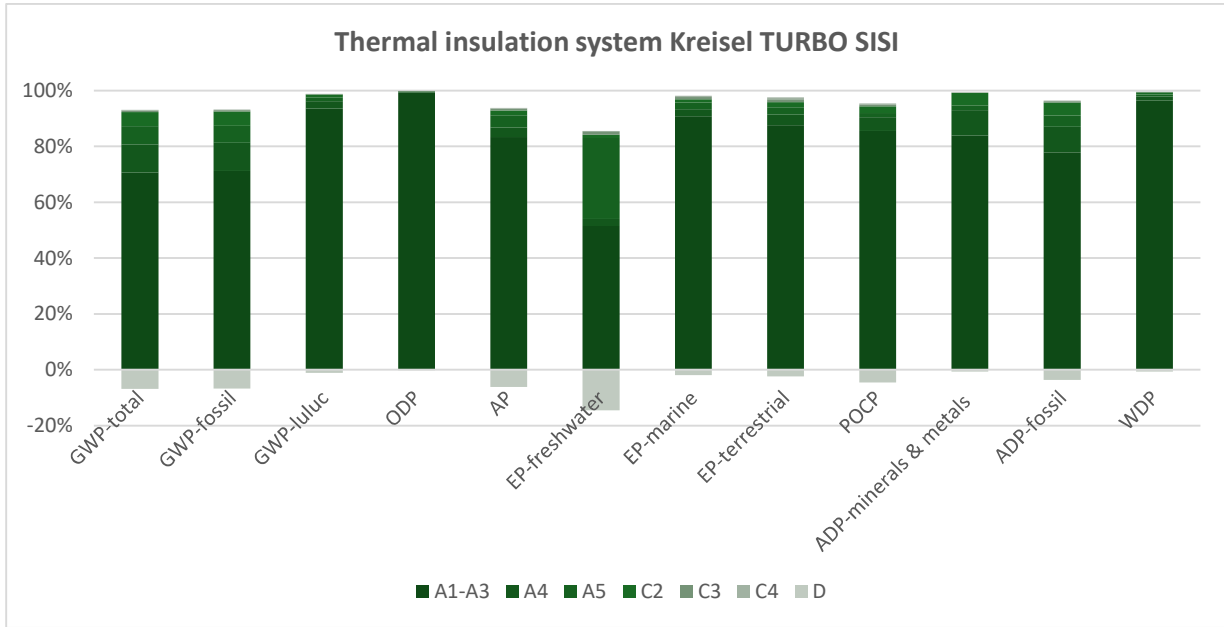


Fig. 6 Shares of life cycle modules on the main categories of influences - Kreisel TURBO SO-PROTECT

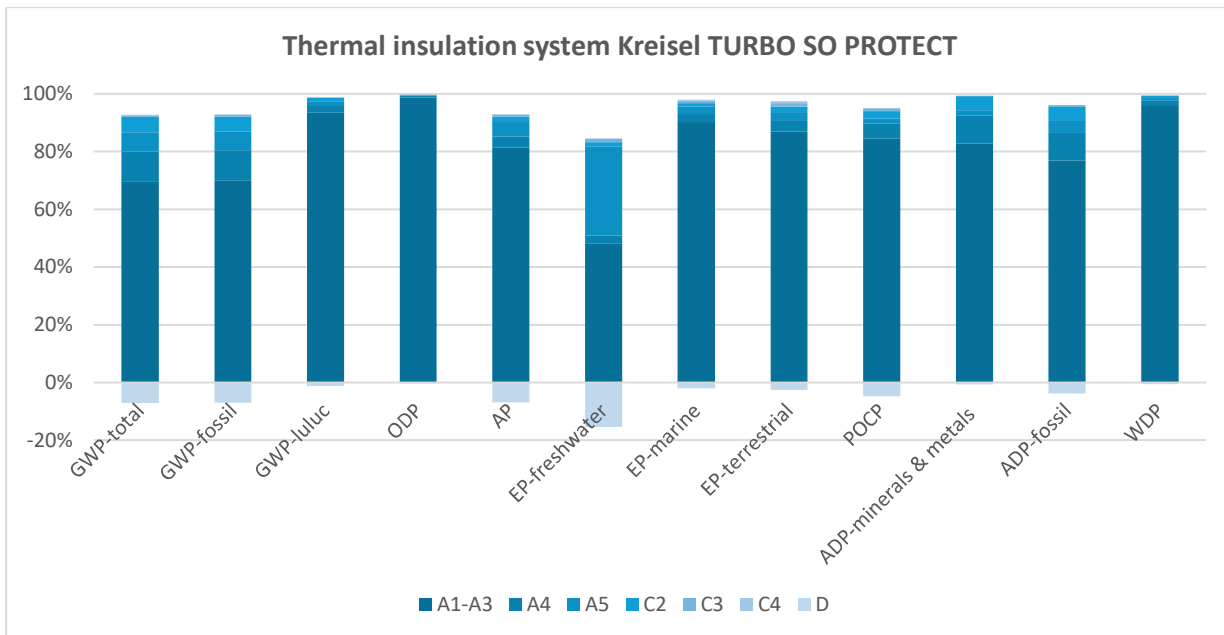


Fig. 7 Shares of life cycle modules on the main categories of influences – Kreisel TURBO MAX-PROTECT

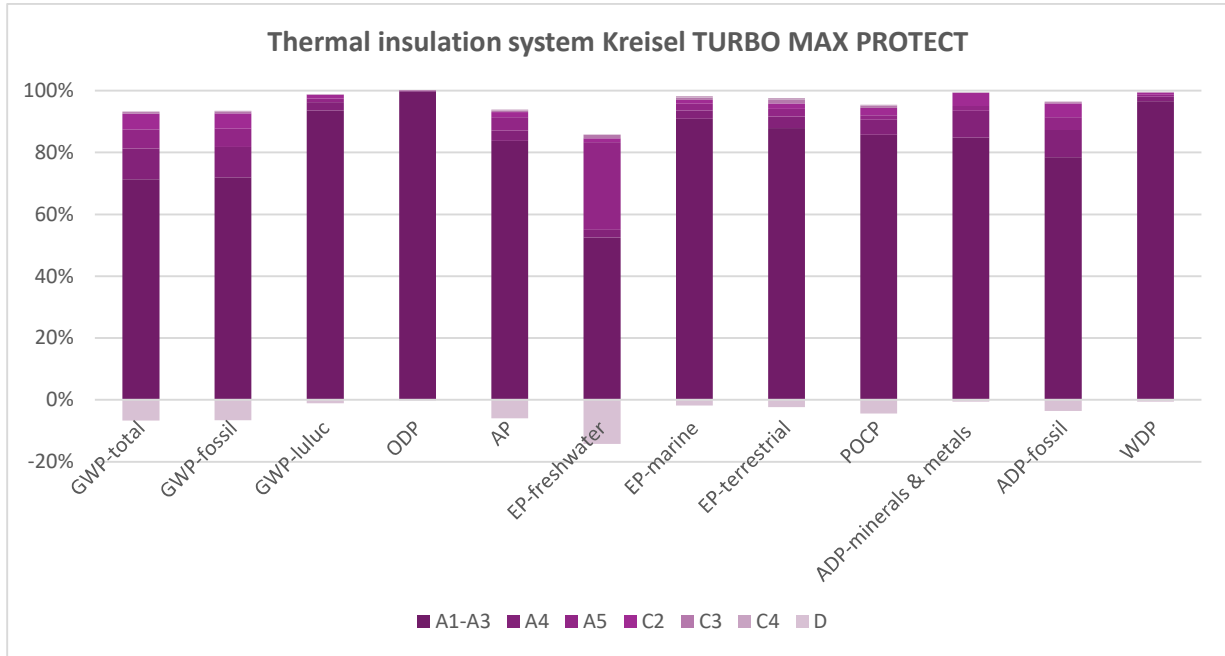


Fig. 8 Shares of life cycle modules on the main categories of influences – Kreisel TURBO ECO PROTECT

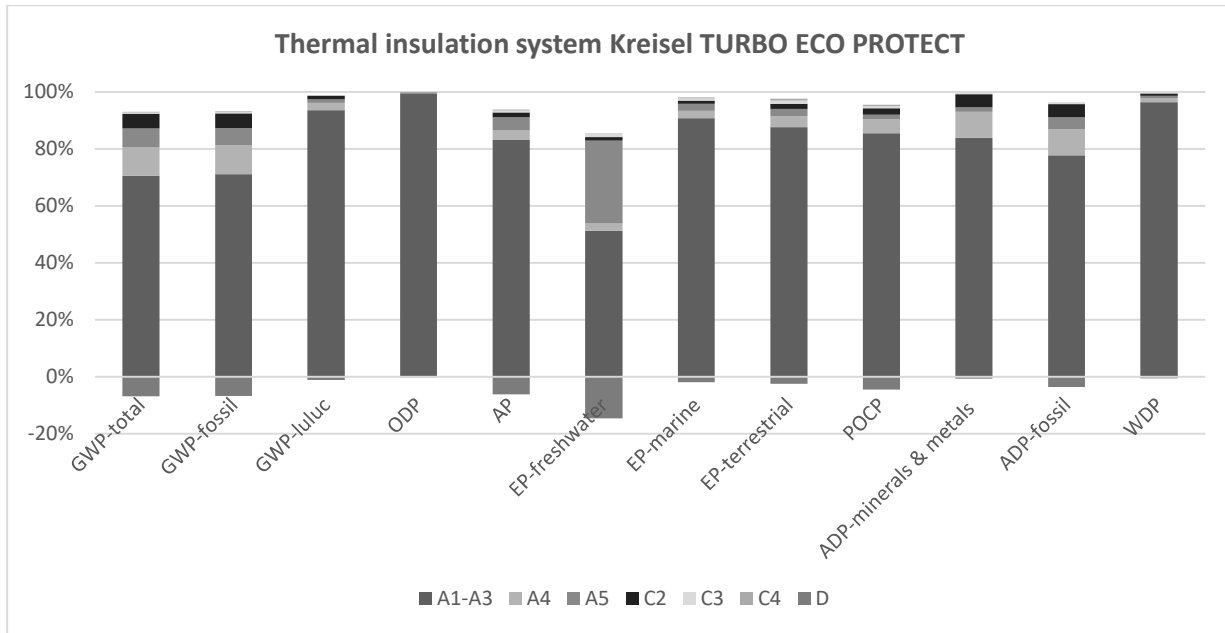
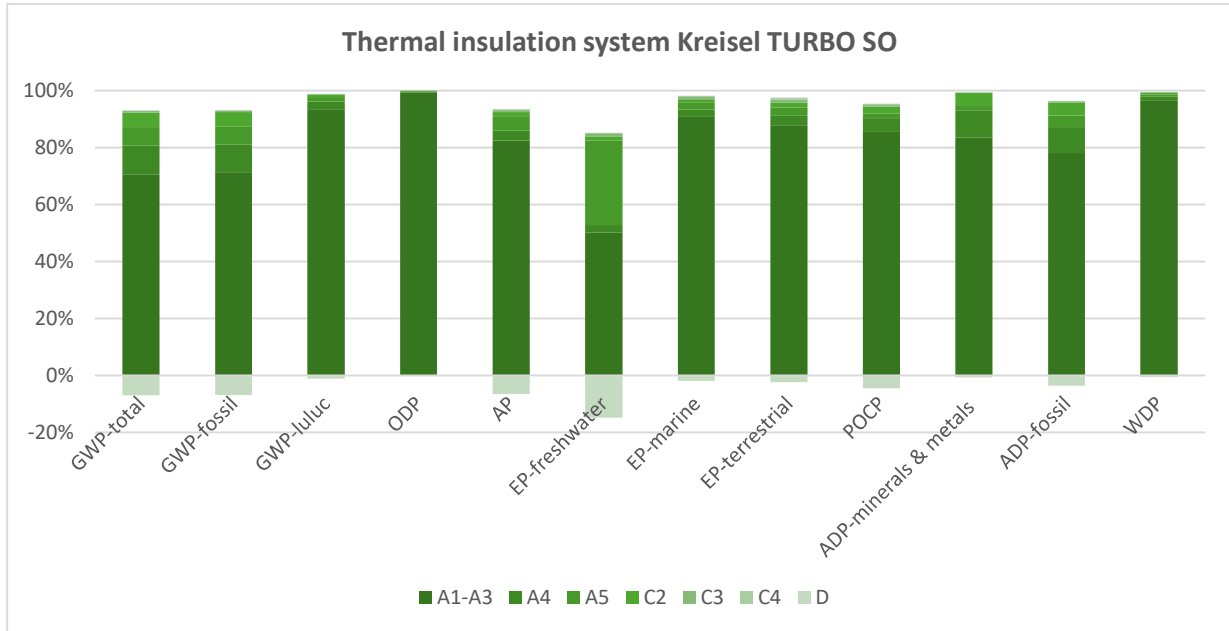


Fig. 9 Shares of life cycle modules on the main categories of influences - Kreisel TURBO SO



The LCA analysis proved that the processes related to obtaining raw materials for the production of components included in thermal insulation systems have the greatest impact on the value of environmental impact indicators. Of all the components, the insulation material – expanded polystyrene panels – has the greatest impact. Modules (A1-A3) account for between 70 and nearly 100 % of the value of all impact categories.

According to the adopted scenario, transport to the assembly site (A4) assumes the delivery of materials produced at the Kreisel-Technika Budowlana sp. z o.o. plant. and materials from outside the plant to the construction site. Depending on the thermal insulation system, the share of the A4 module accounts for 11-13% of the total impact in the GWP-total category.

The installation of the thermal insulation system (module A5) has a negligible impact on the values of the GWP-total impact category, which is about 7%.

The demolition of thermal insulation systems is done manually, as is the initial sorting of waste. For this reason, the environmental impact for this module is negligible.

Transport to the waste treatment site (Module C2) has a relatively low impact on the final values of the LCIA analysis, the contribution of Module C2 in the GWP-total impact category is 5.8-6.2%.

Taking into account the above-mentioned conclusions, the owner of the declaration does not have much influence on the values of environmental impact indicators, as it depends to a large extent on external entities.

LITERATURE

- ✓ PN-EN ISO 14025:2014-04, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.
 - ✓ PN-EN 15804+A2:2020, Sustainability of buildings - Environmental declarations of products - Basic principles of categorization of construction products.
 - ✓ PN-EN ISO 14040:2009 Environmental Management. Life Cycle Assessment. Rules and structure.
 - ✓ PN-EN ISO 14044:2009, Environmental management. Life Cycle Assessment. Requirements and guidelines.
 - ✓ EN 15942:2012, Sustainability of construction works – Environmental product declarations – Communication format business-to-business.
 - ✓ Data from the company's website: www.kreisel.pl
- Explanatory materials can be obtained on the declaration owner's website: www.kreisel.pl