Environmental Product Declaration (EPD)

Declaration code EPD-IBP-GB-14.2

Ensinger insulbar®

Ensinger GmbH

ECO PLATFORM EPD VERIFIED

Insulating profiles

Insulbar®

Basis:

DIN EN ISO 14025
EN 15804 + A2

Company EPD **E**nvironmental **P**roduct **D**eclaration

Publication date:
16.04.2024

Valid until:
16.04.2029

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published EPDs

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Accredited Certification Body
Products + Services
EN ISO/IEC 17065

DAkkS Deutsche Akkreditierungsstelle D-ZE-11349-01-00

Environmental Product Declaration (EPD)

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Declaration holder	Ensinger GmbH Rudolf-Diesel-Straße 8 71154 Nufringen, Germany www.insulbar.com		
Declaration code	EPD-IBP-GB-14.2		
Designation of declared product	Insulbar® insulating profiles and assemblies		
Scope	Thermal barrier of metal windows, doors and facade systems.		
Basis	This EPD was prepared on the basis of EN ISO 14025:2011 and DIN EN 15804:2012+A2:2019. In addition, the "Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen" (General guideline for preparation of Type III Environmental Product Declarations) applies. The Declaration is based on the PCR Documents "PCR Part A" PCR-A-1.0:2023 and „Semifinished products“ PCR-HZ-3.0:2023.		
Validity	Publication date: 16.04.2024	Last revision: 22.04.2024	Valid until: 16.04.2029
	This verified Company Environmental Product Declaration (company EPD) applies solely to the specified products and is valid for a period of five years from the date of publication in accordance with DIN EN 15804.		
LCA Basis	The LCA was prepared in accordance with DIN EN ISO 14040 and DIN EN ISO 14044. The base data include both the data collected at the Ensinger GmbH production site and the generic data derived from the database “LCA for Experts 10”. LCA calculations were carried out for the included “cradle to gate” including all upstream chains (e.g. raw material extraction, etc.).		
Notes	The ift-Guidance Sheet “Conditions and Guidance for the Use of ift Test Documents” applies. The declaration holder assumes full liability for the underlying data, certificates and verifications.		

Christian Kehrer Head of Certification and Surveillance Body	Dr. Torsten Mielecke Chairman of Expert Committee ift-EPD and PCR	Sunsanne Volz External verifier

1 General Product Information

Product definition

The EPD relates to the product group “insulating profile” and applies to:

1 kg insulating profiles and assemblies of company Ensinger GmbH

The declared unit is obtained by summing up:

Product group	Assessed product	Declared unit	Density
PG 1	**insulbar® ESP made of TECATHERM 66 ESP*)** insulbar® REG made of TECATHERM 66 GF insulbar® REG made of TECATHERM 66 GF40	**1 kg**	**1.25 ± 0.05 g/cm³** 1.30 ± 0.05 g/cm³ 1.42 ± 0.05 g/cm³
PG 2	**insulbar® RE made of TECATHERM 66 GF RE*)**	**1 kg**	**1.30 ± 0.05 g/cm³**
PG 3	**insulbar® REG made of TECATHERM 6 GF*)**	**1 kg**	**1.30 ± 0.05 g/cm³**
PG 4	**insulbar® LI made of TECATHERM 66 GF*)**	**1 kg**	**1.00 ± 0.10 g/cm³**
PG 5	**insulbar® RE-LI made of TECATHERM 66 GF RE*)**	**1 kg**	**1.00 ± 0.10 g/cm³**
PG 6	**Coex sealing wire*)**	**1 kg**	**1.06 ± 0.10 g/cm³**

***) Bold** = reference products

Table 1 Product groups

The average unit is declared as follows:
Directly used material flows are determined using the masses (kg) and assigned to the declared unit. All other inputs and outputs in the production were scaled to the declared unit in their entirety since there is no typical functional unit due to the high number of variants. The reference period is the year 2021/2022.

This EPD applies to all profile shapes of insulbar® insulating profiles made of the materials specified above with a solid core (PG 1, PG 2, PG 3) or foamed core (PG 4, PG 5), also in combination with a coex sealing wire (PG 6).

Product group	Assessed product	Linear metre weight per CoEx wire
PG 6	**Coex sealing wire**	**1.14 g/m**

Table 2 Linear metre weight Co-Ex wire

The profiles differ in their linear metre weights depending on the cross-section. For a given linear metre weight, the environmental impact results of the respective profile can be calculated accordingly with reference to the linear metre. Environmental impact results for profile combinations with the Co-Ex wire can also be calculated using the linear metre weight given in Table 2. To do this, multiply the linear metre weight of the Co-Ex wire by its results from its environmental impact results table. The Co-Ex wire is pulled onto the profile twice as standard, but it can also be pulled on once or four times.

Calculation example insulbar® insulating profile assembled with Coex sealing wire:
Assumption: 0.1 kg/m for the example profile in combination with a double assembly with Coex sealing wire.
Coex sealing wire has a linear metre weight of 1.14 g/m as shown in Table 2.

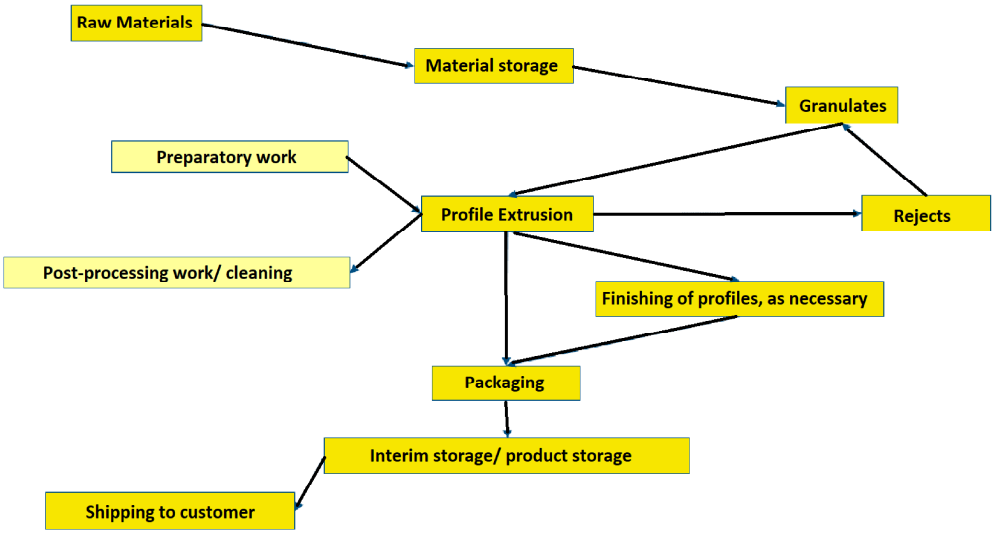
Conversion for the **environmental impact category GWP-t (A1-A3)**

		GWP-t (A1-A3)	
for 1 kg profile (PG1)		6.38	kg CO_2 equivalent
for 1 kg Coex sealing wire		6.26	kg CO_2 equivalent
for 1 m profile	6.38 * 0.1	0.636	kg CO_2 equivalent
for 1 m Coex sealing wire (double)	6.26 * 2 * 0.00114	0.014	kg CO_2 equivalent
Sum of linear metre results		**0.650**	**kg CO_2 equiv.**

Product description

insulbar® insulating profiles are insulating profiles for the thermal barrier of metal profiles. This thermal barrier results in considerable savings in heating and cooling costs for buildings.
These energy savings cannot be taken into account in this EPD, as they only have an effect in the use phase from B1 onwards.
It should be noted that due to the process-related processing of the products insulbar® LI and insulbar® RE-LI, they are deliberately foamed insulating profiles with a lower density compared to the solid insulating profiles of the product series insulbar® REG and insulbar® RE. Due to the lower density of the products insulbar® LI and insulbar® RE-LI, more profile meters of insulating profiles are obtained per unit weight in direct comparison.
The product groups PG 1 to PG 5 include cover foil, low-E foil, laser engraving, rivets, aluminum clips, PE foam and dust blasting.
For a detailed product description refer to the manufacturer specifications at www.insulbar.com or the product specifications of the respective offer/quotation.

Product manufacture



Application

Fields of application are metal profiles with thermal barrier, which are mainly intended for windows, doors, window walls and facades.

Management systems

The following management systems are held:

- Quality management system as per DIN EN ISO 9001:2015
- Energy management system as per DIN EN ISO 50001:2018
- Environmental management system as per DIN EN ISO 14001:2015

Additional information

For additional verifications of applicability or conformity refer to the CE marking and the documents accompanying the product, if applicable.
Additional information on insulbar® insulating profiles can be found in the data sheets. Product handling according to PHIB (Product Handling Information Sheet).
For more information, please see www.insulbar.com

2 Materials used

Primary materials

The raw materials used can be found in Section 6.2 Inventory analysis (Inputs).
The primary materials used are listed in the LCA (see Section 7).

Declarable substances

The product contains no substances from the REACH candidate list (declaration dated 01.06.2023).

3 Construction process stage

Processing recommendations, installation

The instructions for storage, transport, installation/further processing, operation, maintenance and disassembly must be noted. For this, see www.insulbar.com

4 Use stage

Emissions to the environment

No emissions to indoor air, water and soil are known. There may be VOC emissions.

Reference service life (RSL)

The reference service life (RSL) of insulbar® insulating profiles from Ensinger GmbH is not specified as they are semi-finished products.

5 End-of-life stage

Possible end-of-life stages

The insulbar® insulating profiles are taken to central collection points. There the products are usually shredded and sorted into their constituents. The end-of-life stage depends on the site where the products are used and is therefore subject to the local regulations. Observe the locally applicable regulatory requirements.

Company Ensinger GmbH is a member of A|U|F e.V., which promotes the disposal and processing of dismantled building elements / building profiles, windows, doors and facades made of aluminum for material reuse.

Disposal routes

The LCA includes the average disposal routes.

All life cycle scenarios are detailed in the Annex.

6 Life Cycle Assessment (LCA)

Environmental product declarations are based on life cycle assessments (LCAs) which use material and energy flows for the calculation and subsequent representation of environmental impacts.

As a basis for this, life cycle assessments were prepared for insulbar® insulating profiles. These LCAs are in conformity with the requirements set out in DIN EN 15804 and the international standards DIN EN ISO 14040, DIN EN ISO 14044, ISO 21930 and EN ISO 14025.

The LCA is representative of the products presented in the Declaration and the specified reference period.

6.1 Definition of goal and scope

Aim

The goal of the LCA is to demonstrate the environmental impacts of the products. In accordance with DIN EN 15804, the environmental impacts covered by this Environmental Product Declaration are presented for the entire product life cycle in the form of basic information. No other additional environmental impacts are specified.

Data quality, data availability and geographical and time-related system boundaries

The specific data comes exclusively from the years 2021/2022. They were collected on-site at the plant located in Cham and originate in parts from company records and partly from values directly obtained by measurement. Validity of the data was checked by the ift Rosenheim.

The generic data originates from the professional database and building materials database software “LCA for Experts 10”. The last update of both databases was in 2023. Data from before this date originate also from these databases and are not more than ten years old. No other generic data were used for the calculation.

Generic data are selected as accurately as possible in terms of geographic reference. If no country-specific data sets are available or if the regional reference cannot be determined, European or globally valid data sets are used.

Data gaps were either filled with comparable data or conservative assumptions, or the data were cut off in compliance with the 1% rule.

The life cycle was modelled using the sustainability software tool “LCA for Experts” for the development of life cycle assessments.

The data quality complies with the requirements of prEN 15941:2022.

Scope / system boundaries

The system boundaries refer to the supply of raw materials and purchased parts, manufacture and end-of-life stage of insulbar® insulating profiles.
No additional data from pre-suppliers/subcontractors or other sites were taken into consideration.

Cut-off criteria

All company data collected, i.e. all commodities/input and raw materials used, the thermal energy and electricity consumption, were taken into consideration.

The boundaries cover only the product-relevant data. Building sections/parts of facilities that are not relevant to the manufacture of the products, were excluded.

The transport distances of raw materials, ancillary materials and packaging were taken into account.

The criteria for the exclusion of inputs and outputs as set out in DIN EN 15804 are fulfilled. From the data analysis it can be assumed that the total of negligible processes per life cycle stage does not exceed 1% of the mass/primary energy. This way the total of negligible processes does not exceed 5% of the energy and mass input. The life cycle calculation also includes material and energy flows that account for less than 1%.

6.2 Inventory analysis

Aim

All material and energy flows are described below. The processes covered are presented as input and output parameters and refer to the declared units.

Life cycle stages

The complete life cycle of insulbar® insulating profiles is shown in the annex. Product stage “A1 – A3”, end-of-life stage “C1 – C4” and benefits and loads beyond the system boundaries “D” are considered.

Benefits

The below benefits have been defined as per DIN EN 15804:

- Benefits from recycling
- Benefits (thermal and electrical) from incineration

Allocation of co-products

No allocations occur during production.

Allocations for re-use, recycling and recovery

If the products are reused/recycled and recovered during the product stage (rejects), the elements are shredded, if necessary and then sorted into their constituents.
The system boundaries were set following their disposal, reaching the end-of-waste status.

Allocations beyond life cycle boundaries

The use of recycled materials in the manufacturing process was based on the current market-specific situation. In parallel to this, a recycling potential was taken into consideration that reflects the economic value of the product after recycling (recyclate).
Secondary materials that enter the production process as input are calculated in module 1 as input without loads. No benefits are assigned to Module D, but consumption to Modules C3 and C4 (worst case consideration).
The system boundary set for the recycled material refers to collection.

Secondary material

The use of secondary material in Module A3 was considered for Ensinger GmbH. Secondary material is not used.

Inputs

The LCA includes the following production-relevant inputs per of 1 kg insulating profiles and assemblies:

Energy
The input material of heating oil is based on the extra light, European "DE heating oil el" is assumed, for the input material gas „DE Thermal energy from natural gas“, for the input material diesel "DE: Diesel mix, ex filling station", for the input material propellant gas "DE: Liquefied petroleum gas (LPG) (70% propane, 30% butane)”. The „DE: Green electricity mix (Production mix)“ is used for the electricity mix in the plant.

A portion of the process heat is used for space heating. This can, however, not be quantified, hence a “worst case” figure was taken into account for the product.

Water
The water consumed by the individual process steps for the manufacture amounts to a total of 0.349 l per kg for all insulbar® insulating profiles and 15.7 l per kg Coex sealing wire.
The consumption of fresh water specified in Section 6.3 originates (among others) from the process chain of the pre-products.

Raw material / pre-products
The charts below show the share of raw materials/pre-products in percent.

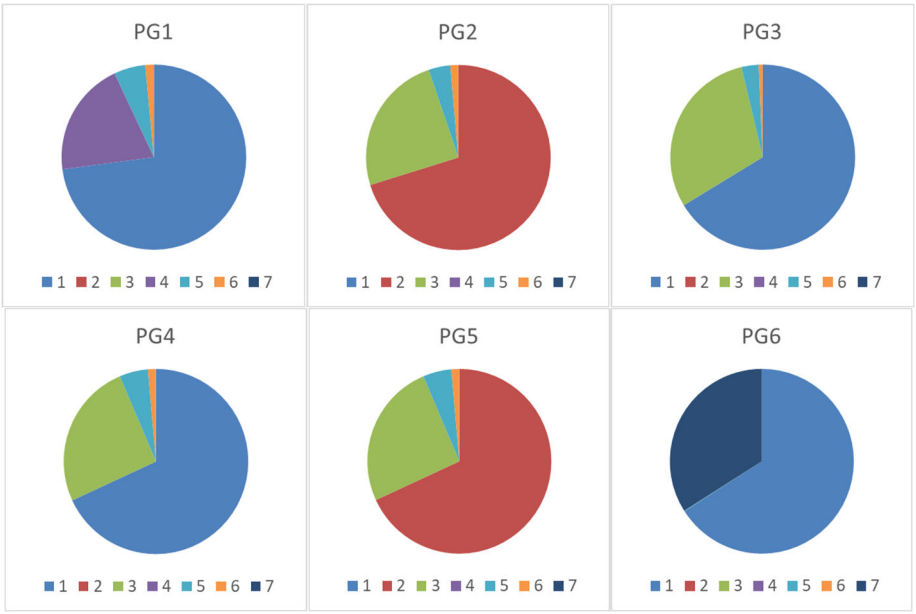


Illustration 1 Percentage of individual materials per declared unit

No.	Material	Mass in % per kg					
		PG 1*	PG 2	PG 3	PG 4	PG 5	PG 6
1	Polyamide	73	-	66	68	-	66
2	Polyamide 100% RE	-	70	-	-	68	-
3	Glass fibre	-	25	30	26	26	-
4	Glass fibre/Carbon fibre	20	-	-	-	-	-
5	Additives	6	4	3	5	5	-
6	Various	1	1	1	1	1	<1%
7	Adhesive	-	-	-	-	-	34

***Values of the reference product insulbar® ESP made of TECATHERM 66 ESP**

Table 3 Percentage of individual materials per declared unit

Ancillary materials and consumables
For insulbar® ESP made of TECATHERM 66 ESP, insulbar® RE made of TECATHERM 66 GF RE and insulbar® REG made of TECATHERM 6 GF, 9.4 g of ancillary materials and consumables are used.

For insulbar® LI made of TECATHERM 66 GF and insulbar® RE-LI made of TECATHERM 66 GF RE, 19.7 g of ancillary materials and consumables are used.

For Coex sealing wire, 0.45 g of ancillary materials and consumables are used.

Product packaging
The amounts used for product packaging are as follows:

No.	Material	Mass in kg per product group (PG)					
		PG 1	PG 2	PG 3	PG 4	PG 5	PG 6
1	Wood	1.21E-02	1.21E-02	1.21E-02	1.21E-02	1.21E-02	1.21E-02
2	Paper/Cardboard	1.78E-03	1.78E-03	1.78E-03	1.78E-03	1.78E-03	1.78E-03
3	Plastics	9.01E-03	9.01E-03	9.01E-03	9.01E-03	9.01E-03	8.76E-03
4	Aluminium	3.14E-03	3.14E-03	3.14E-03	3.14E-03	3.14E-03	0.00
5	Steel	2.05E-04	2.05E-04	2.05E-04	2.05E-04	2.05E-04	2.05E-04

Table 4 Weight in kg of packaging per declared unit

Biogenic carbon content
Only the biogenic carbon content of the associated packaging is reported, as the total mass of biogenic carbon-containing materials is less than 5% of the total mass of the product and associated packaging. According to EN 16449, the following amounts of biogenic carbon are generated for packaging:

No.	Part	Content in kg C per kg
1	In the corresponding packaging	0.01

Table 5 Biogenic carbon content of the packaging at the factory gate

Outputs

The following manufacturing-related outputs were included in the LCA per 1 kg insulbar® insulating profiles:

Waste
Secondary raw materials were included in the benefits.
See Section 6.3 Impact assessment.

Waste water
The manufacture produces 0.492 l waste water.

6.3 Impact assessment

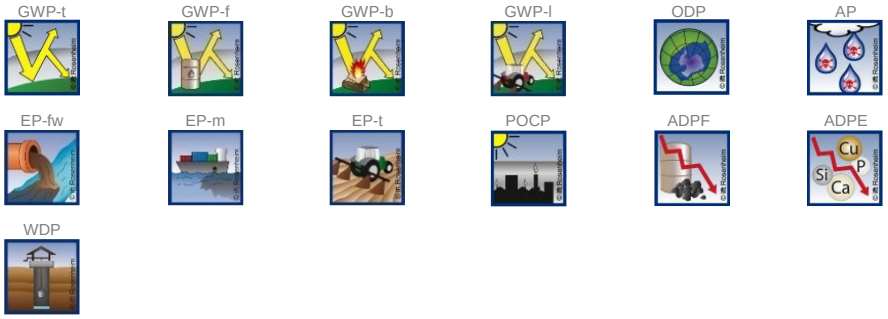
Aim

The impact assessment covers both inputs and outputs. The impact categories applied are stated below:

Core indicators

The models for impact assessment were applied as described in DIN EN 15804-A2.
The core indicators presented in the EPD are as follows:

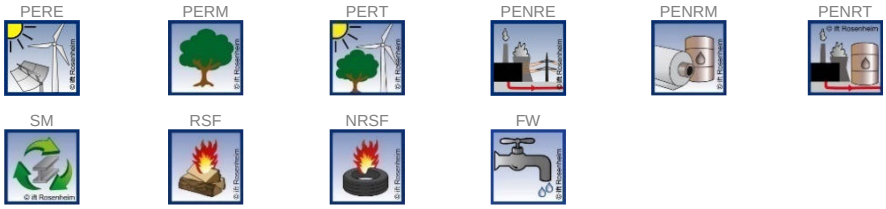
- Climate change - total (GWP-t)
- Climate change - fossil (GWP-f)
- Climate change - biogenic (GWP-b)
- Climate change - land use & land use change (GWP-l)
- Ozone depletion (ODP)
- Acidification (AP)
- Eutrophication freshwater (EP-fw)
- Eutrophication salt water (EP-m)
- Eutrophication land (EP-t)
- Photochemical ozone creation (POCP)
- Depletion of abiotic resources - fossil fuels (ADPF)
- Depletion of abiotic resources - minerals and metals (ADPE)
- Water use (WDP)



Resource management

The models for impact assessment were applied as described in DIN EN 15804-A2.
The following resource use indicators are presented in the EPD:

- Renewable primary energy as energy source (PERE)
- Renewable primary energy for material use (PERM)
- Total use of renewable primary energy (PERT)
- Non-renewable primary energy as energy source (PENRE)
- Renewable primary energy for material use (PENRM)
- Total use of non-renewable primary energy (PENRT)
- Use of secondary materials (SM)
- Use of renewable secondary fuels (RSF)
- Use of non-renewable secondary fuels (NRSF)
- Net use of freshwater resources (FW)

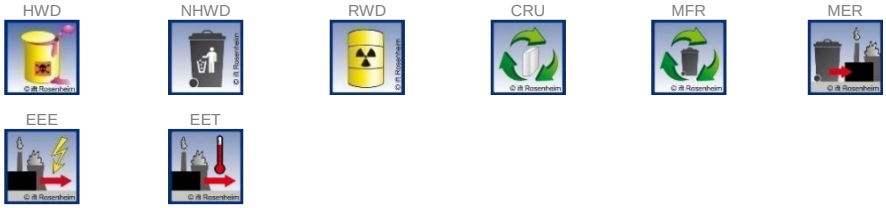


Waste

The waste generated during the production of 1 kg insulating profiles and assemblies is evaluated and shown separately for the fractions trade wastes, special wastes and radioactive wastes. Since waste handling is modelled within the system boundaries, the amounts shown refer to the deposited wastes. A portion of the waste indicated is generated during the manufacture of the pre-products.

The models for impact assessment were applied as described in DIN EN 15804-A2.
The following waste categories and indicators for output closures are presented in the EPD:

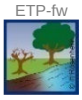
- Disposed hazardous waste (HWD)
- Non-hazardous waste disposed (NHWD)
- Radioactive waste disposed (RWD)
- Components for re-use (CRU)
- Materials for recycling (MFR)
- Materials for energy recovery (MER)
- Exported electrical energy (EEE)
- Exported thermal energy (EET)



Additional environmental impact indicators

The models for impact assessment were applied as described in DIN EN 15804-A2.
The additional impact categories presented in the EPD are as follows:

- Particulate matter emissions (PM)
- Ionizing radiation, human health (IRP)
- Ecotoxicity – freshwater (ETP-fw)
- Human toxicity, carcinogenic effects (HTP-c)
- Human toxicity, non-carcinogenic effects (HTP-nc)
- Impacts associated with land use/soil quality (SQP)

Product Manager 
IRP 
ETP-fw 
HTP-c 
HTP-nc 
SQP 

Results per 1 kg PG1 insulbar® REG made of TECATHERM 66 GF / insulbar® REG made of TECATHERM 66 GF 40 / insulbar® ESP made of TECATHERM 66 ESP																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Core indicators																
GWP-t	kg CO_2 equivalent	6.38	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.02E-03	2.24	7.29E-04	-1.00
GWP-f	kg CO_2 equivalent	6.35	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.00E-03	2.24	7.52E-04	-0.99
GWP-b	kg CO_2 equivalent	3.49E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	-2.94E-05	1.23E-03	-2.49E-05	-9.02E-03
GWP-l	kg CO_2 equivalent	8.90E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.77E-05	2.17E-05	2.33E-06	-9.11E-05
ODP	kg CFC-11-eq.	4.49E-11	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.40E-15	1.92E-12	1.93E-15	-1.22E-11
AP	mol H^+-eq.	1.19E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-06	7.28E-04	5.33E-06	-1.00E-03
EP-fw	kg P-eq.	2.42E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.86E-08	4.40E-07	1.52E-09	-2.70E-06
EP-m	kg N-eq.	3.63E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.82E-06	2.27E-04	1.38E-06	-3.70E-04
EP-t	mol N-eq.	4.11E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.33E-05	3.36E-03	1.51E-05	-3.93E-03
POCP	kg NMVOC-eq.	1.27E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	7.05E-06	5.85E-04	4.15E-06	-9.51E-04
ADPF*²	MJ	125.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.38	1.00E-02	-15.40
ADPE*²	kg Sb equivalent	5.03E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.65E-10	1.31E-08	3.47E-11	-8.67E-08
WDP*²	m^3 world-eq. deprived	0.16	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.15E-05	0.22	8.23E-05	-1.31E-02
Resource management																
PERE	MJ	20.86	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.93	1.64E-03	-5.92
PERM	MJ	0.22	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
PERT	MJ	21.08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.93	1.64E-03	-5.92
PENRE	MJ	108.15	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	17.23	0.84	-15.40
PENRM	MJ	16.87	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	-15.85	-0.83	0.00
PENRT	MJ	125.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.38	1.00E-02	-15.40
SM	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
FW	m^3	1.88E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.37E-06	5.51E-03	2.52E-06	-2.11E-03
Categories of waste																
HWD	kg	7.12E-09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.90E-13	-1.49E-10	2.15E-13	-9.29E-10
NHWD	kg	0.10	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.58E-05	4.73E-02	5.00E-02	-8.32E-03
RWD	kg	9.49E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.13E-07	9.65E-05	1.12E-07	-6.13E-04
Output material flows																
CRU	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MFR	kg	1.49E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
EEE	MJ	2.93E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	3.66	0.00	0.00
EET	MJ	6.75E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	8.40	0.00	0.00

Key:
GWP-t – global warming potential - total **GWP-f** – global warming potential fossil fuels **GWP-b** – global warming potential - biogenic **GWP-l** – global warming potential - land use and land use change **ODP** – ozone depletion potential **AP** - acidification potential **EP-fw** - eutrophication potential - aquatic freshwater **EP-m** - eutrophication potential - aquatic marine **EP-t** - feutrophication potential - terrestrial **POCP** - photochemical ozone formation potential **ADPF*²** - abiotic depletion potential – fossil resources **ADPE*²** - abiotic depletion potential – minerals&metals **WDP*²** – Water (user) deprivation potential **PERE** - Use of renewable primary energy **PERM** - use of renewable primary energy resources **PERT** - total use of renewable primary energy resources **PENRE** - use of non-renewable primary energy **PENRM** - use of non-renewable primary energy resources **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** - net use of 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 **EEE** - exported electrical energy **EET** - exported thermal energy

Results per 1 kg PG1 insulbar® REG made of TECATHERM 66 GF / insulbar® REG made of TECATHERM 66 GF 40 / insulbar® ESP made of TECATHERM 66 ESP															
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	8.02E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.28E-11	4.19E-09	6.55E-11	-7.28E-09
IRP*[1]	kBq U235-eq.	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.17E-05	1.02E-02	1.28E-05	-6.48E-02
ETP-fw*[2]	CTUe	58.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.04E-02	0.54	5.46E-03	-2.64
HTP-c*[2]	CTUh	1.94E-09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.61E-12	3.89E-11	8.40E-13	-1.88E-10
HTP-nc*[2]	CTUh	7.58E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-11	1.69E-09	9.24E-11	-5.87E-09
SQP*[2]	dimensionless	21.70	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.84E-02	0.70	2.52E-03	-4.11

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionizing radiation potential – human health **ETP-fw*[2]** - Eco-toxicity potential – freshwater **HTP-c*[2]** - Human toxicity potential – cancer effects **HTP-nc*[2]** - Human toxicity potential – non-cancer effects **SQP*[2]** – soil quality potential

Disclaimers:

*1 This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some building materials is also not measured by this indicator.

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

Results per 1 kg PG2 insulbar® RE made of TECATHERM 66 GF RE																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Core indicators																
GWP-t	kg CO_2 equivalent	0.81	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.02E-03	0.84	7.29E-04	-0.36
GWP-f	kg CO_2 equivalent	0.80	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.00E-03	0.84	7.52E-04	-0.36
GWP-b	kg CO_2 equivalent	1.29E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	-2.94E-05	1.09E-03	-2.49E-05	-3.23E-03
GWP-l	kg CO_2 equivalent	4.59E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.77E-05	1.36E-05	2.33E-06	-3.26E-05
ODP	kg CFC-11-eq.	4.16E-11	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.40E-15	1.70E-12	1.93E-15	-4.36E-12
AP	mol H^+-eq.	5.26E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-06	3.17E-04	5.33E-06	-3.58E-04
EP-fw	kg P-eq.	1.69E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.86E-08	3.79E-07	1.52E-09	-9.65E-07
EP-m	kg N-eq.	8.18E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.82E-06	9.97E-05	1.38E-06	-1.33E-04
EP-t	mol N-eq.	1.19E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.33E-05	1.39E-03	1.51E-05	-1.41E-03
POCP	kg NMVOC-eq.	2.29E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	7.05E-06	2.54E-04	4.15E-06	-3.40E-04
ADPF*²	MJ	12.97	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.02	1.00E-02	-5.53
ADPE*²	kg Sb equivalent	3.42E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.65E-10	1.14E-08	3.47E-11	-3.10E-08
WDP*²	m^3 world-eq. deprived	9.06E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.15E-05	8.14E-02	8.23E-05	-4.70E-03
Resource management																
PERE	MJ	18.86	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.82	1.64E-03	-2.12
PERM	MJ	0.22	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
PERT	MJ	19.08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.82	1.64E-03	-2.12
PENRE	MJ	-2.66	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	15.70	0.78	-5.53
PENRM	MJ	15.64	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	-14.68	-0.77	0.00
PENRT	MJ	12.98	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.02	1.00E-02	-5.53
SM	kg	0.64	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
FW	m^3	5.07E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.37E-06	2.15E-03	2.52E-06	-7.54E-04
Categories of waste																
HWD	kg	-2.19E-09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.90E-13	-1.55E-10	2.15E-13	-3.33E-10
NHWD	kg	7.55E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.58E-05	1.74E-02	5.00E-02	-2.98E-03
RWD	kg	4.25E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.13E-07	8.54E-05	1.12E-07	-2.19E-04
Output material flows																
CRU	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MFR	kg	1.49E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
EEE	MJ	2.93E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	1.31	0.00	0.00
EET	MJ	6.75E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	3.01	0.00	0.00

Key:
GWP-t – global warming potential - total **GWP-f** – global warming potential fossil fuels **GWP-b** – global warming potential - biogenic **GWP-l** – global warming potential - land use and land use change **ODP** – ozone depletion potential **AP** - acidification potential **EP-fw** - eutrophication potential - aquatic freshwater **EP-m** - eutrophication potential - aquatic marine **EP-t** - feutrophication potential - terrestrial **POCP** - photochemical ozone formation potential **ADPF*²** - abiotic depletion potential – fossil resources **ADPE*²** - abiotic depletion potential – minerals&metals **WDP*²** – Water (user) deprivation potential **PERE** - Use of renewable primary energy **PERM** - use of renewable primary energy resources **PERT** - total use of renewable primary energy resources **PENRE** - use of non-renewable primary energy **PENRM** - use of non-renewable primary energy resources **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** - net use of 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 **EEE** - exported electrical energy **EET** - exported thermal energy

Results per 1 kg PG2 insulbar® RE made of TECATHERM 66 GF RE																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	4.16E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.28E-11	1.95E-09	6.55E-11	-2.61E-09
IRP*[1]	kBq U235-eq.	4.90E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.17E-05	9.01E-03	1.28E-05	-2.32E-02
ETP-fw*[2]	CTUe	7.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.04E-02	0.41	5.46E-03	-0.95
HTP-c*[2]	CTUh	4.85E-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.61E-12	2.41E-11	8.40E-13	-6.74E-11
HTP-nc*[2]	CTUh	1.34E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-11	8.04E-10	9.24E-11	-2.10E-09
SQP*[2]	dimensionless	20.04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.84E-02	0.59	2.52E-03	-1.47

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionizing radiation potential – human health **ETP-fw*[2]** - Eco-toxicity potential – freshwater **HTP-c*[2]** - Human toxicity potential – cancer effects **HTP-nc*[2]** - Human toxicity potential – non-cancer effects **SQP*[2]** – soil quality potential

Disclaimers:

*1 This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some building materials is also not measured by this indicator.

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

Results per 1 kg PG3 insulbar® REG made of TECATHERM 6 GF																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Core indicators																
GWP-t	kg CO_2 equivalent	5.80	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.02E-03	2.24	7.29E-04	-1.00
GWP-f	kg CO_2 equivalent	5.76	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.00E-03	2.24	7.52E-04	-0.99
GWP-b	kg CO_2 equivalent	3.88E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	-2.94E-05	1.23E-03	-2.49E-05	-9.02E-03
GWP-l	kg CO_2 equivalent	8.48E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.77E-05	2.17E-05	2.33E-06	-9.11E-05
ODP	kg CFC-11-eq.	4.56E-11	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.40E-15	1.92E-12	1.93E-15	-1.22E-11
AP	mol H^+-eq.	1.20E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-06	7.28E-04	5.33E-06	-1.00E-03
EP-fw	kg P-eq.	1.95E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.86E-08	4.40E-07	1.52E-09	-2.70E-06
EP-m	kg N-eq.	3.30E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.82E-06	2.27E-04	1.38E-06	-3.70E-04
EP-t	mol N-eq.	3.60E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.33E-05	3.36E-03	1.51E-05	-3.93E-03
POCP	kg NMVOC-eq.	1.16E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	7.05E-06	5.85E-04	4.15E-06	-9.51E-04
ADPF*²	MJ	111.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.38	1.00E-02	-15.40
ADPE*²	kg Sb equivalent	5.08E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.65E-10	1.31E-08	3.47E-11	-8.67E-08
WDP*²	m^3 world-eq. deprived	0.15	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.15E-05	0.22	8.23E-05	-1.31E-02
Resource management																
PERE	MJ	20.80	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.93	1.64E-03	-5.92
PERM	MJ	0.22	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
PERT	MJ	21.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.93	1.64E-03	-5.92
PENRE	MJ	96.17	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	15.30	0.74	-15.40
PENRM	MJ	14.84	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	-13.92	-0.73	0.00
PENRT	MJ	111.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.38	1.00E-02	-15.40
SM	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
FW	m^3	1.71E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.37E-06	5.51E-03	2.52E-06	-2.11E-03
Categories of waste																
HWD	kg	6.12E-09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.90E-13	-1.49E-10	2.15E-13	-9.29E-10
NHWD	kg	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.58E-05	4.73E-02	5.00E-02	-8.32E-03
RWD	kg	8.76E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.13E-07	9.65E-05	1.12E-07	-6.13E-04
Output material flows																
CRU	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MFR	kg	1.49E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
EEE	MJ	2.93E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	3.66	0.00	0.00
EET	MJ	6.75E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	8.40	0.00	0.00

Key:
GWP-t – global warming potential - total **GWP-f** – global warming potential fossil fuels **GWP-b** – global warming potential - biogenic **GWP-l** – global warming potential - land use and land use change **ODP** – ozone depletion potential **AP** - acidification potential **EP-fw** - eutrophication potential - aquatic freshwater **EP-m** - eutrophication potential - aquatic marine **EP-t** - feutrophication potential - terrestrial **POCP** - photochemical ozone formation potential **ADPF*²** - abiotic depletion potential – fossil resources **ADPE*²** - abiotic depletion potential – minerals&metals **WDP*²** – Water (user) deprivation potential **PERE** - Use of renewable primary energy **PERM** - use of renewable primary energy resources **PERT** - total use of renewable primary energy resources **PENRE** - use of non-renewable primary energy **PENRM** - use of non-renewable primary energy resources **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** - net use of 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 **EEE** - exported electrical energy **EET** - exported thermal energy

	Results per 1 kg PG3 insulbar® REG made of TECATHERM 6 GF															
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	7.99E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.28E-11	4.19E-09	6.55E-11	-7.28E-09
IRP*[1]	kBq U235-eq.	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.17E-05	1.02E-02	1.28E-05	-6.48E-02
ETP-fw*[2]	CTUe	51.19	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.04E-02	0.54	5.46E-03	-2.64
HTP-c*[2]	CTUh	1.73E-09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.61E-12	3.89E-11	8.40E-13	-1.88E-10
HTP-nc*[2]	CTUh	6.47E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-11	1.69E-09	9.24E-11	-5.87E-09
SQP*[2]	dimensionless	20.07	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.84E-02	0.70	2.52E-03	-4.11

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionizing radiation potential – human health **ETP-fw*[2]** - Eco-toxicity potential – freshwater **HTP-c*[2]** - Human toxicity potential – cancer effects **HTP-nc*[2]** - Human toxicity potential – non-cancer effects **SQP*[2]** – soil quality potential

Disclaimers:

*1 This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some building materials is also not measured by this indicator.

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

Results per 1 kg PG4 insulbar® LI made of TECATHERM 66 GF																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Core indicators																
GWP-t	kg CO_2 equivalent	5.93	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.02E-03	2.24	7.29E-04	-1.00
GWP-f	kg CO_2 equivalent	5.89	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.00E-03	2.24	7.52E-04	-0.99
GWP-b	kg CO_2 equivalent	3.86E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	-2.94E-05	1.23E-03	-2.49E-05	-9.02E-03
GWP-l	kg CO_2 equivalent	8.88E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.77E-05	2.17E-05	2.33E-06	-9.11E-05
ODP	kg CFC-11-eq.	5.28E-11	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.40E-15	1.92E-12	1.93E-15	-1.22E-11
AP	mol H^+-eq.	1.22E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-06	7.28E-04	5.33E-06	-1.00E-03
EP-fw	kg P-eq.	2.48E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.86E-08	4.40E-07	1.52E-09	-2.70E-06
EP-m	kg N-eq.	3.39E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.82E-06	2.27E-04	1.38E-06	-3.70E-04
EP-t	mol N-eq.	3.84E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.33E-05	3.36E-03	1.51E-05	-3.93E-03
POCP	kg NMVOC-eq.	1.19E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	7.05E-06	5.85E-04	4.15E-06	-9.51E-04
ADPF*²	MJ	114.09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.38	1.00E-02	-15.40
ADPE*²	kg Sb equivalent	5.59E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.65E-10	1.31E-08	3.47E-11	-8.67E-08
WDP*²	m^3 world-eq. deprived	0.15	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.15E-05	0.22	8.23E-05	-1.31E-02
Resource management																
PERE	MJ	24.19	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.93	1.64E-03	-5.92
PERM	MJ	0.22	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
PERT	MJ	24.42	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.93	1.64E-03	-5.92
PENRE	MJ	98.34	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	16.18	0.79	-15.40
PENRM	MJ	15.76	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	-14.80	-0.78	0.00
PENRT	MJ	114.10	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.38	1.00E-02	-15.40
SM	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
FW	m^3	1.80E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.37E-06	5.51E-03	2.52E-06	-2.11E-03
Categories of waste																
HWD	kg	5.55E-09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.90E-13	-1.49E-10	2.15E-13	-9.29E-10
NHWD	kg	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.58E-05	4.73E-02	5.00E-02	-8.32E-03
RWD	kg	8.75E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.13E-07	9.65E-05	1.12E-07	-6.13E-04
Output material flows																
CRU	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MFR	kg	1.49E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
EEE	MJ	2.93E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	3.66	0.00	0.00
EET	MJ	6.75E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	8.40	0.00	0.00

Key:
GWP-t – global warming potential - total **GWP-f** – global warming potential fossil fuels **GWP-b** – global warming potential - biogenic **GWP-l** – global warming potential - land use and land use change **ODP** – ozone depletion potential **AP** - acidification potential **EP-fw** - eutrophication potential - aquatic freshwater **EP-m** - eutrophication potential - aquatic marine **EP-t** - feutrophication potential - terrestrial **POCP** - photochemical ozone formation potential **ADPF*²** - abiotic depletion potential – fossil resources **ADPE*²** - abiotic depletion potential – minerals&metals **WDP*²** – Water (user) deprivation potential **PERE** - Use of renewable primary energy **PERM** - use of renewable primary energy resources **PERT** - total use of renewable primary energy resources **PENRE** - use of non-renewable primary energy **PENRM** - use of non-renewable primary energy resources **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** - net use of 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 **EEE** - exported electrical energy **EET** - exported thermal energy

Results per 1 kg PG4 insulbar® LI made of TECATHERM 66 GF																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	8.30E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.28E-11	4.19E-09	6.55E-11	-7.28E-09
IRP*[1]	kBq U235-eq.	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.17E-05	1.02E-02	1.28E-05	-6.48E-02
ETP-fw*[2]	CTUe	53.50	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.04E-02	0.54	5.46E-03	-2.64
HTP-c*[2]	CTUh	1.86E-09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.61E-12	3.89E-11	8.40E-13	-1.88E-10
HTP-nc*[2]	CTUh	7.02E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-11	1.69E-09	9.24E-11	-5.87E-09
SQP*[2]	dimensionless	24.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.84E-02	0.70	2.52E-03	-4.11

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionizing radiation potential – human health **ETP-fw*[2]** - Eco-toxicity potential – freshwater **HTP-c*[2]** - Human toxicity potential – cancer effects **HTP-nc*[2]** - Human toxicity potential – non-cancer effects **SQP*[2]** – soil quality potential

Disclaimers:

*1 This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some building materials is also not measured by this indicator.

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

Results per 1 kg PG5 insulbar® RE-LI made of TECATHERM 66 GF RE																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Core indicators																
GWP-t	kg CO_2 equivalent	0.99	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.02E-03	2.24	7.29E-04	-1.00
GWP-f	kg CO_2 equivalent	0.97	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.00E-03	2.24	7.52E-04	-0.99
GWP-b	kg CO_2 equivalent	1.85E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	-2.94E-05	1.23E-03	-2.49E-05	-9.02E-03
GWP-l	kg CO_2 equivalent	5.18E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.77E-05	2.17E-05	2.33E-06	-9.11E-05
ODP	kg CFC-11-eq.	4.97E-11	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.40E-15	1.92E-12	1.93E-15	-1.22E-11
AP	mol H^+-eq.	5.72E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-06	7.28E-04	5.33E-06	-1.00E-03
EP-fw	kg P-eq.	1.88E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.86E-08	4.40E-07	1.52E-09	-2.70E-06
EP-m	kg N-eq.	9.53E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.82E-06	2.27E-04	1.38E-06	-3.70E-04
EP-t	mol N-eq.	1.32E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.33E-05	3.36E-03	1.51E-05	-3.93E-03
POCP	kg NMVOC-eq.	2.70E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	7.05E-06	5.85E-04	4.15E-06	-9.51E-04
ADPF*²	MJ	16.40	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.38	1.00E-02	-15.40
ADPE*²	kg Sb equivalent	3.98E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.65E-10	1.31E-08	3.47E-11	-8.67E-08
WDP*²	m^3 world-eq. deprived	9.84E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.15E-05	0.22	8.23E-05	-1.31E-02
Resource management																
PERE	MJ	22.48	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.93	1.64E-03	-5.92
PERM	MJ	0.22	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
PERT	MJ	22.70	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.93	1.64E-03	-5.92
PENRE	MJ	0.64	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	16.18	0.79	-15.40
PENRM	MJ	15.76	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	-14.80	-0.78	0.00
PENRT	MJ	16.41	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.38	1.00E-02	-15.40
SM	kg	0.68	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
FW	m^3	5.96E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.37E-06	5.51E-03	2.52E-06	-2.11E-03
Categories of waste																
HWD	kg	-2.77E-09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.90E-13	-1.49E-10	2.15E-13	-9.29E-10
NHWD	kg	8.07E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.58E-05	4.73E-02	5.00E-02	-8.32E-03
RWD	kg	4.66E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.13E-07	9.65E-05	1.12E-07	-6.13E-04
Output material flows																
CRU	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MFR	kg	1.49E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
EEE	MJ	2.93E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	3.66	0.00	0.00
EET	MJ	6.75E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	8.40	0.00	0.00

Key:
GWP-t – global warming potential - total **GWP-f** – global warming potential fossil fuels **GWP-b** – global warming potential - biogenic **GWP-l** – global warming potential - land use and land use change **ODP** – ozone depletion potential **AP** - acidification potential **EP-fw** - eutrophication potential - aquatic freshwater **EP-m** - eutrophication potential - aquatic marine **EP-t** - feutrophication potential - terrestrial **POCP** - photochemical ozone formation potential **ADPF*²** - abiotic depletion potential – fossil resources **ADPE*²** - abiotic depletion potential – minerals&metals **WDP*²** – Water (user) deprivation potential **PERE** - Use of renewable primary energy **PERM** - use of renewable primary energy resources **PERT** - total use of renewable primary energy resources **PENRE** - use of non-renewable primary energy **PENRM** - use of non-renewable primary energy resources **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** - net use of 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 **EEE** - exported electrical energy **EET** - exported thermal energy

Results per 1 kg PG5 insulbar® RE-LI made of TECATHERM 66 GF RE																
	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Additional environmental impact indicators																
PM	Disease incidence	4.49E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.28E-11	4.19E-09	6.55E-11	-7.28E-09
IRP*[1]	kBq U235-eq.	5.36E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.17E-05	1.02E-02	1.28E-05	-6.48E-02
ETP-fw*[2]	CTUe	9.24	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.04E-02	0.54	5.46E-03	-2.64
HTP-c*[2]	CTUh	6.03E-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.61E-12	3.89E-11	8.40E-13	-1.88E-10
HTP-nc*[2]	CTUh	1.74E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-11	1.69E-09	9.24E-11	-5.87E-09
SQP*[2]	dimensionless	22.68	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.84E-02	0.70	2.52E-03	-4.11

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionizing radiation potential – human health **ETP-fw*[2]** - Eco-toxicity potential – freshwater **HTP-c*[2]** - Human toxicity potential – cancer effects **HTP-nc*[2]** - Human toxicity potential – non-cancer effects **SQP*[2]** – soil quality potential

Disclaimers:

*1 This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some building materials is also not measured by this indicator.

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

Results per 1 kg PG6 Coex sealing wire																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Core indicators																
GWP-t	kg CO_2 equivalent	6.26	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.02E-03	2.24	7.29E-04	-1.00
GWP-f	kg CO_2 equivalent	6.21	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.00E-03	2.24	7.52E-04	-0.99
GWP-b	kg CO_2 equivalent	4.01E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	-2.94E-05	1.23E-03	-2.49E-05	-9.02E-03
GWP-l	kg CO_2 equivalent	8.18E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.77E-05	2.17E-05	2.33E-06	-9.11E-05
ODP	kg CFC-11-eq.	3.58E-11	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.40E-15	1.92E-12	1.93E-15	-1.22E-11
AP	mol H^+-eq.	1.10E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-06	7.28E-04	5.33E-06	-1.00E-03
EP-fw	kg P-eq.	1.42E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.86E-08	4.40E-07	1.52E-09	-2.70E-06
EP-m	kg N-eq.	3.18E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.82E-06	2.27E-04	1.38E-06	-3.70E-04
EP-t	mol N-eq.	3.29E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.33E-05	3.36E-03	1.51E-05	-3.93E-03
POCP	kg NMVOC-eq.	1.13E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	7.05E-06	5.85E-04	4.15E-06	-9.51E-04
ADPF*[2]	MJ	132.88	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.38	1.00E-02	-15.40
ADPE*[2]	kg Sb equivalent	3.85E-07	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.65E-10	1.31E-08	3.47E-11	-8.67E-08
WDP*[2]	m^3 world-eq. deprived	0.13	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	4.15E-05	0.22	8.23E-05	-1.31E-02
Resource management																
PERE	MJ	16.25	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.93	1.64E-03	-5.92
PERM	MJ	0.22	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
PERT	MJ	16.47	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.99E-03	0.93	1.64E-03	-5.92
PENRE	MJ	112.20	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	20.86	1.04	-15.40
PENRM	MJ	20.68	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	-19.48	-1.03	0.00
PENRT	MJ	132.88	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.11	1.38	1.00E-02	-15.40
SM	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
FW	m^3	1.97E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	6.37E-06	5.51E-03	2.52E-06	-2.11E-03
Categories of waste																
HWD	kg	1.06E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	2.90E-13	-1.49E-10	2.15E-13	-9.29E-10
NHWD	kg	6.41E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.58E-05	4.73E-02	5.00E-02	-8.32E-03
RWD	kg	8.10E-04	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.13E-07	9.65E-05	1.12E-07	-6.13E-04
Output material flows																
CRU	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MFR	kg	1.49E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
MER	kg	0.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00
EEE	MJ	2.68E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	3.66	0.00	0.00
EET	MJ	6.24E-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	0.00	8.40	0.00	0.00

Key:
GWP-t – global warming potential - total **GWP-f** – global warming potential fossil fuels **GWP-b** – global warming potential - biogenic **GWP-l** – global warming potential - land use and land use change **ODP** – ozone depletion potential **AP** - acidification potential **EP-fw** - eutrophication potential - aquatic freshwater **EP-m** - eutrophication potential - aquatic marine **EP-t** - feutrophication potential - terrestrial **POCP** - photochemical ozone formation potential **ADPF*[2]** - abiotic depletion potential – fossil resources **ADPE*[2]** - abiotic depletion potential – minerals&metals **WDP*[2]** – Water (user) deprivation potential **PERE** - Use of renewable primary energy **PERM** - use of renewable primary energy resources **PERT** - total use of renewable primary energy resources **PENRE** - use of non-renewable primary energy **PENRM** - use of non-renewable primary energy resources **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** - net use of 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 **EEE** - exported electrical energy **EET** - exported thermal energy

	Results per 1 kg PG6 Coex sealing wire															
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	7.07E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	5.28E-11	4.19E-09	6.55E-11	-7.28E-09
IRP*[1]	kBq U235-eq.	0.11	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.17E-05	1.02E-02	1.28E-05	-6.48E-02
ETP-fw*[2]	CTUe	55.92	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.04E-02	0.54	5.46E-03	-2.64
HTP-c*[2]	CTUh	1.78E-09	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	1.61E-12	3.89E-11	8.40E-13	-1.88E-10
HTP-nc*[2]	CTUh	6.96E-08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	8.07E-11	1.69E-09	9.24E-11	-5.87E-09
SQP*[2]	dimensionless	15.22	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00	3.84E-02	0.70	2.52E-03	-4.11

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionizing radiation potential – human health **ETP-fw*[2]** - Eco-toxicity potential – freshwater **HTP-c*[2]** - Human toxicity potential – cancer effects **HTP-nc*[2]** - Human toxicity potential – non-cancer effects **SQP*[2]** – soil quality potential

Disclaimers:

*1 This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionising radiation from the soil, from radon and from some building materials is also not measured by this indicator.

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

6.4 Interpretation, LCA presentation and critical review

Evaluation

The environmental impacts of the five insulbar® insulating profiles investigated differ from each other to varying degrees. The Coex sealing wire was considered separately. The differences lie in the different pre-products and raw materials used. In particular, the mass fractions of the polyamide suggest this. Since insulbar® RE made of TECATHERM 66 GF RE and insulbar® RE-LI made of TECATHERM 66 GF RE (product groups 2 and 5) do not require the upstream chain of the raw material polyamide due to the use of 100% recycled polyamide, this product also has the lowest environmental impact.

In the area of production, the environmental impact of insulbar® insulating profiles of product groups 1, 3, 4 is mainly caused by the use of polyamide or its upstream chains. The glass fibres in the profiles also have a major influence on the environmental impact of production.
The environmental impact of insulbar® insulating profiles in product groups 2 and 5 is primarily caused by the use of glass fibres and polyolefins and their respective upstream chains.
The foamed profiles (product groups 4 and 5) have a slightly higher environmental impact due to the slightly higher energy consumption, but the lower density results in more profile metres per mass unit.
In case of Coex sealing wire (product group 6), the environmental impact in the area of production is mainly caused by the use of PA66 and to a much lesser extent by the adhesive.

Furthermore, waste handling (thermal recycling) plays an important role regarding the environmental impact of all profiles and wires.

In scenario C4, only marginal expenditures for the physical pretreatment and the landfill operation are to be expected. Allocation to individual products is almost impossible for site disposal.

Compared to the EPD from 2018, the life cycle assessment results differ significantly in some cases. The reasons for this are that the modeling basis was updated to EN 15804+A2 due to the revision of EN 15804+A1, other, more suitable "LCA for Experts" data sets were used, the background data in "LCA for Experts" has changed and by the declaration holder.

The values obtained from the LCA calculation are suitable for the certification of buildings.

Diagrams

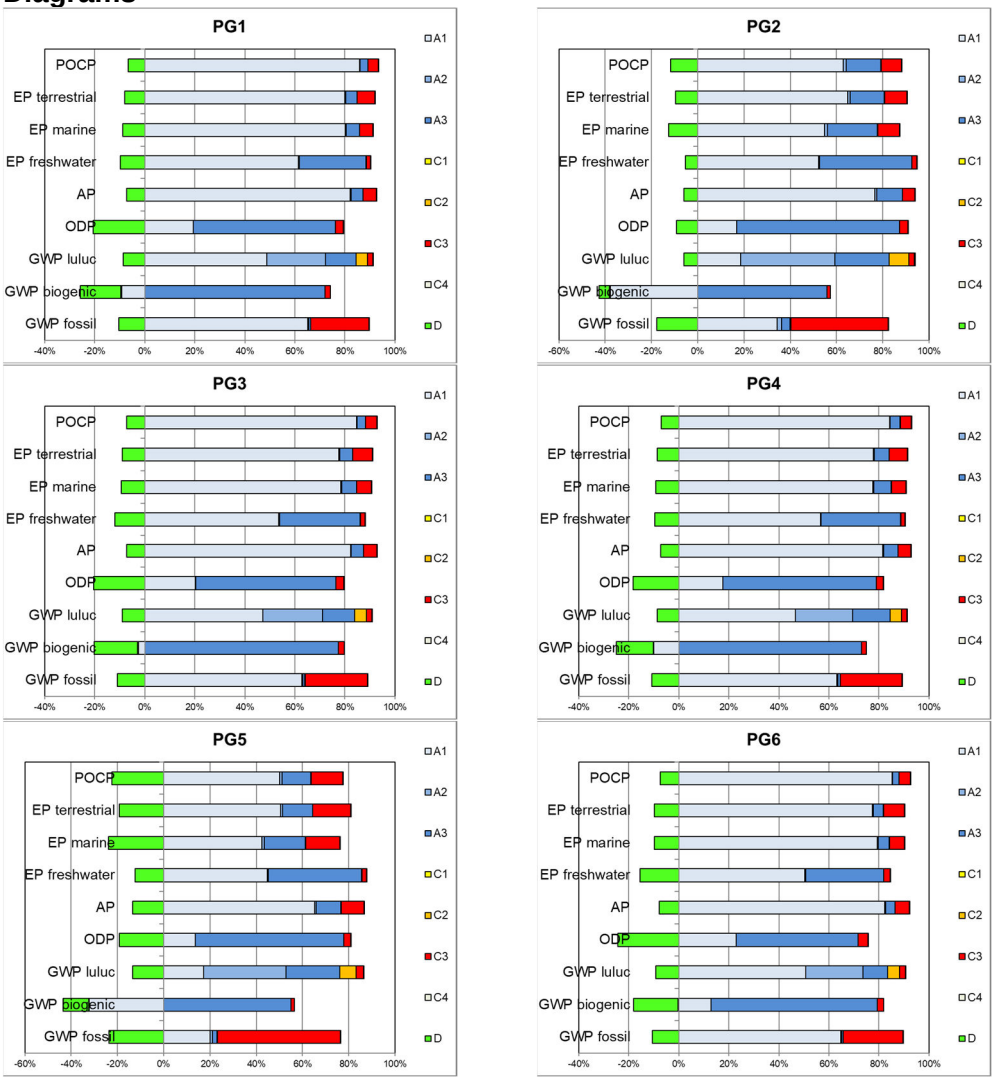


Illustration 2 Percentage of the modules in selected environmental impact indicators

Report

The LCA report underlying this EPD was developed according to the requirements of DIN EN ISO 14040 and DIN EN ISO 14044 as well as DIN EN 15804 and DIN EN ISO 14025. It is deposited with ift Rosenheim. The results and conclusions reported to the target group are complete, correct, without bias and transparent. The results of the study are not designed to be used for comparative statements intended for publication.

Critical review

The critical review of the LCA and the report took place in the course of verification of the EPD and was carried out by the external verifier Susanne Volz.

7 General information regarding the EPD

Comparability

This EPD was prepared according to DIN EN 15804 and is therefore only comparable to those EPDs that also comply with the requirements set out in DIN EN 15804.
Any comparison must refer to the building context and the same boundary conditions of the various life cycle stages.
For comparing EPDs of construction products, the rules set out in DIN EN 15804, Clause 5.3, apply.

The detailed individual results of the products were summarised on the basis of conservative assumptions and differ from the average results. Identification of the product groups and the resulting variations are documented in the background report.

Communication

The communications format of this EPD meets the requirements of EN 15942:2012 and is therefore the basis for B2B communication. Only the nomenclature has been changed according to DIN EN 15804.

Verification

Verification of the Environmental Product Declaration is documented in accordance with the ift "Richtlinie zur Erstellung von Typ III Umweltproduktdeklarationen" (Guidance on preparing Type III Environmental Product Declarations) in accordance with the requirements set out in DIN EN ISO 14025.

This declaration is based on the PCR Document “PCR Part A" PCR-A-0.4:2023 and "Semi-finished products" PCR HZ-3.0:2023.

The European standard EN 15804 serves as the core PCR [a)]
Independent verification of the declaration and statement according to EN ISO 14025:2010
Independent third party verifier: [b)] [Sunsanne, Volz]
[a)] Product category rules [b)] Optional for business-to-business communication Mandatory for business-to-consumer communication (see EN ISO 14025:2010. 9.4).

Revisions of this document

No.	Date	Note	Person in charge	Testing personnel
1	16.04.2024	External verification	Dumproff	Volz
2	16.04.2024	Formatting adjustments	Dumproff	
3	22.04.2024	Formatting adjustments	Dumproff	

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9 Annex

Description of life cycle scenarios for Insulbar® insulating profiles

Product stage			Con-struction process stage		Use stage*							End-of-life stage				Benefits and loads beyond system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	production	Transport	Construction/installation process	Use	maintenance	Repair	replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Disposal	Reuse Recovery Recycling potential
✓	✓	✓	—	—	—	—	—	—	—	—	—	✓	✓	✓	✓	✓

* For declared B-modules, the calculation of the results is performed taking into account the specified RSL related to one year

Table 6 Overview of applied life cycle stages

Note: The standard scenarios selected are presented in bold type. They were also used for calculating the indicators in the summary table.

✓ Included in the LCA
— Not included in the LCA

A5 Construction/installation - not considered, informative module

Scenario	Description
Disposal of packaging	Packaging is disposed according to the on-site waste management

In the selected scenario, environmental impacts arise from the use of packaging.

The amounts used for product packaging are as follows, which were accounted for in A1-A3:

Material	Mass in kg					
	PG 1	PG 2	PG 3	PG 4	PG 5	PG 6
Wood	1.21E-02	1.21E-02	1.21E-02	1.21E-02	1.21E-02	1.21E-02
Paper and cardboard	1.78E-03	1.78E-03	1.78E-03	1.78E-03	1.78E-03	1.78E-03
Plastics	9.01E-03	9.01E-03	9.01E-03	9.01E-03	9.01E-03	8.76E-03
Aluminium	3.14E-03	3.14E-03	3.14E-03	3.14E-03	3.14E-03	0.00
Steel	2.05E-04	2.05E-04	2.05E-04	2.05E-04	2.05E-04	2.05E-04

C1 Deconstruction

No.	Scenario	Description
C1	Deconstruction	Based on EN 17213 (metal windows): Non-glass content 95%

No relevant inputs or outputs apply to the scenario selected. The energy consumed for deconstruction is negligible. Any arising consumption is marginal.

Since this is a single scenario, the results are shown in the relevant summary table.

In case of deviating consumption the removal of the products forms part of site management and is covered at the building level.

C2 Transport

No.	Scenario	Description
C2	Transport	Transport to collection point with 40 t truck (Euro 0-6 Mix), diesel, 27 t payload, 50% capacity used, 100 km.

Since this is a single scenario, the results are shown in the relevant summary table.

C3 Waste management

No.	Scenario	Description
C3	Disposal	Based on EN 17213 (metal windows): Plastics 100% thermal recycling

Electricity consumption of recycling plant: 0.5 MJ/kg.

As the products are placed on the European market, the disposal scenario is based on average European data sets.

The below table presents the disposal processes and their percentage by mass/weight. The calculation is based on the above mentioned shares in percent related to the declared unit of the product system.

C3 Disposal	Unit	C3
Collection process, collected separately	kg	0.95
Collection process, collected as mixed construction waste	kg	0.05
Recovery system, for re-use	kg	0.00
Recovery system, for recycling	kg	0.00
Recovery system, for energy recovery	kg	0.95
Disposal	kg	0.00

Since this is a single scenario, the results are shown in the summary table.

C4 Disposal

No.	Scenario	Description
C4	Disposal	The non-recordable amounts and losses within the re-use/recycling chain (C1 and C3) are modelled as “disposed” (RER).

The consumption in scenario C4 results from physical pre-treatment, waste recycling and management of the disposal site. The benefits obtained here from the substitution of primary material production are allocated to Module D, e.g. electricity and heat from waste incineration.

Since this is a single scenario, the results are shown in the summary table.

D Benefits and loads from beyond the system boundaries

No.	Scenario	Description
D	Recycling potential	Benefits from incineration plant: Benefits from waste incineration: electricity replaces electricity mix (RER); thermal energy replaces thermal energy from European natural gas (RER).

The values in module D result from de-construction at the end of service life.

Since this is a single scenario, the results are shown in the summary table.

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Layout
ift Rosenheim GmbH – 2021

Photographs (front page)
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