Łukasiewicz
Institute of Ceramics
and Building Materials

ENVIRONMENTAL PRODUCT DECLARATION
no. 02-12/2024

Thermal insulation lagging

r.Heat® A/ r.Spiro® A

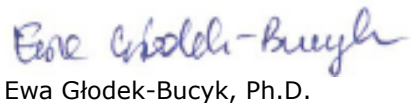
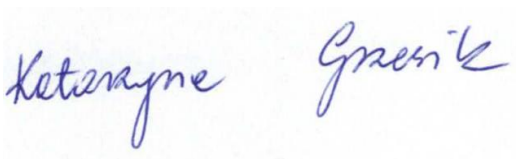
r.Heat® N

Declaration owner:	**Rohhe Sp. z o.o.**
Program owner:	**Lukasiewicz Research Network – Institute of Ceramic and Building Material Environmental Engineering Center**
Name of program:	**Environmental Product Declaration – B2B**
Date of issue:	**05.12.2024**
Declaration valid until:	**05.12.2029**

Energy to live ROHHE®

ENVIRONMENTAL PRODUCT DECLARATION no. 02-12/2024

1. OVERVIEW

Product of declaration	Thermal insulation lagging: • r.Heat® A/ r.Spiro® A • r.Heat® N
Program owner: Łukasiewicz Research Network– Institute of Ceramics and Building Materials Environmental Engineering Center in Opole. **http://www.icimb.pl/opole/**	**Declaration owner:** **Rohhe Sp. z o.o.** Al. Krakowska 19A, 05-555 Tarczyn Telephone: +48 22 299 88 33 Adress e-mail: biuro@rohhe.pl **https://www.rohhe.pl/**
Declared unit:	1 linear meter
Date of issue:	05.12.2024
Declaration valid until:	05.12.2029
Life Cycle Analysis (LCA):	A1-A3, A4, A5, C1-C4 and D according to standard PN-EN 15804+A2 (cradle-to-gate with options)
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
Representatives:	Polish product, year 2023
Declared durability:	50 years
Reasons for performing LCA:	B2B
Standardy produktu	PN-EN 14303:2009+A1:2013
Declarations that are the result of different programs or are not performed in accordance with the standard may not be comparable.	
The Łukasiewicz – Institute of Ceramics and Building Materials Environmental Engineering Center provides access to the Type III environmental declaration for insulation laggings to interested parties.	
The declaration owner is responsible for the information and the base evidence. Łukasiewicz Research Network - Institute of Ceramics and Building Materials Center for Environmental Engineering is not responsible for the manufacturer's information and data and evidence regarding the life cycle assessment.	
Zespół Kiprian, M.Sc. Ewa Głodek-Bucyk, Ph.D. Patryk Okoń, M.Sc. **Approved:**  Joanna Poluszyńska, PhD Director of the Environmental Engineering Center  Ewa Głodek-Bucyk, Ph.D. Leader of the Process Engineering Research Group	**Review:** CEN standard PN-EN 15804+A2 serves as the main PCR document. Independent verification of declarations and data according to EN ISO 14025:2010 ☐ Internal ☒ External  Katarzyna Grzesik, PhD, DSc

2. MANUFACTURE AND PRODUCT INFORMATION

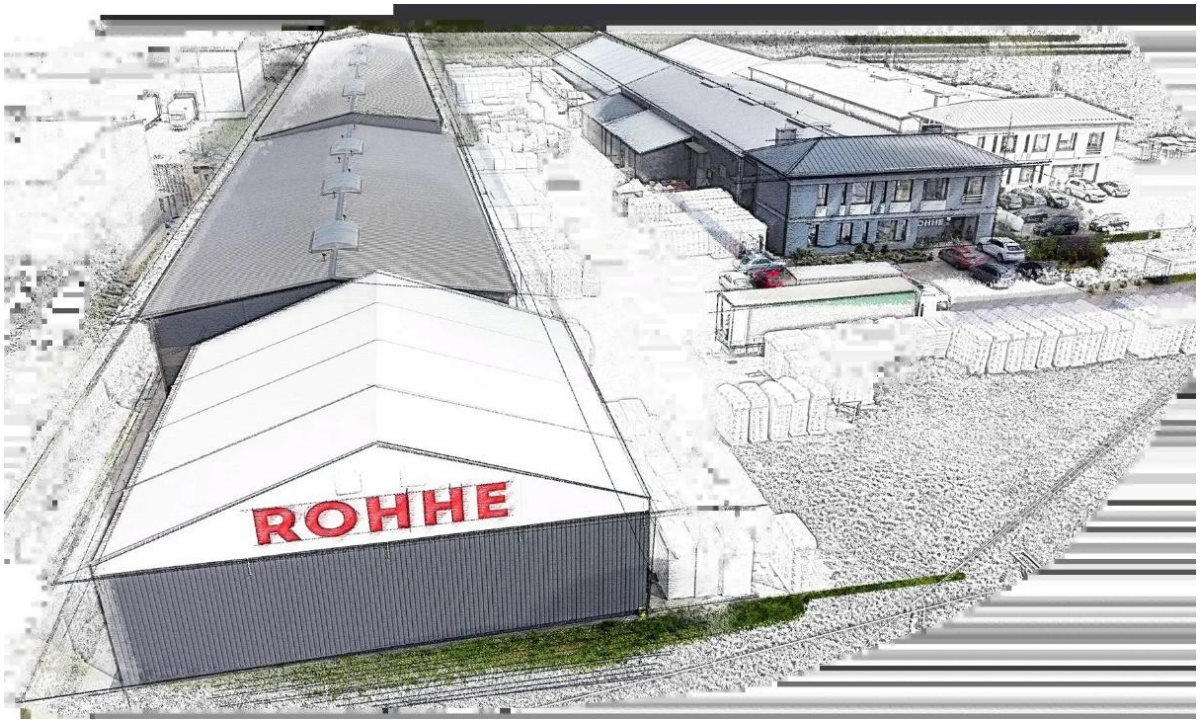


Figure 1. The production plant of Rohhe Sp. z o.o. in Tarczyn.

Rohhe Sp. z o.o. specializes in the production of technical thermal insulation, the purpose of which is thermal insulation of heating, ventilation, air conditioning, water, sewage systems, installed in all types of buildings. The company is active on the domestic and European markets. Rohhe products are currently offered in 18 countries.

The innovation and quality of Rohhe products has been appreciated by independent experts by awarding the "Teraz Polska" and "Lauru klienta" emblems for several years.

Rohhe is the only company on the HVAC thermal insulation market with 100% Polish capital. The company's headquarters, including office, production and warehouse parts, is in Tarczyn. Rohhe products have a CPR certificate for compliance with PN-EN 14303+A1:2013-07, as well as certificates applicable to the maritime market according to Directive 2014/90/EU on marine equipment (MED) and Commission Implementing Regulation (EU) 2023/1667.

The implemented Integrated Management System is the basis for the functioning of the entire organization. The system integrates three main components: FPC, ISO 14001 and ISO 9001. Rohhe takes special care to control and minimize the negative impact on the environment by applying effective preventive measures, optimizing the use of packaging and checking technological processes through systematic environmental measurements. Currently, all electricity consumed comes from renewable energy sources and production itself is zero-emission, i.e. it does not generate any technological wastewater, solid hazardous waste or gases resulting from combustion.

PRODUCT DESCRIPTION AND APPLICATION

r.Heat® A/ r.Spiro® A

Mineral wool lagging with cladding.

r.Heat® A has a longitudinal mounting slit and a wide, self-adhesive closing tab.

A single r.Spiro® A tube consists of two identical elements, connected by a self-adhesive closure tab.

Purpose: as thermal, fire, moisture and acoustic insulation of piping systems. The product is used in heating, heating, ventilation, sanitary and industrial installations.

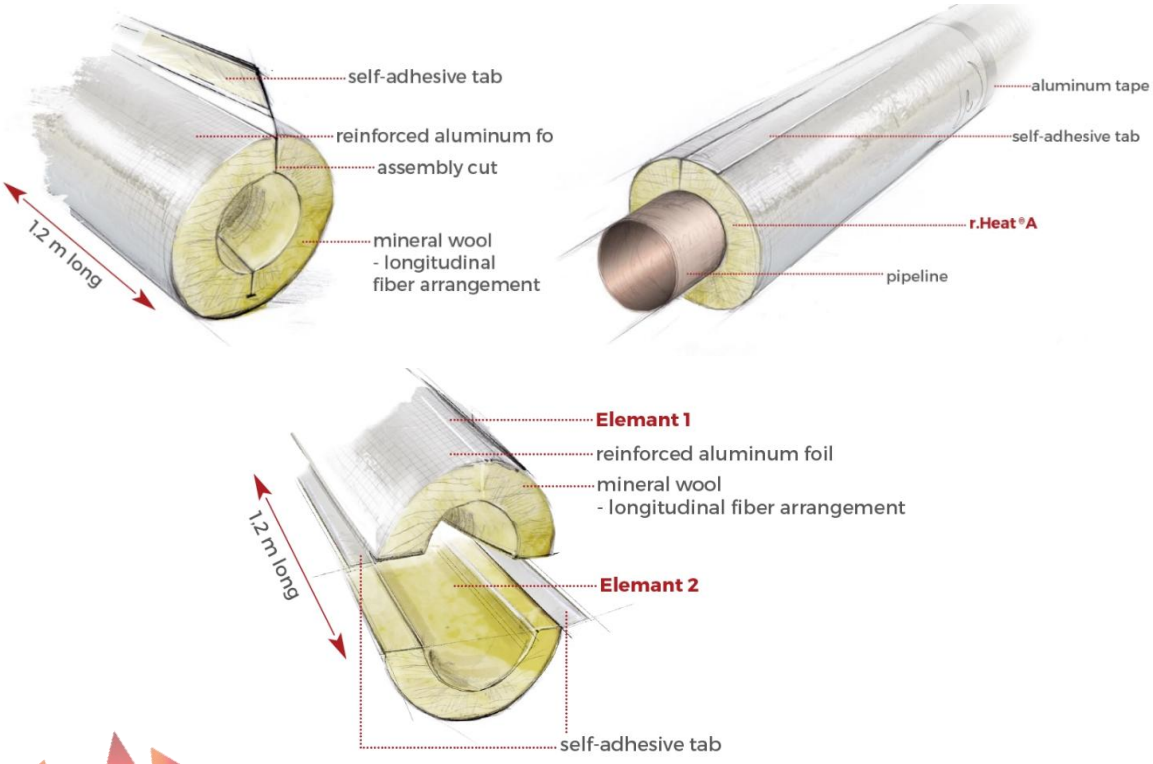
Cladding: aluminum foil reinforced with fiberglass mesh

Product thickness: 12 – 120 mm
Diameter of insulated pipes: from 15 mm

Reaction to fire class: **$A2_L$-s1, d0**
Maximum application temperature: 300 °C
Trace amounts of water-soluble ions CL10 ≤ 10 ppm (10 mg/1 kg)

Table 1 - The value of declared termal conductivity - λ_D

$t_{śr}$ [°C]	10	40	50	100	200	300
λ_D [W/m·K]	0,033	0,037	0,038	0,045	0,065	0,090



r.Heat® N

Mineral wool lagging without cladding.

Purpose: as thermal, fire and acoustic insulation of piping systems. The product is used in industrial and construction installations in applications requiring additional external covers.

The product is suitable for use with both rigid cladding, such as sheet metal, and flexible cladding, e.g. in the form of a multi-layer UV-resistant film. The compact structure of the wool used provides a secure and durable support for the fixed cladding.

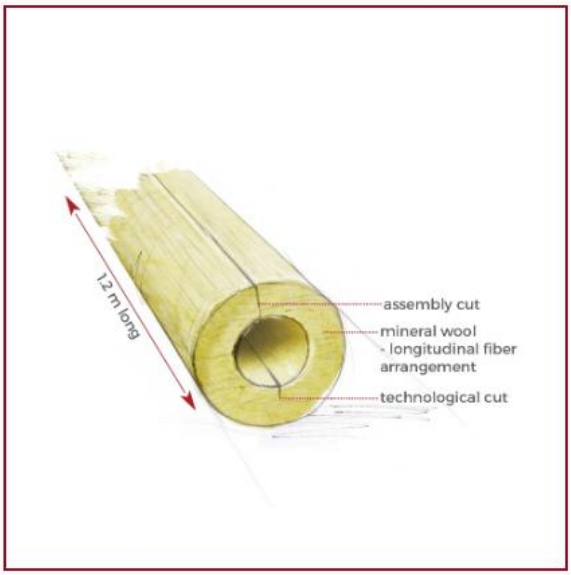
Product thickness: 12 – 120 mm
Diameter of insulated pipes: from 15 mm

Reaction to fire class: **$A1_L$**
Maximum application temperature: 300 °C
Trace amounts of water-soluble ions CL10 ≤ 10 ppm (10 mg/1 kg)

Table 2 - The value of declared thermal conductivity - λ_D

$t_{śr}$ [°C]	10	40	50	100	200	300
λ_D [W/m·K]	0,033	0,037	0,038	0,045	0,065	0,090

Product structure



Pipeline insulation - without cladding

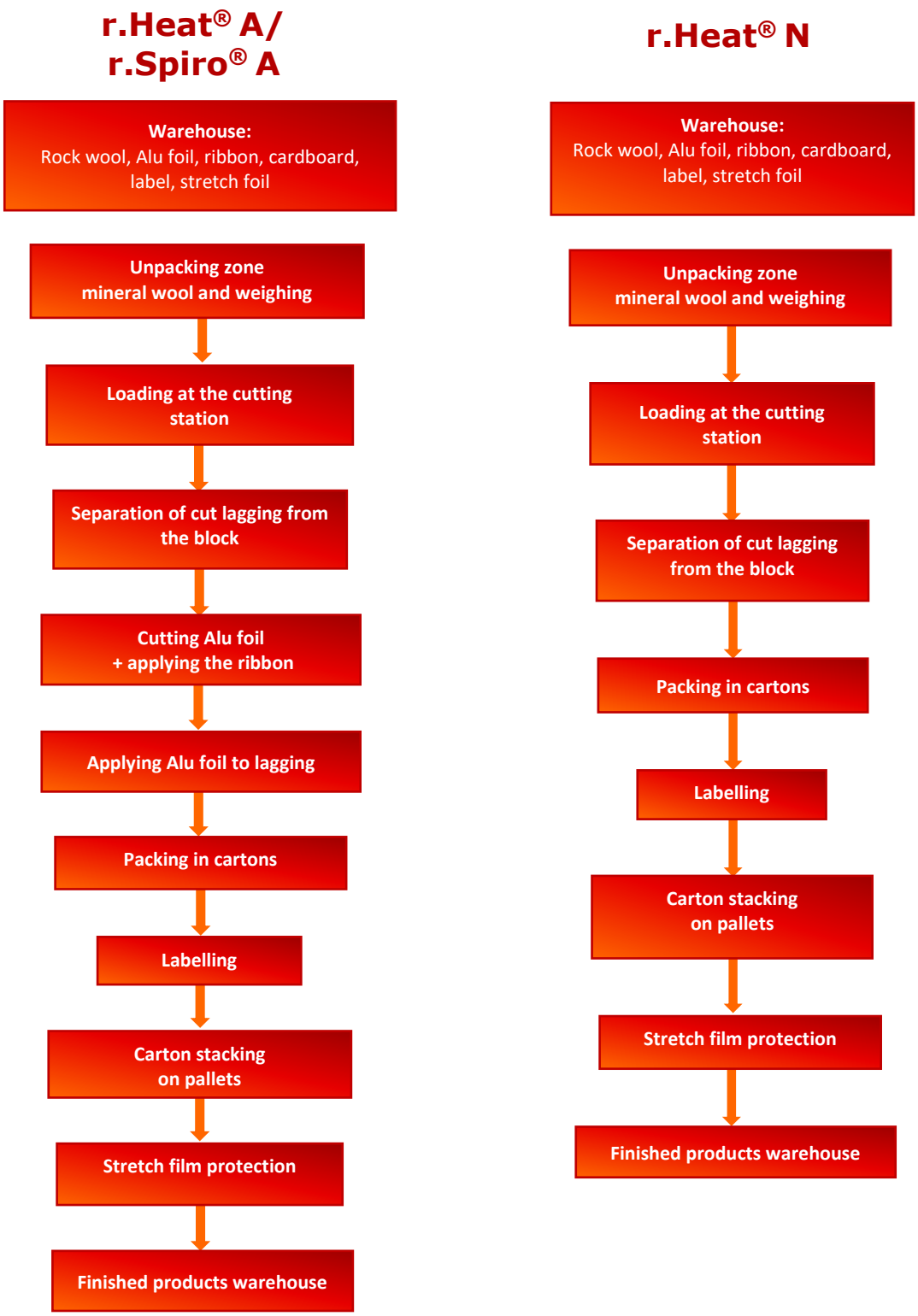


Figure 2. The production process of thermal insulation laggings in the plant of Rohhe Sp. z o.o.

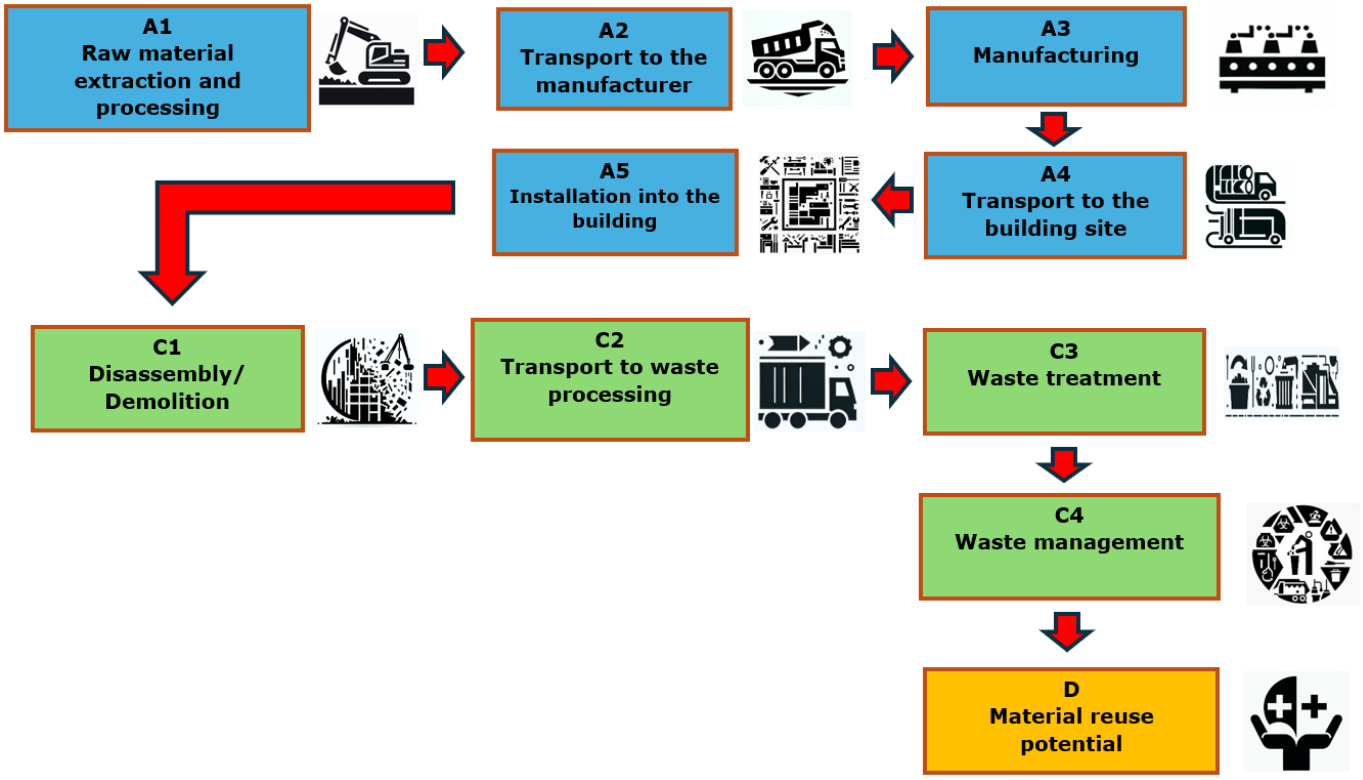
3. BASIC DATA

The environmental declaration is based on data provided by Rohhe Sp. z o.o. The products covered by the declaration are manufactured in one production plant. The values of the input and output streams have been calculated on the basis of data provided by the manufacturer for individual thermal insulation laggings (r.Heat® A, r.Spiro®A and r.Heat® N) with a thickness of 30 mm from 01.01.2023 to 31.12.2023. They were delivered to the program owner in a summary form.
The consumption of raw materials, energy and emissions are given for individual types of lagging. The allocation was made on the basis of data provided by the manufacturer.

4. LCA: CALCULATION AND RULES

System limitations

The life cycle analysis of the tested products includes modules A1-A3, A4, A5C1-C4 and D (Cradle to Gate with options) in accordance with EN 15804.



Data collection period

Data on the production process were provided in 2024 for the period 01.01.2023 - 31.12.2023 (12 months) and correspond to the production technology of the time.

Declared unit

1 linear meter

Assumptions

A1 – extraction and consumption of raw materials refer to specific mass shares in the production process, per unit declared 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 – CO_2, NO_x, SO_2 and dust emission values from the production process received from the manufacturer.
A4 – transport of thermal insulation lagging to the construction site is carried out according to a developed scenario. It assumes the method of transport and the distance
over which the materials are transported.
A5 – installation of thermal insulation lagging is carried out according to a developed scenario. It determines the consumption of energy and materials, and the amount of waste generatedas a result of the assembly process.
C1 – describes the procedure during the disassembly/demolition of thermal insulation lagging. The calculations are performed on the basis of the developed scenario.
C2 – refers to the transport of construction waste to a recovery or disposal plant. The calculations are performed on the basis of the developed scenario.
C3 – takes into account the environmental impact during the processing of construction and demolition waste containing elements of thermal insulation lagging in a waste recovery plant. The calculations are performed on the basis of the developed scenario.
C4 – takes into account the environmental impact of thermal insulation lagging elements. The calculations are performed on the basis of the developed scenario.
D – refers to the impact and effects of the use of secondary material. The calculations are performed 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. 3.10, KOBiZE, and the Guarantee of Origin (GO) certificate. The emission factors for the electricity used in the scenarios were determined using the actual KOBiZE data. The Polish electricity emission factor (Ecoinvent supplemented with current national data from KOBiZE) is 0.685 kg CO2/kWh. The electricity taken into account in production (A3) is modelled in accordance with the energy mix presented in the Guarantee of Origin (GO) certificate. The amount of electricity purchased from the GO covers 100% of the electricity consumption for production. A detailed analysis of data quality was part of an external audit.

Allocation	All data on components manufactured in the plant of Rohhe Sp. z o.o. have been provided by the manufacturer and have been referred to the declared unit of the product – **1 linear meter** (thickness 30 mm). The allocation rules used in this EPD are based on the general ICIMB-PCR A principles.

5. LCA: SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

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 product categorization have been adopted in accordance with the PN-EN 15804 standard.

For the life cycle analysis of products covered by the cradle to gate with options environmental declaration, scenarios have been developed for modules A4, A5, C1-C4 and D:

Module A4 - Transport to the construction site - Transport of thermal insulation lagging from the factory to the destination is carried out using appropriately adapted vehicles, according to the customer's requirements or the specificity of the order. The lagging is packed into cardboard boxes and placed on wooden pallets, then the whole thing is carefully secured with an auxiliary LDPE hood and additionally wrapped in stretch foil to prevent damage during transport. Transport with 100% load capacity was assumed for the calculations.

Module A5 – Assembly – The installation of the thermal insulation lagging is done manually, which eliminates the need to use heavy equipment or power tools. As a result, emissions related to electricity or fuel consumption do not occur. Manual assembly makes this stage low-carbon, with environmental impact mainly focused on waste management.

In order to calculate the impact of this module, the following assumptions were made:

	Packaging waste:
Product	Stretch foil, cartons
Means of transportation	Truck
Load capacity (Mg)	32
Average distance from the recycling facility (km)	100

Module C1 - Demolition/Demolition – Manual demolition, and initial sorting of waste on site is assumed. Manual demolition is a process with a low environmental impact due to the lack of energy demand. The modulus is zero.

Module C2 – Transport – After initial segregation at the demolition site, the thermal insulation lagging waste is directed to further processes.

- Transport is carried out by trucks with a load capacity of 16-32 tons, meeting the EURO 6 emission standards,
- Transport to the recycling plant takes place at a distance of 150 km from the demolition site.
- Transport to the landfill takes place over a distance of 100 km.

Module C3 - **Waste treatment** - All waste goes to the waste treatment plant. Electricity consumption per 1 kg of waste is 0.03 kWh/kg, and energy consumption for internal transport vehicles is 0.3 MJ/kg.

Module C4 – Waste management – It has been assumed that 100% of waste separated in the treatment process will be landfilled (module C3).

Module D - **Material reuse potential** - the benefits of packaging waste processing are included.

6. 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 the system boundaries**
Mining & Sourcing	Transport	Production	Transport	Construction Process	Usufruct	Maintenance	Repair	Exchange	Renovation	Energy consumption	Water consumption	Demolition	Transport	Waste Treatment	Waste management	Potential for reuse
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	**X**	**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 products– **1 mb thermal insulation lagging r.Heat® A/r.Spiro® A and thermal insulation laggings r.Heat® N** with a thickness of 30 mm.

Explanations of the abbreviations used to describe the impact category are provided below:

GWP-total	Global warming potential
GWP-fossil	Global warming potential fossil fuel
GWP-biogenic	Global warming potential biogenic
GWP-luluc	Global warming potential land use and land change
ODP	Depletion potential of the stratospheric ozone layer
AP	Acidification potential of land and water
EP-freshwater	Eutrophication potential, fraction of nutrients reaching freshwater end compartment
EP-marine	Eutrophication potential, fraction of nutrients reaching marine end compartment
EP-terrestial	Eutrophication potential, Accumulated Exceedance
POCP	Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals&metals	Abiotic depletion potential for nonfossil resources
ADP-fossil	Abiotic depletion potential for fossil resources
WDP	Water (user) deprivation potential
PM	Potential incidence of disease due to PM emissions

IRP	Potential Human exposure efficiency relative to U235
ETP-fw	Potential comparative Toxic Unit for ecosystems
HTP-c	Potential comparative Toxic Unit for humans (cancerogenic)
HTP-nc	Potential comparative Toxic Unit for humans (non-cancerogenic)
SQP	Potential soil quality index
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials
PERM	Use of renewable primary energy resources used as raw materials
PERT	Total use of renewable primary energy resources
PEN-RE	Use of non-renewable primary energy resources excluding non-renewable primary energy resources used as raw materials
RE	Use of non-renewable primary energy resources used as raw materials
PENRT	Total use of non-renewable primary energy resources
SM	Use of secondary material
RSF	Use of renewable fuels
NRSF	Use of non-renewable secondary fuels
FW	Use of net fresh water

MAIN IMPACT INDICATORS: 1 mb thermal insulation lagging r.Heat® A , r.Spiro® A; thickness: 30 mm

		Life cycle stage									
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	2,03E+00	8,48E-02	1,93E-01	1,31E-01	0,00E+00	0,00E+00	1,38E-02	6,90E-02	6,08E-03	-4,99E-01
GWP-fossil	kg CO_2 eq.	2,08E+00	8,47E-02	2,35E-01	1,31E-01	0,00E+00	0,00E+00	1,38E-02	6,76E-02	6,07E-03	-5,19E-02
GWP-biogenic	kg CO_2 eq.	-5,39E-02	5,87E-05	-4,32E-02	9,08E-05	0,00E+00	0,00E+00	9,57E-06	1,34E-03	8,37E-07	-4,47E-01
GWP-luluc	kg CO_2 eq.	6,61E-04	2,81E-05	1,64E-03	4,35E-05	0,00E+00	0,00E+00	4,58E-06	3,05E-05	3,13E-06	-2,69E-06
ODP	kg CFC11 eq.	3,24E-08	1,68E-09	6,37E-09	2,61E-09	0,00E+00	0,00E+00	2,75E-10	6,32E-10	1,76E-10	-1,09E-10
AP	mol H+ eq.	1,81E-02	1,76E-04	1,11E-03	2,73E-04	0,00E+00	0,00E+00	2,88E-05	4,82E-04	4,30E-05	-1,21E-04
EP-freshwater	kg PO_4 eq.	5,73E-04	5,74E-06	1,43E-04	8,88E-06	0,00E+00	0,00E+00	9,35E-07	3,80E-05	5,04E-07	-3,18E-06
EP-marine	kg N eq.	1,78E-03	4,24E-05	4,02E-04	6,56E-05	0,00E+00	0,00E+00	6,91E-06	1,86E-04	1,64E-05	-3,34E-04
EP-terrestrial	mol N eq.	3,07E-02	4,57E-04	3,18E-03	7,08E-04	0,00E+00	0,00E+00	7,45E-05	1,96E-03	1,79E-04	-5,22E-04
POCP	kg NMVOC eq.	7,66E-03	2,93E-04	9,07E-04	4,54E-04	0,00E+00	0,00E+00	4,78E-05	5,82E-04	6,41E-05	-2,65E-04
ADP-minerals & metals	kg Sb eq.	2,00E-05	2,76E-07	1,62E-06	4,27E-07	0,00E+00	0,00E+00	4,49E-08	4,14E-08	9,49E-09	-1,46E-08
ADP-fossil	MJ	2,67E+01	1,19E+00	3,77E+00	1,84E+00	0,00E+00	0,00E+00	1,94E-01	8,18E-01	1,49E-01	-7,83E-02
WDP	WDP (m^3) world. ekw	3,72E-01	4,95E-03	1,19E-01	7,66E-03	0,00E+00	0,00E+00	8,06E-04	2,52E-03	6,51E-03	9,27E-03

ADDITIONAL IMPACT INDICATORS: 1 mb thermal insulation lagging r.Heat® A , r.Spiro® A; thickness: 30 mm

		Life cycle stage									
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	1,02E-07	6,24E-09	9,56E-09	9,65E-09	0,00E+00	0,00E+00	1,02E-09	1,02E-08	9,78E-10	-7,47E-10
IRP	kBq U235 eq.	1,33E-01	1,55E-03	5,15E-02	2,39E-03	0,00E+00	0,00E+00	2,52E-04	4,69E-04	9,49E-05	-1,49E-04
ETP-fw	CTUe	3,57E-04	3,57E-06	8,93E-05	5,53E-06	0,00E+00	0,00E+00	5,82E-07	2,37E-05	3,14E-07	-1,98E-06
HTP-c	CTUh	4,52E-07	6,01E-10	9,02E-10	9,30E-10	0,00E+00	0,00E+00	9,80E-11	1,78E-10	2,74E-11	-3,28E-10
HTP-nc	CTUh	1,84E-08	7,48E-10	3,54E-09	1,16E-09	0,00E+00	0,00E+00	1,22E-10	4,30E-10	2,54E-11	-2,63E-08
SQP	-	1,62E+01	7,19E-01	7,49E+00	1,11E+00	0,00E+00	0,00E+00	1,17E-01	8,84E-02	2,93E-01	-1,42E-01

INDICATORS DESCRIBTIONS RESOURCE CONSUMPTION: 1 mb thermal insulation lagging r.Heat® A, r.Spiro® A; thickness: 30 mm

		Life cycle stage									
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	3,74E+00	2,05E-02	2,28E+00	3,17E-02	0,00E+00	0,00E+00	3,34E-03	3,11E-02	1,40E-03	-2,19E-03
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,74E+00	2,05E-02	2,28E+00	3,17E-02	0,00E+00	0,00E+00	3,34E-03	3,11E-02	1,40E-03	-2,19E-03
PEN-RE	MJ	2,89E+01	1,20E+00	3,10E+00	1,85E+00	0,00E+00	0,00E+00	1,95E-01	9,19E-01	1,51E-01	-8,00E-02
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	0,00E+00	0,00E+00
PENRT	MJ	2,89E+01	1,20E+00	3,10E+00	1,85E+00	0,00E+00	0,00E+00	1,95E-01	9,19E-01	1,51E-01	-8,00E-02
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	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	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	0,00E+00	0,00E+00
FW	m^3	9,41E-03	2,20E-04	1,15E-02	3,41E-04	0,00E+00	0,00E+00	3,59E-05	6,17E-04	7,60E-06	-1,38E-05

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 mb thermal insulation lagging r.Heat® A , r.Spiro® A; thickness: 30 mm

		Life cycle stage									
Indicator	**Unit (referenced to DU)**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Amount of hazardous waste	kg	WN	WN	0,00E+00	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	WN	WN	7,21E-03	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	WN	WN	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	WN	WN	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	WN	WN	2,36E-01	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	WN	WN	0,00E+00	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	WN	WN	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

BIOGENIC CARBON	
Biogenic carbon content in the product (kg C_{org})	**0,00E+00**
Biogenic carbon content per package (kg C_{org})	**6,79E-02**

MAIN IMPACT INDICATORS: 1 mb thermal insulation lagging r.Heat® N; thickness: 30 mm

		Life cycle stage									
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	1,95E+00	6,43E-02	1,92E-01	1,88E-01	0,00E+00	0,00E+00	1,38E-02	6,73E-02	5,90E-03	-4,99E-01
GWP-fossil	kg CO_2 eq.	2,01E+00	6,42E-02	2,34E-01	1,88E-01	0,00E+00	0,00E+00	1,38E-02	6,60E-02	5,89E-03	-5,19E-02
GWP-biogenic	kg CO_2 eq.	-5,46E-02	4,45E-05	-4,32E-02	1,30E-04	0,00E+00	0,00E+00	9,57E-06	1,31E-03	8,12E-07	-4,47E-01
GWP-luluc	kg CO_2 eq.	5,82E-04	2,13E-05	1,64E-03	6,24E-05	0,00E+00	0,00E+00	4,58E-06	2,98E-05	3,03E-06	-2,69E-06
ODP	kg CFC11 eq.	3,07E-08	1,28E-09	6,35E-09	3,74E-09	0,00E+00	0,00E+00	2,75E-10	6,16E-10	1,70E-10	-1,09E-10
AP	mol H+ eq.	1,76E-02	1,34E-04	1,11E-03	3,92E-04	0,00E+00	0,00E+00	2,88E-05	4,71E-04	4,17E-05	-1,21E-04
EP-freshwater	kg PO_4 eq.	5,50E-04	4,35E-06	1,43E-04	1,27E-05	0,00E+00	0,00E+00	9,35E-07	3,71E-05	4,89E-07	-3,18E-06
EP-marine	kg N eq.	1,69E-03	3,21E-05	4,02E-04	9,41E-05	0,00E+00	0,00E+00	6,91E-06	1,82E-04	1,59E-05	-3,34E-04
EP-terrestrial	mol N eq.	2,98E-02	3,47E-04	3,18E-03	1,02E-03	0,00E+00	0,00E+00	7,45E-05	1,92E-03	1,74E-04	-5,22E-04
POCP	kg NMVOC eq.	7,33E-03	2,22E-04	9,05E-04	6,51E-04	0,00E+00	0,00E+00	4,78E-05	5,68E-04	6,22E-05	-2,65E-04
ADP-minerals & metals	kg Sb eq.	1,33E-05	2,09E-07	1,62E-06	6,12E-07	0,00E+00	0,00E+00	4,49E-08	4,04E-08	9,20E-09	-1,46E-08
ADP-fossil	MJ	2,56E+01	9,03E-01	3,76E+00	2,65E+00	0,00E+00	0,00E+00	1,94E-01	7,98E-01	1,44E-01	-7,83E-02
WDP	WDP (m^3) world. ekw	3,52E-01	3,75E-03	1,19E-01	1,10E-02	0,00E+00	0,00E+00	8,06E-04	2,46E-03	6,31E-03	9,27E-03

ADDITIONAL IMPACT INDICATORS: 1 mb thermal insulation lagging r.Heat® N; thickness: 30 mm											
		Life cycle stage									
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	9,89E-08	4,73E-09	9,54E-09	1,39E-08	0,00E+00	0,00E+00	1,02E-09	9,99E-09	9,49E-10	-7,47E-10
IRP	kBq U235 eq.	1,22E-01	1,17E-03	5,15E-02	3,43E-03	0,00E+00	0,00E+00	2,52E-04	4,58E-04	9,21E-05	-1,49E-04
ETP-fw	CTUe	3,42E-04	2,71E-06	8,92E-05	7,93E-06	0,00E+00	0,00E+00	5,82E-07	2,31E-05	3,04E-07	-1,98E-06
HTP-c	CTUh	4,51E-07	4,56E-10	9,00E-10	1,33E-09	0,00E+00	0,00E+00	9,80E-11	1,73E-10	2,66E-11	-3,28E-10
HTP-nc	CTUh	1,53E-08	5,67E-10	3,54E-09	1,66E-09	0,00E+00	0,00E+00	1,22E-10	4,19E-10	2,47E-11	-2,63E-08
SQP	-	1,60E+01	5,46E-01	7,49E+00	1,60E+00	0,00E+00	0,00E+00	1,17E-01	8,63E-02	2,84E-01	-1,42E-01

INDICATORS DESCRIBTIONS RESOURCE CONSUMPTION: 1 mb thermal insulation lagging r.Heat® N; thickness: 30 mm											
		Life cycle stage									
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	3,63E+00	1,56E-02	2,28E+00	4,55E-02	0,00E+00	0,00E+00	3,34E-03	3,03E-02	1,35E-03	-2,19E-03
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,63E+00	1,56E-02	2,28E+00	4,55E-02	0,00E+00	0,00E+00	3,34E-03	3,03E-02	1,35E-03	-2,19E-03
PEN-RE	MJ	2,79E+01	9,07E-01	3,09E+00	2,66E+00	0,00E+00	0,00E+00	1,95E-01	8,97E-01	1,46E-01	-8,00E-02
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	0,00E+00	0,00E+00
PENRT	MJ	2,79E+01	9,07E-01	3,09E+00	2,66E+00	0,00E+00	0,00E+00	1,95E-01	8,97E-01	1,46E-01	-8,00E-02
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	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	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	0,00E+00	0,00E+00
FW	m^3	6,71E-03	1,67E-04	1,15E-02	7,66E-03	0,00E+00	0,00E+00	5,62E-04	1,03E-03	7,37E-06	-1,38E-05

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 mb thermal insulation lagging r.Heat® N; thickness: 30 mm											
		Life cycle stage									
Indicator	**Unit (referenced to DU)**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Amount of hazardous waste	kg	WN	WN	0,00E+00	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	WN	WN	6,09E-03	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	WN	WN	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	WN	WN	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	WN	WN	2,35E-01	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	WN	WN	0,00E+00	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	WN	WN	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

BIOGENIC CARBON	
Biogenic carbon content in the product (kg C_{org})	**0,00E+00**
Biogenic carbon content per package (kg C_{org})	**6,79E-02**

All results shown in the tables refer to r.Heat®A/r.Spiro®A and r.Heat®N thermal insulation lagging with a thickness of 30 mm. The appropriate multiplication factors in the table below should be used to obtain environmental parameters for other thicknesses.

Thermal insulation lagging: – **r.Heat®A/r.Spiro®A** – **r.Heat®N**	**Thickness of thermal insulation lagging [mm]**						
	20	**30**	**40**	**50**	**60**	**80**	**100**
Conversion rate	0,67	1	1,33	1,67	2	2,67	3,33

7. INTERPRETATION OF RESULTS

Figures 3 and 4 show the diagram of the contributions of individual life cycle modules to the basic categories of impact of thermal insulation laggings:

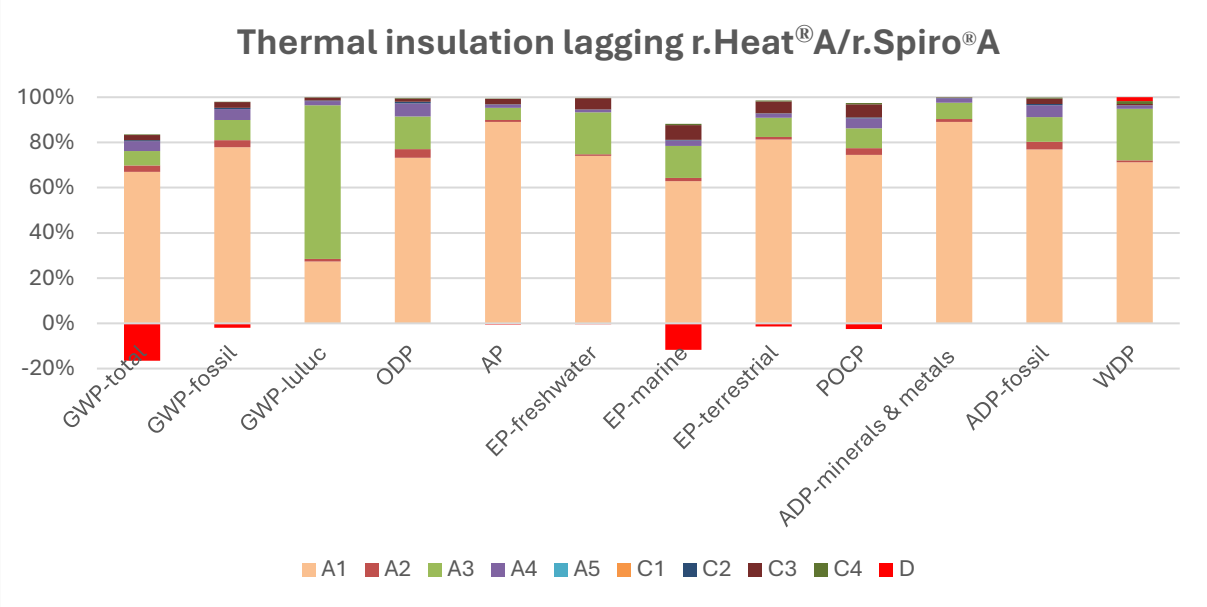


Figure 3 Shares of life cycle modules on the main categories of influence – thermal insulation lagging r.Heat® A/r.Spiro® A

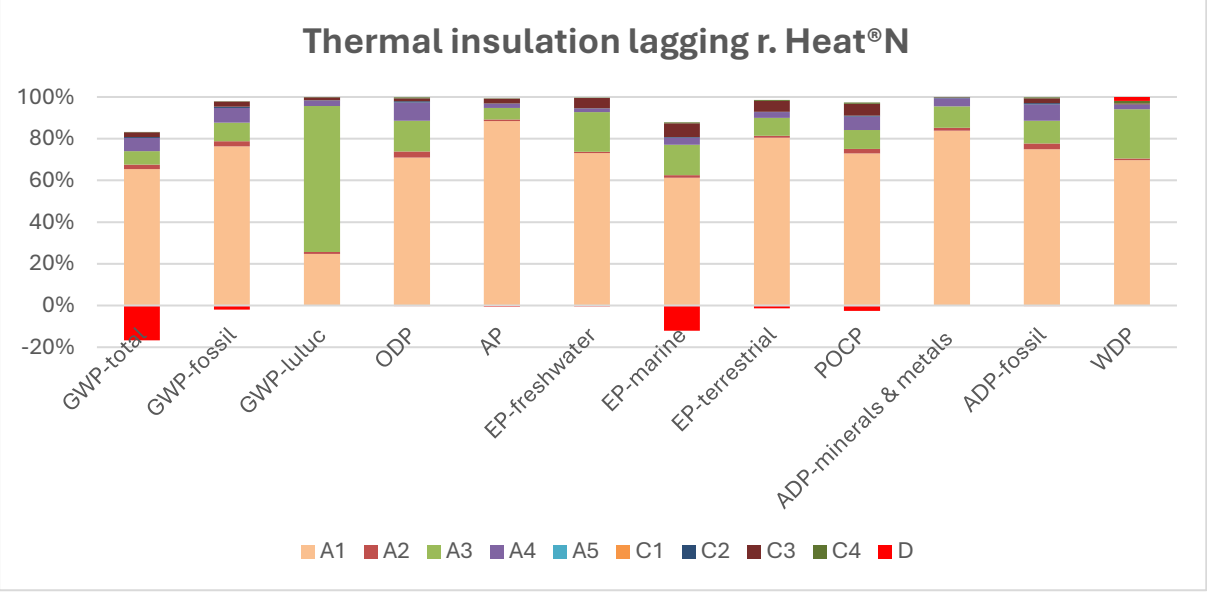


Figure 4 Shares of life cycle modules on the main categories of influence – thermal insulation lagging r.Heat® N.

LITERATURE

- ✓ ICIMB-PCR A. General Product Category Rules for Construction Products.
- ✓ PN-EN 15804+A2:2020, Sustainability of building structures -- Environmental product declarations -Basic principles of categorization of construction products.
- ✓ PN-EN ISO 14025:2014-04, Environmental labels and declarations -- Type III environmental declarations -- Rules and procedures.
- ✓ PN-EN ISO 14040:2009 Environmental management. Life Cycle Assessment. Principles and structure.
- ✓ PN-EN ISO 14044:2009, Environmental management. Life Cycle Assessment. Requirements and guidelines.
- ✓ ISO 21930:2017 - Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services
- ✓ ISO 15686-1:2011, Buildings and constructed assets – Service life planning – Part 1: General principles and framework.
- ✓ ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation.
- ✓ PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business.
- ✓ KOBiZE CO2, SO2, NOx, CO and total particulate matter emission factors for electricity, December 2023.
- ✓ The Act of 14 December 2012 on Waste, Journal of Laws. 2013, item 21.
- ✓ Act of 27 April 2001. Environmental Protection Law Journal of Laws 2024.54, consolidated text.
- ✓ Data from the company's website: **https://www.rohhe.pl/.**

Explanatory material can be obtained by contacting the representative directly Rohhe Sp. z o.o.

Łukasiewicz Research Network – Institute of Ceramics and Building Materials
31-983 Kraków, Cementowa 8 Str., Poland

CENTER OF ENVIROMENTAL ENGINEERING

45-641 Opole, Oświęcimska 21 Str., Poland
Phone: +48 77 456 32 01
www.icimb.lukasiewicz.gov.pl
info.opole@icimb.lukasiewicz.gov.pl

Łukasiewicz
Institute
of Ceramics
and Building
Materials

PROCESS ENGINEERING RESEARCH GROUP

TYPE III ENVIRONMENTAL DECLARATION CERTIFICATE

no. 02-12/2024

Products:

Thermal insulation lagging
r.Heat® A/ r.Spiro® A, r.Heat® N

Owner:

Rohhe Sp. z o.o.

05-555 Tarczyn, al. Krakowska 19A

The declaration was developed in accordance with the requirements of the standard:

PN-EN 15804+A2: 2020-03

Sustainability of construction works
Environmental product declarations
Core rules for the product category of construction products

The declaration was verified in accordance with the requirements of the standard:

PN-EN ISO 14025:2010

Environmental labels and declarations
Type III environmental declarations. Principles and procedures

The certificate was issued for the first time on **December 5, 2024** and is valid for 5 years or until the said EPD is amended.

Process Engineering Research Group Leader

Ewa Głodek-Bucyk, PhD Eng.

Director of Environmental Engineering Center

Joanna Poluszyńska, PhD

Opole, December 2024