ENVIRONMENTAL PRODUCT DECLARATION

No. 01-03/2024

Gypsum plaster

Kreisel - Technika Budowlana Sp. z o.o.

Declaration owner:	*Kreisel – Technika Budowlana Sp. z o.o.*
Program Owner:	*Łukasiewicz Research Network – Institute of Ceramics and Building Materials* *Environmental Engineering Center*
Program Name	*Environmental Product Declarations – B2B*
Release Date:	***08.03.2024***
Declaration valid until:	***08.03.2029***

1. OVERVIEW

Declaration owner: Kreisel – Technika Budowlana Sp. z o.o.	**Products covered by the declaration:** Gypsum plaster
Program Owner: *Łukasiewicz Research Network – Institute of Ceramics and Building Materials* *Environmental Engineering Center Opole* **http://www.icimb.pl/opole/**	**Declaration owner:** Kreisel – Technika Budowlana Sp. z o.o. Szarych Szeregów 23 23-462 Poznań Phone: +48 618467900 Address: Email: sekretariat@kreisel.pl **https://www.kreisel.pl/**
Date of issue: 08.03.2024	**Declared Unit:** **1 kg** (1 kg) of plaster
Declaration valid until: 08.03.2029	**Scope:** The declaration includes the following products: **Machine Gypsum Plaster 651, Machine Gypsum Plaster Hard 651T, Machine Gypsum Plaster Light 651L, Expert Gypsum Plaster Smooth 651L Plus, Manual Gypsum Plaster 650** produced in the Kreisel – Technika Budowlana Sp. z o.o. plant; • Zakładowa 2 Street, 97-427 Rogowiec, • Łużycka 5 Street, 07-400 Ostrołęka. It contains information on the environmental impact of the declared products. All data on the production cycle were collected by Kreisel – Technika Budowlana Sp. z o.o. from 01.01.2022 to 31.12.2022 (12 months) and correspond to the production technology of the time. These are the average data for the total production of gypsum plasters – Machine Gypsum Plaster 651, Machine Gypsum Plaster Hard 651T, Machine Gypsum Plaster Light 651L, Expert Gypsum Plaster Smooth 651L Plus, Manual Gypsum Plaster 650 produced in the production plants of Kreisel – Technika Budowlana Sp. z o.o. in Rogowiec and Ostrołęka. The Life Cycle Assessment has been developed in accordance with the requirements of PN-EN ISO 15804+A2:2020, PN-EN ISO 14025 and PN-EN ISO 14040. The rules for categorization of the product have been adopted in accordance with the PN-EN 15804 standard. The Łukasiewicz Research Network Institute of Ceramics and Building Materials of the Centre for Environmental Engineering in Opole is not responsible for the manufacturer's information as well as data and evidence regarding the life cycle assessment. Declarations that are the result of different programs or that are not made in accordance with the standard may not be comparable.

Product Categorization Rules (PCR)	PN-EN 15804+A2:2020-03 Sustainability of construction works. Environmental Product Declarations. Basic Principles of Categorization of Construction Products, ICIMB-PCR A.
Representativeness:	Polish product, year 2022
Declared durability:	50 years
Reasons for performing LCA:	B2B
Life Cycle Analysis (LCA):	A1-A3, A4, A5, C1-C4 and D (Cradle-to-Gate with options)

The Łukasiewicz Research Network Institute of Ceramics and Building Materials Centre for Environmental Engineering provides access to the type III environmental declaration for gypsum plasters by Kreisel – Technika Budowlana Sp. z o.o. to interested parties.

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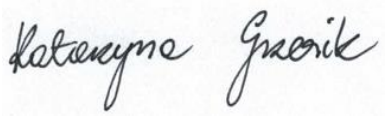
Leader of the Process Engineering Research Group

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. MANUFACTURER & PRODUCT INFORMATION

KREISEL- *Technika Budowlana*
is one of the leading manufacturers of building materials in Poland.

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

One of the very important assumptions of the company is to focus on building partner relations with buyers. KREISEL also owes its market success to the involvement of customers in shaping mutual relations. He actively listens to their suggestions and then, after careful analysis, consistently implements them . In this way, it proves that the customer is the key link in this complex organization.
We pay special attention to the high quality of our products, as well as a diversified offer tailored to individual customer groups. This is one of the reasons why we have gained recognition and trust among our customers. We are perceived as a reliable and worthy partner, providing high-quality construction chemicals.

Our contribution to sustainability is also worth mentioning. In the Ecological Cloning 2023 project, we planted 1055 red maples. Our trees have bloomed all over Poland, benefiting the community and the environment around us.
With the end of this project, our mission does not end. As we look to the future, we are committed to continuing to protect the environment and create sustainable communities.

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

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

Michael Kraus
Ceo

Mateusz Siekierczak
Member of the Management Board, Chief Financial Officer

Historical overview

Beginnings of KREISEL company in Poznań

The first participation in BUDMA Fair

Celebration of the 5th anniversary of the company

Partner of the Polish National Team

Opening of the Plant in Będzin

World Cup in Ski Jumping

New production line in Ujazd

1993
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2016
2017
2018
2022

Opening of the Plant in Ujazd

Purchase of "Eurokrusz" mine

Opening of the Plant in Rogowiec

Opening of the Plant in Kaliska

Opening of the Plant in Ostrołęka

EURO 2012

Purchase of the Lozorno factory - Slovakia

The group of products covered by the declaration are gypsum plasters:

- ✓ **machine gypsum plaster 651,**
- ✓ **machine gypsum plaster hard 651T,**
- ✓ **machine gypsum plaster light 651L,**
- ✓ **Expert Gypsum plaster Smooth 651L Plus,**
- ✓ **Manual gypsum plaster 650.**

The indicative composition of the products covered by the declaration is given in Table 1.

Table 1. Approximate composition of products:

Material	Mass share [%]
Construction gypsum	60-75
Quartz sands	15-30
Carbonate filler	1-12
Calcium hydroxide	1-2
Lightweight fillers	1-3
Setting time regulators	0,2-0,3
Thickeners	0,3-0,6
Rheology modifiers	0,1-0,2

The first stage of production is related to obtaining construction gypsum, which is the basic ingredient of gypsum products. The purchased synthetic gypsum is pre-dried and then heat-treated in a calciner. The resulting binder is cooled, ground and transported to storage silos. Other raw materials are necessary for the next production stage. Bulk raw materials are unloaded
and stored in silos. Other chemical additives are stored in big bags and sacks. Depending on the recipe, the individual raw materials are dosed on scales and mixed in a mixer. After thorough mixing, the finished products are packed into bags and automatically stacked on wooden pallets. This is followed by the process of hooding the pallets and storing them in the warehouse. The quality of the final products is controlled before sale.

The technological diagram of the gypsum plaster production process is shown in Figure 1:

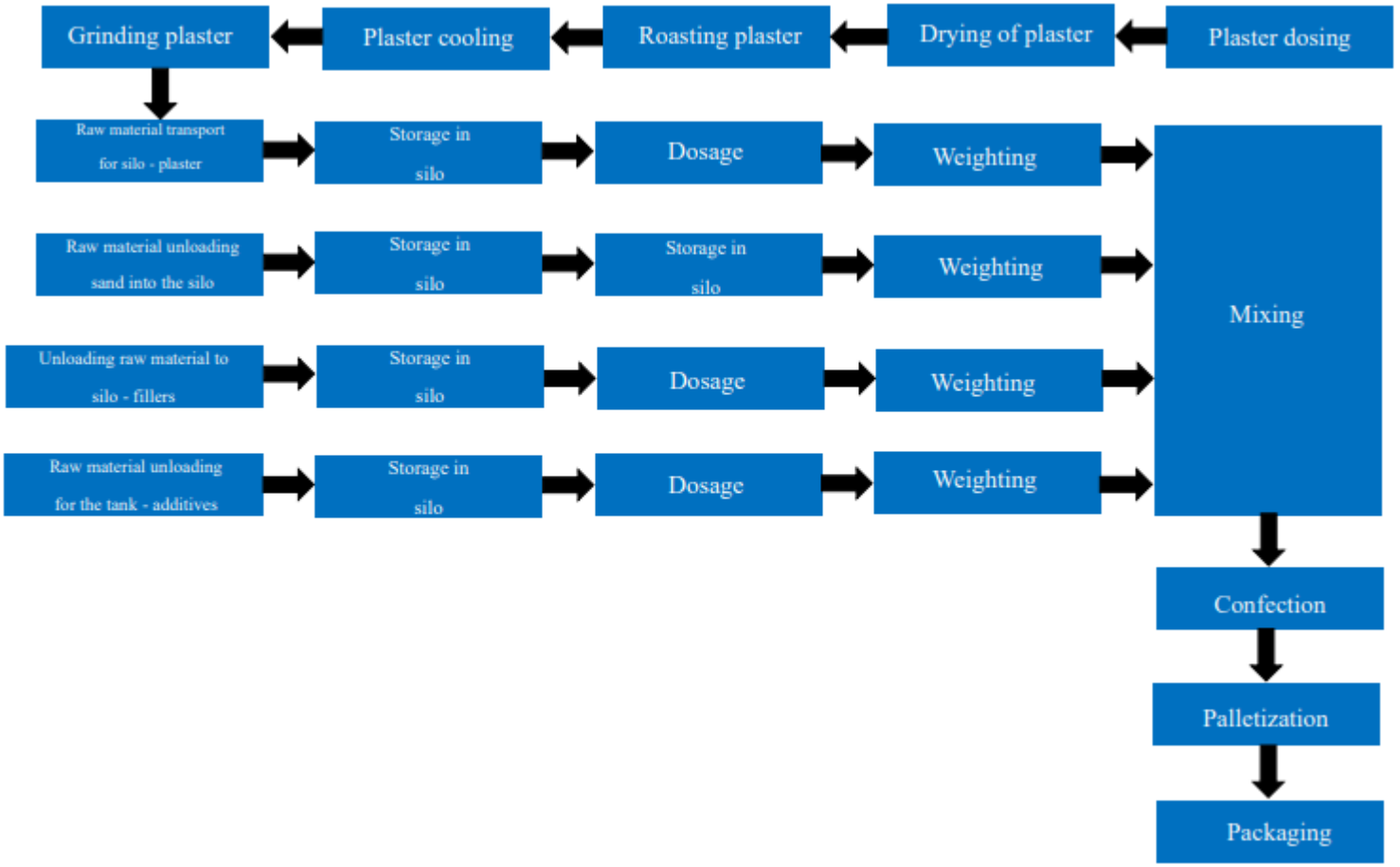


Figure 1: Production diagram of gypsum plasters produced by Kreisel – Technika Budowlana Sp. z o.o.

The basic properties of gypsum plasters produced by Kreisel – Technika Budowlana Sp. z o.o. are presented in Table 2:

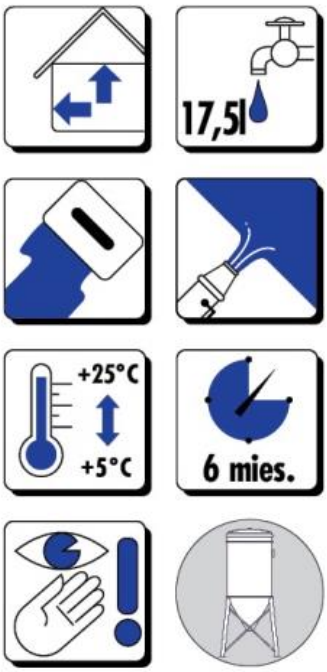
Table 2. Properties of gypsum plasters:

	 EXPERT TYNK GIPSOWY GŁADKI 651L PLUS	 MASZYNOWY TYNK GIPSOWY LEKKI 651L	 MASZYNOWY TYNK GIPSOWY TWARDY 651T	 MASZYNOWY TYNK GIPSOWY 651	 RĘCZNY TYNK GIPSOWY 650
Thickness layers (wall)	5 - 25 mm	5 - 25 mm	5 - 25 mm	5 - 25 mm	5 - 25 mm
Thickness layers (ceiling)	5 - 15 mm	5 - 15 mm	-	5 - 15 mm	5 - 25 mm
Compressive strength	≥ 2 /mm²	≥ 2 /mm²	≥ 6 /mm²	≥ 2 /mm²	≥ 2 /mm²
Consumption at 10 mm/ m²	8 kg	8 kg	10 kg	10 kg	8,5 kg
Overlay machine	TAK	TAK	TAK	TAK	NIE
Overlay manual	TAK	TAK	TAK	TAK	TAK
CHARACTERISTICS					
Yield	●●●	●●●	●●	●●	●●●
Smoothness	●●●	●●	●●	●●	●●
Ease machining	●●●	●●	●●	●●	●●
Hardness surface	●	●	●●●	●	●
●●● high ●● good ● sufficient					

MACHINE GYPSUM PLASTER 651

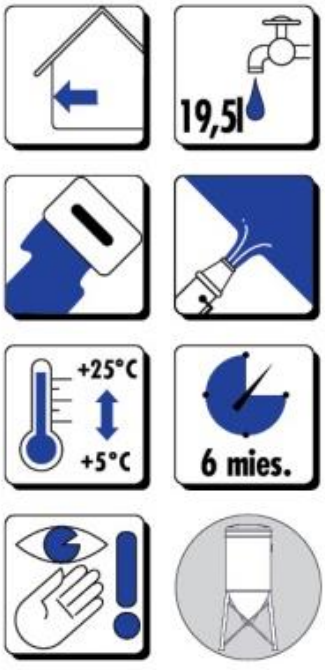
- **STANDARD**
- **SINGLE-LAYER**
- **VERY GOOD ADHESION**
- **FOR INTERIORS**

Substrate type	Concrete, brick, aerated concrete blocks, silicate, ceramic hollow bricks, ceilings
Machining Time	approx. 180 min (until the first honing)
Flexural strength [N/mm2]	≥1.0
Bulk density of dry mix [g/dm3]	600-1100
Bond start[min]:	>50
Adhesion to the ground [N/mm2] -concrete -Ceramic	≥0.1
Grain size	0 - 1.2 mm



MACHINE HARD GYPSUM PLASTER 651T

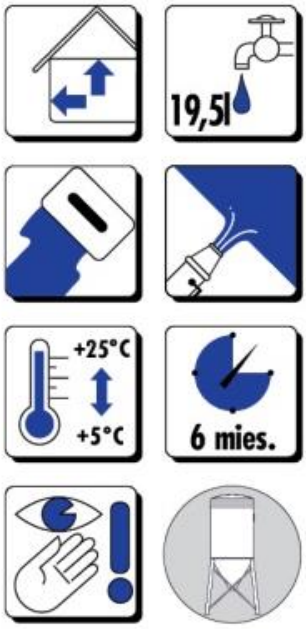
- **INCREASED SURFACE HARDNESS**
- **HIGH MECHANICAL DURABILITY**
- **FOR INTERIORS**
- **EASY PROCESSING**



Substrate type	Concrete, brick, aerated concrete blocks, silicate, ceramic hollow bricks, ceilings
Machining Time	approx. 180 min (until the first honing)
Flexural strength [N/mm2]	≥2.0
Bulk density of dry mix [g/dm3]	600-1100
Bond start[min]:	>50
Adhesion to the ground [N/mm2] -concrete -Ceramic	≥0.1
Grain size	0 - 1.2 mm

MACHINE GYPSUM PLASTER LIGHT 651L

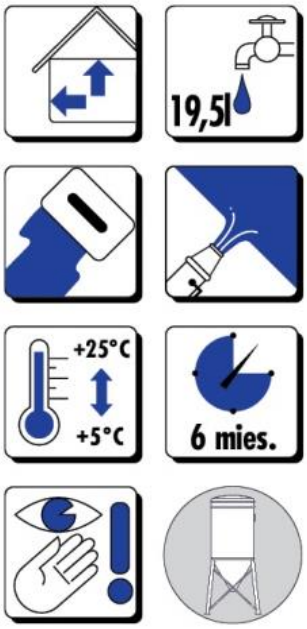
- **HIGH ADHESION AND PERFORMANCE**
- **30% BETTER PERFORMANCE THAN STANDARD PLASTERS**
- **EASY PROCESSING**
- **FOR INTERIORS**



Substrate type	Concrete, brick, aerated concrete blocks, silicate, ceramic hollow bricks, ceilings
Machining Time	approx. 180 min (until the first honing)
Flexural strength [N/mm2]	≥1.0
Bulk density of dry mix [g/dm3]	600-1100
Bond start[min]:	>50
Adhesion to the ground [N/mm2] -concrete -Ceramic	≥0.1
Grain size	0 - 1.2 mm

EXPERT SMOOTH GYPSUM PLASTER 651L PLUS

- **PERFECTLY SMOOTH GYPSUM PLASTER**
- **EASIER PROCESSING**
- **HIGH PERFORMANCE AND ADHESION**
- **FOR INTERIORS**

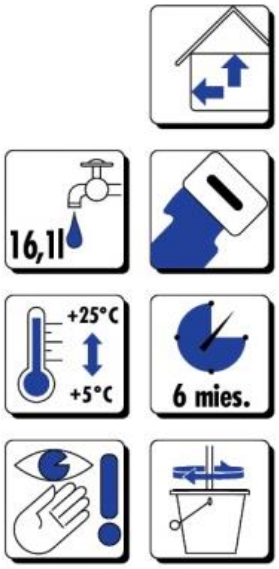


Substrate type	Concrete, brick, aerated concrete blocks, silicate, ceramic hollow bricks, ceilings
Machining Time	approx. 180 min (until the first honing)
Flexural strength [N/mm2]	≥1.0
Bulk density of dry mix [g/dm3]	600-1100
Bond start[min]:	>50
Adhesion to the ground [N/mm2] -concrete -Ceramic	≥0.1
Grain size	0 - 1.2 mm

MANUAL GYPSUM PLASTER 650

- **FOR MANUAL PROCESSING**
- **PLASTIC**
- **IDEAL FOR JAMBS**
- **FOR INTERIORS**

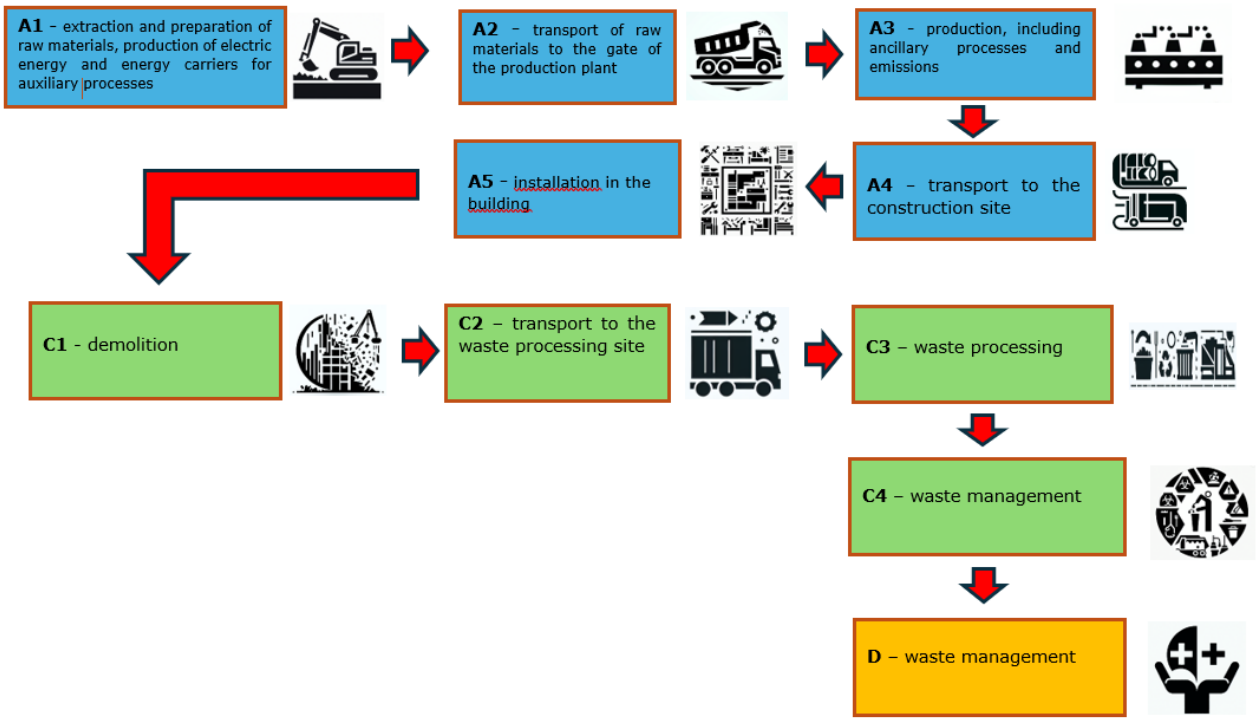
Substrate type	Concrete, brick, aerated concrete blocks, silicate, ceramic hollow bricks, ceilings
Machining Time	approx. 180 min (until the first honing)
Flexural strength [N/mm2]	≥1.0
Bulk density of dry mix [g/dm3]	600-1100
Bond start[min]:	>50
Adhesion to the ground [N/mm2] -concrete -Ceramic	≥0.1
Grain size	0 - 1.2 mm



LCA: SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

System Limitations

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



Duration of data collection

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

Declared Unit

1 kg of gypsum plaster.

Assumptions

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

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

A3 – takes into account the actual production process. Energy and fuel consumption taken into account in full based on consumption data for a period of 1 year. Data provided by the manufacturer.

A4 – transport is carried out by trucks with a load capacity of 16-32 tons, meeting the EURO 6 emission standards, the average distance from the plant to the customer is 100 km.

A5- the consumption of energy and other raw materials in this module has been omitted due to negligible values.

C1 – describes the handling of construction debris during the dismantling/demolition of masonry walls as part of the demolition of the entire building. The data is collected based on the developed scenario. At the demolition site, the material is pre-sorted. Dismantling of plasters does not require energy and materials, it is possible to demolish it manually or with the use of power tools. The impact of these operations is so small that the environmental impact resulting from module C1 can be considered as zero.

C2 – refers to the transport of construction and demolition waste, containing gypsum plasters, to a recovery or disposal facility. The data is collected based on the developed scenario.

C3 – takes into account the environmental impact of the treatment of construction and demolition waste containing gypsum plaster in a waste recovery facility. The calculations are made on the basis of the developed scenario.

C4 – should take into account the impact of stored construction debris containing gypsum plasters. Landfill operations are not taken into account in the developed scenario because construction rubble is not worthless waste, it is recyclable and should not end up in municipal waste landfills.

D – refers to the impact and effects of the use of secondary material. The calculations are made based on the developed scenario.

Cut-off criteria

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

General data

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

Allocation	All data on components manufactured in 2 plants of Kreisel – Technika Budowlana Sp. z o.o. in Rogowiec and Ostrołęka were provided by the manufacturer, provided by the manufacturer and were referred to the declared unit (DU) of the product – there is **1 kg** of gypsum plaster The allocation rules used in this EPD are based on the general principles of ICIMB-PCR A.

4. LCA: SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

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

Module A4 – *Transport to the construction site* **–** Transport is carried out by trucks with a load capacity of 16-32 tonnes meeting the EURO 6 emission standards. The average distance from the plant to the customer is 100 km.

Module A5 – *Installation in a building* **-** The consumption of energy and other raw materials in this module has been omitted due to negligible values.

Module C1 - *Demolition/Demolition* – Demolition of masonry walls is considered to be part of the demolition process of the entire building. Plaster mortars as a wall covering constitute a small percentage of the weight of a masonry wall. It is therefore possible to ignore their participation in the demolition of the entire building and assume the impact of this module as zero.

Module C2 – *Transport* – transport of waste containing gypsum plasters as part of waste processing is directed to the recovery plant (recycling plant).
The following assumptions were made to calculate the impact of this module:

- 100% of the mass of waste is transported to the recovery plant as part of waste 17 01 01 or 17 01 02 (construction rubble),
- transport is carried out by means of self-unloading trucks with a load capacity of 16 – 32 tons, meeting the EURO 6 emission standards
- The material is transported to a waste treatment site located 100 km from the demolition site.

Module C3 - *Waste treatment*, e.g. collection of waste fractions from demolition and treatment of material streams for reuse, recycling and energy recovery. On the basis of national experience, it is assumed that construction rubble is valuable waste and can be recycled.
Therefore, the following processes were assumed for the calculations: unloading (loader), crushing (crusher).

The following were used for the calculations:

energy consumption	0,03	kWh/kg
Fuel consumption	0,315	MJ/kg

Module C4 - Should take into account the impact of stored construction debris containing gypsum plasters. In the developed scenario, save operations are not taken into account. The fraction of construction rubble code 17 01 01 or 17 01 02, which includes the products covered by the declaration, is not subject to storage in the light of Polish regulations.

Module D - Reuse Potential- There is a lot of uncertainty about the development of scenarios for Module D, which makes modelling and calculation difficult. The recycled aggregate fraction of 0/63 mm of construction debris 17 01 01, containing plasters, contributes to the saving of natural resources. However, their low share of m in the total fraction means that the positive impacts resulting from the reuse of the material covered by the declaration are negligible. When processed spoil code 17 01 02 containing the analysed product is used to fill excavations, this also contributes to the conservation of natural resources.

Safety and environmental protection

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

5. LCA: RESULTS

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

DESCRIPTION OF SYSTEM BOUNDARIES (X – INCLUDED IN LCA, MND – UNDECLARED MODULE)																
Production Stage			**Construction phase**		**Stage of use**							**End of Life Stage**				**Benefits and flows beyond system boundaries**
Mining & Sourcing in raw materials	Transport	Production	Transport	Construction Process	Usufruct	Maintenance	Repair	Exchange	Renovation	Energy consumption	Water consumption	Demolition	Transport	Waste Treatment	Waste management	Potential for reuse
A1	**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 gypsum plasters. Explanations of the abbreviations used to describe the impact categories are given below:

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

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

MAIN IMPACT INDICATORS: 1 kg Kreisel machine gypsum plaster 651											
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO2 eq.	3.31E-02	1.35E-02	1.16E-01	1.90E-02	0,00E+00	0,00E+00	1.90E-02	5.67E-02	0,00E+00	-3.93E-03
GWP-fossil	kg CO2 eq.	3.25E-02	1.35E-02	1.45E-01	1.90E-02	0,00E+00	0,00E+00	1.90E-02	5.55E-02	0,00E+00	-3.92E-03
GWP-biogenic	kg CO2 eq.	5.40E-04	1.26E-05	-2.89E-02	1.78E-05	0,00E+00	0,00E+00	1.78E-05	1.11E-03	0,00E+00	-1.02E-05
GWP-luluc	kg CO2 eq.	1.55E-05	6.54E-06	8.89E-05	9.19E-06	0,00E+00	0,00E+00	9.19E-06	2.59E-05	0,00E+00	-4.45E-07
A:	kg CFC11 eq.	1.23E-09	2.86E-10	2.33E-09	4.02E-10	0,00E+00	0,00E+00	4.02E-10	5.31E-10	0,00E+00	-5.92E-11
AP	mol H+ eq.	1.07E-04	2.87E-05	3.23E-04	4.04E-05	0,00E+00	0,00E+00	4.04E-05	3.96E-04	0,00E+00	-3.48E-05
EP-freshwater	kg PO4 eq.	4.22E-06	9.34E-07	4.94E-05	1.31E-06	0,00E+00	0,00E+00	1.31E-06	3.09E-05	0,00E+00	-1.77E-07
EP-marine	kg N eq.	2.80E-05	7.24E-06	7.52E-05	1.02E-05	0,00E+00	0,00E+00	1.02E-05	1.53E-04	0,00E+00	-1.59E-05
EP-terrestrial	mol N eq.	3.18E-04	7.36E-05	7.22E-04	1.04E-04	0,00E+00	0,00E+00	1.04E-04	1.60E-03	0,00E+00	-1.72E-04
POCP	kg NMVOC eq.	1.07E-04	4.46E-05	3.27E-04	6.27E-05	0,00E+00	0,00E+00	6.27E-05	4.73E-04	0,00E+00	-5.14E-05
ADP-minerals & metals	kg Sb eq.	2.19E-07	4.30E-08	2.90E-07	6.04E-08	0,00E+00	0,00E+00	6.04E-08	3.30E-08	0,00E+00	-1.36E-09
ADP-fossil	MJ	3.19E-01	1.87E-01	1,86E+00	2.62E-01	0,00E+00	0,00E+00	2.62E-01	6.53E-01	0,00E+00	-4.94E-02
WDP	WDP (m3) world. EKW	1.15E-02	7.80E-04	8.26E-03	1.10E-03	0,00E+00	0,00E+00	1.10E-03	2.03E-03	0,00E+00	-1.09E-04
ADDITIONAL IMPACT INDICATORS: 1 kg Kreisel machine gypsum plaster 651											
	Life Cycle Stage										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	1.16E-09	9.78E-10	2.21E-09	1.38E-09	0,00E+00	0,00E+00	1.38E-09	8.28E-09	0,00E+00	-9.59E-10
IRP	kBq U235 eq.	2.13E-03	2.53E-04	2.36E-03	3.55E-04	0,00E+00	0,00E+00	3.55E-04	3.99E-04	0,00E+00	-2.47E-05
ETP-fw	CTUe	4.22E-06	9.34E-07	4.94E-05	1.31E-06	0,00E+00	0,00E+00	1.31E-06	3.09E-05	0,00E+00	-1.77E-07
HTP-c	CTUh	7.57E-12	3.14E-12	4.58E-11	4.42E-12	0,00E+00	0,00E+00	4.42E-12	6.10E-12	0,00E+00	-6.65E-13
HTP-nc	CTUh	1.76E-10	4.83E-11	2.29E-10	6.79E-11	0,00E+00	0,00E+00	6.79E-11	1.77E-10	0,00E+00	-2.75E-11
SQP	-	7.05E-02	1.13E-01	2,99E+00	1.58E-01	0,00E+00	0,00E+00	1.58E-01	6.95E-02	0,00E+00	-3.73E-03
INDICATORS DESCRIBING THE CONSUMPTION OF RESOURCES: 1 kg Kreisel machine gypsum plaster 651											
	Life Cycle Stage										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	3.43E-02	2.94E-03	5.75E-01	4.13E-03	0,00E+00	0,00E+00	4.13E-03	2.48E-02	0,00E+00	-4.45E-04
PERMIAN	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3.43E-02	2.94E-03	5.75E-01	4.13E-03	0,00E+00	0,00E+00	4.13E-03	2.48E-02	0,00E+00	-4.45E-04
PEN-RE	MJ	3.12E-01	1.95E-01	2.09E+00	2.74E-01	0,00E+00	0,00E+00	2.74E-01	7.59E-01	0,00E+00	-5.21E-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	3.12E-01	1.95E-01	2.09E+00	2.74E-01	0,00E+00	0,00E+00	2.74E-01	7.59E-01	0,00E+00	-5.21E-02
SM	Kg	0,00E+00	0,00E+00	2.10E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.00E-01	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	m3	2.48E-04	2.98E-05	1.07E-03	4.16E-05	0,00E+00	0,00E+00	4.16E-05	4.95E-04	0,00E+00	-7.71E-06

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 kg K Kreisel machine gypsum plaster 651											
	Life Cycle Stage										
Indicator	**Unit (referenced to DU)**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Amount of hazardous waste	Kg	HV	HV	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	HV	HV	1.96E-04	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	HV	HV	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	HV	HV	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	HV	HV	2.10E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.00E-01	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	HV	HV	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	HV	HV	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 of the product (kg C_{org})	**8.25E-04**
Biogenic carbon content in the package (kg C_{org})	**1.02E-02**

MAIN IMPACT INDICATORS: 1 kg Kreisel machine gypsum plaster hard 651T											
	Life Cycle Stage										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO2 eq.	2.34E-02	3.05E-03	1.14E-01	1.90E-02	0,00E+00	0,00E+00	1.90E-02	5.67E-02	0,00E+00	-3.93E-03
GWP-fossil	kg CO2 eq.	2.29E-02	3.04E-03	1.43E-01	1.90E-02	0,00E+00	0,00E+00	1.90E-02	5.55E-02	0,00E+00	-3.92E-03
GWP-biogenic	kg CO2 eq.	4.31E-04	2.83E-06	-2.87E-02	1.78E-05	0,00E+00	0,00E+00	1.78E-05	1.11E-03	0,00E+00	-1.02E-05
GWP-luluc	kg CO2 eq.	1.48E-05	1.47E-06	9.05E-05	9.19E-06	0,00E+00	0,00E+00	9.19E-06	2.59E-05	0,00E+00	-4.45E-07
A:	kg CFC11 eq.	1.21E-09	6.46E-11	2.23E-09	4.02E-10	0,00E+00	0,00E+00	4.02E-10	5.31E-10	0,00E+00	-5.92E-11
AP	mol H+ eq.	7.36E-05	6.46E-06	3.29E-04	4.04E-05	0,00E+00	0,00E+00	4.04E-05	3.96E-04	0,00E+00	-3.48E-05
EP-freshwater	kg PO4 eq.	2.82E-06	2.11E-07	5.29E-05	1.31E-06	0,00E+00	0,00E+00	1.31E-06	3.09E-05	0,00E+00	-1.77E-07
EP-marine	kg N eq.	1.75E-05	1.63E-06	7.57E-05	1.02E-05	0,00E+00	0,00E+00	1.02E-05	1.53E-04	0,00E+00	-1.59E-05
EP-terrestrial	mol N eq.	1.88E-04	1.66E-05	7.21E-04	1.04E-04	0,00E+00	0,00E+00	1.04E-04	1.60E-03	0,00E+00	-1.72E-04
POCP	kg NMVOC eq.	7.34E-05	1.00E-05	3.21E-04	6.27E-05	0,00E+00	0,00E+00	6.27E-05	4.73E-04	0,00E+00	-5.14E-05
ADP-minerals & metals	kg Sb eq.	2.23E-07	9.69E-09	2.83E-07	6.04E-08	0,00E+00	0,00E+00	6.04E-08	3.30E-08	0,00E+00	-1.36E-09
ADP-fossil	MJ	2.96E-01	4.21E-02	1,82E+00	2.62E-01	0,00E+00	0,00E+00	2.62E-01	6.53E-01	0,00E+00	-4.94E-02
WDP	WDP (m3) world. EKW	7.48E-03	1.75E-04	8.25E-03	1.10E-03	0,00E+00	0,00E+00	1.10E-03	2.03E-03	0,00E+00	-1.09E-04

ADDITIONAL IMPACT INDICATORS: 1 kg Kreisel machine hard gypsum plaster 651T											
	Life Cycle Stage										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	7.58E-10	2.19E-10	2.17E-09	1.38E-09	0,00E+00	0,00E+00	1.38E-09	8.28E-09	0,00E+00	-9.59E-10
IRP	kBq U235 eq.	1.23E-03	5.77E-05	2.33E-03	3.55E-04	0,00E+00	0,00E+00	3.55E-04	3.99E-04	0,00E+00	-2.47E-05
ETP-fw	CTUe	2.82E-06	2.11E-07	5.29E-05	1.31E-06	0,00E+00	0,00E+00	1.31E-06	3.09E-05	0,00E+00	-1.77E-07
HTP-c	CTUh	7.68E-12	7.04E-13	4.53E-11	4.42E-12	0,00E+00	0,00E+00	4.42E-12	6.10E-12	0,00E+00	-6.65E-13
HTP-nc	CTUh	1.02E-10	1.09E-11	2.26E-10	6.79E-11	0,00E+00	0,00E+00	6.79E-11	1.77E-10	0,00E+00	-2.75E-11
SQP	-	4.75E-02	2.52E-02	2,99E+00	1.58E-01	0,00E+00	0,00E+00	1.58E-01	6.95E-02	0,00E+00	-3.73E-03

INDICATORS DESCRIBING RESOURCE CONSUMPTION: 1 kg Kreisel machine gypsum plaster hard 651T											
	Life Cycle Stage										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2.75E-02	6.68E-04	5.76E-01	4.13E-03	0,00E+00	0,00E+00	4.13E-03	2.48E-02	0,00E+00	-4.45E-04
PERMIAN	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2.75E-02	6.68E-04	5.76E-01	4.13E-03	0,00E+00	0,00E+00	4.13E-03	2.48E-02	0,00E+00	-4.45E-04
PEN-RE	MJ	3.00E-01	4.40E-02	2,05E+00	2.74E-01	0,00E+00	0,00E+00	2.74E-01	7.59E-01	0,00E+00	-5.21E-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	3.00E-01	4.40E-02	2,05E+00	2.74E-01	0,00E+00	0,00E+00	2.74E-01	7.59E-01	0,00E+00	-5.21E-02
SM	Kg	0,00E+00	0,00E+00	2.11E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.00E-01	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	m3	9.99E-05	6.84E-06	1.13E-03	4.16E-05	0,00E+00	0,00E+00	4.16E-05	4.95E-04	0,00E+00	-7.71E-06

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 kg Kreisel machine gypsum plaster hard 651T											
	Life Cycle Stage										
Indicator	**Unit (referenced to DU)**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Amount of hazardous waste	Kg	HV	HV	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	HV	HV	2.35E-04	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	HV	HV	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	HV	HV	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	HV	HV	2.11E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.00E-01	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	HV	HV	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	HV	HV	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 of the product (kg C_{org})	8.75E-04
Biogenic carbon content in the package (kg C_{org})	1.02E-02

MAIN IMPACT INDICATORS: 1 kg Kreisel machine gypsum plaster light 651L											
	Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	3.72E-02	5.05E-03	1.13E-01	1.90E-02	0,00E+00	0,00E+00	1.90E-02	5.67E-02	0,00E+00	-3.93E-03
GWP-fossil	kg CO2 eq.	3.59E-02	5.04E-03	1.44E-01	1.90E-02	0,00E+00	0,00E+00	1.90E-02	5.55E-02	0,00E+00	-3.92E-03
GWP-biogenic	kg CO2 eq.	1.27E-03	4.70E-06	-3.15E-02	1.78E-05	0,00E+00	0,00E+00	1.78E-05	1.11E-03	0,00E+00	-1.02E-05
GWP-luluc	kg CO2 eq.	2.03E-05	2.44E-06	9.27E-05	9.19E-06	0,00E+00	0,00E+00	9.19E-06	2.59E-05	0,00E+00	-4.45E-07
A:	kg CFC11 eq.	2.30E-09	1.07E-10	2.29E-09	4.02E-10	0,00E+00	0,00E+00	4.02E-10	5.31E-10	0,00E+00	-5.92E-11
AP	mol H+ eq.	1.13E-04	1.07E-05	3.29E-04	4.04E-05	0,00E+00	0,00E+00	4.04E-05	3.96E-04	0,00E+00	-3.48E-05
EP-freshwater	kg PO4 eq.	4.00E-06	3.49E-07	5.17E-05	1.31E-06	0,00E+00	0,00E+00	1.31E-06	3.09E-05	0,00E+00	-1.77E-07
EP-marine	kg N eq.	2.88E-05	2.70E-06	7.63E-05	1.02E-05	0,00E+00	0,00E+00	1.02E-05	1.53E-04	0,00E+00	-1.59E-05
EP-terrestrial	mol N eq.	3.10E-04	2.75E-05	7.30E-04	1.04E-04	0,00E+00	0,00E+00	1.04E-04	1.60E-03	0,00E+00	-1.72E-04
POCP	kg NMVOC eq.	1.13E-04	1.66E-05	3.27E-04	6.27E-05	0,00E+00	0,00E+00	6.27E-05	4.73E-04	0,00E+00	-5.14E-05
ADP-minerals & metals	kg Sb eq.	2.71E-07	1.61E-08	2.88E-07	6.04E-08	0,00E+00	0,00E+00	6.04E-08	3.30E-08	0,00E+00	-1.36E-09
ADP-fossil	MJ	3.93E-01	6.98E-02	1,85E+00	2.62E-01	0,00E+00	0,00E+00	2.62E-01	6.53E-01	0,00E+00	-4.94E-02
WDP	WDP (m3) world. EKW	1.24E-02	2.91E-04	8.48E-03	1.10E-03	0,00E+00	0,00E+00	1.10E-03	2.03E-03	0,00E+00	-1.09E-04
ADDITIONAL IMPACT INDICATORS: 1 kg Kreisel machine gypsum plaster light 651L											
	Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidency	1.15E-09	3.64E-10	2.23E-09	1.38E-09	0,00E+00	0,00E+00	1.38E-09	8.28E-09	0,00E+00	-9.59E-10
IRP	kBq U235 eq.	1.95E-03	9.52E-05	2.39E-03	3.55E-04	0,00E+00	0,00E+00	3.55E-04	3.99E-04	0,00E+00	-2.47E-05
ETP-fw	CTUe	4.00E-06	3.49E-07	5.17E-05	1.31E-06	0,00E+00	0,00E+00	1.31E-06	3.09E-05	0,00E+00	-1.77E-07
HTP-c	CTUh	9.38E-12	1.17E-12	4.87E-11	4.42E-12	0,00E+00	0,00E+00	4.42E-12	6.10E-12	0,00E+00	-6.65E-13
HTP-nc	CTUh	1.71E-10	1.80E-11	2.34E-10	6.79E-11	0,00E+00	0,00E+00	6.79E-11	1.77E-10	0,00E+00	-2.75E-11
SQP	-	6.15E-02	4.19E-02	3,23E+00	1.58E-01	0,00E+00	0,00E+00	1.58E-01	6.95E-02	0,00E+00	-3.73E-03
INDICATORS DESCRIBING THE CONSUMPTION OF RESOURCES: 1 kg Kreisel machine gypsum plaster light 651L											
	Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	4.41E-02	1.10E-03	6.20E-01	4.13E-03	0,00E+00	0,00E+00	4.13E-03	2.48E-02	0,00E+00	-4.45E-04
PERMIAN	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	4.41E-02	1.10E-03	6.20E-01	4.13E-03	0,00E+00	0,00E+00	4.13E-03	2.48E-02	0,00E+00	-4.45E-04
PEN-RE	MJ	3.93E-01	7.29E-02	2.07E+00	2.74E-01	0,00E+00	0,00E+00	2.74E-01	7.59E-01	0,00E+00	-5.21E-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	3.93E-01	7.29E-02	2.07E+00	2.74E-01	0,00E+00	0,00E+00	2.74E-01	7.59E-01	0,00E+00	-5.21E-02
SM	Kg	0,00E+00	0,00E+00	1.35E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.00E-01	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	m3	1.63E-04	1.12E-05	1.12E-03	4.16E-05	0,00E+00	0,00E+00	4.16E-05	4.95E-04	0,00E+00	-7.71E-06

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 kg Kreisel machine gypsum plaster light 651L											
	Life Cycle Stage										
Indicator	**Unit (referenced to DU)**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Amount of hazardous waste	Kg	HV	HV	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	HV	HV	2.21E-04	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	HV	HV	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	HV	HV	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	HV	HV	1.35E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.00E-01	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	HV	HV	9.62E-03	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	HV	HV	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 of the product (kg C_{org})	**9.99E-04**
Biogenic carbon content in the package (kg C_{org})	**1.12E-02**

MAIN IMPACT INDICATORS: 1 kg Kreisel expert smooth gypsum plaster 651L plus											
	Life Cycle Stage										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO2 eq.	4.05E-02	9.63E-03	1.15E-01	1.90E-02	0,00E+00	0,00E+00	1.90E-02	5.67E-02	0,00E+00	-3.93E-03
GWP-fossil	kg CO2 eq.	3.90E-02	9.62E-03	1.43E-01	1.90E-02	0,00E+00	0,00E+00	1.90E-02	5.55E-02	0,00E+00	-3.92E-03
GWP-biogenic	kg CO2 eq.	1.48E-03	8.98E-06	-2.88E-02	1.78E-05	0,00E+00	0,00E+00	1.78E-05	1.11E-03	0,00E+00	-1.02E-05
GWP-luluc	kg CO2 eq.	2.40E-05	4.66E-06	9.00E-05	9.19E-06	0,00E+00	0,00E+00	9.19E-06	2.59E-05	0,00E+00	-4.45E-07
A:	kg CFC11 eq.	2.63E-09	2.04E-10	2.27E-09	4.02E-10	0,00E+00	0,00E+00	4.02E-10	5.31E-10	0,00E+00	-5.92E-11
AP	mol H+ eq.	1.41E-04	2.05E-05	3.27E-04	4.04E-05	0,00E+00	0,00E+00	4.04E-05	3.96E-04	0,00E+00	-3.48E-05
EP-freshwater	kg PO4 eq.	5.52E-06	6.66E-07	5.18E-05	1.31E-06	0,00E+00	0,00E+00	1.31E-06	3.09E-05	0,00E+00	-1.77E-07
EP-marine	kg N eq.	3.56E-05	5.16E-06	7.55E-05	1.02E-05	0,00E+00	0,00E+00	1.02E-05	1.53E-04	0,00E+00	-1.59E-05
EP-terrestrial	mol N eq.	3.98E-04	5.25E-05	7.21E-04	1.04E-04	0,00E+00	0,00E+00	1.04E-04	1.60E-03	0,00E+00	-1.72E-04
POCP	kg NMVOC eq.	1.34E-04	3.18E-05	3.23E-04	6.27E-05	0,00E+00	0,00E+00	6.27E-05	4.73E-04	0,00E+00	-5.14E-05
ADP-minerals & metals	kg Sb eq.	2.64E-07	3.06E-08	2.85E-07	6.04E-08	0,00E+00	0,00E+00	6.04E-08	3.30E-08	0,00E+00	-1.36E-09
ADP-fossil	MJ	4.42E-01	1.33E-01	1,84E+00	2.62E-01	0,00E+00	0,00E+00	2.62E-01	6.53E-01	0,00E+00	-4.94E-02
WDP	WDP (m3) world. EKW	1.66E-02	5.56E-04	8.25E-03	1.10E-03	0,00E+00	0,00E+00	1.10E-03	2.03E-03	0,00E+00	-1.09E-04

ADDITIONAL IMPACT INDICATORS: 1 kg Kreisel expert smooth gypsum plaster 651L plus											
	Life Cycle Stage										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	1.42E-09	6.96E-10	2.18E-09	1.38E-09	0,00E+00	0,00E+00	1.38E-09	8.28E-09	0,00E+00	-9.59E-10
IRP	kBq U235 eq.	2.66E-03	1.81E-04	2.34E-03	3.55E-04	0,00E+00	0,00E+00	3.55E-04	3.99E-04	0,00E+00	-2.47E-05
ETP-fw	CTUe	5.52E-06	6.66E-07	5.18E-05	1.31E-06	0,00E+00	0,00E+00	1.31E-06	3.09E-05	0,00E+00	-1.77E-07
HTP-c	CTUh	1.08E-11	2.23E-12	4.54E-11	4.42E-12	0,00E+00	0,00E+00	4.42E-12	6.10E-12	0,00E+00	-6.65E-13
HTP-nc	CTUh	2.00E-10	3.44E-11	2.27E-10	6.79E-11	0,00E+00	0,00E+00	6.79E-11	1.77E-10	0,00E+00	-2.75E-11
SQP	-	6.75E-02	8.01E-02	2,99E+00	1.58E-01	0,00E+00	0,00E+00	1.58E-01	6.95E-02	0,00E+00	-3.73E-03
INDICATORS DESCRIBING THE CONSUMPTION OF RESOURCES: 1 kg Kreisel expert smooth gypsum plaster 651L plus											
	Life Cycle Stage										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	5.08E-02	2.10E-03	5.76E-01	4.13E-03	0,00E+00	0,00E+00	4.13E-03	2.48E-02	0,00E+00	-4.45E-04
PERMIAN	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	5.08E-02	2.10E-03	5.76E-01	4.13E-03	0,00E+00	0,00E+00	4.13E-03	2.48E-02	0,00E+00	-4.45E-04
PEN-RE	MJ	4.37E-01	1.39E-01	2,06E+00	2.74E-01	0,00E+00	0,00E+00	2.74E-01	7.59E-01	0,00E+00	-5.21E-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	4.37E-01	1.39E-01	2,06E+00	2.74E-01	0,00E+00	0,00E+00	2.74E-01	7.59E-01	0,00E+00	-5.21E-02
SM	Kg	0,00E+00	0,00E+00	2.11E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.00E-01	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	m3	2.86E-04	2.13E-05	1.11E-03	4.16E-05	0,00E+00	0,00E+00	4.16E-05	4.95E-04	0,00E+00	-7.71E-06
INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 kg Kreisel expert smooth gypsum plaster 651L plus											
	Life Cycle Stage										
Indicator	**Unit (referenced to DU)**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Amount of hazardous waste	Kg	HV	HV	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	HV	HV	2.24E-04	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	HV	HV	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	HV	HV	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	HV	HV	2.11E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.00E-01	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	HV	HV	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	HV	HV	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 of the product (kg C_{org})	9.36E-04
Biogenic carbon content in the package (kg C_{org})	1.02E-02

MAIN IMPACT INDICATORS: 1 kg Kreisel manual gypsum plaster 650											
	Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	3.63E-02	1.48E-02	1.16E-01	1.90E-02	0,00E+00	0,00E+00	1.90E-02	5.67E-02	0,00E+00	-3.93E-03
GWP-fossil	kg CO2 eq.	3.49E-02	1.48E-02	1.45E-01	1.90E-02	0,00E+00	0,00E+00	1.90E-02	5.55E-02	0,00E+00	-3.92E-03
GWP-biogenic	kg CO2 eq.	1.39E-03	1.38E-05	-2.89E-02	1.78E-05	0,00E+00	0,00E+00	1.78E-05	1.11E-03	0,00E+00	-1.02E-05
GWP-luluc	kg CO2 eq.	1.81E-05	7.16E-06	8.89E-05	9.19E-06	0,00E+00	0,00E+00	9.19E-06	2.59E-05	0,00E+00	-4.45E-07
A:	kg CFC11 eq.	2.11E-09	3.14E-10	2.33E-09	4.02E-10	0,00E+00	0,00E+00	4.02E-10	5.31E-10	0,00E+00	-5.92E-11
AP	mol H+ eq.	1.26E-04	3.15E-05	3.23E-04	4.04E-05	0,00E+00	0,00E+00	4.04E-05	3.96E-04	0,00E+00	-3.48E-05
EP-freshwater	kg PO4 eq.	4.91E-06	1.02E-06	4.94E-05	1.31E-06	0,00E+00	0,00E+00	1.31E-06	3.09E-05	0,00E+00	-1.77E-07
EP-marine	kg N eq.	3.26E-05	7.94E-06	7.52E-05	1.02E-05	0,00E+00	0,00E+00	1.02E-05	1.53E-04	0,00E+00	-1.59E-05
EP-terrestrial	mol N eq.	3.72E-04	8.07E-05	7.22E-04	1.04E-04	0,00E+00	0,00E+00	1.04E-04	1.60E-03	0,00E+00	-1.72E-04
POCP	kg NMVOC eq.	1.22E-04	4.88E-05	3.27E-04	6.27E-05	0,00E+00	0,00E+00	6.27E-05	4.73E-04	0,00E+00	-5.14E-05
ADP-minerals & metals	kg Sb eq.	2.49E-07	4.71E-08	2.90E-07	6.04E-08	0,00E+00	0,00E+00	6.04E-08	3.30E-08	0,00E+00	-1.36E-09
ADP-fossil	MJ	3.58E-01	2.05E-01	1,86E+00	2.62E-01	0,00E+00	0,00E+00	2.62E-01	6.53E-01	0,00E+00	-4.94E-02
WDP	WDP (m3) world. EKW	1.46E-02	8.54E-04	8.26E-03	1.10E-03	0,00E+00	0,00E+00	1.10E-03	2.03E-03	0,00E+00	-1.09E-04
ADDITIONAL IMPACT INDICATORS: 1 kg Kreisel manual gypsum plaster 650											
	Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidency	1.33E-09	1.07E-09	2.21E-09	1.38E-09	0,00E+00	0,00E+00	1.38E-09	8.28E-09	0,00E+00	-9.59E-10
IRP	kBq U235 eq.	2.51E-03	2.77E-04	2.36E-03	3.55E-04	0,00E+00	0,00E+00	3.55E-04	3.99E-04	0,00E+00	-2.47E-05
ETP-fw	CTUe	4.91E-06	1.02E-06	4.94E-05	1.31E-06	0,00E+00	0,00E+00	1.31E-06	3.09E-05	0,00E+00	-1.77E-07
HTP-c	CTUh	8.62E-12	3.44E-12	4.58E-11	4.42E-12	0,00E+00	0,00E+00	4.42E-12	6.10E-12	0,00E+00	-6.65E-13
HTP-nc	CTUh	1.91E-10	5.29E-11	2.29E-10	6.79E-11	0,00E+00	0,00E+00	6.79E-11	1.77E-10	0,00E+00	-2.75E-11
SQP	-	6.55E-02	1.23E-01	2,99E+00	1.58E-01	0,00E+00	0,00E+00	1.58E-01	6.95E-02	0,00E+00	-3.73E-03
INDICATORS DESCRIBING RESOURCE CONSUMPTION: 1 kg Kreisel manual gypsum plaster 650											
	Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	4.23E-02	3.22E-03	5.75E-01	4.13E-03	0,00E+00	0,00E+00	4.13E-03	2.48E-02	0,00E+00	-4.45E-04
PERMIAN	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	4.23E-02	3.22E-03	5.75E-01	4.13E-03	0,00E+00	0,00E+00	4.13E-03	2.48E-02	0,00E+00	-4.45E-04
PEN-RE	MJ	3.49E-01	2.14E-01	2.09E+00	2.74E-01	0,00E+00	0,00E+00	2.74E-01	7.59E-01	0,00E+00	-5.21E-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	3.49E-01	2.14E-01	2.09E+00	2.74E-01	0,00E+00	0,00E+00	2.74E-01	7.59E-01	0,00E+00	-5.21E-02
SM	Kg	0,00E+00	0,00E+00	2.10E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.00E-01	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	m3	2.84E-04	3.26E-05	1.07E-03	4.16E-05	0,00E+00	0,00E+00	4.16E-05	4.95E-04	0,00E+00	-7.71E-06

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 kg Kreisel manual gypsum plaster 650											
	Life Cycle Stage										
Indicator	**Unit (referenced to DU)**	**A1**	**A2**	**A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Amount of hazardous waste	Kg	HV	HV	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	HV	HV	1.96E-04	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	HV	HV	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	HV	HV	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	HV	HV	2.10E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6.00E-01	0,00E+00	0,00E+00
Energy Recovery Materials	Kg	HV	HV	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	HV	HV	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 of the product (kg C_{org})	**9.19E-04**
Biogenic carbon content in the package (kg C_{org})	**1.02E-02**

6. INTERPRETATION OF RESULTS

Figures 2, 3, 4, 5 and 6 present diagrams of the share of individual life cycle modules into the basic categories of influence for gypsum plasters – *Kreisel machine gypsum plaster 651, Kreisel machine gypsum plaster hard 651T, Kreisel machine gypsum plaster light 651L, Kreisel expert smooth gypsum plaster 651L plus, Kreisel manual gypsum plaster 650:*

Fig. 2 Shares of life cycle modules on the main categories of influences- Kreisel machine gypsum plaster 651

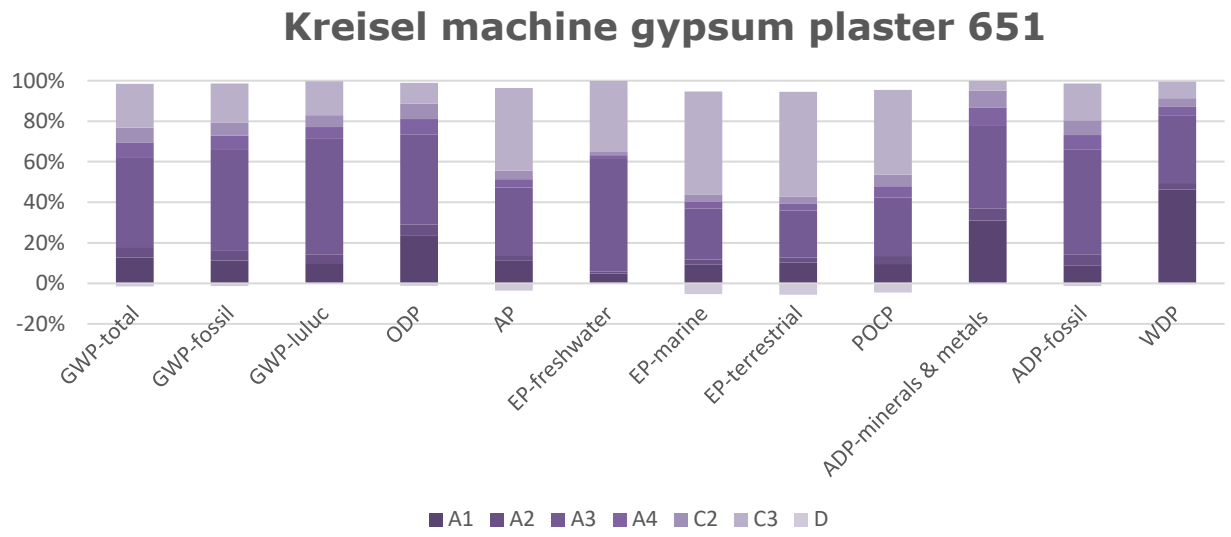


Fig. 3 Shares of life cycle modules on the main categories of influences- Kreisel machine gypsum plaster hard 651T

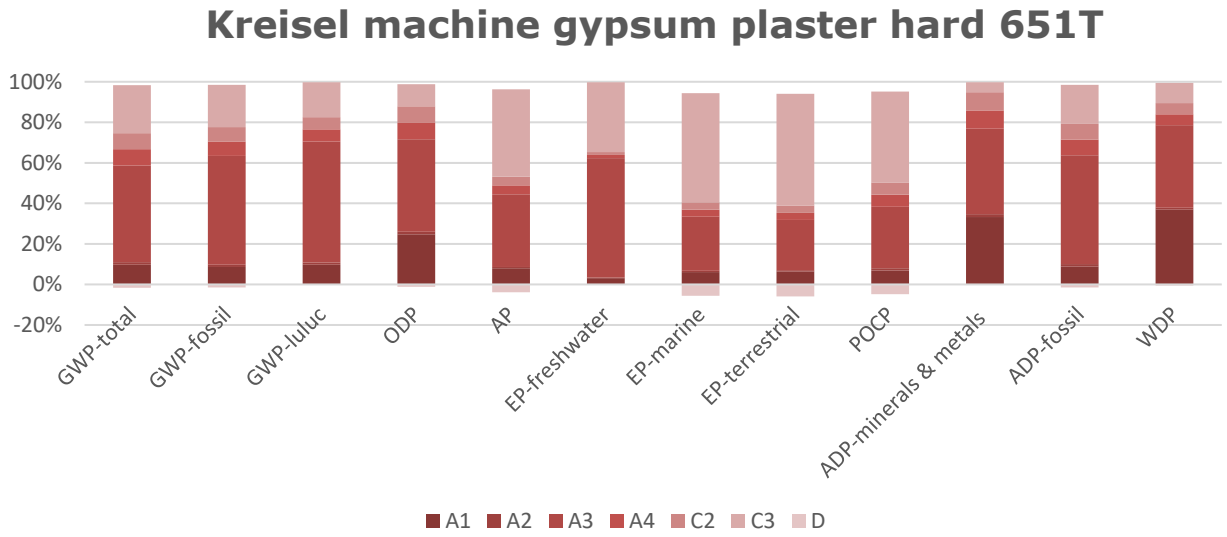


Fig. 4 Shares of life cycle modules on the main categories of influences – Kreisel machine light plaster

651L

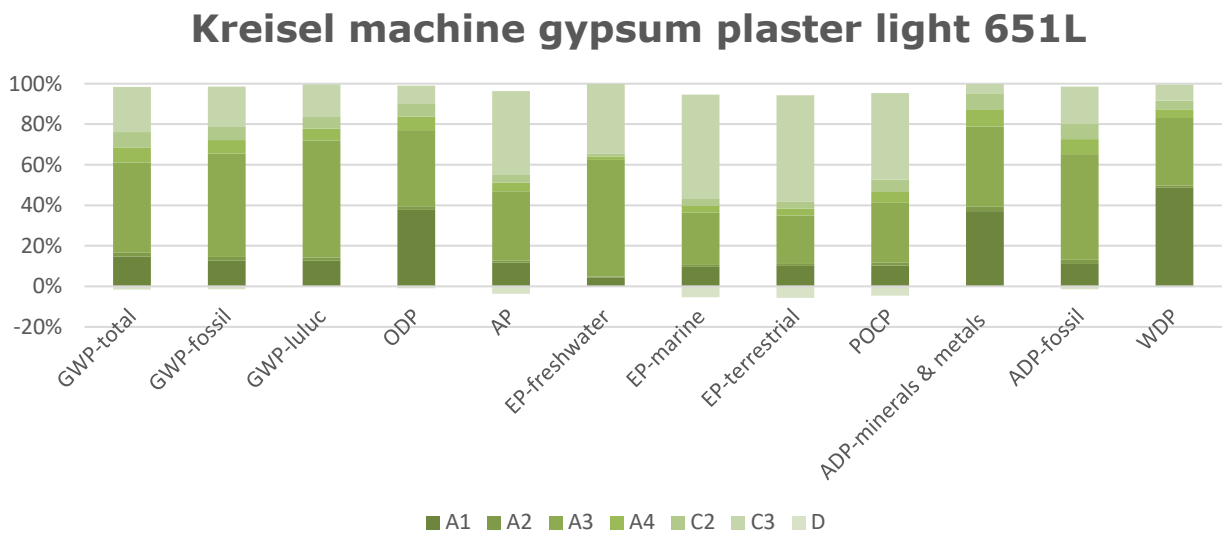


Fig. 5 Shares of life cycle modules on the main categories of influences – Kreisel expert smooth gypsum plaster 651L plus

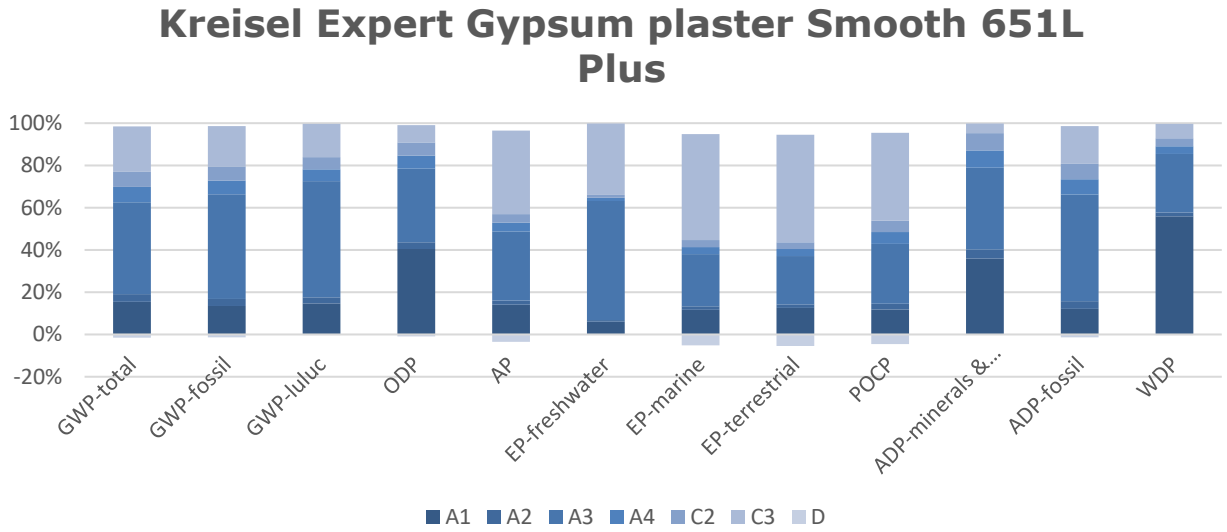
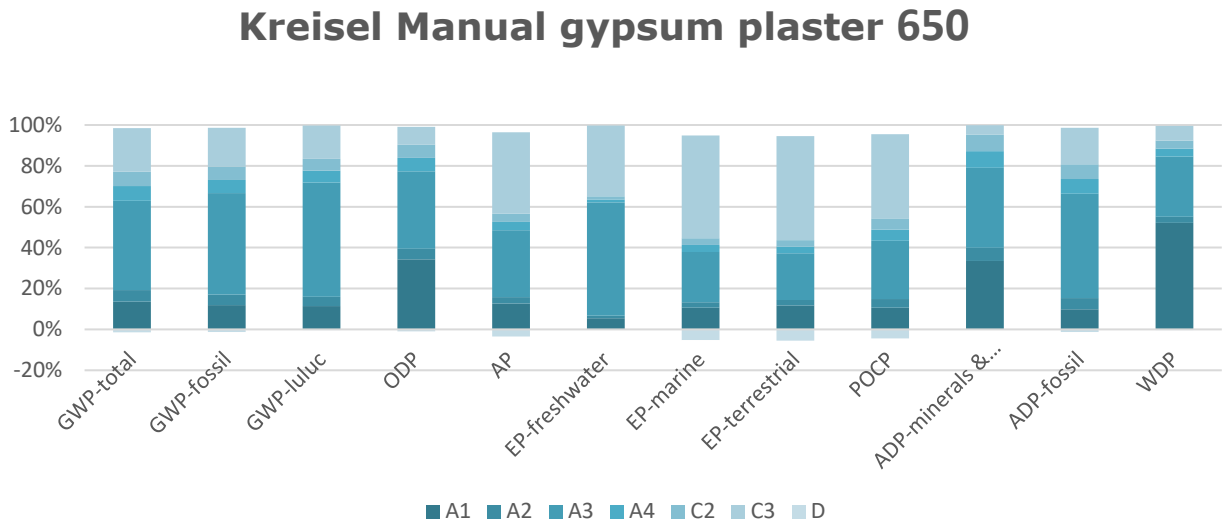


Fig. 6 Shares of life cycle modules on the main categories of influences – Kreisel manual gypsum plaster

650



The production processes of plasters use the same technology. The LCA analysis has shown that the processes related to production have the greatest impact on the value of environmental impact indicators (A3) Module A3 in the "*climate change*" category for all manufactured gypsum plasters accounts for from 44 to nearly 50% of the value of all impact categories.

The impact of transport to the plant (A2) in the "*climate change*" *category* for all gypsum plasters produced accounts for approx. 1.3 to approx. 6% of the total impact in the main categories. The difference is mainly due to the quantity of deliveries in relation to the product produced. The low values of the impact category are also due to the fact that most of the raw materials are delivered to the place of production from Polish.

Transport to the waste treatment site (C2) has a relatively small impact on the final values of the LCIA analysis, the share in the main impact categories is about 7% of the total values.

LITERATURE

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

Explanatory materials can be obtained on the declaration owner's website: www.kreisel.pl

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PROCESS ENGINEERING RESEARCH GROUP

TYPE III ENVIRONMENTAL DECLARATION CERTIFICATE

no. 01-03/2024

Products:

Gypsum plaster

Owner:

Kreisel – Technika Budowlana Sp. z o.o.

23 Szarych Szeregów Str.
23-462 Poznań

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 **March,08 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 Center Of Environmental Engineering

Joanna Poluszyńska, PhD

Opole, March 2024