ENVIRONMENTAL PRODUCT DECLARATION

No. 01-12/2022

READY-MIXED JOINT COMPOUNDS

EKO-MAS GP-95 and EKO-MAS HD-97

EKO-MAS AlwerChem sp. z o.o. sp. k.

Owner of the EPD:	*EKO-MAS AlwerChem sp. z o.o. sp. k.*
Programme owner:	*Łukasiewicz Research Network – Institute of Ceramics and Building Materials*
Name of programme:	*Deklaracje Środowiskowe Produktów – B2B*
Issued:	***05.12.2022***
Valid until:	***05.12.2027***

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ENVIRONMENTAL PRODUCT DECLARATION
No. 02-11/2022

EKO-MAS®

1. GENERAL INFORMATION

Owner of the EPD: EKO-MAS AlwerChem sp. z o.o. sp. k.	**Products covered by the EPD:** **EKO-MAS GP-95** universal ready-mixed leveling compound **EKO-MAS HD-97** ready-mixed finish for machine application.
Programme owner: Łukasiewicz Research Network - Institute for Ceramics And Building Materials Environmental Engineering Center **http://www.icimb.pl/opole/**	**Owner of the EPD:** EKO-MAS AlwerChem sp. z o.o. sp. k. 3 Belwender Str. 32-556 Alwernia Telephone: +48 12 653 41 42 E-mail: biuro@ekomas.pl **https://www.ekomas.pl/**
Date of issuance: 05.12.2022	**Declared product/declared unit:** The declared unit (DU) for the products is 1 kg (1 kilogram) of ready-mixed GP-95 and HD-97 joint compound.
EPD valid until: 05.12.2027	**Scope:** The declaration covers the following products: **EKO-MAS GP-95** and **EKO-MAS HD-97** manufactured in the EKO-MAS AlwerChem sp. z o.o. sp. k., 3 Belwender Str., 32-556 Alwernia. It contains information about the impact of the declared products on the environment. All data on the production cycle have been collected by EKO-MAS AlwerChem sp. z o.o. sp. k. from September 1, 2021 to September 1, 2022 (12 months) and correspond to the production technology of that time. 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 with the PN-EN 15804 standard. The declaration owner is responsible for the underlying information and evidence. Łukasiewicz Research Network - Institute for Ceramics and Building Materials Environmental Engineering Center in Opole is not responsible for the manufacturer's information and data and evidence regarding the life cycle assessment. Declarations resulting from different programs or performed not in accordance with the standard may not be comparable.

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Product Category Rules (PCR)	According to: PN-EN 15804 + A2: 2020-03 Sustainability of construction works. Environmental product declarations. Basic principles of categorization of construction products.
Representativeness:	Polish product, year 2021/2022
Reference Service Life (RSL):	25 years
Reasons for performing LCA:	B2B
Life cycle Analysis (LCA):	LCA covers modules A1-A3, C1-C4 and D according to PN-EN 15804+A2 standard (Cradle-to-Gate with options)

Łukasiewicz Research Network - Institute of Ceramics and Building Materials, Environmental Engineering Center provides access to the type III EPD for GP-95 and HD-97 ready-to-use dolomite putties by EKO-MAS AlwerChem sp. z.o.o sp. k. to the interested parties.

Authors:

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Approved by:
Joanna Poluszyńska, PhD

Director of the environmental engineering center

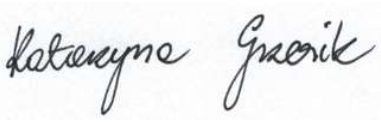
Ewa Głodek-Bucyk, PhD Eng.

Leader of Process Engineering Research Group

Verification:

CEN PN-EN 15804+A2 standard serves as main PCR.
Independent EPD and data verification according to PN-EN ISO 14025:2010 standard.

☐ internal ☒ external



Katarzyna Grzesik, PhD Eng.

2. MANFACTURER AND PRODUCT DESCRIPTION

The EKO-MAS AlwerChem company was established in 1995. It produces professional construction chemicals. The main products are ready-mixed premium leveling compounds made on the basis of dolomite: GP-95 universal ready-mixed leveling compound and HD-97 ready-mixed finish for machine application.

The company also produces loose (powder) plasters - START gypsum plaster and FINISZ dolomite plaster. The offer is complemented by strong acrylic primers: GU-10 universal acrylic primer, GX-12 acrylic primer concentrate and PN-15 deep penetrating primer.

Care for the environment is one of the most important foundations of the company. The strategic importance of pro-ecological production is reflected both in the name of the company itself and in the names of the products it offers. Main products - ready-mixed joint compounds are made on the basis of natural raw material - dolomite.

The production is practically waste-free and environmentally friendly, and the production plant is located among forests, on the Skowronek recreational reservoir in Alwernia in the Lesser Poland Voivodeship.

The company focuses on innovation, constantly looking for new ways of development and developing products in such a way that they best meet the needs of their users.

Products covered by the declaration - GP-95 and HD-97 ready-mixed joint compounds are produced by combining the following basic ingredients:

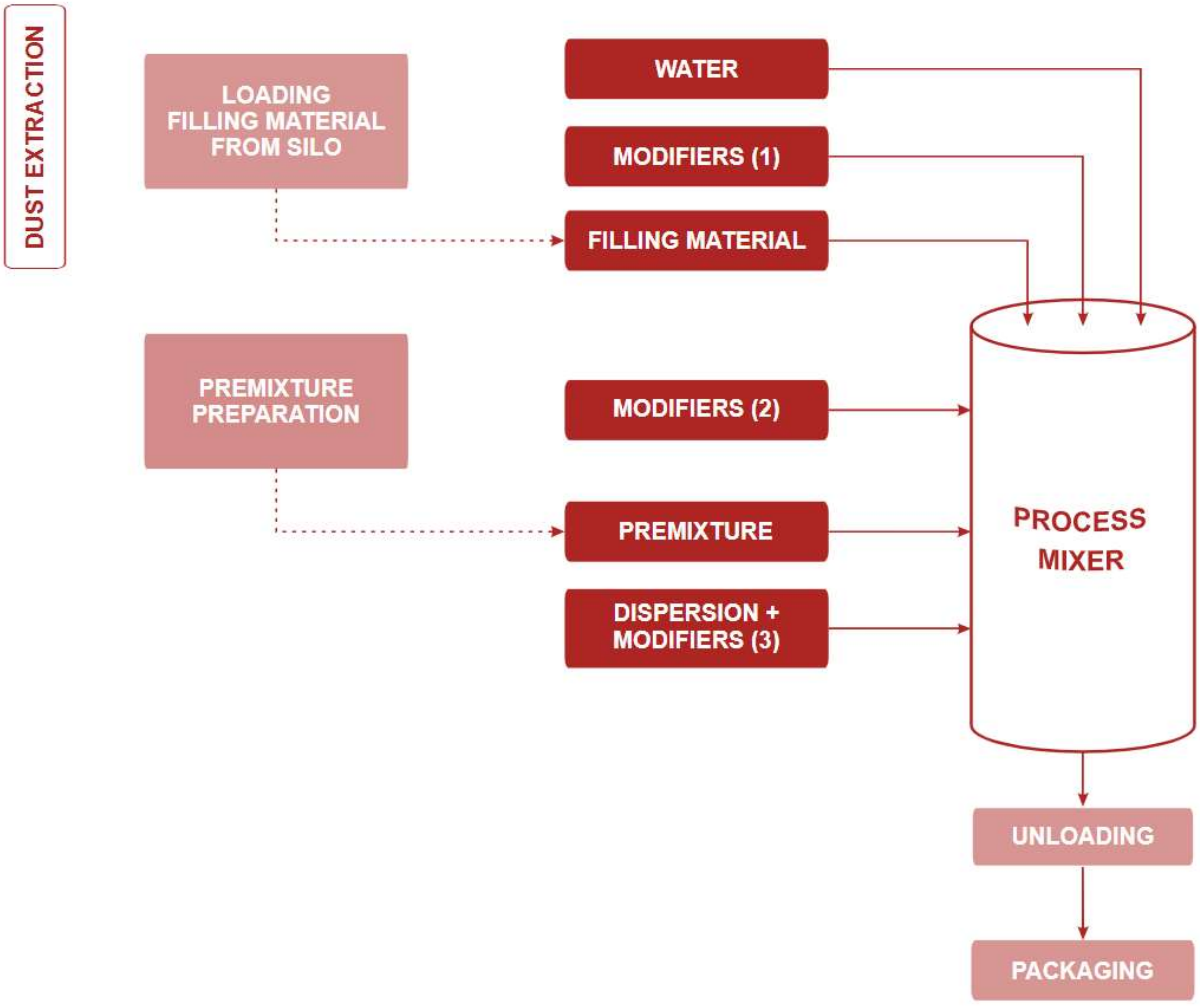
- Dolomite aggregate,
- Aqueous polymer dispersion,
- Modifying additives to improve product properties and processing.

The indicative composition of the products covered by the declaration is presented in the table below.

Material	Mass fraction [%]		Description
	GP-95	HD-97	
Aggregate	71,6	70,9	Very finely ground dolomite aggregate - the main component of the product
Aqueous polymer dispersion	25,7	26,2	An aqueous polymer dispersion solution serving as a binder
Modifiers	0,6	0,8	Chemical additives such as preservatives and enhancers for better properties and processing
Packaging	2,1	2,1	Plastic buckets of different capacity according to product specification

The production process takes place in a mixer where components are supplied in a certain amounts according to the recipe. Water, polymer dispersion and modifying additives are added to the dolomite aggregate to improve the properties of the finished products. The entire process is done in stages to streamline production. After mixing, the finished product is packed in plastic buckets of various sizes.

The production diagram is shown in the figure below.



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EKO-MAS GP-95 is a ready-to-use white joint compound in the form of a paste for making thin-layer skim coat on gypsum, cement-lime and lime plasters, plasterboards and concrete - smoothing walls and ceilings inside rooms not permanently exposed to moisture and for jointing plasterboards with use of bonding tape. Intended for manual application, with a roller or (after dilution) by airless sprayer. Meets the requirements of the harmonized standards EN 15824:2017: Requirements for external and internal plasters based on organic binders and EN 13963:2005, EN 13963:2005 / AC:2006: Materials for jointing plasterboards. Definitions, requirements and test methods.

Contents: finely ground dolomite, aqueous polymer dispersion, modifying additives (preservatives and enhancers for better properties and processing).

Technical data:

Parameter	**Value**
Consumption	Min. 1-1,5 kg/m^2
Application temperature	5°C - 25°C
Drying time	2-24 h depending on conditions
Density	1,9 kg/m^3
Fineness	Approx. 0,063 mm

Performance data (according to Declaration of Performance and Safety Data Sheet):

Characteristics	**Performance Data**	**Harmonized Standard**
Adhesive strength	≥ 0,3 MPa	EN 15824:2017
Heat transfer coeff.	n.a.	
Fire reaction	n.a.	
Hazardous substances	2-methylo-2H-izothiasol-3-one (MIT), **<0,0015%** 1,2-benzisothiazol-3(2H)-one, **<0,0015%** N-(3-aminopropyl)-N-dodecylpropane-1,3-diamine (Di-amine), **< 0,0030%**	
Fire reaction (direct exposure)	n.a.	EN 13963:2005
Flexural strength	≥ 200 N	EN 13963:2005 / AC:2006

According to the Safety Data Sheet prepared in accordance with the regulation (EC) No. 1272/2008, the mixture (EKO-MAS GP-95) is not classified as dangerous for humans. Due to the slight alkalinity of the mixture, direct and prolonged contact may cause skin irritation or sensitization, eye irritation. The mixture is not classified as dangerous for the environment and there are no known hazards if used correctly.

EKO-MAS HD-97 is a ready-to-use white joint compound in the form of a paste for making thin-layer skim coat on gypsum, cement-lime, and lime plaster, plasterboards and concrete - smoothing walls and ceilings inside rooms not permanently exposed to moisture. Intended for application by airless sprayer, with longer setting time. The compound is ready to use, there is no need to dilute before work. Meets the requirements of the harmonized standard EN 15824:2017: Requirements for external and internal plasters based on organic binders.

Contents: very finely ground dolomite, aqueous polymer dispersion, modifying additives (preservatives and enhancers for better properties and processing).

Technical Data:

Parameter	Value
Consumption	Min. 1-1,5 kg/m^2
Application temperature	5°C - 25°C
Drying time	2-24 h depending on conditions
Density	1,84 kg/m^3
Fineness	Approx. 0,063 mm

Performance data (according to Declaration of Performance and Safety Data Sheet):

Characteristics	Performance Data	Harmonized Standard
Adhesive strength	≥ 0,3 MPa	EN 15824:2017
Heat transfer coeff.	n.a.	
Fire reaction	n.a.	
Hazardous substances	2-methylo-2H-izothiasol-3-one (MIT), **<0,0015%** 1,2-benzisothiazol-3(2H)-one, **<0,0015%** N-(3-aminopropyl)-N-dodecylpropane-1,3-diamine (Di-amine), **< 0,0030%**	

According to the Safety Data Sheet prepared in accordance with the regulation (EC) No. 1272/2008, the mixture (EKO-MAS HD-97) is not classified as dangerous for humans. Due to the slight alkalinity of the mixture, direct and prolonged contact may cause skin irritation or sensitization, eye irritation. The mixture is not classified as dangerous for the environment and there are no known hazards if used correctly.

3. LCA: CALCULATION RULES

System boundaries

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

- A1 - extraction and preparation of raw materials, generation of electricity and energy carriers for auxiliary processes,
- A2 - transport of raw materials to the gate of the production plant,
- A3 - production, including ancillary processes and emissions.
- C1 – deconstruction/demolition,
- C2 – transport to the waste processing facility,
- C3 – processing of waste material,
- C4 – treatment of waste material,
- D – re-use potential.

Data collection period

Data on the production process was collected in the years 2021-2022, in the period from 01/09/21 to 01/09/22.

Declared unit (DU)

Due to neglegible differences between the two groups of products, the declared unit is **1 kg** of GP-95 and HD-97 ready-mixed joint compounds produced by EKO-MAS AlwerChem sp. z o.o. sp. k. in Alwernia.

Assumptions

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

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

A3 - values of CO2, NOx, SO2, dust and other emissions from the production process obtained as a result of measurements carried out at the plant, other estimated on the basis of fuel consumption.

C1 - module C1 describes the treatment of construction rubble waste during the deconstruction/demolition of masonry walls as part of the deconstruction/demolition process of the entire building. Data is collected on the basis of a developed scenario. In accordance with the applicable law, construction rubble waste is subject to recovery. The total amount of debris waste generated is transported to a treatment facility for recovery operations. Deconstruction/demolition of masonry walls is considered as part of the demolition process of the entire building. The joint compound as a wall covering constitutes a small percentage of the mass of a masonry wall. Therefore, the contribution of joint compound to the demolition of the entire building can be omitted and the impact of this module can be assumed as zero.

C2 - Module C2 relates to the transport of construction and demolition waste containing joint compound to a waste recovery or disposal facility. Data is collected on the basis of a developed scenario. The transport of waste containing joint compound is directed to a recovery (recycling) facility.

C3 - Module C3 takes into account the environmental impact of processing construction and demolition waste containing joint compound in a waste recovery facility.

Data is collected on the basis of a developed scenario.

C4 - module C4 should take into account the impact of stored construction rubble containing joint compound. In the developed scenario, landfill operations are not taken into account, because construction rubble is not worthless waste, it is recyclable and should not end up in municipal waste landfills.

D - Module D provides information on the impact and effects of using recycled material from recycled construction debris containing joint compounds. There is high uncertainty in the development of scenarios for Module D, which makes modeling and calculation difficult. Recycling aggregate fraction 0/63 mm of construction rubble 17 01 01, containing joint compound, contributes to the saving of natural resources. However, the low mass fraction of the joint compound in the total fraction means that the positive impacts resulting from the reuse of the material covered by the declaration are negligible. When processed rubble code 17 01 02 containing joint compound is used as a filling material, it also contributes to the saving of natural resources.

Cut-off criteria

99% of all mass flows involved in the production process were taken into account.
All the energy used in the process has been taken into account in the EPD.

Generic data

The main source of general and auxiliary data is the EcoInvent 3.8 database and manufacturer's reports.

Allocation

All data provided by the manufacturer have been referred to the declared unit (DU) of the product - 1 kg of ready-mixed joint compounds produced in EKO-MAS AlwerChem sp. z o.o. sp. k. in Alwernia.

4. LCA: SCENARIOS AND ADDITIONAL TECHNICAL DATA

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

Module C2:

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

• 100% of the product is transported to a recovery plant as part of waste 17 01 01 or 17 01 02 (construction rubble),

• Transport is carried out using self-unloading trucks with a load capacity
7.5 - 16 tons, meeting EURO 6 emission standards

• The material is transported to a waste treatment site 100 km from the demolition site.

Module C3:

Waste containing joint compounds intended for recovery is classified as "non-hazardous waste" with the code 17 01 01 or 17 01 02. The first group of waste is recycled into a total fraction of 0/63 mm. The recycling process includes crushing and screening. There is no pre-treatment, additional fraction screening or post-treatment. Recycling takes place at the waste treatment plant. Given that joint compound would be a minor part of waste code 17 01 01, with the caveat that recycled joint compound is a brittle material, its contribution to recycling impacts (module D) should be disregarded. The second group of waste (17 01 02) is usually recovered during backfilling. Only coarse crushing is used to obtain the appropriate classification.

5. LCA: RESULTS

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

SYSTEM BOUNDARIES (X – MODULE INCLUDED IN LCA, MND – MODULE NOT DECLARED, INA – INDICATOR NOT ASSESSED)																
Product stage			**Construction process stage**		**Use stage**							**End-of-life stage**				**Benefits and loads beyond the system boundary**
Raw material supply	Transport	Production	Transport to the construction site	Construction proces	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction	Transport	Waste processing	Disposal	Reuse-recovery-recycling potentiial
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	**X**	**X**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**X**	**X**	**X**	**X**	**X**

The following tables present the results of the LCA analysis for roof windows with single and double glazing. Explanations of the abbreviations used to describe the impact categories are given below:

GWP	Global warming potential
ODP	Depletion potential of the stratospheric ozone layer
AP	Acidification potential of land and water
EP	Eutrophication potential
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
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
PENRM	Use of nonrenewable primary energy resources used as raw materials
PENRT	Total use of non-renewable primary energy resources
SM	Use of secondary material
RSF	Use of renewable secondary fuels
NRSF	Use of non-renewable secondary fuels
FW	Use of net fresh water

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CORE ENVIRONMENTAL IMPACT INDICATORS: 1 kg EKO-MAS GP-95									
	Life Cycle Stage								
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	1,64E-01	7,24E-02	6,82E-02	0,00E+00	2,14E-02	3,58E-03	0,00E+00	INA
GWP-fossil	kg CO_2 eq.	1,68E-01	7,24E-02	6,83E-02	0,00E+00	2,13E-02	3,57E-03	0,00E+00	INA
GWP-biogenic	kg CO_2 eq.	-3,61E-03	-2,21E-05	-2,04E-04	0,00E+00	1,94E-05	1,08E-05	0,00E+00	INA
GWP-luluc	kg CO_2 eq.	2,21E-04	2,29E-05	2,37E-05	0,00E+00	1,01E-05	3,55E-07	0,00E+00	INA
ODP	kg CFC11 eq.	2,55E-06	1,63E-08	6,42E-10	0,00E+00	4,81E-09	7,32E-10	0,00E+00	INA
AP	mol H+ eq.	8,71E-04	2,11E-04	1,89E-04	0,00E+00	6,04E-05	3,63E-05	0,00E+00	INA
EP-freshwater	kg PO_4 eq.	8,15E-06	1,07E-06	2,16E-06	0,00E+00	1,74E-07	1,82E-08	0,00E+00	INA
EP-marine	kg N eq.	1,46E-04	3,84E-05	4,86E-05	0,00E+00	1,15E-05	1,57E-05	0,00E+00	INA
EP-terrestrial	mol N eq.	1,68E-03	4,35E-04	4,51E-04	0,00E+00	1,28E-04	1,72E-04	0,00E+00	INA
POCP	kg NMVOC eq.	5,59E-04	1,67E-04	1,41E-04	0,00E+00	4,93E-05	4,79E-05	0,00E+00	INA
ADP-minerals & metals	kg Sb eq.	1,33E-06	2,19E-07	8,49E-08	0,00E+00	9,77E-08	1,84E-09	0,00E+00	INA
ADP-fossil	MJ	3,87E+00	1,09E+00	2,40E-01	0,00E+00	3,19E-01	4,80E-02	0,00E+00	INA
WDP	m^3 world eq. deprived	8,06E-02	7,08E-03	2,99E-03	0,00E+00	1,06E-03	7,57E-05	0,00E+00	INA

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS : 1 kg EKO-MAS GP-95									
	Life Cycle Stage								
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	7,27E-09	5,79E-09	7,39E-09	0,00E+00	1,45E-09	9,55E-10	0,00E+00	INA
IRP	kBq U235 eq.	1,28E-02	4,65E-03	4,74E-04	0,00E+00	1,39E-03	2,00E-04	0,00E+00	INA
ETP-fw	CTUe	1,19E+01	7,03E-01	6,09E-01	0,00E+00	2,61E-01	3,20E-02	0,00E+00	INA
HTP-c	CTUh	8,38E-11	2,27E-11	5,10E-11	0,00E+00	9,41E-12	1,13E-12	0,00E+00	INA
HTP-nc	CTUh	2,50E-09	8,68E-10	5,13E-10	0,00E+00	2,52E-10	3,17E-11	0,00E+00	INA
SQP	-	1,23E+00	7,55E-01	1,15E+00	0,00E+00	1,89E-01	6,29E-03	0,00E+00	INA

PARAMETERS DESCRIBING RESOURCE USE: 1 kg EKO-MAS GP-95									
	Life Cycle Stage								
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	INA	INA	4,10E-01	0,00E+00	INA	INA	0,00E+00	INA
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
PERT	MJ	0,00E+00	0,00E+00	4,10E-01	0,00E+00	INA	INA	0,00E+00	INA
PEN-RE	MJ	3,64E+00	1,14E+00	2,93E-01	0,00E+00	3,32E-01	5,07E-02	0,00E+00	INA
RE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	INA
PENRT	MJ	3,64E+00	1,14E+00	2,93E-01	0,00E+00	3,32E-01	5,07E-02	0,00E+00	INA
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	INA
RSF	MJ	INA	INA	4,10E-01	0,00E+00	INA	INA	0,00E+00	INA
NRSF	MJ	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
FW	m^3	9,62E-01	6,15E-02	5,98E-02	0,00E+00	2,16E-02	1,35E-03	0,00E+00	INA

ENVIRONMENTAL INFORMATION DESCRIBING WASTE AND OUTPUT FLOWS: 1 kg EKO-MAS GP-95									
	Life Cycle Stage								
Indicator	**Unit (expressed per DU)**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
Non-hazardous waste	kg	INA	INA	6,60E-03	0,00E+00	INA	INA	0,00E+00	INA
Radioactive waste	kg	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
Components for re-use	kg	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
Materials for recycling	kg	INA	INA	6,60E-03	0,00E+00	INA	INA	0,00E+00	INA
Materials for energy recovery	kg	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
Exported energy	MJ/energy carrier	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA

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CORE ENVIRONMENTAL IMPACT INDICATORS: 1 kg EKO-MAS HD-97									
	Life Cycle Stage								
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	1,71E-01	7,24E-02	6,76E-02	0,00E+00	2,14E-02	3,58E-03	0,00E+00	INA
GWP-fossil	kg CO_2 eq.	1,74E-01	7,24E-02	6,77E-02	0,00E+00	2,13E-02	3,57E-03	0,00E+00	INA
GWP-biogenic	kg CO_2 eq.	-3,56E-03	-2,21E-05	-2,06E-04	0,00E+00	1,94E-05	1,08E-05	0,00E+00	INA
GWP-luluc	kg CO_2 eq.	2,28E-04	2,29E-05	2,35E-05	0,00E+00	1,01E-05	3,55E-07	0,00E+00	INA
ODP	kg CFC11 eq.	2,56E-06	1,63E-08	6,34E-10	0,00E+00	4,81E-09	7,32E-10	0,00E+00	INA
AP	mol H+ eq.	9,02E-04	2,11E-04	1,85E-04	0,00E+00	6,04E-05	3,63E-05	0,00E+00	INA
EP-freshwater	kg PO_4 eq.	8,43E-06	1,07E-06	2,08E-06	0,00E+00	1,74E-07	1,82E-08	0,00E+00	INA
EP-marine	kg N eq.	1,51E-04	3,84E-05	4,82E-05	0,00E+00	1,15E-05	1,57E-05	0,00E+00	INA
EP-terrestrial	mol N eq.	1,74E-03	4,35E-04	4,46E-04	0,00E+00	1,28E-04	1,72E-04	0,00E+00	INA
POCP	kg NMVOC eq.	5,81E-04	1,67E-04	1,40E-04	0,00E+00	4,93E-05	4,79E-05	0,00E+00	INA
ADP-minerals & metals	kg Sb eq.	1,42E-06	2,19E-07	8,30E-08	0,00E+00	9,77E-08	1,84E-09	0,00E+00	INA
ADP-fossil	MJ	4,02E+00	1,09E+00	2,33E-01	0,00E+00	3,19E-01	4,80E-02	0,00E+00	INA
WDP	m^3 world eq. deprived	8,66E-02	7,08E-03	2,91E-03	0,00E+00	1,06E-03	7,57E-05	0,00E+00	INA

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS: 1 kg EKO-MAS HD-97									
	Life Cycle Stage								
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	7,51E-09	5,79E-09	7,38E-09	0,00E+00	1,45E-09	9,55E-10	0,00E+00	INA
IRP	kBq U235 eq.	1,32E-02	4,65E-03	4,67E-04	0,00E+00	1,39E-03	2,00E-04	0,00E+00	INA
ETP-fw	CTUe	1,25E+01	7,03E-01	6,01E-01	0,00E+00	2,61E-01	3,20E-02	0,00E+00	INA
HTP-c	CTUh	9,14E-11	2,27E-11	4,85E-11	0,00E+00	9,41E-12	1,13E-12	0,00E+00	INA
HTP-nc	CTUh	3,09E-09	8,68E-10	5,04E-10	0,00E+00	2,52E-10	3,17E-11	0,00E+00	INA
SQP	-	1,25E+00	7,55E-01	1,15E+00	0,00E+00	1,89E-01	6,29E-03	0,00E+00	INA

PARAMETERS DESCRIBING RESOURCE USE: 1 kg EKO-MAS HD-97									
	Life Cycle Stage								
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	INA	INA	4,10E-01	0,00E+00	INA	INA	0,00E+00	INA
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
PERT	MJ	0,00E+00	0,00E+00	4,10E-01	0,00E+00	INA	INA	0,00E+00	INA
PEN-RE	MJ	3,78E+00	1,14E+00	2,85E-01	0,00E+00	3,32E-01	5,07E-02	0,00E+00	INA
RE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	INA
PENRT	MJ	3,78E+00	1,14E+00	2,85E-01	0,00E+00	3,32E-01	5,07E-02	0,00E+00	INA
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	INA
RSF	MJ	INA	INA	4,10E-01	0,00E+00	INA	INA	0,00E+00	INA
NRSF	MJ	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
FW	m^3	9,96E-01	6,15E-02	5,89E-02	0,00E+00	2,16E-02	1,35E-03	0,00E+00	INA

ENVIRONMENTAL INFORMATION DESCRIBING WASTE AND OUTPUT FLOWS: 1 kg EKO-MAS HD-97									
	Life Cycle Stage								
Indicator	**Unit (expressed per DU)**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
Non-hazardous waste	kg	INA	INA	6,61E-03	0,00E+00	INA	INA	0,00E+00	INA
Radioactive waste	kg	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
Components for re-use	kg	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
Materials for recycling	kg	INA	INA	6,61E-03	0,00E+00	INA	INA	0,00E+00	INA
Materials for energy recovery	kg	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA
Exported energy	MJ/energy carrier	INA	INA	0,00E+00	0,00E+00	INA	INA	0,00E+00	INA

6. INTERPRETATION OF LCA

As a result of the LCA analysis carried out in accordance with the requirements and assumptions regarding the system boundaries and cut-off criteria for GP-95 and HD-97 ready-mixed joint compounds produced by EKO-MAS AlwerChem sp. z o.o. sp. k. the following results were achieved:

Values of impact category at life cycle stages: EKO-MAS GP-95 ready-mixed joint compound

Impact category	**EKO-MAS GP-95**				
	A1 [%]	A2 [%]	A3 [%]	C2 [%]	C3 [%]
GWP-total	49,83	21,94	20,67	6,47	1,09
GWP-fossil	5,03E+01	2,17E+01	2,05E+01	6,40E+00	1,07E+00
GWP-biogenic	94,86	0,58	5,36	-0,51	-0,28
GWP-luluc	79,45	8,25	8,53	3,63	0,13
ODP	99,13	0,63	0,02	0,19	0,03
AP	63,67	15,42	13,84	4,41	2,65
EP-freshwater	70,47	9,22	18,65	1,51	0,16
EP-marine	56,10	14,76	18,69	4,41	6,04
EP-terrestrial	58,59	15,16	15,75	4,48	6,02
POCP	57,95	17,32	14,66	5,11	4,97
ADP-minerals & metals	76,73	12,63	4,90	5,64	0,11
ADP-fossil	69,52	19,58	4,30	5,74	0,86
WDP	87,79	7,71	3,26	1,15	0,08

PM	31,81	25,32	32,34	6,35	4,18
IRP	65,69	23,76	2,42	7,11	1,03
ETP-fw	88,11	5,21	4,51	1,93	0,24
HTP-c	49,85	13,53	30,35	5,60	0,67
HTP-nc	60,02	20,84	12,32	6,06	0,76
SQP	36,97	22,63	34,54	5,67	0,19

Values of impact category at life cycle stages: EKO-MAS HD-97 ready-mixed joint compound

Impact category	**EKO-MAS HD-97**				
	A1 [%]	A2 [%]	A3 [%]	C2 [%]	C3 [%]
GWP-total	50,91	21,54	20,13	6,35	1,07
GWP-fossil	51,37	21,34	19,95	6,28	1,05
GWP-biogenic	94,73	0,59	5,49	-0,52	-0,29
GWP-luluc	80,05	8,04	8,25	3,54	0,12
ODP	99,13	0,63	0,02	0,19	0,03
AP	64,66	15,13	13,27	4,33	2,60
EP-freshwater	71,65	9,05	17,66	1,48	0,15
EP-marine	57,05	14,50	18,19	4,33	5,93
EP-terrestrial	59,50	14,90	15,29	4,40	5,91
POCP	58,99	16,95	14,20	5,00	4,86
ADP-minerals & metals	77,97	12,01	4,56	5,36	0,10
ADP-fossil	70,38	19,10	4,09	5,60	0,84
WDP	88,61	7,24	2,98	1,08	0,08
PM	32,52	25,07	31,99	6,28	4,14
IRP	66,35	23,32	2,34	6,98	1,01
ETP-fw	88,67	4,99	4,26	1,85	0,23
HTP-c	52,77	13,12	28,02	5,43	0,65
HTP-nc	65,15	18,27	10,60	5,31	0,67
SQP	37,32	22,52	34,33	5,64	0,19

- The LCA analysis proved that the processes related to the acquisition of raw materials and semi-finished products (A1) have the greatest impact on the value of environmental impact indicators, however, the distribution between the modules of the production stage (A1-A3) is relatively homogeneous. The values resulting from the A1 module for the GP-95 product are from about 30 to nearly 100% of the total value of the impact category, in the case of the HD-97 product they are from about 40 to nearly 100%. Partial processes related to the acquisition of raw materials and energy affect the individual categories of impact to a different extent. The processes related to the production of dolomite filler, vinyl dispersion and packaging have the largest share in the main impact categories.

- The high impact of these processes comes from the fact that the materials produced as a result of these processes have the largest mass share per declared unit or from the fact that these processes are energy-intensive, requiring the supply of large amounts of heat and electricity (mainly from non-renewable sources) and obtaining non-renewable raw materials and, despite a small mass share, their impact is relatively large.

- The impact of transport to the plant (A2) on the impact categories is from approx. 1 to approx. 25% of the total impact in the main categories. This is due to the fact that raw materials are delivered to the place of production from local sources.

- Due to the nature of the production process, which consists mainly in mixing ingredients, the values of the main impact categories in module A3 are up to 34% in the analyzed product groups. Despite the simplicity of the production process and relatively low energy consumption, the share of the A3 module is again high in relation to the other shares, for reasons analogous to those of the A2 module.

- Transport to the waste treatment site (module C2) has a relatively minor impact on the final values of the LCA analysis, the contribution of module C2 to the main impact categories is up to approx. 6% of the total values.

- The waste processing process (construction rubble containing the products covered by the declaration) also does not significantly affect the final result - the values are up to approx. 6% of the total values for the main impact categories.

- Taking into account the above conclusions, the owner of the declaration has a moderate influence on the values of the environmental impact indicators, because it depends on external entities. It can only try to change suppliers to ones that are closer to the production plant and reduce consumption at the level of the production process.

7. LITERATURE

- ✓ PN-EN ISO 14025: 2014-04, Environmental labels and declarations - Type III environmental declarations - Rules and procedures.
- ✓ PN-EN 15804 + A2: 2020, Sustainability of construction works - Environmental product declarations - Basic rules for categorizing construction products.
- ✓ 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.
- ✓ EN 15942: 2012, Sustainability of construction works - Environmental product declarations - Communication format business-to-business.
- ✓ Data from company website: www.ekomas.pl

Explanatory materials can be found on the manufacturers website: **www.ekomas.pl**

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PROCESS ENGINEERING RESEARCH GROUP

TYPE III ENVIRONMENTAL DECLARATION CERTIFICATE

No. 01-12/2022

Products:

READY-MADE JOINT COMPOUNDS

GP-95

HD-97

Owner:

EKO-MAS AlwerChem sp z.o.o. sp. k.
3 Belwender Str.
32-556 Alwernia

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, 2022** 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, December 2022