Łukasiewicz
Institute of Ceramics
and Building Materials

Kaczmarek

ENVIRONMENTAL PRODUCT DECLARATION
No. 02-05/2024

K2-Kan sewer pipe

Declaration owner:	Kaczmarek Malewo Sp.K.
Program Owner:	Łukasiewicz Research Network – Institute of Ceramics and Building Materials Environmental Engineering Center
Name of program	Environmental Product Declarations – B2B
Release Date:	**22.05.2024**
Declaration valid until:	**22.05.2029**

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DECLARATION
ENVIRONMENTAL
PRODUCT No. 02-05/2024

Kaczmarek

1. OVERVIEW

Program owner: **Kaczmarek Malewo Sp.K.**	**Products covered by the declaration:** **K2-Kan sewer pipe**
Program Owner: *Łukasiewicz Research Network – Institute of Ceramics and Building Materials* *Environmental Engineering Center*in Opole. **http://www.icimb.pl/opole/**	**Declaration owner:** Kaczmarek Malewo Sp.K. Malewo 1, 63-800 Gostyń Telefon: +48 65 575 86 00 Adres e-mail: sekretariat@kaczmarek2.pl **https://www.kaczmarek2.pl/**
Date of issue: **22.05.2024**	**Declared Product/Declared Unit:** **1 kg** (1 kilogram) of **K2-Kan** sewer pipe
Declaration valid until: **22.05.2029**	The declaration includes: **K2-Kan** sewer pipe manufactured in the Kaczmarek Malewo Sp.K. plant. in Malewo. The environmental declaration is based on average data provided by the manufacturer for one production plant for individual products covered by the declaration manufactured by Kaczmarek Malewo Sp.K. The average values of the input and output streams were calculated based on data provided by the manufacturer from one production plant. Contains information about the impact of the declared products on the environment. All data regarding the production cycle were collected by Kaczmarek Malewo Sp.K. from the period from January 1, 2022 to December 31, 2022 (12 months) and correspond to the production technology at that time. The life cycle assessment was developed in accordance with the requirements of the PN-EN ISO 15804+A2:2020, PN-EN ISO 14025 and PN-EN ISO 14040 standards. The product categorization rules were adopted in accordance with the PN-EN 15804 standard. The owner of the declaration is responsible for the underlying information and evidence. Łukasiewicz Research Network - Institute of Ceramics and Building Materials Environmental Engineering Center is not responsible for the manufacturer's information, data and evidence regarding life cycle assessment. Declarations that are the result of different programs or are not performed in accordance with the standard may not be comparable.

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Product Categorization (PCR) Rules	According to the standard: PN-EN 15804+A2:2020-03 Sustainability of construction works. Environmental Product Declarations. Basic principles of categorization of construction products.
Representativeness:	Polish product, year 2022
Declared durability:	100 years
Reasons for performing LCA:	B2B
Life Cycle Analysis (LCA):	The LCA analysis includes modules A1-A3, A4, C1-C4 and D according to PN-EN 15804+A2 (Cradle-to-Gate with options)

The Łukasiewicz Research Network – Institute of Ceramics and Building Materials Environmental Engineering Center provides access to the Type III environmental declaration for K2-Kan sewer pipe Kaczmarek Malewo Sp.K. to interested parties.

Authors' team:

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Approved:

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Director of the Center for Environmental Engineering

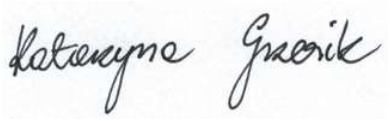
Ewa Głodek-Bucyk, Ph.D.

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. MANUFACTURER AND PRODUCT INFORMATION

Figure 1. Production plant in Malewo.

The company's main activity is the production of plastic products. The history of the company dates back to 1985, when it started producing fancy foil and technical made of softened PVC - started by the company PPHT Barbara Kaczmarek Malewo, managed by four brothers. In the following years of operation, based on the experience gained, the scope of production was introduced and expanded to include water supply, gas and sanitary sewage systems.
The Kaczmarek Malewo company has been operating in Malewo in Greater Poland for almost 40 years. The production plant is shown in Figure 1.
Thanks to the principles of loyalty, honesty and building success on trust, the company is still family-run.
The company produces water supply systems made of PVC-U and PE, gas systems made of PE, external sewage systems made of PVC-U, PP and PE, internal sewage systems made of PP, as well as gutter systems, drainage systems, cable protection pipes, manholes and tanks. and retention and seepage boxes.
The company's latest ventures include the implementation of the production of tanks made of K2-Kan XXL structural pipes and water and sewage pipes made of PE with a diameter of up to DN1400. The company uses state-of-the-art production lines to produce systems in Europe.
All manufactured products meet quality standards. The official confirmation of the high quality of our products is the ISO 9001 certificate: *production and distribution of plastic products for the construction of gas, water and sewage, sewage, gutter, cable, drainage and hollow core installations*.

K2-Kan external sewage pipes are manufactured in accordance with the requirements of the standard PN-EN 13476-3, intended for use in non-pressure underground sanitary, drainage, combined and industrial sewage systems.
K2-Kan system pipes are structural pipes with a smooth internal surface and profiled external surface. The novelty of their design is that the outer wall has additional roof reinforcements at the top of the low, wide rib, which absorb point pressures directly on the outer wall of the pipe, causing its deformation, while preventing deformation of the inner wall. The outer wall also has the shape of a low and wide wave with tight, narrow grooves, where in the last groove there is a gasket intended to connect them.
With such a pipe structure, there is a favorable increase in peripheral stiffness when the thickness of the outer wall changes, while the thickness of the inner wall remains constant. The smooth inner wall is light ash-gray, while the corrugated outer wall is orange - brown (DN/ID 150 - 600) and black (DN/ID 800 - 1000), and DN/OD 160 - 400 is light orange. The main advantage of this type of pipes is that with low material consumption, i.e. with low weight, pipes with high peripheral stiffness are produced. Depending on the thickness of the outer wall, the circumferential stiffness of the pipes can be obtained in the range SN = (4÷16) KN/m^2.

The production of **K2-Kan** sewer pipe is carried out according to the scheme (Fig. 2).

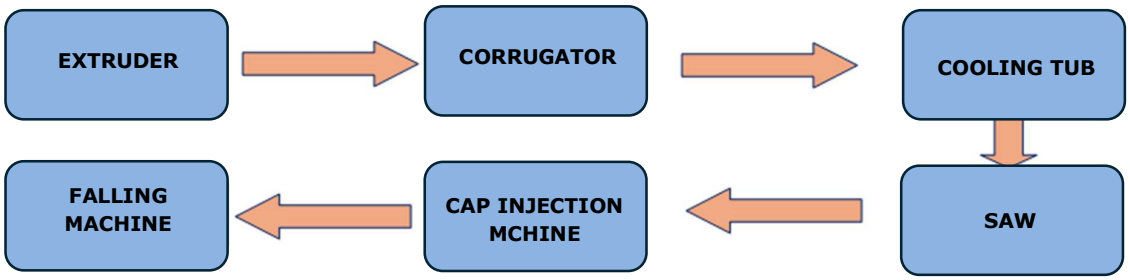


Figure 2: Diagram of the production process of **K2-Kan** sewer pipe**.**

Technical data:

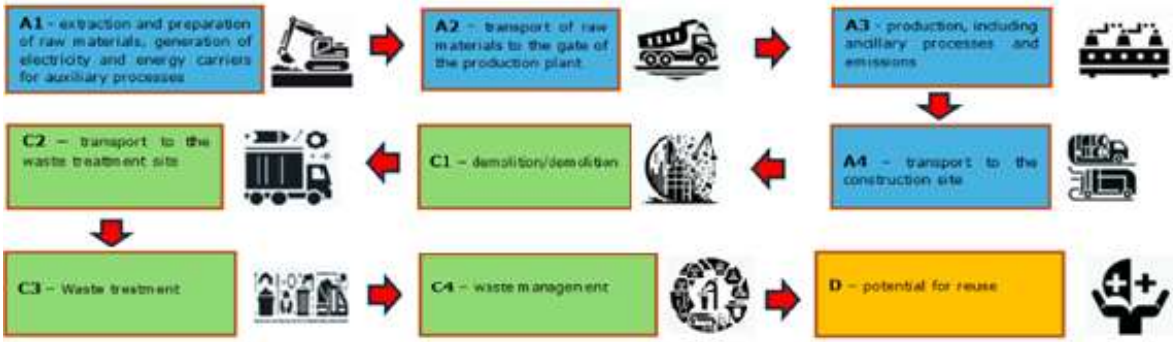
Material	Mass Participation[%]
POLYPROPYLENE	99
DYE	1

Polypropylene density ≥ 900 kg/m3

3. LCA: SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

System Limitations

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



Duration of data collection

The data on the production process were provided in 2024 for the period from January 1, 2022 to December 31, 2022.

Declared Unit (DU)

1 kg (1 kilogram) of **K2-Kan** sewer pipe

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 varied depending on the method of delivery of raw materials,
A3 – CO_2, NO_x, SO_2 and dust emission values from the production process obtained as a result of measurements carried out at the plant, the rest estimated on the basis of fuel consumption.
A4 - transport - data used for calculations are included in the developed scenario.
C1 -C4 - After completion of use, the fittings are left buried in the ground.
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. 3.9.2 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 CO_2/kWh. A detailed analysis of data quality was part of an external audit.
Allocation	All data regarding components manufactured at the Kaczmarek Malewo Sp. K plant. in Malewo were delivered by the manufacturer and were referred to the declared product unit - **1 kg** of **K2 Kan** sewage pipe. The allocation principles 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 products covered by the cradle to gate with options environmental declaration, scenarios have been developed for modules A4, C1-C4 and D:

Module A4:
Transport is carried out by a vehicle with a load capacity of 16-32 tonnes that meets the EURO 6 emission standards, the average distance from the plant to the customer is 350 km.

Modules C1- C4:
Demolition/demolition, waste transport, waste processing, waste disposal.
After the end of use, K2-Kan sewer fittings are left buried in the ground. As a result, processes related to the demolition, transport, treatment and disposal of waste do not take place, which means that the environmental impact of these modules is zero.

Module D
Module D is zero. This means that no potential benefits or burdens are anticipated for the reuse, recycling or recovery of materials at the end of a product's lifecycle.

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	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**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**MND**	**X**	**X**	**X**	**X**	**X**

The following tables present the results of the LCA analysis for **K2-Kan** sewer pipe. Explanations of the abbreviations used to describe the impact category are provided below:

The following tables present the results of the LCA analysis for **K2-Kan** sewer fittings. 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 kg of K2-Kan sewer pipe										
		Life Cycle Stage								
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	1,98E+00	4,42E-01	3,83E-01	6,64E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-fossil	kg CO_2 eq.	1,97E+00	4,42E-01	4,55E-01	6,63E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-biogenic	kg CO_2 eq.	1,11E-02	3,29E-04	-7,20E-02	6,22E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-luluc	kg CO_2 eq.	4,70E-04	2,36E-04	4,23E-04	3,22E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ODP	kg CFC11 eq.	1,00E-08	8,88E-09	1,80E-09	1,41E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
AP	mol H+ eq.	6,66E-03	3,01E-03	2,09E-03	1,41E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-freshwater	kg PO_4 eq.	2,16E-04	2,78E-05	5,24E-04	4,60E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-marine	kg N eq.	1,17E-03	7,54E-04	3,94E-04	3,57E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-terrestrial	mol N eq.	1,24E-02	8,16E-03	3,24E-03	3,62E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
POCP	kg NMVOC eq.	6,13E-03	2,87E-03	1,04E-03	2,19E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ADP-minerals & metals	kg Sb eq.	8,52E-06	1,24E-06	9,57E-07	2,11E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ADP-fossil	MJ	7,14E+01	5,97E+00	5,54E+00	9,18E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
WDP	WDP (m^3) świat. ekw	1,39E+00	2,33E-02	4,56E-02	3,84E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

ADDITIONAL IMPACT INDICATORS: 1 kg K2-Kan sewer pipe										
	Life Cycle Stage									
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	7,20E-08	2,87E-08	8,43E-09	4,82E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
IRP	kBq U235 eq.	1,00E-01	7,29E-03	8,91E-03	1,24E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETP-fw	CTUe	2,16E-04	2,78E-05	5,24E-04	4,60E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HTP-c	CTUh	1,21E-10	9,71E-11	2,40E-11	1,55E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HTP-nc	CTUh	5,36E-09	1,53E-09	5,85E-10	2,38E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
SQP	-	1,56E+00	3,12E+00	1,67E+00	5,55E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
INDICATORS DESCRIBING RESOURCE CONSUMPTION: 1 kg of K2-Kan sewer pipe										
	Life Cycle Stage									
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,04E+00	8,62E-02	5,82E-01	1,45E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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
PERT	MJ	1,04E+00	8,62E-02	5,82E-01	1,45E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PEN-RE	MJ	7,24E+01	6,24E+00	6,99E+00	9,59E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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
PENRT	MJ	7,24E+01	6,24E+00	6,99E+00	9,59E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
SM	kg	0,00E+00	0,00E+00	2,42E-03	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
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
FW	m^3	2,01E-02	8,30E-04	9,12E-03	1,46E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 kg K2-Kan sewer pipe										
	Life Cycle Stage									
Indicator	**Unit**	**A1**	**A2**	**A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Amount of hazardous waste	kg	WN	WN	2,92E-06	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	2,49E-03	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
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
Recyclable Materials	kg	WN	WN	2,42E-03	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
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

Biogenic carbon	
Biogenic carbon content in the product (kg C_{org})	**0.00E+00**
Biogenic carbon content in the package (kg C_{org})	**2,45E-02**

6. INTERPRETATION OF RESULTS

Figure 3 presents a diagram of the shares of individual modules of the life cycle on the basic categories of impact of **K2-Kan** sewer pipe:

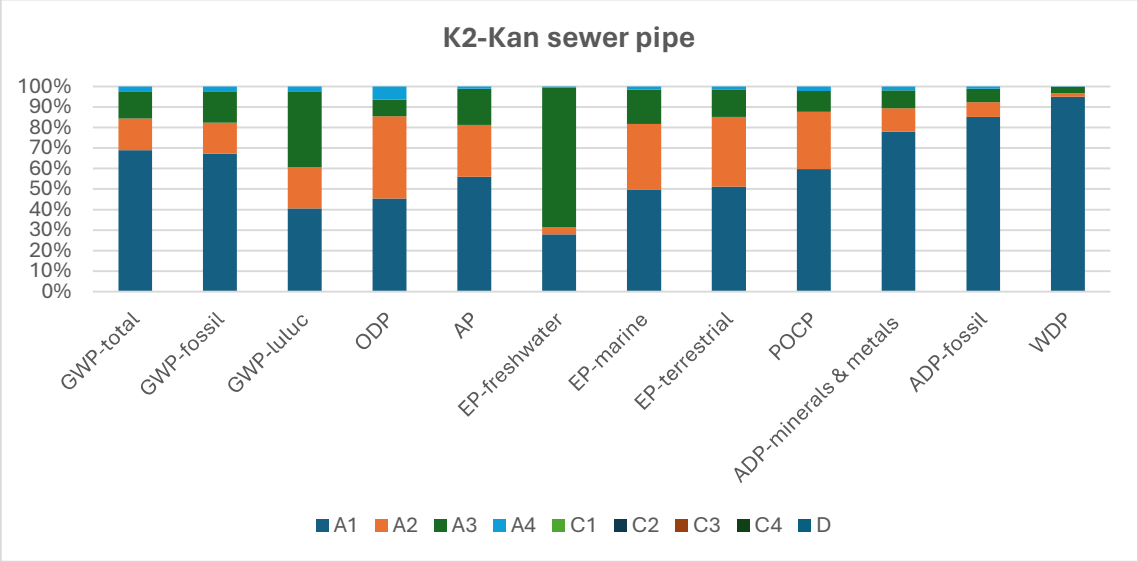


Figure 3 Shares of life cycle modules for the main categories of inflows - **K2-Kan** sewer pipe.

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 building structures -- Environmental product declarations -Basic principles of categorization of 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 the company's website: **https://www.kaczmarek2.pl/**

Explanatory material can be obtained by contacting the representative directly Kaczmarek Malewo Sp.K.