

**ENVIRONMENTAL PRODUCT DECLARATION**  
**No. 03-05/2024**

**K2-Kan sewer fittings**



Declaration owner: Kaczmarek Malewo Sp.K.

Program Owner: Łukasiewicz Research Network – Institute of Ceramics and Building Materials  
Environmental Engineering Center



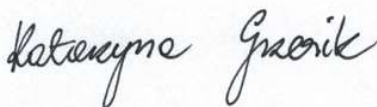
Name of program: Environmental Product Declarations – B2B

Release Date: 22.05.2024

Declaration valid until: 22.05.2029

## 1. OVERVIEW

<p><b>Program owner:</b> <b>Kaczmarek Malewo Sp.K.</b></p>	<p><b>Products covered by the declaration:</b> <b>K2-Kan sewer fittings</b></p>
<p><b>Program Owner:</b> Łukasiewicz Research Network – Institute of Ceramics and Building Materials Environmental Engineering Center in Opole. <b><a href="http://www.icimb.pl/opole/">http://www.icimb.pl/opole/</a></b></p>	<p><b>Declaration owner:</b> Kaczmarek Malewo Sp.K. Malewo 1, 63-800 Gostyń Telefon: +48 65 575 86 00 Adres e-mail: sekretariat@kaczmarek2.pl <b><a href="https://www.kaczmarek2.pl/">https://www.kaczmarek2.pl/</a></b></p>
<p><b>Date of issue:</b> <b>22.05.2024</b></p>	<p><b>Declared Product/Declared Unit:</b> <b>1 kg</b> (1 kilogram) of <b>K2-Kan</b> sewer fittings</p>
<p><b>Declaration valid until:</b> <b>22.05.2029</b></p>	<p>The declaration includes: <b>K2-Kan</b> sewage fittings manufactured in the Kaczmarek Malewo Sp.K. plant. in Piaski.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Declarations that are the result of different programs or are not performed in accordance with the standard may not be comparable.</p>

<p><b>Product Categorization (PCR) Rules</b></p>	<p>According to the standard:  PN-EN 15804+A2:2020-03 Sustainability of construction works. Environmental Product Declarations. Basic principles of categorization of construction products.</p>
<p><b>Representativeness:</b></p>	<p>Polish product, year 2022</p>
<p><b>Declared durability:</b></p>	<p>100 years</p>
<p><b>Reasons for performing LCA:</b></p>	<p>B2B</p>
<p><b>Life Cycle Analysis (LCA):</b></p>	<p>The LCA analysis includes modules A1-A3, A4, C1-C4 and D according to PN-EN 15804+A2 (Cradle-to-Gate with options)</p>
<p><b>The Łukasiewicz Research Network – Institute of Ceramics and Building Materials Environmental Engineering Center provides access to the Type III environmental declaration for K2-Kan sewage fittings Kaczmarek Malewo Sp.K. to interested parties.</b></p>	
<p><b>Authors' team:</b>  Katarzyna Kiprian, M.Eng. Ewa Głodek-Bucyk, Ph.D. Patrik Okoń, M.Eng.</p> <p><b>Approved:</b></p> <p>  Joanna Poluszyńska, PhD Director of the Center for Environmental Engineering</p> <p> Ewa Głodek-Bucyk, Ph.D. Leader of the Process Engineering Research Group</p>	<p><b>Review:</b></p> <p>CEN standard PN-EN 15804+A2 serves as the main PCR document.</p> <p>Independent verification of declarations and data according to EN ISO 14025:2010</p> <p><input type="checkbox"/> Internal                      <input checked="" type="checkbox"/> External</p> <p>  Katarzyna Grzesik, PhD, DSc</p>

## 2. MANUFACTURER AND PRODUCT INFORMATION



**Figure 1.** Production plant in Piaski.

The main profile of the company's activity is the production of plastic products. The history of the company dates back to 1985, when its activity began with the production of haberdashery film and technical technology made of softened PVC, was started by PPHT Barbara Kaczmarek Malewo, managed by four brothers. In the following years of activity, on the basis of the experience gained, the scope of production was introduced and expanded to include water, gas and sanitary sewage systems.

For almost 40 years, the Kaczmarek Malewo company has been operating in Malewo in Wielkopolska. Production also takes place in the second production plant in Piaski. The production plant is shown in Figure 1.

Thanks to the principles of loyalty, honesty and building success on trust, the company is still managed as a family.

The company manufactures PVC-u and PE water supply systems, PE gas systems, PVC-U, PP and PE external sewage systems, PP internal sewage systems, as well as gutter systems, drainage systems, cable casing pipes, as well as manholes, tanks and retention and drainage boxes.

The company's latest projects include the implementation of the production of tanks made of K2-Kan XXL structural pipes and PE water supply and sewage pipes with a diameter of up to DN1400.

For the production of systems, the company uses the most modern production lines in Europe.

All manufactured products meet quality standards. The official confirmation of the high quality of 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 slab installations.*

K2-Kan external sewer fittings made of polypropylene are manufactured in accordance with the requirements of the PN-EN 13476-3 standard, intended for use with K2-Kan pipes in non-pressurized underground sanitary, drainage, combined or industrial sewage systems, laid in the ground under roads with a high degree of load or in other areas.

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



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



**1**

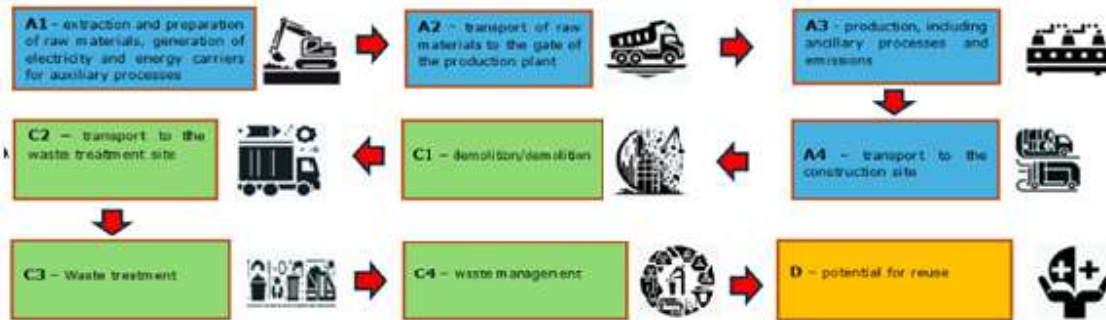
Material	Mass participation [%]
<b>POLYPROPYLENE</b>	<b>99</b>
<b>DYE</b>	<b>1</b>

Polypropylene density  $\geq 900 \text{ kg/m}^3$

### 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 fittings.

#### 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<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub> 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<sub>2</sub>/kWh. A detailed analysis of data quality was part of an external audit.

**Allocation**

All data provided by the manufacturer have been referenced to the product's declared unit (DU) – **1 kg sewer fittings K2-Kan**. 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 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 tones 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.

<b>SYSTEM BOUNDARIES (X –MODULE INCLUDED IN LCA, MND – MODULE NOT DECLARED)</b>																	
Products stage			Construction process stage		Use stage							End-of-life stage				Benefits and loads beyond the system boundary	
Raw material supply	Transport	Production	Transport	Construction process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential	
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 fittings. Explanations of the abbreviations used to describe the impact category are provided below:

<b>GWP-total</b>	Global warming potential
<b>GWP-fossil</b>	Global warming potential fossil fuel
<b>GWP-biogenic</b>	Global warming potential biogenic
<b>GWP-luluc</b>	Global warming potential land use and land change
<b>ODP</b>	Depletion potential of the stratospheric ozone layer
<b>AP</b>	Acidification potential of land and water
<b>EP-freshwater</b>	Eutrophication potential, fraction of nutrients reaching freshwater end compartment
<b>EP-marine</b>	Eutrophication potential, fraction of nutrients reaching marine end compartment
<b>EP-terrestrial</b>	Eutrophication potential, Accumulated Exceedance
<b>POCP</b>	Formation potential of tropospheric ozone photochemical oxidants
<b>ADP-minerals&amp;metals</b>	Abiotic depletion potential for nonfossil resources
<b>ADP-fossil</b>	Abiotic depletion potential for fossil resources
<b>WDP</b>	Water (user) deprivation potential
<b>PM</b>	Potential incidence of disease due to PM emissions
<b>IRP</b>	Potential Human exposure efficiency relative to U235
<b>ETP-fw</b>	Potential comparative Toxic Unit for ecosystems

<b>HTP-c</b>	Potential comparative Toxic Unit for humans (cancerogenic)
<b>HTP-nc</b>	Potential comparative Toxic Unit for humans (non-cancerogenic)
<b>SQP</b>	Potential soil quality index
<b>PERE</b>	Use of renewable primary energy excluding renewable primary energy resources used as raw materials
<b>PERM</b>	Use of renewable primary energy resources used as raw materials
<b>PERT</b>	Total use of renewable primary energy resources
<b>PEN-RE</b>	Use of non-renewable primary energy resources excluding non-renewable primary energy resources used as raw materials
<b>RE</b>	Use of non-renewable primary energy resources used as raw materials
<b>PENRT</b>	Total use of non-renewable primary energy resources
<b>SM</b>	Use of secondary material
<b>RSF</b>	Use of renewable fuels
<b>NRSF</b>	Use of non-renewable secondary fuels
<b>FW</b>	Use of net fresh water

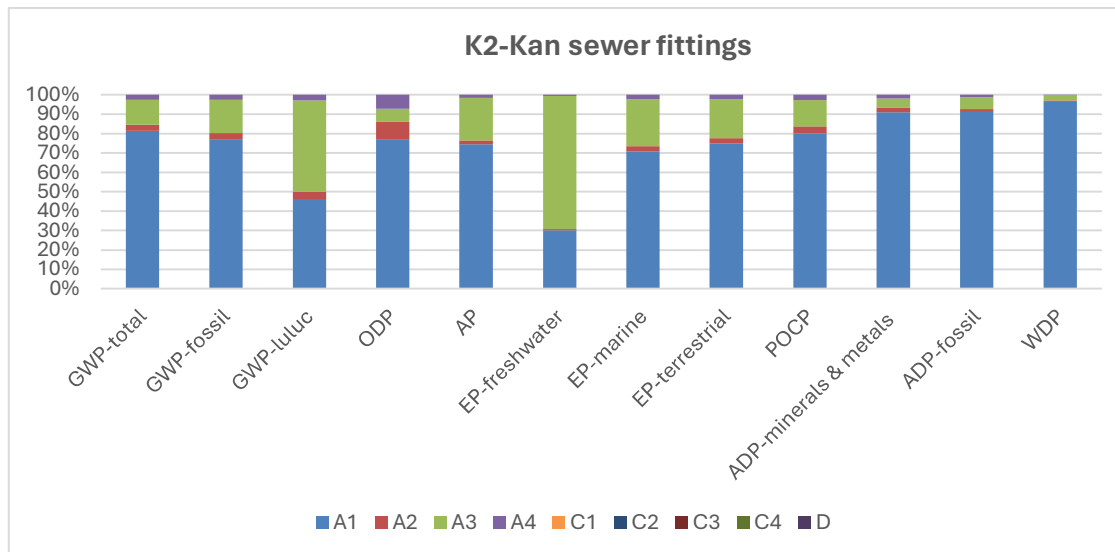
MAIN IMPACT INDICATORS: 1 kg of K2-Kan sewer fittings										
Indicator	Unit	Life Cycle Stage								
		A1	A2	A3	A4	C1	C2	C3	C4	D
GWP-total	kg CO <sub>2</sub> eq.	1,98E+00	8,22E-02	3,07E-01	6,64E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-fossil	kg CO <sub>2</sub> eq.	1,97E+00	8,21E-02	4,36E-01	6,63E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-biogenic	kg CO <sub>2</sub> eq.	1,10E-02	7,70E-05	-1,30E-01	6,22E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-luluc	kg CO <sub>2</sub> eq.	5,10E-04	3,99E-05	5,18E-04	3,22E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ODP	kg CFC11 eq.	1,53E-08	1,74E-09	1,35E-09	1,41E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
AP	mol H <sup>+</sup> eq.	6,90E-03	1,75E-04	2,04E-03	1,41E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-freshwater	kg PO <sub>4</sub> eq.	2,28E-04	5,70E-06	5,20E-04	4,60E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-marine	kg N eq.	1,18E-03	4,41E-05	4,07E-04	3,57E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-terrestrial	mol N eq.	1,27E-02	4,48E-04	3,40E-03	3,62E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
POCP	kg NMVOC eq.	6,12E-03	2,71E-04	1,02E-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.	9,87E-06	2,62E-07	5,01E-07	2,11E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ADP-fossil	MJ	7,01E+01	1,14E+00	4,75E+00	9,18E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
WDP	WDP (m <sup>3</sup> ) świat. ekw.	1,40E+00	4,75E-03	3,83E-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 fittings										
Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
PM	Disease incidence	7,33E-08	5,95E-09	8,34E-09	4,82E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
IRP	kBq U235 eq.	1,01E-01	1,54E-03	8,13E-03	1,24E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETP-fw	CTUe	2,28E-04	5,70E-06	5,20E-04	4,60E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HTP-c	CTUh	1,83E-10	1,91E-11	1,58E-10	1,55E-11	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HTP-nc	CTUh	6,80E-09	2,94E-10	7,24E-10	2,38E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
SQP	-	1,79E+00	6,85E-01	1,15E+01	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 fittings										
Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
PERE	MJ	1,05E+00	1,79E-02	2,38E+00	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	1,05E+00	1,79E-02	2,38E+00	1,45E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PEN-RE	MJ	7,11E+01	1,19E+00	6,18E+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	7,11E+01	1,19E+00	6,18E+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	1,07E-02	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 <sup>3</sup>	1,98E-02	1,81E-04	9,33E-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 fittings										
Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	C1	C2	C3	C4	D
Amount of hazardous waste	kg	WN	WN	9,49E-07	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	1,10E-02	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	1,07E-02	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

<b>Biogenic carbon</b>	
<b>Biogenic carbon content in the product (kg C<sub>org</sub>)</b>	<b>0.00E+00</b>
<b>Biogenic carbon content in the package (kg C<sub>org</sub>)</b>	<b>2,61E-02</b>

## 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 fittings:



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

## 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.