Łukasiewicz
Institute of Ceramics
and Building Materials

RAWLPLUG®

ENVIRONMENTAL PRODUCT DECLARATION

NO. 01-07/2025

Chemical anchor

R-KEX-II

OWNER OF THE DECLARATION:	Rawlplug S.A.
PROGRAMM OWNER:	Łukasiewicz Research Network – Institute of Ceramics and Building Materials
PROGRAM NAME:	Environmental product declaration
DATA OF ISSUE:	**23.07.2025**
DECLARATION VALID UNTIL:	**23.07.2030**

1. GENERAL INFORMATION

Product of declaration:	Chemical anchor R-KEX-II
Program owner: Łukasiewicz Research Network– Institute of Ceramics and Building Materials Environmental Engineering Center in Opole. **http://www.icimb.pl/opole/**	**Declaration owner:** Rawlplug S.A. 6 Kwidzyńska str, 51-416 Wrocław Telephone: +48 695 223 116 Adress: info@rawlplug.com **www.rawlplug.com**
Declared unit:	**1 kg**
Date of issue:	23.07.2025
Declaration valid until:	23.07.2030
Life Cycle Analysis (LCA):	A1-A3, C1-C4 and D according to PN-EN 15804+A2 (Cradle-to-Gate with options)
Product Categorization (PCR) Rules	PN-EN 15804+A2:2020-03 Sustainability of construction works. Environmental Product Declarations. Basic principles of categorization of construction products, ICIMB-PCR A.
Representatives:	Polish product, year 2024
Declared durability:	100 years
Reasons for performing LCA:	B2B
Standard of product	EAD 330499, EAD 330087
Declarations that are the result of different programs or are not performed in accordance with the standard may not be comparable.	
The Łukasiewicz – Institute of Ceramics and Building Materials Environmental Engineering Center provides access to the Type III environmental declaration for chemical anchor R-KEX-II to interested parties.	
The declaration owner is responsible for the information and the base evidence. Łukasiewicz Research Network - Institute of Ceramics and Building Materials Center for Environmental Engineering is not responsible for the manufacturer's information and data and evidence regarding the life cycle assessment.	
Authors' team: Katarzyna Kiprian, M.Sc. Ewa Głodek-Bucyk, Ph.D. Patryk Okoń, M.Sc. **Approved:** Joanna Poluszyńska Joanna Poluszyńska, PhD Director of the Environmental Engineering Center Ewa Głodek-Bucyk 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 Katarzyna Grzesik, PhD, DSc

2. INFORMATION ABOUT THE MANUFACTURER AND PRODUCTS

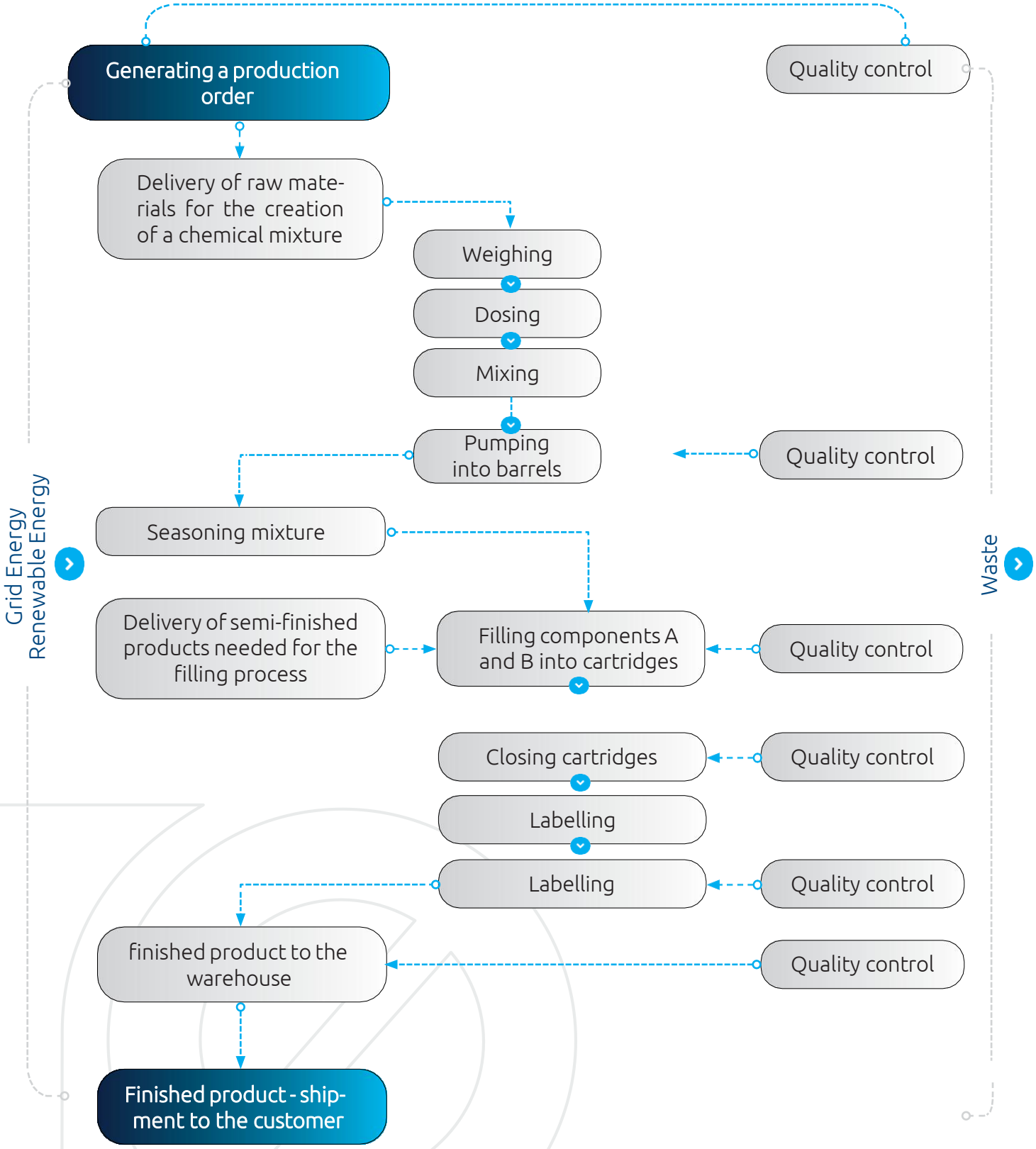
Rawlplug is a leading global supplier of innovative fastening systems, fasteners and tools for the construction and industrial sectors, as well as for individual customers. The company, whose history dates back over 100 years to the invention of the first expansion plug, has four modern production plants. Two in Poland (Wrocław and Łańcut) and in Vietnam and Thailand, as well as a modern Net Zero logistics centre in Kożuchów, Poland. Rawlplug consistently pursues an ambitious ESG strategy, with the overarching goal of achieving climate neutrality by 2030. Thanks to a global network of 42 sales companies, the company delivers high-quality products and services in over 100 countries. With over 2,000 employees, the Rawlplug Group supports the most demanding engineering projects in the world – from Burj Khalifa to space missions to Mars. For more information, visit: **www.rawlplug.com.**

R-KEXII is a premium two-component epoxy resin from Rawlplug, designed for the most demanding applications. Designed for maximum adhesion, durability and reliability – even in extreme conditions. It provides the highest load-bearing capacity in cracked and non-cracked concrete. It is ideal for seismic and fire applications. Designed for threaded rods, reinforcing bars and sleeves with internal threads.

R-KEX-II are adhesive anchors supplied in plastic cartridges with a container for component A (resin mixture with additives) and component B (hardener). The cartridge is equipped with a mixing nozzle, which allows the mortar components to be mixed using a dispensing gun. The steel element (threaded rod, internally threaded rod, reinforcing rod) is inserted into the drilled hole, previously filled with injection mortar (using a dispenser gun), with a slow movement and slight rotation. The steel element is anchored by gluing it to the concrete.

Table 1.
Composition of chemical anchor components R-KEX-II

Component A	
Material	Percentage [%]
Resin	63,98
Filler	33,26
Additives	2,76
Component B	
Material	Percentage [%]
Resin	63,62
Filler	33,18
Additives	3,20


Generating a production order
Quality control
Delivery of raw materials for the creation of a chemical mixture
Weighing
Dosing
Mixing
Pumping into barrels
Quality control
Grid Energy
Renewable Energy
Seasoning mixture
Waste
Delivery of semi-finished products needed for the filling process
Filling components A and B into cartridges
Quality control
Closing cartridges
Quality control
Labelling
Labelling
Quality control
finished product to the warehouse
Quality control
Finished product - shipment to the customer

The technological process of manufacturing R-KEX-II chemical anchors begins with the collection of raw materials from the warehouse, such as epoxy resin, fillers and hardeners. Before being transferred to production, the raw materials are checked for quality to prevent the use of unsuitable materials. The raw materials are then dosed in the correct proportions into the mixing vat — partly automatically and partly manually. At this stage, employees visually check their quality and record all data in the appropriate forms. The prepared mixture is marked with a batch number and date of manufacture. The mixture is installed in a filling machine, where it is packaged into cartridges. During this process, the ease of extrusion and the correctness of the mixing of the ingredients are checked, among other things. Employees take samples from each batch for further quality control in a chemical laboratory. After filling, the finished products are sent for packaging, where they are placed in collective packaging. Each package is carefully checked for content and marked with appropriate labels. The filled cartons are stacked on pallets in accordance with logistics guidelines. After production is complete, a report is prepared and the pallets are entered into the system and marked with warehouse documents. Finally, the pallets are delivered to the warehouse, from where they are shipped to the end customers.

Safety of use and environmental protection

R-KEX-II chemical anchors contain substances that may pose a potential risk to users and the environment. However, as long as the user follows the manufacturer's recommendations, chemical anchors do not pose a risk to users and are safe for the environment. The conditions for the safe use and handling of chemical anchors are set out in the safety data sheet. The safety data sheet contains a description of the hazards that the product may cause, as well as basic physical and chemical data about it. The safety data sheets are available on the website of the declaration owner **www.rawlplug.com.**

3. LCA: CALCULATION RULES

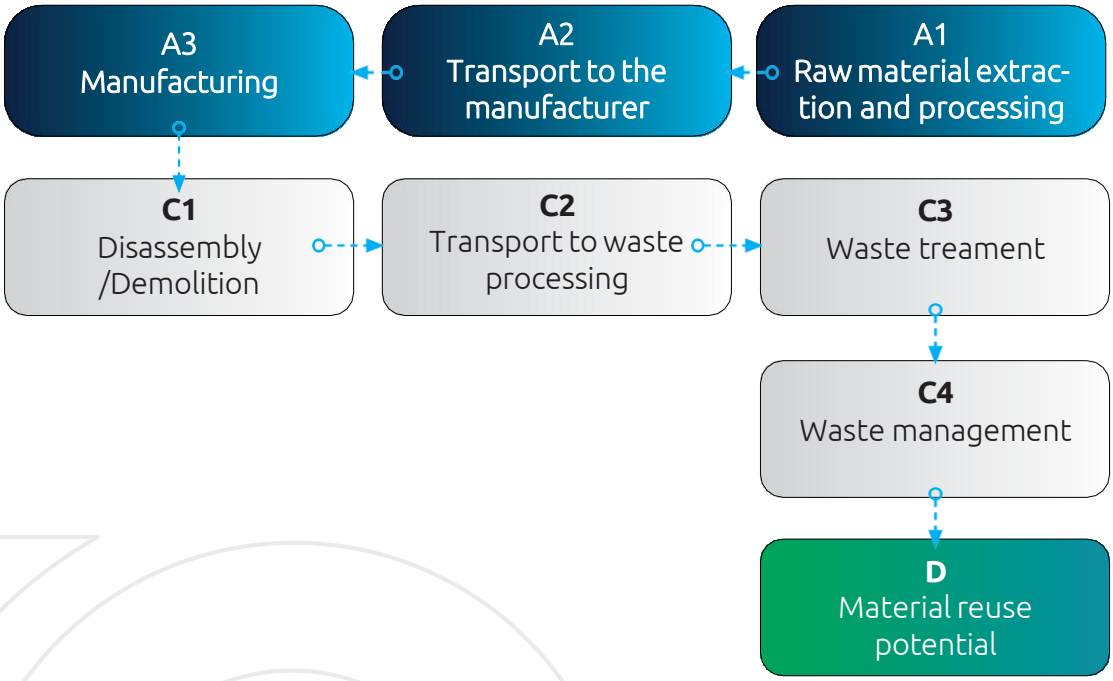
The environmental declaration is based on data provided by the declaration owner, Rawlplug S.A., for the plant where the product is manufactured:

- Rawlplug S.A. 6 Kwidzyńska str., 51-416 Wrocław.

The input and output flow values were calculated based on data provided by the manufacturer from the production plant for the period January 1, 2024 - December 31, 2024 (12 months).

System limitations

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



Data colleration period

Data regarding the production process were provided in 2025 for the period 01/01/2024 - 31/12/2024 (12 months) and correspond to the production technology at that time.

Declared unit

1 kg

Assumptions

A1 – Raw material extraction refers to specific mass shares in the production process per declared unit of product.

A2 – Transport to the production plant gate, with means of transport varying depending on delivery method.

A3 – CO_2, NO_x, SO_2, and dust emission values from the production process obtained as a result of an estimate based on fuel consumption.

C1 – Includes processes related to the end of life of the chemical anchor generated during dismantling/demolition. Calculations are performed based on a developed scenario.

C2 – Refers to the transport of the used product as part of waste treatment, e.g., to a recycling site, and the transport of waste, e.g., to a final disposal site. Calculations are performed based on a developed scenario.

C3 – Considers the environmental impact during the processing of demolition waste containing chemical anchor components at a waste recovery facility. Calculations are performed based on a developed scenario.

C4 – Includes the final management processes of the used chemical anchor. Calculations are performed based on a developed scenario.

D – concerns the impact and consequences of using recycled material. Calculations are performed based on a developed scenario.

Cut-off criteria	Ninety-nine percent of all mass flows involved in the production process were accounted for. All energy used in production was included in the environmental declaration.
General data	The data for the calculations come from Ecoinvent v. 3.10 and have been supplemented with KOBiZE CO_2, SO_2, NO_x, CO and total particulate matter emission factors for electricity, December 2024. Emission factors for electricity were determined using the actual KOBiZE data. The Polish electricity emission factor used (Ecoinvent supplemented with current national data from KOBiZE) is 0.597 kg CO2/kWh. A detailed analysis of data quality was part of an external audit.
Allocation	All data regarding unit processes from a single production plant were obtained via Data Acquisition Questionnaires, completed and verified by the declaration owner – Rawlplug S.A. The original data was referenced to the declared product unit, i.e., 1 kilogram. The allocation principles used are consistent with the requirements of the EN 15804+A2 standard and the ICIMB-PCR Part A guidelines. All data were normalized to the declared unit level and recalculated in accordance with the principle of representativeness of the technological process at the analyzed plant.

4. LCA: SCENARIOS AND ADDITTIONAL TECHNICAL INFORMATION

The life cycle assessment (LCA) was conducted 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 based on the guidelines of the PN-EN 15804 standard. Data used in the life cycle analysis (LCA) were obtained from Data Acquisition Questionnaires (DQs) completed by the declaration owner, Rawlplug S.A., and verified during a data audit. This data is not older than five years, and none of the generic datasets used is older than ten years. Data completeness, representativeness, and consistency were assessed as good. The quality of the specific data (LCI) was assessed as part of the verification process. In line with the „cradle to gate with options" framework, this environmental declaration also includes scenarios for the product's end-of-life phase (modules C1–C4) and potential benefits and burdens beyond the system boundary (module D).

C1 – Dismantling covers the processes associated with the end of life of a chemical anchor, which is typically invisible or impossible to separate from the structure (e.g., concrete). The dismantling process primarily involves the mechanical demolition of the components containing it, i.e., using excavators equipped with hammers. This module also considers the emissions resulting from these activities.

C2 - In order to calculate the impact of this module, the following assumptions were made:

- 100% of the waste mass is transported to a recovery facility as part of waste 17 01 01 or 17 01 02 (construction debris),
- Transport is carried out using dump trucks with a load capacity of 16-32 tons, meeting EURO 6 emission standards,
- The material is transported to a waste processing facility located within 100 km of the demolition site.

C3 - Waste processing, e.g., collection of demolition waste fractions and processing of material streams intended for reuse, recycling, and energy recovery. Based on national experience, construction rubble containing chemical anchors is considered valuable waste and is subject to recycling. According to available information, construction rubble can be reused in many ways, including::

- Construction Aggregate: Construction rubble can be processed into construction aggregate, which can be used to build roads, sidewalks, foundations, walls, and other structures.
- Concrete from Rubble: Construction rubble containing concrete can be processed into new concrete. This allows the material to be reused in new construction projects.
- Ornamental Stones: Stones and bricks collected from rubble can be used as decorative elements in gardens, on paths, or for architectural decoration.
- Thermal Insulation: Rubble can be processed into insulating materials that can be used in construction to improve the energy efficiency of buildings.

Therefore, the following processes were assumed for the calculations: unloading (loader), crushing (crusher). The benefits of using these secondary materials were included in Module D.

C4 – The impact of stored construction debris containing chemical anchors should be considered. The developed scenario does not take into account storage operations. Construction debris fractions with codes 17 01 01 or 17 01 02 are not subject to storage under Polish regulations.

D – includes potential environmental benefits resulting from recovery and reuse. Benefits and burdens beyond the system boundaries were considered. It was assumed that the end product of the crushing process (crushed construction rubble) could be used as a building material for various purposes. Crushed concrete pieces containing a chemical anchor can be used to create foundations, pavement bases, or roads. It can also be used as fill in road construction or in the creation of new areas, and will be used as ballast. Energy recovery from packaging processing was included.

4. 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.

SYSTEM BOUNDARIES (X –MODULE INCLUDED IN LCA, MND – MODULE NOT DECLARED)																
Products stage			**Con-struc-tion 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-recov-ery-recycling potential
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 chemical anchor R-KEX-II. 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 kilogram chemical anchor R-KEX-II

		Life Cycle Stage							
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO2 eq.	4,80E+00	5,01E-02	5,35E-01	7,10E-02	1,76E-02	5,32E-02	0,00E+00	-6,24E-01
GWP-fossil	kg CO2 eq.	4,91E+00	5,00E-02	5,33E-01	7,10E-02	1,76E-02	5,31E-02	0,00E+00	-6,25E-01
GWP-biogenic	kg CO2 eq.	-1,07E-01	3,44E-05	1,83E-03	7,76E-06	1,22E-05	7,81E-05	0,00E+00	1,46E-03
GWP-luluc	kg CO2 eq.	3,21E-03	1,66E-05	7,58E-04	6,16E-06	5,84E-06	3,34E-05	0,00E+00	-2,53E-04
ODP	kg CFC11 eq.	2,30E-07	9,96E-10	1,36E-09	1,09E-09	3,50E-10	5,18E-10	0,00E+00	-8,81E-10
AP	mol H+ eq.	2,08E-02	1,04E-04	2,29E-03	6,41E-04	3,67E-05	3,76E-04	0,00E+00	-3,39E-03
EP-freshwater	kg PO4 eq.	1,15E-03	3,38E-06	6,13E-04	2,07E-06	1,19E-06	2,59E-05	0,00E+00	-2,80E-04
EP-marine	kg N eq.	5,29E-03	2,49E-05	4,17E-04	2,97E-04	8,81E-06	1,49E-04	0,00E+00	-3,26E-04
EP-terrestrial	mol N eq.	3,99E-02	2,69E-04	3,35E-03	3,25E-03	9,51E-05	1,58E-03	0,00E+00	-3,10E-03
POCP	kg NMVOC eq.	1,70E-02	1,73E-04	9,40E-04	9,70E-04	6,09E-05	4,69E-04	0,00E+00	-1,75E-03
ADP-minerals & metals	kg Sb eq.	4,33E-05	1,63E-07	1,23E-06	2,53E-08	5,73E-08	4,10E-08	0,00E+00	-2,98E-07
ADP-fossil	MJ	9,46E+01	7,04E-01	5,75E+00	9,29E-01	2,48E-01	6,45E-01	0,00E+00	-5,19E+00
WDP	WDP (m3) świat. ekw	1,12E+00	2,91E-03	3,67E-02	2,01E-03	1,03E-03	1,99E-03	0,00E+00	-2,93E-02

ADDITIONAL IMPACT INDICATORS: 1 kilogram chemical anchor R-KEX-II

		Life Cycle Stage							
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	2,00E-07	3,66E-09	5,27E-09	1,82E-08	1,30E-09	8,29E-09	0,00E+00	-4,40E-08
IRP	kBq U235 eq.	4,37E-01	9,22E-04	5,54E-03	4,16E-04	3,21E-04	3,87E-04	0,00E+00	-3,05E-03
ETP-fw	CTUe	7,18E-04	2,11E-06	3,82E-04	1,29E-06	7,42E-07	1,61E-05	0,00E+00	-1,74E-04
HTP-c	CTUh	5,59E-08	3,52E-10	6,04E-10	2,77E-10	1,25E-10	1,45E-10	0,00E+00	-5,57E-08
HTP-nc	CTUh	1,56E-07	4,40E-10	6,88E-09	1,15E-10	1,56E-10	3,18E-10	0,00E+00	-4,98E-09
SQP	-	2,44E+01	4,22E-01	1,50E+00	6,53E-02	1,50E-01	8,90E-02	0,00E+00	-1,38E+00

INDICATORS DESCRIBTIONS RESOURCE CONSUMPTION: 1 kilogram chemical anchor R-KEX-II

		Life Cycle Stage							
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	6,12E+00	1,22E-02	1,10E+00	5,70E-03	4,25E-03	3,42E-02	0,00E+00	-3,06E-01
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
PERT	MJ	6,12E+00	1,22E-02	1,10E+00	5,70E-03	4,25E-03	3,42E-02	0,00E+00	-3,06E-01
PEN-RE	MJ	1,02E+02	7,48E-01	6,10E+00	9,87E-01	2,63E-01	6,85E-01	0,00E+00	-5,51E+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
PENRT	MJ	1,02E+02	7,48E-01	6,10E+00	9,87E-01	2,63E-01	6,85E-01	0,00E+00	-5,51E+00
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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
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
FW	m3	1,24E+00	2,68E-03	1,21E-02	3,59E-05	4,31E-05	3,66E-04	0,00E+00	-2,68E-03

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 kilogram chemical anchor R-KEX-II

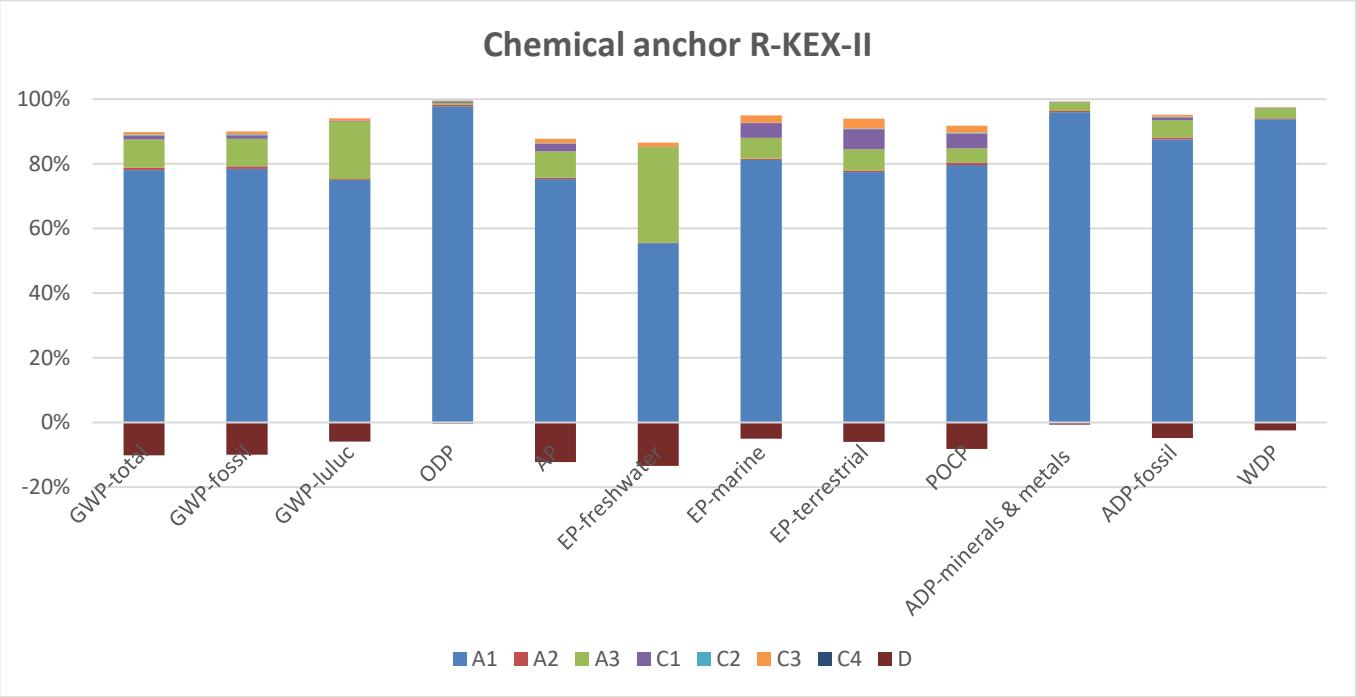
		Life Cycle Stage							
Indicator	**Unit (expressed per DU)**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	WN	WN	6,08E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste	kg	WN	WN	1,68E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Radioactive waste	kg	WN	WN	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for re-use	kg	WN	WN	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	WN	WN	1,69E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	WN	WN	3,02E-01	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	3,15E+00

BIOGENIC CARBON

Contents organic carbon in product (kg C_{org})	**0,00E+00**
Contents organic carbon in packaging (kg C_{org})	**4,62E-02**

6. INTERPRETATION

Figures 3. present diagrams of the shares of individual life cycle modules on the basic impact categories for chemical anchor R-KEX-II.



Figures 3.
Shares of life cycle modules in the main categories of impacts– chemical anchor R-KEX-II".

BIBLIOGRAPHY

- ICIMB-PCR A. General Product Category Rules for Construction Products.
- 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.
- Additional explanatory material can be obtained from the company page of the declaration owner: https://www.rawlplug.com//

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

CENTER OF ENVIROMENTAL ENGINEERING

Łukasiewicz
Institute
of Ceramics
and Building
Materials

45-641 Opole, Oświęcimska 21 Str., Poland
Phone: +48 77 408 33 00

www.icimb.lukasiewicz.gov.pl
info.opole@icimb.lukasiewicz.gov.pl

PROCESS ENGINEERING RESEARCH GROUP

TYPE III ENVIRONMENTAL DECLARATION CERTIFICATE

no. 01-07/2025

Products:

Chemical anchor
R-KEX-II

Owner:

Rawlplug S.A.
6 Kwidzyńska str.,
51-416 Wrocław

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 **July 23, 2025** and is valid for 5 years or until the said EPD is amended.

Process Engineering Research Group Leader

Ewa Głodek-Bucyk,
PhD Eng.

Director of Environmental Engineering Center

Joanna Poluszyńska, PhD

Opole, July 2025