Łukasiewicz
Institute of Ceramics
and Building Materials

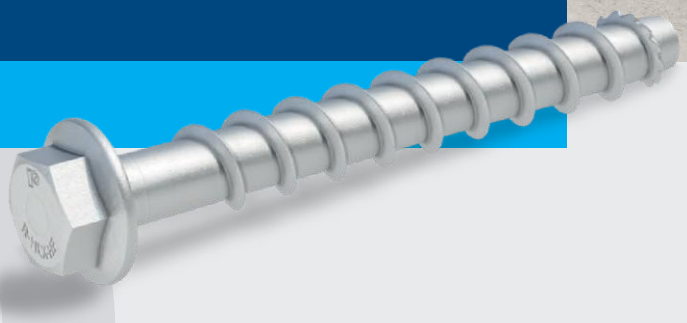
RAWLPLUG®

ENVIRONMENTAL PRODUCT DECLARATION

NO. 06-11/2025

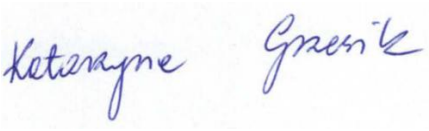
Concrete screw anchor

R-HL X



OWNER OF THE DECLARATION:	Rawlplug S.A.
PROGRAM OWNER:	Łukasiewicz Research Network – Institute of Ceramics and Building Materials
PROGRAM NAME:	Environmental product declaration
DATE OF ISSUE:	**27.11.2025**
DECLARATION VALID UNTIL:	**27.11.2030**

1. GENERAL INFORMATION

Product of declaration:	Concrete screw anchor R-HLX
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:	27.11.2025
Declaration valid until:	27.11.2030
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:	50 years
Reasons for performing LCA:	B2B
Standard of product:	ETA 23/0707
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 Concrete screw anchor R-HLX- ZF 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, PhD Director of the Environmental Engineering Center  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. 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 expan-sion plug, has four modern production plants. Two in Poland (Wrocław and Łańcut) and in Vietnam and Thailand, as well as a modern R5PL 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 com-panies, the company delivers high-quality products and services in over 100 countries. With over 2,000 employees, the Rawlplug Group supports the most demanding engi-neering projects in the world – from Burj Khalifa to space missions to Mars. For more information, visit: **www.rawlplug.com.**

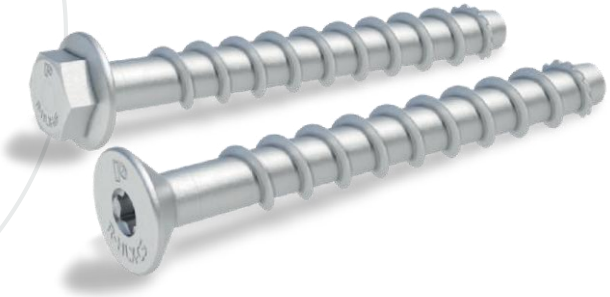
Figure 1.
Production plant in Łańcut

The R-HLX concrete screw anchor is manufactured exclusively from zinc flake (ZF) or zinc-plated (ZP) coated carbon steel. The screw is available in a variety of head styles for a wide range of applications: R-HLX-HF, R-HLX-CS, R-HLX-E, R-HLX-I, R-HLX-P, R-HLX-PX, and R-HLX-SI. Zinc flake coating enhances the product's corrosion resistance. Induction hardening ensures high surface hardness and high core impact strength. R-HLX concrete screws can be used in earthquake-prone areas – seismic category C1 and C2. The new thread shape with additional cutting teeth ensures quick and easy installation, even in reinforced concrete C20/25 – C50/60. The screw can be used as a temporary anchor – after checking for wear, it can be removed and reused. The R-HLX screw anchor achieves the highest mechanical parameters in both cracked and non-cracked concrete, which are confirmed in the ETA document.

Figure 2.
Application of R-HLX concrete screw anchor

Table1.
Percentage of concrete screw components

Component	
Material	Percentage [%]
Steel	100



Concrete screw anchor
R-HLX

Storage of wire rod materials

Approval of assembly

Cold forging
forming, thread rolling

Washing-Phosphate Removal

Heat improvement + carburizing

Heat treatment control

Induction hardening

Making a cover in cooperation

Making a protective covering

Coverage inspection

Packaging

Final inspection

Transport

Warehousing
storage, dispatch

Transport

Grid Energy, Renewable Energy

Waste

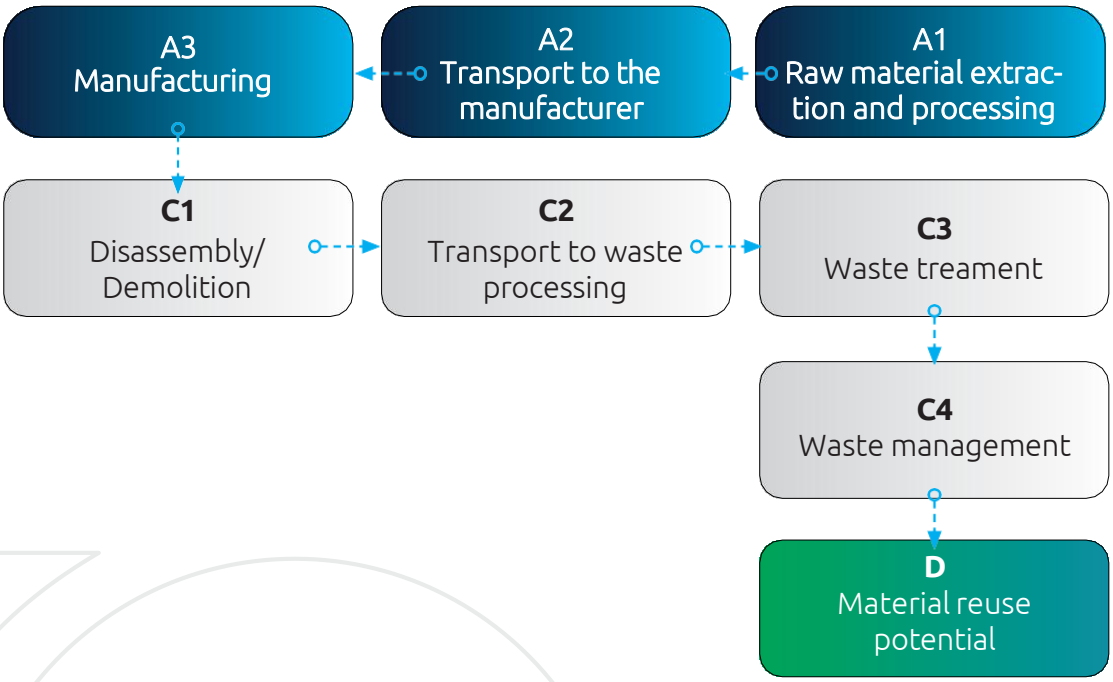
The manufacturing process for the R-HLX concrete screw anchor begins with the storage of raw materials, steel wire rods, which constitute the basic raw material for production. Once mass production is approved, the technological cycle begins, the first stage of which is cold forging. During this process, the screw's shape is formed and the thread is rolled, which gives the product its assembly properties. After obtaining the appropriate geometry, the element undergoes a washing process to remove phosphates from the surface and prepare it for heat treatment. The next stage is heat treatment and carburization, which increases the hardness and strength of the screw, ensuring its resistance to the loads encountered during installation in concrete. After heat treatment, quality control is performed, and then the screws are subjected to induction hardening, which further hardens the surface layer and improves wear resistance. The screws are then sent to a supplier for zinc flake coating. This coating protects the screws against corrosion and significantly increases their durability. After the coating is applied, all components undergo a coating inspection, including an assessment of the quality and thickness of the protective layer. In the next stages, the screws are packaged and subjected to a final inspection, during which all key product parameters are verified. Finally, the finished products are transferred to a warehouse, where they are stored and prepared for shipment. Finally, the final product is transported to be delivered directly to customers.

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:
Koelner Rawlplug IP Sp. z o.o. Oddział w Łańcucie, Podzwierzyniec 41, 37-100 Łańcut 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.

Declarated 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 gate of the production plant, means of transport varied depending on the 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 - covers end-of-life processes related to the concrete screw anchor during dismantling/demolition. Calculations are performed based on a developed scenario.

C2 – refers to the transport of the used product as part of waste processing, 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 concrete screw anchor components at a waste recovery facility. Calculations are performed based on a developed scenario.

C4 – covers the final management processes of the used concrete screw 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 calculation data comes from Ecoinvent v. 3.10 and was supplemented with KOBiZE CO_2, SO_2, NO_x, CO, and total particulate mat-ter emission factors for electricity, December 2024. Emission factors for electricity were determined using actual KOBiZE data. The Pol-ish electricity emission factor used (Ecoinvent supplemented with current KOBiZE national data) is 0.597 kg CO2/kWh. A detailed data quality analysis was part of the external audit.
Allocation	All data regarding unit processes from a single production plant was 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 PN-EN 15804+A2 standard and the ICIMB-PCR Part A guidelines. All data was 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 R-HLXconcrete screw 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.
Impact: fuel consumption (excavator with hammer and crusher)

0,01956	l/kgprod

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 50 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, it is assumed that construction debris containing concrete screw anchor, is valuable waste and is subject to recycling. Steel elements of R-HLX are often separated using electromagnets (anchors can be recovered together with steel scrap). The resulting steel scrap is sent for recycling, often for remelting. Therefore, the following processes were assumed for the calculations: unloading (loader), crushing (crusher).

The following were assumed for the calculations:

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

The benefits of using these secondary materials are covered in Module D.

C4 – The developed scenario assumes the storage of 15% of the waste containing concrete screw anchor, elements remaining after magnetic separation.

D – Includes potential environmental benefits from recovery and reuse. Benefits and burdens beyond the system boundaries are considered. The final product is assumed to be recycled, reducing the need for primary steel production. Energy recovery from packaging processing is included.

5. LCA: RESULTS

The table below shows the LCA modules taken into account when calculating 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-struction 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 concrete screw anchor R-HLX. 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 - Concrete screw anchor R-HLX

Life Cycle Stage									
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	2,16E+00	5,18E-02	1,78E-01	8,35E-02	9,14E-03	6,04E-02	4,18E-04	-1,56E+00
GWP-fossil	kg CO_2 eq.	2,17E+00	5,17E-02	1,78E-01	8,35E-02	9,13E-03	6,03E-02	4,17E-04	-1,57E+00
GWP-biogenic	kg CO_2 eq.	-1,69E-02	3,58E-05	3,84E-04	9,13E-06	6,32E-06	1,03E-04	1,11E-06	1,07E-02
GWP-luluc	kg CO_2 eq.	7,95E-03	1,72E-05	1,54E-04	7,25E-06	3,03E-06	4,36E-05	4,35E-08	-4,94E-04
ODP	kg CFC11 eq.	1,40E-08	1,03E-09	2,84E-09	1,28E-09	1,82E-10	5,30E-10	6,44E-12	-6,82E-09
AP	mol H+ eq.	7,20E-03	1,08E-04	5,89E-04	7,54E-04	1,90E-05	4,07E-04	3,70E-06	-5,54E-03
EP-freshwater	kg PO4 eq.	1,04E-03	3,50E-06	1,20E-04	2,44E-06	6,18E-07	3,42E-05	1,23E-08	-6,18E-04
EP-marine	kg N eq.	1,75E-03	2,59E-05	1,38E-04	3,50E-04	4,57E-06	1,54E-04	1,71E-06	-1,30E-03
EP-terrestrial	mol N eq.	1,81E-02	2,79E-04	1,16E-03	3,83E-03	4,93E-05	1,62E-03	1,87E-05	-1,39E-02
POCP	kg NMVOC eq.	6,31E-03	1,79E-04	4,00E-04	1,14E-03	3,16E-05	4,81E-04	5,60E-06	-4,82E-03
ADP-minerals & metals	kg Sb eq.	4,48E-06	1,68E-07	3,24E-07	2,98E-08	2,97E-08	5,09E-08	1,71E-10	-8,50E-07
ADP-fossil	MJ	2,15E+01	7,27E-01	2,13E+00	1,09E+00	1,28E-01	7,22E-01	5,46E-03	-1,62E+01
WDP	WDP (m^3) świat. ekw	1,10E+00	3,02E-03	-3,94E+01	2,37E-03	5,33E-04	2,36E-03	1,18E-05	-1,08E-01

ADDITIONAL IMPACT INDICATORS: 1 kg – Concrete screw anchor R-HLX

Life Cycle Stage									
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	1,37E-07	3,81E-09	2,11E-09	2,14E-08	6,72E-10	8,35E-09	1,07E-10	-1,06E-07
IRP	kBq U235 eq.	9,08E-02	9,43E-04	1,80E-03	4,89E-04	1,67E-04	4,55E-04	3,01E-06	-1,98E-02
ETP-fw	CTUe	6,45E-04	2,18E-06	7,47E-05	1,52E-06	3,85E-07	2,13E-05	7,67E-09	-3,84E-04
HTP-c	CTUh	5,11E-07	3,67E-10	2,45E-10	3,26E-10	6,48E-11	1,53E-10	1,61E-12	-4,99E-07
HTP-nc	CTUh	1,06E-08	4,57E-10	1,45E-09	1,35E-10	8,06E-11	4,07E-10	7,36E-13	-5,81E-09
SQP	-	6,35E+00	4,39E-01	3,12E-01	7,68E-02	7,76E-02	1,09E-01	6,72E-03	-3,85E+00

INDICATORS DESCRIBTIONS RESOURCE CONSUMPTION: 1 kg - Concrete screw anchor R-HLX									
		Life Cycle Stage							
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,49E+00	1,25E-02	2,37E-01	6,70E-03	2,20E-03	4,47E-02	1,63E-04	-5,17E-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	1,49E+00	1,25E-02	2,37E-01	6,70E-03	2,20E-03	4,47E-02	1,63E-04	-5,17E-01
PEN-RE	MJ	2,29E+01	7,73E-01	2,31E+00	1,16E+00	1,37E-01	7,67E-01	5,80E-03	-1,73E+01
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	2,29E+01	7,73E-01	2,31E+00	1,16E+00	1,37E-01	7,67E-01	5,80E-03	-1,73E+01
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	1,82E-02	1,27E-04	1,78E-03	4,23E-05	2,24E-05	4,82E-04	1,09E-06	-3,46E-02

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 kg - Concrete screw anchor R-HLX									
		Life Cycle Stage							
Indicator	**Unit (expressed per DU)**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	WN	WN	5,42E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste	kg	WN	WN	1,95E-05	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	2,29E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	WN	WN	3,51E-02	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	2,64E-01

BIOGENIC CARBON	
Contents organic carbon in product (kg C_{org})	**0,00E+00**
Contents organic carbon in packaging (kg C_{org})	**2,66E-02**

6. INTERPRETATION

Figure 4 presents diagrams of the shares of individual life cycle modules on the basic impact categories for concrete screw anchor R-HLX

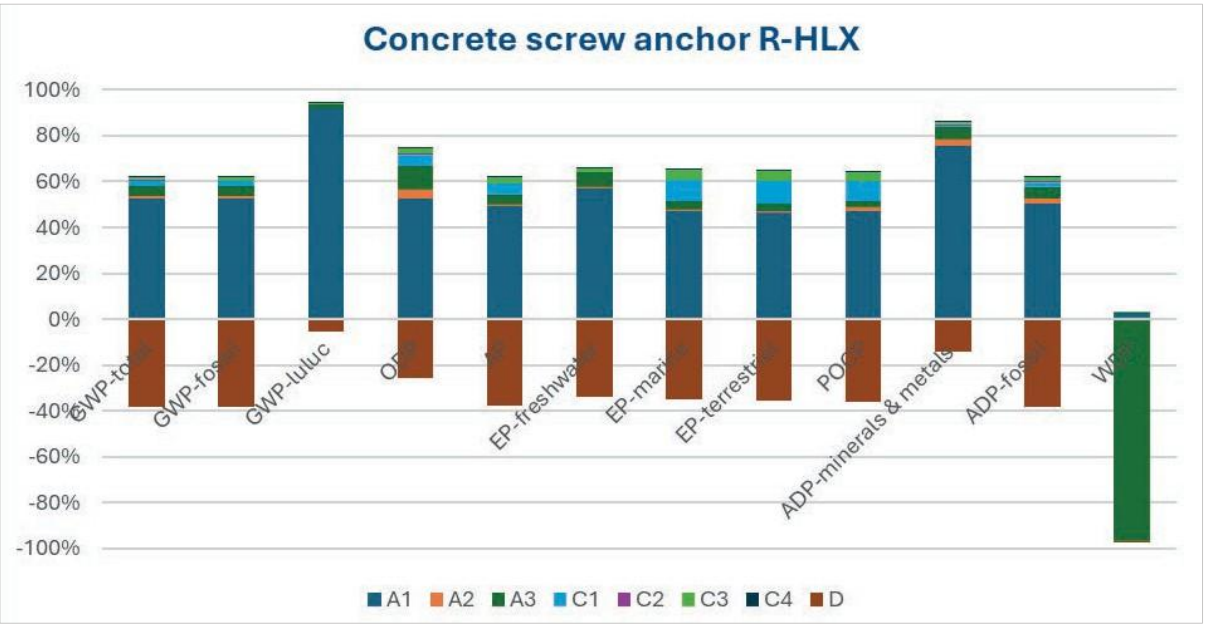


Figure 4.
Shares of life cycle modules in the main categories of impacts – concrete screw anchor R-HLX.

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//

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PROCESS ENGINEERING RESEARCH GROUP

TYPE III ENVIRONMENTAL DECLARATION CERTIFICATE

no. 06-11/2025

Products:

Concrete screw anchor

R-HLX

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 **November 27 2025,** and is valid for 5

Process Engineering Research Group Leader

Ewa Głodek-Bucyk,
PhD Eng.

Director of Environmental Engineering Center

Joanna Poluszyńska, PhD

Opole, november 2025