



Issuance date: 21.11.2023
Validity date: 21.11.2028

Rigidol P-200/PET50 and series



Owner of the EPD:

LERG S.A.
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Contact: lerg@lerg.pl
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EPD Program

Operator:

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ITB is the verified member of The European Platform for EPD program operators and LCA practitioner www.eco-platform.org

Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment. Their aspects were verified by the independent body according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

Life cycle analysis (LCA): A1-A3 in accordance with EN 15804+A2 (Cradle-to-Gate)

The year of preparing the EPD: 2023

Service Life: N/A

PCR: ITB-PCR A

Declared unit: 1 kg

Reasons for performing LCA: B2B

Representativeness: Polish, European

MANUFACTURER

LERG S.A. in Pustków is a manufacturer and exporter of synthetic resins used across industries and sectors, including construction, automotive, furniture and mining.

The core of LERG's offering features mainly polyester, novolak and phenolic resins, resins for wood-derivatives, insulation and composite materials, gelcoats, polyester polyols and formalin and products dedicated to automobile refinishing. The LERG's portfolio currently covers around 600 products.



Figure 1. A view of LERG S.A. production plant located in Pustków (Poland).

PRODUCTS DESCRIPTION AND APPLICATION

Polyols are a group of products intended for the manufacture of a wide range of polyurethanes, which are products of their reaction with isocyanates. Given the origin of their derivation, these are made as polyester polyols under the trade name Rigidol. They are, among others, based on biorenewables and recycled raw materials (pre-consumer and post-consumer). They are used as a component for PIR/PUR sandwich panels. Table 1 shows physicochemical properties of Rigidol P-200/PET50 series:

Type III Environmental Product Declaration No. 557/2023

Table. 1: Physicochemical properties of Rigidol P-200/PET50 series.

Name of Rigidol	Percentage of PET recyclate used in production	Viscosity 25°C [mPa·s]	Hydroxyl value [mg KOH/g]	Acid value [mg KOH/g]	Water content [%]	Density 23°C [g/cm ³]
P-200/PET50	50	3000-4000	210-260	2 - 3	Max. 0,15	1,2-1,23
P-200/PET50 D8	47	2500-3500	220-250	2 - 3	Max. 0,2	1,18-1,21
P-200/PET50 D22	47	2700-3700	220-250	2 - 3,5	Max. 0,15	1,18-1,21

Rigidols are used across industries and sectors:

- for the production of sandwich panels used, for example, in the construction of large-scale facilities, such as warehouses, production halls,
- for the production of spray insulation, e.g. interior roof insulation, large-size door insulation,
- for the production of one- and two-component fixing foams used as sealants in the installation of window and door frames,
- for the production of adhesives in mining.

More information can be found on the LERG S.A. website : <https://www.lerg.pl/>.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit

The declared unit is 1 kg of product of Rigidol P-200/PET50

System boundary

Modules A1-A3 are taken into consideration in the LCA: A1 Production of preliminary products, A2 Transport to plant, A3 Production (incl. provision of energy, production of auxiliaries and consumables or waste treatment). Rigidol products were identified as physically integrated with other products during installation so they cannot be physically separated from them at the end of life and no longer identifiable at the end of life as a result of a physical or chemical transformation process. Therefore, they may omit the declaration of modules C1-C4 and D. This type of EPD declaration is called "cradle to gate".

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of the Rigidol polyols is a line process conducted in the factory of LERG S.A. located in Pustków (Poland). Allocation was done on product mass basis. All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the LERG S.A. production were inventoried on the annual production volume expressed in kg. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were not taken into consideration.

System limits

Type III Environmental Product Declaration No. 557/2023

According to the standard EN 15804+A2, products used for the production of other products should be declared at the production stage. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculations. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA. The production of etiquettes/printing was not considered.

Modules A1 and A2: *Raw materials supply and transport*

The products covered by this EPD contain the base materials: 47-50% recycled material from PET bottles, other chemical substances, additives and ancillary materials. Raw materials come from Polish and international suppliers. Data on transport of the different products to the manufacturing plant is collected and modelled for factory by assessor. Means of transport include trucks and Polish and European fuel averages are applied. Means of transport include trucks > 16 t.

Module A3: *Production*

The production/formulation is done by LERG plants in Pustków, Poland. A scheme of Rigidol P-200/PET50 series production process is presented in Figure 2. The facility is ISO 9001 certified and ISO 14001 in process.

Type III Environmental Product Declaration No. 557/2023

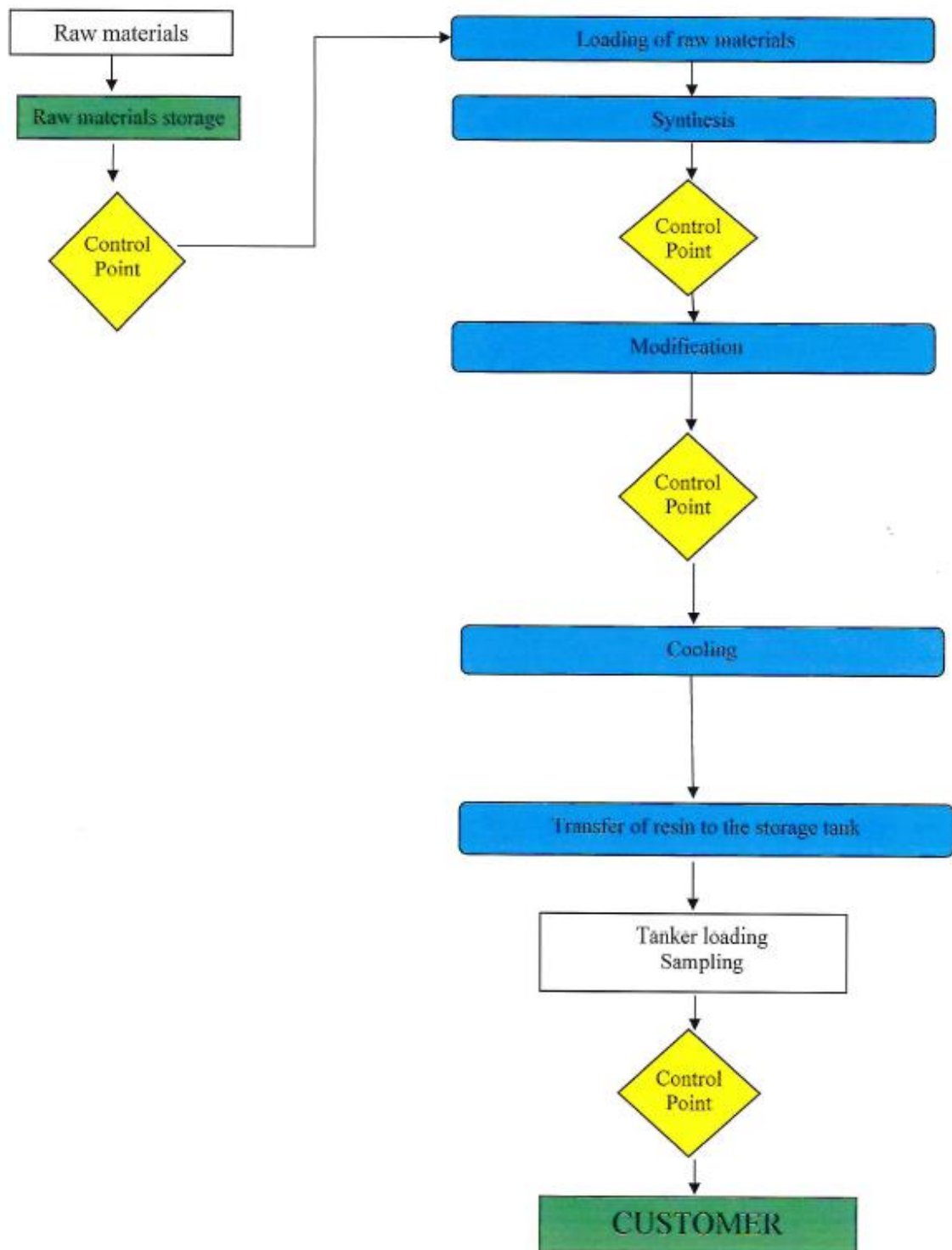


Figure 2. The scheme of Rigidol P-200/PET50 and series production process by LERG S.A.

Data quality

The data selected for LCA analysis originates from ITB-LCI questionnaires completed by LERG S.A. using the inventory data, ITB database, Ecoinvent database v. 3.9.1 and KOBiZE. KOBiZE data is supplemented with Ecoinvent v. 3.9.1 data on the national electricity mix impact where no specific indicator data is provided. No specific data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency are judged as good.

Type III Environmental Product Declaration No. 557/2023

Data collection period

Primary data provided by LERG S.A. covers a period of 01.01.2022 – 31.12.2022 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Assumptions and estimates

The impacts of the representative Rigidol P-200/PET50 products (Rigidol P-200/PET50, Rigidol P-200/PET50 D8, Rigidol P-200/PET50 D22) were aggregated using average. The impacts of the representative product of Rigidol P-200/PET50 were inventoried and calculated for all products presented in Tables 3-6.

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN 15804 + A2.

Databases

The data for the processes comes from Ecoinvent v. 3.9.1 and ITB-Database. Specific data quality analysis was a part of external audit. Polish electricity mix used (production) is 0.761 kg CO₂/kWh (KOBiZE 2022).

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 kg of Rigidol P-200/PET50 produced by LERG S.A..

Table 2. System boundaries for the environmental characteristic of Rigidol P-200/PET50 produced by LERG S.A.

Environmental assessment information (MD – Module Declared, MND – Module Not Declared, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	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
MD	MD	MD	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Type III Environmental Product Declaration No. 557/2023

Table 3. Life cycle assessment (LCA) results of Rigidol P-200/PET50 produced by LERG S.A. - environmental impacts (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3
Global Warming Potential	eq. kg CO ₂	2.12E+00	3.84E-02	5.37E-02	2.22E+00
Greenhouse gas potential - fossil	eq. kg CO ₂	1.84E+00	4.31E-02	5.36E-02	1.94E+00
Greenhouse gas potential - biogenic	eq. kg CO ₂	- 8.93E-03	3.62E-05	1.14E-04	- 8.78E-03
Global warming potential - land use and land use change	eq. kg CO ₂	2.91E-01	2.12E-05	8.79E-06	2.91E-01
Stratospheric ozone depletion potential	eq. kg CFC 11	5.62E-06	9.47E-10	9.04E-09	5.63E-06
Soil and water acidification potential	eq. mol H ⁺	7.75E-03	9.72E-05	1.54E-04	8.00E-03
Eutrophication potential - freshwater	eq. kg P	3.34E-03	3.09E-06	1.70E-05	3.36E-03
Eutrophication potential - seawater	eq. kg N	2.33E-03	2.50E-05	3.50E-05	2.39E-03
Eutrophication potential - terrestrial	eq. mol N	1.60E-02	2.55E-04	2.55E-04	1.65E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	6.42E-03	1.53E-04	1.80E-04	6.75E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.48E-05	1.39E-07	2.81E-08	1.49E-05
Abiotic depletion potential - fossil fuels	MJ	4.41E+01	6.27E-01	2.05E+00	4.68E+01
Water deprivation potential	eq. m ³	1.29E+00	3.14E-03	3.85E-03	1.30E+00

Table 4. Life cycle assessment (LCA) results of Rigidol P-200/PET50 produced by LERG S.A.- additional impacts indicators (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

Type III Environmental Product Declaration No. 557/2023

Table 5. Life cycle assessment (LCA) results of Rigidol P-200/PET50 produced by LERG S.A. - environmental aspects related to resource use (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.01E+00	9.59E-03	8.05E-03	3.03E+00
Consumption of renewable primary energy resources used as raw materials	MJ	2.21E+00	0.00E+00	0.00E+00	2.21E+00
Total consumption of renewable primary energy resources	MJ	5.22E+00	9.59E-03	8.08E-03	5.24E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.93E+01	6.27E-01	7.31E-01	2.06E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	2.51E+01	0.00E+00	1.31E+00	2.64E+01
Total consumption of non-renewable primary energy resources	MJ	4.43E+01	6.27E-01	2.06E+00	4.70E+01
Consumption of secondary materials	kg	5.62E-01	2.81E-04	2.24E-04	5.63E-01
Consumption of renewable secondary fuels	MJ	6.10E-05	3.57E-06	2.29E-07	6.48E-05
Consumption of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net consumption of freshwater resources	m ³	2.55E-02	7.77E-05	8.26E-05	2.57E-02

Table 6. Life cycle assessment (LCA) results of Rigidol P-200/PET50 produced by LERG S.A. - environmental information describing waste categories (DU: 1 kg)

Indicator	Unit	A1	A2	A3	A1-A3
Hazardous waste. neutralized	kg	4.53E-02	4.24E-04	3.24E-04	4.60E-02
Non-hazardous waste neutralised	kg	2.98E+00	1.29E-02	5.86E-03	3.00E+00
Radioactive waste	kg	5.26E-05	2.01E-07	1.95E-07	5.30E-05
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.28E-01	4.65E-06	4.37E-04	1.28E-01
Materials for energy recovery	kg	1.14E-06	3.57E-08	7.26E-05	7.38E-05
Energy exported	MJ	8.15E-02	2.23E-04	3.57E-04	8.21E-02

Type III Environmental Product Declaration No. 557/2023

Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804+A2 and ITB PCR A	
Independent verification corresponding to ISO 14025 (subclause 8.1.3.)	
<input checked="" type="checkbox"/> external	<input type="checkbox"/> internal
External verification of EPD: Halina Prejzner, PhD Eng	
LCA, LCI audit and input data verification: Mateusz Kozicki, PhD	
Verification of LCA: Michał Piasecki, PhD. DSc. Eng	

Note 1: The declaration owner has the sole ownership, liability and responsibility for the information provided and contained in EPD. Declarations within the same product category but from different programmes may not be comparable. Declarations of construction products may not be comparable if they do not comply with EN 15804 + A2. For further information about comparability, see EN 15804 + A2 and ISO 14025. Depending on the application, a corresponding conversion factor such as the specific weight per surface area must be taken into consideration.

Note 2: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (17065/17025 certified). ITB-EPD program is recognized and registered member of The European Platform – Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

Normative references

- ITB PCR A General Product Category Rules for Construction Products
- ISO 14025:2006. Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets – Service life planning – Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation
- ISO 20915:2018 Life cycle inventory calculation methodology for steel products
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- ISO 14067:2018 Greenhouse gases - Carbon footprint of products — Requirements and guidelines for quantification
- EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- KOBiZE Emissions (CO₂, SO₂, NO_x, CO and total dust) from electricity, 2022



Instytut Techniki Budowlanej

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Thermal Physics, Acoustics and Environment Department

02-656 Warsaw, Ksawerów 21

CERTIFICATE № 557/2023 of TYPE III ENVIRONMENTAL DECLARATION

Products:

Rigidol P-200/PET50 and series

Manufacturer:

LERG S.A.

ul. Pustków Osiedle 59D, 39-206 Pustków, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

EN 15804+A2


Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

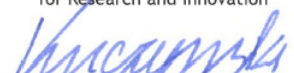
This certificate, issued on 21st November 2023 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics
and Environment Department


Agnieszka Winkler-Skalna, PhD



Deputy Director
for Research and Innovation


Krzysztof Kuczyński, PhD

Warsaw, November 2023