



Environmental Product Declaration

UNE-EN ISO 14025:2010

UNE-EN 15804:2012+A2:2020

ISO 21930:2017

AENOR

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RARx - Rubber Additive for Asphalt Mixes



produced by
 Cirtec



The holder of this Declaration is responsible for its content, as well as for keeping the supporting documentation that justifies the data and statements included during the period of validity.

Owner of the EPD:



Cirtec – Círculo Tecnológico S.L.
C/ Condesa de Venadito 5
28027 Madrid (Madrid)
Spain

Tel. (+34) 914 434 200
Email info@cirtec.es
Web <https://cirtec.es/>

Name and contact information of LCA author



Abaleo S.L.
D. José Luis Canga Cabañes
c/ Poza de la Sal, 8; 3º A
28031 Madrid
Spain

Tel. (+34) 639 901 043
Email jlcanga@abaleo.es;
info@abaleo.es
Web www.abaleo.es

Program GlobalEPD Administrator



AENOR CONFÍA, S.A.U.
C/ Génova 6
28004 – Madrid
Spain

Tel. (+34) 902 102 201
Email aenordap@aenor.com
Web www.aenor.com

AENOR is a founding member of ECO Platform, the European Association of Environmental Product Declaration Verification Programs.

UNE-EN 15804:2012+A2:2020

Independent third-party verification of the declaration and data, according to ISO 14025:2010.

☐ Internal

☒ External

Certifying Agency

AENOR

The Certifying Agency is accredited by ENAC 1/C-PR468

1. General Information.

1.1. About the company

CIRTEC, in just a few years, has consolidated its position as the best company in the development of additives and technical products for the road, always under a criterion of sustainability and circular economy.



CIRTEC specializes in offering the industrial, construction and civil engineering sectors technological products and solutions with the aim of making the concept of circular economy a reality on the road, providing technical solutions based on the use of products, such as rubber powder, obtained from the reuse of end-of-life tires (ELT) and other by-products such as recycled oil or waste bitumen.

RARX, its pre-digested tire powder additive for asphalt mixes, has created a real disruption in the road and asphalt mix sector.

The CIRTEC project is a project that is already consolidated on a global scale, with two factories in Mexico and Spain and a strategy for expansion to other countries.

CIRTEC has high level human, technical and material resources in order to be able to work with its customers not only in the manufacture and supply of the RARX additive, but also to offer highly qualified technical advice in terms of testing, working formulas, dosing, installation and quality control, in order to guarantee optimum execution and design in this type of asphalt mixes with rubber.

CIRTEC is certified in ISO 9001:2015 and ISO 14001:2015 standards.

1.2. RARX

RARX is a high-tech product manufactured from ELT (End-of-Life Tire) powder (60% of its composition) pretreated with bitumen and other additives of mineral origin.

RARX represents an evolution of existing technologies to date for incorporating ELT rubber powder in asphalt mixes:

- It guarantees the final quality of the product and the digestion of the rubber powder particles by performing such process at source (wet route).
- It takes advantage of the simplicity and versatility of use in asphalt mix manufacturing plants by incorporating it into the production process of these mixes as an additive or fine aggregate (dry process).
- RARX is CE marked and complies with all industrial safety standards for products under worldwide regulations.

1.3. Scope of the Declaration

This environmental product declaration describes environmental information related to the life cycle of the cradle-to-gate production with modules C and D of the RARX asphalt mix additive obtained from ELT powder manufactured by CIRTEC in its plant located in Valdemoro (Madrid).

The function performed by the product system studied is the production of the

rubber additive for asphalt mixtures for use in pavement construction.

1.4. Life cycle and compliance

This EPD has been developed and verified in accordance with ISO 14025:2010, UNE-EN 15804:2012+A2:2020 and ISO 21930:2017 as Product Category Rule.

Table 1-1. Product Category Rule

Title	Sustainability in construction. Environmental product declarations. Basic product category rules for construction products.
Registration number/version	UNE EN 15804:2012+A2:2020
Issue date	2020-03
Administrator	AENOR

Title	Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.
Registration number/version	ISO 21930:2017
Issue date	2017-07
Administrator	ISO

This EPD includes the life cycle stages shown in Table 1-2. This EPD scope is cradle-to-gate type with modules C and D.

Tabel 1-2. System boundaries. Information modules considered.

Product stage	A1	Raw material supply	X
	A2	Transport	X
	A3	Manufacturing	X
Construction	A4	Transport	MNE
	A5	Construction Installation	MNE
Use Stage	B1	Use	MNE
	B2	Maintenance	MNE
	B3	Repair	MNE
	B4	Replacement	MNE
	B5	Refurbishment	MNE
	B6	Operational Energy	MNE
	B7	Operational Water	MNE
End of life Stage	C1	Deconstruction / demolition	X
	C2	Transport	X
	C3	Waste processing	X
	C4	Disposal	X
	D	Future reuse, recycling or energy recovery potentials	X
X = Module included in the LCA; NR = Module not relevant; MNE = Module not evaluated			

This EPD may not be comparable with those developed in other Programs or according to different reference documents; in particular it may not be comparable with Statements not developed and verified according to UNE-EN 15804.

Similarly, EPDs may not be comparable if the origin of the data is different (e.g. databases), not all relevant information modules are included or they are not based on the same scenarios.

The comparison of construction products must be made on the same function, applying the same functional unit and at the level of the building (or architectural or engineering work), i.e., including the behavior of the product throughout its life cycle, as well as the specifications of section 6.7.2 of the UNE-EN ISO 14025 Standard.

1.5. Differences from previous versions of this EPD

This version is issued to correct errors in the calculation of biogenic carbon and in module D.

2. Product Information

2.1. Product Identification

This EPD applies to the rubber additive for asphalt mixes RARX produced at Cirtec's plant in Valdemoro (Madrid).

CPC Code: 3794 - Bituminous mixtures based on natural and artificial stone materials and bitumen, natural asphalt or related substances as binders.

2.2. Product performance

Specifically, the manufacturer declares the following information on the technical specifications of the product:

Table 2-1. RARX additive specifications

TECHNICAL DATA SHEET - RARX	
Physical state	Solid, dark gray powder
Odor and appearance	Fine grained, greyish granules
Moisture content	< 0,3%
Bulk density	0,6 ± 0,03 g/cm ³
Specific weight	1,031 ± 0,03 g/cm ³
Flash point	> 300 °C
Solubility	Insoluble in water
Chemical stability	Incompatible as a strong oxidizer

2.3. Product Composition

The RARX is available on the market in two versions or combinations, depending on the final version or the customer's requirements:

Table 2-2. Product composition

Material	% total weight	
	RARx 100% CaCO ₃	RARx Ca(OH) ₂
ELT powder	61-62%	61-62%
Bitumen	13-14%	15-16%
Ca CO ₃	24-25%	16-17%
Ca (OH) ₂	0%	6-7%

The recycled raw material content is 61-62%.

No hazardous substances listed in the "Candidate List of Substances of Very High Concern (SVHC) for authorization" are used during the product's life cycle in a percentage greater than 0.1% of the product's weight.

3. LCA Information

3.1. Life Cycle Assessment

The Life Cycle Assessment Report for the EDP of ELT powder and granulates and RARx additive, dated May 2024, was carried out by the company Abaleo S.L. using the Ecoinvent 3.9.1 (January 2023) and Environmental Footprint (EF) Database 3.1 databases and the SimaPro 9.5.0.0 software, which is the most updated version available at the time the LCA was carried out.

The study was carried out using data from the Cirtec plant in Valdemoro, Madrid.

The LCA study follows the recommendations and requirements of the international standards ISO 14040:2006, ISO 14044:2006, the European Standard EN 15804:2012+A2:2019 and ISO 21930:2017.

3.2. Scope of the study

The scope of this EPD is the production of cradle-to-gate with RARx rubber additive modules C and D for use in asphalt mixtures.

Data specific to the product manufacturing process are from Cirtec's facilities in Valdemoro, Madrid (Spain), corresponding to the year 2021.

It has not been included in the LCA:

- All equipment whose useful life is greater than 3 years.
- The construction of plant buildings, nor other capital assets.
- Staff travel to and from work, and staff travel to and from work.

- Research and development activities.

3.3. Declared Unit.

The declared unit is one ton of RARX additive, including the corresponding part of the packaging in its two formulation versions:

- RARX - 100% Ca CO₃.
- RARX – Ca (OH)₂.

3.4. Reference Service Life (RSL)

The Reference Service Life (RSL) of the additive studied is not specified since the stage of use is not included in the EPD.

3.5. Allocation criteria.

According to PCR criteria, when it has not been possible to avoid allocation, an allocation of the inputs and outputs of the system has been made, on a mass basis.

It has not been necessary to apply economic allocation criteria.

3.6. Cut-off criteria

The gross weight/volume of all materials and energy used in the production process has been included in the LCA.

Consequently, the criterion of including at least 99% of the total weight of the products used for the functional unit declared is met.

There has been no exclusion of energy consumption.

3.7. Data quality assessment

To model the production process of the RARx asphalt mix additive, production data from the Cirtec plant in Valdemoro, Madrid, for the year 2021, which is a representative year for average production, were used. The following data were obtained from this

plant: material and energy consumption; distances from suppliers and waste generation.

Where necessary, the Ecoinvent 3.9.1 (January 2023) and Environmental Footprint (EF) Database 3.1, the latest versions available at the time of the LCA, were used. For the inventory data, to model the LCA and to calculate the environmental impact categories required by the Product Category Rule, SimaPro 9.5.0.0 software was used, which is the most updated version available at the time of the study.

The following criteria were used to select the most representative processes:

- The data should be representative of the technological development actually applied in the manufacturing processes. If no information was available, a data representative of an average technology has been chosen.
- The geographical data should be as close as possible and, where appropriate, average regionalized data.
- The data should be as current as possible.

To assess the quality of the primary data on the production of the products studied, the

criteria for semi-quantitative evaluation of the quality of the data proposed by the European Union in its Guide to the Environmental Footprint of Products and Organizations were applied.

The results obtained are as follows:

- Very good integrity. Score 1.
- Methodological appropriateness and consistency good. Score 2.
- Very good temporal representativeness. Score 1.
- Technological representativeness good. Score 2.
- Very good geographic representativeness. Score 1.
- Low data uncertainty. Score 2.

According to the above data, the Data Quality Rating (DQR) takes the following value: $9/6 = 1.5$, which indicates that the data quality is excellent.

For a better understanding of the data quality assessment performed, it is indicated that the score for each of the criteria varies from 1 to 5 (the lower the score, the higher the quality) and that the following table is applied to obtain the final score:

Table 3-1. Data quality

Data Quality Rate (DQR)	Overall data quality level
$\leq 1,6$	Excellent quality
1,6 a 2,0	Very good quality
2,0 a 3,0	Good quality
3 a 4,0	Reasonable quality
> 4	Inadequate quality

4. System boundaries, scenarios and additional technical information.

The product system studied in the Life Cycle Analysis of RARX rubber additive production is cradle to gate with modules C and D. The following production stages have been studied:

Product stage.

- A1, from the generation of energy consumed in the main process and from the production of raw materials that are part of the final product.

- A2, transport of raw and auxiliary materials to the Valdemoro facilities, distinguishing the means of transport used: truck and ship.

- A3, production of the RARX additive at the Valdemoro plant, including: production of auxiliary materials and packaging; and transportation and management of waste generated.

Table 4-1. Stages and information modules for evaluation of construction products

Life Cycle Information													Additional information	
A1 to 3			A4 - A5		B1 to 7					C1 a 4				D
Product Stage			Construction Stage		Use Stage					End of Life Stage				Benefits and burdens beyond the system
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D
X	X	X	MNE	MNE	MNE	MNE	MNE	MNE	MNE	X	X	X	X	
Raw material supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Deconstruction, demolition	Transport	Waste Processing	Disposal	Future reuse, recycling or energy recovery potentials
Stage	Stage		Stage	Stage	Stage	Stage	Stage	Stage	Stage	Stage	Stage	Stage	Stage	
B6. Operational Energy														
Stage														MNE
B7. Operational Water														
Stage														MNE

X: Module evaluated

MNE: Module not evaluated

X: Module evaluated

MNE: Module not evaluated

End-of-life stage

- C1, considers the consumption of material and energy necessary for the demolition operations of the pavement containing the products studied at the end of their useful life. In this stage, the values for the end of life of asphalt mixes given by ASEFMA are considered.
- C2, at the end of its useful life, the studied product is transported by road for an average distance of 50 km to the waste management point, with EURO5 trucks of 16-32 tons.
- C3 - C4, the values for the end of life of asphalt mixes given by ASEFMA are considered.

The waste scenario considered states that:

- 53.5% of the weight is processed in plant to obtain secondary material in the manufacture of new mixes.
- 27.0% of the weight is used as aggregate or similar.
- 19.5% of the weight of the withdrawn product is sent to landfill disposal.

Table 4-2. Modules C1 to C4 parameters

Parameter	Value (per declared unit)
Collection process	1000 kg collected separately 0 kg collected with mixed waste
Recovery system	535 kg for recycling 270 kg for reuse 0 kg for energy recovery
Disposal	195kg for final disposal
Scenario development assumptions (transport)	Transport of waste by EURO5 truck of 16-32 tons: - Average distance of 50 km from the construction site to the management points.

Benefits and burdens beyond the system:

- D, the reuse and recycling potential expressed as net burdens and benefits relating to the secondary material recovered at exit from the product system is included, calculating the material substitution effects for the resulting net output stream from the product stage. The percentage of secondary material originating from end-of-life tyres is excluded from the calculation.

5. LCA and LCI environmental parameter statements.

The estimated impact results are relative and do not indicate the final value of the impact categories, nor do they refer to threshold values, safety margins or risks.

Environmental impact parameters

Table 5-1 Parameters describing the environmental impacts defined in the UNE-EN 15804 Standard for the production of 1 ton of RARx additive formulated without calcium hydroxide.

RARx – 100% Ca CO ₃ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	-1,62E+02	1,65E+01	4,17E+00	-1,41E+02	7,47E-01	1,49E+01	2,82E+02	7,04E+01	-2,06E+01
GWP-fossil	kg CO ₂ eq	1,85E+02	1,65E+01	4,16E+00	2,05E+02	7,43E-01	1,49E+01	1,36E-01	2,10E+00	-2,06E+01
GWP-biogenic	kg CO ₂ eq	-3,50E+02	9,73E-04	6,11E-03	-3,50E+02	4,00E-03	8,83E-04	2,82E+02	6,83E+01	-7,99E-03
GWP-luluc	kg CO ₂ eq	2,83E+00	3,26E-04	2,96E-03	2,84E+00	2,28E-04	2,93E-04	3,75E-04	5,66E-05	-1,56E-03
ODP	kg CFC-11 eq	1,36E-05	3,55E-07	6,34E-08	1,40E-05	1,28E-08	3,23E-07	3,17E-09	1,39E-08	-2,21E-06
AP	mol H ⁺ eq	6,25E-01	4,87E-02	1,71E-02	6,90E-01	2,44E-03	1,88E-02	6,39E-04	8,94E-03	-8,84E-02
EP-freshwater	kg P eq	1,14E-03	1,29E-05	1,01E-04	1,25E-03	1,75E-05	1,17E-05	8,59E-06	1,20E-06	-6,59E-05
EP-marine	kg N eq	1,33E-01	1,82E-02	3,28E-03	1,55E-01	7,81E-04	4,66E-03	1,09E-04	4,86E-03	-1,75E-02
EP-terrestrial	mol N eq	1,27E+00	1,93E-01	3,55E-02	1,49E+00	8,17E-03	4,54E-02	1,20E-03	4,19E-02	-1,48E-01
POCP	kg NMVOC eq	1,17E+00	7,31E-02	2,03E-02	1,26E+00	3,30E-03	3,52E-02	6,78E-04	1,27E-02	-1,95E-01
ADP-minerals&metals ²	kg Sb eq	1,81E-05	5,65E-07	8,52E-07	1,95E-05	1,07E-06	5,16E-07	8,56E-08	4,13E-08	-7,26E-07
ADP-fossil ²	MJ, v.c.n.	7,75E+03	2,18E+02	1,21E+02	8,09E+03	8,99E+00	1,97E+02	2,06E+00	1,14E+01	-1,35E+03
WDP ²	m3 worl eq depriv	1,56E+02	1,99E-01	1,45E+00	1,58E+02	2,11E+00	1,80E-01	4,95E-02	1,99E-02	-1,15E+00

GWP - total: Global warming potential; **GWP - fossil:** Global warming potential of fossil fuels; **GWP - biogenic:** Biogenic global warming potential; **GWP - luluc:** Global warming potential of land use and land use change; **ODP:** Stratospheric ozone depletion potential; **AP:** Acidification potential, cumulative surplus; **EP-freshwater:** Eutrophication potential, fraction of nutrients reaching the final freshwater compartment; **EP-marine:** Eutrophication potential, fraction of nutrients reaching the final marine water compartment; **EP-terrestrial:** Eutrophication potential, cumulative surplus; **POCP:** Photochemical oxidant formation potential; **ADP-minerals&metals:** Abiotic resource depletion potential for non-fossil resources; **ADP-fossil:** Abiotic resource depletion potential for fossil resources; **WDP:** Water deprivation potential (user), weighted water deprivation consumption.

Table 5-2. Additional environmental impact parameters defined in the UNE-EN 15804 Standard for the production of 1 ton of RARx additive formulated without calcium hydroxide..

RARX – 100% Ca CO ₃ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PM	Incidence of diseases	4,54E-06	1,09E-06	1,64E-07	5,80E-06	4,84E-08	8,99E-07	3,39E-09	2,34E-07	-7,07E-07
IRP ¹	kBq U235 eq	1,10E+01	3,47E-02	8,01E-02	1,11E+01	1,17E-02	3,16E-02	3,17E-02	2,49E-02	-2,61E-01
ETP-fw ²	CTUe	3,00E+03	9,73E+01	1,42E+01	3,11E+03	4,35E+00	8,82E+01	5,23E-01	7,08E+00	-5,85E+02
HTP-c ²	CTUh	5,36E-08	1,16E-09	4,88E-10	5,53E-08	1,77E-09	9,50E-10	1,49E-10	5,79E-11	-2,15E-09
HTP-nc ²	CTUh	8,63E-07	1,15E-07	1,75E-08	9,96E-07	5,33E-09	1,06E-07	1,56E-09	3,02E-09	-1,26E-07
SQP ²	Pt	1,56E+02	4,15E-01	2,41E+00	1,58E+02	4,22E-01	3,77E-01	4,51E-01	3,42E+01	-2,00E+01

PM: Potential for disease incidence due to particulate matter emissions; **IRP:** Exposure efficiency of human potential relative to U235; **ETP-fw:** Ecosystem Toxic Unit comparative potential - freshwater; **HTP-c:** Ecosystem Toxic Unit comparative potential - carcinogenic effects; **HTP-nc:** Ecosystem Toxic Unit comparative potential - non-carcinogenic effects; **SQP:** Soil Quality Potential Index.

Note 1. This impact category deals primarily with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents or occupational exposure due to disposal of radioactive waste in subway facilities. The potential for ionizing radiation from soil, due to radon or from some building materials is also not measured in this Parameter.

Note 2. The results of this environmental impact indicator should be used with caution as the uncertainties of the results are high and experience with this Parameter is limited.

Table 5-3. Parameters describing the environmental impacts defined in ISO 21930 for the production of 1 ton of RARX additive formulated without calcium hydroxide.

RARX – 100% Ca CO ₃ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP	kg CO ₂ eq	1,80E+02	1,63E+01	4,05E+00	2,00E+02	7,37E-01	1,47E+01	1,35E-01	1,93E+00	-1,91E+01
ODP	kg CFC-11 eq	1,43E-05	3,74E-07	7,15E-08	1,48E-05	1,47E-08	3,40E-07	3,45E-09	1,47E-08	-2,32E-06
EP	kg PO ₄ --- eq	5,74E-02	6,57E-03	1,49E-03	6,55E-02	3,46E-04	1,99E-03	6,82E-05	1,79E-03	-7,48E-03
AP	kg SO ₂ eq	5,17E-01	4,32E-02	1,48E-02	5,75E-01	2,13E-03	1,57E-02	5,30E-04	8,15E-03	-7,22E-02
POCP	kg C ₂ H ₄ eq	4,87E-02	2,07E-03	7,99E-04	5,15E-02	1,70E-04	1,58E-03	2,97E-05	3,75E-04	-7,96E-03

GWP: Global Warming Potential; **ODP:** Stratospheric Ozone Depletion Potential; **EP:** Eutrophication Potential; **AP:** Acidification Potential; **POCP:** Photochemical Oxidant Formation Potential.

Table 5-4 Parameters describing the environmental impacts defined in the UNE-EN 15804 Standard for the production of 1 ton of RARX additive formulated with calcium hydroxide.

RARX – Ca (OH) ₂ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	-8,70E+01	2,31E+01	4,17E+00	-5,97E+01	7,47E-01	1,49E+01	2,81E+02	7,01E+01	-2,32E+01
GWP-fossil	kg CO ₂ eq	2,58E+02	2,31E+01	4,16E+00	2,86E+02	7,43E-01	1,49E+01	1,36E-01	2,10E+00	-2,31E+01
GWP-biogenic	kg CO ₂ eq	-3,48E+02	1,36E-03	6,11E-03	-3,48E+02	4,00E-03	8,83E-04	2,81E+02	6,80E+01	-8,61E-03
GWP-luluc	kg CO ₂ eq	2,83E+00	4,55E-04	2,96E-03	2,83E+00	2,28E-04	2,93E-04	3,75E-04	5,66E-05	-1,75E-03
ODP	kg CFC-11 eq	1,53E-05	4,98E-07	6,34E-08	1,58E-05	1,28E-08	3,23E-07	3,17E-09	1,39E-08	-2,49E-06
AP	mol H ⁺ eq	7,22E-01	6,59E-02	1,71E-02	8,05E-01	2,44E-03	1,88E-02	6,39E-04	8,94E-03	-9,92E-02
EP-freshwater	kg P eq	1,23E-03	1,81E-05	1,01E-04	1,35E-03	1,75E-05	1,17E-05	8,59E-06	1,20E-06	-7,42E-05
EP-marine	kg N eq	1,53E-01	2,49E-02	3,28E-03	1,82E-01	7,81E-04	4,66E-03	1,09E-04	4,86E-03	-1,95E-02
EP-terrestrial	mol N eq	1,45E+00	2,64E-01	3,55E-02	1,75E+00	8,17E-03	4,54E-02	1,20E-03	4,19E-02	-1,65E-01
POCP	kg NMVOC eq	1,37E+00	1,01E-01	2,03E-02	1,49E+00	3,30E-03	3,52E-02	6,78E-04	1,27E-02	-2,19E-01
ADP-minerals&metals ²	kg Sb eq	1,86E-05	7,94E-07	8,52E-07	2,02E-05	1,07E-06	5,16E-07	8,56E-08	4,13E-08	-7,93E-07
ADP-fossil ²	MJ, v.c.n.	8,77E+03	3,05E+02	1,21E+02	9,20E+03	8,99E+00	1,97E+02	2,06E+00	1,14E+01	-1,52E+03
WDP ²	m3 worl eq depriv	1,57E+02	2,79E-01	1,45E+00	1,58E+02	2,11E+00	1,80E-01	4,95E-02	1,99E-02	-1,29E+00

GWP - total: Global warming potential; **GWP - fossil:** Global warming potential of fossil fuels; **GWP - biogenic:** Biogenic global warming potential; **GWP - luluc:** Global warming potential of land use and land use change; **ODP:** Stratospheric ozone depletion potential; **AP:** Acidification potential, cumulative surplus; **EP-freshwater:** Eutrophication potential, fraction of nutrients reaching the final freshwater compartment; **EP-marine:** Eutrophication potential, fraction of nutrients reaching the final marine water compartment; **EP-terrestrial:** Eutrophication potential, cumulative surplus; **POCP:** Photochemical oxidant formation potential; **ADP-minerals&metals:** Abiotic resource depletion potential for non-fossil resources; **ADP-fossil:** Abiotic resource depletion potential for fossil resources; **WDP:** Water deprivation potential (user), weighted water deprivation consumption.

Table 5-5. Additional environmental impact parameters defined in the UNE-EN 15804 Standard for the production of 1 ton of RARX additive formulated with calcium hydroxide.

RARX – Ca (OH) ₂ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PM	Incidence of diseases	4,98E-06	1,54E-06	1,64E-07	6,68E-06	4,84E-08	8,99E-07	3,39E-09	2,34E-07	-7,81E-07
IRP ¹	kBq U235 eq	1,14E+01	4,88E-02	8,01E-02	1,15E+01	1,17E-02	3,16E-02	3,17E-02	2,49E-02	-2,84E-01
ETP-fw ²	CTUe	3,44E+03	1,36E+02	1,42E+01	3,59E+03	4,35E+00	8,82E+01	5,23E-01	7,08E+00	-6,59E+02
HTP-c ²	CTUh	5,53E-08	1,62E-09	4,88E-10	5,74E-08	1,77E-09	9,50E-10	1,49E-10	5,79E-11	-2,39E-09
HTP-nc ²	CTUh	9,65E-07	1,62E-07	1,75E-08	1,14E-06	5,33E-09	1,06E-07	1,56E-09	3,02E-09	-1,42E-07
SQP ²	Pt	2,37E+02	5,82E-01	2,41E+00	2,40E+02	4,22E-01	3,77E-01	4,51E-01	3,42E+01	-2,01E+01

PM: Potential for disease incidence due to particulate matter emissions; **IRP:** Exposure efficiency of human potential relative to U235; **ETP-fw:** Ecosystem Toxic Unit comparative potential - freshwater; **HTP-c:** Ecosystem Toxic Unit comparative potential - carcinogenic effects; **HTP-nc:** Ecosystem Toxic Unit comparative potential - non-carcinogenic effects; **SQP:** Soil Quality Potential Index.

Note 1. This impact category deals primarily with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents or occupational exposure due to disposal of radioactive waste in subway facilities. The potential for ionizing radiation from soil, due to radon or from some building materials is also not measured in this Parameter.

Note 2. The results of this environmental impact indicator should be used with caution as the uncertainties of the results are high and experience with this Parameter is limited.

Table 5-6. Parameters describing the environmental impacts defined in ISO 21930 for the production of 1 ton of RARX additive formulated with calcium hydroxide.

RARX – Ca (OH) ₂ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP	kg CO ₂ eq	2,52E+02	2,28E+01	4,05E+00	2,79E+02	7,37E-01	1,47E+01	1,35E-01	1,93E+00	-2,15E+01
ODP	kg CFC-11 eq	1,61E-05	5,25E-07	7,15E-08	1,67E-05	1,47E-08	3,40E-07	3,45E-09	1,47E-08	-2,62E-06
EP	kg PO ₄ --- eq	6,56E-02	9,03E-03	1,49E-03	7,61E-02	3,46E-04	1,99E-03	6,82E-05	1,79E-03	-8,36E-03
AP	kg SO ₂ eq	5,96E-01	5,86E-02	1,48E-02	6,70E-01	2,13E-03	1,57E-02	5,30E-04	8,15E-03	-8,10E-02
POCP	kg C ₂ H ₄ eq	6,28E-02	2,85E-03	7,99E-04	6,65E-02	1,70E-04	1,58E-03	2,97E-05	3,75E-04	-8,96E-03

GWP: Global Warming Potential; **ODP:** Stratospheric Ozone Depletion Potential; **EP:** Eutrophication Potential; **AP:** Acidification Potential; **POCP:** Photochemical Oxidant Formation Potential.

Use of resources

Table 5-7 Parameters describing resource use for the production of 1 ton of RARX additive formulated without calcium hydroxide.

RARX – 100% Ca CO ₃ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ, v.c.n.	9,75E+02	5,73E-01	2,64E+00	9,78E+02	3,77E-01	5,22E-01	4,44E-01	1,07E+00	-6,79E+00
PERM	MJ, v.c.n.	1,03E+04	0,00E+00	0,00E+00	1,03E+04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ, v.c.n.	1,13E+04	5,73E-01	2,64E+00	1,13E+04	3,77E-01	5,22E-01	4,44E-01	1,07E+00	-6,79E+00
PENRE	MJ, v.c.n.	8,25E+03	2,19E+02	1,27E+02	8,60E+03	9,58E+00	1,99E+02	3,64E+00	1,23E+01	-1,36E+03
PENRM	MJ, v.c.n.	1,71E+04	0,00E+00	5,90E+01	1,72E+04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ, v.c.n.	2,53E+04	2,19E+02	1,86E+02	2,58E+04	9,58E+00	1,99E+02	3,64E+00	1,23E+01	-1,36E+03
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	0,00E+00
RSF	MJ, v.c.n.	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, v.c.n.	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	2,21E+00	9,19E-03	3,47E-02	2,26E+00	5,25E-02	8,34E-03	1,80E-03	3,63E-03	-1,46E-01

PERE: Primary renewable energy use excluding primary renewable energy resources used as feedstock; **PERM:** Primary renewable energy use used as feedstock; **PERT:** Total primary renewable energy use; **PENRE:** Primary non-renewable energy use excluding primary non-renewable energy resources used as feedstock; **PENRM:** Use of non-renewable primary energy used as feedstock; **PENRT:** Total use of non-renewable primary energy; **SM:** Use of secondary materials; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of flowing water resources.

Table 5-8 Parameters describing resource use for the production of 1 ton of RARX additive formulated with calcium hydroxide.

RARX – Ca (OH) ₂ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ, v.c.n.	1,01E+03	8,05E-01	2,64E+00	1,01E+03	3,77E-01	5,22E-01	4,44E-01	1,07E+00	-7,11E+00
PERM	MJ, v.c.n.	1,03E+04	0,00E+00	0,00E+00	1,03E+04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ, v.c.n.	1,13E+04	8,05E-01	2,64E+00	1,13E+04	3,77E-01	5,22E-01	4,44E-01	1,07E+00	-7,11E+00
PENRE	MJ, v.c.n.	9,28E+03	3,07E+02	1,27E+02	9,72E+03	9,58E+00	1,99E+02	3,64E+00	1,23E+01	-1,53E+03
PENRM	MJ, v.c.n.	1,77E+04	0,00E+00	5,90E+01	1,77E+04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ, v.c.n.	2,70E+04	3,07E+02	1,86E+02	2,75E+04	9,58E+00	1,99E+02	3,64E+00	1,23E+01	-1,53E+03
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	0,00E+00
RSF	MJ, v.c.n.	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, v.c.n.	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	2,31E+00	1,29E-02	3,47E-02	2,36E+00	5,25E-02	8,34E-03	1,80E-03	3,63E-03	-1,51E-01

PERE: Primary renewable energy use excluding primary renewable energy resources used as feedstock; **PERM:** Primary renewable energy use used as feedstock; **PERT:** Total primary renewable energy use; **PENRE:** Primary non-renewable energy use excluding primary non-renewable energy resources used as feedstock; **PENRM:** Use of non-renewable primary energy used as feedstock; **PENRT:** Total use of non-renewable primary energy; **SM:** Use of secondary materials; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of flowing water resources.

Waste categories

Table 5-9 Parameters describing the waste categories for the production of 1 ton of formulated RARX additive without calcium hydroxide.

RARX – 100% Ca CO ₃ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	kg	3,34E-02	1,44E-03	1,18E-04	3,50E-02	5,85E-05	1,31E-03	8,05E-06	7,63E-05	-5,82E-03
NHWD	kg	2,80E+00	1,08E-02	1,15E-01	2,92E+00	7,81E-02	9,80E-03	3,07E-02	1,95E+02	-4,29E-02
RWD	kg	6,94E-03	1,87E-05	5,34E-05	7,01E-03	8,72E-06	1,70E-05	2,25E-05	1,32E-05	-1,28E-04

HWD: Hazardous waste disposed; **NHWD:** Non-Hazardous waste disposed; **RWD:** Radioactive waste disposed.

Table 5-10 Parameters describing the waste categories for the production of 1 ton of RARX additive formulated with calcium hydroxide.

RARX – Ca (OH) ₂ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	kg	3,78E-02	2,02E-03	1,18E-04	3,99E-02	5,85E-05	1,31E-03	8,05E-06	7,63E-05	-6,56E-03
NHWD	kg	2,94E+00	1,52E-02	1,15E-01	3,07E+00	7,81E-02	9,80E-03	3,07E-02	1,95E+02	-4,79E-02
RWD	kg	7,15E-03	2,62E-05	5,34E-05	7,23E-03	8,72E-06	1,70E-05	2,25E-05	1,32E-05	-1,39E-04

HWD: Hazardous waste disposed; **NHWD:** Non-Hazardous waste disposed; **RWD:** Radioactive waste disposed.

Outflows

Table 5-11 Parameters describing the output flows for the production of 1 ton of formulated RARX additive without calcium hydroxide.

RARX – 100% Ca CO ₃ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,70E+02	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	1,18E+00	1,18E+00	0,00E+00	0,00E+00	5,35E+02	0,00E+00	0,00E+00
MER	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	0,00E+00
EE	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

CRU: Components for reuse; **MFR:** Materials for recycling; **MER:** Materials for energy recovery; **EE:** Energy exported.

Table 5-12 Parameters describing the output flows for the production of 1 ton of RARX additive formulated with calcium hydroxide.

RARX – Ca (OH) ₂ Declared unit: 1 ton										
Parameter	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,70E+02	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	1,18E+00	1,18E+00	0,00E+00	0,00E+00	5,35E+02	0,00E+00	0,00E+00
MER	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	0,00E+00
EE	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

CRU: Components for reuse; **MFR:** Materials for recycling; **MER:** Materials for energy recovery; **EE:** Energy exported.

6. Additional Environmental Information.

6.1. Other indicators

The production of RARX asphalt mix additive does not generate co-products.

The global warming potential excluding biogenic carbon is:

RARX – 100% Ca CO ₃ Declared Unit: 1 ton	
Parameter	A1-A3
GWP-GHG* (kg CO ₂ eq)	2,09E+02

RARX – Ca (OH) ₂ Declared Unit: 1 ton	
Parameter	A1-A3
GWP-GHG* (kg CO ₂ eq)	2,89E+02

* The category includes all greenhouse gases included in GWP-total, but excludes the uptake and emissions of biogenic carbon dioxide and biogenic carbon stored in the product.

6.2. Biogenic Carbon Content

The manufacturer states that the products studied have the following biogenic carbon content:

	RARx – 100% Ca CO ₃	RARx – Ca (OH) ₂
Biogenic carbon product (kgC/declared unit))	9,55+01	9,51+01
Biogenic carbon packaging (kgC/declared unit)	0	0

6.3. Indoor air emissions

The manufacturer declares that the RARX asphalt mix additive in its two formulations does not generate emissions to indoor air during its useful life.

6.4. Emissions to soil and water

The manufacturer declares that the RARx asphalt additive in its two formulations does not generate emissions to soil or water during its useful life.

6.5. Electrical mix used

The electricity mix used for the characterization of electricity for the year 2022 is that of the marketing company, Cepsa Gas y Electricidad S.A.U., obtained from the annual report of the National Commission for Markets and Competition (CNMC: GWP - IPCC 2021: 0.131 kgCO₂e/kWh).

6.6. Global Network RARx

The EDP of the RARx additive has been analyzed and audited at the production site of the factory in Spain.

RARx is manufactured and distributed worldwide by our network of manufacturers and distributors:

- Spain Factory - www.cirtec.es
- Mexico Factory - www.neotechasphalt.mx



References

[1] UNE-EN 15804:2012+A2:2020. Sustainability in construction. Environmental product declarations. Basic product category rules for construction products.

[2] General Instructions of the GlobalEPD Program 3rd revision 09-10 2023.

[3] UNE-EN ISO 14025:2010 Environmental labels. Environmental declarations type III. Principles and procedures (ISO 14025:2006).

[4] UNE-EN ISO 14040:2006/A1:2021. Environmental Management. Life Cycle Assessment. Principles and reference framework. Modification 1. (ISO 14040:2006/Amd 1:2020).

[5] UNE-EN ISO 14044:2006/A1:2021. Environmental management. Life cycle assessment. Requirements and guidelines. Modification 2. (ISO 14044:2006/Amd 2:2020).

[6] ISO 21930:2017 Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services.

[7] Life Cycle Assessment Report for EPD of ELT powder and granulates and RARx additive. Drafted by Abaleo S.L., June 2024. Version 7.

[8] Ecoinvent 3.9.1 (January 2023) and Environmental Footprint (EF) Database 3.1.

[9] Environmental impact assessment methodologies applied by SimaPro 9.5.0.0.

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A verified environmental declaration

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