

Environmental Product Declaration

In accordance with ISO 14025:2006 for:

Micronox ON16 y ON16D Adsorbents

from

PROMINDSA S.A.

EPD of multiple products, based on the weighted average results of Micronox ON16 and ON16D.

Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Type of EPD:	Average EPD covering Micronox ON16 and ON16D adsorbents.
EPD registration number:	EPD-IES-0034465:001
Version date:	2026-10-05
Validity date:	2031-10-05

An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com

micronox
BIOX



GENERAL INFORMATION

Programme Information	
Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	support@environdec.com

Product Category Rules (PCR)
PCR version: Basic chemicals, 2021:03, Version 1.1.6, General Programme Instructions (GPI) version: GPI 3.0.1, published in 2019. The PCR review was conducted by: <i>The Technical Committee of the International EPD® System.</i> See https://www.environdec.com/about-us/international-epd-system. Review chair: Lars-Gunnar Lindfors. The review panel may be contacted via the Secretariat https://www.environdec.com/support.

Third-party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ Individual EPD verification without a pre-verified LCA/EPD tool Third-party verification: CERTINALIA, SLU, Anardi Area Aldea, 5, 20730 Azpeitia, Gipuzkoa (Spain) Accredited by: ENAC (Spanish National Accreditation Body), accreditation no. 125/C-PR283 *EPD process certification involves an accredited certification body certifying and periodically auditing the EPD process and conducting external and independent verification of EPDs that are regularly published. More information can be found in the General Programme Instructions on www.envrondec.com. Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025

INFORMATION ABOUT EPD OWNER

EPD owner:

PROMINDSA S.A. (Productos Minerales para la Industria, S.A.)

Address:

Plataforma Logística de Zaragoza (PLAZA), Calle Messina, 5, 50197, Zaragoza, Spain

Contact:

Dune Prat, duneprat@promindsa.com, +34 976 151 074

Website:

<https://promindsa.com/>

Address and contact information of the LCA practitioner commissioned by the EPD owner:

FUNDACIÓN CIRCE (Research Centre for Energy Resources and Consumption)
Parque Empresarial Dinamiza, Avda. Ranillas 3D, 1st Floor, 50018, Zaragoza, Spain
circe@fcirce.es , +34 976 976 859, www.fcirce.es

Organisation description:

PROMINDSA is an industrial company specialised in the extraction, development, transformation and supply of iron oxides and hydroxides, integrating the entire value chain from mineral extraction through processing, quality control and distribution.

Its activities include the production of inorganic products for industry through crushing, micronisation, classification and packaging processes, ensuring consistency of their technical properties. PROMINDSA extracts, develops, transforms and supplies its products to more than 70 countries worldwide, serving a range of industrial sectors such as paints, biogas, construction, glass, asphalt, mortars and concrete, and foundries. The company operates mainly from its plant in Tierga (Zaragoza), where production and technical control are concentrated, providing mineral solutions adapted to multiple industrial sectors.

Product- or management-system-related certifications:

ISO 9001, ISO 14001 and ISO 45001 certificates.

PRODUCT INFORMATION

Product name:

Micronox ON16 and ON16D Adsorbents.

Product identification:

Micronox ON16 and ON16D are compounds of iron oxides-hydroxides and other functional oxides specifically developed to be added directly to the fermentation reactor.

Additional product information can be found on the PROMINDSA website at <https://promindsa.com/micronox-biox/>.

Visual representation of the product:



UN CPC code: 34220.07 – Iron oxides and hydroxides.

Composition / CAS Number:

COMPONENTS	CAS No.
Iron oxyhydroxide (FeOOH)	1310-14-1
Iron(III) oxide (Fe ₂ O ₃)	1317-60-8
Silicon dioxide (SiO ₂)	14808-60-7
Mica* (KAl ₂ (AlSi ₃ O ₁₀)(OH) ₂)	12001-26-2

GHS statements (Micronox ON16):

STOT RE 2: H373 - May cause damage to organs through prolonged or repeated exposure (Inhalation).

P260: Do not breathe dust

P314: Get medical advice/attention if you feel unwell.

P501: Dispose of contents/container in accordance with applicable legislation on hazardous waste or packaging and packaging waste, respectively.

GHS statements (Micronox ON16D):

The GHS statements are not applicable due to the higher iron oxide purity and, consequently, because the concentration of the respirable fractions of silica and mica is below 1%.

Additional product information:

Density (g/mL)	1.00 (±0.10)
pH	8 (±1)
Appearance	Micronised solid
Solids content	100%
Use	H ₂ S removal

Product description:

Micronox ON16 and ON16D are mineral adsorbents obtained from iron oxide-hydroxide-rich minerals extracted at the Ojos Negros mine (Teruel), owned by Cironita (PROMINDSA's parent company), and processed at PROMINDSA's facilities in Tierga (Zaragoza). Their main function is the removal of

hydrogen sulphide (H₂S) in anaerobic digestion processes, transforming it into iron sulphide and sulphur, compounds that subsequently form part of the resulting fertilisers. These products have been widely used in biogas plants. The manufacturing process comprises mineral extraction and transport, receipt and classification according to iron content, drying, micronisation (grinding and particle-size classification), packaging, quality control and storage. Both products share the same production process and differ only in their iron content.

Name and location of production site:

Production of the Micronox ON16 and ON16D R02 pigments takes place at the PROMINDSA plant in Tierga (Zaragoza), Spain.

CONTENT DECLARATION

- Mass (weight) of one product unit as purchased or per declared unit: 1 kilogram of Micronox ON16 and ON16D adsorbents.
- Product content in the form of a list of materials and substances, and their mass:

Product content	Mass, kg	Post-consumer recycled material, % by mass of product	Biogenic material, % by mass of product	Biogenic material, kg C/product or declared unit
Iron oxides and hydroxides	1000	0	0	0
TOTAL	1000	0	0	0

- Mass and content of distribution and/or consumer packaging:

Packaging materials	Mass, kg	Mass-% (relative to product)	Biogenic material, kg C/product or declared unit
Big-bag (PP)	4,59E-04	0,05%	0
Plastic covers (PE)	1,38E-03	0,14%	0
Pallet cover cardboard	7,26E-04	0,07%	3,27E-04
Pallet	2,50E-02	2,50%	1,25E-02
Paper bags	4,62E-03	0,46%	1,92E-03
TOTAL	4,59E-04	3,22%	1,47E-02

1 kg of biogenic carbon in the product/packaging corresponds to the uptake of 44/12 kg of CO₂.

Hazardous substances from the SVHC Candidate List	EC No.	CAS No.	Mass-% per product or declared unit
N/A	-	-	0

During the product life cycle, no hazardous substances included in the "Candidate List of Substances of Very High Concern (SVHC) for authorisation" are used at concentrations above 0.1% by weight of the product.

LCA INFORMATION

Declared unit:

1 tonne of Micronox ON16/ON16D adsorbent.

Time representativeness:

2025

Geographical scope:

The products are manufactured in Spain.

LCA databases and software used:

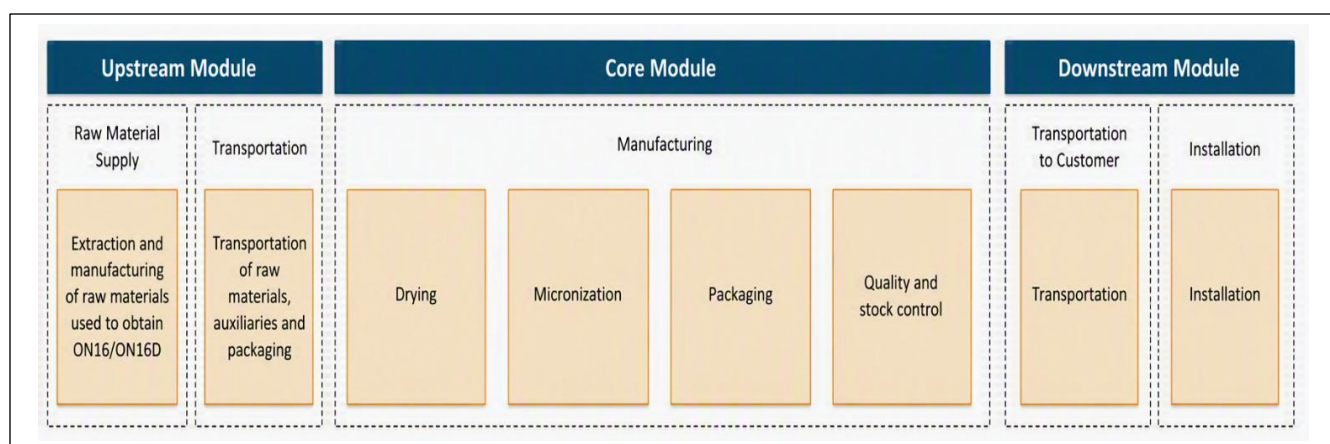
Ecoinvent v3.10 and SimaPro v9.6.0.1.

Description of the system boundaries:

This assessment has been carried out using a comprehensive approach covering all information modules of the product life cycle (from the initial to the final phase, or cradle to grave). According to PCR 2021:03 Basic chemicals, quantification of the use and end-of-life stages of the product is not mandatory when the product is used as an input in industrial processes. In this case, these stages have been excluded from the inventory because the following conditions are met:

- The product or material is physically integrated with other products during use (in this case, it becomes part of the digestate from the biogas reactor), so it cannot be physically separated from them at the end of its service life.
- The product or material is no longer identifiable at the end of its service life as a result of a physical or chemical transformation process.
- The product or material does not contain biogenic carbon.
- The EPD is not used for business-to-consumer (B2C) communication.

Process flow diagram:



Additional information:

Cut-off criteria

The life cycle inventory includes, as a minimum, 99% of the material and energy inputs of each unit process. Only flows whose individual contribution is below 1% of the total mass or energy and whose omission does not significantly affect the LCA results have been excluded, ensuring that the excluded inputs and outputs together represent less than 1% of the mass and energy of each life cycle module.

Flows related to the construction of production facilities and machinery used in pigment manufacturing have not been considered in this study, except those associated with the generation of electricity used at the factory. Long-term emissions have also been excluded from the calculation of environmental impacts.

Regarding waste, treatment of generated waste has been considered until it reaches the end-of-waste status. This criterion has been applied to waste generated in the different declared modules.

Allocation rules

Different final products are manufactured at the PROMINDSA production plant, including Micronox ON16 and ON16D adsorbents. Therefore, to distribute resource and energy consumption, as well as waste generation, among the different products, allocation percentages (provided by PROMINDSA and based on its technical knowledge) were first applied to differentiate consumption associated with the extraction and manufacturing stages. Subsequently, once these consumptions had been segregated, a mass-based allocation criterion was applied, considering the ratio between the mass produced of each adsorbent and total production.

Processes included in the LCA:

"Upstream" module

This module includes the production of the raw materials, auxiliaries and packaging materials used to produce the adsorbents.

"Core" module

The Core module includes all processing activities carried out at the PROMINDSA production plant, as well as the transport of auxiliary and packaging materials from suppliers to the facility.

The production process comprises receipt and classification of the mineral according to iron content, material drying, micronisation by grinding, particle-size classification, packaging, quality control and storage of the final product. Both adsorbents share exactly the same production process and differ only in their iron content.

During this stage, electricity, diesel and propane consumption are considered, as well as the treatment of waste generated during the production process.

The electricity consumed for manufacturing the Micronox ON16 and ON16D adsorbents is supplied by ACCIONA and has been modelled using a 100% renewable electricity mix, certified through Guarantees of Origin (GOs). An emission factor of 0.026 kg CO₂-eq./kWh has been applied to model electricity consumption.

"Downstream" module

Downstream processes include transport of the Micronox ON16 and ON16D adsorbents to the customer and the management of packaging waste at the end of its service life.

Regarding transport of the product to the customer, no specific primary data are available due to the high variability in supply destinations, as the product is marketed under a demand-driven distribution

model. In accordance with PCR 2021:03 Basic Chemicals, in the absence of specific data, an average transport scenario representative of the European market has been considered, based on road transport by a 16–32 tonne truck and a standard distance of 1,000 km.

The treatment of packaging waste generated after product distribution has also been considered (big bags, paper bags, plastic covers, pallet cover cardboard and wooden pallets).

The use and end-of-life stages of the adsorbent are not included because, during use in biogas reactors, the product is integrated into and transformed by the process, losing its identity as an independent product.

Declared modules, geographical scope, share of primary data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction stage		Use stage							End-of-life stage				Beyond the product life cycle
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Landfilling	Reuse, recovery, recycling
Module	Upstream		Core	Downstream													Benefits
Declared modules	X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geographical area	EU27/GLO	EU27	EU27/GLO	EU27	EU27/GLO	-	-	-	-	-	-	-	-	-	-	-	-
Share of primary data	5,20%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Declared life cycle modules/processes/stages shall be indicated with “X”. Undeclared life cycle modules/processes/stages shall be marked as “ND”. The geographical scope shall be reported using the country code(s) (e.g. UK, FR, DE) and/or the name of the region(s) (e.g. EU 27, Global). A variation of 0% shall be reported for single-product or single-site EPDs.

Process	Source type	Source	Reference year	Data type	Share of primary data, in the GWP-GHG category
Electricity consumption at plant (Core)	Data collection	PROMINDSA-specific data	2025	Primary	5,20%
Total share of primary data in GWP-GHG results					5,20%

“The share of primary data is calculated based on the GWP-GHG results. It is a simplified indicator of data quality that encourages the use of more primary data, with the aim of increasing representativeness and comparability between EPDs. This indicator does not cover all relevant aspects of data quality and is not comparable between different product categories.”

ENVIRONMENTAL PERFORMANCE

LCA results – main environmental results

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.

Part 1: Environmental impacts of the product (1 kg of ON16/ON16D)

Impact category indicators

Results per 1 kg of Micronox ON16/ON16D (product only)					
Indicator	Unit	Upstream	Core	Downstream	Total
GWP-total	kg CO ₂ eq.	1,85E-02	7,23E-02	1,52E-01	2,43E-01
GWP-fossil	kg CO ₂ eq.	1,85E-02	7,12E-02	1,52E-01	2,42E-01
GWP-biogenic	kg CO ₂ eq.	1,03E-05	3,12E-04	4,97E-05	3,72E-04
GWP-luluc	kg CO ₂ eq.	4,55E-06	7,45E-04	3,73E-06	7,53E-04
ODP	kg CFC 11 eq.	1,13E-09	6,11E-10	3,10E-09	4,83E-09
AP	mol H ⁺ eq.	2,34E-04	1,67E-04	1,77E-04	5,78E-04
EP-freshwater	kg P eq.	1,39E-07	7,41E-08	1,27E-07	3,41E-07
EP-marine	kg N eq.	6,97E-05	7,34E-05	3,93E-05	1,82E-04
EP-terrestrial	mol N eq.	1,01E-03	8,06E-04	4,29E-04	2,24E-03
POCP	kg NMVOC eq.	3,01E-04	2,62E-04	3,84E-04	9,46E-04
ADP-minerals&metals*	kg Sb eq.	3,32E-08	1,99E-09	5,02E-09	4,02E-08
ADP-fossil*	MJ	7,62E-01	4,71E-01	2,00E+00	3,24E+00
WDP*	m ³	1,03E-03	3,46E-02	8,52E-04	3,65E-02
Abbreviations	GWP-total: Global warming potential; GWP-fossil: Global warming potential of fossil fuels; GWP-biogenic: Biogenic global warming potential; GWP-luluc: Global warming potential from land use and land use change; ODP: Ozone depletion potential; AP: Acidification potential, accumulated exceedance; EP-freshwater: Eutrophication potential, fraction of nutrients reaching the final freshwater compartment; EP-marine: Eutrophication potential, fraction of nutrients reaching the final marine compartment; EP-terrestrial: Eutrophication potential, accumulated exceedance; POCP: Tropospheric ozone formation potential; ADP-minerals & metals: Abiotic depletion potential for non-fossil resources; ADP-fossil: Abiotic depletion potential for fossil resources; WDP: Water deprivation potential (user), weighted water deprivation consumption. NR: Not relevant				

* Note: The biogenic carbon contained in the packaging materials has already been balanced within modules A1-A3. Therefore, no additional biogenic carbon balance is declared beyond the stated system boundaries.

** Note: The results of this environmental impact indicator should be used with caution, as uncertainty in these results is high or experience with the indicator is limited.

Additional mandatory and voluntary impact category indicators

Results per 1 kg of Micronox ON16/ON16D (product only)					
Indicator	Unit	Upstream	Core	Downstream	Total
GWP-GHG ¹	kg CO ₂ eq.	1,85E-02	7,20E-02	1,52E-01	2,42E-01
PM	Disease inc.	4,20E-09	3,66E-09	8,98E-09	1,68E-08
IRP ²	kBq U235 eq	1,72E-04	1,39E-03	2,73E-04	1,83E-03
ETP-fw ³	CTUe	1,25E-01	2,01E-02	6,86E-02	2,13E-01
HTP-c ³	CTUh	7,81E-12	2,78E-11	1,06E-11	4,62E-11
HTP-nc ³	CTUh	6,56E-11	2,39E-10	1,01E-09	1,31E-09
SQP ³	-	2,26E-02	-1,95E-04	4,49E-03	2,69E-02
Abbreviations	GWP-GHG: Global Warming Potential – Greenhouse Gases; PM: Potential incidence of diseases due to particulate matter (PM) emissions; IRP: Relative human exposure efficiency for U235; ETP-fw: Comparative toxic unit potential for freshwater ecosystems; HTP-c: Comparative toxic unit potential – cancer effects; HTP-nc: Comparative toxic unit potential – non-cancer effects; SQP: Soil quality potential index; NR: Not relevant				

*Note 1: This indicator accounts for all greenhouse gases, except the uptake and emission of biogenic carbon dioxide and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total, except that the characterisation factor (CF) for biogenic CO₂ is set to zero.

**Note 2: This impact category primarily addresses potential impacts of low doses of ionising radiation on human health from the nuclear fuel cycle. It does not consider effects from possible nuclear accidents or occupational exposure from disposal of

radioactive waste in underground facilities. The ionising radiation potential from soil due to radon or from certain building materials is also not measured by this parameter.

****Note 3:** The results of this environmental impact indicator should be used with caution, as uncertainty in the results is high and experience with this parameter is limited.

Resource use indicators

Results per 1 kg of Micronox ON16/ON16D (product only)					
Indicator	Unit	Upstream	Core	Downstream	Total
PERE	MJ	5,14E-03	7,16E-01	6,96E-03	7,28E-01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	5,14E-03	7,16E-01	6,96E-03	7,28E-01
PENRE	MJ	7,62E-01	4,71E-01	2,00E+00	3,24E+00
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	7,62E-01	4,71E-01	2,00E+00	3,24E+00
SM	kg	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
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	3,73E-05	4,47E-04	5,14E-05	5,36E-04
Abbreviations	PERE: Use of renewable primary energy resources 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; PENRE: Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM: Use of non-renewable primary energy resources used as raw materials; PENRT: Total use of non-renewable primary energy; SM: Use of secondary material; RSF: Use of renewable secondary fuels; NRSF: Use of non-renewable secondary fuels; FW: Net use of freshwater resources; NR: Not relevant				

Waste indicators

Results per 1 kg of Micronox ON16/ON16D (product only)					
Indicator	Unit	Upstream	Core	Downstream	Total
Hazardous waste disposed	kg	6,36E-06	2,01E-05	1,48E-05	4,12E-05
Non-hazardous waste disposed	kg	3,40E-05	2,48E-03	5,96E-05	2,57E-03
Radioactive waste disposed	kg	1,16E-07	9,43E-07	1,88E-07	1,25E-06

Output flow indicators

Results per 1 kg of Micronox ON16/ON16D (product only)					
Indicator	Unit	Upstream	Core	Downstream	Total
Components for reuse	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	1,46E-03	2,84E-02	2,98E-02
Materials for energy recovery	kg	0,00E+00	2,19E-04	2,47E-03	2,69E-03
Exported energy, electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Part 2: Environmental impacts of packaging (1.47E-02 kg per kilogram of adsorbent)

Impact category indicators

Results per 1 kg of Micronox ON16/ON16D (packaging only)					
Indicator	Unit	Upstream	Core	Downstream	Total
GWP-total	kg CO ₂ eq.	-2,54E-02	1,08E-03	6,08E-02	3,64E-02
GWP-fossil	kg CO ₂ eq.	1,37E-02	1,08E-03	6,29E-03	2,11E-02
GWP-biogenic	kg CO ₂ eq.	-3,92E-02	3,54E-07	5,45E-02	1,53E-02
GWP-luluc	kg CO ₂ eq.	5,00E-05	2,65E-08	1,32E-07	5,01E-05
ODP	kg CFC 11 eq.	3,69E-10	2,20E-11	1,02E-10	4,93E-10
AP	mol H ⁺ eq.	6,42E-05	1,26E-06	6,52E-06	7,19E-05
EP-freshwater	kg P eq.	1,19E-06	9,05E-10	4,68E-09	1,20E-06
EP-marine	kg N eq.	1,81E-05	2,79E-07	1,66E-06	2,01E-05
EP-terrestrial	mol N eq.	2,01E-04	3,05E-06	1,79E-05	2,21E-04
POCP	kg NMVOC eq.	9,10E-05	2,73E-06	1,35E-05	1,07E-04
ADP-minerals&metals*	kg Sb eq.	3,77E-09	3,57E-11	1,95E-10	4,01E-09
ADP-fossil*	MJ	2,92E-01	1,43E-02	6,61E-02	3,72E-01
WDP*	m ³	7,88E-03	6,06E-06	8,21E-05	7,97E-03
Abbreviations	GWP-total: Global warming potential; GWP-fossil: Global warming potential of fossil fuels; GWP-biogenic: Biogenic global warming potential; GWP-luluc: Global warming potential from land use and land use change; ODP: Ozone depletion potential; AP: Acidification potential, accumulated exceedance; EP-freshwater: Eutrophication potential, fraction of nutrients reaching the final freshwater compartment; EP-marine: Eutrophication potential, fraction of nutrients reaching the final marine compartment; EP-terrestrial: Eutrophication potential, accumulated exceedance; POCP: Tropospheric ozone formation potential; ADP-minerals & metals: Abiotic depletion potential for non-fossil resources; ADP-fossil: Abiotic depletion potential for fossil resources; WDP: Water deprivation potential (user), weighted water deprivation consumption. NR: Not relevant				

* Note: The biogenic carbon contained in the packaging materials has already been balanced within modules A1-A3. Therefore, no additional biogenic carbon balance is declared beyond the stated system boundaries.

** Note: The results of this environmental impact indicator should be used with caution, as uncertainty in these results is high or experience with the indicator is limited.

Additional mandatory and voluntary impact category indicators

Results per 1 kg of Micronox ON16/ON16D (packaging only)					
Indicator	Unit	Upstream	Core	Downstream	Total
GWP-GHG1	kg CO ₂ eq.	1,38E-02	1,08E-03	6,29E-03	2,11E-02
PM	Disease inc.	7,84E-10	6,39E-11	2,99E-10	1,15E-09
IRP 1	kBq U235 eq	5,58E-04	1,94E-06	9,15E-06	5,69E-04
ETP-fw 2	CTUe	8,44E-02	4,88E-04	5,32E-03	9,02E-02
HTP-c 2	CTUh	9,66E-11	7,52E-14	6,40E-13	9,74E-11
HTP-nc 2	CTUh	8,66E-11	7,17E-12	4,28E-11	1,37E-10
SQP 2	-	3,74E+00	3,19E-05	2,60E-04	3,74E+00
Abbreviations	GWP-GHG: Global Warming Potential – Greenhouse Gases; PM: Potential incidence of diseases due to particulate matter (PM) emissions; IRP: Relative human exposure efficiency for U235; ETP-fw: Comparative toxic unit potential for freshwater ecosystems; HTP-c: Comparative toxic unit potential – cancer effects; HTP-nc: Comparative toxic unit potential – non-cancer effects; SQP: Soil quality potential index; NR: Not relevant				

*Note 1: This indicator accounts for all greenhouse gases, except the uptake and emission of biogenic carbon dioxide and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total, except that the characterisation factor (CF) for biogenic CO₂ is set to zero.

**Note 2: This impact category primarily addresses potential impacts of low doses of ionising radiation on human health from the nuclear fuel cycle. It does not consider effects from possible nuclear accidents or occupational exposure from disposal of radioactive waste in underground facilities. The ionising radiation potential from soil due to radon or from certain building materials is also not measured by this parameter.

**Note 3: The results of this environmental impact indicator should be used with caution, as uncertainty in the results is high and experience with this parameter is limited.

Resource use indicators

Results per 1 kg of Micronox ON16/ON16D (packaging only)					
Indicator	Unit	Upstream	Core	Downstream	Total
PERE	MJ	6,00E-01	4,95E-05	2,38E-04	6,01E-01
PERM	MJ	4,10E-01	0,00E+00	-3,92E-01	1,75E-02
PERT	MJ	1,01E+00	4,95E-05	-3,92E-01	6,18E-01
PENRE	MJ	2,92E-01	1,43E-02	6,61E-02	3,72E-01
PENRM	MJ	7,37E-02	0,00E+00	-5,36E-02	2,01E-02
PENRT	MJ	3,65E-01	1,43E-02	1,25E-02	3,92E-01
SM	kg	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
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	2,19E-04	3,66E-07	3,10E-06	2,23E-04
Acronyms	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; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water				

Waste indicators

Results per 1 kg of Micronox ON16/ON16D (packaging only)					
Indicator	Unit	Upstream	Core	Downstream	Total
Hazardous waste disposed	kg	2,07E-05	1,05E-07	3,69E-05	5,78E-05
Non-hazardous waste disposed	kg	3,02E-04	4,24E-07	2,85E-02	2,88E-02
Radioactive waste disposed	kg	4,42E-07	1,34E-09	6,30E-09	4,49E-07

Output flow indicators

Results per 1 kg of Micronox ON16/ON16D (packaging only)					
Indicator	Unit	Upstream	Core	Downstream	Total
Components for reuse	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	2,84E-02	2,84E-02
Materials for energy recovery	kg	0,00E+00	0,00E+00	2,47E-03	2,47E-03
Exported energy, electricity	MJ	0,00E+00	0,00E+00	4,70E-03	4,70E-03
Exported energy, thermal	MJ	0,00E+00	0,00E+00	9,41E-03	9,41E-03

ABBREVIATIONS

Abbreviation	Definition
General abbreviations	
EN	European Standard
EF	Environmental Footprint
GPI	General Programme Instructions
ISO	International Organization for Standardization
CEN	European Committee for Standardization
CPC	Central Product Classification
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
GRI	Global Reporting Initiative
SVHC	Substances of Very High Concern
ND	Not Declared
ICV	Life Cycle Inventory
ACV	Life Cycle Assessment
GHG	Greenhouse gases

REFERENCES

- [1] UNE-EN ISO 14025:2010. Environmental labels and declarations – Type III environmental declarations – Principles and procedures.
- [2] ISO 14040:2006. Environmental management – Life cycle assessment – Principles and framework.
- [3] ISO 14044:2006. Environmental management – Life cycle assessment – Requirements and guidelines.
- [4] PCR 2021:03 Basic chemicals (version 1.1.6), 2025.
- [5] EPD International, (2019) General Programme Instructions for the International EPD® System. Version 3.01. www.environdec.com.
- [6] Eurostat, “Treatment of waste by waste category, hazardousness and waste management operations. 2020,” [Online]. Available: https://ec.europa.eu/eurostat/databrowser/view/env_wastrt__custom_19585919/default/table?page=time:2020.
- [7] National Commission on Markets and Competition (CNMC), Electricity labelling 2025, [Online]. Available: <https://gdo.cnmc.es/CNMC/accesoEtiquetado.do>.
- [8] REE, Generation structure by technology. National electricity system, 2025. [Online]. Available: <https://www.ree.es/es/datos/generacion/estructura-generacion>.

VERSION HISTORY

Original EPD version, 2026-10-05

VERIFICATION STATEMENT CERTIFICATE CERTIFICADO DE DECLARACIÓN DE VERIFICACIÓN

Certificate No. / Certificado nº: EPD16902

CERTINALIA, S.L.U., confirms that independent third-party verification has been conducted of the Environmental Product Declaration (EPD) on behalf of:

CERTINALIA, S.L.U., confirma que se ha realizado verificación de tercera parte independiente de la Declaración Ambiental de Producto (DAP) en nombre de:

PRODUCTOS MINERALES PARA LA INDUSTRIA, S.A. (PROMINDSA)

Calle Messina, 5
Plataforma Logística de Zaragoza (PLA-ZA)
50197 Zaragoza - SPAIN

for the following product:
para el siguiente producto:

Adsorbents Micronox BIOX ON16 and ON16D *Adsorbentes Micronox BIOX ON16 y ON16D*

with registration number **EPD-IES-0034465** in the International EPD® System (www.environdec.com)
*con número de registro **EPD-IES-0034465** en el Sistema Internacional EPD® (www.environdec.com)*

it's in conformity with:
es conforme con:

- **ISO 14025:2010 Environmental labels and declarations. Type III environmental declarations.**
- **General Programme Instructions for the International EPD® System v3.**
- **PCR 2021:03 Basic chemicals v1.1.6.**
- **UN CPC 34220.07 Iron oxides and hydroxides.**

Issued date / *Fecha de emisión:* 02/10/2026
Update date / *Fecha de actualización:* 02/10/2026
Serial Nº / *Nº Serie:* EPD1690200-E



Carlos Nazabal Alsua
Manager

*The validity of this certificate is subject to the validity of its related EPD.
La validez de este certificado está sujeta a la vigencia de su correspondiente EPD.*

*This certificate is subject to modifications, temporary suspensions and withdrawals by CERTINALIA.
El presente certificado está sujeto a modificaciones, suspensiones temporales y retiradas por CERTINALIA.*

*The validity of this certificate can be checked through consultation in www.certinalia.com.
El estado de vigencia del certificado puede confirmarse mediante consulta en www.certinalia.com.*



