



**AENOR**



# ENVIRONMENTAL PRODUCT DECLARATION

## GROUND GRANULATED BLAST FURNACE SLAG

### ABOÑO FACTORY

Independent verification of the declaration and data,  
according to:

EN ISO 14025:2010

EN 15804:2012+A2:2019

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The owner of the EPD shall be liable for the underlying life cycle assessment data and evidences.



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

**Product Category Rule:**

**The European Standard EN 15804:2012+A2:2019 serves as the basis for CPRs.**

Independent verification of the declaration and data, in accordance with the  
Standard UNE EN ISO 14025:2010

☐ Internal ☒ External

Third Party verified:



The Certification Body is accredited by ENAC 1/C-PR468

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## 1. GENERAL INFORMATION

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### 1.1. The organization

Cementos Tudela Veguín S.A. is one of the companies of Masaveu Industria, which has four production centers, which are located in Narón, Tudela Veguín, Aboño and La Robla.

The Aboño factory, which provides the framework for this EPD, has the following production capacities in tons/year:

- Gray clinker: 750,000
- Gray cement: 1,500,000
- Ground granulated blast furnace slag: 1,000,000

### 1.2. Scope of the Environmental Product Declaration

The EPD covers all product stages from 'cradle to gate' (A1-A3) throughout 2022. The selected system boundaries comprise of Sustituir por Ground granulated blast furnace slag include raw material extraction up to the finished product at the factory gate.

### 1.3. Lifecycle and compliance

This EPD has been developed and verified in accordance with the UNE-EN ISO 14025:2010 and EN 15804:2012+A2:2019 Standards.

This Environmental Product Declaration includes the following life cycle stages:

### SYSTEM BOUNDARIES. LIFE CYCLE STAGES

<b>PRODUCT STAGE</b>	A1	Raw materials supply	X
	A2	Transport	X
	A3	Manufacturing	X
<b>CONSTRUCTION</b>	A4	Transport	MNA
	A5	Construction installation process	MNA
<b>STAGE OF USE</b>	B1	Use	MNA
	B2	Maintenance	MNA
	B3	Repair	MNA
	B4	Replacement	MNA
	B5	Refurbishment	MNA
	B6	Operation energy use	MNA
	B7	Operational water use	MNA
<b>END OF SERVICE LIFE</b>	C1	De-construction/demolition	MNA
	C2	Transport	MNA
	C3	Waste processing	MNA
	C4	Disposal	MNA
	D	Reuse - Recovery - Recycling potential	MNA

X = Module included in the LCA; NR = Module not relevant; MNA = Module not assessed

This EPD may not be comparable with those developed in other programmes or in accordance with different reference documents, specifically it may not be comparable with EPDs not prepared according to the EN 15804+A2 Standard.

Likewise, this EPD may not be comparable if the data source is different (for example, 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 behaviour of the product throughout its life cycle, as well as the specifications of section 6.7.2 of UNE-EN ISO 14025.



## 2. PRODUCT INFORMATION

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### 2.1. Product identification

Granulated blast furnace slag, or GBFS, is a vitrified material produced by rapid cooling of a molten slag obtained by melting iron ore in a blast furnace. This slag has hydraulic properties when properly activated. This rapid cooling, quenching, includes the water quenching process, commonly referred to as 'granulation'. The CPC code of the product is 37440.



## 2.2. Product features

Conformity is ensured through compliance with the quality standards included in the CE marking. The aforementioned marking requires that the product present a series of characteristics:

PHYSICAL FEATURE	UNIT	LIMIT ACCORDING TO 15167-1
Blaine Specific Surface	cm <sup>2</sup> /g	> 2,750
Moisture	%	≤ 1.0
MECHANICAL FEATURE	UNIT	LIMIT ACCORDING TO 15167-1
Hydraulic activity index 7 days	%	≥ 45
Hydraulic activity index 28 days	%	≥ 70
Setting time	min.	No more than twice that of the reference CEM I 52.5 N

Is used as an addition to cement in those cases where additional protection is required regarding the risk of attack by aggressive agents.

Also indicated is its use as a direct addition to concrete, in those cases where regulations require it, and those environments that require some type of special protection.

## 2.3. Product composition

The composition of soil granulated slag in accordance with UNE-EN 15167-1 standard is the following:

CHEMICAL PROPERTY	UNIT	LIMIT ACCORDING TO 15167-1
Sulfates	%	≤ 2.0
Sulfides	%	≤ 2.5
MgO	%	≤ 18
Loss on ignition	%	≤ 3.0
Chlorides	%	≤ 0.10
Na <sub>2</sub> O K <sub>2</sub> O Al <sub>2</sub> O <sub>3</sub>	%	Informational value
CaO+MgO+SiO <sub>2</sub> <sup>(1)</sup>	%	≥ 66
(CaO+MgO)/SiO <sub>2</sub> <sup>(1)</sup>	%	> 1.0

Also, none of the components of the final product are included in the 'Candidate List of Substances of Very High Concern for Authorization'.

(1) Applicable parameters also according to UNE-EN 197-1

## 3. LCA INFORMATION

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### 3.1. Life cycle analysis

The life cycle analysis is described in the LCA report for ground granulated slag with reference to the year 2022.

It is complemented by a series of annexes where particularities corresponding to the production process are described.

### 3.2. Declared unit

The declared unit is 1 ton (1,000 kg) of granulated and ground slag.

### 3.3. Reference service life (RSL)

The slag loses its physical identity and is neither recognizable nor separable on site, therefore, its reference service life is linked to the service life of the structural elements in which it is integrated.

### 3.4. Allocation criteria

When it has not been possible to avoid allocation, mass allocations have been made. It has been applied in the case of energy consumption, waste and emissions to water.

In the case of waste, the 'Polluter pays' principle has been applied, therefore, as established in Annex D of Standard UNE-EN 16908:2019, whoever generates the waste 'declares the use of the waste and the impact environmental of the use of the waste in the module where it is used'.

### 3.5. Cut-off rules

More than 99% of the materials and energy consumption have been included.

### 3.6. Representativeness, quality and selection of data

The LCA is limited to the production of granulated and ground slag at the Aboño Factory in the time horizon of 2022.

The database used in this inventory is Ecoinvent v3.8, which incorporates data related to materials, energy, transportation, processing, use, waste scenario or waste treatment. These data comply with the system of quality indicators set forth in UNE-EN ISO 14041, which evaluates their suitability by granting them a score based on temporal, geographical, and technological criteria.

In the modeling of the process, in the absence of specific data, data at the national level have been selected, whenever possible. If not, European or global data have been used in that same order of priority.

For modeling, generation of inventories and calculation of environmental impact, the SimaPro 9.4.0.2 tool has been used.

### 3.7. Other calculation rules and assumptions

#### 3.7.1. Biogenic carbon content

The declaration of biogenic carbon content is omitted because due to the nature of the product its proportion is well below the limit of 5% with respect to the total mass, according to what is indicated in the EN 15804:2012+A2:2019 standard.



## 4. SYSTEM BOUNDARIES, SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

This EPD includes only modules A1-A3, product stage, according to the modular scheme of the EN 15804+A2 standard, and presents the results in an aggregated form.

In the cement manufacturing process, the following stages have been included in the life cycle analysis.

### A1. Raw material supply

The raw material is the granulated slag itself, which is a co-product of the manufacture of pig iron.

### A2. Transport

The granulated blast furnace slag and fuels from the granulation plant are transported in a humid state by truck to the Aboño factory.

### A3. Manufacturing

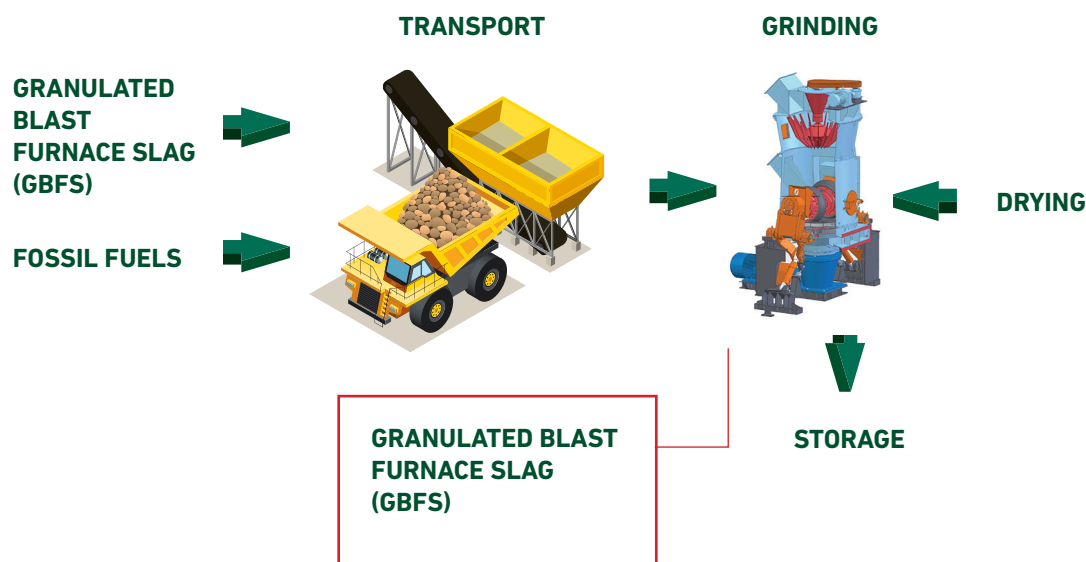
#### GRINDING AND DRYING

The granulated blast furnace slag is transported by belts to a vertical mill, where it is ground and dried with gas.

#### PRODUCT STORAGE

Ground granulated blast furnace slag is stored in silos for future shipment.

## PRODUCT STAGE



## 5. DECLARATION OF ENVIROMENTAL LCA AND LCI PARAMETERS

### ENVIRONMENTAL IMPACTS

IMPACT CATEGORY	UNITS	A1-A3
GWP- total	kg CO <sub>2</sub> -equivalent	3.62E+01
GWP- fossil	kg CO <sub>2</sub> -equivalent	3.62E+01
GWP- biogenic	kg CO <sub>2</sub> -equivalent	2.29E-02
GWP- lu&luc	kg CO <sub>2</sub> -equivalent	2.06E-03
ODP	kg CFC <sub>11</sub> -equivalent	9.13E-06
AP	mol H <sup>+</sup> <sub>equivalent</sub>	8.75E-02
EP- freshwater	kg P <sub>equivalent</sub>	2.45E-04
EP- marine	kg N <sub>equivalent</sub>	3.99E-02
EP- terrestrial	mol N <sub>equivalent</sub>	2.20E-01
POCP	kg NMVOC <sub>equivalent</sub>	1.17E-01
ADP - minerals & metals <sup>(1)</sup>	kg Sb <sub>equivalent</sub>	9.68E-06
ADP - fossil <sup>(1)</sup>	MJ	9.62E+02
WDP <sup>(1)</sup>	m <sup>3</sup>	6.90E+00

**GWP - total:** Global warming potential total

**GWP - fossil:** Global warming potential fossil

**GWP - biogenic:** Global warming potential biogenic

**GWP - lu&luc:** Global warming potential of land use and land use change

**ODP:** Depletion potential of the stratospheric ozone layer

**AP:** Acidification potential, accumulated exceedance

**EP - freshwater:** Eutrophication potential, fraction of nutrients reaching freshwater end com-partment

**EP - marine:** Eutrophication potential, fraction of nutrients reaching marine end compart-ment

**EP - terrestrial:** Eutrophication potential, accumulated exceedance

**POCP:** Formation potential of tropospheric ozone

**ADP - minerals & metals:** Abiotic depletion potential for non-fossil resources

**APD - fossil:** Abiotic depletion potential for fossil resources

**WDP:** Water (user) deprivation potential, deprivation weighted water consumption

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.

(1) The results of this environmental impact indicator shall be used with caution, since the uncertainties of the results are high and there is limited experience with the indicator.

## ADDITIONAL ENVIRONMENTAL IMPACTS

IMPACT CATEGORY	UNITS	A1-A3
PM	Disease incidence	3.83E-07
IRP <sup>(2)</sup>	kBq U235 <sub>equivalent</sub>	8.07E+00
ETP-fw <sup>(1)</sup>	CTUe	2.17E+02
HTP-c <sup>(1)</sup>	CTUh	1.60E-09
HTP-nc <sup>(1)</sup>	CTUh	1.10E-07
SQP <sup>(1)</sup>	Pt	8.98E+01

**PM:** Potential for disease incidence due to particulate matter emissions

**IRP:** Human potential exposure efficiency relative to U235

**ETP-fw:** Comparative potential toxic unit for humans - freshwater

**HTP-c:** Comparative potential toxic unit for humans - carcinogenic effects

**HTP-nc:** Comparative potential toxic unit for humans - non-carcinogenic effects

**SQP:** Soil quality potential index

## PARAMETERS DESCRIBING RESOURCE USE

PARAMETER	UNITS	A1-A3
PERE	MJ	2.57E+01
PERM	MJ	0.00E+00
PERT	MJ	2.57E+01
PENRE	MJ	1.02E+03
PENRM	MJ	0.00E+00
PENRT	MJ	1.02E+03
SM	kg	1.00E+03
FW	m <sup>3</sup>	4.78E+02

**PERE:** Use of renewable primary energy excluding renewable primary energy resources used as raw materials

**PERM:** Use of renewable primary energy used as raw material

**PERT:** Total use of primary renewable energy

**PENRE:** Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials

**PENRM:** Use of non-renewable primary energy used as raw material

**PENRT:** Total use of primary non-renewable energy

**SM:** Use of secondary materials

**FW:** Net use of running water resources

(1) The results of this environmental impact indicator shall be used with caution, since the uncertainties of the results are high and there is limited experience with the indicator.

(2) This impact category deals mainly with the eventual impacts of low doses of ionizing radiation on human health, from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation of the soil, due to radon or some construction materials, is not measured in this parameter either.

## WASTE CATEGORIES

PARAMETER	UNITS	A1-A3
HWD	kg	5.72E-04
NHWD	kg	2.41E+00
RWD	kg	6.47E-03

**HWD:** Hazardous waste disposed  
**NHWD:** Non-hazardous waste disposed  
**RWD:** Radioactive waste disposed

## OUTPUT FLOWS

PARAMETER	UNITS	A1-A3
CRU	kg	0.00E+00
MFR	kg	2.43E-02
MER	kg	1.89E+00
EE	MJ	0.00E+00

**CRU:** Components for re-use  
**MFR:** Materials for recycling  
**MER:** Materials for energy recovery  
**EE:** Exported energy

## REFERENCES

- LCA Report Ground Granulated Blast Furnace Slag Version V1.2. September 2023.
- General Rules of the GlobalEPD Program, 2nd revision. AENOR. February 2016.
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- EN 15804:2012+A2:2019 Sustainability in construction. Environmental product declarations. Basic product category rules for construction products.
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- UNE-EN 197-1: 2011 Cement. Part 1.
- UNE-EN 15171:1:2006 Granulated ground blast furnace slag for use in concrete, mortars and pastes. Part 1: Definitions, specifications and conformance criteria.
- UNE-EN 16908:2019+A1:2022 Construction cements and limes. Environmental product declarations. Product category rules complementary to Standard EN 15804.
- Commission Delegated Regulation (EU) 2021/21 39 of 4 June 2021. Technical selection criteria to determine the conditions under which an economic activity is considered to contribute substantially to the mitigation of climate change or to adaptation to it.

MASAVEU ● INDUSTRIA



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A VERIFIED ENVIRONMENTAL DECLARATION



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