



Environmental  
Product  
Declaration

**ISO 14025:2010**

**UNE-EN 15804:2012+A2:2020/AC2021**



# AENOR

## Artificial aggregates

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## 1. General information

### 1.1. Organization

The Federation of Aggregates, hereinafter FdA, incorporated in 2007, is a non-profit organisation, composed of ANEFA, ARIGAL, ARIVAL, EUSKAL ÁRIDO and GREMI D'ÀRIDS DE CATALUNYA, which represents the interests of aggregates producing companies in Spain, both nationally and internationally.

The objectives of the FdA include the promotion of the sustainable development of the sector, environmental protection and corporate social responsibility, through technical improvement, the application of good practices and compliance with standards and regulations on production and product quality, environment, etc.

With this sectoral EPD, the FdA focuses on promoting corporate social responsibility strategies, in addition to:

- The circular economy.
- Facilitate the marketing of their products.
- Reduce the risk associated with changes in environmental legislation or customer purchasing criteria.
- Communicate, in a standardized way, the environmental performance of its products and services.

The holder of this sectoral Environmental Product Declaration - EPD - is the FdA, whose contact details can be found on page 2 of this declaration.

This sectoral EPD is for the exclusive use of the undertakings and establishments listed in ANNEX I.

### 1.2. Scope of the Declaration

This sectoral EPD includes only modules A1- A3, product stage according to the modular scheme defined in UNE- EN 15804+A2.

This EPD is therefore of the "cradle to door" type.

### 1.3. Lifecycle and Compliance

This EPD has been developed and verified in accordance with UNE-EN ISO 14025:2010 y UNE-EN 15804:2012+A2:2020/ AC 2021.

Product category rule information	
Descriptive title	Sustainability in construction. Environmental product declarations. Basic rules of product categories for construction products.
Registration code and version	UNE-EN 15804:2012 + A2:2020/ AC 2021
Date of issue	2020-03
Compliance	UNE-EN 15804:2012 + A2:2020/ AC 2021
Program Officer	AENOR CONFÍA, S.A.U.

This environmental statement includes the following stages of the life cycle:

**System limitations. Information modules taken into account**

Product stage	A1	Supply of raw materials	X
	A2	Transport to the factory	X
	A3	Manufacture	X
Construction	A4	Transport to the site	MNE
	A5	Installation / construction	MNE
Stage of use	B1	Usage	MNE
	B2	Maintenance	MNE
	B3	Repair	MNE
	B4	Replacement	MNE
	B5	Rehabilitation	MNE
	B6	In-service energy Consumption	MNE
	B7	Water use in service	MNE
Later life	C1	Deconstruction / demolition	MNE
	C2	Transport	MNE
	C3	Residue treatment	MNE
	C4	Elimination	MNE
	D	Potential for reuse, recovery and/or recycling	MNE
X = Module included in the LCA; NR = Module no relevant; EMN = Unassessed module			

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 the EPD not developed according to UNE-EN 15804+A2.

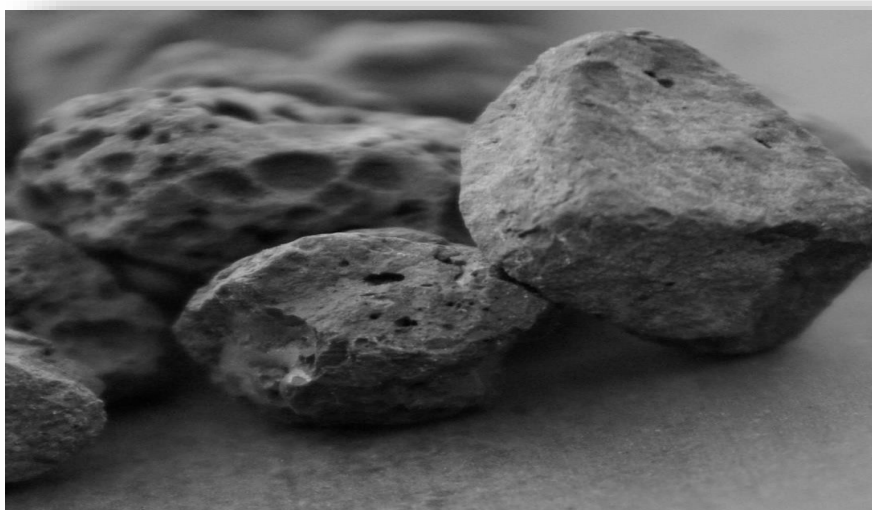
Similarly, EPD may not be comparable if the source of the data is different (e.g. databases), if not all relevant information modules are included, or if they are not based on the same scenarios.

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 UNE-EN ISO 14025.

#### 1.4 Differences from previous versions of this DAP

This DAP is an update to the version published on 2023-03-27.

This review is issued to add more companies to the sectoral DAP, which modifies the results obtained.



## 2. The Product

### 2.1. Product identification

Aggregates are normally defined as fragments or grains of mineral materials, inert solids that, with appropriate particle size, can be used in construction (building and infrastructure) and in many industrial applications, alone or with the addition of cement, lime or bituminous binder.

Aggregates are classified according to their origin:

- Natural aggregates.
- Artificial aggregates.
- Recycled aggregates.

**This sectoral EPD applies to artificial aggregates.**

Artificial aggregates are residues from industrial processes, such as iron and steel slag, foundry sands, fly ash from coal combustion, etc., which, after a crushing and classification process (if necessary), make it possible to obtain an aggregate that can be used in certain applications.

### 2.2. Product Uses.

The main areas of application of aggregates can be summarized as follows:

- Aggregates for mortar, according to UNE-EN 13139.
- Aggregates for hydrocarbon mixtures and surface coatings used in the construction of pavements, aerodromes and other traffic areas, according to UNE EN 13043.
- Aggregates for materials treated with hydraulic binders and untreated materials used for civil engineering works and for pavement construction, according to UNE EN 13242.

- Aggregates for railway ballasts, according to UNE EN 13450.
- Aggregates for riprap – Part 1: Specifications, according to UNE EN 13383-1.

### 2.3. Product Performance

The performance of aggregates can be summarized in the indicator describing the resistance to fragmentation via the Los Angeles coefficient.

Performance	Calculation or test method	Value	Units
Strength to fragmentation (Los Angeles coefficient)	UNE-EN 1097-2	≤45	Dimensionless

### 2.4. Composition of the product

The composition of the product refers in all cases to the nature of the aggregate or to the weighted composition of the aggregate. The percentage of artificial aggregates used annually in construction is very low (about 0.75Mt per year in Spain). They represent 0.10% of the total production of aggregates in Spain.

The weighted composition of artificial aggregates of FdA member companies is as follows:

Type of material	Total (%)
Steelworks slag	90,32%
Municipal solid waste incineration slag	3,63%
Steel slag	6,05%
Grand total	100,00%

### 3. Information about LCA

#### 3.1. Life Cycle Assessment

This EPD is based on a life cycle assessment "from cradle to door" A1-A3, carried out by IECA with the collaboration of Marcel Gómez Consultoría Ambiental.

#### 3.2. Declared unit

1 ton of artificial aggregates

#### 3.3. Reference useful life (RSL)

In general, the reference service life will be that of the element or application in which the aggregates are used, ranging from 50 to 100 years.

#### 3.4. Distribution criteria

For flows associated with the production process, such as energy consumption and residue generation, a physical criterion (mass) was applied to allocate inputs and outputs from the production system to each product, based on production. No simplification has been made to these flows and they are taken into account in their entirety. The allocation of co-products was a financial allocation.

#### 3.5. Cut-off criteria

Generally, the cut-off criteria are 1% of renewable and non-renewable primary energy consumption and 1% of the total input mass of the manufacturing process (according to UNE-EN 15804). The assessment considers all available data from the production process, i.e., all raw materials used, auxiliary materials used, and energy consumption, using the best available data sets in the reference database.

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

To model the overall processing/manufacturing process, production data from companies participating in this EPD were used for the year 2019, which is considered the base year.

These plants reported data on: energy consumption for processing in the plant to shipment, consumables, transportation distances, tailings production and all production operations likely to generate environmental impacts.

In general, activity data is obtained through complete records of annual production through reliable measurement processes for each of the production centers associated with the FdA.

The data are all for the year 2019, with a temporal correlation between 1 and 10 years compared to the sets in the database. With a satisfactory Spanish geographical correlation in relation to representative groups of the European context and, finally, with an equal or similar technological correlation in relation to flows for processes such as the use of machinery or transport equipment.

The management and control of the data guarantee the quality of the data in terms of representativeness and consistency, established by the FdA.

The Ecoinvent Data Quality system was used as a methodology for data quality assessment during LCA development.



### 3.7 Other calculation rules and assumptions

The inventory data used is the weighted average of the specific data corresponding to the artificial aggregate. The weights are based on the output of each individual farm in relation to total production.

These aggregates include all the variability of the typologies of the population of the holdings considered, both from the point of view of the type of farm, the technology used and the origin of the aggregate (see section 3). It includes operations throughout the country.

The aggregates production considered represents 71.0% of that integrated into the FdA and 57.1% of the total of Spain.

With regard to the source of the data, data from the Ecoinvent 3.8 manufacturer survey and processes were used when these data were not available or when modelling transport and similar processes.

Weighted averages were taken into account for site-attributable energy consumption for both electricity and diesel and natural gas.

The electricity mix is that of 2019 based on REE data. The percentage of renewable electricity produced and consumed in the facility represents 2.37% of the total.

Transport was considered from the origin of the aggregate or consumable, whether by truck, sea or rail. Each site also reported the road transport distance for each of the secondary materials (explosives and detonating cords, diesel, gasoline, fuel oil, lubricants, additives and flocculants).

The total quantity transported and the weighted average distance were therefore determined for each production site.

For consumables and raw materials, the aggregate tonne\*kilometre ratios are 0.010 t\*km and 3.380 t\*km respectively.



## 4. Límites System limitations, scenarios and additional technical information

The "cradle-to-door" approach was a cradle-to-door approach, i.e. an A1-A3 declaration where:

A1, supply of steel slag according to the polluter-pays principle.

A2, transport of aggregates to the treatment site. Transport of consumables and fuels to the processing site.

A3, artificial aggregates treatment centre

Information modules not considered should be marked as "Unassessed Module (UNM)". The cradle-to-door approach is justified because, in most of the applications mentioned, aggregates lose their physical identity since they are constituents of other building products such as concrete, mortars, road surfaces, etc.

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

- Be representative data on the technological development actually applied.
- In general, the data provided by the manufacturers were taken into account according to the proximity criterion, i.e. the use of the data provided by the manufacturers.

Simplifications have been avoided as far as possible, retaining all the variability of the input data in terms of their type, nature and processing.

### 4.1. Process upstream of manufacturing

The process begins with the acquisition of steel slag.

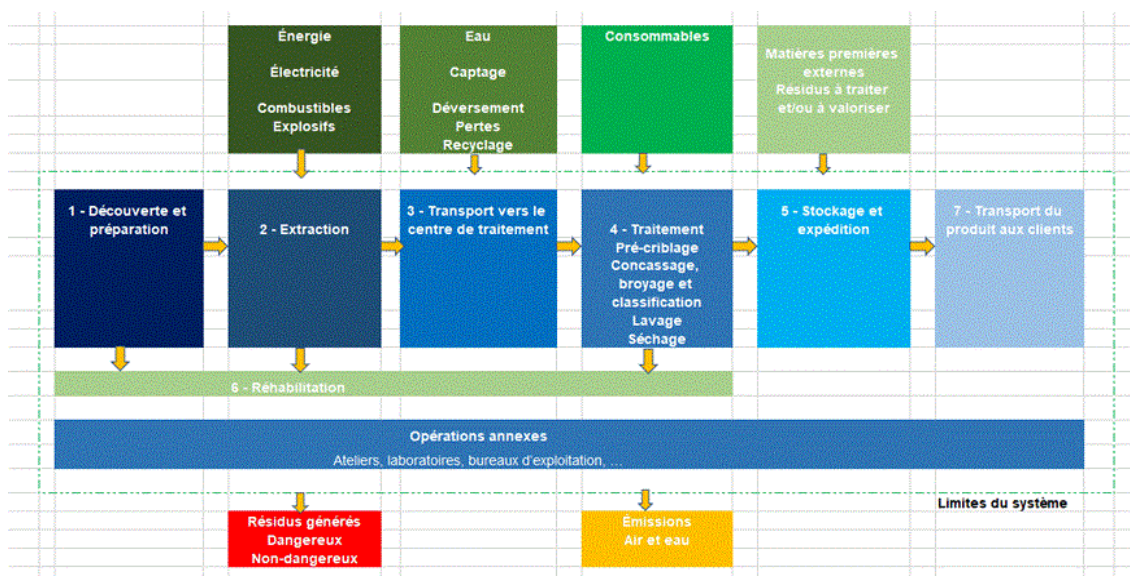
### 4.2. Processes related to transport

Module A2 includes the transport of aggregates to processing sites, as well as the transport of consumables, spare parts and fuels to farms.

### 4.3. Product Manufacturing

Module A3 includes the treatment of artificial aggregates in the plant in a manner totally equivalent to that of natural aggregates. Sites can include a wide variety of processes, including the usual crushing, grinding and classification.

The general approach used is described in the diagram below:





## 5. LCA and ICV Environmental Parameter Declarations

The results of the estimated impact 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 impacts

Parameter	Unit	A1	A2	A3	A1+A2+A3
<b>GWP – total</b>	kg CO <sub>2</sub> eq.	0,00E+00	5,47E-01	3,39E+00	3,93E+00
<b>GWP – fossil</b>	kg CO <sub>2</sub> eq.	0,00E+00	5,47E-01	3,37E+00	3,92E+00
<b>GWP – biogenic</b>	kg CO <sub>2</sub> eq.	0,00E+00	3,20E-05	1,32E-02	1,32E-02
<b>GWP – luluc</b>	kg CO <sub>2</sub> eq.	0,00E+00	4,43E-06	3,10E-03	3,11E-03
<b>ODP</b>	kg CFC 11 eq.	0,00E+00	1,30E-07	5,90E-07	7,20E-07
<b>AP</b>	mol H <sup>+</sup> eq.	0,00E+00	1,09E-03	2,80E-02	2,91E-02
<b>EP – freshwater</b>	kg P eq.	0,00E+00	2,80E-07	5,53E-05	5,55E-05
<b>EP – marine</b>	kg N eq.	0,00E+00	1,81E-04	1,05E-02	1,07E-02
<b>EP – terrestrial</b>	mol N eq.	0,00E+00	2,01E-03	1,16E-01	1,18E-01
<b>POCP</b>	kg NMVOC eq.	0,00E+00	7,08E-04	3,24E-02	3,31E-02
<b>ADP – minerals and metals <sup>1</sup></b>	kg Sb eq.	0,00E+00	2,38E-08	5,36E-06	5,39E-06
<b>ADP – fossil <sup>1</sup></b>	MJ	0,00E+00	7,76E+00	6,47E+01	7,24E+01
<b>WDP <sup>1</sup></b>	m <sup>3</sup>	0,00E+00	-1,31E-03	1,05E+00	1,05E+00

GWP - total: Global warming potential; GWP - fossil: Global warming potential of fossil fuels; GWP - 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 compartment of marine water; PE-terrestrial: Eutrophication potential, cumulative surplus; POCP: Tropospheric ozone formation potential; ADP-minerals&metals Potential for depletion of abiotic resources for non-fossil resources; Fossil ODA: Potential for depletion of abiotic resources for fossil resources; WDP: Water deprivation potential (user), weighted water deprivation consumption. NR: Not relevant

<sup>1</sup> The results of this environmental impact indicator should be used with caution as the uncertainties of these results are high and experience with this parameter is limited...

## Resource utilization

Parameter	Units	A1	A2	A3	A1-A3
<b>PERE</b>	MJ	0,00E+00	1,19E-02	4,66E+00	4,67E+00
<b>PERM</b>	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<b>PERT</b>	MJ	0,00E+00	1,19E-02	4,66E+00	4,67E+00
<b>PENRE</b>	MJ	0,00E+00	7,76E+00	6,24E+01	7,01E+01
<b>PENRM</b>	MJ	0,00E+00	0,00E+00	2,32E+00	2,32E+00
<b>PENRT</b>	MJ	0,00E+00	7,76E+00	6,47E+01	7,24E+01
<b>SM</b>	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<b>RSF</b>	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<b>NRSF</b>	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<b>FW</b>	m <sup>3</sup>	0,00E+00	1,99E-05	2,21E-02	2,21E-02

**PERE**: Use of renewable primary energy excluding renewable primary energy resources used as raw material; **PERM**: Use of renewable primary energy used as raw material; **PERT** : Total use of renewable primary 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 non-renewable primary energy consumption; **SM**: Use of secondary materials; **RSF**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Net use of piped water resources; **NR**: Not relevant

## Residue categories

Parameter	Units	A1	A2	A3	A1-A3
<b>HWD</b>	kg	0,00E+00	1,71E-05	1,07E-03	2,33E-03
<b>NHWD</b>	kg	0,00E+00	2,68E-04	1,85E-01	2,12E-01
<b>RWD</b>	kg	0,00E+00	4,65E-05	4,44E-04	5,09E-04

**HWD:** Hazardous waste disposed of; **NHWD:** Non-hazardous waste disposed of; **RWD:** Radioactive residues disposed of; **NR:** Not relevant

## Output stream

Parameter	Units	A1	A2	A3	A1-A3
<b>CRU</b>	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<b>MFR</b>	kg	0,00E+00	0,00E+00	4,19E-02	4,19E-02
<b>MER</b>	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<b>EE</b>	MJ	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; **NR:** Not relevant

## Information on biogenic carbon content

Biogenic carbon content	Units	Resultado por unidad funcional declarada
Biogenic carbon content produced - kgC	kg C	0,00E+00

## 6. Additional environmental information

### 6.1. Air emissions

Artificial aggregates are free of volatile organic compounds that may be emitted during use.

### 6.2. Emissions to soil and water.

Artificial aggregates do not emit any compounds into the soil or water during their use, as they are a product that does not undergo physical, chemical, or biological transformations. They are neither soluble nor combustible, nor do they react physically, chemically, or in any other way. They are not biodegradable and do not negatively affect other materials with which they come into contact in a way that could lead to environmental contamination or harm human health.

This product does not leach, so it does not pose a risk to the quality of surface or groundwater.

### 6.3. Biogenic Carbon Content

Artificial aggregates do not contain materials containing biogenic carbon.

### 6.4. Other Declarations

The product does not contain substances included in the Candidate List of Substances of Very High Concern for Authorisation of the European Chemicals Agency.

### 6.5. Electricity Mix

The electricity mix has been calculated for 2019 based on data from the CNMC's mix of non-GdO retailers:

- 0,310 kgCO<sub>2</sub> eq/ kWh.



## Appendix 1. Associated production sites

### **PROMOTORA MEDITERRÀNEA-2, S.A.**

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SANT VICENÇ DELS HORTS

ZARAGOZA MEGASA

### **SORRES I GRAVES EGARA**

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SORRANOVA



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Una declaración ambiental verificada

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