Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Inertex™

from

Acciaieria Arvedi Spa

Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): CONSTRUCTION PRODUCTS, PCR 2019:14, VERSION 1.1
PCR review was conducted by: *Martin Erlandsson, IVL Swedish Environmental Research Institute, martin.erlandsson@ivl.se*
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: *Rina Services Spa* *In case of accredited certification bodies:* Accredited by: *Accredia, n. 001H*
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 from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: Acciaieria Arvedi Spa

Contact: Morandi Riccardo
Technical support to Acciaieria Arvedi Spa was provided by e3 – studio associato di consulenza.

Description of the organisation: Acciaieria Arvedi started up in 1992 as the prototype of a new steelmaking model for steel coil production, capable of producing thin and quality materials in small lots at competitive costs and with highly flexible production.
The production cycle of ISP and ESP starts with the casting of a thin slab (75/100 mm) directly reduced with a liquid core to a thickness of 55/90 mm and fed in-line to a roughing mill which reduces it to a very thin gauge (about 10/12 mm) and is subsequently fed to the finishing mill to obtain the final thickness.
The first process phase, together with a limited heating phase achieved through an induction furnace, differentiates Arvedi technology from other thin slab technologies and characterises the process due to the high product quality and the particular attitude to the production of high strength thermo-mechanical thin gauge (0.8 mm) steel grades.

In addition to steel, the smelting process produces Inertex, an industrial aggregate.

Management system-related certifications: Acciaieria Arvedi Spa has implemented a quality, environment and safety management system certified according to ISO 9001 and ISO 14001 standards.

Name and location of production site: the production of Inertex takes place at the steel mill in Via Acquaviva, 18, 26100 Cremona CR; the processing of Inertex take place in the plant of Acciaieria Arvedi Spa, via Riglio 23/A, Cremona.

Product information

Product name: Inertex

Product identification: industrial aggregate

Product description: Inertex is a by-product according to art. 184 bis of Legislative Decree 152/06 deriving from an electric furnace steel mill.
Inertex is an industrial aggregate obtained from the simple crushing and screening of the conventional electric arc aggregate.
This traditional transformation process produces attractive sizes for use in sub-foundations, stabilized mixes, fillings, asphalts and concretes.
In relation to the exclusive mechanical and elastic performance of Inertex, the subsequent processing through cold transformation processes of the size of the granule shape allows to obtain materials that can be used in sectors where high performance and absence of free silica are required.
The careful formulation of mixtures containing precise proportions of precise sizes allows the use of Inertex in cementitious, resinous and geopolymeric composites with reduced environmental impact characterized by superior mechanical and elastic characteristics.
The use of Inertex allows to avoid the depletion of natural resources such as gravel.

Product-related certifications:

Product	CE mark 2+ scheme, according to the following standards
Inertex 0/90	13242-12620-13043
Inertex 0/22	13242-12620-13043
Inertex 0/16	13242-12620-13043
Inertex 0/8	13242-12620-13043
Inertex 0/4	13242-12620-13043-13139
Inertex 4/8	13242-12620-13043
Inertex 8/12	13242-12620-13043
Inertex 8/16	13242-12620-13043
Inertex 12/22	13242-12620-13043
Inertex 22/30	13242-12620-13043
Inertex 30/60	13242-12620-13043-13450
Inertex Armourstone	13383
Inertex 0/2	13242-12620-13043
Inertex 2/4	13242-12620-13043
Inertex 0,2/0,4	13139
Inertex 0,4/2	13139
Inertex 0,4/0,7	13139
Inertex 0,7/1,2	13139
Inertex 1,2/3	13139
Inertex 0,1/0,6	13139
Filler Inertex	13139-13043-12620

The product is registered according to the REACH regulation.

UN CPC code:
41 Basic metals

LCA information

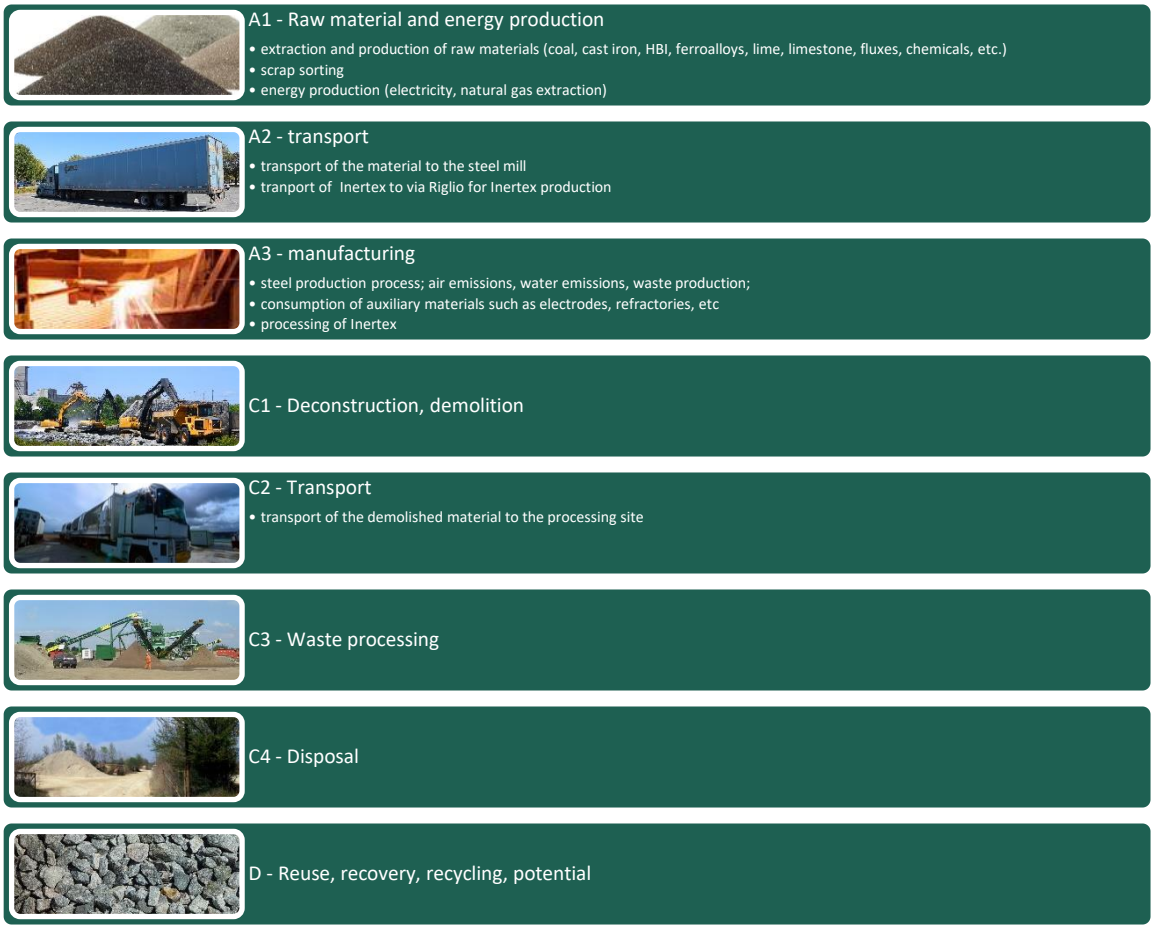
Declared unit: the declared unit is 1 ton of Inertex

Time representativeness: the data refer to the year 2020

Database and LCA software used: Ecoinvent 3.6; Sima Pro 9.1.1

Description of system boundaries:
Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D).
Since Inertex is a by-product of steel smelting, with an economic value, it is analysed also the production phases of the steel mill, by allocating the impacts between steel and Inertex.

System diagram:



Transport to the customer and the use phase aren't considered according to EN:15804

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

Cradle to gate with options

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
Geography	EU	EU	IT										EU	EU	EU	EU	EU
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

More information:
Allocation is avoided whenever possible by dividing the system into sub-systems; since allocation between steel and Inertex cannot be avoided, an economic allocation was made.
The "cut off" approach is used to model the impacts of ferrous scrap entering the steel mill; in the case of scrap, only the impacts resulting from the sorting and processing of the scrap and its transport to the steel mill are considered;
According to EN:15804 the applied cut-off criterion for mass and energy flows is 1%.
For the electricity used in the plant it's used the residual mix according to "Results of the calculation of Residual Mixes for the calendar year 2020".
The CO2 emissions from the installation are calculated according to the ETS (Emission Trading System).

Scenarios considered:
C1: the consumption of diesel fuel for demolition activities is assumed to be equal to 1,7 l_{diesel}/t
C2: the distance of treatment plant is assumed to be equal to 50 km
C3: a recycling rate of 98% is assumed; the consumption for recycling operations is considered to be equal to that for the production of Inertex
C4: a disposal rate of 2% is assumed
D: Module D has an environmental impact, as the percentage of recycled material content in Inertex (100%) is greater than the fraction of the product sent for recovery at the end of its life (98%).

Content information

Product components	CAS n.	%
Calcium-Iron-Silicium-Magnesium-Manganese-Aluminium oxide equivalent	91722-10-0	100%

According to Statement of Conformity n ° VAA-017 of Rina Services, Inertex is composed 100% of the by-product slag from steelworks.

Inertex is sold in bulk, without packaging.

Inertex does’t contain SVHC substances.

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	9,18E+01	3,87E+00	1,59E+01	1,12E+02	5,52E+00	4,51E+00	2,14E+00	1,05E-01	1,71E-01
GWP-biogenic	kg CO_2 eq.	1,43E-01	3,13E-02	1,36E-02	1,88E-01	1,53E-03	3,30E-03	7,92E-02	2,09E-04	2,23E-03
GWP-luluc	kg CO_2 eq.	3,69E-02	4,75E-03	9,93E-04	4,26E-02	4,35E-04	1,33E-03	2,35E-04	2,94E-05	2,27E-04
GWP-total	kg CO_2 eq.	9,19E+01	3,90E+00	1,59E+01	1,12E+02	5,52E+00	4,51E+00	2,21E+00	1,06E-01	1,74E-01
ODP	kg CFC 11 eq.	7,50E-06	5,88E-07	5,30E-07	8,61E-06	1,19E-06	1,07E-06	3,91E-07	4,34E-08	1,55E-08
AP	mol H^+ eq.	4,30E-01	2,41E-02	2,29E-02	4,77E-01	5,77E-02	2,30E-02	1,76E-02	1,00E-03	1,12E-03
EP-freshwater	kg PO_4^{3-} eq.	9,46E-02	5,06E-03	1,14E-03	1,01E-01	6,07E-04	9,86E-04	8,34E-04	3,31E-05	3,22E-04
EP-freshwater	kg P eq.	3,09E-02	1,65E-03	3,73E-04	3,29E-02	1,98E-04	3,22E-04	2,72E-04	1,08E-05	1,05E-04
EP-marine	kg N eq.	8,46E-02	6,49E-03	8,86E-03	9,99E-02	2,55E-02	7,87E-03	6,37E-03	3,46E-04	2,53E-04
EP-terrestrial	mol N eq.	8,84E-01	6,91E-02	9,45E-02	1,05E+00	2,79E-01	8,62E-02	7,14E-02	3,79E-03	3,06E-03
POCP	kg NMVOC eq.	3,73E-01	1,98E-02	2,70E-02	4,20E-01	7,68E-02	2,57E-02	1,92E-02	1,10E-03	7,74E-04
ADP-minerals&metals*	kg Sb eq.	3,90E-04	4,91E-05	3,69E-05	4,76E-04	8,46E-06	7,75E-05	3,60E-06	9,64E-07	1,83E-05
ADP-fossil*	MJ	1,11E+03	6,21E+01	4,34E+01	1,21E+03	7,59E+01	7,06E+01	3,04E+01	2,94E+00	2,50E+00
WDP	m^3	8,48E+00	5,32E-01	2,29E-02	9,03E+00	1,02E-01	2,30E-01	5,46E-01	1,32E-01	2,93E-01
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential 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 compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption									

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Use of resources

Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
PERE	MJ	5,39E+01	5,32E+00	8,92E-01	6,02E+01	4,11E-01	8,90E-01	3,32E+00	2,38E-02	2,23E-01
PERM	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
PERT	MJ	5,39E+01	5,32E+00	8,92E-01	6,02E+01	4,11E-01	8,90E-01	3,32E+00	2,38E-02	2,23E-01
PENRE	MJ	1,11E+03	6,21E+01	4,34E+01	1,21E+03	7,59E+01	7,06E+01	3,04E+01	2,94E+00	2,50E+00
PENRM	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
PENRT	MJ	1,11E+03	6,21E+01	4,34E+01	1,21E+03	7,59E+01	7,06E+01	3,04E+01	2,94E+00	2,50E+00
SM	kg	7,49E+02	0,00E+00	0,00E+00	7,49E+02	0,00E+00	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	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	3,81E+00	2,79E-01	9,76E-02	4,19E+00	3,92E-02	6,46E-02	1,00E-01	5,01E-03	3,62E-02
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 production and output flows

Waste production

Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	9,69E-02	7,58E-03	2,26E-02	1,27E-01	2,23E-03	3,87E-03	1,06E-03	2,28E-04	1,02E-03
Non-hazardous waste disposed	kg	9,03E+00	2,69E+00	3,18E+00	1,49E+01	8,99E-02	6,15E+00	5,90E-02	2,00E+01	0,00E+00
Radioactive waste disposed	kg	2,41E-03	3,95E-04	2,08E-04	3,01E-03	5,27E-04	4,82E-04	1,54E-04	1,93E-05	1,27E-05

Output flows

Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
Components for re-use	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
Material for recycling	kg	0,00E+00	0,00E+00	4,68E+01	4,68E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	4,13E-01	4,13E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, electricity	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
Exported energy, thermal	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

Potential environmental impact – additional mandatory indicators

Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO_2 eq.	8,85E+01	3,83E+00	1,59E+01	1,08E+02	5,46E+00	4,47E+00	2,12E+00	1,03E-01	1,68E-01
PM	Disease incidence	5,97E-06	2,48E-07	5,55E-07	6,78E-06	2,52E-06	4,19E-07	3,58E-07	1,94E-08	1,28E-08
Acronyms	GWP-GHG= Global warmin Potential according to IPCC 2013; PM=Particulate matter emissions									

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Information on biogenic carbon content

Results per functional or declared unit		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0

[1] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

References

General Programme Instructions of the International EPD® System. Version 3.01.
CONSTRUCTION PRODUCTS, PCR 2019:14, VERSION 1.1
Studio LCA di Inertex rev.2 del 10/11/2021

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