Environmental Product Declaration

as per ISO 14025 and EN 15804

Owner of the declaration:	A. Bianchini Ingeniero S.A.
Publisher:	Kiwa-Ecobility Experts
Programme operator:	Kiwa-Ecobility Experts
Registration number:	EPD-Kiwa-EE-000385-EN
Issue date:	22.05.2024
Valid to:	22.05.2029

1. General information

A. Bianchini Ingeniero S.A.

Programme operator:
Kiwa-Ecobility Experts
Kiwa GmbH, Ecobility Experts
Wattstraße 11-13
13355 Berlin
Germany

Registration number:
EPD-Kiwa-EE-000385-EN

This declaration is based on the Product Category Rules:
PCR B – Product Category Rules for steel construction products, Requirements on the Environmental Product Declarations for steel construction products; Version 2020-03-13

Issue date
22.05.2024

Valid to
22.05.2029

METALLIC COATED WIRE

Owner of the declaration:
A. Bianchini Ingeniero S.A.
Gran Vial 8, Pol. Ind. C.I.V.
08170 Montornès del Vallès (Barcelona)
Spain

Declared product / declared unit:
1 average metric ton of hot-dip coated steel wire produced in Bianchini premises

Scope:
METALLIC COATED WIRE, GalMAC®, GalMAC® C3, SuperGalMAC®, GalMAC® Green and GaBIARQ®, are steel wires with hot dip metallic alloyed zinc coating consist of a steel substrate with metallic alloyed zinc coating, applied by using a continuous hot dip galvanizing process. Zinc aluminum coating is composed of a mix of zinc (90%-100%) aluminium (0%-10%) approximately mish metals (Lanthanum -La and Cerium - Ce added <0.01%) and if requested with organic coating.
The chemical composition has been selected to provide an excellent corrosion protection in demanding areas.
Kiwa-Ecobility Experts assumes no liability for manufacturer's information, LCA data and evidence.

Verification
The European standard EN 15804+A2:2019 serves as the core PCR.

Independent verification of the declaration and data according to ISO 14025: 2010.

☐internal ☒external

Raoul Mancke
(Head of programme operations, Kiwa-Ecobility Experts)

Martin Koehrer
(Verification body, Kiwa-Ecobility Experts)

Dr.-Ing. Morteza Nikravan
(External verifier of Kiwa GmbH)

2. Product

2.1 Product description

METALLIC COATED WIRE, GalMAC®, GalMAC® C3, SuperGalMAC®, GalMAC® Green and GaBIARQ®, steel substrate with metallic alloyed zinc coating, applied by using a continuous hot dip galvanizing process. Zinc aluminum coating is composed of a mix of zinc (90%-100%) aluminium (0% -10%) approximately mish metals (Lanthanum -La and Cerium - Ce added <0.01%) and if requested with organic coating.

The chemical composition has been selected to provide an excellent corrosion protection in demanding areas.

2.2 Application (Intended Use of the product)

METALLIC COATED WIRE, GalMAC®, GalMAC® C3, SuperGalMAC®, GalMAC® Green and GaBIARQ®, can be processed by all conventional processing operations as bending, cutting, welding etc.. and it can be used in several industrial application, such as:

- Construction: gabions and double twist mesh products, welded mesh products for architecture and landscaping, safety fence.
- Agriculture: vineyard, greenhouse and fencing.
- Industrial: armored cables, flexible tubes, metal networks, DIY
- Sparkling beverages bottles: gabbiette ('muzzles' – stoppers) of champagne, prosecco, cava, beer.

2.3 Reference Service Life (RSL)

METALLIC COATED WIRE, GalMAC®, GalMAC® C3, SuperGalMAC®, GalMAC® Green and GaBIARQ®, offers self-heling on cut edge and great corrosion resistance in salty and demanding industrial environment conditions. The coating process can apply various thickness of Zinc aluminum alloy according to EN 10244-2 (A-B- E). Corrosion resistance and durability can be evaluated with specific tests as "Salt Spray test" according to EN ISO 9227. Reference service life depends on specific applications and environmental conditions.

2.4 Technical data

Characteristic	Unit	Value
Density	kg/m^3	7850
Tensile strength	N/mm^2	350-1860
Minimum elongation	%	>3
Wire Diameter	mm	0.20 – 8.00
Grade of the material	-	C4D – C82D

2.5 Substances of very high concern

METALLIC COATED WIRE, GalMAC®, GalMAC® C3, SuperGalMAC®, GalMAC® Green and GaBIARQ do not contain substances listed on the candidate list of Substances of Very High Concern, as published on the ECHA website, in concentrations exceeding 0,1 percentage by mass

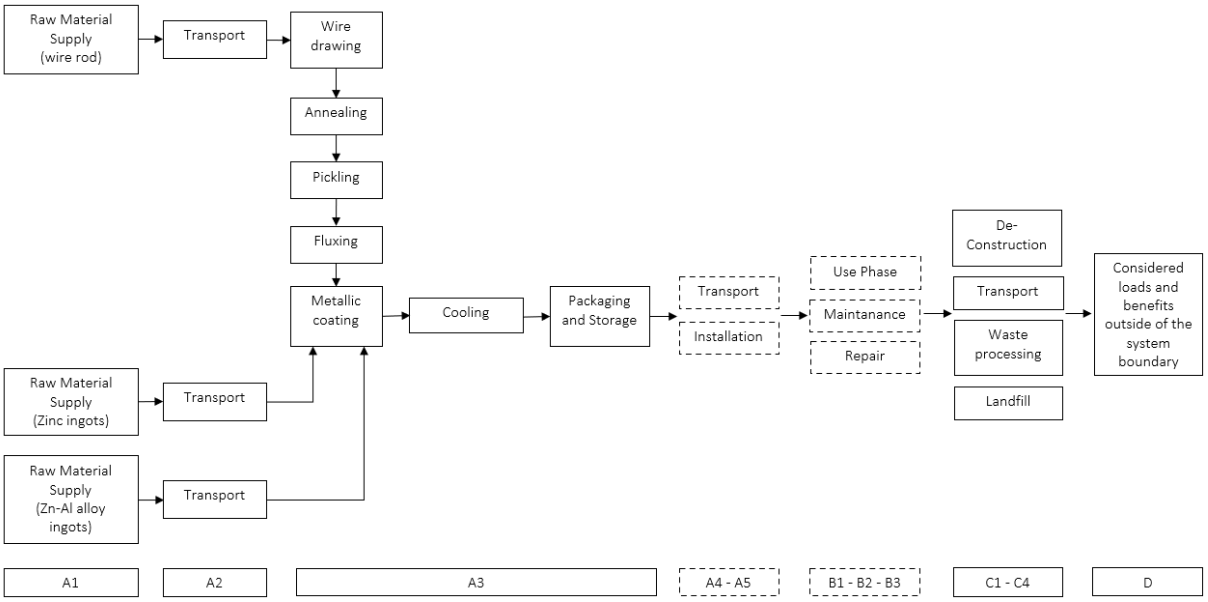
2.6 Base materials / Ancillary materials

The composition of the reference products is reported in Table below.

Raw material	Unit	Value
Steel rod	kg	1060
Zinc alloy	kg	21
Zinc-Aluminium alloy	kg	10

2.7 Manufacturing

The manufacturing is managed in the Montornès del Vallès (Spain) by A. Bianchini Ingeniero S.A. a subsidiary of Officine Maccaferri S.p.A. The production process includes the drawings, annealing, metallic coating (Zinc aluminum alloy) and organic coating.



2.8 Other Information

For further information on this product please visit the webpage under the following links: www.mac-caferri.com or https://abianchini.es/.

3. LCA: Calculation rules

3.1 Declared unit

In accordance with the PCR-C, 1 t of an average METALLIC COATED WIRE is chosen as the declared unit.

3.2 Conversion factors

Product	Unit	Value
Declared Unit	t	1
Weight per reference unit	kg	1000

3.3 Scope of declaration and system boundaries

This is a cradle to gate EPD with modules C1-C4 and module D. More precisely, the following processes were accounted for each module:

A1 - Production of raw materials used in the products, as well as the production of energy carriers used in the production process.

A2 - Transport of raw materials to the manufacturing site and internal handling.

A3 - Manufacturing of METALLIC COATED WIRE, GalMAC®, GalMAC® C3, SuperGalMAC®, GalMAC® Green and GaBIARQ® which includes the manufacturing steps reported in section 2.6 as well as the production of the distribution packaging and of the ancillary material. In addition, the treatment of waste generated from the distribution packaging and from the end-of-life of the product are accounted for.

C1 – Disassembly of the packaging and of the steel wire were considered to be insignificant and equal to zero.

C2 - Transport from collection point to waste processing and disposal site.

C3 - Shredding and sorting of fractions for recycling.

C4 - Landfill of material fractions not recycled.

D - Benefit and load beyond the product system.

Description of the system boundary																
Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manu-facturing	Transport from manu-facturer to place of use	Construction-installation process	Use	Main-tenance	Repair	Replacement	Refur-bishmen	Operational energy use	Operational water use	De-construction / demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
X=Module declared | MND=Module not declared																

3.4 Geographical reference area

All process-specific data was collected for the operating year (from 01/07/2022 to 30/06/2023). Geographical reference area is global.

3.5 Cut-uff Criteria

The cut-off applied are related to the packaging of chemicals products and lubricating oil used in the production process.

3.6 Allocation

A mass allocation based on the weight of the production volumes has been applied.

3.7 Data collection and reference time period

Specific data were collected at A. Bianchini Ingeniero S.A site in Spain considering an annual average referred to 2022/2023, whereas the most updated selected generic datasets available in the LCI databases were used for the other modules. Thus, in line with PCR A requirements, manufacturer-specific data is not older than 5 years and generic data is not older than 10 years.

3.8 Estimates and assumptions

The main assumptions are related to distances of inbound transportations. It was also assumed that liquid and gas auxiliaries are unpacked and supplied in tanker trucks.

3.9 Comparability

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used , functional or declared unit, geographical reference, definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPDs programs may differ. A comparability needs to be evaluated. For further guidance see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

4. LCA: Scenarios and additional technical information

As far as the end-of-life of the METALLIC COATED WIRE is concerned, modules C1 and C2 are not significant as the wire can be used as intermediate product for different applications. Therefore, dismantling and transport to the treatment site was considered equal to zero. In module C3 the steel wire undergoes a shredding process with a 5% waste that is sent to landfill (C4) and the remaining 95% that is sent to recycling (D).

Regarding the end of life of packaging components, the following scenarios were applied:

- The end-of-life plastic component was, conservatively, incinerated.
- The end of life of the wooden pallet was taken from the PEF Guidance.
- The end-of-life steel component was recycled**.**

Processes	Unit (expressed per FU or DU of components, products or materials and by type of material)	METALLIC COATED WIRE
Collection process specified by type	Kg collected separately	Polymer: 1.91E+01 kg
		Paper: 1.00E+01 kg
		Wood: 3.38E+01 kg
		Steel: 1.00E+03 kg
Recovery system specified by type	Kg for reuse	0
	Kg for recycling	Wood: 1.01E+01 kg
		Steel: 5.95E+02 kg
	Kg for energy recovery	Polymer: 1.91E+01 kg
		Paper: 7.43 kg
		Wood: 1.06E+01 kg
Disposal specified by type	Kg product or material for final deposition	Landfill (Paper): 2.57 kg
		Landfill (Wood): 1.27E+01 kg
		Landfill (Steel): 5.00E+01 kg

5. LCA: Results

The following tables show the results of the impact assessment indicators, resource use, waste and other output streams. The results presented here refer to the declared average product.

LCA results - Indicators describing environmental impacts based on the impact assessment (LCIA): METALLIC COATED WIRE 1 ton (EN 15804+A2)									
Parameter	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
Core environmental impact indicators (EN 15804+A2)									
GWP-total	kg CO2 eqv.	1.86E+03	1.03E+02	2.49E+01	0.00E+00	3.33E-02	2.56E+01	6.23E+00	-2.45E+02
GWP-f	kg CO2 eqv.	1.86E+03	1.04E+02	2.40E+01	0.00E+00	3.35E-02	2.41E+01	3.91E+00	-2.45E+02
GWP-b	kg CO2 eqv.	1.90E+00	1.64E-01	8.47E-01	0.00E+00	0.00E+00	1.41E+00	2.32E+00	3.76E-01
GWP-luc	kg CO2 eqv.	6.40E-01	4.68E-01	6.12E-02	0.00E+00	3.10E-04	3.85E-03	1.78E-04	-1.02E-01
ODP	kg CFC 11 eqv.	6.07E-09	1.02E-11	1.91E-10	0.00E+00	2.93E-15	6.63E-10	4.68E-13	7.06E-10
AP	mol H+ eqv.	4.79E+00	1.36E+00	8.12E-02	0.00E+00	1.76E-04	3.72E-02	1.23E-03	-5.58E-01
EPfr	kg P eqv.	2.04E-03	1.97E-04	9.00E-05	0.00E+00	1.22E-07	1.45E-04	3.84E-06	-2.17E-05
EPmar	kg N eqv.	1.13E+00	5.98E-01	3.18E-02	0.00E+00	8.49E-05	1.22E-02	7.75E-04	-1.34E-01
EPter	mol N eqv.	1.22E+01	6.56E+00	3.63E-01	0.00E+00	9.45E-04	1.26E-01	4.92E-03	-1.45E+00
POCP	kg NMVOC eqv.	3.78E+00	1.51E+00	6.96E-02	0.00E+00	1.66E-04	2.92E-02	1.61E-03	-4.46E-01
ADP-e	kg Sb-eqv.	3.98E-02	3.83E-06	2.56E-06	0.00E+00	2.17E-09	4.41E-06	5.89E-09	-2.72E-06
ADP-f	MJ	1.86E+04	1.34E+03	4.00E+02	0.00E+00	4.54E-01	3.42E+02	2.14E+00	-1.86E+03
WU	m3 world eqv.	1.40E+02	6.98E-01	1.90E+00	0.00E+00	3.85E-04	8.14E-01	4.43E-01	-3.71E+00
Additional environmental impact indicators (EN 15804+A2)									
PM	disease incidence	6.68E-05	2.86E-05	6.01E-07	0.00E+00	8.21E-10	2.93E-07	1.03E-08	-8.13E-06
IR	kBq U235 eqv.	7.16E+01	3.02E-01	2.94E+00	0.00E+00	8.50E-05	3.52E+00	8.51E-03	3.07E+00
ETP-fw	CTUe	3.72E+03	9.52E+02	3.82E+02	0.00E+00	3.20E-01	1.30E+02	2.34E+00	-2.87E+02
HTP-c	CTUh	2.20E-06	1.84E-08	6.37E-09	0.00E+00	6.46E-12	2.07E-08	1.15E-10	-3.80E-07
HTP-nc	CTUh	1.31E-05	7.12E-07	1.80E-07	0.00E+00	2.85E-10	9.37E-08	1.03E-08	2.81E-07
SQP	Pt	3.13E+03	2.89E+02	1.10E+02	0.00E+00	1.90E-01	2.23E+02	4.14E-01	1.64E+02

ADP-e= Abiotic depletion potential for non-fossil resources | **ADP-f**=Abiotic depletion for fossil resources potential | **AP**= Acidification potential, Accumulated Exceedance | **EPfr**= Eutrophication potential, fraction of nutrients reaching freshwater end compartment | **EPmar**= Eutrophication potential, fraction of nutrients reaching marine end compartment| **EPter**= Eutrophication potential, Accumulated Exceedance | **GWP-b**=Global Warming Potential biogenic | **GWP-f**=Global Warming Potential fossil fuels | **GWP-luc**=Global Warming Potential land use and land use change |**GWP-total**=Global Warming Potential total| **ODP**=Depletion potential of the stratospheric ozone layer |**POCP**=Formation potential of tropospheric ozone | **WU**=Water (user) deprivation potential, deprivation- weighted water consumption | **ETP-fw**=Potential Comparative Toxic Unit for ecosystems | **HTP-c**=Potential Toxic Unit for Humans toxicity, cancer | **HTP-nc**= Potential Toxic Unit for humans, non-cancer | **IRP**=Potential Human exposure efficiency relative to U235, human health | **PM**=Potential incidence of disease due to Particulate Matter emissions | **SQP**=Potential soil quality index

Disclaimer on ADP-e, ADP-f, WU, ETP-fr, HTP-c, HTP-nc, SQP: The results of these environmental impact indicators must be used with caution, as the uncertainties in these results are high or as there is limited experience with the indicator.

Disclaimer on IR: This impact category mainly addresses the potential effect of low dose ionizing radiation on human health in the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents and occupational exposures, nor does it consider radioactive waste disposal in underground facilities. Potential ionizing radiation from soil, radon, and some building materials is also not measured by this indicator.

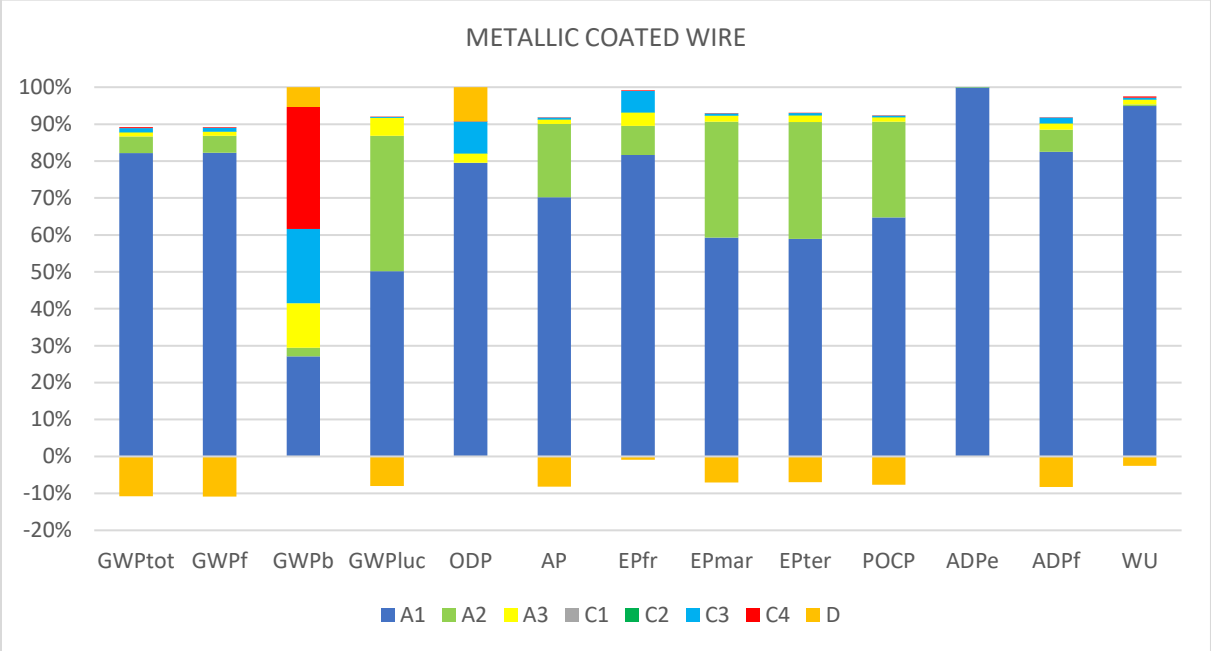
LCA results - Indicators describing resource use and environmental information derived from life cycle inventory (LCI): METALLIC COATED WIRE 1 t (EN 15804+A2)									
Parameter	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	3.99E+03	5.29E+01	1.14E+02	0.00E+00	3.22E-02	3.21E+02	3.36E-01	2.92E+02
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
PERT	MJ	3.99E+03	5.29E+01	1.14E+02	0.00E+00	3.22E-02	3.21E+02	3.36E-01	2.92E+02
PENRE	MJ	1.87E+04	1.34E+03	4.01E+02	0.00E+00	4.56E-01	3.42E+02	2.15E+00	-1.88E+03
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
PENRT	MJ	1.87E+04	1.34E+03	4.01E+02	0.00E+00	4.56E-01	3.42E+02	2.15E+00	-1.88E+03
SM	Kg	3.22E+02	0.00E+00	0.00E+00	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
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
FW	M3	5.11E+00	5.85E-02	1.10E-01	0.00E+00	3.54E-05	1.15E-01	1.04E-02	-1.67E-01
HWD	Kg	3.99E+03	5.29E+01	1.14E+02	0.00E+00	3.22E-02	3.21E+02	3.36E-01	2.92E+02
NHWD	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
RWD	Kg	3.99E+03	5.29E+01	1.14E+02	0.00E+00	3.22E-02	3.21E+02	3.36E-01	2.92E+02
CRU	Kg	1.87E+04	1.34E+03	4.01E+02	0.00E+00	4.56E-01	3.42E+02	2.15E+00	-1.88E+03
MFR	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
MER	Kg	1.87E+04	1.34E+03	4.01E+02	0.00E+00	4.56E-01	3.42E+02	2.15E+00	-1.88E+03
EET	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
EEE	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

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 resources | **SM**=Use of secondary material | **RSF**=Use of renewable secondary fuels | **NRSF**=Use of non-renewable secondary fuels | **FW**=Use of fresh water | **HWD**=Hazardous waste disposed | **NHWD**=Non-hazardous waste disposed | **RWD**=Radioactive waste disposed | **CRU**=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported energy, thermical | **EE**=Exported energy, electrical

LCA results - information on biogenic carbon content at the factory gate: METALLIC COATED WIRE 1 t (EN 15804+A2)		
Parameter	**Unit**	**Value**
biogenic carbon content in product	kg C	0
biogenic carbon content in accompanying packaging	kg C	7.87E+00
NOTE 1 kg biogenic carbon is equivalent to 44/12 kg CO2		

6. LCA: Interpretation

The analysis of the contribution of each module to the impacts of METALLIC COATED WIRE is shown in the graph below. It can be observed that the impacts are driven by modules A1-A3, while the contribution of the other modules is about 2% for all impact categories analyzed, except for Eutrophication, freshwater (7%), driven by the disposal of the shredded steel scrap in landfill due to phosphorous and phosphate emissions of the landfill process, and biogenic GWP (64%), whose impact is driven by the disposal of wood waste of distribution packaging. Focusing on module A1, the most relevant process is wire rod production, led by the share of steel billet produced by BOF. The latter alone is responsible for 75% of the total impact on the GWP of A1-A3 modules. The contribution of module D is valuable compared to modules A1-A3, especially in GWP Total (12%).



7. References

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ISO 14040:2006, Environmental management - Life cycle assessment - Principles and framework

ISO 14044:2006, Environmental management - Life cycle assessment - Requirements and guidelines

ISO 14025:2010: Environmental labels and declarations — Type III environmental declarations — Principles and procedures EN 13249

EN 15804:2012+A2:2019/AC:2021 Sustainability of construction works — Environmental Product Decla-rations — Core rules for the product category of construction products

PCR A: General Program Category Rules for Construction Products from the EPD program Kiwa-Ecobility Experts, R.0_2021-07-16

PCR B: Kiwa-Ecobility Experts, Berlin, 2020: PCR B – Product Category Rules for steel construction products, Requirements on the Environmental Product Declarations for steel construction products; Version 2020-03-13 (draft)

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