Environmental Product Declaration

as per ISO 14025 and EN 15804

Owner of the declaration:	Officine Maccaferri S.p.A.
Publisher:	Kiwa-Ecobility Experts
Programme operator:	Kiwa-Ecobility Experts
Registration number:	EPD-Kiwa-EE-000413-EN
Issue date:	18.09.2024
Valid to:	18.09.2029

1. General information

Officine Maccaferri S.p.A.

Programme operator:
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13355 Berlin
Germany

Registration number:
EPD-Kiwa-EE-000413-EN

This declaration is based on the Product Category Rules:
PCR B Requirements on the Environmental Product Declarations for steel construction products - Edition 2020-03-13 (draft)

Issue date:
18.09.2024

Valid to:
18.09.2029

WELDED MESHES

Owner of the declaration:
Officine Maccaferri S.p.A.
Via Alberico Albricci 9
20122 Milano (MI)
Italy

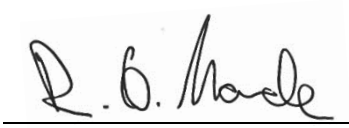
Declared product / declared unit:
1 average kg of Hot-dip coated steel welded meshes including distribution packaging.

Scope:
WELDED MESHES are made from hot-dip coated steel wires, coated with zinc and/or zinc-aluminum alloy composed of a mix of zinc (90%-100%) aluminium (0%-10%) approximately and mish metals (Lanthanum -La and Cerium - Ce added <0.01%) before welding. The EPD type is Cradle to gate with options, modules C1-C4, and module D.
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



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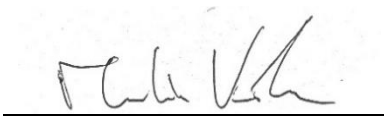

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Dr.-Ing. Morteza Nikravan
(External verifier of Kiwa GmbH)

2. Product

2.1 Product description

WELDED MESHES are made from hot-dip coated steel wires, coated with zinc and/or zinc-aluminum alloy and mish metals before welding.
Zinc aluminum coating is composed of a mix of zinc (90%-100%), aluminium (0%-10%), and mish metals (Lanthanum -La and Cerium - Ce added <0.01%).
The chemical composition of metallic coatings has been selected to provide corrosion protection in several environmental conditions. WELDED MESHES are characterized by the wire diameter and the mesh sizes (centre-to-centre distance between two consecutive wires).

2.2 Application (Intended Use of the product)

WELDED MESHES are used in various applications, including:

- Construction:
  - Welded mesh gabions
  - Architectural and landscaping welded mesh products
  - Covering or cladding materials
  - Safety fences
- Soil reinforcement systems:
  - Front component of soil reinforcement systems

2.3 Reference Service Life (RSL)

WELDED MESHES reference service life depends on specific applications and environmental conditions. When used as welded mesh gabions, the typical service life is up to 50 years, according to EN 10223-8 whether tested accordingly.

2.4 Technical data

Characteristic	Unit	Value
Density of steel (wire)	kg/m^3	7850
Wire Diameter range	mm	3.00 – 8.00
Mesh sizes range	mm	25 - 200
Grade of steel material	-	C4D – C82D

2.5 Substances of very high concern

WELDED MESHES 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.

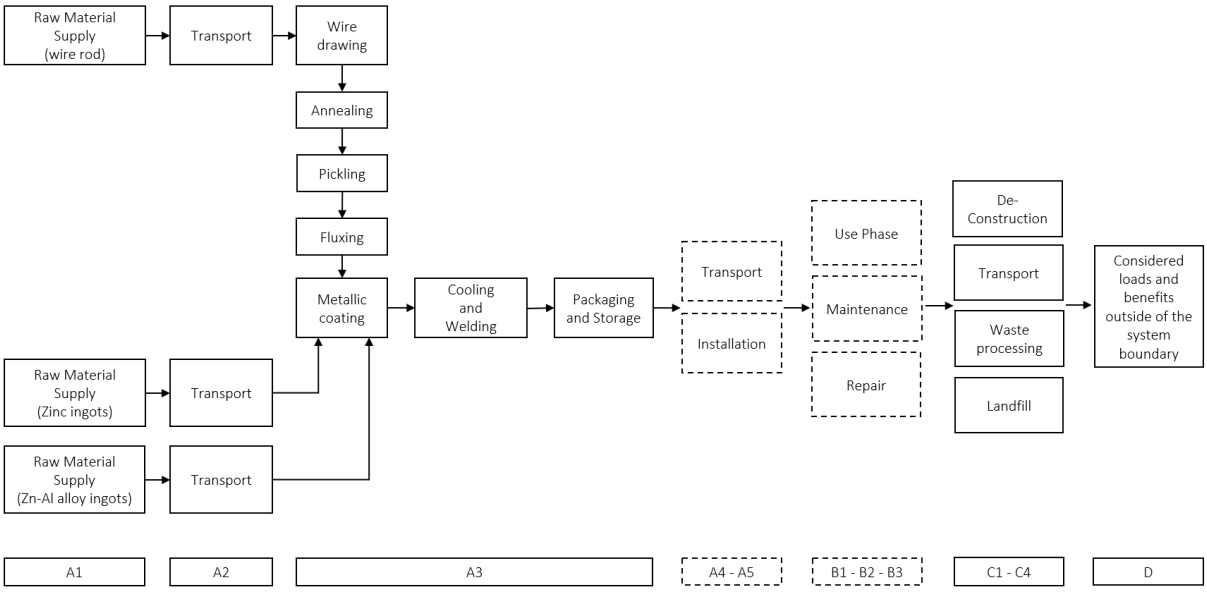
2.6 Base materials / Ancillary materials

The composition for 1 kg of the reference product is reported in Table below.

Raw material	Unit	Value
Steel wire rod	kg	1.06
Zinc alloy	kg	0.21
Zinc-Aluminium alloy	kg	0.10

2.7 Manufacturing

The manufacturing is carried out 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 or Zinc aluminum alloy) and welding.



2.8 Other Information

For further information on this product please visit the webpage under the following links:
www.maccaferri.com
www.abianchini.es

3. LCA: Calculation rules

3.1 Declared unit

In accordance with the PCR-C, 1 kg of an average WELDED MESH is chosen as the declared unit.

3.2 Conversion factors

Product	Unit	Value
Declared Unit	kg	1

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 WELDED MESH which includes the manufacturing steps reported in section 2.6 as well as the production of the distribution packaging and of the ancillary material.
C1 – Disassembly of the packaging and of the welded mesh were considered to be negligible 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. The plant uses onsite generated electricity through a photovoltaic system.

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 WELDED MESHES are used in constructions in welded mesh gabions, welded mesh products for architecture, landscaping, covering or cladding, component of soil reinforcement systems: they are therefore intended to be embedded in a permanent manner in the engineering work in which they are used. For this reason, an end of life equal to zero was assumed. The results included in C2 and D modules are referred to the end of life of secondary packaging of the product used in the distribution phase for which a recycling scenario was applied.

Processes	Unit (expressed per FU or DU of components, products or materials and by type of material)	WELDED MESHES
Collection process specified by type	Kg collected separately	Steel: 1.90E-02 kg
Recovery system specified by type	Kg for recycling	Steel: 1.90E-02 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): WELDED MESHES 1 kg (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.	2.00E+00	1.09E-01	2.96E-02	0.00E+00	1.59E-04	0.00E+00	0.00E+00	-7.74E-03
GWP-f	kg CO2 eqv.	2.00E+00	1.08E-01	2.77E-02	0.00E+00	1.57E-04	0.00E+00	0.00E+00	-7.75E-03
GWP-b	kg CO2 eqv.	2.12E-03	1.73E-04	1.76E-03	0.00E+00	3.66E-07	0.00E+00	0.00E+00	1.23E-05
GWP-luluc	kg CO2 eqv.	7.25E-04	4.94E-04	6.63E-05	0.00E+00	1.48E-06	0.00E+00	0.00E+00	-3.26E-06
ODP	kg CFC 11 eqv.	7.22E-12	1.08E-14	2.08E-13	0.00E+00	1.40E-17	0.00E+00	0.00E+00	2.30E-14
AP	mol H+ eqv.	5.17E-03	1.44E-03	9.00E-05	0.00E+00	8.40E-07	0.00E+00	0.00E+00	-1.77E-05
EPfr	kg P eqv.	2.22E-06	2.07E-07	1.00E-07	0.00E+00	5.83E-10	0.00E+00	0.00E+00	-5.81E-10
EPmar	kg N eqv.	1.24E-03	6.30E-04	3.51E-05	0.00E+00	4.06E-07	0.00E+00	0.00E+00	-4.25E-06
EPter	mol N eqv.	1.33E-02	6.92E-03	3.99E-04	0.00E+00	4.52E-06	0.00E+00	0.00E+00	-4.60E-05
POCP	kg NMVOC eqv.	4.08E-03	1.59E-03	7.77E-05	0.00E+00	7.96E-07	0.00E+00	0.00E+00	-1.41E-05
ADP-e	kg Sb-eqv.	4.19E-05	4.04E-09	2.79E-09	0.00E+00	1.04E-11	0.00E+00	0.00E+00	-8.16E-11
ADP-f	MJ	2.04E+01	1.41E+00	4.48E-01	0.00E+00	2.17E-03	0.00E+00	0.00E+00	-5.81E-02
WU	m3 world eqv.	1.81E-01	7.37E-04	2.05E-03	0.00E+00	1.84E-06	0.00E+00	0.00E+00	-1.12E-04
Additional environmental impact indicators (EN 15804+A2)									
PM	disease incidence	7.10E-08	3.01E-08	6.87E-10	0.00E+00	3.93E-12	0.00E+00	0.00E+00	-2.59E-10
IR	kBq U235 eqv.	8.46E-02	3.19E-04	3.14E-03	0.00E+00	4.07E-07	0.00E+00	0.00E+00	1.14E-04
ETP-fw	CTUe	4.03E+00	1.00E+00	4.12E-01	0.00E+00	1.53E-03	0.00E+00	0.00E+00	-8.96E-03
HTP-c	CTUh	2.34E-09	1.94E-11	8.02E-12	0.00E+00	3.09E-14	0.00E+00	0.00E+00	-1.21E-11
HTP-nc	CTUh	1.40E-08	7.51E-10	2.08E-10	0.00E+00	1.36E-12	0.00E+00	0.00E+00	9.32E-12
SQP	Pt	2.96E+00	3.05E-01	1.20E-01	0.00E+00	9.07E-04	0.00E+00	0.00E+00	5.47E-03

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-luluc**=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, WDP, ETP-fw, 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.

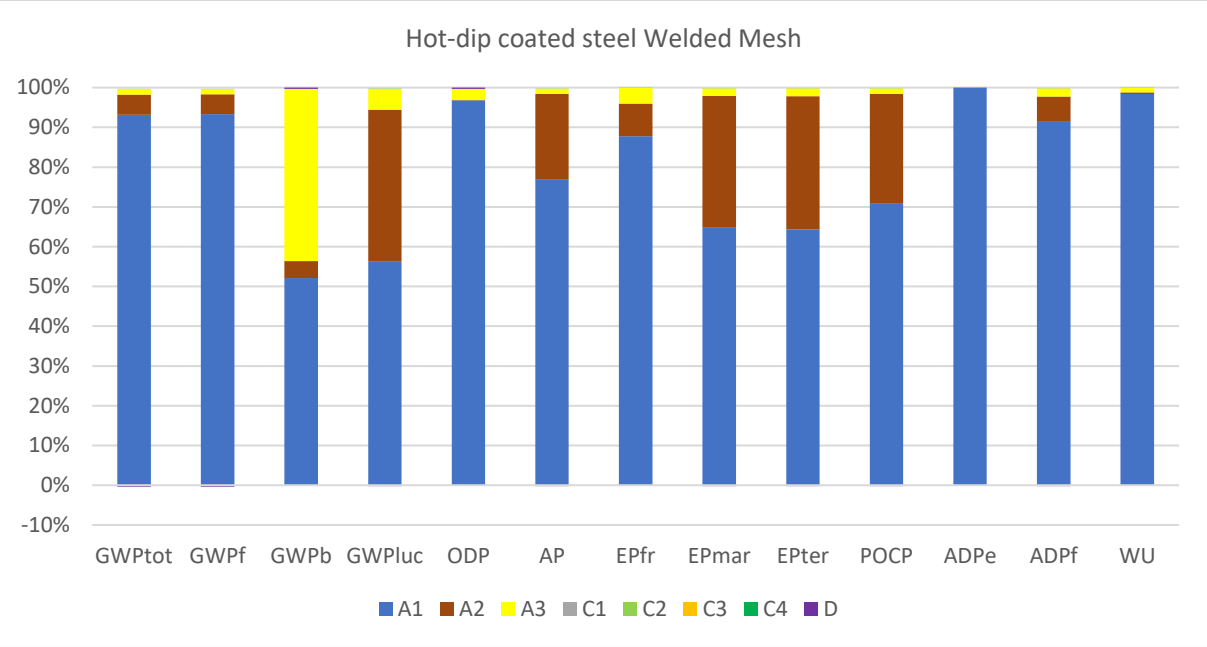
LCA results - Indicators describing resource use and environmental information derived from life cycle inventory (LCI): WELDED MESHES 1 kg (EN 15804+A2)									
Parameter	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	4.70E+00	5.58E-02	1.24E-01	0.00E+00	1.54E-04	0.00E+00	0.00E+00	9.67E-03
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	4.70E+00	5.58E-02	1.24E-01	0.00E+00	1.54E-04	0.00E+00	0.00E+00	9.67E-03
PENRE	MJ	2.05E+01	1.41E+00	4.48E-01	0.00E+00	2.18E-03	0.00E+00	0.00E+00	-5.88E-02
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	2.05E+01	1.41E+00	4.48E-01	0.00E+00	2.18E-03	0.00E+00	0.00E+00	-5.88E-02
SM	Kg	3.40E-01	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	5.87E-03	6.18E-05	1.20E-04	0.00E+00	1.69E-07	0.00E+00	0.00E+00	-5.02E-06
HWD	Kg	5.29E-07	4.42E-12	-2.25E-12	0.00E+00	8.06E-15	0.00E+00	0.00E+00	-1.48E-13
NHWD	Kg	8.91E-02	1.74E-04	5.70E-03	0.00E+00	3.14E-07	0.00E+00	0.00E+00	-1.17E-04
RWD	Kg	7.64E-04	2.17E-06	2.12E-05	0.00E+00	2.82E-09	0.00E+00	0.00E+00	1.03E-06
CRU	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
MFR	Kg	0.00E+00	0.00E+00	6.50E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-02
MER	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
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 | **EEE**=Exported energy, electrical

LCA results - information on biogenic carbon content at the factory gate: WELDED MESHES 1 kg (EN 15804+A2)		
Parameter	**Unit**	**Value**
biogenic carbon content in product	kg C	0
biogenic carbon content in accompanying packaging	kg C	0
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 WELDED MESH 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 1% for all impact categories analyzed. Focusing on module A1, the most relevant process is the wire rod production, led by the share of steel billet produced by BOF. The latter alone is responsible for 73% of the total impact on the GWP of A1-A3 modules. The contribution of module D is negligible compared to modules A1-A3 (<1%).



7. References

EN 15804	EN 15804:2012+A2:2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products
ISO 14025	ISO 14025:2010 Environmental labels and declarations — Type III environmental declarations — Principles and procedures
ISO 14040	ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework
ISO 14044	ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
PCR A	Kiwa-Ecobility Experts, Berlin, 2022: PCR A – General Program Category Rules for Construction Products from the EPD programme of Kiwa-Ecobility Experts; Version 2.1
PCR B	Kiwa-Ecobility Experts, Berlin, 2020: PCR B – Product Category Rules for steel construction products, Requirements on the Environmental Product
Ecoinnovazione; 2024.	Technical report: LCA study of plastic-coated Double Twist Products for Geoengineering works.

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