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-000478-EN
Issue date:	30.01.2026
Valid to:	30.01.2031

Steel Fibres

For Concrete Reinforcements and Shotcrete

1. General information

Officine Maccaferri S.p.A.

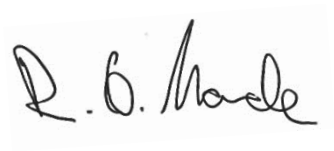
Programme operator:
Kiwa-Ecobility Experts
Kiwa GmbH, Ecobility Experts
Wattstraße 11-13
13355 Berlin, Germany

Registration number:
EPD-Kiwa-EE-000478-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:
30.01.2026

Valid to:
30.01.2031



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

Onur Üzüm
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Steel Fibres

Owner of the declaration:
Officine Maccaferri S.p.A.
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20122 Milano (MI) – Italy

Declared product / declared unit:
1 metric ton of steel fibres

Scope:
Steel Fibres are a high-quality fibre classified into Group I: cold-drawn wire fibres.
There are different product variants like glued or loose fibres. Gluing is applied for some of the variants to avoid fibre balling during mixing and to ensure homogeneous distribution of the fibres throughout the concrete and mortar mix.
The worst-case product EPD type is Cradle to gate with option module A4, module A5, 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 EN ISO 14025:2010.

☐internal ☒external

Dr. Ing. Morteza Nikravan
(Third party verifier)

2. Product

2.1 Product description

Steel fibres (FF or FS), available in both high and ultra-high strength variants (HS or UHS), can be supplied either loose or bonded together (glued) and are specifically developed for advanced structural applications. These include precast concrete components commonly employed in tunnel construction and other civil engineering works such as floors, buildings, precast and infrastructure.

Serving as a substitute for traditional reinforcement methods like steel bars and mesh, steel fibres offer a three-dimensional, isotropic reinforcement solution that distributes stresses more uniformly throughout the concrete matrix.

The distinctive hooked shape at the ends of steel fibres plays a key role in controlling their pullout behaviour from the concrete matrix. This mechanism is fundamental in providing concrete with its well-known ductile behaviour and enhanced strength after cracking.

2.2 Application (Intended Use of the product)

Steel fibres can be used in concrete structures to enhance their load-bearing performance and to replace partially or fully the traditional steel rebar reinforcement. When incorporated in appropriate quantities, the fibres improve the mechanical properties of concrete, such as tensile strength, resistance to shear forces, impact durability, and fatigue performance.

These fibres are suitable for a wide range of concrete and mortar types, including those used in sprayed applications, floors, precast elements, in-situ casting, and structural repairs. Their application spans various sectors, including above-ground structures (like industrial floors, buildings, and civil works), below-ground construction (such as tunnel linings), and precast concrete manufacturing.

2.3 Reference Service Life (RSL)

The service life of steel fibres is directly dependent on the exposure classes of the concrete in which they are incorporated. These exposure classes are defined by the environmental conditions and the intended durability performance of the concrete elements.

2.4 Technical data

Characteristics (*)	Value	Unit
Length	From 33 to 50	mm
Equivalent diameter	From 0,55 to 1,05	mm
Nominal Tensile strength	From 1100 to 2400	MPa
Durability	relates to the concrete incorporating fibres	

(*) Performances of Steel Fibres are detailed in DOP and Technical Data Sheet.

Steel Fibres are CE certified for structural applications according to EN 14889-1:2006.

2.5 Substances of very high concern

Steel fibres do not contain SVHC.

2.6 Base materials / Ancillary materials

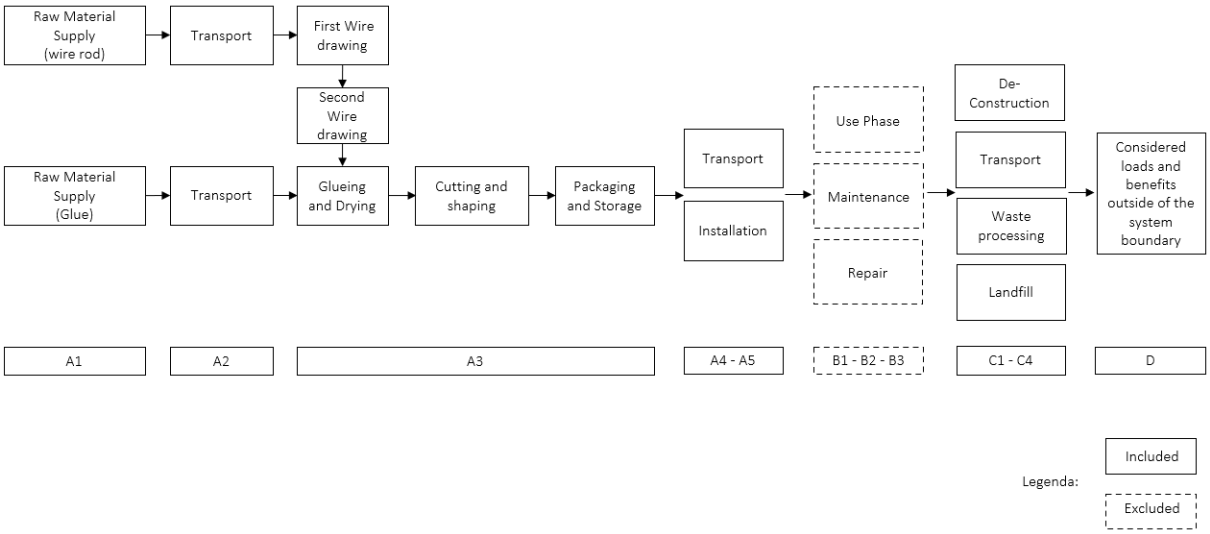
The product family includes several variants: all the variants are produced cutting and shaping cold drawn steel wire with different diameter and length.

Glued Steel fibres	UoM	Value	% of the product
BoM – contribution (kg) of materials to the declared unit – 1 ton of product			
Steel	kg	1000	98.5%
PVA glue	kg	15	1.5%
Total weight	**kg**	**1015**	

The reference CPC code is 412 “Products of iron or steel”.

2.7 Manufacturing

The manufacturing is managed in the Tianjin (China) by Maccaferri (Tianjin) fibres Co.,LTD. a subsidiary of Officine Maccaferri S.p.A. The production process includes the drawings, gluing and cutting of steel fibres.



2.8 Other Information

Further technical characteristics and information of the steel Fibres are published on the Maccaferri website (https://www.maccaferri.com/).

According to Construction Product Regulation (EU) 305/2011 the essential technical characteristics are reported in Declaration of Performances (DoP).

In terms of total recycled contents, the analysed steel fibres have the following characteristics:

Steel produced entirely via blast oxygen furnace (BOF) with at least 22.16% recycled content; no electric arc furnace (EAF) was used.

Steel fibres	% of recycled material*	%EAF	%BOF
Steel	22.16	0	100

*Based on the available suppliers’ declarations.

3. LCA: Calculation rules

3.1 Declared unit

In accordance with the PCR B, 1 ton of steel fibres plus its packaging is chosen as the declared unit.

3.2 Scope of declaration and system boundaries

This is a cradle-to-gate with module A4, module A5, modules C1-C4 and module D. In module A5 only the end of life of the distribution packaging has been considered, since the installation process is highly dependent on the concrete product in which the steel fibres are included and the specific project application. 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 and assembling of the steel fibres (see section 2.7 for details), the production of the distribution packaging and of the ancillary material. In addition, the treatment of waste generated from the manufacturing processes is accounted for.

A4 - Transport from the manufacturer to the construction site (considering a distance of 1000 km by truck and 1000 km by ship to give the possibility to adjust the results depending on the specific distance at hand).

A5 - End-of-life of the distribution packaging.

C1 - Disassembly of steel fibres which is considered negligible, so no impacts have been accounted for (see section 4).

C2 - Transport from the collection to the subsequent wase treatments.

C3 - Shredding process (95% efficiency assumed).

C4 - Landfill of the losses generated in the shredding.

D - Benefit due to the avoided production of electrical and thermal energy resulting from the incineration of the wood and plastic component of the distribution packaging and from the recycling of steel.

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	Manufacturing	Transport from manufacturer to place of use	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	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	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
X=Module declared | MND=Module not declared																

3.3 Geographical reference area

All process-specific data was collected for the 2024 reference year and considering a global distribution of the product.

3.4 Cut-off Criteria

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

3.5 Allocation

A mass allocation based on the weight of the production volumes has been applied for general waste of the manufacturing process.

3.6 Data collection and reference time period

Specific data were collected at the Tianjin area plant considering an annual average referred to 2024, 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.

3.7 Estimates and assumptions

The main assumptions are related to distances of inbound and background transportations and the packaging of ancillary materials.

3.8 Power Mix

A location-based approach has been used for the modelling of the electricity consumptions, when possible, with the national consumption mix, namely Chinese consumption mix. The GWP-total value of the electricity used is 0.732 kg CO_2 eq./kWh.

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+A2. 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), end of life 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

Steel fibres are used in reinforced concrete. The impact of dismantling is mainly due to the mass of the concrete, for this reason C1 is considered equal to zero. The removed reinforced concrete is then sent for shredding on a truck EURO 5 (module C2), which consider the transport of the steel fibres component only. The shredding operation separates the steel from the concrete (module C3), with a loss of steel of 5% sent to landfill, whereas the remaining treated steel is sent for recycling (module D).

Processes	Unit (expressed per FU or DU of components, products or materials and by type of material)	Steel fibres
Collection process specified by type	kg collected separately	Steel: 1000 kg
		Plastic: 2.3 kg
		Cardboard: 17.5 kg
		Wood: 11.6 kg
Recovery system specified by type	kg for recycling	Steel: 950 kg
	kg for recycling	Wood: 3.49 kg
	kg for energy recovery	Plastic: 2.3 kg
	kg for energy recovery	Cardboard: 13 kg
	kg for energy recovery	Wood: 0.02 kg
Disposal specified by type	kg product or material for final deposition	Landfill (Steel): 50 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 worst-case product and are calculated according to the Life Cycle Impact Assessment (LCIA) method recommended by EN15804:2012+A2:2019, which is based on the LCIA method EF3.1. The applied allocation method for post-consumer waste is cut-off.

LCA results - Indicators describing environmental impacts based on the impact assessment (LCIA): 1 ton of steel fibres worst-case product (EN 15804+A2)									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
		Core environmental impact indicators (EN 15804+A2)							
GWP-total	kg CO2 eqv.	2.56E+03	1.02E+02	4.45E+01	0.00E+00	9.11E+00	2.45E+01	3.84E-02	-3.97E+02
GWP-f	kg CO2 eqv.	2.56E+03	1.01E+02	7.16E+00	0.00E+00	9.02E+00	2.41E+01	3.82E-02	-3.97E+02
GWP-b	kg CO2 eqv.	0.00E+00	1.07E-02	3.73E+01	0.00E+00	0.00E+00	3.37E-01	0.00E+00	9.80E-03
GWP-luc	kg CO2 eqv.	3.11E+00	9.33E-01	4.86E-03	0.00E+00	9.33E-02	3.85E-03	1.57E-04	-2.49E-01
ODP	kg CFC 11 eqv.	8.89E-06	1.17E-11	5.81E-12	0.00E+00	1.07E-12	6.63E-10	1.07E-13	-2.31E-10
AP	mol H+ eqv.	8.76E+00	6.60E-01	1.18E-02	0.00E+00	4.63E-02	3.70E-02	2.70E-04	-9.32E-01
EPfr	kg P eqv.	6.84E-01	2.47E-04	4.87E-05	0.00E+00	2.44E-05	1.45E-04	5.69E-08	-1.49E-04
EPmar	kg N eqv.	2.21E+00	3.10E-01	6.62E-03	0.00E+00	2.27E-02	1.21E-02	7.07E-05	-2.28E-01
EPter	mol N eqv.	2.37E+01	3.38E+00	5.20E-02	0.00E+00	2.47E-01	1.25E-01	7.71E-04	-2.46E+00
POCP	kg NMVOC eqv.	1.08E+01	6.64E-01	1.55E-02	0.00E+00	4.36E-02	2.90E-02	2.11E-04	-7.53E-01
ADP-e	kg Sb-eqv.	2.07E-03	6.27E-06	9.64E-08	0.00E+00	6.01E-07	4.41E-06	2.37E-09	-4.61E-06
ADP-f	MJ	2.69E+04	1.28E+03	2.22E+01	0.00E+00	1.15E+02	3.41E+02	5.01E-01	-3.10E+03
WU	m3 world eqv.	7.14E+02	3.83E-01	3.66E+00	0.00E+00	3.63E-02	6.94E-01	4.12E-03	-4.13E+00
		Additional environmental impact indicators (EN 15804+A2)							
PM	disease incidence	2.13E-04	7.65E-06	8.43E-08	0.00E+00	2.45E-07	2.92E-07	3.36E-09	-1.43E-05
IR	kBq U235 eqv.	3.99E+01	2.31E-01	8.83E-02	0.00E+00	2.10E-02	3.52E+00	5.70E-04	4.18E+00
ETP-fw	CTUe	8.82E+03	1.59E+03	2.12E+01	0.00E+00	1.50E+02	1.30E+02	4.31E-01	-4.76E+02
HTP-c	CTUh	2.30E-06	2.16E-08	4.94E-10	0.00E+00	2.02E-09	2.07E-08	6.67E-12	-6.13E-07
HTP-nc	CTUh	1.08E-05	1.16E-06	3.42E-08	0.00E+00	1.14E-07	9.30E-08	2.50E-10	1.61E-07
SQP	Pt	9.37E+03	5.13E+02	5.15E+00	0.00E+00	5.12E+01	2.23E+02	1.28E-01	1.87E+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): 1 ton of steel fibres worst-case product (EN 15804+A2)									
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	3.27E+03	8.55E+01	3.76E+00	0.00E+00	8.49E+00	3.21E+02	9.70E-02	3.89E+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	3.27E+03	8.55E+01	3.76E+00	0.00E+00	8.49E+00	3.21E+02	9.70E-02	3.89E+02
PENRE	MJ	2.65E+04	1.28E+03	2.22E+01	0.00E+00	1.15E+02	3.41E+02	5.01E-01	-3.10E+03
PENRM	MJ	3.81E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.69E+04	1.28E+03	2.22E+01	0.00E+00	1.15E+02	3.41E+02	5.01E-01	-3.10E+03
SM	Kg	2.40E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	7.35E-02	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	1.52E+01	4.17E-02	8.66E-02	0.00E+00	4.09E-03	1.13E-01	1.21E-04	-2.74E-01
HWD	Kg	4.96E+02	4.61E-08	6.64E-09	0.00E+00	4.18E-09	-6.67E-08	1.10E-10	1.04E-06
NHWD	Kg	1.87E+01	1.62E-01	6.79E+00	0.00E+00	1.52E-02	3.13E-01	2.50E+00	-5.95E+00
RWD	Kg	1.72E-01	1.67E-03	5.81E-04	0.00E+00	1.52E-04	3.33E-02	5.24E-06	4.30E-02
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	1.72E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E+02
MER	Kg	8.95E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	MJ	2.68E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.04E+01
EEE	MJ	1.70E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.86E+01
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, thermal | EE=Exported energy, electrical									

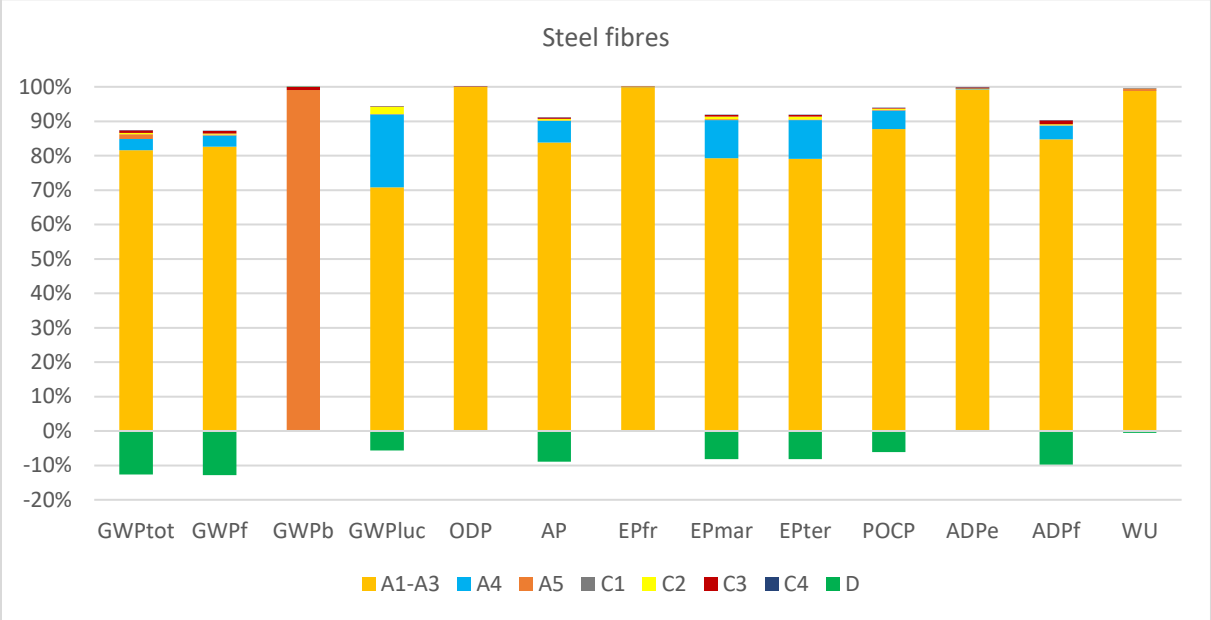
LCA results - information on biogenic carbon content at the factory gate: 1 ton of steel fibres worst-case product (EN 15804+A2)		
Parameter	**Unit**	**Value**
biogenic carbon content in product	kg C	0
biogenic carbon content in accompanying packaging	kg C	12.3
NOTE 1 kg biogenic carbon is equivalent to 44/12 kg CO2		

Concerning module A4, a default scenario of 1000 km by ship and 1000 km by truck has been calculated. The following table shows the core impact categories results for each route, allowing the user to adapt them to the actual location.

LCA results - Indicators describing environmental impacts based on the impact assessment (LCIA): 1 ton of steel fibres worst-case product (EN 15804+A2)				
Parameter	**Unit**	**A4**	**A4 (truck)**	**A4 (ship)**
		Core environmental impact indicators (EN 15804+A2)		
GWP-total	kg CO2 eqv.	1.02E+02	9.11E+01	1.07E+01
GWP-f	kg CO2 eqv.	1.01E+02	9.02E+01	1.07E+01
GWP-b	kg CO2 eqv.	1.07E-02	0.00E+00	0.00E+00
GWP-luc	kg CO2 eqv.	9.33E-01	9.33E-01	3.65E-04
ODP	kg CFC 11 eqv.	1.17E-11	1.07E-11	1.01E-12
AP	mol H+ eqv.	6.60E-01	4.63E-01	1.96E-01
EPfr	kg P eqv.	2.47E-04	2.44E-04	2.74E-06
EPmar	kg N eqv.	3.10E-01	2.27E-01	8.29E-02
EPter	mol N eqv.	3.38E+00	2.47E+00	9.08E-01
POCP	kg NMVOC eqv.	6.64E-01	4.36E-01	2.28E-01
ADP-e	kg Sb-eqv.	6.27E-06	6.01E-06	2.67E-07
ADP-f	MJ	1.28E+03	1.15E+03	1.25E+02
WU	m3 world eqv.	3.83E-01	3.63E-01	1.99E-02

6. LCA: Interpretation

The analysis of the contribution of each module to the impacts of steel fibres is presented in the graph below. These considerations apply to all steel fibres produced by Officine Maccaferri. The results show that the impacts are mainly driven by modules A1–A3, with the production phase accounting for between 75% and 99% across all impact categories. The contribution of modules C1–C4 is limited, representing around 1.5% for all the analysed impact categories. The benefit associated with module D is significant, reaching approximately 15% when compared to modules A1–A3.



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 Declarations for steel construction products; Version 2020-03-13 (draft)
Ecoinnovazione; 2025	Technical Report: LCA Study of Steel fibres products for Concrete Reinforcements and Spritz Beton
LCA for Experts	v. 10.9.0.17 software and the 2025.1 professional Sphera DB

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