

Environmental Product Declaration

according to ISO 14025 and EN 15804



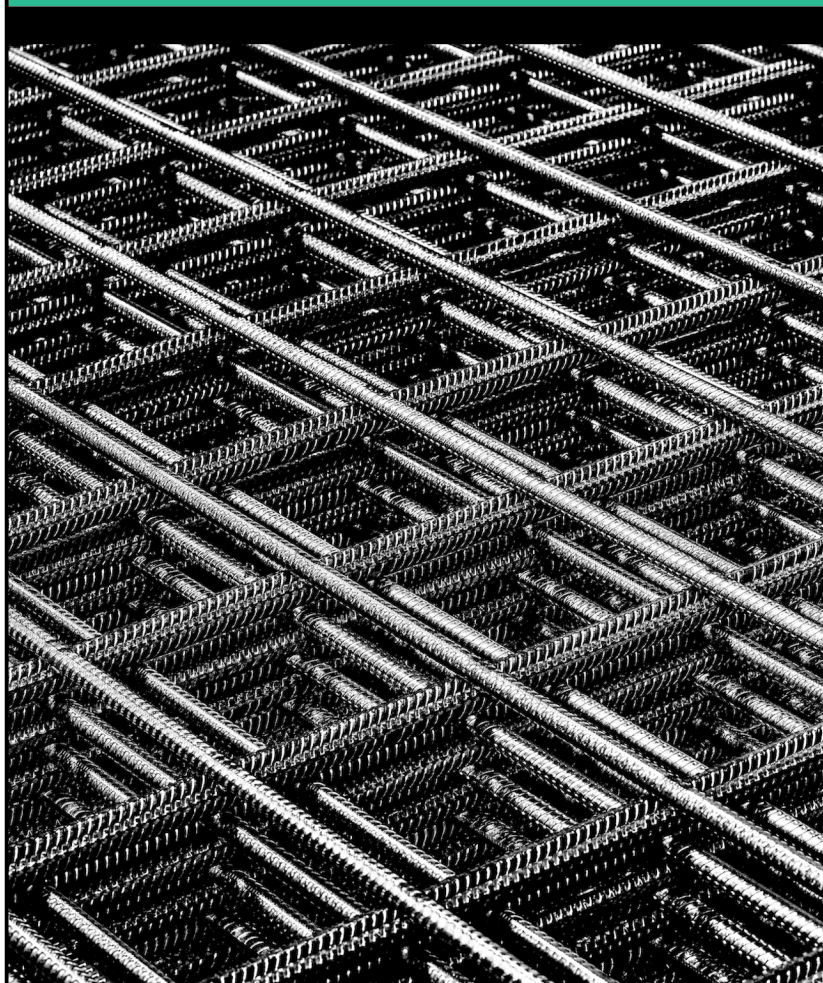
This declaration is for:
**Sustainable reinforcing steel from
100% secondary steel made with
renewable power.**

Provided by:
Van Merksteijn International B.V.



program operator
Stichting MRPI®
publisher
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www.mrpi.nl

MRPI® registration
1.1.00443.2023
date of first issue
25-05-2023
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25-05-2028





COMPANY INFORMATION



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PRODUCT

Sustainable reinforcing steel from 100% secondary steel made with renewable power.

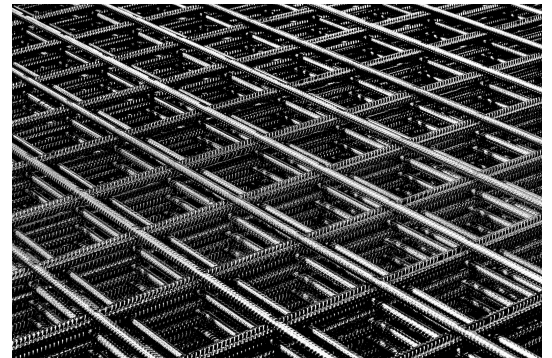
DECLARED UNIT/FUNCTIONAL UNIT

1 ton

DESCRIPTION OF PRODUCT

Sustainable produced reinforcing steel like welded fabric, coils and bars from secondary steel (scrap) and produced using renewable power.

VISUAL PRODUCT



MRPI® REGISTRATION

1.1.00443.2023

DATE OF ISSUE

25-05-2023

EXPIRY DATE

25-05-2028

MORE INFORMATION

Wapeningsproducten - Van Merksteijn International (van-merksteijn.com)

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by **Anne Kees Jeeninga , Advieslab V.O.F.**. The LCA study has been done by **Jasper Roosendaal, Royal HaskoningDHV**. The certificate is based on an LCA-dossier according to ISO14025 and EN15804+A2/Bepalingsmethode. It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPDs of construction products may not be comparable if they do not comply with EN15804+A2/Bepalingsmethode. Declaration of SVHC that are listed on the 'Candidate List of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

PROGRAM OPERATOR

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ir. J-P den Hollander, Managing director MRPI®

DEMONSTRATION OF VERIFICATION

CEN standard EN15804 serves as the core PCR[a]

Independent verification of the declaration and data,
according to EN ISO 14025:2010:
internal: external: X

Third party verifier:



Anne Kees Jeeninga , Advieslab V.O.F.

[a] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

Reinforcing steel – Van Merksteijn International

The wire rod produced from secondary steel (scrap) at Van Merksteijn’s steel mill in the Eemshaven, the Netherlands, is processed in reinforcing steel like welded fabric, coils, bars according to the European standards in the Almelo, the Netherlands, processing plant.

Reference service life = 100 years

About Van Mercksteijn International

Steel and Van Merksteijn are often mentioned in one breath. All over the world. No wonder, considering the fact that Van Merksteijn is widely seen as the number one authority in the field of reinforcement products and fencing panels.

Our reputation is the result of hard work, a forward-looking vision, and, of course, knowledge, experience, and craftsmanship. And do you know what distinguishes us even more than all of this? Our overall quality. Yes, we place high demands on quality. Very high. You might say, sky-high. In every conceivable area. It’s the only way we can be sure to keep delivering the very best. In terms of service, speed, problem-solving drive and partnership. In terms of sustainability, safety, working conditions.

It all starts with wire rod, then it just keeps going. It’s always been that way, and always will be.

Chemical composition - Input scrap steel	Bulk density	C	Mn	Si	P	S	Cr	Ni
Unit	[t/m3]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
Shreddered Scrap	0.7	0.27	0.58	0.21	0.045	0.04	0.12	0.09

COMPONENT > 1% of total mass

[%]

low-alloyed wiring rod, from electric arc furnace (EAF), 100% scrap (secondary steel), 100% electric (EU wind)

1000

SCOPE AND TYPE

The wire rod produced from secondary steel (scrap) at Van Merksteijn’s steel mill in the Eemshaven, the Netherlands, is processed in reinforcing steel like welded fabric, coils, bars according to the European standards in Almelo, the Netherlands, processing plant. At end-of-life, reinforced concrete is broken, the scrap metal recovered and recycled again. EPD is valid for the Dutch (NEN-EN15804 + A2) and European market (EN15804 + A2) and follows the general ISO14025 standard. The results are representative of an average output for wire rod from Van Merksteijn International produced in the Eemshaven, Groningen, the Netherlands. Production is fully electric based on renewable energy. The Almelo production site is processing the wire rod into several reinforcing steel products by amongst cold drawing and welding (for welded fabric).

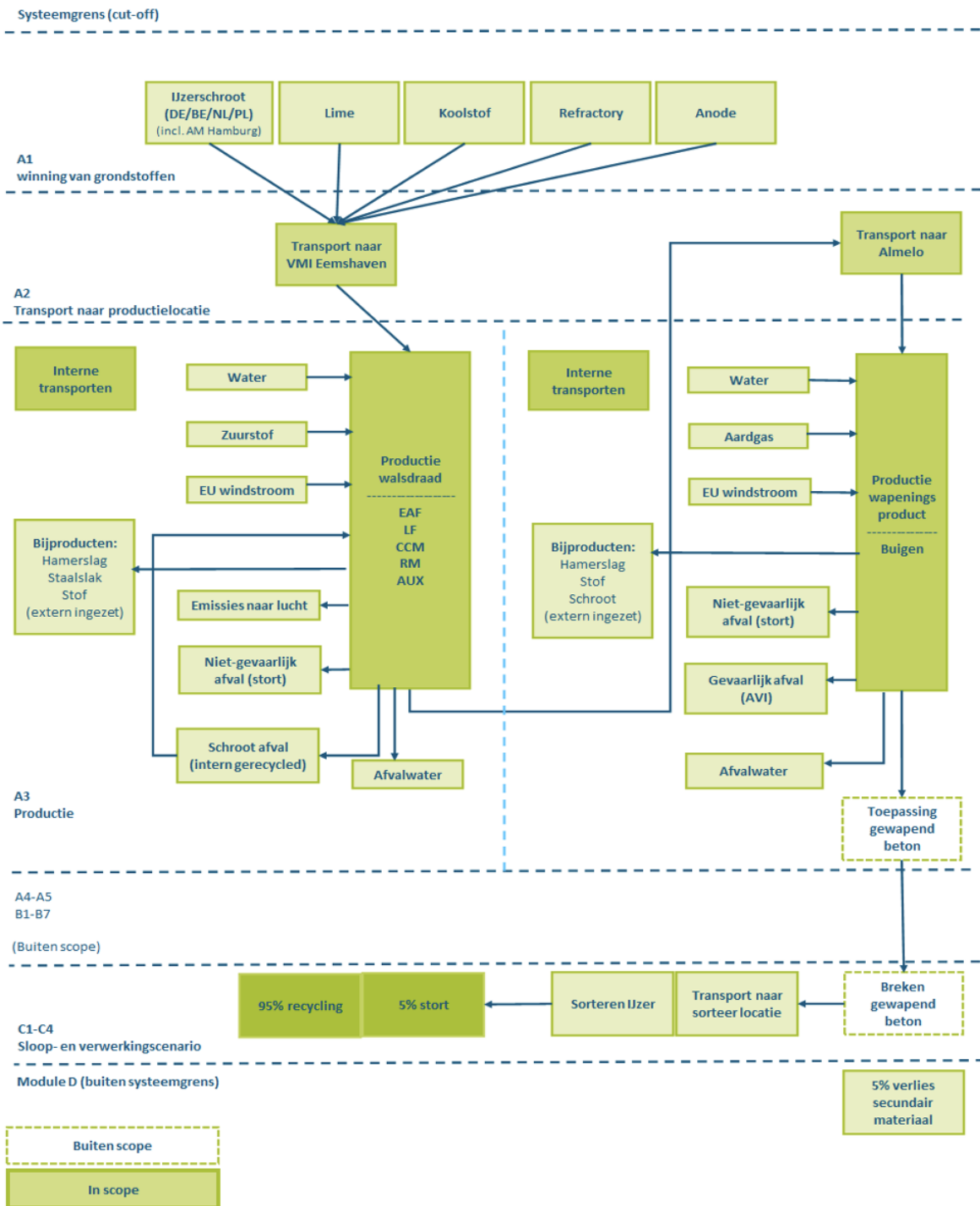
LCA is conducted using the Ecoinvent 3.6 database, Simapro 9.4 LCA software, and using the NMD processendatabase 3.5 for an NMD Category 1 LCA (MRPI+). Scope covers A1-A3 and C1-C4+D for

use in European-wide market

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE					USE STAGE					END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Raw material supply	Transport	Manufacturing	Transport gate to site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential	
x	x	x	ND	ND	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x	

X = Modules Assessed

ND = Not Declared



LCA process diagram according to EN 15804 (7.2.1)

REPRESENTATIVENESS

An average production output based on the plant configuration has been retained. The average is conservatively calculated (worst-case scenario) based on production demand of the Almelo processing plant projected to production at Eemshaven in VMI's Electric Arc Furnace. The quantities were tested and applied in the permit application (and permits obtained - such as the Nature (Wnb) and environmental (WABO) permit). In accordance with the PCR (2012:1) for construction materials, the calculation is tested for deviations from the average production year. Generic data should not be older than 10 years. Specific data should not be older than 5 years.

At all times, the choice has been made to calculate with processes and database references that match the geographical context of the production process. Standard profiles that do not match geographically have been adjusted to be geographically accurate location as representative as possible.

In accordance with the PCR for construction materials (2012:1), the input data should technologically mimic the physical reality of the represented production process. This rule of thumb has been applied for the LCA model of the wire rod - with a very detailed dataset from the factory configuration and operational usage numbers for 1 production year.

ENVIRONMENTAL IMPACT per functional unit or declared unit (indicators A1)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
ADPE	kg Sb eq.	1.95 E-3	1.45 E-4	1.98 E-3	4.07 E-3	0.00	7.70 E-5	1.37 E-3	2.41 E-6	4.42 E-4
ADPF	MJ	1.52 E+3	3.51 E+2	2.31 E+2	2.10 E+3	0.00	6.94 E+1	3.34 E+2	7.32 E+0	8.48 E+2
GWP	kg CO2 eq.	1.36 E+2	2.38 E+1	6.53 E+1	2.26 E+2	0.00	4.48 E+0	2.44 E+1	2.58 E-1	5.53 E+1
ODP	kg CFC11 eq.	1.20 E-5	2.08 E-6	1.46 E-6	1.55 E-5	0.00	8.49 E-7	3.05 E-6	8.61 E-8	3.87 E-6
POCP	kg ethene eq.	5.57 E-2	1.45 E-2	7.43 E-2	1.44 E-1	0.00	2.80 E-3	2.15 E-2	2.75 E-4	6.17 E-2
AP	kg SO2 eq.	5.42 E-1	1.21 E-1	1.64 E-1	8.28 E-1	0.00	1.66 E-2	2.40 E-1	1.89 E-3	2.19 E-1
EP	kg (PO4)3- eq.	8.54 E-2	2.28 E-2	1.59 E-2	1.24 E-1	0.00	3.21 E-3	3.06 E-2	3.65 E-4	3.09 E-2

Toxicity indicators for Dutch market

HTP	kg DCB eq.	7.17 E+1	2.12 E+0	5.80 E+1	1.32 E+2	0.00	9.69 E-1	2.96 E+1	1.17 E-1	3.27 E+1
FAETP	kg DCB eq.	7.03 E+0	1.64 E-2	5.64 E-1	7.61 E+0	0.00	4.07 E-2	5.51 E-1	2.77 E-3	1.07 E+0
MAETP	kg DCB eq.	6.90 E+3	8.23 E+1	1.84 E+3	8.81 E+3	0.00	1.09 E+2	2.40 E+3	9.91 E+0	2.24 E+3
TETP	kg DCB eq.	1.94 E-1	8.93 E-3	8.33 E-1	1.04 E+0	0.00	5.44 E-3	9.21 E-2	2.93 E-4	2.60 E+0
ECI	Euro	1.74 E+1	2.45 E+0	9.88 E+0	2.97 E+1	0.00	4.30 E-1	5.45 E+0	3.65 E-2	7.47 E+0
ADPF	kg Sb. eq.	7.32 E-1	1.69 E-1	1.11 E-1	1.01 E+0	0.00	3.34 E-2	1.60 E-1	3.52 E-3	4.08 E-1

- ADPE = Abiotic Depletion Potential for non-fossil resources
- ADPF = Abiotic Depletion Potential for fossil resources
- GWP = Global Warming Potential
- ODP = Depletion potential of the stratospheric ozone layer
- POCP = Formation potential of tropospheric ozone photochemical oxidants
- AP = Acidification Potential of land and water
- EP = Eutrophication Potential
- HTP = Human Toxicity Potential
- FAETP = Fresh water aquatic ecotoxicity potential
- MAETP = Marine aquatic ecotoxicity potential
- TETP = Terrestrial ecotoxicity potential
- ECI = Environmental Cost Indicator
- ADPF = Abiotic Depletion Potential for fossil resources expressed in [kg Sb-eq.]

ENVIRONMENTAL IMPACT per functional unit or declared unit (core indicators A2)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1.37 E+2	1.10 E+1	6.23 E+1	2.10 E+2	0.00	4.53 E+0	2.33 E+1	2.64 E-1	5.73 E+1
GWP-fossil	kg CO2 eq.	1.38 E+2	1.10 E+1	6.23 E+1	2.11 E+2	0.00	4.52 E+0	2.47 E+1	2.63 E-1	5.71 E+1
GWP-biogenic	kg CO2 eq.	-1.03 E+0	-4.64 E-3	1.50 E-2	-1.02 E+0	0.00	2.24 E-3	-1.41 E+0	5.22 E-4	1.26 E-1
GWP-luluc	kg CO2 eq.	9.19 E-2	1.04 E-3	2.09 E-2	1.14 E-1	0.00	1.13 E-3	2.76 E-2	7.34 E-5	7.07 E-2
ODP	kg CFC11 eq.	1.38 E-5	2.45 E-7	9.71 E-7	1.50 E-5	0.00	1.07 E-6	3.54 E-6	1.08 E-7	4.01 E-6
AP	mol H+ eq.	6.88 E-1	3.33 E-2	1.88 E-1	9.08 E-1	0.00	2.18 E-2	2.99 E-1	2.50 E-3	2.68 E-1
EP-freshwater	kg PO4 eq.	4.77 E-3	6.14 E-5	1.14 E-3	5.96 E-3	0.00	3.12 E-5	1.68 E-3	2.95 E-6	2.93 E-3
EP-marine	kg N eq.	1.73 E-1	4.72 E-3	2.82 E-2	2.06 E-1	0.00	7.21 E-3	6.60 E-2	8.60 E-4	5.52 E-2
EP-terrestrial	mol N eq.	1.98 E+0	5.31 E-2	3.07 E-1	2.34 E+0	0.00	7.96 E-2	7.66 E-1	9.48 E-3	5.85 E-1
POCP	kg NMVOC eq.	5.47 E-1	2.59 E-2	1.43 E-1	7.16 E-1	0.00	2.42 E-2	2.09 E-1	2.75 E-3	2.44 E-1
ADP-minerals & metals	kg Sb eq.	1.95 E-3	4.23 E-5	1.96 E-3	3.95 E-3	0.00	7.70 E-5	1.37 E-3	2.41 E-6	4.42 E-4
ADP-fossil	MJ, net calorific value	1.50 E+3	1.64 E+2	1.80 E+2	1.84 E+3	0.00	7.01 E+1	3.42 E+2	7.36 E+0	7.27 E+2
WDP	m3 world eq. deprived	2.80 E+1	3.99 E-1	6.46 E+0	3.49 E+1	0.00	2.20 E-1	3.44 E+0	3.30 E-1	2.46 E+1

GWP-total = Global Warming Potential total

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 Exceedence

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 Exceedence

POCP = Formation potential of tropospheric ozone photochemical oxidants

ADP-minerals&metals = Abiotic Depletion Potential for non fossil resources [2]

ADP-fossil = Abiotic Depletion for fossil resources potential [2]

WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

Disclaimer [2]

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

ENVIRONMENTAL IMPACT per functional unit or declared unit (additional indicators A2)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	6.67 E-6	1.41 E-7	1.63 E-6	8.44 E-6	0.00	3.35 E-7	3.76 E-6	4.85 E-8	5.81 E-6
IRP	kBq U235 eq.	6.68 E+0	5.97 E-2	4.24 E-1	7.16 E+0	0.00	3.02 E-1	1.70 E+0	3.02 E-2	2.46 E+0
ETP-fw	CTUe	3.16 E+3	4.22 E+1	1.05 E+3	4.26 E+3	0.00	5.12 E+1	1.47 E+3	4.77 E+0	1.42 E+3
HTP-c	CTUh	1.20 E-7	1.40 E-8	1.17 E-7	2.52 E-7	0.00	1.31 E-9	3.59 E-8	1.10 E-10	5.11 E-7
HTP-nc	CTUh	3.36 E-6	6.30 E-8	3.83 E-6	7.25 E-6	0.00	4.36 E-8	1.70 E-6	3.39 E-9	1.32 E-5
SQP	---	1.03 E+3	6.17 E+0	2.12 E+2	1.25 E+3	0.00	8.08 E+1	6.88 E+2	1.54 E+1	1.95 E+2

PM = Potential incidence of disease due to PM emissions

IRP = Potential Human exposure efficiency relative to U235 [1]

ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]

HTP-c = Potential Comparative Toxic Unit for humans [2]

HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]

SQP = Potential soil quality index [2]

Disclaimer [1]

- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer [2]

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

RESOURCE USE per functional unit or declared unit (A1 / A2)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERM	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	1.32 E+2	1.19 E+0	2.82 E+3	2.95 E+3	0.00	7.11 E-1	5.37 E+1	5.95 E-2	5.17 E+1
PENRE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENRM	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENRT	MJ	1.59 E+3	1.81 E+2	1.91 E+2	1.97 E+3	0.00	7.44 E+1	3.63 E+2	7.82 E+0	7.76 E+2
SM	kg	0.00	0.00	1.09 E+3	1.09 E+3	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m3	9.76 E-1	1.21 E-2	4.85 E-1	1.47 E+0	0.00	7.12 E-3	1.62 E-1	7.86 E-3	7.04 E-1

PERE = Use of renewable energy excluding renewable primary energy resources

PERM = Use of renewable energy resources used as raw materials

PERT = Total use of renewable primary energy resources

PENRE = Use of non-renewable primary energy resources excluding non-renewable 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 materials

RSF = Use of renewable secondary fuels

NRSF = Use of non renewable secondary fuels

FW = Use of net fresh water

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 / A2)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	kg	2.21 E-3	2.26 E-4	1.98 E-3	4.42 E-3	0.00	1.74 E-4	1.03 E-3	1.10 E-5	2.56 E-3
NHWD	kg	1.50 E+1	3.11 E-1	2.00 E+1	3.54 E+1	0.00	6.15 E+0	1.00 E+1	5.00 E+1	1.38 E+1
RWD	kg	7.70 E-3	6.93 E-5	4.46 E-4	8.21 E-3	0.00	4.78 E-4	2.03 E-3	4.83 E-5	2.07 E-3
CRU	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	0.00	0.00	0.00	0.00	0.00	0.00	9.50 E+2	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ETE	MJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

HWD = Hazardous Waste Disposed

RWD = Radioactive Waste Disposed

MFR = Materials for recycling

EEE = Exported Electrical Energy

NHWD = Non Hazardous Waste Disposed

CRU = Components for reuse

MER = Materials for energy recovery

ETE = Exported Thermal Energy

BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 / A2)

	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
BCCpr	kg C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BCCpa	kg C	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

BCCpr = Biogenic carbon content in product

BCCpa = Biogenic carbon content in packaging

CALCULATION RULES

End-of-life processing for phase C2-C4 + D is based on the standardised scenarios given by NEN-EN15804+A2 (version 1.1, march 2022) Bepalingsmethode milieuprestatie bouw (The Environmental Performance Assessment Method for Construction Works).

Economic allocation for steel slug and trimmings has not been applied. Since the economic value of these by-products are only created after extra processing economic allocation is not applicable in compliance with (NEN)-EN15804 en the 'Bepalingsmethode Milieuprestaties' applicable for the Dutch market.

In this study, all inputs and outputs - such as emissions, energy and material inputs - are included in the calculation according to the rules of the NEN-EN15804+A2 (Bepalingsmethode). In doing so, certain cut-off criteria may be used. The use of cut-off criteria is as follows.

Permitted cut-off criteria:

1. Capping inputs <1% energy consumption and <1% mass and <5% for each environmental impact category per module A1-A3, A4-A5, B1-B5, C3-C4 and D;
2. Cut-off capital goods in production phase (A1-A3) if <5% for each environmental impact category; In the life cycle inventory, several material flows were left out of scope in accordance with the cut-off criteria for cut-off of inputs <1% by mass and <5% for each environmental impact category. The cut-off is justified with a calculation of their total contributing environmental impacts per impact category and per module.

The infrastructure for the production has been cut-off based on the cut-off criteria. Based on the annual production numbers and impact per tonne wiring rod, infrastructure comes at <E-11.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Production and extraction of raw material- and energy flows (A1)

Extraction of raw materials. Iron scrap is collected mainly from the Netherlands, Belgium and Germany.

Transport between extraction and manufacturing (A2)

Transport during production. Transport between production sites takes place between suppliers and the Eemshaven production site. Internal transports take place for transshipment and within the factory gates of the production sites.

Manufacturing to product (A3)

Production. After transshipment, scrap is transported by conveyor belt to the electric arc furnace where it is melted. After melting, the liquid steel is poured into a so-called ladle. This is placed in the ladle furnace (LF). In the LF, a number of metallurgical processes are carried out after which the ladle is moved to the continuous casting machine (CCM). In the CCM, the liquid steel is poured into a continuous strand. In the EAF, oxygen, carbon (for foam slag formation), lime and dolomite (as synthetic slag former) and graphite electrodes are added. Wear takes place on the electrodes and refractory masonry. Carbon, lime and ferro-alloy additives (<1%) are then added again in the LF.

After the CCM, the continuous strand is fed into the rolling mill (RM) where it is rolled out into wire rod, layed into coils and strapped with steel wire. Input material is the liquid steel and water for cooling. The wire rod is transported to Almelo for final processing into rebar reinforcement product. EPD is for the end products including welded fabric, coils and bars, B500A, B500B.

Various waste streams arise during the production process. Steel scrap is 100% recycled internally by returning to the EAF, mill scale is recycled externally and sold as a by-product. This also applies to steel slag released during production and dust captured from the off-gas. Residual waste is also generated from production and there is water discharge and emissions to air. The emissions to air are guaranteed values on the basis of which a nature licence has been obtained and so used for the EIA. The emissions apply to the entire plant and can be found supported by evidence in the project file. At end-of-life 95% recycling is modelled following the prescribed end-of-life scenario for reinforcement steel by the NEN-EN15804+A2 (Bepalingsmethode).

DECLARATION OF SVHC

This product does not contain any substances on the SVHC candidate list.

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REMARKS

None