Environmental Product Declaration

according to ISO 14025 and EN 15804

This declaration is for:
Wire Rod based on 100% secondary steel produced with EU wind power.

Provided by:
Van Merksteijn International B.V.

program operator
Stichting MRPI®
publisher
Stichting MRPI®
www.mrpi.nl

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MRPI® REGISTRATION

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DATE OF ISSUE

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EXPIRY DATE

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PRODUCT

Wire Rod based on 100% secondary steel produced with EU wind power.

DECLARED UNIT/FUNCTIONAL UNIT

1 ton

DESCRIPTION OF PRODUCT

Sustainable produced wire rod in the usual steel grades for the production of reinforcement steel formed from 100% recycled steel produced in an Electric Arc Furnace with renewable power supply.

VISUAL PRODUCT

MORE INFORMATION

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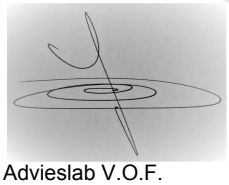
ir. J-P den Hollander, Managing director MRPI®

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

Wire rod – Van Merksteijn International

100% secondary steel (scrap) is collected mainly from the Netherlands, Belgium and Germany and shipped to the production facility of wire rod in the Eemshaven, the Netherlands. The produced wire rod is based on average production outputs for a year and is applied in reinforcement products once further processed. The production process does not use fossil fuels and is fully electric using renewable power. The wire rod steel grades are in compliance with SAE 1006, SAE 1008, SAE 1010, SAE 1012 and SAE 1015 as smooth wire rod which is the semi-finished product for the production of B500A ribbed wire or WS221 for ribbed wire which is the semi-finished product for the production of B500B, B500C and B550B ribbed wire rod.

Reference service life = 100 years

About Van Merksteijn

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

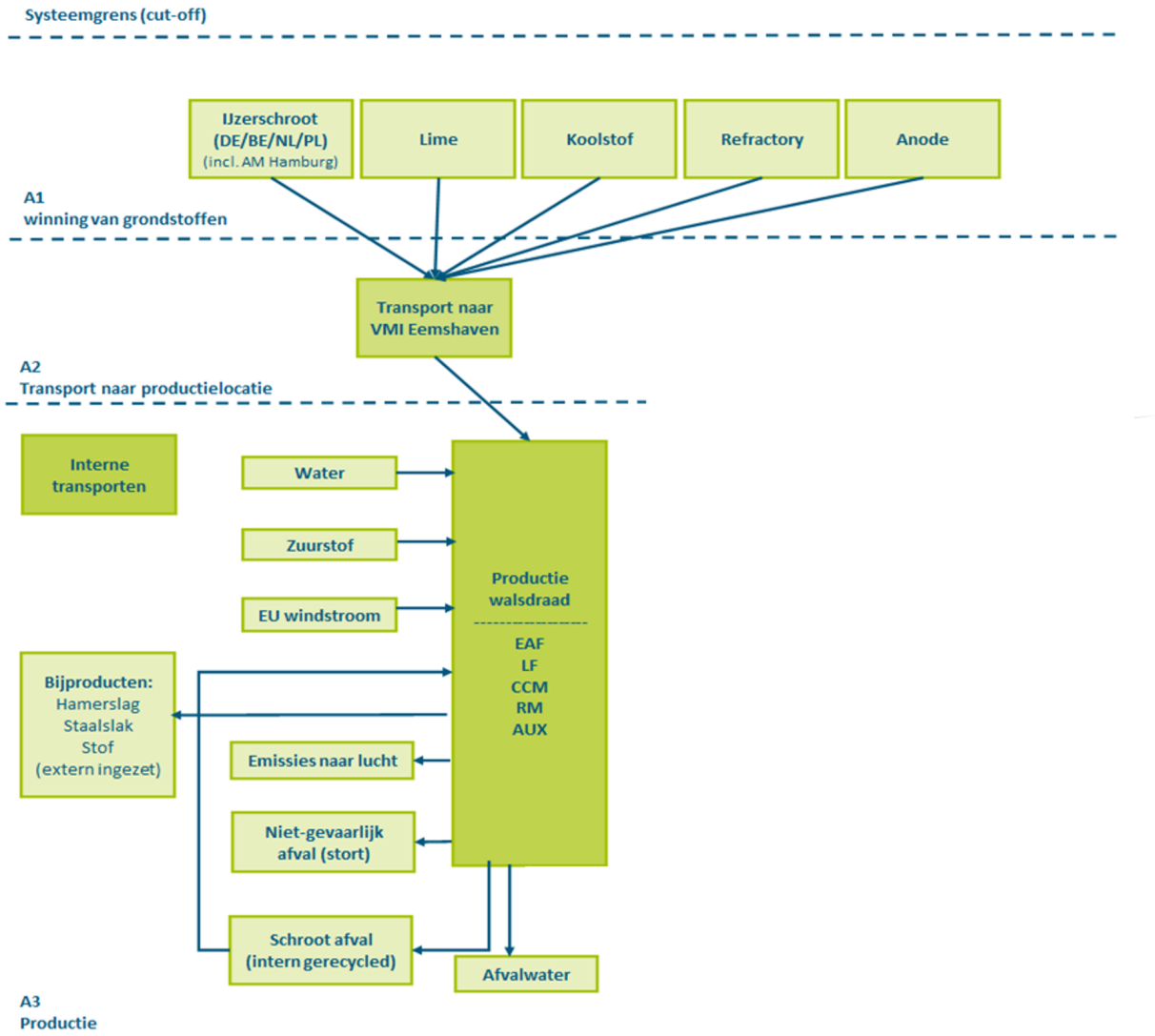
100% secondary steel (scrap) is collected mainly from the Netherlands, Belgium and Germany and shipped to the production facility of wire rod in the Eemshaven, the Netherlands. At end-of-life, reinforced concrete is broken, the scrap metal recovered and recycled again. EPD is valid for the Dutch (NEN-EN15804 + 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, Groninngen, the Netherlands. Production is fully electric based on renewable power. Separate EPD is available for Sustainable reinforcing steel to be used in reinforced concrete constructions. Based on 100% secondary steel and produced fully with renewable energy.

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
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
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
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 (100% EU wind). 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	3.86 E-5	1.83 E-3	3.82 E-3	0.00	7.70 E-5	1.37 E-3	2.41 E-6	4.42 E-4
ADPF	MJ	1.49 E+3	1.68 E+2	1.94 E+2	1.85 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	9.80 E+0	5.89 E+1	2.05 E+2	0.00	4.48 E+0	2.44 E+1	2.58 E-1	5.53 E+1
ODP	kg CFC11 eq.	1.18 E-5	1.98 E-7	8.38 E-7	1.29 E-5	0.00	8.49 E-7	3.05 E-6	8.61 E-8	3.87 E-6
POCP	kg ethene eq.	5.55 E-2	6.28 E-3	7.26 E-2	1.34 E-1	0.00	2.80 E-3	2.15 E-2	2.75 E-4	6.17 E-2
AP	kg SO2 eq.	5.41 E-1	2.57 E-2	1.50 E-1	7.17 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.	8.53 E-2	1.77 E-3	1.36 E-2	1.01 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	1.93 E+0	5.50 E+1	1.29 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	1.50 E-2	5.33 E-1	7.58 E+0	0.00	4.07 E-2	5.51 E-1	2.77 E-3	1.07 E+0
MAETP	kg DCB eq.	6.89 E+3	7.52 E+1	1.74 E+3	8.71 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	8.16 E-3	7.91 E-1	9.94 E-1	0.00	5.44 E-3	9.21 E-2	2.93 E-4	2.60 E+0
ECI	Euro	1.73 E+1	8.17 E-1	9.01 E+0	2.72 E+1	0.00	4.30 E-1	5.45 E+0	3.65 E-2	7.47 E+0
ADPF	kg Sb. eq.	7.16 E-1	8.09 E-2	9.35 E-2	8.91 E-1	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	1.00 E+1	6.11 E+1	2.08 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	1.00 E+1	6.11 E+1	2.09 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.	-1.04 E+0	-4.24 E-3	1.40 E-2	-1.03 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	9.52 E-4	1.95 E-2	1.12 E-1	0.00	1.13 E-3	2.76 E-2	7.34 E-5	7.07 E-2
ODP	kg CFC11 eq.	1.36 E-5	2.24 E-7	9.08 E-7	1.47 E-5	0.00	1.07 E-6	3.54 E-6	1.08 E-7	4.01 E-6
AP	mol H+ eq.	6.87 E-1	3.04 E-2	1.79 E-1	8.96 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.	4.76 E-3	5.61 E-5	1.06 E-3	5.88 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	4.32 E-3	2.69 E-2	2.04 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	4.85 E-2	2.93 E-1	2.32 E+0	0.00	7.96 E-2	7.66 E-1	9.48 E-3	5.85 E-1
POCP	kg NMVOC eq.	5.46 E-1	2.37 E-2	1.39 E-1	7.08 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	3.87 E-5	1.83 E-3	3.82 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	1.47 E+3	1.50 E+2	1.68 E+2	1.79 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	3.64 E-1	6.06 E+0	3.44 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	1.28 E-7	1.55 E-6	8.35 E-6	0.00	3.35 E-7	3.76 E-6	4.85 E-8	5.81 E-6
IRP	kBq U235 eq.	6.67 E+0	5.46 E-2	3.97 E-1	7.12 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	3.85 E+1	9.82 E+2	4.18 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	1.28 E-8	1.12 E-7	2.45 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	5.75 E-8	3.74 E-6	7.15 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	5.64 E+0	1.98 E+2	1.23 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	1.09 E+0	2.63 E+3	2.76 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	1.56 E+3	1.65 E+2	1.79 E+2	1.91 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	1.10 E-2	4.73 E-1	1.46 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	2.18 E-3	2.06 E-4	1.85 E-3	4.23 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	2.84 E-1	1.90 E+1	3.43 E+1	0.00	6.15 E+0	1.00 E+1	5.00 E+1	1.38 E+1
RWD	kg	7.69 E-3	6.33 E-5	4.17 E-4	8.17 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
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
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 transhipment 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 dololime (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 reinforcement product. EPD is for the wire rod stage. Seperate EPD is available for the reinforcing products produced from the wire rod covered in this EPD.

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 the nature (Wnb) and environmental (WABO) permits have 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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10. Pré Sustainability. 2022. Simapro 9.4.1

REMARKS

None