

# Environmental Product Declaration



In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

## ***Hot-rolled rebars***

from

### ***Arminox***

Programme:	The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a>
Programme operator:	EPD International AB
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*An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at [www.environdec.com](http://www.environdec.com)*



## General information

This LCA study has been conducted according to the requirements in EN 15804:2012+A2:2019. The LCA study is also conducted in accordance with PCR 2019:14 - Construction Products, as this is a requirement for EPDs published through The International EPD System.

The International EPD System also require that a LCA study is conducted in accordance with a complementary PCR (c-PCR) if a c-PCR exist. However, this is not the case for construction steel products since a CEN c-PCR for steel and aluminium structural products is still being developed.

## Programme information

<b>Programme:</b>	The International EPD® System
<b>Address:</b>	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
<b>Website:</b>	<a href="http://www.environdec.com">www.environdec.com</a>
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<b>Accountabilities for PCR, LCA and independent, third-party verification</b>
<b>Product Category Rules (PCR)</b>
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction Products (EN 15804:A2) v1.2.5 UN CPC code: 412 – products of iron or steel
PCR review was conducted by: IVL Swedish Environmental Research Institute, EPD International Secretariat
<b>Life Cycle Assessment (LCA)</b>
LCA accountability: Cecilie Holm Arentoft and Rikke Zuwa Kempf Bernberg, COWI A/S, Parallevej 2, 2800 Kgs. Lyngby, Denmark
<b>Third-party verification</b>
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:
<input checked="" type="checkbox"/> EPD verification by individual verifier
Third-party verifier: Pär Lindman, Miljögiraff AB, Independent approved Verifier by EPD International.
Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes       No

[Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier]

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

### Company information

Owner of the EPD: Arminox

Contact: Brian Andersen

Description of the organisation:

Arminox is one of the World's leading suppliers of stainless reinforcement steel in the construction industry. Arminox is certified by renowned international product standards and Arminox stainless reinforcement steel can be both used for new buildings as well as renovation in an aggressive environment, where damages to the concrete construction may occur. <sup>1</sup>

Arminox is ISO 9001:2015 certified and Arminox stainless reinforcement steel is certified in accordance to British Standard BS 6744:2016, BS8666, and Kontrollrådet in Norway.

Name and location of production site(s): Arminox located in Viborg at Jernvej 22 in Denmark.

For more information, see Arminox' webpage: [About Arminox Stainless](#).

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<sup>1</sup> [About Arminox](#)

## Product information

Product name: Stainless steel hot-rolled reinforcement bars

Product identification: This EPD describes stainless steel hot-rolled reinforcement bars produced by Arminox in Viborg. Rebars are a type of construction material used to reinforce concrete structures. Reinforcement rebars are embedded within concrete to enhance its tensile strength and provide structural integrity, especially in applications where the concrete might be subjected to tension forces or other forms of stress. Hot-rolled rebar is defined as products with a circular section with at least two rows of transverse ribs uniformly distributed throughout its length. The products are hot-rolled coil and rebar that are manufactured by straightening, cutting, and bending at the Arminox factory.

According to EN 10088-1 the classification of stainless steel is a minimum content of 10.5% chrome and maximum 1.2% carbon. Stainless steel alloys, used for reinforcement often have a higher content of chrome, as well as addition of nickel and maybe molybdenum to increase the corrosion resistance further.



*Figure 1 Hot-rolled steel picture*

### Product description:

Stainless steel rebars are distinct from conventional carbon steel rebars in that they are made from stainless steel, which is a type of alloy that contains chromium and other elements to provide corrosion resistance and durability. This corrosion resistance is a key advantage of stainless steel rebars, making them suitable for use in environments where exposure to moisture, chemicals, or other corrosive substances might degrade the performance of conventional carbon steel rebars.

Stainless steel rebars are commonly used in applications where the concrete structure will be exposed to harsh environments, such as marine environments, industrial settings, or areas with high levels of chloride ions (which can accelerate corrosion in carbon steel). They are also used in structures where long-term durability and reduced maintenance are important considerations.

Stainless steel rebars come in various grades and specifications, each designed for specific applications and environments. The selection of the appropriate grade of stainless-steel rebar depends on factors such as the intended use, exposure conditions, and engineering requirements of the concrete structure. Expected service life is 100-120 years.

UN CPC code: UN CPC code: 412 – products of iron or steel

Geographical scope: Denmark

## LCA information

The underlying Life Cycle Assessment (LCA) has been conducted in accordance with ISO 14040 and ISO 14044. The study is also performed according to PCR 2019:14

Product Category Rules (PCR) – Construction Products – Version 1.2.5 The International EPD System. Issued 2022-09-07. Valid until 2024-12-20

Construction products and construction services, EN15804:2012+A1:2013, and General Programme Instructions for the international EPD® System, version 4.0.

Declared unit: 1 metric tonne hot-rolled rebars from Arminox.

Reference service life: 50 years.

Time representativeness: This declaration, including data collection and the modelled foreground system including results, represents the production of hot-rolled rebars described as the declared products with the product descriptions presented above on the production site located Viborg, Denmark. The specific data for Arminox has been received from Arminox in February 2023. The data is based on the annual average of 2022. Background data are based on GaBi Professional 2023 and Ecoinvent v3.9 and are mostly less than 3 years old. All background processes are based on reference data from 2018 or newer or reviewed to be valid. Generally, the used background datasets are of high quality.

Foreground system: The product is produced using electricity from wind in production. Background system: Upstream and downstream processes are modelled using electricity grid mix.

Database(s) and LCA software used: Generic data and background data are based on the GaBi professional database version 2023 and the EcoInvent 3.9 database.

Description of system boundaries: Cradle to grave and module D (A + B + C + D). Yet, no environmental impacts are associated with the use stage (B1-B7).

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes.

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	GL O	GL O	DK	EUR	EUR	DK	DK	DK	DK	DK	DK	DK	GL O	GL O	GL O	EUR	GLO
Specific data used	>90%			>90%	>90%												

Figure 2: System boundary according to EN 15804:2012+A2:2019 for hot-rolled rebars.

**Product stage (A1-A3) includes:**

- A1 – Extraction and processing of raw materials
- A2 – Transport to the production site
- A3 – Manufacturing processes

The modules A1-A3 are aggregated and comprise the acquisition of all raw materials including products and energy, transport to the production site, packaging, and waste processing of both waste from manufacturing and treatment of raw material packaging waste up to the “end-of-waste” state or final disposal.

Hot-rolled rebars consist of scrap steel 70% and of primary steel 30% of the total product weight.

The material input for the steel has been modelled by having the exact scrap steel percentage obtained by a mass input of a mix of electric arc furnace (EAF) steel billet with 20% scrap and blast furnace (BF) which is 100% scrap steel. The energy related to producing the stainless steel has been by the process in GaBi called stainless steel white hot rolled coil (304). The process meets the criteria that it has a chromium content of more than 10.5% and a carbon content lower than 1.2%. Furthermore, the input is hot rolled and stainless as required.

The production waste from manufacturing consists of steel and is sent to recycling. Raw material packaging products polyester and LDPE plastic are incinerated, and steel band is sent to recycling. No benefits from recycling of waste or energy recovery from A3 is credited in module D.

The manufacture process consists of straightening, cutting, and bending into hot-rolled rebars.

Purchased electricity used in the manufacturing process of module A3 does not account for more than 30% of the GWP-GHG results of modules A1-A3. The EPD does therefore not include a declaration of the energy source behind the purchased electricity and its climate impact. However, the EPD is modelled with wind energy, since Arminox buys green certificates on their electricity, which are based on wind energy.

**Construction process stage (A4-A5) includes:**

The products are transported to the consumer by truck. An average distance of 400 km by truck to consumers in Scandinavia and Northern Germany is used. There is no waste associated with installation. There is no consumption of electricity associated with the installation.

The product packaging is sent to incineration and recycling.

**End of Life (C1-C4) includes:**

There is no electricity consumption associated with the deconstruction of the product.

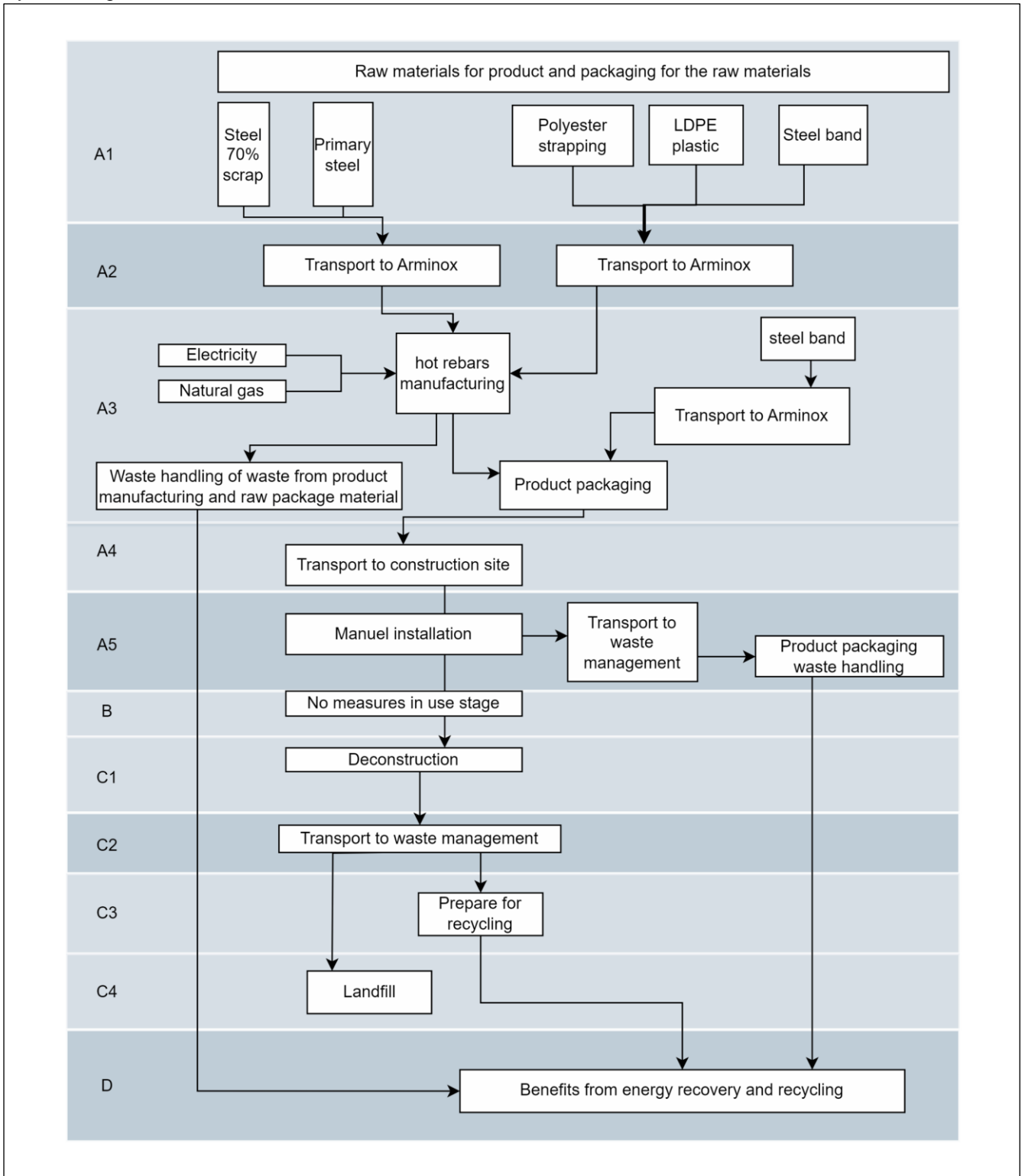
The product is transported 60 km by truck to a waste management facility in Denmark.

85% of hot-rolled rebars is recycled in the waste processing module C3 while 15% of rebars is going to landfill, disposal, C4.

**Re-use, recovery and recycling potential (D) includes:**

Module D includes material credits and thermal and electrical energy credits from waste handling of product packaging and product waste from the modules A5 and C3.

System diagram:





## Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight- % and kg C/kg
hotrolled coil	419	70%	0 resp. 0
hotcolled rebars	581	70%	0 resp. 0
	1000		
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Steel band	1	0.1%	0

The product itself has a weight of 1000 kg. Therefore, the product component is 1000 kg. It should be noted that the production has a waste, and therefore the total weight of raw materials used to produce the declared unit is 1002.51 kg. The packaging materials weight% per product is the weight excluding production waste.

Arminox has declared no dangerous substances from the candidate list of SVHC for Authorisation.

## Results of the environmental performance indicators

### Mandatory impact category indicators according to EN 15804

ENVIRONMENTAL IMPACTS PER TON										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	2.67E+03	3.34E+01	2.11E-02	0.00E+00	4.17E-01	5.29E+00	0.00E+00	7.26E+00	-1.75E+03
GWP-fossil	[kg CO <sub>2</sub> eq.]	2.66E+03	3.31E+01	2.11E-02	0.00E+00	3.93E-01	5.24E+00	0.00E+00	7.25E+00	-1.75E+03
GWP-biogenic	[kg CO <sub>2</sub> eq.]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP-luluc	[kg CO <sub>2</sub> eq.]	8.44E+00	3.02E-01	6.63E-05	0.00E+00	2.33E-02	4.77E-02	0.00E+00	7.13E-03	-6.50E-01
ODP	[kg CFC 11 eq.]	3.21E-09	4.25E-12	2.54E-14	0.00E+00	3.27E-13	6.71E-13	0.00E+00	1.16E-11	-1.09E-09
AP	[mol H <sup>+</sup> eq.]	2.17E+01	4.83E-02	5.62E-05	0.00E+00	1.91E-03	7.68E-03	0.00E+00	2.25E-02	-4.02E+00
EP-freshwater	[kg P eq.]	5.09E-03	1.19E-04	3.37E-08	0.00E+00	9.20E-06	1.88E-05	0.00E+00	6.35E-06	-1.31E-03
EP-marine	[kg N eq.]	2.86E+00	1.75E-02	1.51E-05	0.00E+00	4.55E-04	2.80E-03	0.00E+00	5.65E-03	-9.82E-01
EP-terrestrial	[mol N eq.]	3.14E+01	2.07E-01	1.68E-04	0.00E+00	5.78E-03	3.31E-02	0.00E+00	6.21E-02	-1.06E+01
POCP	[kg NMVOC eq.]	8.35E+00	4.23E-02	4.50E-05	0.00E+00	1.52E-03	6.75E-03	0.00E+00	1.77E-02	-3.36E+00
ADPm <sup>1</sup>	[kg Sb eq.]	3.53E-03	2.15E-06	7.73E-10	0.00E+00	1.66E-07	3.40E-07	0.00E+00	1.92E-07	-6.77E-05
ADPf <sup>1</sup>	[MJ]	4.11E+04	4.45E+02	2.99E-01	0.00E+00	3.43E+01	7.02E+01	0.00E+00	1.05E+02	-1.45E+04
WDP <sup>1</sup>	[m <sup>3</sup> world eq. deprived]	1.64E+03	3.94E-01	0.00E+00	0.00E+00	3.04E-02	6.23E-02	0.00E+00	0.00E+00	-2.31E+01
Caption	GWP-total = Globale 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 = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = Water Depletion Potential The numbers are declared in scientific notation, e.g., 1.95E+02. This number can also be written as: 1.95*10 <sup>2</sup> or 195, while 1.12E-11 is the same as 1.12*10 <sup>-11</sup> or 0.0000000000112.									
Disclaimer	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									

### Additional mandatory and voluntary impact category indicators

ADDITIONAL ENVIRONMENTAL IMPACTS PER TON										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	2.67E+03	3.34E+01	2.11E-02	0.00E+00	4.17E-01	5.29E+00	0.00E+00	7.26E+00	-1.75E+03
PM	[Disease incidence]	3.77E-04	3.99E-07	5.86E-10	0.00E+00	0.00E+00	6.36E-08	0.00E+00	2.43E-07	-5.81E-05
IRP <sup>2</sup>	[kBq U235 eq.]	1.85E+02	1.25E-01	4.06E-04	0.00E+00	0.00E+00	1.97E-02	0.00E+00	1.80E-01	-7.38E+00
ETP-fw <sup>1</sup>	[CTUe]	2.30E+04	3.16E+02	1.17E-01	0.00E+00	0.00E+00	4.99E+01	0.00E+00	2.98E+01	-3.11E+03
HTP-c <sup>1</sup>	[CTUh]	4.52E-04	6.46E-09	8.97E-12	0.00E+00	0.00E+00	1.02E-09	0.00E+00	3.69E-09	-2.35E-06
HTP-nc <sup>1</sup>	[CTUh]	3.90E-05	3.44E-07	8.42E-10	0.00E+00	0.00E+00	5.44E-08	0.00E+00	3.68E-07	-2.13E-05
SQP <sup>1</sup>	-	1.57E+04	1.86E+02	5.23E-02	0.00E+00	0.00E+00	2.93E+01	0.00E+00	9.79E+00	-8.82E+02
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless) The numbers are declared in scientific notation, e.g., 1.95E+02. This number can also be written as: 1.95*10 <sup>2</sup> or 195, while 1.12E-11 is the same as 1.12*10 <sup>-11</sup> or 0.0000000000112.									
Disclaimers	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									
	<sup>2</sup> 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.									

## Resource use indicators

RESOURCE USE PER TON										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PERE	[MJ]	1.20E+04	3.23E+01	2.56E-02	0.00E+00	2.50E+00	5.11E+00	0.00E+00	9.42E+00	-8.41E+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	0.00E+00
PERT	[MJ]	1.20E+04	3.23E+01	2.56E-02	0.00E+00	2.50E+00	5.11E+00	0.00E+00	9.42E+00	-8.41E+02
PENRE	[MJ]	4.11E+04	4.46E+02	2.99E-01	0.00E+00	3.44E+01	7.05E+01	0.00E+00	1.05E+02	-1.46E+04
PENRM	[MJ]	8.74E+01	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]	4.12E+04	4.46E+02	2.99E-01	0.00E+00	3.44E+01	7.05E+01	0.00E+00	1.05E+02	-1.46E+04
SM	[kg]	7.02E+02	0.00E+00	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	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	0.00E+00
FW	[m³]	5.56E+01	3.54E-02	8.51E-06	0.00E+00	2.73E-03	5.60E-03	0.00E+00	1.18E-03	-2.20E+00
Caption	<p>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 = Net use of fresh water</p> <p>The numbers are declared in scientific notation, e.g., 1.95E+02. This number can also be written as: 1.95*10<sup>2</sup> or 195, while 1.12E-11 is the same as 1.12*10<sup>-11</sup> or 0.0000000000112.</p>									

## Waste and output flow indicators

WASTE CATEGORIES AND OUTPUT FLOWS PER TON										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD	[kg]	2.28E-01	1.38E-09	1.87E-11	0.00E+00	0.00E+00	2.18E-10	0.00E+00	8.66E-09	0.00E+00
NHWD	[kg]	1.12E+02	6.80E-02	3.20E-01	0.00E+00	0.00E+00	1.07E-02	0.00E+00	1.50E+02	-2.17E+01
RWD	[kg]	1.74E+00	8.35E-04	2.74E-06	0.00E+00	0.00E+00	1.32E-04	0.00E+00	1.22E-03	-8.11E-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	0.00E+00
MFR	[kg]	2.72E+00	0.00E+00	7.50E-01	0.00E+00	0.00E+00	0.00E+00	8.50E+02	0.00E+00	0.00E+00
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	0.00E+00
EEE	[MJ]	1.21E+01	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]	2.16E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Caption	<p>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; EEE = Exported electrical energy; EET = Exported thermal energy</p> <p>The numbers are declared in scientific notation, e.g., 1.95E+02. This number can also be written as: 1.95*10<sup>2</sup> or 195, while 1.12E-11 is the same as 1.12*10<sup>-11</sup> or 0.0000000000112.</p>									

## Additional environmental information

EN 15804:2012+A1:2013 results

ENVIRONMENTAL IMPACTS PER TON										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP	[kg CO <sub>2</sub> -eq.]	2.56E+03	3.21E+01	1.99E-02	0.00E+00	2.05E-01	5.08E+00	0.00E+00	6.78E+00	-1.71E+03
ODP	[kg CFC11-eq.]	3.78E-09	5.00E-12	2.99E-14	0.00E+00	3.86E-13	7.90E-13	0.00E+00	1.36E-11	-1.29E-09
AP	[kg SO <sub>2</sub> -eq.]	1.86E+01	3.44E-02	4.42E-05	0.00E+00	1.44E-03	5.48E-03	0.00E+00	1.80E-02	-3.24E+00
EP	[kg PO <sub>4</sub> <sup>3-</sup> -eq.]	1.06E+00	7.53E-03	5.54E-06	0.00E+00	2.70E-04	1.20E-03	0.00E+00	1.99E-03	-3.41E-01
POCP	[kg ethene-eq.]	8.11E-01	0.00E+00	2.92E-06	0.00E+00	2.12E-04	0.00E+00	0.00E+00	1.65E-03	-5.68E-01
ADPE	[kg Sb-eq.]	6.57E-02	2.15E-06	7.91E-10	0.00E+00	1.66E-07	3.40E-07	0.00E+00	2.00E-07	-6.83E-05
ADPF	[MJ]	3.64E+04	4.37E+02	2.87E-01	0.00E+00	3.37E+01	6.91E+01	0.00E+00	9.97E+01	-1.41E+04
Caption	GWP = Global warming potential; ODP = Ozone depletion potential; AP = Acidification potential of soil and water; EP = Eutrophication potential; POCP = Photochemical ozone creation potential; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources The numbers are declared in scientific notation, e.g., 1.95E+02. This number can also be written as: 1.95*10 <sup>2</sup> or 195, while 1.12E-11 is the same as 1.12*10 <sup>-11</sup> or 0.0000000000112.									

The results for “Resource use indicators” and “Waste and output flow indicators” calculated regarding the old standard EN 15804:2012+A1:2013, is the same as calculated with the current standard EN 15804:2012+A2:2019.

The results of the current EPD refer to the functional unit of 1 ton of hot-rolled rebars. The calculated environmental impacts show that raw material module A1 has the largest contribution to the total impact in 19 out of the 19 environmental impact categories. The production of steel is generally the process with the highest contribution.

### Transport to the building site (A4)

Scenario information	Value	Unit
Road transport	GLO: Truck, Euro 6 A-C, more than 32t gross weight / 24.7t payload capacity Sphera <u-so>	
Fuel type	Diesel	-
Vehicle type	EURO 6	-
Weighted transport distance	201	km
Capacity utilization (including empty runs)	61%	%
Gross density of products transported		
Rebars	7,950	kg/m <sup>3</sup>

### Reference service life

RSL information		Unit
Reference service Life	50	Years

### End of life (C1-C4)

Scenario information	Rebars	Unit
Collected separately	0	kg
Collected with mixed waste	1000	kg
For reuse	0	kg
For recycling	850	kg
For energy recovery	0	kg
For final disposal	150	kg

## Re-use, recovery and recycling potential (D)

### Credit potential for A3.

Material	Hot-rolled rebars (kg)	GaBi process for incineration (energy credit)	GaBi process for recycling (material credit)
Stainless steel recycling	2.72		DE: BF steel billet
Polyester plastic	0.72	RER: Plastic packaging in municipal waste	
LDPE plastic	1.94	RER: Plastic packaging in municipal waste	

### Credit potential for A5

Material	Hot-rolled rebars (kg)	GaBi process for incineration (energy credit)	GaBi process for recycling (material credit)
Steel	0.75		DE: BF steel billet

The credit potential for the product in module C3 is 850 kg and material credit is BF steel billet.

Product	Material	Leaving A3/A5/C3			Credited in module D after removal of burden free input to avoid double crediting		
		EET (MJ)	EEE (MJ)	MFR(kg)	EET (MJ)	EEE (MJ)	MFR(kg)
Hot-rolled rebars	Plastic (A3)	21.60	12.10		21.60	12.10	
	Steel (A3)			2.72			2.72
	Steel band (A5)			0.75			0.75
	Hot-rolled rebar (C3)			850			850

### Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A2 chapter 7.4.1.

### Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A2 chapter 7.4.2.

## References

General Programme Instructions of the International EPD® System. Version 4.0.

*Other references to be added, e.g. c-PCR used*

EN 15804 + A2:2019 - "Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products"

EN 15804 + A1:2013 - "Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products"

PCR 2019:14 - Product Category Rules (PCR) – Construction Products – Version 1.2.5. The International EPD System. Issued 2022-07-08. Valid until 2024-12-20.

Arminox Project report covering the following EPDs: S-P-10576 Hot-rolled rebars  
S-P-10575 Cold-rolled rebars, S-P-10341 Steel ties.

