



**Environmental
Product
Declaration**

According to EN15804+A2 (+indicators A1)



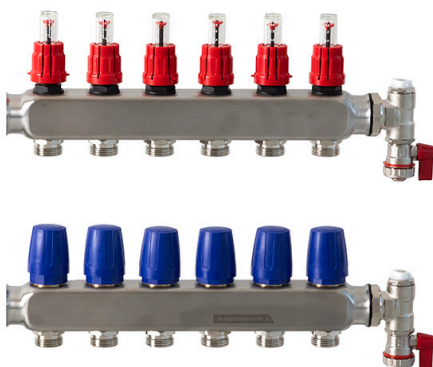
This declaration is for:

**Armaturjonsson Gulvvarmefordelere
Rustfritt stål 2-15 kurser**

Provided by:

MAGNUM Heating B.V.

Armaturjonsson 



program operator

Stichting MRPI®

publisher

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MRPI® registration

1.1.00553.2024

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COMPANY INFORMATION

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PRODUCT

Armaturjonsson Gulvvarmefordelere

Rustfritt stål 2-15 kurser

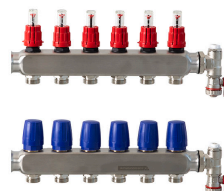
DECLARED UNIT/FUNCTIONAL UNIT

1 piece, with a reference number of groups of five. The environmental profile of other number of groups within the range of 2-15 groups can be calculated with the scalable and non-scalable environmental profiles.

DESCRIPTION OF PRODUCT

Armaturjonsson Gulvvarmefordelere Open manifold is used in low temperature installations and is made of 4301 stainless steel. The manifolds are produced in a range of 2-15 groups.

VISUAL PRODUCT



MRPI® REGISTRATION

1.1.00553.2024

DATE OF ISSUE

13-6-2024

EXPIRY DATE

13-6-2029

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Gert-Jan Vroege, Eco Intelligence. The LCA study has been done by Benthe Vermaas and R.A. Kraaijenbrink, LBP|SIGHT. The certificate is based on an LCA-dossier according to EN15804+A2 (+indicators A1). It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPD's of construction products may not be comparable if they do not comply with EN15804+A2. 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.

MORE INFORMATION

<https://www.armaturjonsson.no/produkter/vannb%C3%A5ren-gulvvarme/armaturjonsson-gulvvarmefordelere/armaturjonsson-gulvvarmefordelere>

PROGRAM OPERATOR

Stichting MRPI®

Kingsfordweg 151

1043 GR

Amsterdam

DEMONSTRATION OF VERIFICATION

CEN standard EN15804 serves as the core PCR(a)

Independent verification of the declaration an data according to EN15804+A2 (+indicators A1)

internal: external: x

Third party verifier: Gert-Jan Vroege, Eco Intelligence

[a] PCR = Product Category Rules

Ing. L. L. Oosterveen MSc. MBA

Managing Director MRPI

DETAILED PRODUCT DESCRIPTION

Armaturjonsson Gulvvarmefordelere rustfritt stål Open manifold is used in low temperature installations and is made of the very high quality 4301 stainless steel. This manifold is fitted as standard with 1" ball valves, 1 automatic air vent, 2 drain valves and a pressure gauge. The manifolds are produced in a range of 2-15 groups. The reference service life is 25 years.

Production process

All product parts of the manifold are purchased and assembled by MAGNUM in the production site. Hand tools are used for assembly, and all manifolds undergo a leakage test. The manifolds are packed in cardboard boxes for transport.

Technical details, specification and application

The specifications of the Armaturjonsson Gulvvarmefordelere rustfritt stål Open LT are given in the table below. The manifolds can be applied for district heating, pellet stoves, solar heat (with buffer tank), heat pumps and central heating boilers.

Technical details:

- The body of this manifold is stainless steel 4301
- Thermostatic group valves M30x 1,5 suitable for MAGNUM actuators
- Groups fitted with professional flow meters with a range of 0-2,5L/min
- Group connections suitable for ¾" Eurocones
- Primary connection 1" Sealable by ball valves
- Manifold is supplied with mounting material as standard
- Ball valve 1" with red handle
- Flow meter Camflux 2,5 L/m- 1/2"
- Pressure gauge 40 mm axial 1/8"
- Automatic air vent nickel-plated 1/2" + O-ring
- Ball valve 1" with blue handle

Specifications	Yes / No
Valve on inlet	Yes
Thermostat on inlet	No
Pump	No
Flow Meter	Yes
Thermometer	No
Pressure gauge	Yes
Air vent	Yes
Valve on return	Yes
RTL valve on return	No
In control valve mixing quantity	No
Stop valve between supply and return	No
Inspection	CE

Material components

Armaturjonsson Gulvvarmefordelere rustfritt stål Open LT, floor heating manifolds are manufactured in a range of 2 to 15 groups, consisting of fifteen different product parts (and ten material components). The number of parts used per product parts can either be dependent on the number of groups applied, or be a fixed number independent of the number of groups applied. Thereby, the material composition is dependent on the applied number of groups. The material composition of the reference product, the Armaturjonsson Gulvvarmefordelere rustfritt stål Open LT with five groups, is given in the table below.

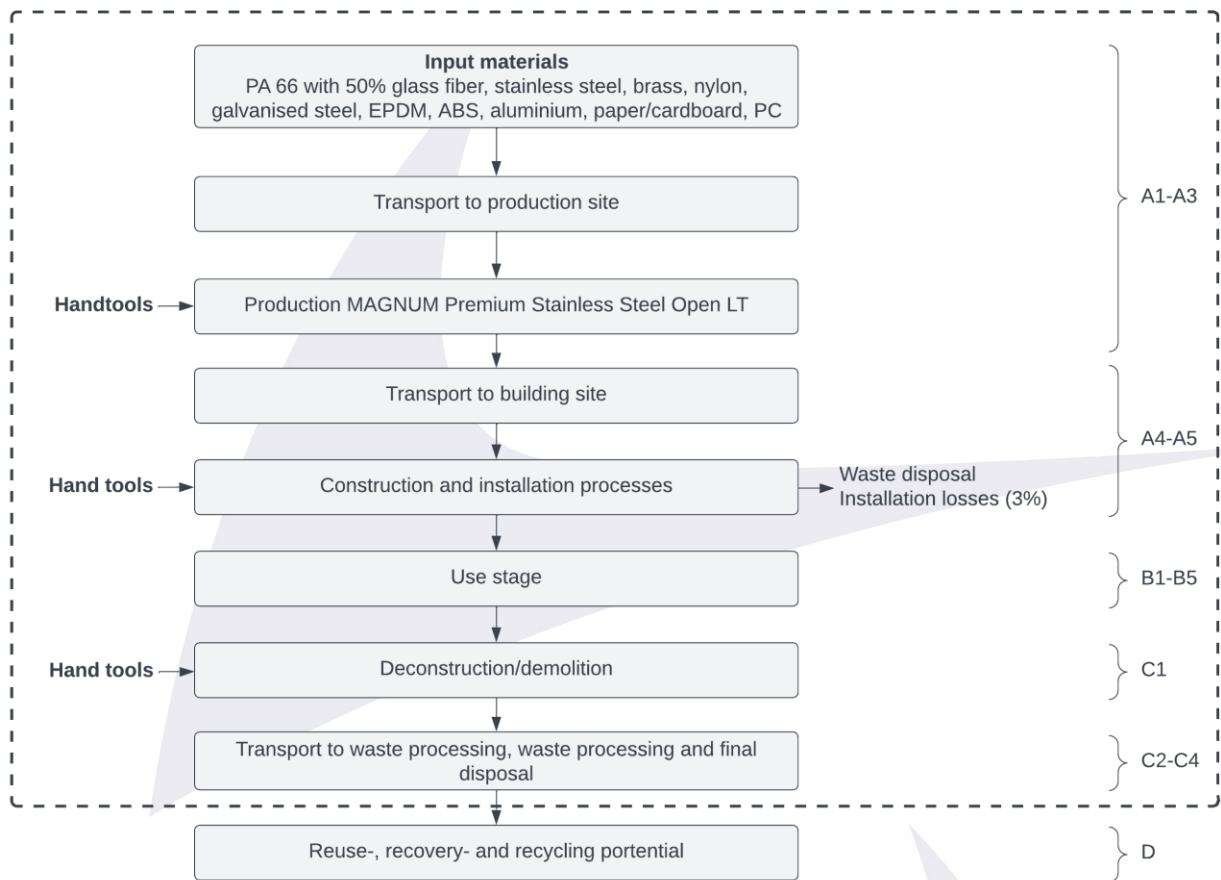
Component (> 1%)	(%)
Polyamide 66 (PA 66) with 50% glass fibre	1%
Stainless steel	26%
Brass	59%
Nylon	1%
Galvanised steel	1%
Ethylene Propylene Diene Monomer (EPDM)	1%
Acrylonitrile Butadiene Styrene (ABS)	5%
Polymethyl methacrylate (PMMA)	1%
Aluminium	1%
Paper/cardboard	5%
Polycarbonate	<1%

SCOPE AND TYPE

This EPD is based on a Cradle-to-Grave LCA of Armaturjonsson Gulvvarmefordelere rustfritt stål Open LT, produced in a single MAGNUM production site in Tholen. The MAGNUM manifolds are installed in the Netherlands and at its end-of-life, it is treated according to the Dutch end-of-life scenarios. As a result, the EPD is representative for the Dutch market.

Company-specific data for the production stage has been collected by Magnum Projects services B.V. The LCI data has been evaluated by the LCA-practitioner and checked by the EPD verifier. Generic data has been used for the background processes, originating from the Ecoinvent 3.6 Cut-off database. For the calculation of the LCA results, the software program SimaPro 9.5.0.0 has been used.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USER 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	X	X	X	X	X	X	X	ND	ND	X	X	X	X	X
X= Modules Assessed ND= Not Declared																



REPRESENTATIVENESS

The data used for the LCA are representative for the production of the MAGNUM Premium Stainless Steel Open LT, manufactured by MAGNUM Heating B.V. in Tholen, the Netherlands.

ENVIRONMENTAL IMPACT per 1 piece, with reference number of groups of 5 (A1)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADPE	kg Sb eq.				8,23 E-02	2,78 E-06	2,47 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,20 E-06	7,17 E-06	2,61 E-08	-2,25 E-03
GWP	kg CO2 eq.				2,41 E+01	1,09 E-01	7,72 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,68 E-02	1,14 E+00	1,24 E-02	-5,78 E+00
ODP	Kg CFC11 eq.				1,27 E-06	1,93 E-08	4,16 E-08	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	8,30 E-09	3,93 E-08	7,34 E-10	-3,20 E-03
POCP	Kg ethene eq.				6,03 E-02	6,58 E-05	1,83 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,82 E-05	1,34 E-04	4,24 E-06	-2,00 E-02
AP	kg SO2 eq.				1,17 E+00	4,79 E-04	3,51 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,06 E-04	1,43 E-03	1,77 E-05	-3,44 E-01
EP	kg (PO4) 3- eq.				6,64 E-02	9,41 E-05	2,02 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,04 E-05	2,03 E-04	5,77 E-06	-2,07 E-02

Toxicity indicators for Dutch market

HTP	kg DCB- Eq				2,94 E+02	4,59 E-02	8,83 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,24 E-09	2,04 E-08	4,65 E-10	-9,81 E-07
FAETP	kg DCB- Eq				4,45 E+00	1,34 E-03	1,34 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,98 E-03	1,03 E-02	3,09 E-04	-1,09 E+01
MAETP	kg DCB- Eq				1,91 E+04	4,82 E+00	5,75 E+02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	6,34 E-01	1,73 E+01	9,05 E-01	-4,21 E+03
TETP	kg DCB- Eq				6,61 E-01	1,62 E-04	1,99 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,06 E-11	3,86 E-10	2,63 E-12	-6,55 E-08
ECI	euro				3,52 E+01	1,31 E-02	1,06 E+00	0,00	0,00	0,00	0,00	0,00	ND	ND	0,00	6,94 E-10	1,12 E-08	1,78 E-10	-5,05 E-06
ADPF	kg Sb eq.				1,61 E-01	8,01 E-04	4,97 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	6,17 E-01	3,30 E+00	1,63 E-01	-5,01 E+01

- 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 1 piece, with reference number of groups of 5 (core indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.				2,51 E+01	1,10 E-01	7,89 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,72 E-02	7,62 E-01	-3,03 E-02	-1,51 E+01
GWP-fossil	kg CO2 eq.				2,47 E+01	1,10 E-01	7,88 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,72 E-02	1,14 E+00	1,20 E-02	-1,51 E+01
GWP-biogenic	kg CO2 eq.				4,23 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	-3,81 E-01	-4,23 E-02	0,00 E+00
GWP-luluc	kg CO2 eq.				3,51 E-02	4,03 E-05	1,06 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,73 E-05	1,89 E-04	1,04 E-06	-3,20 E-03
ODP	kg CFC11 eq.				1,39 E-06	2,43 E-08	4,57 E-08	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,04 E-08	4,14 E-08	9,09 E-10	-4,50 E-03
AP	mol H+ eq.				1,34 E+00	6,37 E-04	4,03 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,74 E-04	1,81 E-03	2,36 E-05	-1,03 E+01
EP-freshwater	kg PO4 eq.				1,06 E-02	1,11 E-06	3,20 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,76 E-07	1,00 E-05	4,26 E-08	-3,09 E-03
EP-marine	kg N eq.				7,48 E-02	2,25 E-04	2,32 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	9,64 E-05	4,40 E-04	1,27 E-05	-2,10 E-02
EP-terrestrial	mol N eq.				1,07 E+00	2,48 E-03	3,29 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,06 E-03	5,05 E-03	9,16 E-05	-3,72 E+01
POCP	kg NMVOC eq.				2,89 E-01	7,07 E-04	8,90 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,03 E-04	1,36 E-03	2,91 E-05	-8,65 E-02
ADP-minerals & metals	kg Sb eq.				8,23 E-02	2,78 E-06	2,47 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,20 E-06	7,17 E-06	2,61 E-08	-1,82 E-03
ADP-fossil	MJ, net calorific value				2,93 E+02	1,66 E+00	9,06 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	7,12 E-01	2,17 E+00	6,85 E-02	-6,17 E+01
WDP	m3 world eq. Deprived				1,49 E+01	5,93 E-03	4,51 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,55 E-03	5,94 E-02	1,45 E-03	-3,69 E+00

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 experienced with the indicator.

ENVIRONMENTAL IMPACT per 1 piece, with reference number of groups of 5 (additional indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence				3,61 E-06	9,87 E-09	1,11 E-07	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,24 E-09	2,04 E-08	4,65 E-10	-9,81 E-07
IRP	kBq U235 eq.				9,16 E-01	6,94 E-03	2,85 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,98 E-03	1,03 E-02	3,09 E-04	-1,09 E+01
ETP-fw	CTUe				1,30 E+04	1,48 E+00	3,90 E+02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	6,34 E-01	1,73 E+01	9,05 E-01	-4,21 E+03
HTP-c	CTUh				2,97 E-07	4,80 E-11	9,00 E-09	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,06 E-11	3,86 E-10	2,63 E-12	-6,55 E-08
HTP-nc	CTUh				1,52 E-05	1,62 E-09	4,57 E-07	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	6,94 E-10	1,12 E-08	1,78 E-10	-5,05 E-06
SQP	----				2,49 E+02	1,44 E+00	7,73 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	6,17 E-01	3,30 E+00	1,63 E-01	-5,01 E+01

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.

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 experienced with the indicator.

OUTPUT FLOWS AND WASTE CATEGORIES per 1 piece, with reference number of groups of 5 (A1 and A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg				1,05 E-02	4,20 E-06	3,15 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,80 E-06	6,00 E-06	9,28 E-08	-2,49 E-04
NHWD	kg				1,29 E+01	1,05 E-01	4,39 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,51 E-02	6,44 E-02	2,84 E-01	-2,19 E+00
RWD	kg				7,91 E-04	1,09 E-05	2,52 E-05	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,67 E-06	1,14 E-05	4,32 E-07	-1,32 E-04
CRU	kg				0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
MFR	kg				0,00 E+00	0,00 E+00	1,46 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
MER	kg				0,00 E+00	0,00 E+00	2,68 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	6,38 E-01	0,00 E+00	0,00 E+00
EEE	MJ				0,00 E+00	0,00 E+00	1,21 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	3,04 E+00	0,00 E+00	0,00 E+00
ETE	MJ				0,00 E+00	0,00 E+00	8,04 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	5,24 E+00	0,00 E+00	0,00 E+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

RESOURCE USE per 1 piece, with reference number of groups of 5 (A1 and A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ				6,14 E+01	2E -02	2E +00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	9E -03	3E- 01	3E- 03	-1E+ 01
PERM	MJ				4,10 E+00	0E +00	0E +00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E +00	0E +00	0E +00	0E +00
PERT	MJ				6,55 E+01	2E -02	2E +00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	9E -03	3E- 01	3E- 03	-1E +01
PENRE	MJ				2,97 E+02	2E +00	1E +01	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	8E -01	2E +00	7E- 02	-6E +01
PENRM	MJ				1,64 E+01	0E +00	0E +00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E +00	0E +00	0E+ 00	0E+ 00
PENRT	MJ				3,13 E+02	2E +00	1E +01	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	8E -01	2E +00	7E- 02	-6E +01
SM	kg				1,19 E+00	0E +00	0E +00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E +00	0E +00	0E+ 00	0E+ 00
RSF	MJ				0,00 E+00	0E +00	0E +00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E +00	0E +00	0E+ 00	0E+ 00
NRSF	MJ				0,00 E+00	0E +00	0E +00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E +00	0E +00	0E+ 00	0E+ 00
FW	m3				4,04 E-01	2E- 04	1E- 02	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	9E- 05	2E- 03	8E- 05	-9E- 02

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

BIOGENIC CARBON CONTENT per 1 piece, with reference number of groups of 5 (A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
BBCpr	Kg C				0,00 E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	0E+00	0E+00	0E+00	0E+00
BCCpa	kg C				4,23 E-01	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	0E+00	-4E- 01	-4E- 02	0E+00

BBCpr = Biogenic carbon content in product

BCCpa = Biogenic carbon content in packaging

CALCULATION RULES

The reference year of this study is 2022-2023. The LCA was carried out in accordance with the requirements and guidelines of the NMD "Bepalingsmethode Milieuprestatie Bouwwerken" (Environmental Performance Assessment Method for Construction Works) (version 1.1, March 2022) and the NMD-Verification protocol (version 1.1, May 2022). The NMD-Assessment method is based on ISO 14040 - ISO14044 and NEN-EN 15804:2012 + A2 (2019).

Allocation

All material inputs and outputs have been collected at the product level.

Cut-off

In line with paragraph 6.3.6 of the EN15804:A2, all significant input and output streams must be included in the calculations.

- A cut-off process may not contribute to more than 1% of the energy usage and may not exceed 1% of the mass. Processes excluded from the calculations may not contribute to more than 5% of the total energy usage or total mass.
- The sum of the processes excluded from the calculations, may not contribute to more than 5% of the total energy usage or total mass.

In line with EN 15804 the following processes are not considered within the system boundaries of this LCA:

- Overhead processes, like office departments, personal transportation, etc.
- Production, maintenance and the end-of-life stage of capital goods like buildings, machinery, etc.

It is not to be expected for the above-mentioned processes to contribute significantly to the environmental profile of the Armaturjonsson Gulvvarmefordelere rustfritt stål Open LT.

SENARIOS AND ADDITIONAL TECHNICAL INFORMATION

A1-A3 - Production

Armaturjonsson Gulvvarmefordelere rustfritt stål Open LT, floor heating manifolds are manufactured in a range of 2 to 15 groups. All product parts of the manifolds are purchased and assembled by MAGNUM in the production site. The manifolds are assembled with fifteen different product parts. The number of parts used per product parts can either be dependent on the number of groups applied, such as the flow meter, or be a fixed number independent of the number of groups applied, such as the ball valve. Hand tools are used for assembly, and all manifolds undergo a leakage test. The manifolds are packed in cardboard boxes for transport.

A4 - Transport to building site

In line with the Bepalingsmethode, the Armaturjonsson Gulvvarmefordelere are transported by freight lorry and cover a distance of 150 km.

A5 - Installation

It is assumed that no impacts are related to the installation processes of the product, as the Armaturjonsson Gulvvarme manifolds are installed manually. In accordance with the Bepalingsmethode, there is a material loss of 3% during this stage. The packaging materials are processed as waste in this stage in accordance with the prescribed set of scenario values for the end-of-life stage by the Bepalingsmethode.

B1-B5 - Use

There are no emissions or environmental impacts during the use stage. The use stage is declared as '0'.

C1 - Demolition

It is assumed that no impacts are related to the demolition of the product, as the Armaturjonsson Gulvvarme manifolds are dismantled manually.

C2-C4 - Transport, processing and disposal EoL

The waste in this stage is also processed by the set of scenario values for the end-of-life-stage, as prescribed by the Bepalingsmethode. Thereby, all ten material components are processed according to the scenario's listed in the table below.

Module D - Loads and benefits beyond the system boundaries

The recycling/incineration loads and benefits of the Armaturjonsson Gulvvarme manifolds, resulting from the end-of-life scenario's as described above, are included in this module.

The recycling/incineration loads and benefits, after reaching end-of-waste, of the losses during construction and that of the packaging materials (A5) are also included in module D.

Material component	Landfill (%)	Incineration (%)	Recycling (%)	C2 transport distance (km)
Polyamide 66 (PA 66) with 50% glass fibre	0	100	0	150
Stainless steel	1	0	99	50,5
Brass	5	0	95	52,5
Nylon	20	80	0	140
Galvanised steel	5	0	95	52,5
Ethylene Propylene Diene Monomer (EPDM)	10	85	5	140
Acrylonitrile Butadiene Styrene (ABS)	20	80	0	140
Aluminium	3	3	94	54,5
Paper/cardboard	10	85	5	140
Polycarbonate (PC)	20	80	0	140

DECLARATION OF SVHC

The product does not contain materials listed in the "Candidate list of Substances of Very High Concern for authorization".

REFERENCES

- [1] The NMD "Bepalingsmethode Milieuprestatie Bouwwerken" (Environmental Performance Assessment Method for Construction Works) (version 1.1, March 2022) and the NMD-Verification protocol (version 1.1, May 2022).
- [2] NEN-EN 1584 Duurzaamheid van bouwwerken - Milieuverklaringen van producten - Basisregels voor de productgroep bouwproducten;
- [3] ISO, 2006. "Environmental management. Life cycle assessment - Principles and framework". ISO 14040:2006;
- [4] ISO, 2006. "Environmental management. Life cycle assessment – Requirements and Guidelines". ISO 14044:2006;
- [5] International Organization for Standardization, ISO/TR 14025, "Environmental labels and declarations – Type III environmental declarations", ISO/TR 14025:2000.

REMARKS

Scaling

Armaturjonsson Gulvvarmefordelere rustfritt stål Open LT, floor heating manifolds are manufactured in a range of 2 to 15 groups. The manifolds are assembled with fifteen different product parts. The number of parts used per product parts can either be dependent on the number of groups applied, such as the flow meter, or be a fixed number independent of the number of groups applied, such as the ball valve. Therefore, a scalable and non-scalable environmental profile have been modeled. Both profiles are shown on the next pages.

To obtain the environmental profile of the Armaturjonsson Gulvvarmefordelere rustfritt stål Open LT for a specific number of groups within the range of 2-15 groups, one must sum the environmental profile of the non-scalable part with the product of the scalable part and the number of groups. For example, to calculate the environmental profile of the Armaturjonsson Gulvvarmefordelere rustfritt stål Open LT with 10 groups, one calculates the Global Warming Potential (GWP) by: $GWP_{ten\ groups} = GWP_{non-scalable} + 10 * GWP_{scalable}$.

ENVIRONMENTAL IMPACT per 1 piece, scalable profile (A1)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADPE	kg Sb eq.				5,74 E-03	1,40 E-07	1,72 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	6,23 E-08	3,91 E-07	1,63 E-09	-1,34 E-04
GWP	kg CO2 eq.				1,26 E+00	5,46 E-03	4,08 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,44 E-03	9,42 E-02	8,18 E-04	-3,13 E-01
ODP	Kg CFC11 eq.				6,48 E-08	9,69 E-10	2,08 E-09	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,32 E-10	3,04 E-09	4,66 E-11	-1,23 E-05
POCP	Kg ethene eq.				3,95 E-03	3,29 E-06	1,19 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,47 E-06	7,27 E-06	2,68 E-07	-1,18 E-03
AP	kg SO2 eq.				7,93 E-02	2,40 E-05	2,38 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,07 E-05	7,94 E-05	1,12 E-06	-2,38 E-02
EP	kg (PO4) 3- eq.				4,40 E-03	4,72 E-06	1,33 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,11 E-06	1,13 E-05	3,73 E-07	-1,35 E-03

Toxicity indicators for Dutch market

HTP	kg DCB-Eq				1,32 E+01	2,30 E-03	3,97 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,03 E-03	1,15 E-02	1,41 E-04	-3,92 E+00
FAETP	kg DCB-Eq				3,02 E-01	6,71 E-05	9,06 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,00 E-05	4,05 E-04	6,16 E-05	-9,52 E-02
MAETP	kg DCB-Eq				1,31 E+03	2,41 E-01	3,95 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,08 E-01	1,35 E+00	4,30 E-02	-4,18 E+02
TETP	kg DCB-Eq				3,65 E-02	8,12 E-06	1,10 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,63 E-06	3,33 E-05	3,58 E-07	-9,93 E-03
ECI	euro				1,76	0,00	0,05	0,00	0,00	0,00	0,00	0,00	ND	ND	0,00	0,00	0,01	0,00	-0,53
ADPF	kg Sb eq.				8,48 E-03	4,02 E-05	2,58 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,79 E-05	6,54 E-05	2,03 E-06	-4,88 E-02

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 1 piece, non-scalable profile (A1)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADPE	kg Sb eq.				5,36 E-02	2,09 E-06	1,61 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	8,84 E-07	5,22 E-06	1,80 E-08	-1,58 E-03
GWP	kg CO2 eq.				1,78 E+01	8,17 E-02	5,68 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,46 E-02	6,70 E-01	8,27 E-03	-4,21 E+00
ODP	Kg CFC11 eq.				9,50 E-07	1,45 E-08	3,12 E-08	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	6,14 E-09	2,41 E-08	5,01 E-10	-3,14 E-03
POCP	Kg ethene eq.				4,06 E-02	4,93 E-05	1,24 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,09 E-05	9,79 E-05	2,90 E-06	-1,41 E-02
AP	kg SO2 eq.				7,70 E-01	3,59 E-04	2,32 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,52 E-04	1,03 E-03	1,22 E-05	-2,25 E-01
EP	kg (PO4) 3- eq.				4,44 E-02	7,06 E-05	1,36 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,99 E-05	1,46 E-04	3,90 E-06	-1,39 E-02

Toxicity indicators for Dutch market

HTP	kg DCB-Eq				2,28 E+02	3,44 E-02	6,85 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,46 E-02	1,36 E-01	1,43 E-03	-3,71 E+01
FAETP	kg DCB-Eq				2,94 E+00	1,00 E-03	8,85 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,25 E-04	3,55 E-03	4,99 E-04	-8,71 E-01
MAETP	kg DCB-Eq				1,26 E+04	3,61 E+00	3,78 E+02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,53 E+00	1,30 E+01	3,37 E-01	-3,86 E+03
TETP	kg DCB-Eq				4,79 E-01	1,22 E-04	1,44 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	5,15 E-05	4,01 E-04	3,80 E-06	-2,51 E-02
ECI	euro				26,36	0,01	0,79	0,00	0,00	0,00	0,00	0,00	ND	ND	0,00	0,00	0,05	0,00	-5,18
ADPF	kg Sb eq.				1,19 E-01	6,01 E-04	3,68 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,54 E-04	7,36 E-04	2,20 E-05	-3,80 E-01

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 1 piece, scalable profile (core indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.				1,29 E+00	5,51 E-03	4,19 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,46 E-03	9,44 E-02	9,40 E-04	-1,06 E+00
GWP-fossil	kg CO2 eq.				1,29 E+00	5,51 E-03	4,19 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,46 E-03	9,43 E-02	9,40 E-04	-1,06 E+00
GWP-biogenic	kg CO2 eq.				0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
GWP-luluc	kg CO2 eq.				1,63 E-03	2,02 E-06	4,92 E-05	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	9,01 E-07	1,20 E-05	6,35 E-08	-2,68 E-04
ODP	kg CFC11 eq.				7,09 E-08	1,22 E-09	2,28 E-09	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	5,42 E-10	3,14 E-09	5,77 E-11	-2,54 E-04
AP	mol H+ eq.				9,07 E-02	3,19 E-05	2,73 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,43 E-05	1,00 E-04	1,49 E-06	-7,30 E-02
EP-freshwater	kg PO4 eq.				7,25 E-04	5,55 E-08	2,18 E-05	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,48 E-08	5,91 E-07	2,56 E-09	-2,13 E-04
EP-marine	kg N eq.				4,73 E-03	1,13 E-05	1,43 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	5,02 E-06	2,42 E-05	8,20 E-07	-1,40 E-03
EP-terrestrial	mol N eq.				6,88 E-02	1,24 E-04	2,08 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	5,54 E-05	2,76 E-04	5,82 E-06	-3,28 E-02
POCP	kg NMVOC eq.				1,85 E-02	3,54 E-05	5,59 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,58 E-05	7,44 E-05	1,85 E-06	-5,49 E-03
ADP-minerals & metals	kg Sb eq.				5,74 E-03	1,40 E-07	1,72 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	6,23 E-08	3,91 E-07	1,63 E-09	-1,26 E-04
ADP-fossil	MJ, net calorific value				1,59 E+01	8,30 E-02	4,86 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,71 E-02	1,31 E-01	4,34 E-03	-3,04 E+00
WDP	m3 world eq. Deprived				9,58 E-01	2,97 E-04	2,89 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,33 E-04	4,69 E-03	8,36 E-05	-2,39 E-01

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 experienced with the indicator.

ENVIRONMENTAL IMPACT per 1 piece, non-scalable profile (core indicators A2)

	Unit	A1	A2	A3	A1- A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.				1,87 E+01	8,24 E-02	5,80 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,49 E-02	2,91 E-01	-3,50 E-02	-9,78 E+00
GWP-fossil	kg CO2 eq.				1,82 E+01	8,24 E-02	5,79 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,49 E-02	6,72 E-01	7,31 E-03	-9,78 E+00
GWP-biogenic	kg CO2 eq.				4,23 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	-3,81 E-01	-4,23 E-02	0,00 E+00
GWP-luluc	kg CO2 eq.				2,70 E-02	3,02 E-05	8,17 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,28 E-05	1,29 E-04	7,24 E-07	-1,86 E-03
ODP	kg CFC11 eq.				1,04 E-06	1,82 E-08	3,43 E-08	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	7,70 E-09	2,58 E-08	6,21 E-10	-3,23 E-03
AP	mol H+ eq.				8,83 E-01	4,78 E-04	2,67 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,02 E-04	1,30 E-03	1,62 E-05	-9,93 E+00
EP-freshwater	kg PO4 eq.				7,03 E-03	8,31 E-07	2,11 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,52 E-07	7,07 E-06	2,98 E-08	-2,02 E-03
EP-marine	kg N eq.				5,11 E-02	1,68 E-04	1,60 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	7,13 E-05	3,19 E-04	8,55 E-06	-1,40 E-02
EP-terrestrial	mol N eq.				7,24 E-01	1,86 E-03	2,25 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	7,86 E-04	3,67 E-03	6,25 E-05	-3,70 E+01
POCP	kg NMVOC eq.				1,97 E-01	5,30 E-04	6,10 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,24 E-04	9,92 E-04	1,99 E-05	-5,90 E-02
ADP-minerals & metals	kg Sb eq.				5,36 E-02	2,09 E-06	1,61 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	8,84 E-07	5,22 E-06	1,80 E-08	-1,19 E-03
ADP-fossil	MJ, net calorific value				2,14 E+02	1,24 E+00	6,63 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	5,26 E-01	1,52 E+00	4,68 E-02	-4,65 E+01
WDP	m3 world eq. Deprived				1,01 E+01	4,44 E-03	3,07 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,88 E-03	3,59 E-02	1,03 E-03	-2,49 E+00

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 experienced with the indicator.

ENVIRONMENTAL IMPACT per 1 piece, scalable profile (additional indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence				2,11 E-07	4,94 E-10	6,37 E-09	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,21 E-10	1,09 E-09	2,94 E-11	-6,27 E-08
IRP	kBq U235 eq.				5,00 E-02	3,48 E-04	1,53 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,55 E-04	6,07 E-04	1,99 E-05	-8,86 E-01
ETP-fw	CTUe				8,91 E+02	7,41 E-02	2,68 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,31 E-02	1,31 E+00	1,91 E-02	-2,92 E+02
HTP-c	CTUh				1,33 E-08	2,40 E-12	3,99 E-10	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,07 E-12	2,21 E-11	1,72 E-13	-4,57 E-09
HTP-nc	CTUh				1,05 E-06	8,10 E-11	3,14 E-08	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,61 E-11	6,78 E-10	1,20 E-11	-3,73 E-07
SQP	----				1,38 E+01	7,20 E-02	4,22 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,21 E-02	1,69 E-01	1,05 E-02	-4,13 E+00

ENVIRONMENTAL IMPACT per 1 piece, non-scalable profile (A1 and A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence				2,56 E-06	7,40 E-09	7,86 E-08	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,13 E-09	1,49 E-08	3,18 E-10	-6,67 E-07
IRP	kBq U235 eq.				6,66 E-01	5,21 E-03	2,09 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,20 E-03	7,22 E-03	2,10 E-04	-6,44 E+00
ETP-fw	CTUe				8,50 E+03	1,11 E+00	2,56 E+02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,69 E-01	1,08 E+01	8,09 E-01	-2,75 E+03
HTP-c	CTUh				2,31 E-07	3,59 E-11	7,01 E-09	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,52 E-11	2,75 E-10	1,77 E-12	-4,26 E-08
HTP-nc	CTUh				9,99 E-06	1,21 E-09	3,00 E-07	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	5,13 E-10	7,81 E-09	1,17 E-10	-3,18 E-06
SQP	----				1,80 E+02	1,08 E+00	5,62 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	4,56 E-01	2,46 E+00	1,11 E-01	-2,95 E+01

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.

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 experienced with the indicator.

OUTPUT FLOWS AND WASTE CATEGORIES per 1 piece, scalable profile (A1 and A2)

	Unit	A1	A2	A3	A1- A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg				7,17 E-04	2,10 E-07	2,15 E-05	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	9,39 E-08	3,41 E-07	5,81 E-09	-5,98 E-06
NHWD	kg				3,64 E-01	5,27 E-03	1,18 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,35 E-03	3,68 E-03	1,78 E-02	-1,42 E-01
RWD	kg				4,22 E-05	5,45 E-07	1,31 E-06	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	2,43 E-07	6,45 E-07	2,76 E-08	-9,80 E-06
CRU	kg				0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
MFR	kg				0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
MER	kg				0,00 E+00	0,00 E+00	1,12 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	3,72 E-02	0,00 E+00	0,00 E+00
EEE	MJ				0,00 E+00	0,00 E+00	6,11 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	2,04 E-01	0,00 E+00	0,00 E+00
ETE	MJ				0,00 E+00	0,00 E+00	1,05 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	3,51 E-01	0,00 E+00	0,00 E+00

OUTPUT FLOWS AND WASTE CATEGORIES per 1 piece, non-scalable profile (A1 and A2)

	Unit	A1	A2	A3	A1- A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg				6,88 E-03	3,15 E-06	2,07 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	1,33 E-06	4,30 E-06	6,37 E-08	-2,19 E-04
NHWD	kg				1,11 E+01	7,88 E-02	3,80 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,34 E-02	4,60 E-02	1,95 E-01	-1,47 E+00
RWD	kg				5,81 E-04	8,16 E-06	1,87 E-05	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	3,46 E-06	8,14 E-06	2,94 E-07	-8,34 E-05
CRU	kg				0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
MFR	kg				0,00 E+00	0,00 E+00	1,46 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
MER	kg				0,00 E+00	0,00 E+00	2,62 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	4,52 E-01	0,00 E+00	0,00 E+00
EEE	MJ				0,00 E+00	0,00 E+00	1,17 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	2,02 E+00	0,00 E+00	0,00 E+00
ETE	MJ				0,00 E+00	0,00 E+00	7,51 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	ND	ND	0,00 E+00	0,00 E+00	3,48 E+00	0,00 E+00	0,00 E+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

RESOURCE USE per 1 piece, scalable profile (A1 and A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ				3,02 E+00	1E-03	9E-02	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	5E-04	2E-02	2E-04	-1E +00
PERM	MJ				0,00 E+00	0E+00	0E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E+00	0E+00	0E+00	0E+00
PERT	MJ				3,02 E+00	1E-03	9E-02	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	5E-04	2E-02	2E-04	-1E +00
PENRE	MJ				1,57 E+01	9E-02	5E-01	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	4E-02	1E-01	5E-03	-3E +00
PENRM	MJ				1,37 E+00	0E+00	0E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E+00	0E+00	0E+00	0E+00
PENRT	MJ				1,70 E+01	9E-02	5E-01	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	4E-02	1E-01	5E-03	-3E +00
SM	kg				3,94 E-02	0E+00	0E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E+00	0E+00	0E+00	0E+00
RSF	MJ				0,00 E+00	0E+00	0E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E+00	0E+00	0E+00	0E+00
NRSF	MJ				0,00 E+00	0E+00	0E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E+00	0E+00	0E+00	0E+00
FW	m3				2,52 E-02	1E-05	8E-04	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	5E-06	2E-04	5E-06	-6E -03

RESOURCE USE per 1 piece, non-scalable profile (A1 and A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ				4,63 E+01	2E-02	2E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	7E-03	2E-01	2E-03	-7E +00
PERM	MJ				4,10 E+00	0E+00	0E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E+00	0E+00	0E+00	0E+00
PERT	MJ				5,04 E+01	2E-02	2E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	7E-03	2E-01	2E-03	-7E +00
PENRE	MJ				2,18 E+02	1E+00	7E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	6E-01	2E+00	5E-02	-4E +01
PENRM	MJ				9,54 E+00	0E+00	0E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E+00	0E+00	0E+00	0E+00
PENRT	MJ				2,28 E+02	1E+00	7E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	6E-01	2E+00	5E-02	-4E +01
SM	kg				9,98 E-01	0E+00	0E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E+00	0E+00	0E+00	0E+00
RSF	MJ				0,00 E+00	0E+00	0E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E+00	0E+00	0E+00	0E+00
NRSF	MJ				0,00 E+00	0E+00	0E+00	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	0E+00	0E+00	0E+00	0E+00
FW	m3				2,78 E-01	2E-04	9E-03	0E +00	0E +00	0E +00	0E +00	0E +00	ND	ND	0E +00	6E-05	2E-03	5E-05	-6E -02

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

BIOGENIC CARBON CONTENT per 1 piece, scalable profile (A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
BBCpr	Kg C				0,00 E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	0E+00	0E+00	0E+00	0E+00
BCCpa	kg C				0,00 E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	0E+00	0E+00	0E+00	0E+00

BIOGENIC CARBON CONTENT per 1 piece, non-scalable profile (A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
BBCpr	Kg C				0,00 E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	0E+00	0E+00	0E+00	0E+00
BCCpa	kg C				4,23 E-01	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	0E+00	-4E- 01	-4E- 02	0E+00

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging