Environmental Product Declaration

According to EN15804+A2 (+indicators A1)

This declaration is for:
MAGNUM Premium Composite Open LT, floor heating manifold, 1-15 groups

Provided by:
MAGNUM Heating B.V.

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

MRPI® registration
1.1.00552.2024
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COMPANY INFORMATION

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MRPI® REGISTRATION

1.1.00552.2024

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.

PROGRAM OPERATOR

Stichting MRPI®
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Managing Director MRPI

PRODUCT

MAGNUM Premium Composite Open LT, floor heating manifold, 1-15 groups

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 1-15 groups can be calculated with the scalable and non-scalable environmental profiles.

DESCRIPTION OF PRODUCT

This professional MAGNUM Premium Composite Open LT is a manifold suitable for both high and low temperatures. The manifolds are produced in a range of 1-15 groups.

VISUAL PRODUCT

MORE INFORMATION

https://www.magnumheating.com/product/premium-plastic-open-lt/

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

DETAILED PRODUCT DESCRIPTION

The MAGNUM Premium Composite Open manifold consists of individual composite elements that are connected by threaded rods. It is manufactured with a number of groups in the range of 1-15.

The individual elements are made of a glass-fibre reinforced polyamide composite that is very suitable for high and low temperatures. The elements have a double-walled construction that automatically forms an insulating layer. This makes this manifold extremely suitable for heating, but also for cooling. This insulating layer practically eliminates the formation of condensation on the manifold. This manifold is increasingly used in combination with a heat pump, which heats in the winter and cools in the summer. This manifold is equipped as standard with 1" ball valves, 2 automatic air vents, 2 filler drain valves, thermometer and a thermo-manometer. 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 MAGNUM Premium Composite are given in the table below. The manifolds can be applied for district heating, pellet stoves, solar heat (with buffer tank, and central heating boilers.

Technical details:

- Constructed from separate composite elements, with a 10 year guarantee
- Thermostatic group valves M30x 1,5 suitable for MAGNUM actuators
- Groups fitted with a professional flow meter 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
- Flowmeter Camflux 2,5 L/m- 1/2"
- Bi-metal thermometer incl. DB
- 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	Yes
Pressure gauge	Yes
Air vent	Yes
Valve on return	No
RTL valve on return	No
In control valve mixing quantity	No
Stop valve between supply and return	No

Material components

The MAGNUM Premium Composite Open LT, floor heating manifolds are manufactured in a range of 1 to 15 groups, consisting of fifteen different product parts (and eleven 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 MAGNUM Premium Composite Open LT with five groups, is given in the table below.

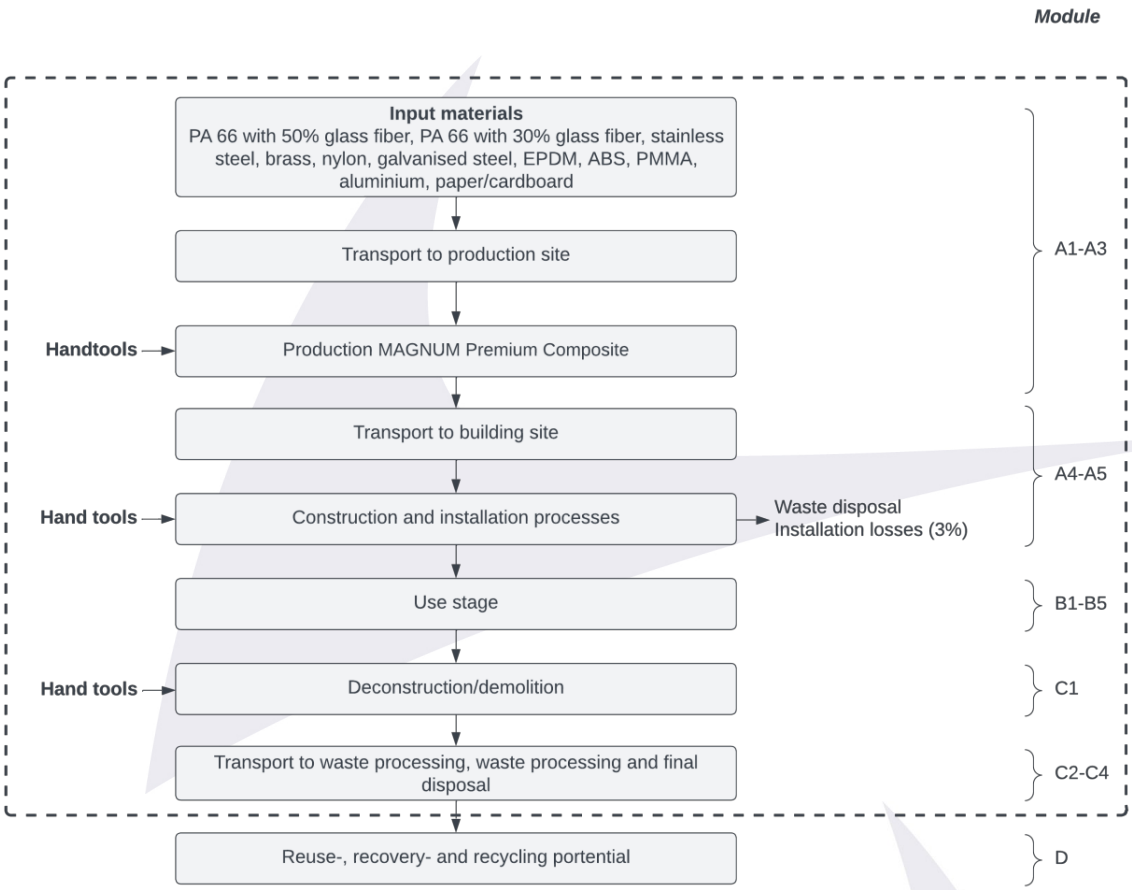
Component (> 1%)	(%)
Polyamide 66 (PA 66) with 50% glass fibre	1%
Polyamide 66 (PA 66) with 30% glass fibre	15%
Stainless steel	12%
Brass	58%
Nylon	1%
Galvanised steel	2%
Ethylene Propylene Diene Monomer (EPDM)	3%
Acrylonitrile Butadiene Styrene (ABS)	2%
Polymethyl methacrylate (PMMA)	<1%
Aluminium	1%
Paper/cardboard	5%

SCOPE AND TYPE

This EPD is based on a Cradle-to-Grave LCA of MAGNUM Premium Composite Open LT manifolds, 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 Projectservices 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 Composite Open LT manifolds, 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.				8,52 E-02	2,89 E-06	2,56 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	1,49 E-06	7,92 E-06	2,34 E-08	-2,45 E-03
GWP	kg CO2 eq.				2,76 E+01	1,13 E-01	9,21 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	5,84 E-02	2,57 E+00	9,43 E-03	-6,01 E+00
ODP	Kg CFC11 eq.				1,33 E-06	2,01 E-08	4,44 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	7,37 E-08	6,71 E-10	-3,38 E-03
POCP	Kg ethene eq.				6,31 E-02	6,83 E-05	1,92 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	3,52 E-05	1,66 E-04	3,57 E-06	-1,92 E-02
AP	kg SO2 eq.				1,21 E+00	4,98 E-04	3,64 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	2,57 E-04	1,74 E-03	1,60 E-05	-3,53 E-01
EP	kg (PO4) 3- eq.				7,09 E-02	9,78 E-05	2,16 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	5,04 E-05	2,63 E-04	4,83 E-06	-2,16 E-02
Toxicity indicators for Dutch market																			
HTP	kg DCB-Eq				2,46 E+02	4,77 E-02	7,40 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	2,46 E-02	2,57 E-01	1,95 E-03	-5,82 E+01
FAETP	kg DCB-Eq				4,55 E+00	1,39 E-03	1,37 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	7,18 E-04	9,58 E-03	6,79 E-04	-1,40 E+00
MAETP	kg DCB-Eq				1,96 E+04	5,01 E+00	5,89 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	2,58 E+00	3,10 E+01	4,08 E-01	-6,14 E+03
TETP	kg DCB-Eq				6,16 E-01	1,69 E-04	1,85 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	8,69 E-05	7,31 E-04	5,10 E-06	-1,13 E-01
ECI	euro				31,31	0,01	0,95	0,00	0,00	0,00	0,00	0,00	ND	ND	0,00	0,01	0,17	0,00	-8,16
ADPF	kg Sb eq.				1,83 E-01	8,33 E-04	5,64 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	4,29 E-04	1,47 E-03	2,92 E-05	-1,31 E+00

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.				2,89 E+01	1,14 E-01	9,46 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	5,89 E-02	2,19 E+00	-3,38 E-02	-2,61 E+01
GWP-fossil	kg CO2 eq.				2,85 E+01	1,14 E-01	9,45 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	5,89 E-02	2,58 E+00	8,58 E-03	-2,61 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.				3,62 E-02	4,19 E-05	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	2,16 E-05	2,65 E-04	9,15 E-07	-3,97 E-03
ODP	kg CFC11 eq.				1,46 E-06	2,52 E-08	4,88 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	1,30 E-08	7,57 E-08	8,30 E-10	-8,21 E-03
AP	mol H+ eq.				1,39 E+00	6,63 E-04	4,18 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	3,41 E-04	2,21 E-03	2,14 E-05	-1,10 E+01
EP-freshwater	kg P eq.				1,10 E-02	1,15 E-06	3,30 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	5,94 E-07	1,26 E-05	3,82 E-08	-3,16 E-03
EP-marine	kg N eq.				7,96 E-02	2,33 E-04	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-04	5,65 E-04	1,07 E-05	-2,12 E-02
EP-terrestrial	mol N eq.				1,13 E+00	2,57 E-03	3,47 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-03	6,43 E-03	8,35 E-05	-3,74 E+01
POCP	kg NMVOC eq.				3,05 E-01	7,35 E-04	9,39 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	3,79 E-04	1,73 E-03	2,60 E-05	-8,53 E-02
ADP-minerals & metals	kg Sb eq.				8,52 E-02	2,89 E-06	2,56 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	1,49 E-06	7,92 E-06	2,34 E-08	-1,91 E-03
ADP-fossil	MJ, net calorific value				3,43 E+02	1,72 E+00	1,06 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	8,88 E-01	2,92 E+00	6,25 E-02	-5,90 E+01
WDP	m3 world eq. Deprived				1,66 E+01	6,16 E-03	5,05 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	3,18 E-03	1,16 E-01	1,14 E-03	-3,68 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				3,66 E-06	1,03 E-08	1,12 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	5,29 E-09	2,32 E-08	4,24 E-10	-9,74 E-07
IRP	kBq U235 eq.				9,61 E-01	7,22 E-03	3,00 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	3,72 E-03	1,32 E-02	2,87 E-04	-2,37 E+01
ETP-fw	CTUe				1,33 E+04	1,54 E+00	4,00 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	7,92 E-01	3,14 E+01	1,07 E+00	-4,32 E+03
HTP-c	CTUh				2,49 E-07	4,98 E-11	7,58 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	2,57 E-11	5,86 E-10	2,50 E-12	-6,75 E-08
HTP-nc	CTUh				1,56 E-05	1,68 E-09	4,69 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	8,66 E-10	1,50 E-08	1,75 E-10	-5,35 E-06
SQP	----				2,48 E+02	1,49 E+00	7,70 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	7,70 E-01	3,33 E+00	1,49 E-01	-5,11 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				1,08 E-02	4,37 E-06	3,26 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	2,25 E-06	7,43 E-06	8,33 E-08	-1,73 E-04
NHWD	kg				9,35 E+00	1,09 E-01	3,32 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	5,63 E-02	8,72 E-02	2,58 E-01	-2,19 E+00
RWD	kg				8,38 E-04	1,13 E-05	2,68 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	5,83 E-06	1,38 E-05	3,97 E-07	-1,43 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	1,34 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	0,00 E+00	3,97 E+00	0,00 E+00	0,00 E+00
MER	kg				0,00 E+00	0,00 E+00	2,91 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	1,41 E+00	0,00 E+00	0,00 E+00
EEE	MJ				0,00 E+00	0,00 E+00	1,29 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	6,02 E+00	0,00 E+00	0,00 E+00
ETE	MJ				0,00 E+00	0,00 E+00	9,58 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	1,04 E+01	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				5,64 E+01	2E-02	2E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	1E-02	4E-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				6,05 E+01	2E-02	2E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	1E-02	4E-01	3E-03	-1E+01
PENRE	MJ				3,35 E+02	2E+00	1E+01	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	9E-01	3E+00	7E-02	-5E+01
PENRM	MJ				3,23 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				3,67 E+02	2E+00	1E+01	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	9E-01	3E+00	7E-02	-5E+01
SM	kg				1,05 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				4,46 E-01	2E-04	1E-02	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	1E-04	4E-03	7E-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

BCCpr = 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 MAGNUM Premium Composite.

SENARIOS AND ADDITIONAL TECHNICAL INFORMATION

A1-A3 - Production
The MAGNUM Premium Composite Open LT, floor heating manifolds are manufactured in a range of 1 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 MAGNUM manifolds 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 MAGNUM 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 MAGNUM 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 eleven 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 MAGNUM 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
Polyamide 66 (PA 66) with 30% 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
Polymethyl methacrylate (PMMA)	20	80	0	140
Aluminium	3	3	94	54,5
Paper/cardboard	10	85	5	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

The MAGNUM Premium Composite Open LT, floor heating manifolds are manufactured in a range of 1 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 MAGNUM Premium Composite Open LT for a specific number of groups within the range of 1-15 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 MAGNUM Premium Composite 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.				6,45 E-03	2,45 E-07	1,94 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-07	8,02 E-07	1,95 E-09	-1,77 E-04
GWP	kg CO2 eq.				2,79 E+00	9,58 E-03	9,74 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	6,19 E-03	4,44 E-01	1,04 E-03	-5,17 E-01
ODP	Kg CFC11 eq.				1,10 E-07	1,70 E-09	3,76 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	1,10 E-09	1,24 E-08	5,50 E-11	-5,73 E-05
POCP	Kg ethene eq.				5,13 E-03	5,78 E-06	1,55 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	3,73 E-06	1,85 E-05	3,28 E-07	-1,32 E-03
AP	kg SO2 eq.				9,36 E-02	4,21 E-05	2,82 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	2,72 E-05	1,95 E-04	1,33 E-06	-2,66 E-02
EP	kg (PO4) 3- eq.				5,75 E-03	8,27 E-06	1,74 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	5,34 E-06	3,08 E-05	4,58 E-07	-1,65 E-03
Toxicity indicators for Dutch market																			
HTP	kg DCB-Eq				1,49 E+01	4,03 E-03	4,49 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	2,61 E-03	3,25 E-02	1,67 E-04	-4,38 E+00
FAETP	kg DCB-Eq				3,43 E-01	1,18 E-04	1,04 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	7,61 E-05	1,53 E-03	7,47 E-05	-1,06 E-01
MAETP	kg DCB-Eq				1,48 E+03	4,23 E-01	4,47 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	2,74 E-01	4,67 E+00	5,43 E-02	-4,66 E+02
TETP	kg DCB-Eq				4,14 E-02	1,42 E-05	1,25 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	9,21 E-06	8,85 E-05	4,24 E-07	-1,13 E-02
ECI	euro				2,09	0,00	0,06	0,00	0,00	0,00	0,00	0,00	ND	ND	0,00	0,00	0,03	0,00	-0,63
ADPF	kg Sb eq.				1,87 E-02	7,04 E-05	5,71 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	4,55 E-05	1,94 E-04	2,40 E-06	-2,21 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, 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.				5,30 E-02	1,67 E-06	1,59 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	7,01 E-07	3,91 E-06	1,37 E-08	-1,57 E-03
GWP	kg CO2 eq.				1,37 E+01	6,54 E-02	4,34 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	2,74 E-02	3,51 E-01	4,24 E-03	-3,42 E+00
ODP	Kg CFC11 eq.				7,83 E-07	1,16 E-08	2,56 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	4,87 E-09	1,16 E-08	3,96 E-10	-3,09 E-03
POCP	Kg ethene eq.				3,75 E-02	3,95 E-05	1,14 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	1,66 E-05	7,31 E-05	1,93 E-06	-1,26 E-02
AP	kg SO2 eq.				7,41 E-01	2,88 E-04	2,23 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	1,21 E-04	7,61 E-04	9,39 E-06	-2,20 E-01
EP	kg (PO4) 3- eq.				4,21 E-02	5,65 E-05	1,29 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	2,37 E-05	1,09 E-04	2,54 E-06	-1,34 E-02
Toxicity indicators for Dutch market																			
HTP	kg DCB-Eq				1,71 E+02	2,75 E-02	5,16 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	1,16 E-02	9,46 E-02	1,11 E-03	-3,63 E+01
FAETP	kg DCB-Eq				2,84 E+00	8,04 E-04	8,53 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	3,37 E-04	1,91 E-03	3,05 E-04	-8,64 E-01
MAETP	kg DCB-Eq				1,22 E+04	2,89 E+00	3,66 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	1,21 E+00	7,68 E+00	1,37 E-01	-3,81 E+03
TETP	kg DCB-Eq				4,09 E-01	9,73 E-05	1,23 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	4,08 E-05	2,88 E-04	2,98 E-06	-5,64 E-02
ECI	euro				20,88	0,01	0,63	0,00	0,00	0,00	0,00	0,00	ND	ND	0,00	0,00	0,03	0,00	-5,00
ADPF	kg Sb eq.				8,96 E-02	4,81 E-04	2,78 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	2,02 E-04	5,05 E-04	1,72 E-05	-2,06 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.				2,90 E+00	9,66 E-03	1,01 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	6,24 E-03	4,45 E-01	1,20 E-03	-3,97 E+00
GWP-fossil	kg CO2 eq.				2,90 E+00	9,66 E-03	1,01 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	6,24 E-03	4,45 E-01	1,20 E-03	-3,97 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.				2,26 E-03	3,54 E-06	6,92 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	2,29 E-06	3,62 E-05	7,70 E-08	-3,01 E-04
ODP	kg CFC11 eq.				1,20 E-07	2,13 E-09	4,10 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	1,38 E-09	1,25 E-08	6,81 E-11	-1,18 E-03
AP	mol H+ eq.				1,07 E-01	5,60 E-05	3,24 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	3,62 E-05	2,49 E-04	1,77 E-06	-2,43 E-01
EP-freshwater	kg PO4 eq.				8,37 E-04	9,74 E-08	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	6,29 E-08	1,52 E-06	3,08 E-09	-2,38 E-04
EP-marine	kg N eq.				6,61 E-03	1,97 E-05	2,01 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	6,54 E-05	1,00 E-06	-1,56 E-03
EP-terrestrial	mol N eq.				9,04 E-02	2,18 E-04	2,75 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	1,41 E-04	7,36 E-04	6,89 E-06	-7,67 E-02
POCP	kg NMVOC eq.				2,52 E-02	6,21 E-05	7,65 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	4,01 E-05	1,97 E-04	2,20 E-06	-6,14 E-03
ADP-minerals & metals	kg Sb eq.				6,45 E-03	2,45 E-07	1,94 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-07	8,02 E-07	1,95 E-09	-1,41 E-04
ADP-fossil	MJ, net calorific value				3,63 E+01	1,46 E-01	1,11 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	9,41 E-02	3,72 E-01	5,13 E-03	-3,44 E+00
WDP	m3 world eq. Deprived				1,52 E+00	5,21 E-04	4,61 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	3,37 E-04	1,99 E-02	1,06 E-04	-2,68 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.				1,44 E+01	6,60 E-02	4,42 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	2,77 E-02	-2,86 E-02	-3,97 E-02	-6,27 E+00
GWP-fossil	kg CO2 eq.				1,40 E+01	6,60 E-02	4,41 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	2,77 E-02	3,52 E-01	2,60 E-03	-6,27 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.				2,49 E-02	2,42 E-05	7,54 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	1,01 E-05	8,45 E-05	5,29 E-07	-2,47 E-03
ODP	kg CFC11 eq.				8,57 E-07	1,46 E-08	2,83 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	6,11 E-09	1,30 E-08	4,89 E-10	-2,31 E-03
AP	mol H+ eq.				8,49 E-01	3,83 E-04	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	1,61 E-04	9,65 E-04	1,25 E-05	-9,76 E+00
EP-freshwater	kg PO4 eq.				6,79 E-03	6,65 E-07	2,04 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	2,79 E-07	4,96 E-06	2,27 E-08	-1,97 E-03
EP-marine	kg N eq.				4,66 E-02	1,35 E-04	1,46 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	5,66 E-05	2,38 E-04	5,69 E-06	-1,34 E-02
EP-terrestrial	mol N eq.				6,75 E-01	1,49 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	6,24 E-04	2,75 E-03	4,91 E-05	-3,70 E+01
POCP	kg NMVOC eq.				1,79 E-01	4,24 E-04	5,57 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	1,78 E-04	7,42 E-04	1,50 E-05	-5,46 E-02
ADP-minerals & metals	kg Sb eq.				5,30 E-02	1,67 E-06	1,59 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	7,01 E-07	3,91 E-06	1,37 E-08	-1,21 E-03
ADP-fossil	MJ, net calorific value				1,62 E+02	9,95 E-01	5,04 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	4,17 E-01	1,06 E+00	3,68 E-02	-4,18 E+01
WDP	m3 world eq. Deprived				9,07 E+00	3,56 E-03	2,74 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	1,49 E-03	1,68 E-02	6,09 E-04	-2,34 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				2,90 E-07	8,67 E-10	8,82 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	5,60 E-10	2,35 E-09	3,48 E-11	-7,01 E-08
IRP	kBq U235 eq.				7,85 E-02	6,10 E-04	2,43 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	3,94 E-04	1,61 E-03	2,33 E-05	-4,08 E+00
ETP-fw	CTUe				1,00 E+03	1,30 E-01	3,03 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	8,39 E-02	5,20 E+00	2,24 E-02	-3,26 E+02
HTP-c	CTUh				1,51 E-08	4,21 E-12	4,55 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	2,72 E-12	7,95 E-11	2,00 E-13	-5,11 E-09
HTP-nc	CTUh				1,18 E-06	1,42 E-10	3,54 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	9,18 E-11	1,93 E-09	1,38 E-11	-4,17 E-07
SQP	----				1,76 E+01	1,26 E-01	5,44 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	8,16 E-02	2,79 E-01	1,24 E-02	-4,62 E+00

ENVIRONMENTAL IMPACT per 1 piece, non-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				2,21 E-06	5,92 E-09	6,82 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	2,49 E-09	1,14 E-08	2,50 E-10	-6,23 E-07
IRP	kBq U235 eq.				5,68 E-01	4,17 E-03	1,78 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	1,75 E-03	5,10 E-03	1,70 E-04	-3,30 E+00
ETP-fw	CTUe				8,26 E+03	8,87 E-01	2,48 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	3,72 E-01	5,44 E+00	9,58 E-01	-2,69 E+03
HTP-c	CTUh				1,74 E-07	2,88 E-11	5,30 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	1,21 E-11	1,88 E-10	1,50 E-12	-4,20 E-08
HTP-nc	CTUh				9,70 E-06	9,70 E-10	2,92 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	4,07 E-10	5,37 E-09	1,06 E-10	-3,27 E-06
SQP	----				1,60 E+02	8,63 E-01	4,98 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	3,62 E-01	1,94 E+00	8,75 E-02	-2,80 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				8,11 E-04	3,69 E-07	2,44 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	2,38 E-07	8,48 E-07	6,92 E-09	-6,63 E-06
NHWD	kg				4,53 E-01	9,24 E-03	1,50 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	5,97 E-03	1,03 E-02	2,10 E-02	-1,59 E-01
RWD	kg				6,92 E-05	9,56 E-07	2,17 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	6,18 E-07	1,56 E-06	3,25 E-08	-1,12 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	7,28 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	2,43 E-01	0,00 E+00	0,00 E+00
MER	kg				0,00 E+00	0,00 E+00	6,40 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	2,13 E-01	0,00 E+00	0,00 E+00
EEE	MJ				0,00 E+00	0,00 E+00	2,84 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	9,47 E-01	0,00 E+00	0,00 E+00
ETE	MJ				0,00 E+00	0,00 E+00	4,89 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	0,00 E+00	1,63 E+00	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				6,77 E-03	2,52 E-06	2,04 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	1,06 E-06	3,19 E-06	4,87 E-08	-1,40 E-04
NHWD	kg				7,09 E+00	6,31 E-02	2,57 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	2,65 E-02	3,57 E-02	1,53 E-01	-1,40 E+00
RWD	kg				4,92 E-04	6,53 E-06	1,59 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	2,74 E-06	5,99 E-06	2,35 E-07	-8,70 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	9,74 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	2,76 E+00	0,00 E+00	0,00 E+00
MER	kg				0,00 E+00	0,00 E+00	2,59 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	3,44 E-01	0,00 E+00	0,00 E+00
EEE	MJ				0,00 E+00	0,00 E+00	1,15 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	1,29 E+00	0,00 E+00	0,00 E+00
ETE	MJ				0,00 E+00	0,00 E+00	7,13 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	2,22 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				4,01E+00	2E-03	1E-01	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	1E-03	4E-02	2E-04	-1E+00
PERM	MJ				0,00E+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				4,01E+00	2E-03	1E-01	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	1E-03	4E-02	2E-04	-1E+00
PENRE	MJ				3,34E+01	2E-01	1E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	1E-01	4E-01	5E-03	-4E+00
PENRM	MJ				5,62E+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				3,90E+01	2E-01	1E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	1E-01	4E-01	5E-03	-4E+00
SM	kg				4,38E-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				0,00E+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				0,00E+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				3,96E-02	2E-05	1E-03	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	1E-05	7E-04	6E-06	-7E-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				3,64E+01	1E-02	1E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	5E-03	2E-01	2E-03	-7E+00
PERM	MJ				4,10E+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				4,05E+01	1E-02	1E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	5E-03	20E-01	2E-03	-7E+00
PENRE	MJ				1,68E+02	1E+00	5E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	4E-01	1E+00	4E-02	-4E+01
PENRM	MJ				4,22E+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				1,72E+02	1E+00	5E+00	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	4E-01	1E+00	4E-02	-4E+01
SM	kg				8,26E-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				0,00E+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				0,00E+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				2,48E-01	1E-04	8E-03	0E+00	0E+00	0E+00	0E+00	0E+00	ND	ND	0E+00	5E-05	9E-04	4E-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