ENVIRONMENTAL PRODUCT DECLARATION

as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	Grundfos Holding A/S
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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MAGNA3 25-40/60/80/100/120 (Cast iron)

Grundfos Holding A/S

Institut Bauen und Umwelt e.V.

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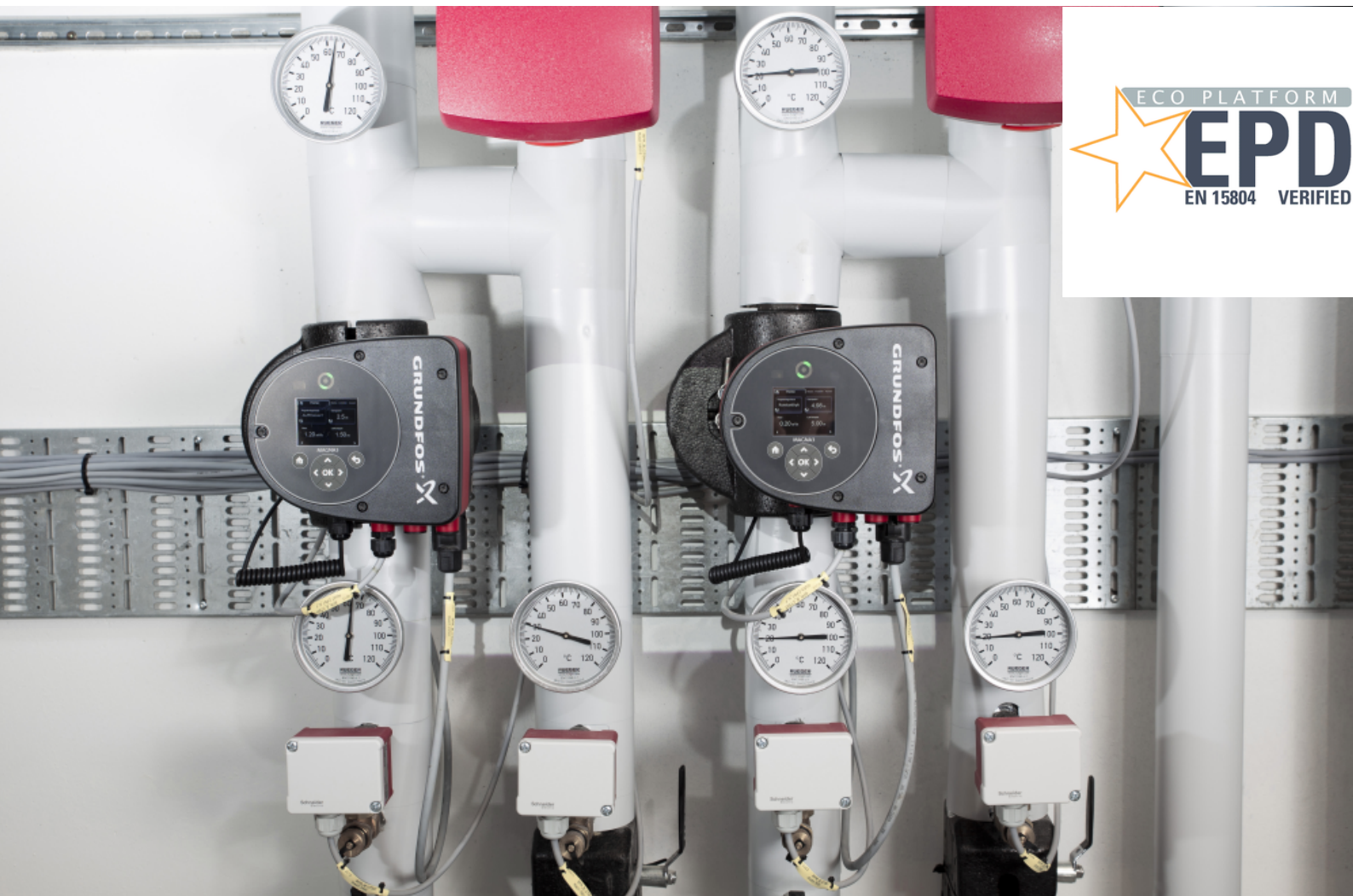

General Information

Grundfos Holding A/S

Programme holder
IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number
EPD-GRU-20180144-CCC1-EN

This declaration is based on the product category rules:
Pumps for liquids and liquids with solids, 08.2018
(PCR checked and approved by the SVR)

Issue date
11/20/2018

Valid to
11/19/2023

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Dipl. Ing. Hans Peters
(Head of Board IBU)

MAGNA3 25-40/60/80/100/120 (Cast Iron)

Owner of the declaration
Grundfos Holding A/S
Poul Due Jensens Vej 7
DK-8850 Bjerringbro
Denmark

Declared product / declared unit
1 PCS. of MAGNA3 25-40/60/80/100/120 (Cast Iron)

Scope:
The declared product is 1 piece of MAGNA3 25-40/60/80/100/120 (Cast Iron) pump. The product is produced in Wahlstedt, Germany, and the life cycle assessment is based on data collected at the production site. The declaration covers five different types of the MAGNA3 25- product (40/60/80/100/120). All life cycle sub-modules are identical for all five types, except module B6. The indicator results for module B6 in the results tables are declared for MAGNA3 25-40. B6 indicator results for 60, 80, 100 or 120 can be derived by multiplying the B6 indicator results with the factors given in the section LCA: Results.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Verification

The standard /EN 15804/ serves as the core PCR
Independent verification of the declaration and data according to /ISO 14025:2010/
☐ internally ☒ externally

Angela Schindler
(Independent verifier appointed by SVR)

Product

Product description / Product definition
The Grundfos MAGNA3 circulator pumps are designed for circulating liquids in heating systems, air-conditioning and cooling systems and domestic hot-water systems. However, the pump range can also be used in ground source heat pump systems and solar-heating systems.

The MAGNA3 pump is a centrifugal pump powered by an electrical motor. It has a high-performance neodymium magnet rotor which increases motor efficiency and an insulation shell to reduce heat loss from the cast iron pump housing with threaded connections.

This EPD covers five types of the MAGNA3 pump. These are all the same physical products and 100 % identical in terms of design, dimensions and materials as well as supply chain and manufacturing processes, i.e. all cradle to gate processes (A1-A3). The products are also identical in terms of packaging, distribution, reference service life and end-of-life treatment. The only thing that differentiates the products from each other is the software which controls how the pump operates in the system in which it is installed, making them fit for different applications. Hence, all life cycle modules are identical, except use stage module B6, which will change, as the applied scenarios for electricity consumption changes.

Each type covers 4 different product numbers: PN10 (Int.), PN10 (Germany), PN16 (Int.), PN16 (Germany). They are grouped as shown below. The group reference in the technical data and scenarios refers also to these.

GROUP 1 - MAGNA3 25-40 180 PN10/16:
97924244, 97924623, 97924249, 97924628

GROUP 2 - MAGNA3 25-60 180 PN10/16:
97924245, 97924624, 97924250, 97924629

GROUP 3 - MAGNA3 25-80 180 PN10/16:
97924246, 97924625, 97924251, 97924630

GROUP 4 - MAGNA3 25-100 180 PN10/16:
97924247, 97924626, 97924252, 97924631

GROUP 5 - MAGNA3 25-120 180 PN10/16:
97924248, 97924627, 97924253, 97924632

For the placing on the market in the EU/EFTA (with the exception of Switzerland) the following legal provisions as well as the corresponding harmonised norms based on these provisions apply:

Machinery Directive (2006/42/EC)
Standard used: EN 809:1998 + A1:2009.

Radio Equipment Directive (2014/53/EU)
Standards used: EN 60335-1:2012/AC:2014 + A11:2014, EN 60335-2-51:2003 + A1:2008 + A2:2012, EN 62233:2008.
EN 55014-1:2006 + A1:2009 + A2:2011, EN 55014-1:2017, EN 61000-6-2:2005, EN 61000-3-2:2014, EN 61000-3-3:2013, ETSI EN 301 489-1 V2.2.0, ETSI EN 301 489-17 V3.2.0.
ETSI EN 300 328 V2.1.1

Ecodesign Directive (2009/125/EC)
Commission Regulation (EC) No: 641/2009 and Commission Regulation (EU) 622/2012.
Standards used: EN 16297-1:2012, EN 16297-2:2012.

The CE-marking takes into account the proof of conformity with the respective harmonized norms based on the legal provisions above.

MAGNA3 pumps are not covered by a harmonized standard under the /Regulation EU No. 305/2011/ (CPR).

Application
For the application and use the respective national provisions apply.

The pump is designed for circulating liquids in the following systems:

- heating systems
- domestic hot-water systems
- air-conditioning and cooling systems
- ground-source heat-pump systems
- solar-heating systems

The pump is suitable for thin, clean, non-aggressive and non-explosive liquids, not containing solid particles or fibres that may attack the pump mechanically or chemically. In heating systems, the water must meet the requirements of accepted standards on water quality in heating systems, for example the German standard VDI 2035. The pumps are also suitable for domestic hot-water systems.

Technical Data
The performance data of the product according to the harmonised norms, based on the harmonisation provisions above apply.

The relevant technical specifications according to the PCR Part B is given in the table below. Characteristics that are the same for all five product groups are only given once. Others are given individually for all five groups.

Name	Value	Unit
Frequency	50	Hz
Voltage	230	V
Pumped liquid (e.g. water)	Clean water	-
Energy Efficiency Index	0,18	
Flow range, Gr. 1 (max)	6,1	m3/h
Flow range, Gr. 2 (max)	7,5	m3/h
Flow range, Gr. 3 (max)	8,5	m3/h
Flow range, Gr. 4 (max)	9,4	m3/h
Flow range, Gr. 5 (max)	9,7	m3/h
Head max., Gr. 1	4	m
Head max., Gr. 2	6	m
Head max., Gr. 3	8	m
Head max., Gr. 4	10	m
Head max., Gr. 5	12	m
Power input, Gr. 1 Average (from load profile describing use)	0,0238	kW
Power input, Gr. 2 Average (from load profile describing use)	0,0363	kW
Power input, Gr. 3 Average (from load profile describing use)	0,0498	kW
Power input, Gr. 4 Average (from load profile describing use)	0,0643	kW
Power input, Gr. 5 Average (from load profile describing use)	0,0739	kW
Nominal capacity, Gr. 1	0,05	kW
Nominal capacity, Gr. 2	0,084	kW
Nominal capacity, Gr. 3	0,116	kW
Nominal capacity, Gr. 4	0,153	kW
Nominal capacity, Gr. 5	0,185	kW

Base materials / Ancillary materials

Name	Value	Unit
Aluminium	5,4	%
Cardboard	6,4	%
Cast iron	36	%
Ceramics	0,8	%
Copper	3,2	%
Electronics	6,1	%
Magnet	1,9	%
Paper	3,0	%
Plastic film	0,2	%
Plastics	15,6	%
Rubber	0,6	%
Stainless steel	6,5	%
Steel	6,6	%
Wood pallet	7,7	%
TOTAL	100	%

REACH
The product does not contain substances listed in the Candidate List of Substances of Very High Concern for Authorisation (15.01.2018) exceeding 0.1 percentage by mass.

ISO 14001
The Wahlstedt production has been assessed and certified as meeting the requirements in ISO 14001:2015 (Certificate DE11/81829052.07)

Reference service life
No use stage scenario which refers to the lifetime of the product is declared. However, to facilitate building calculations, an estimated RSL of 10 years can be used. This is an EU consensus-based estimation, referenced on page 37 in Appendix 7: Lot 11 – Circulators in Buildings, prepared by AEA Energy & Environment for the European Commission in the context of the Eco Design Directive:

There is no definitive information on average circulator life available, there is consensus within industry that it is at least 12 years. However, this is complicated by many factors, including many being scrapped prematurely when e.g. the boiler they are connected to is replaced.

From the estimated stock (140Mpa) and annual sales (14Mpa), the average lifetime of the circulator is taken as being 10 years for the purposes of this study.

The RSL of the declared product is not directly influencing the results in this study, as no declared use stage scenario is dependent on the RSL; The use stage sub-module B6 is declared per year as required by the PCR Part B.

LCA: Calculation rules

Declared Unit
The declared unit is 1 piece (pce) of product.

Name	Value	Unit
Declared unit	1	pce.
Mass reference	6,41	kg/pce
Conversion factor to 1 kg	0,156	-

System boundary
This EPD is Cradle-To-Grave.

The system boundaries of the EPD follow the modular approach in EN 15804.

By decision no. 20170712-n of the SVR, the modules B3, B4 and B5 are by default declared as "MNR" (module not relevant).

The product stage (A1-A3) comprises raw material extraction and processing, transport processes as well as the manufacturing process. The product stage is included in the study, and according to EN 15804 the system boundary with nature is set to include those processes that provide the material and energy inputs into the system and the following manufacturing, transport up to the factory gate as well as the processing of any waste arising from those processes.

Wastes and losses are included in the modules where they occur according to the polluter pays principle and the modular approach of EN 15804.

The product stage includes:

- A1 Extraction and processing of raw materials
- A1 Reuse of products or materials from a previous product system
- A1 Processing of secondary materials
- A1 Generation of electricity, steam and heat from primary energy resources, also including their extraction, refining and transport
- A1 Energy recovery and other recovery processes from secondary fuels
- A2 Transportation up to the factory gate and internal transport
- A3 Production of ancillary materials or pre-products
- A3 Manufacturing of products and co-products
- A3 Manufacturing of packaging
- A1-A3 processing up to the end-of-waste state or disposal of final residues

For secondary material inputs, the system boundary to the previous system (providing the secondary material) is set where outputs reach the end-of-waste state. The recycling of secondary material into new raw materials is included in the system boundary of this study.

Waste materials from production processes that is recycled without any modification of the material-inherent characteristics are modelled as closed loop within A1-A3. This is done up to the input mass flow that was used during production.

Waste for incineration arising in the product stage is accounted for in the module where the waste is produced. The environmental loads from the incineration process are declared in the module where it occurs and the electricity and heat which is produced from the incineration is considered as closed-loop within A1-A3, as described in PCR Part A, 5.5.1.

Input of biogenic carbon from the production of packaging material is inventoried in A3. As required by PCR Part A, the corresponding end-of-life module of the packaging material, A5, is also declared and the emissions of biogenic carbon inventoried.

The construction process stage (A4-A5) includes:

A4:

- Transportation from factory gate to distribution center
- Consumption of electricity, thermal energy and water at distribution center
- Transportation from distribution center to construction site
- Wastage during distribution

A5:

- Installation process
- Transport of packaging waste to treatment site
- Waste treatment of packaging

The packaging material does not reach the end of waste state but is incinerated as waste. According to European statistics, the average R1 value of incineration plants is > 0.6. Therefore, it is assumed that packaging material are treated thermally in an incineration plant with R1 > 0.6. The loads from the combustion process of packaging are declared in module A5 and the resulting energy benefits in module D, as required by the PCR Part A, 5.5.2.

Use stage (B1-B7):
The use stage, related to the building fabric includes:

- B1, use or application of the installed product
- B2, maintenance

The use stage related to the operation of the building includes:

- B6, operational energy use
- B7, operational water use

In this study, all use stage modules are assessed, though B1, B2 and B7 are assessed to be zero. By decision no. 20170712-n of the SVR, the modules B3, B4 and B5 are by default declared as "MNR" (module not relevant). The modules include the provision and transport of all materials, products and related energy and water use, as well as waste processing up to the end-of-waste state or disposal of final residues during the use stage. They also include all impacts and aspects related to the losses during the use stage (i.e. production, transport, and waste processing and disposal of the lost products and materials).

Contributions to operational energy use during the use stage (B6) comes from the electricity consumption of the product. The annual electricity consumption is calculated by multiplying the average power input, which is based on a defined load profile, with the annual running hours. These values are declared in the scenarios section.

The End-of-Life stage (C1-C4) includes all activities from when the product reaches the end of its service life and no longer provides any functionality and until all materials and components are processed for reuse/recycling or disposed of.

According to EN 15804 and the PCR Part A, the end of life stage includes:

- C1 deconstruction of the product from the building, including initial on-site sorting of the materials
- C2 transportation of the discarded product to a recycling site and transportation of waste to final disposal
- C3 waste processing, collection of waste fractions from the deconstruction and waste processing of material flows intended for reuse, recycling and energy recovery
- C4 waste disposal including physical pre-treatment and management of the disposal site

At end of life, the MAGNA3 pump is manually disassembled from the piping system in which it has been installed. The definition of the applied end-of-life scenario in this EPD follows the requirements in the PCR Part A, 6.2 regarding complex products, with a combination of recycling, thermal waste treatment and landfilling. 100 % of the material is considered in the end of life scenario as required by the PCR. An overall collection rate of 90 % have been assumed. Materials from which energy is recovered in an incineration process with a R1-value above 0.60 are in this study included with the environmental burdens from the incineration process inventoried in C3, the recovered energy is declared as exported energy in C3 and the energy benefits is declared in D. This procedure is according to the PCR Part A, 5.5.6.

C3 includes the mechanical separation of the product followed by a series of sorting steps. Metal fractions are recycled and plastics, paper (manuals) and electronics are assumed incinerated with energy recovery. The residual fractions are landfilled and declared in C4. The specific amounts are shown in the scenarios section.

Beyond system boundary (D): According to EN 15804 module D includes the reuse, recovery and/or recycling potentials, expressed as net impacts and benefits. Any declared benefits and loads from net flows leaving the product system that have not been allocated as co-products and that have passed the end-of-waste state are included in module D.

Contributions to module D comes from waste incineration processes in A5 and C3 as well as material recycling in C3. The specific fractions and net flows are shown in the scenarios section.

Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account.

Software and databases used: GaBi ts 8.7.0.18 (database schema 8007) // Ecoinvent v3.4.

LCA: Scenarios and additional technical information

The following technical information forms the basis for the declared gate-to-grave modules and can be used for developing specific scenarios in the context of a building assessment.

Transport from the gate to the site (A4)

Name	Value	Unit
Litres of fuel	0,0129	l/100km
Transport distance	2003	km
Capacity utilisation (including empty runs)	85	%
Gross density of products transported	428	kg/m^3

Wastage during distribution	0,01	%

Assembly (A5)

Name	Value	Unit
Packaging waste for incineration (PE-film)	0,0093	kg
Packaging waste for incineration (Wood pallet)	0,49	kg
Packaging waste for incineration (Cardboard)	0,411	kg

An estimated RSL of 10 years can be used to facilitate building calculations. This is an EU consensus-based estimation, referenced in Appendix 7: Lot 11 – Circulators in Buildings, prepared by AEA Energy & Environment for the European Commission in the context of the Eco Design Directive.

Reference service life

Name	Value	Unit
Life Span according to the manufacturer	10	a

Operational energy use (B6)

Name	Value	Unit
Electricity consumption, Group 1	119	kWh/a
Electricity consumption, Group 2	181,5	kWh/a
Electricity consumption, Group 3	249	kWh/a
Electricity consumption, Group 4	321,5	kWh/a
Electricity consumption, Group 5	369,5	kWh/a
Average power input, Group 1	0,0238	kW
Average power input, Group 2	0,0363	kW
Average power input, Group 3	0,0498	kW
Average power input, Group 4	0,0643	kW
Average power input, Group 5	0,0739	kW
Running hours (all groups)	5000	h/a

End of life (C1-C4)

Name	Value	Unit
Collected as mixed construction waste	5,5	kg
Transportation distance (C2)	500	km
Aluminium for recycling	0,3	kg
Steel for recycling	2,42	kg
Copper for recycling	0,19	kg
Stainless steel for recycling	0,36	kg
Paper for incineration w/energy recovery	0,17	kg
Plastics for incineration w/energy recovery	0,93	kg
Electronics for incineration w/energy recovery	0,35	kg
Landfilling	0,79	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

The values in the table are flow amounts which contributes to module D.

Name	Value	Unit
A5, incineration w/energy recov. (PE-foil)	0,0093	kg
A5, incineration w/energy recov. (Wood pallet)	0,49	kg
A5, incineration w/energy recov. (Cardboard)	0,411	kg
C3, steel for recycling (net amounts)	-0,158	kg
C3, stainless steel for recycling (net amounts)	0,224	kg
C3, aluminium for recycling (net amounts)	-0,047	kg
C3, copper for recycling (net amounts)	0,061	kg
C3, paper for incineration, w/ energy recov.	0,17	kg
C3, plastics for incineration, w/ energy recov.	0,93	kg
C3, electronics for incineration, w/ energy recov.	0,35	kg

LCA: Results

Characterization model: CML 2001 – Apr. 2013. By Decision no. 20170712-n of the IBU SVR, the modules B3, B4, B5 are marked as MNR (module not relevant) as default. The LCA results in B6 refers to a period of one year, as required by the PCR Part B. To quantify B6 over the total life cycle, the LCA results of module B6 is multiplied by 10 (estimated service life).The indicator results for module B6 are declared for MAGNA3 25-40. B6 indicator results for 60/80/100/120 can be derived by multiplying the B6 indicator results with the following factors:

MAGNA3 25-40: **1,00**
MAGNA3 25-60: **1,53**
MAGNA3 25-80: **2,09**
MAGNA3 25-100: **2,70**
MAGNA3 25-120: **3,11**

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the 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	MNR	MNR	MNR	X	X	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 PCS of MAGNA3 25-40 (Cast Iron)

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
GWP	[kg CO_2-Eq.]	5.13E+1	7.72E-1	1.51E+0	0.00E+0	0.00E+0	4.94E+1	0.00E+0	0.00E+0	1.41E-1	3.33E+0	1.26E-2	-1.80E+0
ODP	[kg CFC11-Eq.]	7.17E-8	7.20E-12	3.44E-14	0.00E+0	0.00E+0	2.20E-10	0.00E+0	0.00E+0	5.91E-15	1.28E-12	2.85E-15	-7.08E-9
AP	[kg SO_2-Eq.]	4.72E-1	3.19E-3	2.33E-4	0.00E+0	0.00E+0	1.40E-1	0.00E+0	0.00E+0	5.83E-4	1.11E-3	7.46E-5	-8.84E-3
EP	[kg $(PO_4)^{3-}$-Eq.]	2.52E-2	8.01E-4	4.72E-5	0.00E+0	0.00E+0	1.31E-2	0.00E+0	0.00E+0	1.48E-4	1.45E-4	1.03E-5	-4.45E-4
POCP	[kg ethene-Eq.]	2.45E-2	-1.28E-3	5.98E-6	0.00E+0	0.00E+0	8.78E-3	0.00E+0	0.00E+0	-2.39E-4	7.50E-5	5.80E-6	-5.39E-4
ADPE	[kg Sb-Eq.]	3.01E-3	3.70E-7	2.13E-8	0.00E+0	0.00E+0	2.62E-5	0.00E+0	0.00E+0	1.26E-8	2.06E-7	4.84E-9	-2.06E-4
ADPF	[MJ]	6.53E+2	1.06E+1	3.85E-1	0.00E+0	0.00E+0	5.26E+2	0.00E+0	0.00E+0	1.93E+0	3.46E+0	1.63E-1	-2.35E+1

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources

RESULTS OF THE LCA - RESOURCE USE: 1 PCS of MAGNA3 25-40 (Cast Iron)

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
PERE	[MJ]	1.50E+2	5.76E-1	1.52E+1	0.00E+0	0.00E+0	3.39E+2	0.00E+0	0.00E+0	1.01E-1	4.38E+0	2.09E-2	-3.45E+0
PERM	[MJ]	1.79E+1	0.00E+0	-1.52E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-2.39E+0	0.00E+0	0.00E+0
PERT	[MJ]	1.68E+2	5.76E-1	6.28E-2	0.00E+0	0.00E+0	3.39E+2	0.00E+0	0.00E+0	1.01E-1	1.99E+0	2.09E-2	-3.45E+0
PENRE	[MJ]	6.89E+2	1.06E+1	8.40E-1	0.00E+0	0.00E+0	9.02E+2	0.00E+0	0.00E+0	1.94E+0	3.11E+1	1.69E-1	-2.87E+1
PENRM	[MJ]	3.12E+1	0.00E+0	-4.00E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-2.54E+1	0.00E+0	0.00E+0
PENRT	[MJ]	7.20E+2	1.06E+1	4.45E-1	0.00E+0	0.00E+0	9.02E+2	0.00E+0	0.00E+0	1.94E+0	5.66E+0	1.69E-1	-2.87E+1
SM	[kg]	3.18E+0	3.18E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m^3]	8.55E-1	1.11E-3	3.93E-3	0.00E+0	0.00E+0	4.62E-1	0.00E+0	0.00E+0	1.87E-4	9.69E-3	3.23E-5	-6.63E-3

Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 PCS of MAGNA3 25-40 (Cast Iron)

Parameter	Unit	A1-A3	A4	A5	B1	B2	B6	B7	C1	C2	C3	C4	D
HWD	[kg]	9.64E-5	5.60E-7	4.32E-9	0.00E+0	0.00E+0	4.23E-7	0.00E+0	0.00E+0	1.02E-7	4.01E-9	2.91E-9	-2.18E-8
NHWD	[kg]	3.05E+0	1.23E-3	1.67E-2	0.00E+0	0.00E+0	6.35E-1	0.00E+0	0.00E+0	1.56E-4	9.89E-2	7.93E-1	2.33E-1
RWD	[kg]	2.58E-2	2.71E-5	2.39E-5	0.00E+0	0.00E+0	1.49E-1	0.00E+0	0.00E+0	4.06E-6	8.74E-4	2.44E-6	-2.03E-3
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.26E+0	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	2.23E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.03E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	4.01E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	9.05E+0	0.00E+0	0.00E+0

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

Note: The use of secondary material (SM) in A4 comes from product wastage during distribution.

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