

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	FAAC S.p.A. Soc. Unipersonale
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-FAA-20260116-IBA1-EN
Issue date	28/04/2026
Valid to	27/04/2031

AS3020 - Sliding Door Automation FAAC S.p.A. Soc. Unipersonale

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1. General Information

FAAC S.p.A. Soc. Unipersonale

Programme holder

IBU – Institut Bauen und Umwelt e.V.
 Hegelplatz 1
 10117 Berlin
 Germany

Declaration number

EPD-FAA-20260116-IBA1-EN

This declaration is based on the product category rules:

Drive systems for automatic doors and gates, 01/08/2021
 (PCR checked and approved by the SVR)

Issue date

28/04/2026

Valid to

27/04/2031

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AS3020 - Sliding Door Automation

Owner of the declaration

FAAC S.p.A. Soc. Unipersonale
 Via Calari 10
 40069 Bologna
 Italy

Declared product / declared unit

1 unit.

Scope:

The declaration represents 1 automatic FAAC AS3020 sliding door operator.
 The length of the AS3020 sliding door operator varies depending on project requirements. For this declaration, the operator analysed is configured to operate two door leaves (bi-parting) with a beam length of 3.7 m.

The operator is designed, assembled and tested by FAAC at the Zola Predosa plant in Italy in Via Calari 10, 40069, Zola Predosa (BO).

Primary data cover the year 2024.

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.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR	
Independent verification of the declaration and data according to ISO 14025:2011	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally

Sr Lucas Berman,
 (Independent verifier)

2. Product

2.1 Product description/Product definition

The FAAC AS3000 series is the latest solution for sliding door automation.

Built on FAAC's long experience, it combines reliability, efficiency, and ease of use. It offers all the key advantages of automatic doors while helping create a comfortable and welcoming environment.

The AS3000 range of automations is designed for pedestrian sliding doors where the leaves are suspended and moved by a brushless direct drive motor.

The Series AS3000 includes the following range:

- AS3010 leaf weight up to 120 Kg
- AS3020 leaf weight up to 200 Kg / 150+150 kg**
- AS3030 leaf weight up to 300 Kg

The analysis focuses on the product AS3020, with item code **1053020**, which consists of a set of main components, housed inside aluminium profiles. The main components are:

- Drive unit:** the motor unit that controls the movements of the sliding door
- Gasket:** sealing element that help reduce vibrations and noise
- Trolley kit:** includes the sliding trolleys that support and guide the door leaf along the track
- Hinge kit:** required for fastening and ensuring the correct movement of the connected door leaves
- Closing Side Covers:** lateral covers that seal the automation system and protect the internal components
- Pre-cut belt:** transmits motion from the drive unit to the trolleys, ensuring smooth sliding of the door leaf

For the placing on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the following legal provisions apply:

- EN ISO 12100:2010
- EN 60335-1:2012 + A11:2014 + A13:2017 + A15:2021
- EN ISO 13849-1:2015 Cat 2 PL c
- EN ISO 13849-2:2012
- EN 60335-2-103:2015
- EN 16005:2023+A1:2024
- Machinery Directive 2006/42/EC* and the corresponding harmonised standards
- 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment with the applicable amendments (RoHS).

Disposal of the product is subject to the Waste from Electrical and Electronic Equipment (*WEEE*) Directive within Europe, *Directive 2012/19/EU* together with the *RoHS Directive 2011/65/EU* and its amending *Directive 2015/863*.

For the application and use the respective national provisions apply.

2.2 Application

The AS3020 operator is intended for application in automatic pedestrian sliding doors typically used in commercial and public environments, including shops, hospitals, offices, airports, and shopping centres.

The system complies with *EU Regulation 2023/826*, ensuring a standby power consumption of less than 0.5 W.

It is equipped with a direct-drive brushless motor, designed to provide enhanced energy efficiency, reduced mechanical wear, and extended operational lifespan.

The product features a certified lifecycle of up to 2,000,000 cycles, guaranteeing long-term reliability and durability under intensive operating conditions.

An emergency backup battery is always included in the drive kit, ensuring operational continuity in the event of a power failure.

Installation has been optimized to achieve a reduction in installation time, thanks to specially engineered components that simplify assembly and configuration procedures.

The system ensures silent operation, with a sound level ranging between 33.3 dB and 37.7 dB, achieved through the use of the brushless motor and a newly designed sliding rail equipped with an anti-vibration gasket.

The system is fully compatible with FAAC TK20, TK35, and TK50 frame systems, as well as with the Airslide system.

It is also pre-configured for integration with Simply Connect modules, enabling advanced connectivity and advanced system management capabilities.

2.3 Technical Data

Technical data of AS3020.

Constructional data

Features

- Clear opening - Bi-parting: 800-3000 mm
- Clear opening - Single Slide: 700-3000 mm
- Suitable for doors up 50mm thickness
- Profile finish: anodized aluminium, colour on request or painted in colour according to RAL card

Name	Value	Unit
Height	100	mm
Installation depth	182	mm
Opening and closing force	-	N
Opening speed (progressively adjustable)	70	cm/s
Closing speed (progressively adjustable)	70	cm/s
Hold open time	-	s
Supply voltage	100-240	V
Auxiliary max. load	1A, 24V	
Power input - max. absorbed power	150	W
Protection type	-	-
Frequency	50/60	Hz
Max door weight (double leaf)	150+150	kg
Aluminium profile finish	powder coating	n.a.
Mass of product	16.9	kg
Mass of packaging	1.9	kg
Total mass	18.7	kg

Performance data of the product according to the harmonised standards, based on provisions for harmonization.

Voluntary data: performance certified according to:

- EN16005
- EN13849: PI.D Cat.2

2.4 Delivery status

The operator is delivered in a cardboard box.

2.5 Base materials/Ancillary materials

Name	Value	Unit
Steel	48.8	%
Aluminium	25.3	%
Cardboard (packaging)	9.9	%
Battery	3.0	%
Zamak	2.3	%
Polycarbonate (PC)	1.7	%
Nitrile Butadiene Rubber (NBR)	1.7	%
Acrylonitrile Butadiene Styrene (ABS)	1.5	%
Electronic board	1.4	%
Polyamide (PA6)	0.9	%
Polyoxymethylene (POM)	0.8	%
Thermoplastic Vulcanizate (TPV)	0.8	%
Miscellaneous (cut-off)	0.6	%
Expansion board	0.5	%
Connector	0.3	%
Magnet	0.2	%
Cable	0.1	%
PC-ABS	0.1	%
Thermoplastic elastomer (TPE)	0.1	%
Polymethylmethacrylate (PMMA)	<0.1	%
Neoprene	<0.1	%
Motor	<0.1	%
Power supply unit	<0.1	%

The mass of the product with packaging is equal to 18.73 kg, whereas that without packaging is 16.88 kg.

This product/article/at least one partial article contains substances listed in the *candidate list* (date: 21.01.2025) exceeding 0.1 percentage by mass: yes.

Lead (Pb) - CAS No. 7439921 is included in some of the alloy used. The concentration of lead in each individual alloy does not exceed 10.0% (by mass).

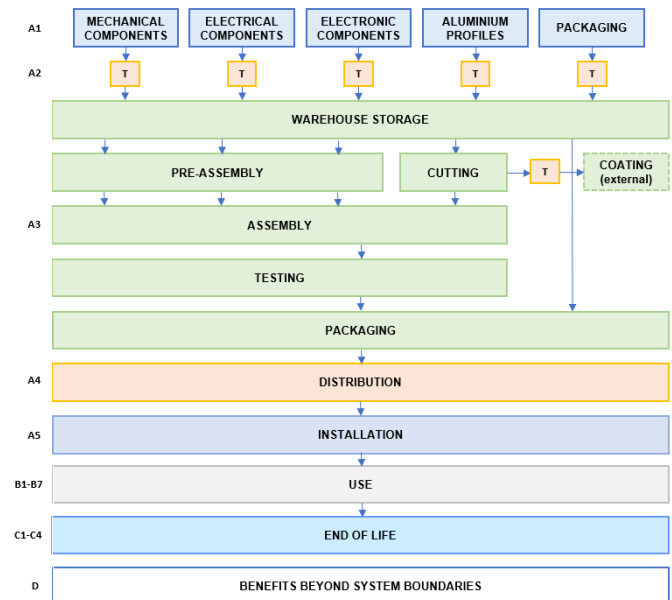
2.6 Manufacture

The sliding door automation is manufactured in the FAAC plant situated in Via Monaldo Calari, 10, 40069 Zola Predosa BO (Italy).

The manufacturing process begins with the receipt of finished and semi-finished components at the Zola Predosa facility. Semi-finished parts include extruded aluminium profiles, which are cut in-house to the required dimensions before being sent to an external subcontractor for powder coating. Finished components include mechanical, electrical, and electronic parts.

All components are then pre-assembled and fully assembled to form the final product. Finally, the completed product is tested, then packaged and prepared for shipment.

Below is a flowchart of the production/assembly process.



2.7 Environment and health during manufacturing

The FAAC plant in Zola Predosa is certified to the following ISO standards:

- ISO 14001: Environmental Management System
- ISO 9001: Quality Management System
- ISO 45001: Occupational Health and Safety Management System

2.8 Product processing/Installation

Information on the machinery and tools needed for installation as well as the safety measures are specified in the instruction manual provided by FAAC.

2.9 Packaging

The packaging consists of cardboard boxes, for a total mass of 1.9 kg.

The end-of-life phase for packaging during installation was modelled according to Eurostat 2025 data on recycling rates for packaging waste, indicating a recycling rate of 86.6% and an incineration with energy recovery rate of 13.4%.

Waste code according to *European Waste Catalogue and Hazardous Waste List (EWC)*- Valid from 1 January 2002: -EWC 15 01 01 - paper and cardboard packaging

2.10 Condition of use

No significant changes in material composition or environmentally relevant material properties are expected over the service life of the product. However, safety information related to transport, installation, use, maintenance, and end-of-life management is provided together with the product documentation. Data about maintenance operations is provided in paragraph 4.

2.11 Environment and health during use

The product does not release harmful substances or emissions into the environment.

2.12 Reference service life

The reference service life is established at 20 years, both according to the BBSR publication '*Nutzungsdauern von Bauteilen für Lebenszyklusanalysen nach Bewertungssystem Nachhaltiges Bauen (BNB)*' (2017), which indicates 20 years for automatic doors (Automatiktüren) and in line with internal

expert assessments and product testing results.

2.13 Extraordinary effects

Fire

Not applicable.

Water

Not applicable.

Mechanical destruction

No hazards are anticipated during mechanical destruction.

2.14 Re-use phase

Construction components and materials, including batteries and electronic parts, must not be disposed of with household waste. They should be taken to authorised collection and recycling centres.

2.15 Disposal

After having dismantled the product, disposal in compliance with the current waste disposal regulations is assumed to occur.

A European end-of-life scenario is applied based on the destinations defined in A4. Accordingly, recycling, incineration with/without energy recovery, and landfill rates were taken from IEC TR 62635, in particular, tables D.3.3, D.6, D.7 and D.8.

Waste codes according to the *European Waste Catalogue and Hazardous Waste List (EWC) - Valid from 1 January 2002*:

- EWC 17 04 07 - mixed metals
- EWC 20 01 36 - discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35
- EWC 17 04 11 - cables other than those mentioned in 17 04 10
- EWC 07 02 13 - waste plastic

2.16 Further information

Additional information on the product is available on FAAC's website <https://www.faac.it/prodotti/as3000-automazione-porte-scorrevoli>

3. LCA: Calculation rules

3.1 Declared Unit

The declaration refers to 1 sliding door automation AS3020.

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	pce.
Mass of product with packaging	18.7	kg
Mass reference	18.7	kg/pce

3.2 System boundary

The system boundary is cradle to grave and module D (A+B+C+D).

The following life cycle stages were considered:

Production stage:

- A1 – Raw material extraction and processing
- A2 – Transport to the manufacturer and
- A3 – Manufacturing

Distribution and installation stages:

- A4 – Transport to the construction site;
- A5 – Installation in the building

Use stage related to the operation of the building includes:

- B1 - Use
- B2 - Maintenance
- B3 - Repair
- B4 - Replacement
- B5 - Refurbishment
- B6 - Operational energy use
- B7 - Operational water use

End-of-life stage:

- C1 - Deinstallation
- C2 – Transport to waste processing
- C3 – Waste processing for recycling and incineration with energy recovery
- C4 – Disposal (landfill, waste for incineration)

This includes provision of all materials, products and energy, packaging processing and their transport, as well as waste processing up to the end-of-waste state or disposal of final residues.

Module D:

- Declaration of benefits and loads beyond the system boundaries

3.3 Estimates and assumptions

The following assumptions were made:

- A1: due to the lack of specific datasets, in terms of modelling, TPV and TPE were assumed as generic elastomers; PC-ABS alloy as generic PC
- B2 - maintenance: as per product manual, it is suggested to replace the backup battery every 3-5 years. A 4-year replacement has been considered.
- B6 - use: for the use phase a European scenario was considered
- C2 - transport: a distance of 100 km was considered for the transport of the materials to the disposal/recovery/recycling site
- C3-C4 EoL: the end of life rates were considered according to the standard IEC TR 62635:2012 as follows:

MATERIAL	RECYCLING RATE (%)	INCINERATION WITH ENERGY RECOVERY (%)	INCINERATION W/O ENERGY RECOVERY (%)	LANDFILL (%)	SOURCE OF SCENARIO
STEEL	95%	0%	0%	5%	IEC TR 62635 (table D.6)
ALUMINIUM	95%	0%	0%	5%	IEC TR 62635 (table D.6)
BATTERY	70%	0%	0%	30%	IEC TR 62635 (table D.3.3) (battery (Ni-Cd))
ZAMAK	70%	0%	0%	30%	IEC TR 62635 (table D.6) (other metal)
PC	94%	0%	0%	6%	IEC TR 62635 (table D.6)
NBR					no information available
ABS	94%	0%	0%	6%	IEC TR 62635 (table D.6)
ELECTRONIC BOARD	14%	43%	0%	43%	IEC TR 62635 (table D.3.3) (FWB - Poor)
PA6	94%	0%	0%	6%	IEC TR 62635 (table D.6)
POM	0%	5%	0%	95%	IEC TR 62635 (table D.6) (other polymers)
TPV	0%	5%	0%	95%	IEC TR 62635 (table D.6) (other polymers)
EXPANSION BOARD	14%	43%	0%	43%	IEC TR 62635 (table D.3.3) (FWB - Poor)
CONNECTOR	0%	0%	0%	100%	no information available
MAGNET	70%	0%	0%	30%	IEC TR 62635 (table D.6) (other metal)
CABLE	24%	76%	0%	0%	IEC TR 62635 (table D.3.3) (cable low current)
PC-ABS	94%	0%	0%	6%	IEC TR 62635 (table D.6)
TPE	0%	5%	0%	95%	IEC TR 62635 (table D.6) (other polymers)
PMMA	0%	0%	0%	100%	no information available
NEOPRENE	0%	0%	0%	100%	no information available
MOTOR	85%	0%	0%	15%	IEC TR 62635 (table D.7) (AC motor)
POWER SUPPLY UNIT	0%	0%	0%	100%	no information available

3.4 Cut-off criteria

The cut-off includes:

- the packaging of raw materials
- components making up 0.6% of the total product + packaging mass. These consist of labels and small LDPE bags

3.5 Background data

Specific data was used based on the production of 2024. For processes where the producer lacks influence or specific information, such as raw material extraction and end-of-life treatment, generic data from the following primary sources were considered:

- *Ecoinvent 3.11*
- *SimaPro 10.2*

The emission factor used for phase A3 is equal to 0.636 kgCO₂eq/kWh.

3.6 Data quality

The data quality is assessed based on the requirements of the PCR Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to *EN 15804+A2:2019, version 1.4*.

The data used in this study cover the year 2024 and were collected to ensure temporal, geographical, and technological representativeness, using the most recent and relevant datasets available.

The data quality can be described as good.

3.7 Period under review

Primary data covers a period of 12 months, from January 2024 to December 2024.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Europe

3.9 Allocation

The allocation of manufacturing inputs and outputs at the Zola Predosa plant in 2024 was carried out based on an economic parameter, namely turnover.

3.10 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. The used background database is *Ecoinvent 3.11*.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Biogenic carbon is present in cardboard packaging only and it was calculated by considering the biogenic carbon content associated with the *ecoinvent* dataset used to model the biomass.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.84	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂.

The following chapters detail the information considered in each downstream phase.

Transport from the gate to the site (A4)

Name	Value	Unit
Litres of fuel	23.2	l/100km
Transport distance	1283	km
Capacity utilisation (including empty runs)	47.3	%

Assembly (A5)

The installation process only involves manual operations with the use of a drill carried out by a technician. Therefore, no specific material or energy flows were considered for this purpose.

The only included process refers to the disposal of packaging waste. Eurostat 2025 data on Recycling rates for packaging waste were used (86.6% recycling; 13.4% incineration with energy recovery).

Name	Value	Unit
Cardboard packaging EoL	1.9	kg

Maintenance (B2)

This phase includes the ordinary maintenance and periodic substitutions needed to maintain the functional and technical performance of the product as detailed in the AS3000 product instruction manual. This means the inclusion of the production and transportation of any component used for maintenance, the transport of the technician to the installation site, the transportation of any waste arising from the maintenance activities, and the end-of-life processes of this waste.

For the operator AS3020, the ordinary maintenance, required every 6 months, includes the following activities:

- check fastening of the automation to the wall
- check fastening of motor and return pulley
- check trolleys
- check mechanical stops
- check belt tension
- cleaning of sliding track, lower guide show, trolleys
- functional check of the system

In terms of periodic substitutions, they are shown in the following table:

Name	Value	Unit
Belt (NBR) - every 5 years	1.26	kg/RSL
End-stop bumpers (NBR) - every 5 years	0.06	kg/RSL
Backup battery (NiMH) - every 4 years*	2.82	kg/RSL

*The replacement of the backup battery is recommended every 3-5 years; for the assessment, a four-year replacement interval has been considered.

The reference service life is established at 20 years, both according to the *BBSR* publication and in line with internal expert assessments and product testing results.

Reference service life

Name	Value	Unit
Life Span (according to BBSR)	20	a
Life Span according to the manufacturer	20	a

Operational energy use (B6) and Operational water use (B7)

The drive AS3020 under study consumes energy during use, operating in three different modes: active mode, standby mode and idle mode (night mode).

The data used to calculate the percentage of time in the different modes and the calculations to obtain the electricity consumption during the RSL are presented in the tables below. Power consumption data for the drive unit and accessories, including standby and idle modes, were provided by FAAC based on internal testing.

Parameters	Value	UM	%
Cycles	2.000.000	number	
Time cycle	12	s	
Seconds in 20years	630.720.000	s	
time cycle power on	10	s	
time cycle stand-by	2	s	
Time on Power ON	24.000.000	s	3,8%
Time on StandBy	396.480.000	s	62,9%
Time on idle	210.240.000	s	33,3%

	Percentage of time	Power consumption	Energy consumption (Wh)	Energy consumption (kWh)
Power Mode 1: Power ON	3,8%	0,12 kWh per cycle	240.000	240
Power Mode 2: Standby	62,9%	2,96 W	325.995	326
Power mode 3: Idle	33,3%	0,67 W	39.128	39
TOTAL			605.123	605

Name	Value	Unit
Electricity consumption	605.12	kWh

The European power mix is used to model electricity consumption during the use phase, which is Electricity, low voltage {Europe without Switzerland} | market group for electricity, low voltage | Cut-off, U.

End of life (C1-C4)

Name	Value	Unit
Collected separately waste type waste type	16.8	kg
Recycling	14.7	kg
Energy recovery	0.2	kg
Landfilling	1.9	kg

5. LCA: Results

Results for the sliding door operator AS3020.

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

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	X	X	X	X	X	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 unit

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	2.8E+02	4.97E-01	1.44E+00	3.62E+00	5.13E-01	0	1.8E+02	0	0	0	2.09E+02	0	0	2.52E-01	2.36E+00	2.73E-01	-7.81E+01
GWP-fossil	kg CO ₂ eq	2.78E+02	4.96E-01	1.9E+00	3.61E+00	3.49E-02	0	1.82E+02	0	0	0	2.02E+02	0	0	2.52E-01	2.35E+00	2.7E-01	-7.84E+01
GWP-biogenic	kg CO ₂ eq	1.04E+00	2.67E-04	-4.78E-01	2.24E-03	4.78E-01	0	-2.47E+00	0	0	0	6.53E+00	0	0	1.56E-04	5.3E-03	2.7E-03	5.36E-01
GWP-luluc	kg CO ₂ eq	5.64E-01	1.83E-04	1.58E-02	1.25E-03	1.1E-05	0	3.79E-01	0	0	0	5.97E-01	0	0	8.75E-05	6.42E-04	6.07E-05	-1.95E-01
ODP	kg CFC11 eq	2.82E-05	1.05E-08	5.66E-08	7.95E-08	6.98E-10	0	1.03E-04	0	0	0	3.78E-06	0	0	5.54E-09	7.05E-09	1.44E-09	-4.77E-07
AP	mol H ⁺ eq	2.34E+00	3.61E-03	8.87E-03	1.66E-02	1.92E-04	0	2.43E+00	0	0	0	1.16E+00	0	0	1.16E-03	2.36E-03	5.32E-04	-5.28E-01
EP-freshwater	kg P eq	2.39E-01	3.32E-05	1.05E-03	2.56E-04	2.88E-06	0	5.48E-02	0	0	0	1.94E-01	0	0	1.78E-05	1.94E-04	5.85E-05	-3.11E-02
EP-marine	kg N eq	6.57E-01	1.19E-03	3.94E-03	6.52E-03	8.47E-05	0	1.61E+00	0	0	0	1.85E-01	0	0	4.55E-04	1.44E-03	1.29E-03	-8.77E-02
EP-terrestrial	mol N eq	4.16E+00	1.31E-02	3.07E-02	7.11E-02	8.46E-04	0	1.94E+00	0	0	0	1.64E+00	0	0	4.96E-03	6.72E-03	1.81E-03	-9.23E-01
POCP	kg NMVOC eq	1.08E+00	4.24E-03	8.21E-03	2.5E-02	2.67E-04	0	8.47E-01	0	0	0	5.25E-01	0	0	1.74E-03	2.58E-03	5.76E-04	-2.93E-01
ADPE	kg Sb eq	5.25E-02	1.5E-06	1.02E-05	1.18E-05	1.04E-07	0	4.61E-03	0	0	0	2.69E-03	0	0	8.25E-07	2.52E-06	2.36E-07	-1.15E-03
ADPF	MJ	3.39E+03	7.05E+00	2.75E+01	5.22E+01	4.49E-01	0	2.32E+03	0	0	0	4.63E+03	0	0	3.64E+00	7.52E+00	1.3E+00	-8.16E+02
WDP	m ³ world eq deprived	7.81E+01	2.8E-02	9.25E-01	2.16E-01	2.91E-03	0	1.25E+02	0	0	0	4.88E+01	0	0	1.51E-02	5.57E-02	2.67E-02	-1.17E+01

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; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 unit

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	4.3E+02	1.08E-01	1.51E+01	8.4E-01	9.21E-03	0	4.05E+02	0	0	0	1.21E+03	0	0	5.86E-02	1.06E+00	7.79E-02	-8.24E+01
PERM	MJ	0	0	2.39E+01	0	-2.39E+01	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	4.3E+02	1.08E-01	3.9E+01	8.4E-01	-2.39E+01	0	4.05E+02	0	0	0	1.21E+03	0	0	5.86E-02	1.06E+00	7.79E-02	-8.24E+01
PENRE	MJ	3.35E+03	7.05E+00	2.76E+01	5.22E+01	4.49E-01	0	2.32E+03	0	0	0	4.63E+03	0	0	3.64E+00	7.52E+00	1.3E+00	-8.16E+02
PENRM	MJ	3.97E+01	0	0	0	0	0	3.49E+01	0	0	0	0	0	0	0	-2.16E+01	-1.81E+01	0
PENRT	MJ	3.39E+03	7.05E+00	2.76E+01	5.22E+01	4.49E-01	0	2.36E+03	0	0	0	4.63E+03	0	0	3.64E+00	-1.41E+01	-1.68E+01	-8.16E+02
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	2.65E+00	8.91E-04	3.06E-02	6.88E-03	3.42E-04	0	3.19E+00	0	0	0	2.95E+00	0	0	4.8E-04	4.12E-03	-2.13E-03	-4.8E-01

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 – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2:

1 unit																		
Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	5.35E-01	1.77E-04	1.97E-02	1.38E-03	3.52E-03	0	2.53E-01	0	0	0	2.25E-01	0	0	9.66E-05	4.66E-02	8.63E-03	-7.23E-02
NHWD	kg	1.87E+01	3.98E-01	4.22E-01	3.24E+00	1.86E+00	0	6.24E+01	0	0	0	1.76E+01	0	0	2.26E-01	1.49E+01	1.84E+00	-3.81E+00
RWD	kg	1.79E-02	2.02E-06	5.15E-05	1.59E-05	1.7E-07	0	5.61E-02	0	0	0	3.31E-02	0	0	1.11E-06	2.71E-05	1.76E-06	-1.55E-04
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	1.61E+00	0	0	0	0	0	0	0	0	0	1.47E+01	0	0
MER	kg	0	0	0	0	2.49E-01	0	0	0	0	0	0	0	0	0	1.9E-01	0	0
EEE	MJ	0	0	0	0	4.95E-01	0	0	0	0	0	0	0	0	0	6.74E-01	0	0
EET	MJ	0	0	0	0	9.92E-01	0	0	0	0	0	0	0	0	0	1.33E+00	0	0

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

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:

1 unit																		
Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	1.92E-05	4.53E-08	9.17E-08	3.57E-07	3.26E-09	0	1.16E-05	0	0	0	4.12E-06	0	0	2.49E-08	3.47E-08	5.98E-09	-6.89E-06
IR	kBq U235 eq	3.06E+01	8.2E-03	2.02E-01	6.45E-02	6.83E-04	0	3.75E+01	0	0	0	1.29E+02	0	0	4.5E-03	1.06E-01	7.06E-03	-6.51E-01
ETP-fw	CTUe	6.21E+03	8.86E-01	1.64E+01	6.85E+00	5.23E-01	0	6.9E+03	0	0	0	6.61E+02	0	0	4.78E-01	8.58E+00	3.7E+01	-4.8E+02
HTP-c	CTUh	2.11E-07	1.24E-10	6.3E-10	9.23E-10	2.1E-11	0	1.38E-07	0	0	0	5.57E-08	0	0	6.44E-11	8.21E-10	4.8E-11	-4.94E-08
HTP-nc	CTUh	6.47E-06	4.6E-09	2.97E-08	3.63E-08	8.5E-10	0	2.53E-06	0	0	0	3.13E-06	0	0	2.53E-09	4.15E-08	2.11E-09	-1.19E-06
SQP	SQP	1.33E+03	4.81E+00	7.53E+01	3.89E+01	3.13E-01	0	2.17E+03	0	0	0	9.02E+02	0	0	2.72E+00	2.14E+00	1.6E+00	-2.25E+02

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator 'Potential Human exposure efficiency relative to U235'. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators 'abiotic depletion potential for non-fossil resources', 'abiotic depletion potential for fossil resources', 'water (user) deprivation potential, deprivation-weighted water consumption', 'potential comparative toxic unit for ecosystems', 'potential comparative toxic unit for humans – cancerogenic', 'Potential comparative toxic unit for humans - not cancerogenic', 'potential soil quality index'. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

6. LCA: Interpretation

As shown in the figure below, the main contributions to all impact categories originate from raw material extraction and processing (phase A1), the production of substituted components during product maintenance (phase B2), and electricity consumption during use (phase B6).

With regards to the **GWP-total** impact category, the main contribution comes from the extraction and processing of raw materials (41%), in particular the support profile, followed by the motor group, the electronic group, and the expansion board. In addition, the electricity consumption during the use phase and the maintenance activities contribute respectively to 31% and 26% of the total impact of this phase.

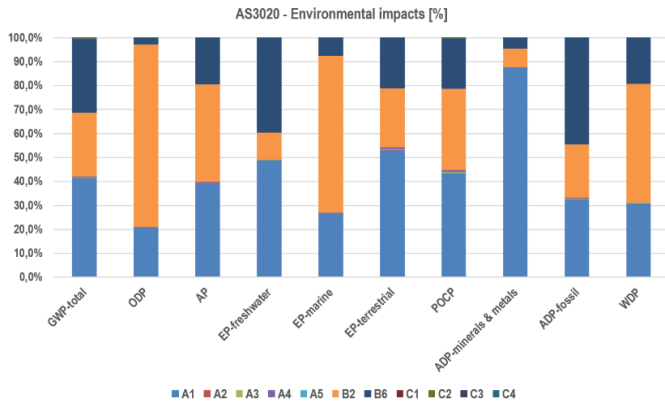
For the **ozone depletion** impact category, where phase B2 accounts for 76,2% of the total impact, over 99% of this impact is attributed to the use of PTFE in the production of the positive

electrode within the batteries.

For the **acidification** impact category, accounting for 41% of the total lifecycle impact, mainly due to the extraction and processing of nickel for the production of the negative electrode within the batteries. The extraction and processing of raw materials and the electricity consumption during use contribute respectively to 39% and 19% of the acidification potential over the product lifecycle.

For the **eutrophication freshwater / marine / terrestrial** impact categories, phase A1 constitutes 43% of the total lifecycle impact, followed by phase B2 with 34%. The main impact is attributed to upstream processes of electronic components, mainly the positive and negative electrodes of the NiMH batteries. The electricity consumption during use contributes to 23% of eutrophication potential.

The figure below illustrates the contribution of each life cycle phase to the core impact categories.



The results should be evaluated taking into account the underlying assumptions, especially those concerning the modelling of electronic components and the maintenance phase.

7. Requisite evidence

Not applicable in this EPD.

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**Publisher**

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