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-20250288-IBI1-EN
Issue date	25.08.2025
Valid to	24.08.2030

JS HA - Retractable Security Bollards

FAAC S.p.A. Soc. unipersonale

Institut Bauen und Umwelt e.V.

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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-20250288-IBI1-EN

This declaration is based on the product category rules:

vehicle access control and vehicle security barrier systems , 01.11.2024
(PCR checked and approved by the SVR)

Issue date

25.08.2025

Valid to

24.08.2030

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

JS HA - Retractable Security Bollards

Owner of the declaration

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

Declared product / declared unit

1 unit.

Scope:

The current environmental declaration outlines the LCA environmental results for the JS HA bollard range, using the JS 80 HA EFO INOX model as the representative product, selected according to a worst-case scenario, specifically, the heaviest and with the most complex finishes. The EPD covers the following products: JS 48 HA, JS 80 HA, JS 48 HA EFO, JS 80 HA EFO, JS 48 HA INOX, JS 80 HA INOX, JS 48 HA EFO INOX, JS 80 HA EFO INOX.

The EPD is a representative EPD.

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

Primary data cover the year 2023.

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
☐ internally ☒ externally

Dr.-Ing. Nikolay Minkov,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The FAAC JS 80 HA EFO INOX bollard is an automatic retractable security bollard, consisting of a reinforced steel underground structure and a retractable cylinder that extends 1,000 mm above ground with a diameter of 275 mm. The steel cylinder is protected against accidental impacts and damage from chemical and pollutant agents (e.g., fossil oils) by a replaceable mDure® polymer sleeve.

To protect the bollard from corrosion, the structure and cylinder undergo a cataphoresis treatment, all internal fastening systems are made of stainless steel, and the top of the cylinder is coated with Rilsan® anti-corrosion resin.

The FAAC JS 80 HA EFO INOX bollard is installed in a cemented pit within a reinforced foundation, as specified in the installation drawings. The hydraulic power unit (HPU) is integrated within the bollard and can be accessed from above without removing the bollard from the pit. The EFO (Emergency Fast Operation) feature allows for rapid deployment, making the bollard rise much faster in urgent situations compared to standard versions. Additionally, the hydraulic oil used is certified according to Ecolabel requirements for biodegradable hydraulic fluids.

The bollard remains visible in all environmental conditions thanks to a reflective band and an LED light ring that flashes when the cylinder is in motion and remains steadily illuminated when the cylinder is raised. Each movement of the bollard is preceded and signaled by an acoustic warning device (buzzer).

The FAAC JS 80 HA EFO INOX bollard is certified to stop, in a single-unit configuration, vehicles weighing 7,500 kg traveling at a speed of 80 km/h, achieving the following performance ratings:
PAS 68: PAS 68:2013 V/7500 (N3)/80/90:1.0/0.8
IWA 14-1: IWA 14–1:2013 V/7200[N3C]/80/90:1.3
ASTM F2656/F2656M: ASTM F2656 C750-P1

The measured penetration level is P1 (the highest achievable rating).
The FAAC JS 80 HA EFO INOX bollard is certified to remain operational after impact.

The JS 80 HA EFO INOX bollard was selected as the representative model for the JS HA bollard range because it has the highest weight and the most extensive range of finishings. This choice also reflects the highest potential environmental impacts within the product family.
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:

- *Directive no. 2006/42/EC ANNEX II 1B*
- *and the harmonised standards based on these provisions:*
- *EN ISO 12100:2010*
- *EN 60335-1:2012+A11:2014+A13:2017+A15:2021*

The CE-marking takes into account the proof of conformity with the respective harmonized standards based on the legal provisions above. For the application and use the respective national provisions apply.

2.2 Application

The JS HA bollards by FAAC are part of their high-security product range designed for perimeter protection and vehicle access control. These bollards are designed to provide safety and durability, with the capability to stop vehicles of significant mass and speed in security-critical locations.

2.3 Technical Data

Technical data (specify system and properties)

Name	Value	Unit
Cylinder height from ground	1000	mm
Cylinder diameter	275	mm
Cycle time	13.8	s
Power supply voltage	220-240	V
Max. power	4000	W
Operating ambient temperature	-40 /+80	°C
Power input "Standby"	8	W
Power input "Operative consumption per cycle"	9.8	W
Mass of total system with packaging	922.5	kg
Mass of total system without packaging	847.3	kg
Mass of bollard	664.2	kg
Mass of pit	181.2	kg
Mass of electronic board	1.9	kg
Mass of packaging	75.1	kg

Performance data of the product according to the harmonised standards, based on provisions for harmonization.
Voluntary data: performance certified according to *PAS 68; IWA 14-1* and *ASTM F2656* standards.

- Able to withstand impact with a truck driven at 50 km/h (JS 48 HA) or 80 km/h (JS 80 HA). P1 penetration rating, still operational after impact.
- Breakthrough resistance: 673,000 J (JS 48 HA) – 1,852,000 J (JS 80 HA)

2.4 Delivery status

Each bollard is individually delivered on a OSB board and packaged in a cardboard box.

2.5 Base materials/Ancillary materials

Name	Value	Unit
Steel	79.9	%
Aluminium	2.6	%
Brass	<0.1	%
Cast iron	12.6	%
Motor + pump	1.7	%
Zinc	<0.1	%
Polypropylene (PP)	<0.1	%
Polyamide (PA)	<0.1	%
Polycarbonate (PC)	<0.1	%
Polyurethane (PU)	1.1	%
Polyvinylchloride (PVC)	<0.1	%
Acrylonitrile butadiene styrene (ABS)	0.1	%
Polyoxymethylene (POM)	<0.1	%
Polyesther copolymer	<0.1	%
PA66 + glass fibre	0.4	%
Hydraulic oil	0.7	%
Electrical material	0.1	%
Cables	0.2	%
Synthetic rubber	0.2	%
Magnet unit	<0.1	%
Capacitor	<0.1	%
Electrical connector	0.1	%
Electrical contactor	<0.1	%
Electronic boards	0.2	%

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.
The list of concentration ranges on the components is provided in the following table.

Description	SVHC name	CAS number	% SVHC
EFO JS 275 HA Flange Assembly	Lead	7439-92-1	≥ 0.3% w/w and < 1.0% w/w
Motor Side Flange Assembly PU JS 275 HA	Lead	7439-92-1	≥ 0.3% w/w and < 1.0% w/w
Coil AB000192 AMP 230VDC	Lead	7439-92-1	≥ 0.3% w/w and < 1.0% w/w
Oil Return Tube PU JS HA	Lead	7439-92-1	> 0.1% w/w and ≤ 100% w/w
Air valve 3/8" 6 BAR	Lead	7439-92-1	2,5%-3,5%
Overmolded Male Connector with O-Ring	Lead	7439-92-1	>0.1%
Coil AB000192 AMP 230VDC	Lead	7439-92-1	≥ 0.3% w/w and < 1.0% w/w
Pressure Switch JS HA EFO	Lead	7439-92-1	≥ 1% w/w and < 10% w/w
Plunger Rod J275HA SEC	Chromium Trioxide	1333-82-0	>0,1%
Upper Plunger Flange Assembly J275HA SEC	Lead	7439-92-1	≥ 0.3% w/w and < 1.0% w/w
Lower Plunger Flange Group JS HA	Lead	7439-92-1	≥ 0.3% w/w and < 1.0% w/w
Valve CD000174 CDVN	Lead	7439-92-1	≥ 0.3% w/w and < 1.0% w/w
Cylinder Pin 6x35 H8 UNI 1707 AVP	Lead	7439-92-1	≥ 0.3% w/w and < 1.0% w/w

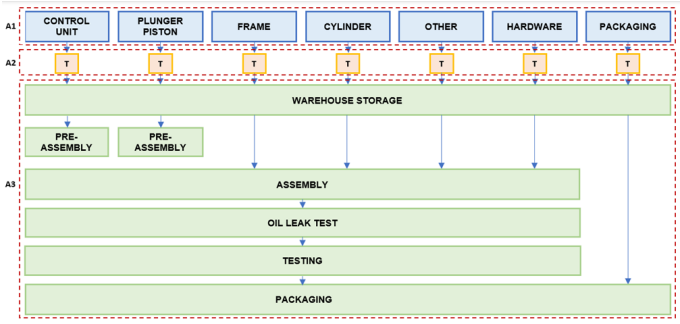
2.6 Manufacture

The bollards are manufactured in the FAAC plant situated in Via Monaldo Calari, 10, 40069 Zola Predosa BO (Italy).

Semi-finished products are sent from suppliers to the plant in Zola Predosa. Components are machined by subcontractors according to technical drawings developed by FAAC.

In the FAAC plant the power units and the plunger piston are pre-assembled. Then, the cylinder is assembled with the whole structure and the finished bollard is tested. Lastly, the bollard is packed for shipping.

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 Oriented Strand Board (OSB) wood weighing 75 kg and cardboard weighing 0.12 kg. The end-of-life phase for these materials during installation was modeled based on a scenario where 50% is incinerated with energy recovery and 50% is sent to landfill, following the "end-of-waste" scenario described in Table G.4 of EN 50693:2019. Biogenic carbon balancing and the environmental impact of packaging disposal were included in module A3, as the installation phase falls outside the system boundaries.

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

EWC 15 01 01 paper and cardboard packaging
EWC 15 01 02 plastic packaging
EWC 15 01 03 wooden 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

Due to the lack of standards and guidelines on the reference service life of bollards, the following scenario was chosen according to the manufacturer's know how and product technical specifications. The following specifications are valid for all JS HA bollards.

In fact, under regular maintenance, after 500.000 cycles, it is recommended to replace the power unit to maintain high performance; by replacing this component with its spare, the life of the bollard could be extended for years. We considered 5 replacements and a reference life of 20 years thereby 340

cycles each day. However, with less frequent daily use, the life years would be lengthened accordingly.

Technical specification	Value	%
Total cycles (no)	500.000,00	
Cycle Time (s)	13,80	
Reference Service Life (RSL)	20,00	
Seconds in 20 years	630.720.000,00	
Time on Power ON (s)	6.900.000,00	1,09%
Time on Standby (s)	623.820.000,00	98,91%

2.13 Extraordinary effects

Fire

Not applicable.

Water

In the event of floods or water related environmental disasters, to date the product does not contain substances that have an impact on water. However, the operation of the product may be affected.

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. Oil must be collected in a sealed container and delivered to an authorised disposal and recycling facility.

2.15 Disposal

After having dismantled the product, disposal in compliance with the current waste disposal regulations is assumed to occur. In the model, in the absence of end-of-life data for the bollards, the recycling, incineration, and landfill rates suggested by the EN50693 standard were considered.
Waste codes according to *European Waste Catalogue* and Hazardous Waste List (EWC) - Valid from 1 January 2002:

- *EWC 17 04 07 - mixed metals*
- *EWC 13 01 12* - readily biodegradable hydraulic oils*
- *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/serie-js-dissuasori-disicurezza.

3. LCA: Calculation rules

3.1 Declared Unit

The declaration refers to 1 FAAC JS 80 HA EFO INOX, inclusive of engine, electronic controls and installation components.

Declared unit

Name	Value	Unit
Declared unit	1	pce.
Mass reference product system with packaging	949.6	kg/pce

3.2 System boundary

Cradle to gate with options, modules C1-C4, and module D (A1-A3 + C + D and addi-tional modules. The additionalmodules are B1, B2, B3, B4, B5, B6, B7.

The following life cycle stages were considered:

Production stage:

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

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
- 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

3.3 Estimates and assumptions

The following assumptions were made:

- phase C1 considers the handling of the bollard for 2 hours, modelled with the dataset Machine operation, diesel, < 18.64 kW, low load factor {GLO}| machine operation, diesel, < 18.64 kW, low load factor | Cut-off, U. In addition, road surface finishing is considered by including 8 hours working by an asphalt paver modelled with Machine operation, diesel, >= 74.57 kW, low load factor {GLO}| machine operation, diesel, >= 74.57 kW, low load factor | Cut-off, U;
- a distance of 1000 km was considered for the transport of the materials to the disposal/recovery/recycling site (C2);
- for the use phase a European scenario was considered;
- for the end-of-life percentages of the product the end-of-waste scenario described in Table G.4 of EN 50693:2019 was followed. Some materials are not included in Table G.4, therefore assumptions have been made. Below is a summary of the % rates used in the end of life for the different components/materials:

Material	Recycling Rate (%)	Energy recovery Rate (%)	Disposal rate, by incineration without energy recovery (%)	Disposal rate, by landfilling (%)
STEEL	80			20
ALUMINIUM	70			30
BRASS	70			30
CAST IRON	80			20
MOTOR+PUMP*				100
ZINC	60			40
POLYPROPYLENE	20	40		40
POLYAMIDE*			50	50
PC*			50	50
POLYURETHANE		50	-	50
PVC*			50	50
ABS	20	40	-	40
POM*			50	50
POLYESTER COPOLYMER*			50	50
PA66 GF*			50	50
HYDRAULIC OIL*	70		30	
ELECTRICAL MATERIAL	50			50
CABLE*	66		34	
SYNTHETIC RUBBER		50		50
MAGNET UNIT*	50			50
CAPACITOR*	50			50
ELECTRICAL CONNECTOR*	50			50
ELECTRICAL CONTACTOR*	50			50
ELECTRONIC BOARD*	50			50

3.4 Cut-off criteria

The cut-off includes:

- the packaging of raw materials
- the end of life of packaging of raw materials
- the thermal energy, auxiliaries and waste produced at the Zola Predosa assembly plant since not specifically employed or generated by the production process of the bollards
- certain bollard's components, mainly small plastic and rubber parts as well as the satin finish applied to one component since no suitable dataset was available for its modelling

A sensitivity analysis was conducted to assess the impact of cut-off related to packaging, thermal energy, auxiliaries and waste on the overall results. The findings revealed that the effect of cut-off on the total results was minimal, with an influence of less than 1.3%.

3.5 Background data

Specific data was used based on the production of 2023. 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 3.10
- SimaPro 9.6.0.1
The emission factor used for phase A3 is equal to 0.610 $kgCO_2eq/kWh$.

3.6 Data quality

The data quality can be described as good.

3.7 Period under review

Primary data cover a period of 12 months, from January 2023 to December 2023.

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

An economic allocation method was applied in this assessment. This type of allocation was considered appropriate as inputs and outputs of manufacturing processes could not be clearly allocated based on physical parameters such as mass, pieces produced and surface area occupied.

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. In order for two EPDs to be comparable, they must be based on the same PCR (including the same version) or on PCRs that are fully aligned. The products must also have identical functions, technical performances, and uses (e.g., same declared or functional unit); share equivalent system boundaries and data descriptions; follow consistent data quality requirements, data collection and allocation methods; use the same cut-off criteria and the same impact assessment method, including the version of the characterisation factors; and be valid at the time of comparison.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Considering accompanying packaging, biogenic carbon content has been derived from the total mass of corrugated board box and wood.

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	33.54	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Maintenance (B2)

Phase B2 includes the transport of the maintenance operator considered as 100 km every 5 years and modelled with the dataset Transport, freight, light commercial vehicle {RoW}| transport, freight, light commercial vehicle | Cut-off, U.
The maintenance operations are specified in the product instruction manual by FAAC and considered in the study. The maintenance operations involve periodic checks on various parts of the system and the replacement of specific components (declared in B4). The checks, scheduled every five years, include examining critical components such as pipes, the cylinder top ring, puffer limit switches, the cylinder guide, reflective film, LED lights, and the buzzer.

Regular maintenance ensures the continued reliability and performance of the system by addressing wear and tear on these components, thereby reducing the risk of malfunction and extending the product's operational lifespan.

Name	Value	Unit
Maintenance cycle	5	Number/RSL

Replacement (B4)

Phase B4 includes the use of a crane for 2 hours to aid in the substitution of components, modelled with the dataset Machine operation, diesel, < 18.64 kW, low load factor {GLO}| machine operation, diesel, < 18.64 kW, low load factor | Cut-off, U.

The table below outlines the components replacement and their corresponding frequency that have been considered in the model.

Name	Value	Unit
Substitution of the expansion cap every 10 years	0,89	g
Oil substitution every 10 years / 250000 cycles	6.35	kg
Substitution of the hydraulic unit filters every 10 years / 250000 cycles	0.02	kg
Substitution of the EFO accumulator every 10 years	18.00	kg
Substitution of the cylinder guide every 250000 cycles	0.18	kg

Reference service life

Name	Value	Unit
Life Span according to the manufacturer	20	a

Operational energy use (B6)

Name	Value	Unit
Electricity consumption	1406	kWh

The total energy consumption was calculated according to the parameters in the following table. The total energy consumption during the RSL is 1,406 kWh.

Operation	Percentage of time	Power consumption (W/h)	Phase duration (s)	Energy consumption in 20y (W)
Standby	98,91%	8		1.386.266,67
Lowering	0,52%	20	6,60	200,56
Raising	0,49%	1650	6,20	15.543,74
Push	0,08%	2700	1,00	4.102,45
Charge EFO*		4000	8,00	8,89
Use EFO*		20	1,50	0,01
TOTAL			**13,80**	**1.406.113,43**

Since no inputs or outputs are associated with phases B1, B3, B5, and B7, the resulting environmental impacts for these phases are zero.

End of life (C1-C4)

Name	Value	Unit
Collected separately waste type metals, plastics, electrical materials, oil	847.33	kg
Reuse	-	kg
Recycling	649.7	kg
Incineration with energy recovery	6.02	kg
Incineration without energy recovery	4.48	kg
Landfilling	187.12	kg

5. LCA: Results

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	MND	MND	X	X	X	X	X	X	X	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 piece JS 80 HA EFO INOX

Parameter	Unit	A1	A2	A3	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	3.75E+03	1.08E+01	2.82E+01	0	8.47E-01	0	3.87E+01	0	4.78E+02	0	2.14E+02	1.32E+02	5.48E+01	1.09E+01	-1.03E+03
GWP-fossil	kg CO_2 eq	3.69E+03	1.07E+01	2.81E+01	0	8.46E-01	0	3.87E+01	0	4.61E+02	0	2.14E+02	1.32E+02	5.47E+01	1.09E+01	-1.04E+03
GWP-biogenic	kg CO_2 eq	6.58E+01	6.52E-03	0	0	4.94E-04	0	-2.06E-02	0	1.63E+01	0	2.32E-02	7.78E-03	3.76E-02	4.19E-03	4.51E+00
GWP-luluc	kg CO_2 eq	3.44E+00	3.64E-03	1.02E-01	0	4.11E-04	0	8.6E-03	0	1.4E+00	0	1.84E-02	5.39E-02	2.44E-02	9.53E-04	-1.77E-01
ODP	kg CFC11 eq	5.54E-05	2.16E-07	8.15E-07	0	1.26E-08	0	5.95E-07	0	8.49E-06	0	3.25E-06	1.92E-06	2.51E-07	4.42E-08	-3.58E-06
AP	mol H^+ eq	1.94E+01	4.83E-02	2.31E-01	0	3.97E-03	0	9.49E-02	0	2.71E+00	0	6.13E-01	6E-01	1.98E-01	1.15E-02	-6.06E+00
EP-freshwater	kg P eq	2.1E+00	7.38E-04	1.28E-02	0	1.13E-04	0	3.94E-03	0	4.29E-01	0	6.2E-03	1.06E-02	1.1E-02	2E-04	-4.4E-01
EP-marine	kg N eq	3.75E+00	1.9E-02	7.52E-02	0	1.28E-03	0	2.66E-02	0	4.25E-01	0	2.37E-01	2.25E-01	5.27E-02	1.03E-01	-1.02E+00
EP-terrestrial	mol N eq	3.83E+01	2.07E-01	8.27E-01	0	1.41E-02	0	2.89E-01	0	3.81E+00	0	2.59E+00	2.46E+00	5.53E-01	4.73E-02	-1.1E+01
POCP	kg NMVOC eq	1.29E+01	7.42E-02	2.92E-01	0	5.41E-03	0	2.62E-01	0	1.25E+00	0	1.02E+00	8.48E-01	1.62E-01	1.6E-02	-3.7E+00
ADPE	kg Sb eq	2.38E-01	3.34E-05	1.86E-04	0	6.66E-06	0	9.67E-05	0	6.18E-03	0	7.57E-05	4.13E-04	1.02E-03	3.43E-06	-3.42E-02
ADPF	MJ	4.5E+04	1.54E+02	5.88E+02	0	1.16E+01	0	5.32E+02	0	1.07E+04	0	2.77E+03	1.88E+03	2.42E+02	3.4E+01	-9.43E+03
WDP	m^3 world eq deprived	1.06E+03	6.72E-01	9.43E+00	0	6.55E-02	0	3.44E+00	0	1.33E+02	0	6.01E+00	8.99E+00	3.8E+00	-4.23E-02	-8.52E+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 piece JS 80 HA EFO INOX

Parameter	Unit	A1	A2	A3	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	4.61E+03	2.57E+00	1.83E+03	0	2.94E-01	0	8.83E+00	0	2.88E+03	0	1.65E+01	2.46E+01	3.45E+01	5.86E-01	-3.64E+02
PERM	MJ	0	0	1.04E+03	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	4.61E+03	2.57E+00	2.87E+03	0	2.94E-01	0	8.83E+00	0	2.88E+03	0	1.65E+01	2.46E+01	3.45E+01	5.86E-01	-3.64E+02
PENRE	MJ	4.5E+04	1.54E+02	5.89E+02	0	1.16E+01	0	5.32E+02	0	1.07E+04	0	2.77E+03	1.88E+03	2.42E+02	3.4E+01	-9.43E+03
PENRM	MJ	7.4E+02	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	4.57E+04	1.54E+02	5.89E+02	0	1.16E+01	0	5.32E+02	0	1.07E+04	0	2.77E+03	1.88E+03	2.42E+02	3.4E+01	-9.43E+03
SM	kg	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
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m^3	3.72E+01	2.22E-02	3.38E-01	0	2.11E-03	0	9.83E-02	0	9.26E+00	0	1.98E-01	2.66E-01	1.42E-01	1.5E-02	-3.49E+00

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 piece JS 80 HA EFO INOX

Parameter	Unit	A1	A2	A3	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	1.17E +01	4E-03	8.82E-02	0	6.96E-04	0	1.31E-02	0	6.04E-01	0	2.53E-02	4.98E-02	4.49E-01	1.31E-01	-2.12E-01
NHWD	kg	2.94E +02	9.47E +00	4.25E +00	0	3.37E-01	0	8.24E-01	0	3.45E +01	0	1.7E+00	1.15E +02	6.52E +02	1.85E +02	-9.12E +01
RWD	kg	8.31E-02	5.05E-05	1.18E-03	0	5.25E-06	0	1.51E-04	0	7.6E-02	0	3.05E-04	3.99E-04	4.52E-04	8.98E-06	1.19E-02
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0	0	6.46E +02	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	6.02E +00	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0	0	3.86E +01	1.24E +01	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0	0	2.09E +02	2.48E +01	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 piece JS 80 HA EFO INOX

Parameter	Unit	A1	A2	A3	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	2.77E-04	1.04E-06	4.65E-06	0	8.37E-08	0	1.32E-06	0	9.66E-06	0	1.45E-05	1.27E-05	2.69E-06	2.18E-07	-9.1E-05
IR	kBq U235 eq	4.07E +02	2.03E-01	4.52E +00	0	2.1E-02	0	7.04E-01	0	2.96E +02	0	1.24E +00	1.63E +00	1.77E +00	3.64E-02	4.57E+01
ETP-fw	CTUe	9.35E +04	3.99E +01	5.87E +02	0	3.11E+00	0	8.3E+01	0	1.91E +03	0	3.93E +02	4.93E +02	2.35E +02	1.27E +03	-4.43E +04
HTP-c	CTUh	2.16E-04	7.25E-08	2.11E-07	0	4.78E-09	0	9.03E-08	0	1.08E-06	0	9.38E-07	6.84E-07	1.57E-07	8.36E-09	-1.32E-04
HTP-nc	CTUh	1.19E-04	1.07E-07	5.13E-07	0	7.21E-09	0	1.65E-07	0	7.49E-06	0	4.93E-07	1.29E-06	1.02E-06	6.68E-08	-4.02E-05
SQP	SQP	1.51E +04	1.15E +02	1.22E +04	0	4.77E +00	0	5.14E +01	0	2.38E +03	0	1.95E +02	1.41E +03	4.12E +02	6.12E +01	-3.6E+03

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 IRP.
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 ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP
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

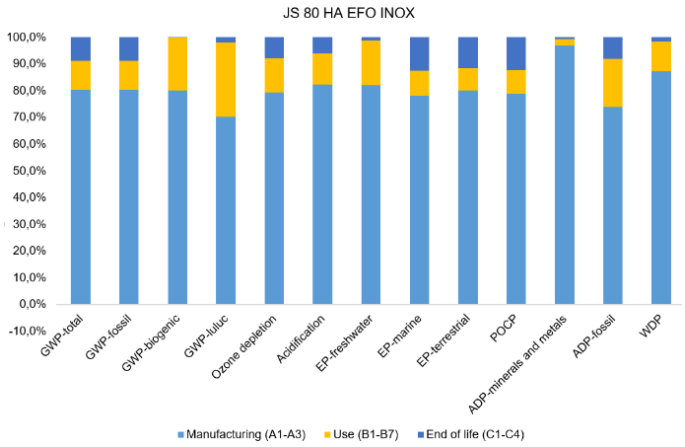
This chapter presents an interpretation of the Life Cycle Impact Assessment categories. When expressed as a percentage, the impact indicates its proportion of the total product impact across all modules, excluding module D.

The LCA results for the JS 80 HA EFO INOX bollard indicate that the manufacturing stage accounts for the majority of the environmental impacts across all indicators. Specifically, the manufacturing impacts range from 73.8% for ADP-fossil to 96.8% for ADP-minerals and metals, with phase A1 being the primary contributor within this stage.

The use phase is the second-largest contributor, with an average impact of 11.1%, varying between 2.6% and 18.2% depending on the indicator. The end-of-life stage ranks third, contributing an average of 7.0%, with values ranging between 0.6% and 12.5%.

Finally, the installation phase contributes an average of 0.3% to the total impact, primarily due to CO_2 emissions associated with the disposal of product packaging.

The average impact was calculated by considering GWP total and other environmental indicators, excluding GWP-fossil, biogenic and LULUC.



The variations in environmental impacts within the JS HA product range have been evaluated and are shown in the following table.

Impact Category	UM	JS 48 HA	JS 80 HA	JS 48 HA EFO	JS 80 HA EFO	JS 48 HA INOX	JS 80 HA INOX	JS 48 HA EFO INOX
Climate change - Total	kg CO2 eq	-11,7%	-3,0%	-9,5%	-1,1%	-10,4%	-1,8%	-8,0%
Climate change - Fossil	kg CO2 eq	-11,9%	-3,0%	-9,7%	-1,1%	-10,6%	-1,8%	-8,1%
Climate change - Biogenic	kg CO2 eq	-6,2%	-5,1%	-3,0%	-2,2%	-3,9%	-2,9%	-0,6%
Climate change - Land use and LU change	kg CO2 eq	-6,3%	-2,2%	-4,8%	-0,8%	-5,5%	-1,4%	-4,0%
Ozone depletion	kg CFC11 eq	-6,7%	-1,6%	-5,0%	-0,3%	-6,2%	-1,2%	-4,1%
Acidification	mol H+ eq	-10,7%	-4,0%	-7,8%	-1,2%	-9,4%	-2,7%	-6,3%
Eutrophication, freshwater	kg P eq	-9,1%	-3,3%	-6,5%	-0,8%	-8,3%	-2,5%	-5,6%
Eutrophication, marine	kg N eq	-11,0%	-3,3%	-8,6%	-1,0%	-9,9%	-2,3%	-7,4%
Eutrophication, terrestrial	mol N eq	-11,6%	-3,5%	-9,1%	-1,2%	-10,3%	-2,3%	-7,6%
Photochemical ozone formation	kg NMVOC eq	-11,7%	-3,2%	-9,4%	-1,1%	-10,5%	-2,0%	-8,0%
Resource use, minerals and metals	kg Sb eq	-4,4%	-3,8%	-1,1%	-0,5%	-3,9%	-3,3%	-0,5%
Resource use, fossils	MJ	-10,2%	-2,6%	-8,2%	-0,9%	-9,1%	-1,6%	-6,9%
Water use	m3 depriv.	-14,1%	-3,3%	-11,5%	-1,0%	-12,9%	-2,2%	-10,1%
Additional impact categories	**UM**	**JS 48 HA**	**JS 80 HA**	**JS 48 HA EFO**	**JS 80 HA EFO**	**JS 48 HA INOX**	**JS 80 HA INOX**	**JS 48 HA EFO INOX**
Particulate matter	disease inc.	-15,1%	-3,8%	-12,8%	-1,5%	-13,6%	-2,3%	-11,2%
Ionising radiation	kBq U-235 eq	-4,7%	-1,9%	-3,4%	-0,7%	-4,0%	-1,2%	-2,6%
Ecotoxicity, freshwater - part 1	CTUe	-17,8%	-3,4%	-15,1%	-0,7%	-17,1%	-2,7%	-14,3%
Ecotoxicity, freshwater - part 2	CTUe	-4,8%	-2,6%	-1,8%	0,3%	-5,0%	-2,9%	-2,0%
Ecotoxicity, freshwater - inorganics	CTUe	-11,2%	-3,5%	-8,1%	-0,4%	-10,8%	-3,1%	-7,6%
Ecotoxicity, freshwater - organics - p.1	CTUe	-19,1%	-3,3%	-16,5%	-0,8%	-18,2%	-2,5%	-15,7%
Ecotoxicity, freshwater - organics - p.2	CTUe	0,4%	3,9%	1,0%	4,4%	-3,9%	-0,5%	-3,2%
Human toxicity, cancer	CTUh	-19,1%	-3,4%	-16,5%	-0,8%	-18,2%	-2,5%	-15,7%
Human toxicity, non-cancer	CTUh	-8,8%	-4,2%	-5,3%	-0,8%	-8,0%	-3,4%	-4,4%
Land use	Pt	-7,2%	-2,7%	-5,4%	-1,0%	-6,1%	-1,7%	-4,2%

Resource use indicators	UM	JS 48 HA	JS 80 HA	JS 48 HA EFO	JS 80 HA EFO	JS 48 HA INOX	JS 80 HA INOX	JS 48 HA EFO INOX
PERE	MJ (LHV)	-6,2%	-2,9%	-4,7%	-1,5%	-4,7%	-1,4%	-3,0%
PERM	MJ (LHV)	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
PERT	MJ (LHV)	-5,6%	-2,6%	-4,2%	-1,3%	-4,2%	-1,2%	-2,7%
PENRE	MJ (LHV)	-10,2%	-2,6%	-8,2%	-0,9%	-9,1%	-1,6%	-6,9%
PENRM	MJ (LHV)	-3,3%	-3,3%	3,4%	3,4%	-6,7%	-6,7%	0,0%
PENRT	MJ (LHV)	-10,1%	-2,6%	-8,1%	-0,9%	-9,1%	-1,7%	-6,8%
Use of secondary material	kg	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Use of renewable secondary fuels	MJ (LHV)	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Use of non-renewable secondary fuels	MJ (LHV)	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Net use of fresh water	m3	-11,7%	-3,0%	-9,5%	-1,0%	-10,6%	-1,9%	-8,2%
Hazardous waste disposed	kg	-5,5%	-4,5%	-2,4%	-1,4%	-4,1%	-3,1%	-0,9%
Non-hazardous waste disposed	kg	-18,8%	-3,8%	-16,3%	-1,3%	-17,5%	-2,5%	-15,0%
Radioactive waste disposed	kg	-5,3%	-2,1%	-3,8%	-0,8%	-4,4%	-1,3%	-2,9%
Components for re-use	kg	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Materials for recycling	kg	-21,3%	-3,6%	-18,9%	-1,2%	-20,0%	-2,4%	-17,7%
Materials for energy recovery	kg	-5,8%	-5,8%	6,8%	6,8%	-12,6%	-12,6%	0,0%
Exported energy - electricity	MJ	-5,3%	-5,3%	3,2%	3,2%	-8,5%	-8,5%	0,0%
Exported energy - heat	MJ	-2,3%	-2,3%	1,3%	1,3%	-3,7%	-3,7%	0,0%
Recovered energy	MJ	-2,9%	-2,9%	1,7%	1,7%	-4,5%	-4,5%	0,0%
Biogenic carbon content - product	kg C	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Biogenic carbon content - packaging	kg C	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%

7. Requisite evidence

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The literature referred to in the Environmental Product Declaration must be listed in full.Standards already fully quoted in the EPD do not need to be listed here again.
The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced.

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