ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	E. Hawle Armaturenwerke GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-HAW-20230068-IBA1-EN
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Valid to	02.03.2028

E3 Valve DN100

E. Hawle Armaturenwerke GmbH

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD VERIFIED

1. General Information

E. Hawle Armaturenwerke GmbH	E3 Valve
Programme holder IBU – Institut Bauen und Umwelt e.V. Hegelplatz 1 10117 Berlin Germany	**Owner of the declaration** E. Hawle Armaturenwerke GmbH Wagrainer Straße 13 4840 Vöcklabruck Austria
Declaration number EPD-HAW-20230068-IBA1-EN	**Declared product / declared unit** 1 piece E3 valve
This declaration is based on the product category rules: Fittings and connections for water supply, 09-2022 (PCR checked and approved by the SVR)	**Scope:** This Environmental Product Declaration refers to a declared unit of 1 piece E3 valve - type 'DN100 PN16 SHORT' - produced at the production sites of E. Hawle Armaturenwerke GmbH in Vöcklabruck and Frankenmarkt (Austria). 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*.
Issue date 03.03.2023	**Verification** The standard *EN 15804* serves as the core PCR Independent verification of the declaration and data according to *ISO 14025:2011* ☐ internally ☒ externally
Valid to 02.03.2028	
Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)	
Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.))	Prof. Dr. Birgit Grahl (Independent verifier)

2. Product

2.1 Product description/Product definition

The declared product is a gate valve for drinking water supply according to *EN 1074-1* and *EN 1074-2* with the trade name 'Hawle E3', specifically the version 'DN100 PN16 SHORT'. The product is installed in the pipeline network via flange connections and is used to open or shut off the water flow.

Catalog number: 4000E3
Internal material number: 5001482
Goods no. / Imp. code no.: 84818061
EAN/UPC code: 9007878121296
Coating standard: *EN 14901*

The gate valve is designed as a resilient seated wedge-type gate valve with a smooth and free bore. The body has a two-part design: the bottom part is connected to the pipeline via flanges. Optionally, supports, spigots or other connection systems (System2000, VRS) may also be used.
The top part (the bonnet) houses the spindle and the sealing wedge. The top and bottom part are connected with stainless steel screws and an elastomer gasket. The bonnet and the body are made from EN-GJS-400-15 ductile cast iron pursuant to *EN 1563*. They are epoxy powder coated on the inside and outside pursuant to *DIN 3476-1* and in compliance with the quality and testing provisions of *RAL-GZ 662*.
The sealing wedge is vulcanized over its entire surface. A wedge nut is connected flexibly, without any clearance, and such that it absorbs vibrations, by way of positive locking and elastomer embedding.
The inside of the wedge is made from EN-GJS-400 ductile cast iron pursuant to *EN 1563*, while the outside of the wedge is fully rubberized with vulcanized EPDM (vulcanised ethylene-propylene-diene rubber, according to *EN 681-1*). The wedge guide has a plastic top piece.

The Duplex stainless-steel spindle (Duplex 1.4162 (pitting-resistence-equivalent-number (PRE number) ~26)) rounds out the load-optimized design and guarantees ultra-low wear, minimal closure torques, and optimum corrosion resistance.

An O-ring carrier and a spindle support seal the spindle and ensure easy movement of the sealing wedge.

The flange openings are closed with covering caps to protect against contamination pursuant to the *ÖVGW PW 100* standard of the Austrian Gas and Water Industry Association (ÖVGW), *EN 12351*, and *EN 805* in accordance with the *PW 501* test guidelines for water of the ÖVGW – Regulations for valves in the drinking water supply.

The Hawle E3 valve can be retrofitted with a variety of accessories: position indicators or motorized actuators, hand wheels or extension spindles.

For the use and application of the product the respective national provisions at the place of use apply, in Germany for example the building codes of the federal states and the corresponding national specifications.

2.2 Application

The valve is used to shut off pipelines in drinking water supply networks.

2.3 Technical Data

Constructional Data

Name	Value	Unit
Medium	Water	
Nominal diameter (DN)	100	
Max. working pressure (PN)	16	bar
Temperature (range)	0 - 40	°C
Connection 1	Flange (EN 1092-2)	
Connection 1	Flange (EN 1092-2)	
Weight	0.0205	t
Housing material	EN-GJS-400-15 (EN 1563)	
Spindle material	1.4162 (EN 10088-3)	

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (no CE-marking).

2.4 Delivery status

The E3 valve is delivered fully assembled, tested, and packaged.
The E3 short DN100 PN16 is 46 cm high, 19 cm long, and 21 cm wide; it has a weight of 20.5 kg.

2.5 Base materials/Ancillary materials

The main product components are listed in the table below.

Name	Material	Count	Sum Weight	Ratio-Weight
Body	GJS BESCH	1 PCS	13,5 kg	65,90%
Bonnet	GJS BESCH	1 PCS	2,98 kg	14,55%
Wedge	GJS/W270	1 PCS	2,2 kg	10,74%
Spindle	1.4162	1 PCS	0,91 kg	4,44%
O-Ring Bush	CuZn40Pb2/ EPDM	1 PCS	0,3 kg	1,46%
Covering Cap	PE80	2 PCS	0,246 kg	1,20%
Body Screws	A2-70	4 PCS	0,16 kg	0,78%
Spindle Support	CuZn21Si3P	1 PCS	0,083 kg	0,41%
Edge Protection Ring	PE100 Regranul 01 schwarz	1 PCS	0,065 kg	0,32%
Bonnet Gasket	EPDM 70±5Sh W270	1 PCS	0,028 kg	0,14%
O-Ring-Bush Screw	Edelstahl A2-70	2 PCS	0,006 kg	0,03%
Friction Washer	POM Delrin FG100	2 PCS	0,004 kg	0,02%
O-Ring	EPDM 70Sh	1 PCS	0,003 kg	0,01%
O-Ring	EPDM 70Sh	1 PCS	0,001 kg	0,00%

1) One partial article contains substances listed in the candidate list (date: 21.10.2022) exceeding 0.1 percentage by mass: **yes.**

Substance: Lead
CAS number: 7439-92-1
Hazards: H360FD and H362 (according to Regulation (EC) No 1272/2008 (CLP))
Component: O-ring carrier
Material: Brass CuZn40Pb2
Concentration:
- Approx. 2 % in the component
- Approx. 0.028 % in the product

The materials used in the product are exclusively metallic materials suitable for drinking water hygiene, which are classified by the Federal Environment Agency (UBA) as harmless for the protection of human health, see document *Bewertungsgrundlage* (evaluation basis) of the German Federal Environment Agency for metallic materials in contact with drinking water.

2) This product/article/at least one partial article contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: **no.**

3) Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): **no.**

2.6 Manufacture

The gate valve is manufactured in accordance with the quality management standard *ISO 9001*.
All products are checked for function and tightness prior to dispatch. Production takes place according to the specifications of the relevant standards. The products and the manufacturing methods also meet the requirements of the country-specific approvals.

Production takes place at the two production sites of E. Hawle Armaturenwerke GmbH in Vöcklabruck and Frankenmarkt.
The body components are processed mechanically; the surfaces are blasted and then epoxy powder coated.

The spindles are produced from Duplex rod material that is swaged externally. The swaged part is processed mechanically at Hawle and the thread is rolled.
Various plastic components are produced using injection molding machines: sliding disk made from POM granules (polyoxymethylene), covering cap/edge protection made from PEHD granules (high-density-polyethylene), wedge guide made from POM-C granules.
The sealing wedge is first punched and blasted. The wedge and wedge nut are coated with adhesion promoter and are then vulcanized with rubber.
The bonnet gasket is made from raw rubber in elastomer production. Various O-rings are bought in.
The individual components are assembled and are finished after passing the functional and pressure testing.

2.7 Environment and health during manufacturing

The production process at Hawle complies with the health and safety management standard *ISO 45001*.
The commitment to continuous improvement is reflected in the company's exceeding of legal requirements with regard to inspections, evaluations, prevention staff and prevention times, and additional measures in connection with the 'Hawle Vital Program'.

The certified environmental management system according to *ISO 14001* is proof of Hawle's commitment to steadily reducing its environmental impact. This includes various initiatives in the following areas:

- Resource efficiency: use of recycled plastics for parts that do not come into contact with drinking water; closing raw material loops with suppliers by way of cast iron swarf agglomeration; continuous scrap monitoring; integrated waste management concept; repair of used Euro-pallets, etc.
- Water management: preparation and re-use of test water;
- Energy management: thermal insulation; heat recovery plants; energy recovery plans; efficiency-boosting measures; lighting optimization, etc.

2.8 Product processing/Installation

Installation instructions are enclosed with the product.
Installation may be carried out by trained personnel of the user themselves. Screws and wrenches are required on site to make the flange connection with the pipes.
After assembly, a pressure test is to be conducted in the open trench pursuant to *EN 805*; this is to be dictated by the working pressure.

2.9 Packaging

The flange openings of the Hawle valves are closed with covering caps during final assembly in order to prevent the ingress of contamination during storage and transport. Additional packaging serves merely to protect the product during transport and is dictated by the destination country in question (sea freight, air cargo, parcel express, truck).

The provisions governing standard packaging types are set out in a dedicated handbook.
For continental Europe, the transport packaging consists of an exchangeable Euro-pallet with a reusable folding frame and a hardboard base.
Multiple valves are usually placed on this. The contact points are protected with cardboard inserts (partly recycled secondary packaging) and the frame is braced with PET straps.

The packaging materials can either be re-used or sent to the country-specific waste collection systems (waste wood, wastepaper, plastic packaging).

2.10 Condition of use

The material composition during the usage phase is the same as that at the time of manufacture.
The highly corrosion-resistant design ensures a long product life.

The Hawle gate valve is designed for maintenance-free operation. However, the valves must be operated at appropriate time intervals (recommended: 1x per year).

2.11 Environment and health during use

From an environmental and health perspective, there are no hazards or restrictions on use.

2.12 Reference service life

Hawle products are produced according to extremely high standards. In order to achieve the greatest possible service life, the products are made from or coated with particularly corrosion-resistant materials.

The reference service life of the gate valve is 50 years according to *EN 1074.*

Influences on aging may include non-standard conditions, such as corrosive media or soils, and excessive operation of the valve.

2.13 Extraordinary effects

Fire
Gate valves are not subject to the Construction Products Regulation. A building material class/flammability cannot be specified.

Water
In the event of flooding or other exposure to water, no negative effects on the product and therefore no resulting consequences for the environment are to be expected.

Mechanical destruction
No negative consequences for the environment are to be expected in the event of mechanical destruction.
As part of a drinking water supply pipeline, potential impacts in the event of a functional failure must be considered in the overall risk assessment of the supply pipeline.

2.14 Re-use phase

Repair: The top part of the body including the wedge/spindle can be exchanged and replaced with new components. The O-rings can even be exchanged under pressure during operation.
Reuse: The cast iron body components can be

returned to the production cycle by way of lye treatment/recoating.
Recycling: The product can be dismantled into its components. The materials that are relevant in terms of weight (cast iron, stainless steel, brass) can be recycled directly.

2.15 Disposal
The product is disposed of according to national regulations. Not considering the possibilities mentioned in 2.14, the gate valve is disposed of by being fed into the scrap iron processing cycle.
The waste code according to the European Waste Catalogue is: 17 04 07 Mixed Metal Waste

2.16 Further information
You can find further information at:
www.hawle.com

3. LCA: Calculation rules

3.1 Declared Unit
This environmental product declaration refers to a declared unit of 1 piece E3 valve - type „DN100 PN16 SHORT“ - with a weight of 20.5 kg/piece.

Declared unit

Name	Value	Unit
Declared unit	1	pce.
Weight	20.5	kg/pce

The bulk density of 7.2 g/cm³ was calculated based on the main mass fraction of cast iron.

3.2 System boundary
The life cycle assessment of E3 valves refers to a cradle-to-gate analysis with modules C1–C4 and module D (A1–A3 + C + D). The following life cycle phases are part of the analysis.

Module A1–A3 | Production stage
The production stage includes the upstream burdens of raw material supply, their transports and the production of E3 valves at E. Hawle Armaturenwerke GmbH in Vöcklabruck and Frankenmarkt. The production sites are supplied with electricity from hydropower (emission factor GWP total: 6,4 g CO_2-equivalents/kWh). The provision of thermal energy at the site in Vöcklabruck is based on district heating using natural gas and biomass. Thermal energy supply in Frankenmarkt is based on local heating using biomass. The production of the product packaging is also included in module A1–A3.

Module C1 | Deconstruction and demolition
The product is used underground and is either dismounted from the accompanying structures and used in steel production or the valves may remain in the ground after their service life. In the case of removal, the whole valves are used as secondary material in the steel production. The disposal without disassembly of the product is considered as representative for the end-of-life scenario. Burdens associated with the dismounting of the products are assumed as low. The real energy consumption of dismounting strongly depends on the site-specific conditions.

Module C2 | Transport to disposal
The transport to the disposal of the material is estimated declaring a 50 km radius to the waste processing.

Module C3 | Waste processing
Product flows that reach Module D for recycling reach the end-of-waste state in C3 and thus leave the product system. Environmental impacts resulting from the sorting of metal scrap are not included, as referring energy demand is considered to be negligible.

Module C4 | Disposal
Module C4 refers to the emissions from the disposal of the losses from waste processing. Since the chosen scenario assumes the recycling of 100 % of the product, no environmental burdens are declared in module C4.

Module D | Benefits and loads beyond the system boundary
Module D declares the recycling of the recovered metals (100 % share) including the environmental potential for substituting primary material.

3.3 Estimates and assumptions
All assumptions are verified through detailed documentation and correspond to the best possible representation of reality based on the available data. Regional applicability of the used background data refers to average data under European or German conditions taken from the *GaBi*-database. German data were used for the Austrian market whenever European or Austrian average data were not available.

3.4 Cut-off criteria
All inputs and outputs for which data are available are included in the LCA model. Data gaps are filled with conservative assumptions from average data (when available) or with generic data and are documented accordingly. Only data with a contribution of less than 1 % were cut off. Ignoring such data is justified based on the irrelevance of the expected effect. Processes, materials, or emissions known to make a significant contribution to the environmental effects of the products under examination have not been neglected. It is assumed that the data have been completely recorded and the overall total of ignored input flows do not amount to more than 5 % of total energy and mass flows. Environmental impacts of machines, plant and infrastructure were not included.

3.5 Background data
This study uses generic background data for the evaluation of upstream environmental impacts from *GaBi*-database 2022.2 and is modelled in *GaBi*-software version 10.

3.6 Data quality
Data collection is based on product-specific questionnaires. It follows an iterative process clarifying questions via e-mail, telephone calls or in personal/web-meetings. Intensive discussions between Hawle and Daxner & Merl results in an accurate mapping of product-related material and energy flows.

This leads to a high quality of foreground data collected. Data collection relies on a consistent process according to *ISO 14044*.
The technological, geographical and time-related representativeness of the database was kept in mind when selecting background data. Whenever specific data were missing, either generic datasets or representative average data were used instead. The implemented *GaBi* background datasets refer to the latest versions available and are carefully chosen. Except for the dataset for POM they are not more than ten years old. Due to a lack of more actual data for POM, the industry publication of Plastics Europe from 2010 is part of this analysis. In the absence of more recent data, this data set serves as a conservative approximation with a very small impact on the overall result.

3.7 Period under review

Foreground data were collected in the 2020 production year, and the data are based on the volumes produced on an annual basis.

3.8 Allocation

For energy demand, auxiliary materials and land occupation, no product specific data are available. Therefore, annual quantities were allocated to the product using representative allocation keys (product mass, pieces produced, mass of cast iron parts).
All inputs of secondary material are regarded as burdenfree. To calculate the net flow, the total external scrap input is subtracted from the total mass of the product.

3.9 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 *GaBi* background database was used to calculate the LCA (*GaBi* 10; 2022.2).

4. LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic carbon
The declared product does not contain any biogenic carbon.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in accompanying packaging	1.5	kg C

The carbon stored in the packaging was taken into account as "CO_2-neutral". Thus the storage effect of the carbon bound in the packaging is not included in the calculation but is considered as emitted immediately.

Installation into the building (A5)
The end-of-life of the packaging materials is not declared in Module A5.

Name	Value	Unit
Packaging (Pallet)	1.47	kg
Packaging (Wooden frame)	1.80	kg
Packaging (PET strips)	0.01	kg
Packaging (Cardboard)	0.03	kg
Packaging (Particle board)	0.17	kg

End of life (C1–C4)

Name	Value	Unit
Collected separately	20.5	kg
Recycling 100 %	20.5	kg

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

Name	Value	Unit
Net flow of steel scrap	4.7	kg

5. LCA: Results

The following table contains the LCA results for a declared unit of 1 piece E3 valve DN100 with a weight of 20.5 kg/piece.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = 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	ND	ND	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 piece E3 valve (20.5 kg/piece)

Core Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Global warming potential - total	[kg CO_2-Eq.]	4.45E+1	0.00E+0	6.15E-2	0.00E+0	0.00E+0	-8.06E+0
Global warming potential - fossil fuels	[kg CO_2-Eq.]	4.36E+1	0.00E+0	6.17E-2	0.00E+0	0.00E+0	-8.07E+0
Global warming potential - biogenic	[kg CO_2-Eq.]	8.53E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.12E-3
GWP from land use and land use change	[kg CO_2-Eq.]	2.08E-2	0.00E+0	4.15E-4	0.00E+0	0.00E+0	-1.66E-4
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	3.33E-10	0.00E+0	6.04E-15	0.00E+0	0.00E+0	-1.76E-14
Acidification potential, accumulated exceedance	[mol H^+-Eq.]	1.28E-1	0.00E+0	2.06E-4	0.00E+0	0.00E+0	-1.73E-2
Eutrophication, fraction of nutrients reaching freshwater end compartment	[kg P-Eq.]	1.51E-4	0.00E+0	2.20E-7	0.00E+0	0.00E+0	-1.46E-6
Eutrophication, fraction of nutrients reaching marine end compartment	[kg N-Eq.]	2.67E-2	0.00E+0	9.40E-5	0.00E+0	0.00E+0	-3.05E-3
Eutrophication, accumulated exceedance	[mol N-Eq.]	2.86E-1	0.00E+0	1.05E-3	0.00E+0	0.00E+0	-2.67E-2
Formation potential of tropospheric ozone photochemical oxidants	[kg NMVOC-Eq.]	8.23E-2	0.00E+0	1.85E-4	0.00E+0	0.00E+0	-1.24E-2
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	5.36E-4	0.00E+0	6.20E-9	0.00E+0	0.00E+0	-2.01E-5
Abiotic depletion potential for fossil resources	[MJ]	5.69E+2	0.00E+0	8.08E-1	0.00E+0	0.00E+0	-7.41E+1
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m^3 world-Eq deprived]	1.11E+1	0.00E+0	6.88E-4	0.00E+0	0.00E+0	-1.50E+0

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 piece E3 valve (20.5 kg/piece)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier	[MJ]	4.68E+2	0.00E+0	5.60E-2	0.00E+0	0.00E+0	4.67E+0
Renewable primary energy resources as material utilization	[MJ]	5.70E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	5.25E+2	0.00E+0	5.60E-2	0.00E+0	0.00E+0	4.67E+0
Non-renewable primary energy as energy carrier	[MJ]	5.37E+2	0.00E+0	8.11E-1	3.37E+1	0.00E+0	-7.41E+1
Non-renewable primary energy as material utilization	[MJ]	3.37E+1	0.00E+0	0.00E+0	-3.37E+1	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	5.70E+2	0.00E+0	8.11E-1	0.00E+0	0.00E+0	-7.41E+1
Use of secondary material	[kg]	1.72E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.66E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m^3]	4.64E-1	0.00E+0	6.47E-5	0.00E+0	0.00E+0	-3.38E-2

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 piece E3 valve (20.5 kg/piece)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	[kg]	6.83E-8	0.00E+0	4.29E-12	0.00E+0	0.00E+0	-5.72E-10
Non-hazardous waste disposed	[kg]	9.55E+0	0.00E+0	1.32E-4	0.00E+0	0.00E+0	1.12E+0
Radioactive waste disposed	[kg]	2.30E-2	0.00E+0	1.51E-6	0.00E+0	0.00E+0	9.21E-6
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	0.00E+0	2.05E+1	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 piece E3 valve (20.5 kg/piece)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Potential incidence of disease due to PM emissions	[Disease Incidence]	ND	ND	ND	ND	ND	ND
Potential Human exposure efficiency relative to U235	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for ecosystems	[CTUe]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - cancerogenic	[CTUh]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - not cancerogenic	[CTUh]	ND	ND	ND	ND	ND	ND
Potential soil quality index	[-]	ND	ND	ND	ND	ND	ND

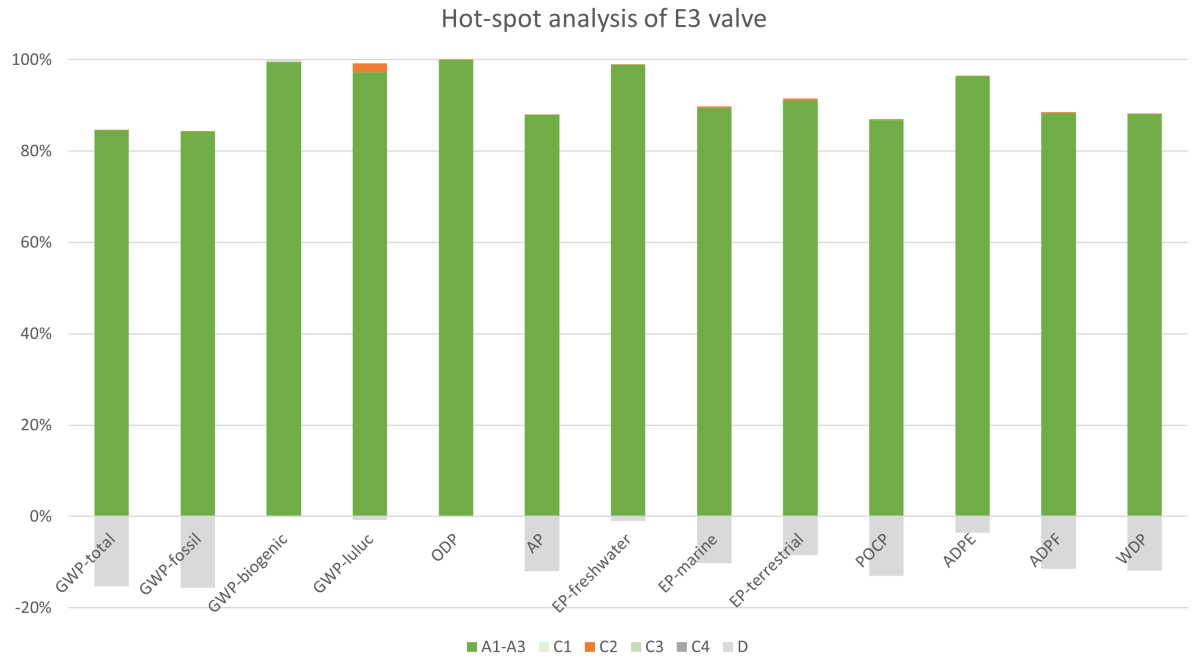
The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

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 nor radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from 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 weightedwater consumption, eutrophication fractionof nutrients reaching freshwater end compartment, potential comparative toxic unit for humans cancerogenic, potential comparative toxic unit for humans notcancerogenic, potential soil quality index:
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 experience with the indicator.

6. LCA: Interpretation

The following interpretation contains a summary of the LCA results referenced to a declared unit of 1 piece of E3 valve DN100.



The comparison of the products' life cycle phases shows a clear dominance of the production phase (modules A1-A3).
The environmental impact in the production phase is mainly dominated by raw material provision, especially of the cast iron components.

In the production phase of the valves, the production of the housing represents the major hot-spot in all of the impact categories considered except for abiotic depletion potential minerals and metals (ADPE), where the stainless steel spindle is the main driver.

Due to electricity provision from hydropower and thermal energy provision partly from biomass, energy use shows a very low impact in all categories.

The product is used underground and only removed if also the accompanying structures are removed from the ground. It is to be expected that a certain share of the valves remains in the ground after use. In case of dismounting, the valve is collected separately but not disassembled.

As a result of product recyclability, in case the material is removed at the end of life primary steel can be substituted. According to the set method, the first step is to saturate the secondary material used in module A with material from module C. The excess amount from module C (“net flow”) can substitute primary steel and leads to corresponding substitution potentials in module D.

The environmental impact of the transport of the products to recycling (C2) represents a minor contribution to the overall environmental impact of the product.

7. Requisite evidence

Not relevant for this EPD.

8. References

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