ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Frese Hydronic Control and Balancing Valve (Ductile (cast) iron)

Vexve Denmark | Frese A/S

EPD HUB, HUB-5532

Published on 25.02.2026 Last updated on 15.05.2026 Valid until 24.02.2031

Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.2 (24 Mar 2025) and JRC characterization factors EF 3.1.

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Vexve Denmark | Frese A/S
Address	Sorøvej 8, DK-4200 Slagelse
Contact details	dk.info@vexve.com
Website	www.frese.eu and www.vexve.com

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019/AC:2021 and ISO 14025
PCR	EPD Hub Core PCR Version 1.2, 24 Mar 2025
Sector	Manufactured product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Anne Damm, Vexve Denmark | Frese A/S
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Yazan Badour as an authorized verifier for EPD Hub

This EPD is intended for business-to-business and/or business-to-consumer communication. The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	Frese Hydronic Control and Balancing Valve (Ductile (cast) iron)
Additional labels	This EPD covers: OPTIMA Compact DN-50-DN300 (Veriflow-series), Sigma Compact DN50-DN300 (Veriflow-series), PV Compact DN40-DN50 (Spectrum-series), PV Compact DN50-DN200, ALPHA Wafer DN50-DN1000, OMEGA Compact DN65-DN800 (Standard-series) and OMEGA Compact DN65-DN800 (Leaguard-series).
Product reference	Reference product: SIGMA Compact VF DN80 PN16 Low Flow (53-2402)
Place(s) of raw material origin	Asia and Europe
Place of production	Denmark, Slagelse
Place(s) of installation and use	Global
Period for data	Calendar year 2024
Averaging in EPD	Multiple products
Variation in GWP-fossil for A1-A3 (%)	-3,2%/+1,9%
GTIN (Global Trade Item Number)	5705564055729
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	0,61

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
Mass of packaging	0,13968 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	28,1
GWP-total, A1-A3 ($kgCO_2e$)	29,8
Secondary material, inputs (%)	78,8
Secondary material, outputs (%)	84,3
Total energy use, A1-A3 (kWh)	123
Net freshwater use, A1-A3 (m^3)	0,28

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Vexve – Inspired by Your Flow

Vexve aims to be the leading provider of mission-critical valve solutions in the transition to a low-carbon future.

At Vexve Denmark, we develop and manufacture dynamic valves and innovative, energy-efficient solutions for hydronic systems in buildings and industrial applications, marine systems and district energy networks. Our technologies optimize energy use and enhance overall system performance.

With more than 80 years of experience under the Frese name, we are proud to be part of the Vexve Group. Together, we work to become the leading provider of mission-critical valve technologies in the shift towards a lower-carbon future.

We supply more than 70 countries and employ over 900 people across modern production facilities in Finland, the Czech Republic, Germany, China and Denmark.

Our mission is to advance energy efficiency – through deep technical expertise, reliable partnerships and solutions that make a real difference.

PRODUCT DESCRIPTION

Product description:
The Frese control and balancing valve range in this EPD consists of large-dimension hydronic valves used to keep water-based heating and cooling systems stable, predictable and energy efficient in buildings and district networks. The product group covers pressure independent control valves of the OPTIMA Compact Veriflow series DN50–DN300, SIGMA Compact dynamic flow-limiting valves DN50–DN300 and PV Compact differential pressure control valves DN40–DN200, ALPHA Wafer DN50-DN1000 and OMEGA Compact DN65-DN800. Together, these valves help maintain design flows and stable differential pressures in mains, risers and branches so that downstream control valves, coils and heat exchangers can work with good authority and low risk of noise, even when pump speed and system load are changing.

Within the product group, the pressure independent control valves combine an externally adjustable automatic balancing function, an integrated differential pressure controller and a full-authority modulating control section in a single body, providing dynamic flow and temperature control without the need for separate balancing valves. The dynamic flow-limiting valves provide externally adjustable, constant flow limitation and isolation to different parts of the system, so overflows and unnecessary pump energy are avoided while still allowing measurement and verification via integrated test points. The differential pressure control valves are installed typically in the return line and keep the pressure difference across a circuit or group of valves at a set level, creating stable conditions for modulating control valves and reducing the risk of hydronic noise.

Across the range, the valves consist of cast iron or ductile iron bodies with internal components such as stainless-steel springs, diaphragms and cartridges, complemented by elastomeric sealing elements like EPDM O-rings and diaphragms designed for typical HVAC pressures and temperatures. In many applications these valves are used together with electric actuators, capillary tubes and external controllers, but in this Environmental Product Declaration only the passive mechanical valve assemblies, including integrated measuring points, are included in the assessed product system; actuators and other external control equipment are not part of the EPD scope.

Physical properties of the product:
Materials: The valves in this group are primarily made of ductile/cast iron GJS 400-18RT, accounting for more than 80% of their total weight. Other materials include stainless steel, steel, brass, copper, zinc, rubber (EPDM), and different types of plastic (such as ABS, PPS, PTFE, SEPS and PE-LD).

Additional product information:
Find more details such as product specifications, applications, technical information, datasheets, images, and other resources on our website: www.frese.eu.

Further information can be found at: www.frese.eu and www.vexve.com.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	99,28%	Asia and Europe
Minerals	0	-
Fossil materials	0,72%	Asia and Europe
Bio-based materials	0	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0,055

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg
Mass per declared unit	1 kg
Functional unit	-
Reference service life	-

SUBSTANCES, REACH – VERY HIGH CONCERN

Substances of very high concern	EC	CAS
Lead: The valves consist of a small amount of brass. The brass used contains lead. For every 1 kg of brass, approximately 2% (0.02 kg) is lead.	231-100-4	7439-92-1

The brass in these valves constitute a minimal amount, around 1,5-2 % per kg valve. Therefore, the lead constitutes an even smaller percentage, as the brass alloy contains only 2% lead. This results in approximately 0,03% lead per kg valve.

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Not declared = ND.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

The valves are composed mainly of ductile or cast iron (>80%). Other materials include stainless steel, steel, brass, various types of plastic and rubber components. Some products in this group, but not all, also include copper and zinc components. We purchase almost all components ready-made from various suppliers and assemble the valves at our factory. The few components that are not purchased ready-made are manufactured in-house. The manufacturing consists of some metalworking on brass, the production losses for machining are accounted for. Pre-processed components include Sand-casted and painted ductile iron, some wax-casted stainless steel and steel components, and some cold-rolled and metal-worked stainless steel and steel components, as well as contoured and metal-worked brass, metal-worked zinc and copper, and injection molded rubber and plastic parts. Raw material origins are both Asia and Europe. Transport information is based on actual distances between suppliers of raw materials and components to our factory in Denmark.

Electricity is used to power assembly machines, cutting machines, electric forklifts, electric heating and lighting. Electricity is also used to perform air pressure tests on the valves. A location-based approach was used for modelling the electricity mix utilized in the factory, location is Denmark. For the components manufactured in-house ancillary resources are used, such as cutting fluid (oil) for lubrication during metalworking and water for washing.

Once the valves are manufactured and assembled, they are packaged using materials such as a paper installation guide, cardboard boxes, wooden EUR pallets and plastic wrap. The valves are then shipped to the installation site. The transport distance to the installation site is calculated as the average distance to customers for the valves sold in 2024.

Production losses and manufacturing waste consist of metal scrap from the processing of brass. The scrap is normally sold to a “Brass Foundry” for recycling, but no documentation was provided by the foundry. Therefore, this conservative scenario was applied instead: Brass is 60% recycled and 40% landfilled (source: internationalcopper.org). The transport distance is defined as the distance between our factory and the brass foundry. Wastewater and cutting oil are collected, together by an industrial waste management company, which separates the oil and water. Afterwards, the oil is incinerated with energy recovery, and the water is cleansed. Transport is to the waste management company.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

The transport distance from our factory to the installation site is calculated as an average of all kilometers traveled to deliver these valves to customers during 2024. The calculation relies on relative annual sales percentages combined with actual distances in kilometers. The chosen transport method was lorries. We assume full truckloads, meaning the vehicle capacity utilization factor is set to one. Yes, it can vary, but since transportation emissions play only a minor role in the overall environmental impact, those variations are considered negligible. Nothing gets lost during transport because the packaging is secure, and even nested packaging assumes full volume utilization.

The installation process is normally carried out using hand tools or handheld equipment with minimal energy use, therefore the resources required for A5 installation are considered negligible in this assessment.

When installation happens, the waste comes from packaging, and it falls into four material types: cardboard, paper, plastic, and wood. According to EUROSTAT cardboard, paper and plastic are mostly recycled, while wooden pallets are mostly landfilled (but typically reused).

PRODUCT USE AND MAINTENANCE (B1-B7)

The life expectancy for our valves is approximately 15 years, with a warranty period of 5 years.

Frese Hydronic Control and Balancing Valve (ductile (cast) iron) do not need maintenance, repair or refurbishment. The use phase is not relevant for the life cycle emissions of this product and is therefore not accounted for in the assessment.

Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

Disassembly is typically done with hand tools or handheld equipment, using so little energy that the resources needed for this step (C1) are considered negligible in the assessment. At the end of their life, products are assumed to be transported by lorry to the nearest waste handling site, with an average distance of 20 km (C2).

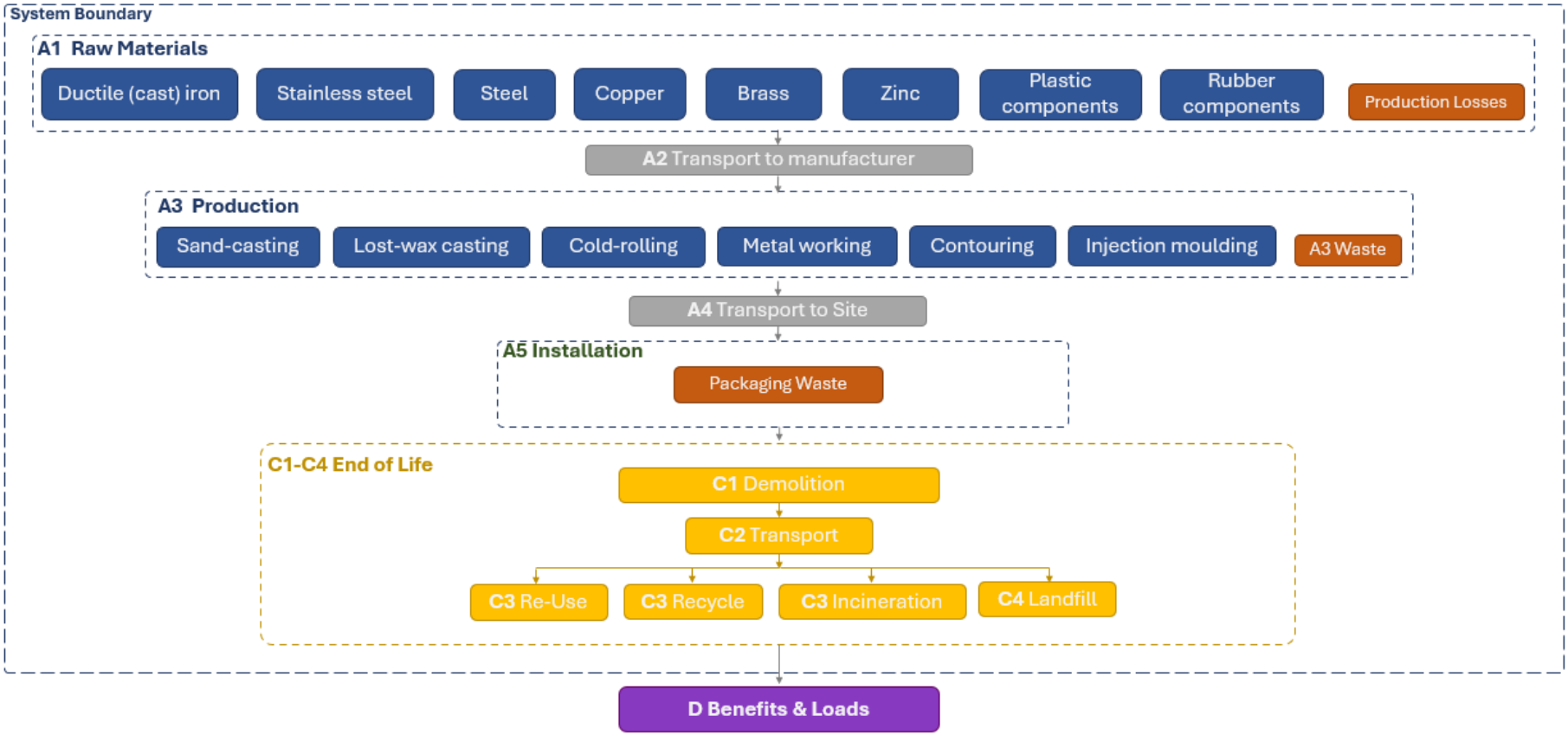
In module C3, energy and resources are used to sort and process stainless steel, iron, zinc, rubber, plastics, paint, and composite materials for recycling or incinerating with energy recovery (efficiency above 60%). Waste that is incinerated without energy recovery or sent to landfill is included in module C4. About 85% of iron is sent for recycling, while the remaining 15% goes to landfill, based on figures from Material insights.org. The recycling rate is the

same for steel, reported by worldsteel.org. For stainless steel, 95% is considered for recycling, and only 5% landfilled, stated by worldstainless.org. When it comes to brass and copper, around 60% is recycled and 40% disposed of in landfill, this ratio is the same for zinc, using data from internationalcopper.org and Material insights.org. For rubber and plastic components, about 73% is incinerated with energy recovery, while 27% is landfilled, based on plasticseurope.org. Finally, paint reaches its end of life with 99% being incinerated without energy recovery and 1% landfilled, according to Eurostat.

Because parts of the product and its packaging can be recycled or used for energy recovery, using recycled materials reduces the need to produce new raw materials. Additionally, energy gained from incinerating waste can replace electricity and heat that would otherwise come from primary sources.

All environmental benefits and impacts from incineration and recycling (module C), as well as from waste packaging in modules A5, are included in module D.

SYSTEM DIAGRAM



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

This LCA study includes the provision of all materials, transportation, energy and emission flows, and end of life processing of product. All industrial processes from raw material acquisition and pre-processing, production, product distribution and installation and end-of-life management are included. For easier modelling and because of lack of accuracy in available modelling resources, some constituents under 1% of product mass are excluded. This includes the adhesive/glue and lubricant (silicone oil/grease) of the valves which constitute a very small amount and have a negligible impact on the emissions of the product. Costs for large equipment and buildings, construction work and infrastructure, as well as the upkeep and operation of major machinery, employee-related activities, and energy and water used for office management and sales are not included. Adhesives and lubricants have been excluded because they represent less than 1% of the valve's total weight (≤ 0.00008 kg per 1 kg valve). At end of life, the adhesive and lubricant remain attached to the valve components and are therefore treated together with the respective materials. During steel recycling, the adhesive is thermally degraded during remelting. When plastic and rubber components are incinerated with energy recovery, the lubricant is combusted and contributes a minor energy input. Alternatively, if components are landfilled, both adhesive and lubricant are disposed of together with the materials. Given the very small quantities involved, their contribution to the overall environmental impact is negligible, and this exclusion is considered acceptable.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging material	Allocated by mass or volume
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	Multiple products
Grouping method	Based on a representative product
Variation in GWP-fossil for A1-A3, %	-3,2%/+1,9%

SIGMA Compact VF DN80 PN16 Low Flow (53-2402) has been selected as the representative valve. It was chosen because it is one of the best-selling Frese Hydronic Control and Balancing Valve (ductile (cast) iron) products and is closest to the general average mass of Frese Hydronic Control and Balancing Valve (ductile (cast) iron) products. Most of the materials and components seen in 53-2402 are also used in many of the other products in the group.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator for EPD Hub V3 and EPD Process Certification v3.2.3. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1/3.11 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11 environmental data sources follow the methodology 'allocation, Cut-off, EN 15804+A2'.

Additionally, the EPD Generator also uses IDEMAT as a source of environmental data. IDEMAT provides life cycle inventory data for materials and processes and includes the Eco-costs LCIA method, which monetizes environmental impacts and complies with ISO 14008.

References for installation waste (A5) are taken from EUROSTAT [env_waspac] - Eurostat *"Packaging waste by waste management operations"* (2021).

End-of-Life recycling rate references are sourced from:

Worldstainless.org Recycling - worldstainless *"The global life cycle of stainless steels"* (2019) reporting that 95% of stainless steel is recycled.

Worldsteel.org Life cycle inventory data and eco-profiles - worldsteel.org "*Life cycle inventory (LCI) study*" (2020) reporting that 85% of iron is considered for recycling.

Internationalcopper.org Recycling - copperalliance *"Copper recycling"* (2016) reporting that approximately 60% of copper alloys, such as brass are recycled.

Material-insights.org Recycled material profiles - Material Insights *"Zinc"* (2026) reporting that 60% of zinc is recycled.

Plasticseurope.org Building & construction - Plastics Europe *"Overview of Plastic Waste from Building and Construction by Polymer and by Recycling, Energy Recovery and Disposal"* (2018) reporting that approximately 73% of plastic and rubber waste is treated via incineration with energy recovery.

EUROSTAT Statistics | Eurostat *"Treatment of waste by waste category, hazardousness and waste management operations"* (2022) reporting that 99% of waste paint incinerated together with wood substrate or in metal recycling process without energy recovery.

ENVIRONMENTAL IMPACT DATA

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	2,97E+01	1,62E-01	-5,71E-02	2,98E+01	1,10E-01	2,08E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,14E-03	3,15E-02	7,60E-03	-1,82E+00
GWP – fossil	kg CO_2e	2,78E+01	1,62E-01	1,46E-01	2,81E+01	1,10E-01	4,52E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,14E-03	3,17E-02	7,59E-03	-1,78E+00
GWP – biogenic	kg CO_2e	1,80E+00	2,87E-05	-2,03E-01	1,59E+00	2,30E-05	2,04E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,50E-07	-2,39E-04	-6,65E-08	-3,48E-02
GWP – LULUC	kg CO_2e	4,26E-02	8,21E-05	5,65E-04	4,32E-02	4,18E-05	4,74E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,04E-07	2,36E-05	8,29E-07	-9,93E-04
Ozone depletion pot.	kg CFC_{-11}e	3,03E-07	2,38E-09	2,25E-09	3,08E-07	2,19E-09	4,45E-11	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,30E-11	2,56E-10	5,96E-11	-8,58E-09
Acidification potential	mol H^+e	1,43E-01	3,34E-03	5,03E-04	1,47E-01	4,31E-04	2,03E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,90E-06	2,29E-04	1,14E-05	-1,97E-02
EP-freshwater[2)]	kg Pe	1,63E-02	7,57E-06	7,88E-05	1,63E-02	7,30E-06	1,13E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,44E-07	1,26E-05	1,49E-07	-1,98E-03
EP-marine	kg Ne	2,95E-02	8,45E-04	1,68E-04	3,05E-02	1,39E-04	2,95E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,35E-06	5,11E-05	6,38E-06	-2,14E-03
EP-terrestrial	mol Ne	2,78E-01	9,38E-03	1,56E-03	2,89E-01	1,51E-03	7,50E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,55E-05	5,76E-04	3,66E-05	-2,52E-02
POCP ("smog")[3)]	kg NMVOCe	8,99E-02	2,64E-03	5,35E-04	9,31E-02	6,27E-04	2,52E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,13E-05	1,71E-04	1,53E-05	-7,94E-03
ADP-minerals & metals[4)]	kg Sbe	4,52E-04	2,57E-07	6,25E-07	4,53E-04	2,98E-07	1,91E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,91E-09	1,34E-06	3,87E-09	-1,97E-04
ADP-fossil resources	MJ	3,89E+02	2,11E+00	1,57E+00	3,92E+02	1,58E+00	4,28E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,10E-02	2,58E-01	5,24E-02	-1,78E+01
Water use[5)]	m^3e depr.	7,44E+00	7,60E-03	6,58E-02	7,51E+00	8,03E-03	1,48E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,59E-04	5,58E-03	9,51E-04	-5,36E-01

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	1,98E-06	8,65E-09	5,17E-09	2,00E-06	1,07E-08	2,99E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,13E-10	3,11E-09	2,05E-10	-1,49E-07
Ionizing radiation[6]	kBq U235e	2,69E+00	1,31E-03	1,43E-02	2,70E+00	1,88E-03	2,20E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,74E-05	2,16E-03	2,55E-05	2,20E-03
Ecotoxicity (freshwater)	CTUe	2,20E+03	2,07E-01	3,10E+00	2,20E+03	1,85E-01	9,04E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,65E-03	1,11E+00	2,62E-02	-7,30E+01
Human toxicity, cancer	CTUh	2,14E-08	3,18E-11	1,55E-10	2,16E-08	1,82E-11	2,82E-12	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,52E-13	1,70E-11	1,25E-11	-1,89E-09
Human tox. non-cancer	CTUh	6,32E-07	8,34E-10	1,01E-09	6,34E-07	1,01E-09	1,52E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,01E-11	1,16E-09	2,69E-11	-1,46E-07
SQP[7]	-	1,07E+02	9,01E-01	2,25E+01	1,30E+02	1,56E+00	4,23E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,12E-02	4,93E-01	4,75E-02	-1,02E+01

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8]	MJ	5,07E+01	2,11E-02	2,21E+00	5,29E+01	2,55E-02	-2,13E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,05E-04	4,69E-02	4,05E-04	-2,52E+00
Renew. PER as material	MJ	1,07E-02	0,00E+00	2,04E+00	2,05E+00	0,00E+00	-2,04E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	-1,07E-02	2,97E-01
Total use of renew. PER	MJ	5,07E+01	2,11E-02	4,25E+00	5,50E+01	2,55E-02	-4,17E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,05E-04	4,69E-02	-1,03E-02	-2,22E+00
Non-re. PER as energy	MJ	3,88E+02	2,11E+00	9,26E-01	3,91E+02	1,58E+00	2,10E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,10E-02	1,49E-01	-3,66E-02	-1,78E+01
Non-re. PER as material	MJ	1,71E-01	0,00E+00	1,00E-01	2,71E-01	0,00E+00	-1,00E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-1,19E-01	-5,17E-02	2,83E-02
Total use of non-re. PER	MJ	3,89E+02	2,11E+00	1,03E+00	3,92E+02	1,58E+00	-7,90E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,10E-02	3,00E-02	-8,83E-02	-1,78E+01
Secondary materials	kg	7,88E-01	9,64E-04	4,77E-03	7,94E-01	6,87E-04	5,41E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,34E-05	3,13E-04	1,75E-05	7,38E-01
Renew. secondary fuels	MJ	2,82E-03	5,65E-06	3,69E-02	3,97E-02	8,49E-06	3,64E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,69E-07	1,46E-05	1,38E-07	-2,68E-04
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	2,79E-01	2,06E-04	2,27E-03	2,81E-01	2,31E-04	-1,05E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,57E-06	1,29E-04	2,11E-05	-1,42E-02

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	9,38E+00	3,06E-03	6,77E-03	9,39E+00	2,29E-03	5,84E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,48E-05	2,09E-03	1,01E-04	-8,85E-01
Non-hazardous waste	kg	1,63E+02	4,81E-02	5,60E-01	1,64E+02	4,55E-02	2,01E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,98E-04	7,00E-02	8,37E-03	-8,88E+00
Radioactive waste	kg	6,62E-04	3,20E-07	3,58E-06	6,66E-04	4,66E-07	5,57E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,24E-09	5,52E-07	6,22E-09	7,09E-07

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	1,40E-04	1,40E-04	0,00E+00	7,99E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	8,43E-01	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	1,50E-02	1,50E-02	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,43E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	3,94E-02	0,00E+00	0,00E+00
Exported energy – Electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,95E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	1,67E-02	0,00E+00	0,00E+00
Exported energy –	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,31E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	2,27E-02	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	2,90E+01	1,61E-01	1,46E-01	2,93E+01	1,09E-01	1,30E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,12E-03	3,17E-02	7,57E-03	-1,77E+00
Ozone depletion Pot.	kg $CFC_{-11}e$	2,62E-07	1,89E-09	1,87E-09	2,66E-07	1,74E-09	3,63E-11	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,42E-11	2,20E-10	4,75E-11	-8,33E-09
Acidification	kg SO_2e	1,19E-01	2,66E-03	3,88E-04	1,22E-01	3,31E-04	1,52E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,23E-06	1,84E-04	8,88E-06	-1,68E-02
Eutrophication	kg PO_4^3e	2,09E-02	3,11E-04	1,02E-03	2,22E-02	7,37E-05	1,45E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,32E-06	2,71E-05	2,14E-06	-1,60E-03
POCP (“smog”)	kg C_2H_4e	7,33E-03	1,37E-04	4,25E-05	7,51E-03	2,80E-05	3,17E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,92E-07	1,09E-05	7,98E-07	-1,18E-03
ADP-elements	kg Sbe	4,49E-04	2,52E-07	5,89E-07	4,50E-04	2,91E-07	1,86E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,77E-09	1,34E-06	3,59E-09	-1,97E-04
ADP-fossil	MJ	3,46E+02	2,09E+00	1,33E+00	3,49E+02	1,55E+00	3,91E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,04E-02	2,21E-01	5,20E-02	-1,80E+01

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[9)]	kg CO_2e	2,79E+01	1,62E-01	1,46E-01	2,82E+01	1,10E-01	4,53E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,14E-03	3,18E-02	7,60E-03	-1,78E+00

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH4 fossil, CH4 biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO2 is set to zero.

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation

1. Market for electricity, low voltage, Denmark, Ecoinvent, 0.19 kgCO2e/kWh

Transport scenario documentation - A4 (Transport resources)

1. Transport, freight, lorry >32 metric ton, EURO5, 875.06 km
2. Transport, freight, sea, container ship, 252.24 km

Scenario parameter	Value
Capacity utilization (including empty return) %	• Lorry 50%
Bulk density of transported products (kg/m³)	0,00996 m³
Volume capacity utilization factor	• Lorry = 1

Installation scenario documentation - A5 (Installation waste)

Scenario information	Value	
Waste materials on the building site before waste processing, generated by the product's installation (specified by type) / kg	Wood packaging	0,07070
	Paper/Cardboard packaging	0,06844
	Plastic packaging	0,00054

Output materials (**specified by type**) as result of waste processing at the building site e.g. collection for recycling, for energy recovery, disposal (**specified by route**) / kg		Wood packaging	Paper / Cardboard	Plastic packaging
	Recycling	0,02262	0,05681	0,00022
	Energy recovery	0,02121	0,00548	0,00020
	Disposal	0,02687	0,00615	0,00012

End of Life scenario documentation - C1-C4 (Data source)

Scenario information	Value
Collection process – kg collected separately	1 kg
Collection process – kg collected with mixed waste	0 kg
Recovery process – kg for re-use	0 kg
Recovery process – kg for recycling	0,84120 kg
Recovery process – kg for energy recovery	0,00396 kg
Disposal (total) – kg for final deposition	0,15484 kg
Scenario assumptions e.g. transportation	Transportation is estimated to be 20 km to the closest waste handling site from client location. By > 32-ton lorry (Euro 5).

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier. The project report on the Life Cycle Assessment and the report(s) on features of environmental relevance are filed at EPD Hub. EPD Hub PCR and ECO Platform verification checklist are used.

EPD Hub is not able to identify any unjustified deviations from the PCR and EN 15804+A2 in the Environmental Product Declaration and its project report.

EPD Hub maintains its independence as a third-party body; it was not involved in the execution of the LCA or in the development of the declaration and has no conflicts of interest regarding this verification.

The company-specific data and upstream and downstream data have been examined as regards plausibility and consistency. The publisher is responsible for ensuring the factual integrity and legal compliance of this declaration.

The software used in creation of this LCA and EPD is verified by EPD Hub to conform to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules and General Program Instructions.

Verified tools

Tool verifier: Magaly Gonzalez Vazquez
Tool verification validity: 27 March 2025 - 26 March 2028

Yazan Badour as an authorized verifier for EPD Hub Limited 25.02.2026

ANNEX

This Environmental Product Declaration “Frese Hydronic Control and Balancing Valve (Ductile (cast) iron)” covers the following product groups, all of which are ductile (cast) iron-based products:

- Frese OPTIMA Compact Standard-series (DN40 - DN50)
- Frese OPTIMA Compact Veriflow-series (DN40 - DN50, DN50 - DN300)
- Frese OPTIMA Compact Veriflow Ultra-series (DN50 – DN125)
- Frese OPTIMA Compact EP (DN50 - DN200)
- Frese SIGMA Compact (DN40 - DN50)
- Frese SIGMA Compact Veriflow-series (DN50 - DN300)
- Frese Sigma Compact Veriflow Ultra-series (DN50 – DN125)
- Frese PV-SIGMA Compact (DN40 - DN50)
- Frese PV-SIGMA Compact Spectrum-series (DN40 - DN50)
- Frese PV Compact Spectrum-series (DN40 - DN50)
- Frese PV Compact (DN50 - DN200)
- Frese PV Compact Ultra-series (DN50 – DN125)
- Frese ALPHA Wafer (DN50 - DN1000)
- Frese OMEGA Compact Standard-series (DN65 - DN800)
- Frese OMEGA Compact Leakguard-series (DN65 - DN800)
- Frese STBV VODRV (DN65 - DN500)
- Frese STBV FODRV (DN65 - DN300)
- Frese STBV Range DRV (DN65 - DN500)

The declaration covers the relevant accessories and spare parts linked to these product groups, including:

- Frese Metering Station (DN65 – DN300)