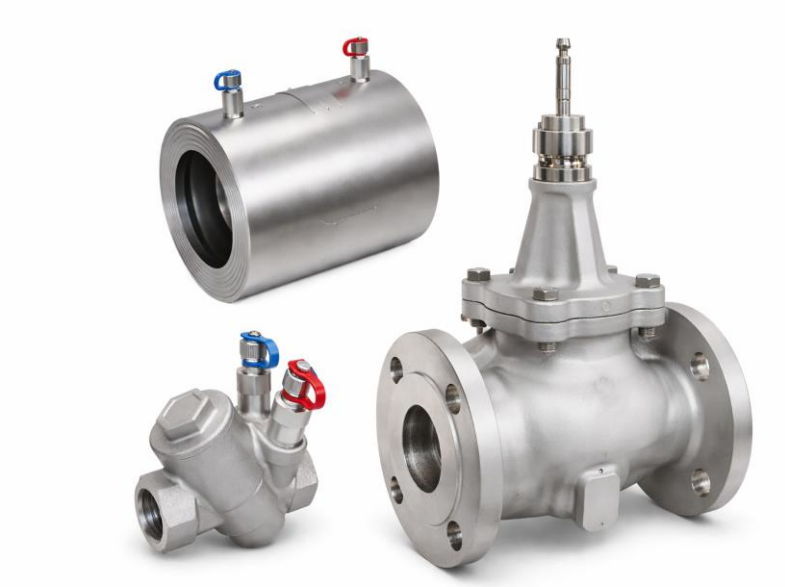
ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Frese Hydronic Control and Balancing Valve (Stainless steel)
Vexve Denmark | Frese A/S



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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 authorized verifier acting for EPD HUB Limited

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 (Stainless steel)
Additional labels	This EPD covers: OPTIMA Compact HCR (DN15-DN80), ALPHA Sanitary (DN15-DN20), ALPHA Wafer (DN25-DN450), ALPHA HCR Cartridge Type 20, ALPHA HCR Cartridge Type 50, ALPHA HCR Cartridge Type 60, and ALPHA HCR Cartridge Type 70.
Product reference	Reference product is: ALPHA Sanitary DN15 P/T (58-9001M)
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 (%)	-9,1%/+7,3%
GTIN (Global Trade Item Number)	5705564072818
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	2,03

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
Mass of packaging	0,30871 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	25,8
GWP-total, A1-A3 ($kgCO_2e$)	27,4
Secondary material, inputs (%)	65,9
Secondary material, outputs (%)	94
Total energy use, A1-A3 (kWh)	113
Net freshwater use, A1-A3 (m^3)	0,25

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 optimise 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 Hydronic Control and Balancing Valve (Stainless steel) range is a family of hydronic products that keep water-based heating, cooling and domestic hot water systems stable, energy efficient and easy to operate in buildings, industry and marine applications.

The product group in this EPD covers pressure independent control valves of the OPTIMA Compact HCR type, ALPHA Sanitary valves for domestic hot water circulation and ALPHA Wafer flow limiting valves. Together, these valves regulate and stabilise flow under changing differential pressure conditions so that coils, heat exchangers and domestic hot water branches receive the intended design flow during both full-load and part-load operation.

The pressure-bearing components and cartridges are primarily manufactured in stainless steel, providing high resistance to hot potable water, treated heating and cooling water and, in selected high corrosion resistant configurations, even aggressive media typically found in marine and other harsh environments.

OPTIMA Compact HCR valves provide pressure independent control for terminal units and process loads by combining automatic flow limitation with full authority control characteristics in a compact body, using stainless-steel internal parts to secure stable operation over a wide pressure and temperature range.

ALPHA Sanitary valves keep each domestic hot water branch in balance, independent of pressure changes and water temperature, so circulation losses are compensated, and hot water is available quickly at tapping points even under demanding operating conditions.

ALPHA Wafer valves provide automatic flow limitation at higher flows, using ALPHA cartridges in a wafer body for control of flow in larger pipes without the need for manual balancing and with options for high corrosion resistance where system conditions require it.

Across the range, the valves consist of stainless-steel bodies with internal stainless-steel cartridges, springs and seats, supported by elastomeric and polymer sealing elements, and are intended for long service life under typical and harsh operating conditions.

In many applications the valves are combined with electric or thermal actuators and external controllers, but in this Environmental Product Declaration only the passive mechanical valve assemblies are included; the environmental impacts of actuators and other external control equipment are not part of the assessed product system.

Physical properties of the product:

Materials: The valves in this group are primarily made of stainless steel AISI 316, accounting for more than 95% of their total weight. Other materials include rubber (such as EPDM and FKM), and plastic (such as PTFE, SEPS and PE-LD).

Additional product information:

Find more details such as product specifications, applications, technical information, datasheets, images, etc. 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	98,71%	Asia and Europe
Minerals	0	
Fossil materials	1,29%	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	0,057

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
N/A	-	-

The products included in this Environmental Product Declaration do not contain any substances of very high concern (SVHC) as listed on the Candidate List of Substances of Very High Concern for Authorisation under Regulation (EC) No 1907/2006 (REACH) in concentrations above 0.1% (w/w).

This statement is based on material specifications, supplier declarations, and current regulatory information applicable at the time of publication of this EPD.

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 primarily made of stainless steel (>95%). Other materials include various plastic and rubber components. All components are purchased ready-made from different suppliers, and the valves are assembled in-house. Pre-processed components include either lost-wax casted stainless steel or hot-rolled and metal worked stainless steel, as well as injection-moulded rubber and plastic parts. Raw materials origin from both Asia and Europe, but mostly China. Most parts come from Frese Valves Ningbo CNY, a subsidiary of Vexve Denmark | Frese A/S. Transport information is based on actual distances between suppliers of raw materials and components to the factory in Denmark.

At the Danish factory, electricity is used to power assembly lines, electric forklifts, and lighting. Electricity is also used for air pressure tests on the valves. District heating is used for space heating. A location-based approach was used for modelling the electricity mix utilized in the factory. No ancillary materials are used in the assembly process.

Once the valves are assembled, they are packaged using materials such as a paper installation guides, cardboard boxes, wooden EUR pallets, plastic wrap, and plastic bags. 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 are not considered, as all components are purchased as ready-made parts, and only assembly is performed in-house. Production losses are not accounted for. Furthermore, as there are no in-house manufacturing and no use of ancillary materials, no manufacturing waste is generated within the declared system boundary.

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 the Danish factory to the installation site is calculated as an average of all kilometres travelled to deliver valves to customers during 2024. The calculation relies on relative annual sales percentages combined with actual distances in kilometres. The chosen transport method was lorries. Full truckloads are assumed, meaning the vehicle capacity utilization factor is set to one. It can vary, however, 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.

During installation, 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 of a Frese valve is approximately 15 years, with a warranty period of 5 years.

Frese Hydronic Control and Balancing Valve (Stainless steel) 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.

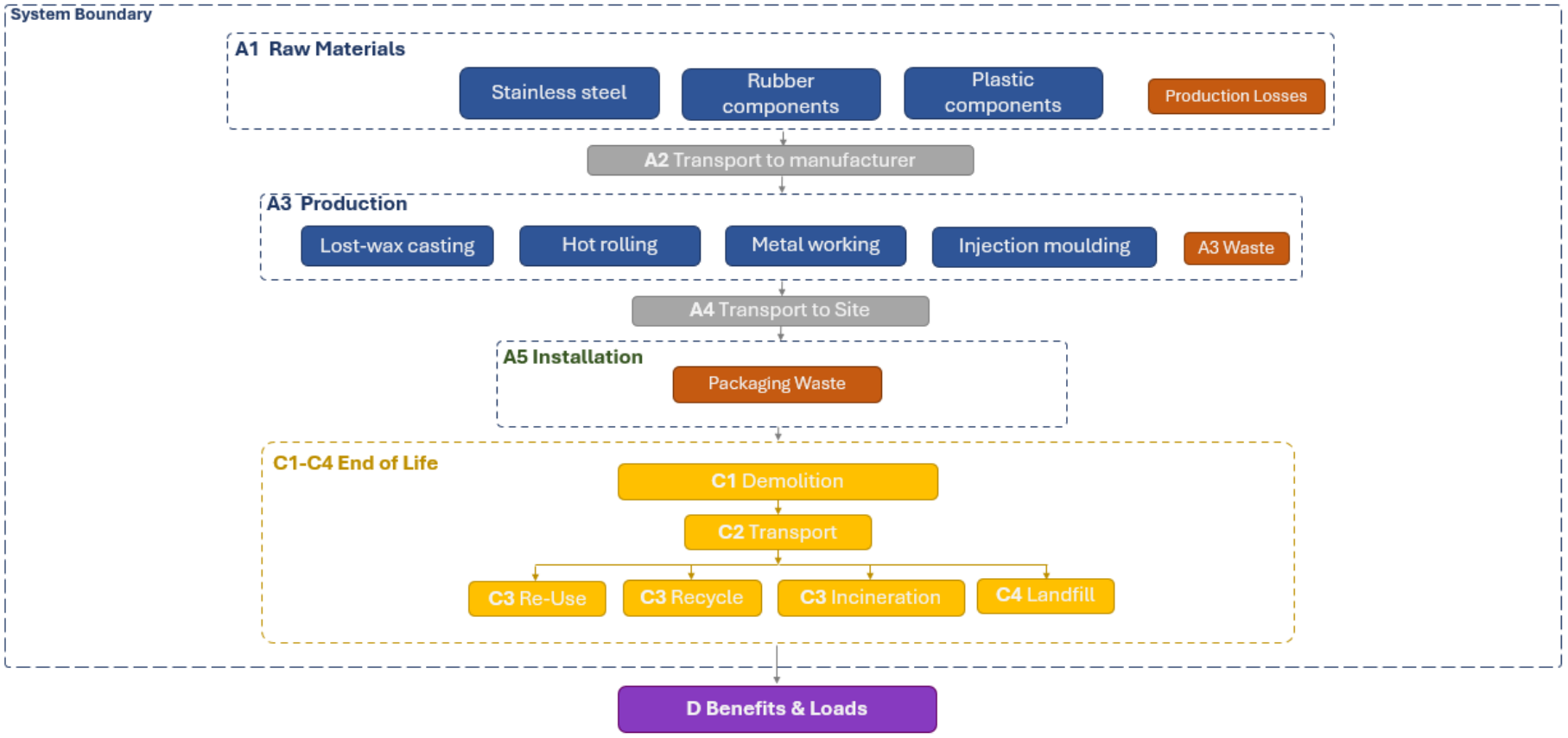
At the end of life, products are assumed to be transported by lorry to the nearest waste handling site, with an average distance of 20 km (C2).

In module C3, energy and resources are used to sort and process stainless steel, rubber, plastics, and composite materials for recycling or incineration with energy recovery (efficiency above 60%). Waste that is incinerated without energy recovery or sent to landfill is included in module C4. 95% of steel is recycled, the remaining 5% of stainless steel is landfilled, according to worldstainless.org. For rubber and plastic components, 73% is incinerated with energy recovery, and 27% is landfilled, according to plasticseurope.org.

As parts of the product and its packaging can be recycled, using recycled materials reduces the need to produce new raw materials. Additionally, energy gained from incinerating waste with energy recovery 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 due to 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	Not applicable
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, %	-9,1%/+7,3%

ALPHA Sanitary DN15 P/T (58-9001M) has been selected as the representative valve. It was chosen because it is one of the best-selling Frese Hydronic Control and Balancing Valve (Stainless steel) products and is closest to the general average mass of Frese Hydronic Control and Balancing Valve (Stainless steel) products. Most of the materials and components seen in 58-9001M are also used in 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.

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.

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	2,68E+01	2,60E-01	3,09E-01	2,74E+01	2,50E-02	2,16E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,15E-03	5,08E-02	6,33E-04	-4,54E+00
GWP – fossil	kg CO_2e	2,51E+01	2,60E-01	4,96E-01	2,58E+01	2,50E-02	1,06E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,15E-03	5,08E-02	6,33E-04	-4,49E+00
GWP – biogenic	kg CO_2e	1,67E+00	4,11E-05	-1,96E-01	1,48E+00	5,26E-06	2,05E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,52E-07	-4,53E-05	-3,19E-07	-4,74E-02
GWP – LULUC	kg CO_2e	3,53E-02	1,39E-04	9,83E-03	4,52E-02	9,38E-06	8,16E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,07E-07	2,64E-05	2,02E-07	-4,34E-03
Ozone depletion pot.	kg $CFC_{-11}e$	2,74E-07	3,75E-09	1,41E-08	2,92E-07	5,02E-10	8,39E-11	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,32E-11	2,95E-10	9,88E-12	-3,03E-08
Acidification potential	mol H^+e	1,15E-01	7,23E-03	2,37E-03	1,25E-01	8,06E-05	4,17E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,93E-06	2,57E-04	2,47E-06	-2,52E-02
EP-freshwater[2)]	kg Pe	1,28E-02	8,86E-06	2,88E-04	1,31E-02	1,68E-06	2,42E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,45E-07	1,38E-05	2,95E-08	-1,36E-03
EP-marine	kg Ne	2,60E-02	1,80E-03	8,39E-04	2,87E-02	2,74E-05	6,63E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,35E-06	5,76E-05	8,21E-06	-4,51E-03
EP-terrestrial	mol Ne	2,41E-01	2,00E-02	7,16E-03	2,68E-01	2,98E-04	1,44E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,56E-05	6,50E-04	1,02E-05	-4,82E-02
POCP ("smog")[3)]	kg NMVOCe	7,92E-02	5,45E-03	1,90E-03	8,66E-02	1,31E-04	4,99E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,13E-05	1,92E-04	3,71E-06	-1,54E-02
ADP-minerals & metals[4)]	kg Sbe	1,70E-04	2,81E-07	5,86E-06	1,76E-04	6,89E-08	5,20E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,93E-09	1,51E-06	5,76E-10	-1,17E-04
ADP-fossil resources	MJ	3,51E+02	3,22E+00	7,58E+00	3,62E+02	3,62E-01	8,32E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,11E-02	2,89E-01	8,39E-03	-4,86E+01
Water use[5)]	m^3e depr.	6,80E+00	9,46E-03	4,00E-01	7,21E+00	1,85E-03	3,01E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,59E-04	6,66E-03	2,62E-05	-1,29E+00

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	1,75E-06	8,79E-09	2,01E-08	1,78E-06	2,48E-09	5,59E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,14E-10	3,45E-09	5,58E-11	-3,59E-07
Ionizing radiation[6]	kBq U235e	2,38E+00	1,55E-03	8,71E-02	2,47E+00	4,36E-04	5,48E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,75E-05	2,43E-03	5,66E-06	-1,92E-01
Ecotoxicity (freshwater)	CTUe	1,89E+03	2,51E-01	8,71E+01	1,98E+03	4,26E-02	2,64E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,67E-03	2,15E-01	1,28E-02	-1,27E+01
Human toxicity, cancer	CTUh	1,45E-08	5,44E-11	3,08E-10	1,49E-08	4,11E-12	6,87E-12	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,53E-13	1,93E-11	9,54E-14	-4,04E-09
Human tox. non-cancer	CTUh	2,44E-07	8,75E-10	6,85E-09	2,52E-07	2,35E-10	3,66E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,02E-11	1,30E-09	9,18E-12	-8,95E-08
SQP[7]	-	8,85E+01	4,61E-01	2,60E+01	1,15E+02	3,64E-01	7,84E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,13E-02	5,56E-01	1,68E-02	-2,33E+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	4,11E+01	2,60E-02	3,60E+00	4,47E+01	5,89E-03	-4,77E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,07E-04	5,34E-02	8,71E-05	-1,14E+01
Renew. PER as material	MJ	0,00E+00	0,00E+00	4,19E+00	4,19E+00	0,00E+00	-4,19E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,21E-01
Total use of renew. PER	MJ	4,11E+01	2,60E-02	7,79E+00	4,89E+01	5,89E-03	-8,96E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,07E-04	5,34E-02	8,71E-05	-1,10E+01
Non-re. PER as energy	MJ	3,51E+02	3,22E+00	7,47E+00	3,62E+02	3,62E-01	1,85E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,11E-02	3,45E-02	-1,19E-01	-4,86E+01
Non-re. PER as material	MJ	3,52E-01	0,00E+00	1,73E-01	5,25E-01	0,00E+00	-1,73E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-2,57E-01	-9,51E-02	5,13E-02
Total use of non-re. PER	MJ	3,51E+02	3,22E+00	7,64E+00	3,62E+02	3,62E-01	-1,55E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,11E-02	-2,23E-01	-2,14E-01	-4,85E+01
Secondary materials	kg	6,59E-01	1,52E-03	2,19E-01	8,79E-01	1,56E-04	1,35E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,35E-05	3,52E-04	2,20E-06	5,28E-01
Renew. secondary fuels	MJ	2,28E-03	4,32E-06	6,50E-02	6,73E-02	1,97E-06	7,90E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,70E-07	1,63E-05	4,50E-08	-1,22E-03
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	2,41E-01	2,37E-04	9,06E-03	2,51E-01	5,34E-05	-1,54E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,59E-06	1,80E-04	-5,17E-06	-3,93E-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	6,81E+00	4,33E-03	2,63E-02	6,84E+00	5,24E-04	1,46E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,50E-05	2,78E-03	9,87E-06	-4,39E+00
Non-hazardous waste	kg	1,49E+02	6,04E-02	1,20E+00	1,50E+02	1,05E-02	3,31E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,01E-04	7,80E-02	1,76E-02	-9,14E+00
Radioactive waste	kg	5,85E-04	3,79E-07	2,06E-05	6,06E-04	1,08E-07	1,39E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,28E-09	6,24E-07	1,38E-09	-4,73E-05

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	0,00E+00	0,00E+00	0,00E+00	2,12E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	9,40E-01	0,00E+00	0,00E+00
Materials for energy rec	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
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,34E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	9,37E-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	9,77E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	3,94E-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	1,37E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	5,43E-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	2,62E+01	2,59E-01	5,06E-01	2,70E+01	2,48E-02	3,42E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,13E-03	5,07E-02	6,17E-04	-4,47E+00
Ozone depletion Pot.	kg $CFC_{-11}e$	2,38E-07	2,98E-09	1,21E-08	2,53E-07	4,00E-10	6,90E-11	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,44E-11	2,43E-10	7,85E-12	-2,56E-08
Acidification	kg SO_2e	9,54E-02	5,77E-03	1,79E-03	1,03E-01	6,11E-05	3,15E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,25E-06	2,06E-04	1,83E-06	-2,10E-02
Eutrophication	kg PO_4^3e	1,85E-02	6,39E-04	1,83E-03	2,10E-02	1,54E-05	3,92E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,33E-06	3,03E-05	8,82E-07	-2,87E-03
POCP (“smog”)	kg C_2H_4e	6,43E-03	2,88E-04	1,52E-04	6,87E-03	5,74E-06	8,04E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,94E-07	1,22E-05	2,15E-07	-1,27E-03
ADP-elements	kg Sbe	1,67E-04	2,77E-07	5,83E-06	1,73E-04	6,73E-08	5,09E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,79E-09	1,50E-06	5,64E-10	-1,17E-04
ADP-fossil	MJ	3,13E+02	3,19E+00	6,22E+00	3,23E+02	3,54E-01	7,38E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,05E-02	2,47E-01	8,30E-03	-4,57E+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	2,51E+01	2,60E-01	5,05E-01	2,59E+01	2,50E-02	1,06E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,15E-03	5,08E-02	6,33E-04	-4,50E+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

2. Heat and power co-generation, natural gas, 1MW electrical, lean burn, Denmark, Ecoinvent, 0.0291 kgCO2e/MJ

Transport scenario documentation - A4 (Transport resources)

1. Transport, freight, lorry >32 metric ton, EURO5, 178.02 km

Scenario parameter	Value
Capacity utilization (including empty return) %	• Lorry 50%
Bulk density of transported products (kg/m³)	0,000211 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	0,08796
	Paper/Cardboard packaging	0,21916
	Plastic packaging	0,00159
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	0,02815 / 0,18190 / 0,00064
	Energy recovery	0,02639 / 0,01753 / 0,00059
	Disposal	0,03342 / 0,01972 / 0,00037

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	0,93774 kg
Recovery process – kg for energy recovery	0,00942 kg
Disposal (total) – kg for final deposition	0,05284 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 authorized verifier acting for EPD HUB Limited

18.02.2026

ANNEX

Number	Name & Group	Weight (kg)	GTIN
OPTIMA Compact HCR			
58-8180	OPTIMA Compact HCR DN15	3.468	5705564071163
58-8181	OPTIMA Compact HCR DN20	4.343	5705564071170
58-8182	OPTIMA Compact HCR DN25	5.349	5705564071187
58-8183	OPTIMA Compact HCR DN32	6.614	5705564071194
58-8184	OPTIMA Compact HCR DN40	11.002	5705564071217
58-8110	OPTIMA Compact HCR DN50 PN16	17.016	5705564069658
58-8111	OPTIMA Compact HCR DN65 PN16	23.546	5705564069689
58-8112	OPTIMA Compact HCR DN80 PN16	35.792	5705564069672
58-8130	OPTIMA Compact HCR DN50 PN25	17.22	5705564069696
58-8131	OPTIMA Compact HCR DN65 PN25	23.277	5705564069702
58-8132	OPTIMA Compact HCR DN80 PN25	35.792	5705564069719
ALPHA Sanitary			
58-9001M	ALPHA Sanitary DN15 P/T	0.35	5705564072818
58-9006M	ALPHA Sanitary DN15 plugs	0.35	5705564067975
58-9011M	ALPHA Sanitary DN20 P/T	0.39	5705564072771
58-9016M	ALPHA Sanitary DN20 plugs	0.39	5705564067982

Number	Name & Group	Weight (kg)	GTIN
ALPHA Wafer			
58-9038L	ALPHA Wafer DN25 PN16 P/T	1.124	5705564070005
58-9058L	ALPHA Wafer DN40 PN25 P/T	1.669	5705564070203
58-9073L	ALPHA Wafer DN50 PN16 P/T	4.04	5705564070210
58-9076L	ALPHA Wafer DN50 PN16 Plug	3.995	5705564071668
58-9083L	ALPHA Wafer DN65 PN16 P/T	5.93	5705564070227
58-9093L	ALPHA Wafer DN80 PN16 P/T	8.842	5705564070234
58-9103L	ALPHA Wafer DN100 PN16 P/T	9.76	5705564070241
58-9163L	ALPHA Wafer DN125 PN16 P/T	11.752	5705564070258
58-9113M	ALPHA Wafer DN150 PN16 P/T	11.979	5705564070265
58-9123M	ALPHA Wafer DN200 PN16 P/T	18.596	5705564070272
58-9133M	ALPHA Wafer DN250 PN16 P/T	24.892	5705564070289
58-9143M	ALPHA Wafer DN300 PN16 P/T	35.761	5705564070296
58-9153M	ALPHA Wafer DN350 PN16 P/T	45.858	5705564070302
58-9173M	ALPHA Wafer DN400 PM16 P/T	52.68	5705564070333
58-9183M	ALPHA Wafer DN450 PM16 P/T	59.855	5705564106629
ALPHA HCR Cartridge Type 20 - AISI316			
47-20120	ALPHA Cartridge w/orifice 0.020 m3/h	0.064	5705564090751

Number	Name & Group	Weight (kg)	GTIN
47-20170	ALPHA Cartridge w/orifice 0.040 m3/h	0.065	5705564069443
47-20200	ALPHA Cartridge w/orifice 0.060 m3/h	0.065	5705564072832
47-20230	ALPHA Cartridge w/orifice 0.080 m3/h	0.064	5705564069450
47-20260	ALPHA Cartridge w/orifice 0.0105 m3/h	0.064	5705564069467
47-20300	ALPHA Cartridge w/orifice 0.135 m3/h	0.064	5705564069474
47-20250	ALPHA Cartridge w/orifice 0.180 m3/h	0.064	5705564069481
47-20400	ALPHA Cartridge w/orifice 0.240 m3/h	0.064	5705564069498
47-20460	ALPHA Cartridge w/orifice 0.310 m3/h	0.064	5705564069504
47-20510	ALPHA Cartridge w/orifice 0.410 m3/h	0.064	5705564069511
47-20530	ALPHA Cartridge w/orifice 0.450 m3/h	0.064	5705564090768
47-20570	ALPHA Cartridge w/orifice 0.500 m3/h	0.064	5705564090775
47-20590	ALPHA Cartridge w/orifice 0.550 m3/h	0.064	5705564090782
47-20620	ALPHA Cartridge w/orifice 0.600 m3/h	0.064	5705564090812
47-20680	ALPHA Cartridge w/orifice 0.700 m3/h	0.063	5705564090836
47-20740	ALPHA Cartridge w/orifice 0.800 m3/h	0.063	5705564090843

Number	Name & Group	Weight (kg)	GTIN
ALPHA HCR Cartridge Type 50 - AISI316			
51-55179	ALPHA Cartridge w/orifice 1.061 l/s	0.881	5705564040251
51-55184	ALPHA Cartridge w/orifice 1.092 l/s	0.833	5705564068460
51-55189	ALPHA Cartridge w/orifice 1.125 l/s	0.832	5705564068477
51-55194	ALPHA Cartridge w/orifice 1.167 l/s	0.831	5705564068484
51-55200	ALPHA Cartridge w/orifice 1.222 l/s	0.83	5705564040299
51-55206	ALPHA Cartridge w/orifice 1.289 l/s	0.829	5705564040305
51-55213	ALPHA Cartridge w/orifice 1.375 l/s	0.828	5705564040312
51-55220	ALPHA Cartridge w/orifice 1.475 l/s	0.826	5705564068491
51-55227	ALPHA Cartridge w/orifice 1.583 l/s	0.825	5705564040336
51-55235	ALPHA Cartridge w/orifice 1.725 l/s	0.823	5705564040343
51-55243	ALPHA Cartridge w/orifice 1.808 l/s	0.824	5705564068507
51-55251	ALPHA Cartridge w/orifice 1.967 l/s	0.825	5705564068514
51-55260	ALPHA Cartridge w/orifice 2.194 l/s	0.827	5705564040374
51-55269	ALPHA Cartridge w/orifice 2.472 l/s	0.831	5705564040381

Number	Name & Group	Weight (kg)	GTIN
51-55279	ALPHA Cartridge w/orifice 2.889 l/s	0.826	5705564040398
51-55287	ALPHA Cartridge w/orifice 3.154 l/s	0.844	5705564068521
51-55292	ALPHA Cartridge w/orifice 3.470 l/s	0.848	5705564040411
51-55298	ALPHA Cartridge w/orifice 3.722 l/s	0.854	5705564040428
51-55303	ALPHA Cartridge w/orifice 4.100 l/s	0.862	5705564040435
51-55308	ALPHA Cartridge w/orifice 4.444 l/s	0.869	5705564040442
ALPHA HCR Cartridge Type 60 - AISI316			
51-66285	ALPHA Cartridge w/orifice 4.733 l/s	0.866	5705564039774
51-66292	ALPHA Cartridge w/orifice 5.041 l/s	0.865	5705564039781
51-66301	ALPHA Cartridge w/orifice 5.221 l/s	0.863	5705564039798
51-66305	ALPHA Cartridge w/orifice 5.408 l/s	0.862	5705564068538
51-66312	ALPHA Cartridge w/orifice 5.684 l/s	0.86	5705564039811
51-66319	ALPHA Cartridge w/orifice 5.980 l/s	0.858	5705564039828
51-66326	ALPHA Cartridge w/orifice 6.236 l/s	0.856	5705564039835
51-66332	ALPHA Cartridge w/orifice 6.523 l/s	0.855	5705564039842
51-66338	ALPHA Cartridge w/orifice 6.815 l/s	0.853	5705564039859
51-66344	ALPHA Cartridge w/orifice 7.117 l/s	0.851	5705564039866
51-66349	ALPHA Cartridge w/orifice 7.369 l/s	0.85	5705564039873
51-66356	ALPHA Cartridge w/orifice 7.690 l/s	0.848	5705564039880
51-66362	ALPHA Cartridge w/orifice 8.099 l/s	0.846	5705564068545
51-66367	ALPHA Cartridge w/orifice 8.320 l/s	0.845	5705564039903
51-66373	ALPHA Cartridge w/orifice 8.605 l/s	0.843	5705564039910
51-66379	ALPHA Cartridge w/orifice 8.961 l/s	0.841	5705564039927
51-66385	ALPHA Cartridge w/orifice 9.324 l/s	0.839	5705564039934
51-66391	ALPHA Cartridge w/orifice 9.709 l/s	0.838	5705564039941
51-66393	ALPHA Cartridge w/orifice 10.093 l/s	0.837	5705564039958
51-66398	ALPHA Cartridge w/orifice 10.468 l/s	0.835	5705564039965
51-66400	ALPHA Cartridge w/orifice 10.724 l/s	0.835	5705564039972
51-66407	ALPHA Cartridge w/orifice 11.381 l/s	0.832	5705564039989
51-66407H	ALPHA Cartridge w/orifice 12.500 l/s	0.826	5705564068453

Number	Name & Group	Weight (kg)	GTIN
ALPHA HCR Cartridge Type 70 - AISI316			
51-76285	ALPHA Cartridge w/orifice 3.257 l/s	0.824	5705564071767
51-76292	ALPHA Cartridge w/orifice 3.389 l/s	0.822	5705564071774
51-76301	ALPHA Cartridge w/orifice 3.639 l/s	0.82	5705564071781
51-76305	ALPHA Cartridge w/orifice 3.785 l/s	0.819	5705564071798
51-76312	ALPHA Cartridge w/orifice 3.938 l/s	0.817	5705564071804
51-76319	ALPHA Cartridge w/orifice 4.104 l/s	0.815	5705564071811
51-76326	ALPHA Cartridge w/orifice 4.316 l/s	0.813	5705564071828
51-76332	ALPHA Cartridge w/orifice 4.472 l/s	0.812	5705564071835
51-76338	ALPHA Cartridge w/orifice 4.708 l/s	0.81	5705564071842
51-76344	ALPHA Cartridge w/orifice 4.993 l/s	0.809	5705564071859
51-76349	ALPHA Cartridge w/orifice 5.069 l/s	0.807	5705564071866
51-76356	ALPHA Cartridge w/orifice 5.306 l/s	0.805	5705564071873
51-76362	ALPHA Cartridge w/orifice 5.556 l/s	0.803	5705564071880
51-76367	ALPHA Cartridge w/orifice 5.686 l/s	0.802	5705564071897
51-76373	ALPHA Cartridge w/orifice 5.914 l/s	0.8	5705564071903
51-76379	ALPHA Cartridge w/orifice 6.174 l/s	0.798	5705564071910
51-76385	ALPHA Cartridge w/orifice 6.389 l/s	0.797	5705564071927
51-76391	ALPHA Cartridge w/orifice 6.667 l/s	0.795	5705564071934
51-76393	ALPHA Cartridge w/orifice 6.764 l/s	0.794	5705564071941
51-76398	ALPHA Cartridge w/orifice 6.986 l/s	0.792	5705564071958
51-76400	ALPHA Cartridge w/orifice 7.146 l/s	0.792	5705564071965
51-76407	ALPHA Cartridge w/orifice 0.7444 l/s	0.79	5705564071972
51-76407H	ALPHA Cartridge w/orifice 8.500 l/s	0.784	5705564071989
51-76420	ALPHA Cartridge w/orifice 9.014 l/s	0.779	5705564071996