

Environmental Product Declaration

In accordance with ISO14025:2006 and EN15804:2012+A2:2019

Hexagon Ragasco Linktra Smart cylinder 18,2 L



Owner of the declaration:
Hexagon Ragasco AS

Product name:
Linktra Smart cylinder 18,2 L

Declared unit:
1 Linktra composite LPG cylinder with a capacity of 18,2 L

Product category /PCR:
NPCR 023: Packaging products and services v1.1 (2021)

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
NEPD-7016-6414-EN

Registration number:
NEPD-7016-6414-EN

Issue date:
28.06.2024

Valid to:
28.06.2029

General information

Product:

Linktra Smart cylinder 18,2 L

Program operator:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
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Declaration Number:

NEPD-7016-6414-EN

This declaration is based on Product Category Rules:

NPCR 023: Packaging products and services v1.1 (2021)

Statement of liability:

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer, life cycle assessment data and evidence.

Declared unit:

1 Hexagon Ragasco Linktra Smart composite LPG cylinder with a capacity of 18,2 L

Functional unit:

One delivery of 7,5 kg of propane gas with a Linktra Smart composite 18,2 L LPG cylinder, at sales point, with an expected lifetime of 60 deliveries over 30 years, cradle-to-grave.

Verification:

Independent verification of the declaration and data, according to ISO14025:2010

internal



external



Julie Lyslo Skullestad

Julie Lyslo Skullestad, Aase Teknikk AS
(Independent verifier approved by EPD Norway)

Owner of the declaration:

Hexagon Ragasco AS
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Manufacturer:

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2831 Raufoss Industrial Park, Norway
Phone: +47 61 15 16 00
e-mail: info@hexagonragasco.com

Place of production:

Raufoss, Norway

Management system:

ISO 9001:2015, ISO 14001:2015 ISO 50001:2018

Organisation no:

878612752

Issue date:

28.06.2024

Valid to:

28.06.2029

Year of study:

2023

Comparability:

EPDs from other programmes than the Norwegian EPD Foundation may not be comparable.

The EPD has been worked out by:

Sander Nørsterud & Alexander Borg, Asplan Viak

Sander Nørsterud

asplan
viak 

approved

Håkon Hauan

Håkon Hauan
Managing Director of EPD-Norway

Product description

Hexagon Ragasco is the largest global manufacturer of composite LPG (Liquified Petroleum Gas, i.e., propane/butane mixes) cylinders. The Linktra® Smart cylinder is their “Internet of Things” (IoT) offer that enables the connection of cylinders to consumers’ mobile phones as well as to the IT systems of LPG distributors. They let consumers know how much LPG is left and when they will need to refill.

- **Seamless user experience:** LPG users can monitor gas levels and know when and where to refill through the Linktra® app.
- **Optimized logistics:** Linktra® gives the LPG marketer insight into consumer-usage patterns, allowing optimized logistics thanks to a cloud-based dashboard.
- **Proven technology:** Manufactured with the proven Hexagon Ragasco composite technology, with the safest track-record in the industry.

The company has over the last 24 years developed and operated a fully automated manufacturing plant in Raufoss, Norway, with an annual production capacity of 2 million cylinders. Since the year 2000, the company has sold over 24 million cylinders in approx. 100 countries. The cylinders are fully compatible with Bio- LPG, also called renewable LPG.

The Hexagon Ragasco cylinders are designed in compliance with international T4 composite cylinder standards like EN 12245, EN 14427, ISO 11119-3, TC SU 5931 and special permit DOT-SP 12706. The products have unique benefits which give environmental advantages in all phases of their lifetime:

- **Lightweight:** reduced product weight by approx. 50% compared to steel cylinders, resulting in reduced raw material consumption, reduced carbon emissions during transportation and reduced material for end-of-life handling.
- **Rust-free materials:** prolonged lifetime in high humidity climates, eliminates the need for refurbishment as required for steel cylinders and which generates toxic residues such as paints and chemicals.
- **Durability:** durable cylinders with proven lifetime of 24 years (and counting). The first cylinders produced in the year 2000 are still in the value chain in Norway and Finland.

In addition, the products have enhanced safety as they do not BLEVE¹ if exposed to a fire.

Hexagon Ragasco offers casing spare parts to customers to ensure the longest possible lifetime of the products in their value chain.

Based on the use of Norwegian hydroelectric power and Lean Manufacturing principles, Hexagon Ragasco manufactures in compliance with international industry-, environmental- and energy standards such as ISO 9001, ISO 14001 and ISO 50001.

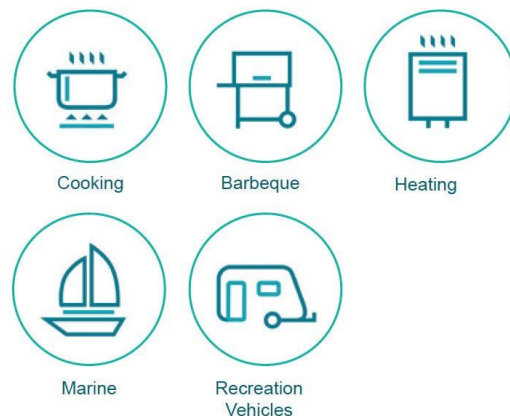
Since 2000 the company has re-used its own liner waste directly in production. Hexagon Ragasco continuously invests in more environmentally friendly processes in production, such as incineration facility, energy recovery systems, water cleaning systems, grinders for thermoplastics, etc. The company has explored and put into place new circular solutions for end-of-life of the composite cylinders through several funded R&D projects with strategic partners. Focus is put on product- and technology innovations covering the whole value chain to secure a sustainable business for customers and stakeholders, including lifetime prediction and real-life ageing in several climatic regions in the world.

Hexagon Ragasco performed their first Life Cycle Assessment (LCA) in 2015, published an EPD for the product stage (A1-A4) in 2021, and subsequently an EPD for the use and end-of-life stages in 2022. This new EPD is based on figures for 2023.

Hexagon Ragasco uses LCA as a strategic calculator/tool for future technological development and sourcing. It also gives the company the possibility to further improve the product’s environmental carbon footprint in the value chain, including the use phase, end-of-life phase and into new circular products.

LPG is a transition fuel for cleaner cooking, replacing wood, charcoal, kerosene, and other highly polluting energy sources in large parts of the world. The use of LPG eliminates the soot and particles released through combustion and thereby improves the air quality and the health of millions of people around the world. As an example, since 2016, Hexagon Ragasco has sold 1 million cylinders to Bangladesh which has potentially helped avoid emissions of approx. 137,000 metric tons of CO₂ equivalents by replacing highly polluting and dangerous fuels.

Hexagon Ragasco composite cylinders are in use across a wide range of domestic and leisure applications:



As well as industrial applications:



¹ Boiling Liquid Expansion Vapour Explosion



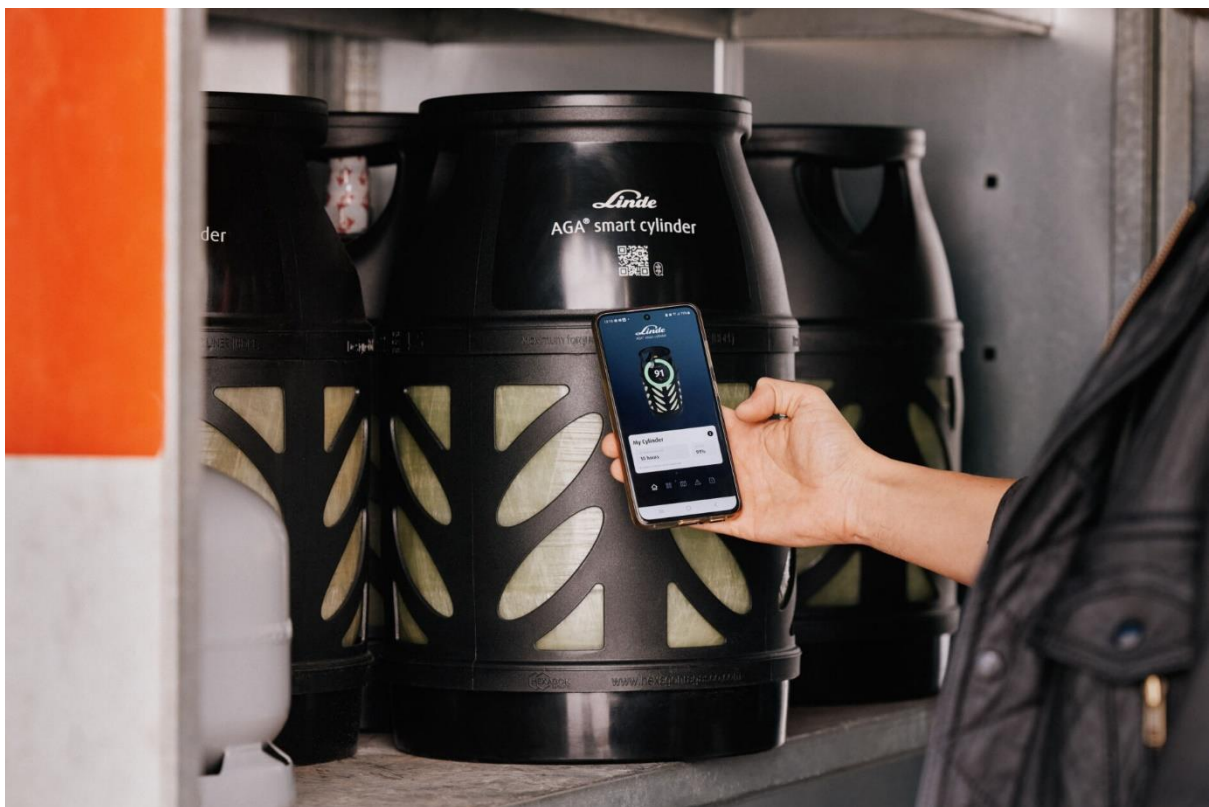
Linktra Smart cylinders at our customer's facility before distribution

Product specification

All manufacturing processes for the Linktra Smart cylinders are done in-house and are fully automated, starting with the raw materials through to the completed cylinders on pallet ready for shipment, except for the sensor that is purchased ready to mount.

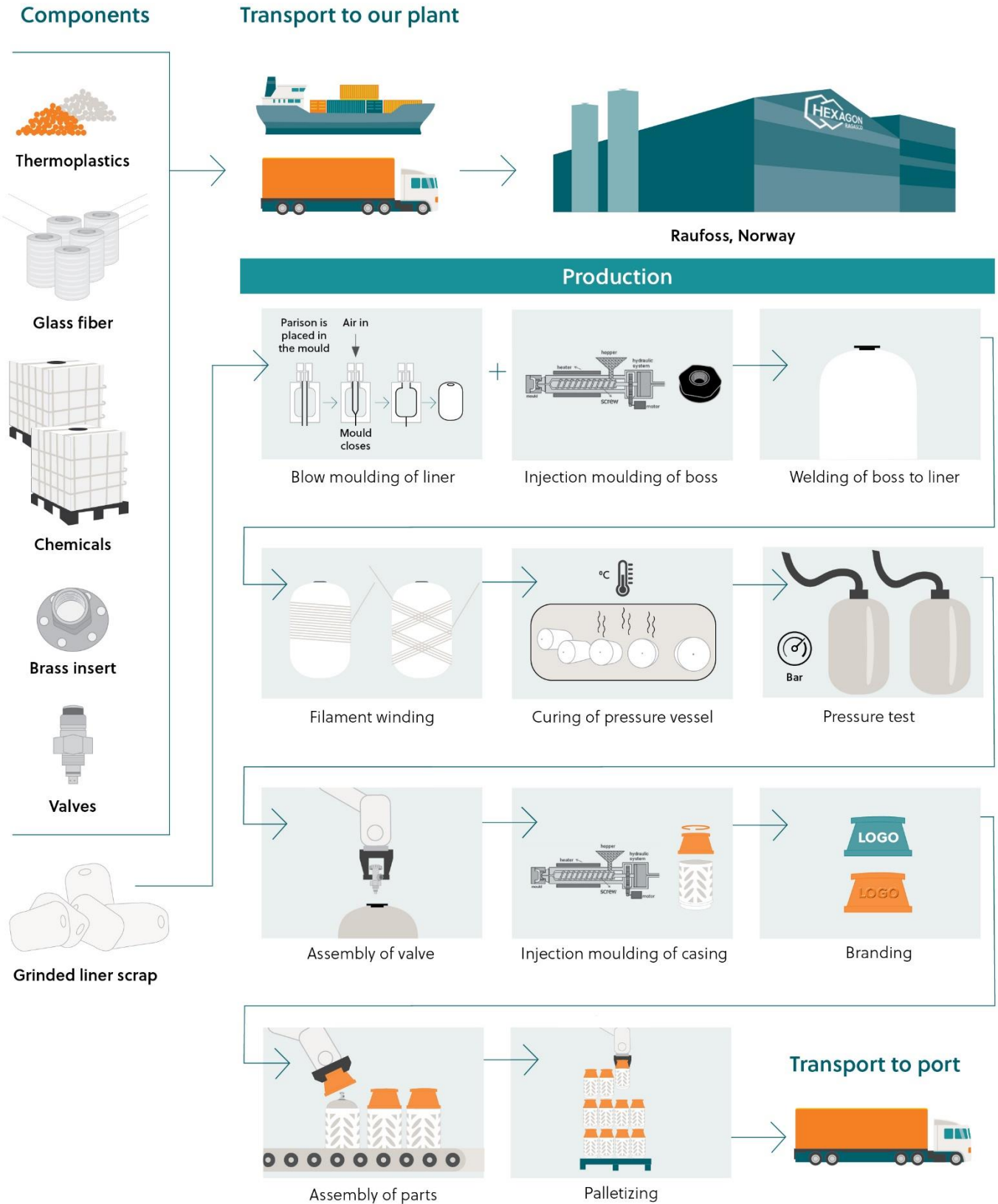


Hexagon Ragasco manufacturing facility




Reading the LPG level with the Linktra app customized for the Norwegian distributor

Manufacturing process Hexagon Ragasco composite cylinders



Technical Specifications

The EPD is declared for a 18,2 L container.

	
SPECIFICATIONS¹	18,2 L
Propane Capacity (kg)	7,5
Butane Capacity (kg)	8,5
Empty weight ² (kg)	4,24
Water content (L)	18,2
Height (mm)	468
Diameter (mm)	305

¹. All values are nominal. ² Without a valve

Hexagon Ragasco cylinders can be delivered with a wide variety of different valves for different uses with vapor or liquid outtake.

Material composition at factory gate

Materials	Kg	%
Vessel excl. brass (insert and valve)	2,82	59 %
Casing parts	1,42	30 %
Sensor system excl. brass valve	0,06	1 %
Brass valve	0,48	10 %
Sum	4,78	100 %
Disposable pallet	0,21	
Packaging film	0,02	
Sum with packaging	5,01	

Technical data:

Propane capacity:	7,5kg
Butane capacity:	8,5
kg Water content:	18,2 l
Height:	468 mm
Diameter:	305 mm

Technical standards:

The LPG cylinders are produced to the following technical standards: ISO 11119-3, EN 12245, EN 14427.

Market:

Cradle-to-gate is valid for the global market. Transport, use and end-of-life scenarios are valid for the Norwegian market.

Reference service life:

30 years.

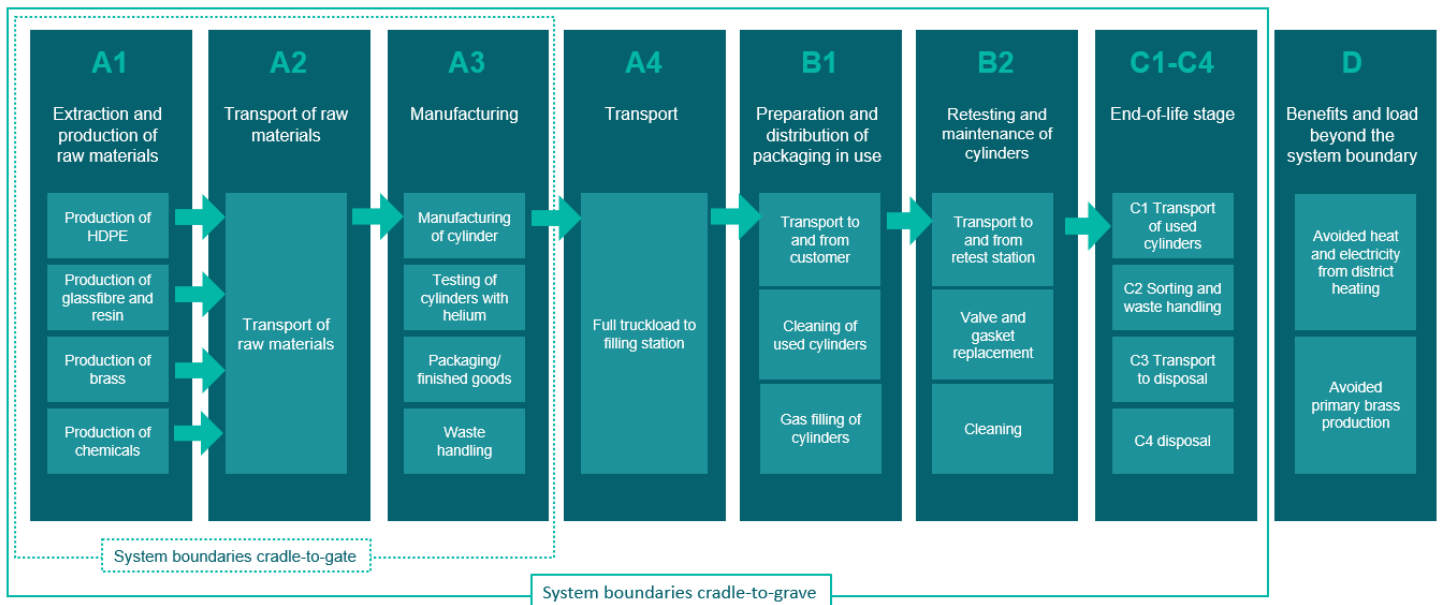
Declared unit:

1 Linktra Smart composite LPG cylinder with a capacity of 18,2 l

Functional unit:

One delivery of 7,5 kg of propane gas with a Linktra Smart composite 18,2 L LPG cylinder, at sales point, with an expected lifetime of 60 deliveries over 30 years, cradle-to-grave.

Figure 1: System boundary



Data Quality:

Data for production and transport is site specific for Raufoss and based on specific data for the year 2023. Generic data is mainly from ecoinvent v. 3.9.1, with some processes based on ecoinvent v3.9.1. All generic data is <10 years old. Characterization factors are according to EN 15804:2012+A2 2019.

Allocation:

The allocation is made in accordance with the provisions of ISO 14025. Incoming energy and waste production in-house is allocated equally among all products through mass allocation. Transportation of the material is allocated to this analysis.

System boundary:

A1-A3, A4, B1, B2, C1-C4, D

Cut-off criteria:

All major raw materials and all the essential energy is included. The production process for raw materials and energy flows that are included with very small amounts (<1%) are not included. This cut-off rule does not apply for hazardous materials and substances.

The functional unit for the packaging product is, according to PCR 023, related to one delivery of gas with a 18,2 liters composite cylinder. Based on use data from Norwegian gas cylinders, the cylinder is assumed to be filled (B1) two times a year with an expected lifetime of 30 years, resulting in 60 fillings during the cylinder's lifetime. Maintenance (B2) is assumed to be performed 2 times during the cylinder's lifetime. Please note that the production of the transported gas is not included in the scope of the EPD.

Transport from production place to assembly/user (A4)

The transportation distance represents transport of the cylinder to filling station in Oslo, which is the most likely scenario for the Norwegian market. The number of cylinders in one truck is limited by volume, and therefore the capacity utilization by mass is relatively low. The volume capacity utilization factor is 100 %.

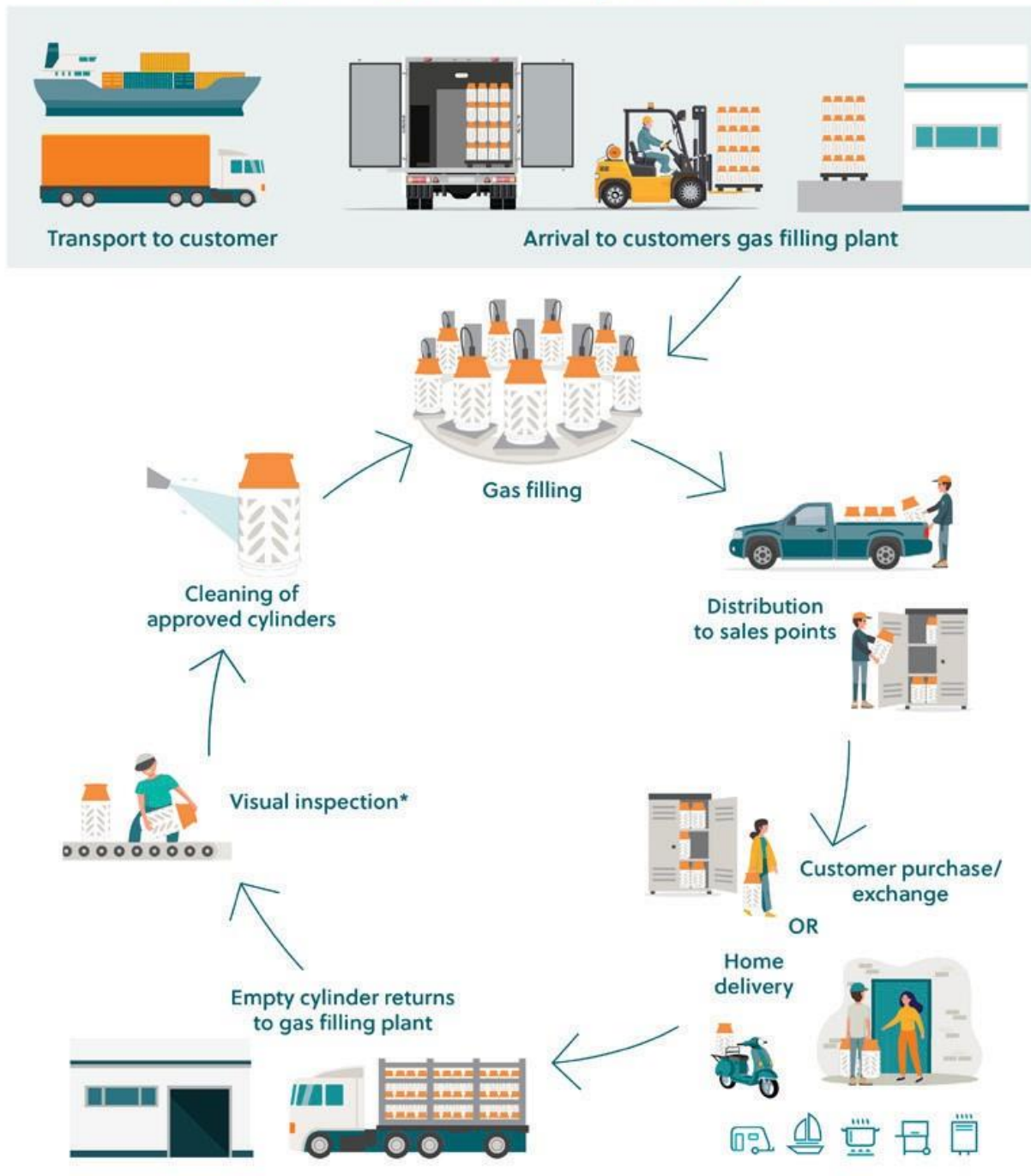
The results are sensitive for changes to the number of fillings (60 fillings), and total transport distance for each use. To get results for cradle-to-gate (A1-A3, A4) and end-of-life (C1-C4, D) for one 18,2 l cylinder, the LCA results can be multiplied by 60. The following information describe the scenarios in the different modules of the EPD.

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	Value (l/t)
Truck	17 %	32 t Euro 6	120	0,062	l/tkm

Use (B1)

Between each use cylinders are sent to filling station for inspection, washing and filling. Additional packaging and labelling for retail sale is applied. The cylinders are then distributed to central retail sales point by train, and further by truck. The use phase does not include customer purchase/exchange and home delivery, as this is not a part of the system boundaries.

Circularity of the use phase of Hexagon Ragasco composite cylinders



* Upon inspection, a cylinder may need further maintenance or to pass a periodic inspection

- | | | | | | | | |
|--|---|--|---|--|---|--|--|
| | <p>Perform periodic inspection procedure to requalify cylinder for further use.</p> | | <p>Further inspection reveals no damage. Cylinder goes to cleaning.</p> | | <p>Further inspection reveals casing damage. Replace damaged parts.</p> | | <p>Further inspection reveals pressure vessel damage. Send cylinder to waste handling.</p> |
|--|---|--|---|--|---|--|--|

	Unit	Value
Transport to and from filling station, 24 t Euro 6 truck	km (one way)	100
Transport to and from filling station, train	km (one way)	450
Water	liter	0,2
Soap	liter	0,013
Degrease	liter	0,0005
Shrink plastic	kg	0,0015
Glossy carton	kg	0,002
O-ring	kg	0,002
Electricity	kWh	0,24
Permeation of propane gas during use ¹	g/year	14,46

¹ Propane has a GWP value of 3,3 kg CO₂ eq. (IPCC 2021)

Maintenance (B2)

Cylinders are periodically sent to retesting in Denmark. It is assumed that the cylinders are retested twice before being discarded after 30 years.

Resource use per one maintenance cycle	Unit	Value
Maintenance cycle (number of cycles)		2
Transport to and from maintenance center, 32 t Euro 6 truck	km (one way)	560
Replacement of valve and sensor	kg	0,54
O-ring	kg	0,002
Water consumption	liter	0,2
Electricity consumption	kWh	0,173
Natural gas	kWh	0,102

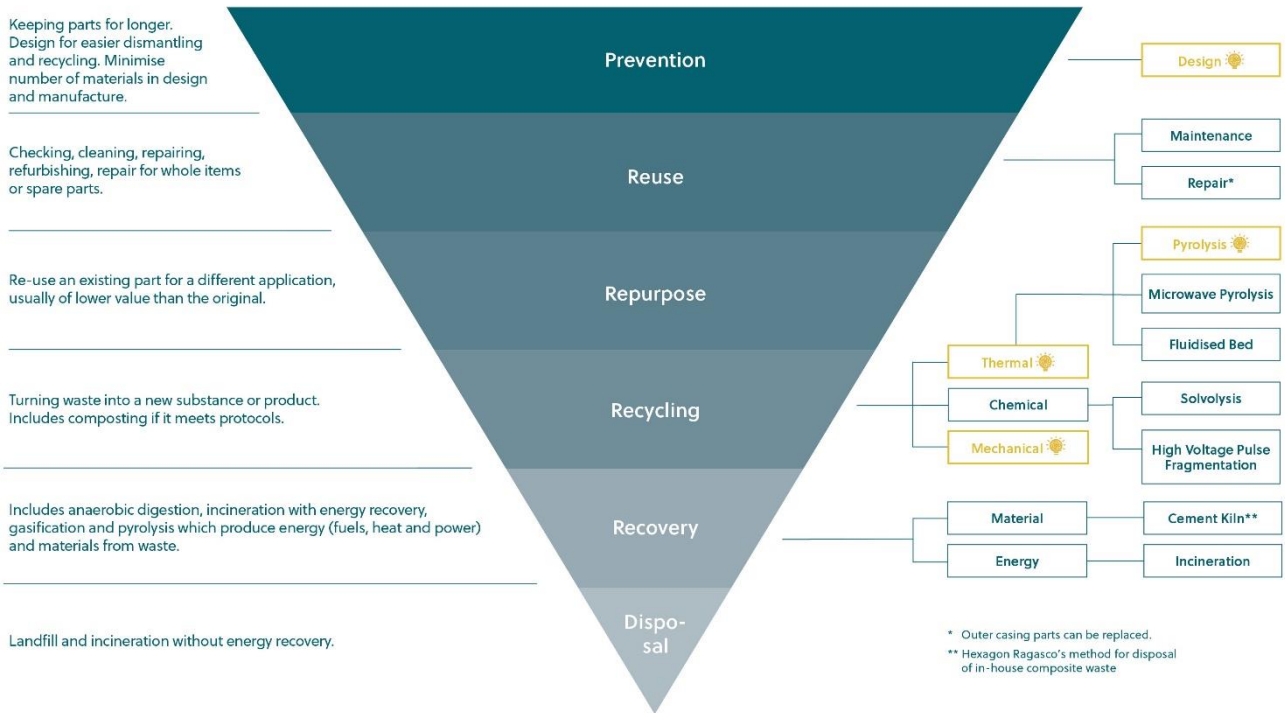


Linktra Smart cylinder at exchange point in Norway

End of Life (C2, C3, C4)

Waste processing of cylinders are sent to incineration, while the brass valve and insert, as well as the sensor are recycled. Disposal of ashes is assumed to happen at the same location as the incineration facility.

EU waste hierarchy for composite materials



Unit	Value	
Recycling	kg	1,62
Energy recovery	kg	4,44
To landfill	kg	

Transport to waste processing (C1)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/ Energy consumption	value (l/t)
Truck, incineration	17%	24 t Euro 6	30	0,062	l/tkm
Truck, recycling	17%	24 t Euro 6	130	0,062	l/tkm

Transportation of cylinders to a nearby incineration facility. Brass valves and sensor are sent to recycling.

Benefits and loads beyond the system boundaries (D)

	Unit	Value
Substitution of heat	MJ	69,29
Substitution of electricity	MJ	2,28
Substitution of primary brass production	kg	0,56
Substitution of PCB	kg	0,02

The benefits and load beyond the system boundary are calculated from net flows sent to incineration and recycling. The substitution of heat and electricity is based on the Danish district heating mix of 2020. Only primary brass is used for calculating substitution of brass. Since the valve contains 60 % recycled content and a recycling rate of 99 % is assumed, the net scrap brass is 39 %.

LCA: Results

LCA results are related to the functional unit of one delivery of 18,2 l gas with a composite Linktra cylinder at sales point. To get the total impact of the entire lifetime of the cylinders the impacts for each module can be multiplied by 60. Using the declared unit is however not recommended as it does not take into account the benefit of reusing the gas cylinders. Environmental impact of the transported gas is not included in the scope of the EPD.

SYSTEM BOUNDARIES (X=included, MND=module not declared, MNR=module not relevant)

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

CORE ENVIRONMENTAL IMPACT INDICATORS

Indicator	Unit	A1	A2	A3	A1-A3	A4	B1	B2
GWP-total	kg CO2 eq.	2,23E-01	1,44E-02	1,63E-02	2,54E-01	2,91E-03	4,22E-01	1,34E-01
GWP-fossil	kg CO2 eq.	2,28E-01	1,44E-02	1,60E-02	2,58E-01	2,90E-03	4,17E-01	1,32E-01
GWP-biogenic	kg CO2 eq.	-4,43E-03	1,33E-05	2,51E-04	-4,17E-03	2,79E-06	3,26E-03	2,31E-03
GWP-LULUC	kg CO2 eq.	1,94E-04	8,50E-06	3,35E-05	2,36E-04	4,51E-07	9,60E-04	2,10E-04
ODP	kg CFC11 eq.	5,05E-09	2,62E-10	3,87E-10	5,70E-09	6,36E-11	7,19E-09	2,98E-09
AP	mol H ⁺ eq.	2,20E-03	2,25E-04	1,56E-04	2,58E-03	4,80E-06	1,61E-03	2,50E-03
EP-freshwater	kg P eq.	1,21E-04	7,38E-07	9,81E-06	1,32E-04	8,22E-08	8,12E-05	1,74E-04
EP-marine	kg N eq.	2,78E-04	5,90E-05	1,98E-05	3,57E-04	1,28E-06	4,50E-04	1,91E-04
EP-terrestrial	mol N eq.	3,07E-03	6,48E-04	2,33E-04	3,95E-03	1,28E-05	4,69E-03	2,30E-03
POCP	kg NMVOC eq.	1,07E-03	1,89E-04	7,84E-05	1,34E-03	8,53E-06	1,83E-03	7,75E-04
ADP-M&M	kg Sb eq.	2,79E-05	2,61E-08	1,56E-06	2,95E-05	1,90E-09	2,16E-06	3,86E-05
ADP-fossil	MJ	4,74E+00	1,90E-01	3,73E-01	5,31E+00	4,03E-02	5,53E+00	1,79E+00
WDP	m ³	1,04E-01	1,00E-03	1,30E-01	2,35E-01	1,48E-04	1,49E+00	6,95E-02

Parameter	Unit	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	9,15E-04	1,31E-01	0,00E+00	5,11E-04	-8,65E-02
GWP-fossil	kg CO2 eq.	9,14E-04	1,31E-01	0,00E+00	5,06E-04	-7,57E-02
GWP-biogenic	kg CO2 eq.	9,15E-07	8,13E-05	0,00E+00	4,58E-06	-1,06E-02
GWP-LULUC	kg CO2 eq.	1,48E-07	1,60E-07	0,00E+00	1,63E-07	-2,35E-04
ODP	kg CFC11 eq.	2,08E-11	3,90E-11	0,00E+00	1,16E-11	-1,40E-09
AP	mol H ⁺ eq.	1,56E-06	1,62E-05	0,00E+00	2,44E-06	-1,90E-03
EP-freshwater	kg P eq.	2,69E-08	1,04E-07	0,00E+00	5,81E-08	-1,40E-04
EP-marine	kg N eq.	4,12E-07	7,76E-06	0,00E+00	1,14E-06	-1,81E-04
EP-terrestrial	mol N eq.	4,11E-06	8,53E-05	0,00E+00	1,05E-05	-2,03E-03
POCP	kg NMVOC eq.	2,77E-06	2,12E-05	0,00E+00	3,95E-06	-5,76E-04
ADP-M&M	kg Sb eq.	6,21E-10	1,72E-09	0,00E+00	1,01E-09	-2,21E-05
ADP-fossil	MJ	1,32E-02	9,10E-03	0,00E+00	8,99E-03	-9,56E-01
WDP	m ³	4,84E-05	1,41E-03	0,00E+00	-3,24E-05	-5,86E-02

GWP-total: Global Warming Potential; **GWP-fossil:** Global Warming Potential fossil fuels; **GWP-biogenic:** Global Warming Potential biogenic; **GWP-LULUC:** Global Warming Potential land use and land use change; **ODP:** Depletion potential of the stratospheric ozone layer; **AP:** Acidification potential, Accumulated Exceedance; **EP-freshwater:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; See “additional Norwegian requirements” for indicator given as PO₄ eq. **EP-marine:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-terrestrial:** Eutrophication potential, Accumulated Exceedance; **POCP:** Formation potential of tropospheric ozone; **ADP-M&M:** Abiotic depletion potential for non-fossil resources (minerals and metals); **ADP-fossil:** Abiotic depletion potential for fossil resources; **WDP:** Water deprivation potential, deprivation weighted water consumption

Indicator	Unit	A1	A2	A3	A1-A3	A4	B1	B2
PM	Disease incidence	1,20E-08	1,89E-04	8,01E-10	1,89E-04	9,65E-11	2,73E-08	8,35E-09
IRP	kBq U235 eq.	1,70E-02	1,74E-04	3,89E-03	2,11E-02	2,85E-05	4,49E-02	1,22E-02
ETP-fw	CTUe	5,19E+00	8,34E-02	1,74E-01	5,45E+00	1,61E-02	2,37E+00	5,49E+00
HTP-c	CTUh	2,26E-10	4,62E-12	1,92E-11	2,50E-10	4,37E-13	4,15E-10	2,02E-10
HTP-nc	CTUh	6,68E-09	5,63E-11	3,84E-10	7,12E-09	9,02E-12	2,73E-09	7,35E-09
SQP	Dimensionless	1,33E+00	1,20E-01	2,48E-01	1,70E+00	1,74E-02	6,59E+00	1,42E+00

Indicator	Unit	C1	C2	C3	C4	D
PM	Disease incidence	3,15E-11	1,05E-10	0,00E+00	4,88E-11	-1,44E-08
IRP	kBq U235 eq.	9,32E-06	1,44E-05	0,00E+00	1,37E-05	-8,57E-03
ETP-fw	CTUe	5,29E-03	4,41E-03	2,55E-02	3,65E+00	0,00E+00
HTP-c	CTUh	1,42E-13	1,42E-12	0,00E+00	2,16E-12	-1,26E-10
HTP-nc	CTUh	2,89E-12	2,69E-11	0,00E+00	8,68E-11	-6,68E-09
SQP	Dimensionless	5,70E-03	1,88E-03	0,00E+00	1,44E-02	-4,06E+00

PM: Particulate matter emissions; **IRP:** Ionising radiation, human health; **ETP-fw:** Ecotoxicity (freshwater); **ETP-c:** Human toxicity, cancer effects; **HTP-nc:** Human toxicity, non-cancer effects; **SQP:** Land use related impacts / soil quality

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
ILCD type / level 2	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals & metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – 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.

Disclaimer 2 – 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

RESOURCE USE

Parameter	Unit	A1	A2	A3	A1-A3	A4	B1	B2
RPEE	MJ	2,95E-01	2,13E-03	4,42E-01	7,39E-01	3,91E+00	4,98E+00	1,97E-01
RPEM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,91E+00	0,00E+00	0,00E+00
TPE	MJ	2,95E-01	2,13E-03	4,42E-01	7,39E-01	2,84E-04	4,98E+00	1,97E-01
NRPE	MJ	3,07E+00	1,90E-01	3,73E-01	3,63E+00	4,03E-02	5,40E+00	-6,49E-01
NRPM	MJ	1,67E+00	0,00E+00	0,00E+00	1,67E+00	0,00E+00	1,37E-01	2,44E+00
TRPE	MJ	4,74E+00	1,90E-01	3,73E-01	5,31E+00	4,03E-02	5,53E+00	1,79E+00
SM	kg	4,80E-03	0,00E+00	0,00E+00	4,80E-03	0,00E+00	0,00E+00	9,60E-03
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
W	m3	2,42E-03	2,34E-05	3,03E-03	5,47E-03	3,44E-06	3,46E-02	1,62E-03

Parameter	Unit	C1	C2	C3	C4	D
RPEE	MJ	9,29E-05	2,40E-04	0,00E+00	2,14E-04	-8,74E-01
RPEM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	9,29E-05	2,40E-04	0,00E+00	2,14E-04	-8,74E-01
NRPE	MJ	1,32E-02	9,10E-03	0,00E+00	8,99E-03	-9,56E-01
NRPM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TRPE	MJ	1,32E-02	9,10E-03	0,00E+00	8,99E-03	-9,56E-01
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
W	m3	1,13E-06	3,28E-05	0,00E+00	-7,54E-07	-1,36E-03

RPEE: Renewable primary energy resources used as energy carrier; **RPEM:** Renewable primary energy resources used as raw materials; **TPE:** Total use of renewable primary energy resources; **NRPE:** Non-renewable primary energy resources used as energy carrier; **NRPM:** Non-renewable primary energy resources used as materials; **TRPE:** Total use of non-renewable primary energy resources; **SM:** Use of secondary materials; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **W:** Use of net fresh water

END OF LIFE - WASTE

Parameter	Unit	A1	A2	A3	A1-A3	A4	B1	B2
HW	kg	1,62E-04	4,02E-06	1,70E-03	1,86E-03	5,55E-07	2,84E-04	2,27E-04
NHW	kg	2,61E-02	9,63E-03	4,48E-03	4,02E-02	1,35E-03	3,21E-01	4,46E-02
NHW	kg	4,33E-06	4,14E-08	8,85E-07	5,26E-06	6,72E-09	1,01E-05	3,10E-06

Parameter	Unit	C1	C2	C3	C4	D
HW	kg	1,82E-07	1,37E-05	0,00E+00	3,25E-02	-1,73E-04
NHW	kg	4,41E-04	2,13E-04	0,00E+00	9,12E-04	-2,14E-02
NHW	kg	2,20E-09	3,63E-09	0,00E+00	3,23E-09	-2,13E-06

HW Hazardous waste disposed; **NHW** Non-hazardous waste disposed; **RW** Radioactive waste disposed

END OF LIFE - OUTPUT FLOW

Parameter	Unit	A1	A2	A3	A1-A3	A4	B1	B2
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,98E-02
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,40E-03	2,03E-03
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Parameter	Unit	C1	C2	C3	C4	D
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	0,00E+00	1,44E-02	0,00E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	2,28E+00	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	6,93E+01	0,00E+00	0,00E+00	0,00E+00

HW CR Components for reuse; **MR** Materials for recycling; **MER** Materials for energy recovery; **EEE** Exported electric energy; **ETE** Exported thermal energy

Reading example: 9,0 E-03 = $9,0 \cdot 10^{-3}$ = 0,009

Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	0,00E+00
Biogenic carbon content in the accompanying packaging	kg C	7,73E-05

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

Additional requirements

Location based electricity mix from the use of electricity in the manufacturing phase

National production mix from import, medium voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing process (A3).

National electricity grid	Foreground/core [kWh]	GWP _{total} [kg CO ₂ -eq./kWh]	SUM [kg CO ₂ -eq]
Electricity, medium voltage {NO} market for electricity, medium voltage Cut-off, U	0,107	0,032	0,003421

Additional environmental impact indicators required in NPCR Part A for construction products

In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation.

Parameter	Unit	A1	A2	A3	A1-A3	A4	B1	B2
GWP-IOBC	kg CO ₂ eq.	2,24E-01	1,44E-02	1,63E-02	2,54E-01	2,62E-03	4,22E-01	1,34E-01

Parameter	Unit	C1	C2	C3	C4	D
GWP-IOBC	kg CO ₂ eq.	9,15E-04	1,31E-01	0,00E+00	5,11E-04	-8,65E-02

GWP-IOBC Global warming potential calculated according to the principle of instantaneous oxidation.

Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Some products used in the manufacturing may contain substances on the REACH candidate list, but during the curing process these materials change properties and are no longer considered harmful substances. This is confirmed by the material supplier and documentation is available upon request.

- The product contains no substances given by the REACH Candidate list or the Norwegian priority list.
- The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- The product contains dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskiten, Annex III), see table.

Indoor environment

No tests have been carried out on the product concerning indoor climate.

Bibliography



ISO 14025:2010	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 14044:2006	Environmental management - Life cycle assessment - Requirements and guidelines EN
15804:2012+A2:2019	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products
ISO 21930:2007	Sustainability in building construction - Environmental declaration of building products
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LCA Report	Life Cycle Assessment report of Linktra 18,2L Cylinder, 2024, Sander Nørsterud
NPCR 023:2021	Packaging products and services v 1.1., Norwegian EPD foundation ISO
9001:2015	Quality management systems – Requirements
ISO 14001:2015	Environmental management systems – Requirements with guidance for use
ISO 50001:2018	Energy management systems – Requirements with guidance for use
ISO 11119-3:2020	Gas cylinders- Design, construction and testing of refillable composite gas cylinders and tubes
CEN – EN 12245:2009	Transportable gas cylinders – Fully wrapped composite cylinders
DIN – EN 14427:2014	LPG equipment and accessories – Transportable refillable fully wrapped composite cylinders for LPG – Design and construction

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