

VIGG

Environmental Product Declaration

by ateljé Lyktan

Width 117 mm, height 454 mm, weight 0,894 kg, luminous flux 200 lm, power rating 4 W

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021

Ateljé Lyktan AB, Fyrvaktaregatan 7, SE-296 35, Sweden

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General information

Programme information

Programme	The International EPD® System
Address	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR2019-14 Construction products v2.0.1 and UN CPC code(s) 4653, together with EN 15804:2012+A2:2019.
PCR review was conducted by: The Technical Committee of the International EPD® System. Review chair: Rob Rouwette (chair), Noa Meron (co-chair). The review panel may be contacted via support@environdec.com.
External and independent ('third-party') verification of the declaration and data, according to ISO 14025:2006, via EPD verification through: Third party verifier: Viktor Hakkarainen, CHM Analytics AB, viktor.hakkarainen@chm-analytics.com
<input checked="" type="checkbox"/> Individual EPD verification without a pre-verified LCA/EPD tool <input type="checkbox"/> Individual EPD verification with a pre-verified LCA/EPD tool <input type="checkbox"/> EPD process certification* without a pre-verified LCA/EPD tool <input type="checkbox"/> EPD process certification* with a pre-verified LCA/EPD tool <input type="checkbox"/> Fully pre-verified EPD tool
<i>Approved by: The International EPD® System</i>
Procedure for follow-up of data during EPD validity involves third party verifier: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but registered in different EPD programs, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterization factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

The LCA approach harmonizes with the Product Category Rules for building products, PCR 2019:14 v2.0.1. The Life Cycle Assessment report (Nilsson, 2025) is available to EPD-auditor on request and include all the detailed information required according to ISO 14044 (ISO, 2006b).

Company information

Owner of the EPD

Ateljé Lyktan AB

Contact

Rasmus Nilsson, Sustainability & Environmental Manager
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Description

Ateljé Lyktan develops, produces and markets lighting products – with a focus on energy efficiency, sustainability and circularity. We design our products to be used, upgraded and reused in a well-thought-out and flexible way. We make it possible to extend the life of the product by upgrading both hardware and software. The company was founded in 1934. The head office and factory are located in Åhus, located on the shores of the Baltic Sea in the southern Sweden.

Name and location of production site(s)

Ateljé Lyktan AB, Fyrvaktaregatan 7, SE-296 35, Sweden

Product-related or management system-related certifications

Ateljé Lyktan AB is certified according to ISO 9001 and ISO 14001. All products are produced in accordance with the requirements for CE-marking.



Product information

Product name

Vigg

Product identification

Vigg, width 117 mm, height 454 mm

Product description

Vigg is a thoughtfully designed task light, designed for the way we work today. Balancing functionality, sustainability, and a discreet aesthetic. Developed in collaboration with Arup, it delivers focused illumination while minimizing glare, making it ideal for both offices and home workspaces.

With an intuitive single-button control and smooth dimming, Vigg ensures effortless usability. To promote energy savings, it automatically turns off after one hour. Built for longevity, it supports our circular initiative, allowing easy servicing and refurbishment.

A die-cast zinc base and head for a seamless, solid feel. A precision-engineered aluminium heatsink ensures performance, while the partly recycled steel stem adds both strength and elegance. The baseplate? A refined blend of cork and rubber, creating a soft yet stable connection to any surface.

Including light source, colour temperature 3000K or 4000K, CRI 90, L90 50 000h. Can be tilted upwards up to 90° and downwards to 40° angle. Non-rotatable.

For this report, the system studied was the life cycle of Vigg, cradle to grave, and its function is to act as a task light source in an office environment. The representative product for this report is the Vigg version with a width of 117 mm, height of 454 mm, a weight of 0,894 kg that is used for 20 years (2500 hours per year) with a power-rating of 4W and a luminous flux of 200lm.

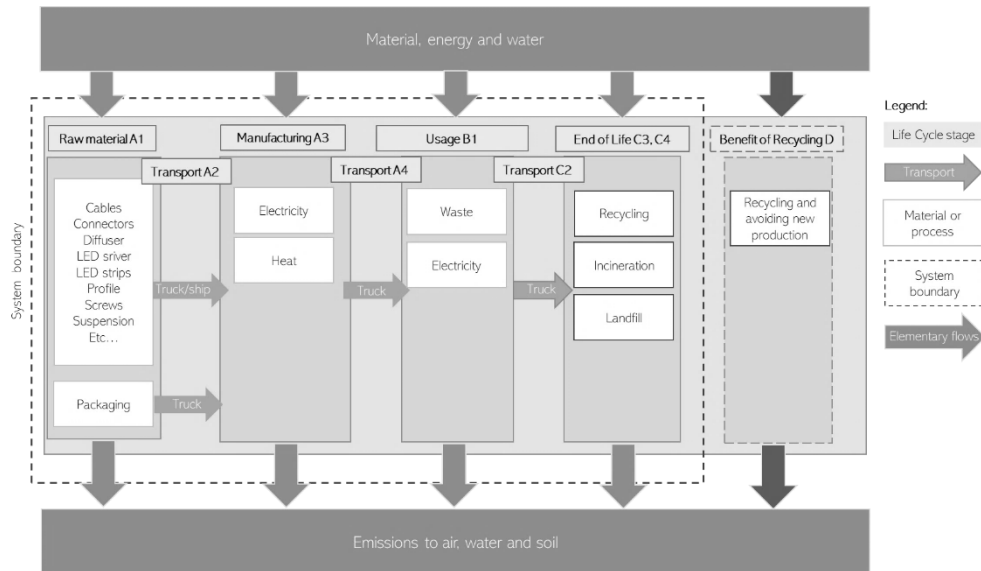
LCA information

Declared unit	One (1) Vigg luminaire with a width of 117 mm, height of 454 mm, a weight of 0,894 kg that is used for 20 years (2500 hours per year) with a power-rating of 4W and a luminous flux of 200 lm.
Function	Office light during the lifetime of one luminaire.
Technical lifetime	Minimum of 50 000 of operating hours. Implies that no parts needs to be replaced during the assumed lifetime, which therefore gives a Reference Service Life (RSL) of 20 years.
Product group classification	UN CPC 4653
Goal and scope	Understanding the product's environmental impact during the life cycle, for internal product development to reduce the impact but also to our stakeholders when selecting luminaires.
Audience	Primarily purchasers of luminaires but also lighting installers, lighting designers, architects and constructors.
Manufacturing site	Ateljé Lyktan, Åhus, Sweden.
Geographical area	Results represent Sweden. The product's main market is Europe.
Compliant with	This EPD follows the "Book-keeping" LCA approach which is defined as attributional LCA in the ISO 14040 standard. In accordance with ISO 14025, ISO 14040 – ISO 140 44 and EN 15804:2012+A2:2019 This EPD follows the Product Category Rules PCR2019-14 Construction products v2.0.1
Cut-off rules	The following procedure is followed for the exclusion of inputs and output: - Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts shall be included - Infrastructure/capital goods have been excluded in this assessment except for direct electricity datasets that's been used. The chosen electricity-datasets has therefore been modelled with system-processes to still capture the impact caused by infrastructure/capital goods as infrastructure are deemed to be of importance in electricity-datasets. A screening and expert judgement showed that the following aspects contribute less than 1% and could be cut-off: - Various supplier packaging - Manufacturing waste - Energy and material use in installation

Background data	The data quality is considered fair. All site-specific data for raw materials, auxiliary materials as well as energy and emissions in the manufacturing process is from 2024 and have been represented with Ecoinvent datasets. All other relevant environmental aspects have been represented by generic Ecoinvent data. Ecoinvent is a LCI (Life cycle inventory) data library. Ecoinvent contains data for the specific geographical regions relevant for this study. The background data from Ecoinvent 3.10 are from 2017-2023. EN 15804 reference package 3.1 has been used.
Foreground data - primary	Weight of articles and composition of raw materials. Suppliers' location for transport and some specific data on energy and material use Packaging, rest materials, electricity, heat and waste.
Electricity data	Electricity consumption in the A3 module is GoO-certified hydro power and B6 electricity is represented by data for national production mix in Ecoinvent 3.10 regionalized for Sweden.
Allocations	Polluter Pays / Allocation by Classification One allocation rule is applied: the energy and fuel necessary for the manufacture is allocated in kWh by production of the declared unit
Impact assessment methods	Potential environmental impacts are calculated with Environmental Footprint 3.1 method as implemented in SimaPro 10.2 Resource use values are calculated from Cumulative Energy Demand V1.12.
Based on LCA report	Ateljé Lyktan AB LCA report 0001A Vigg – (Nilsson, Ateljé Lyktan AB, 2026)
Software	SimaPro 10.2

System diagram

This study has system boundaries of type b, cradle-to-gate with options, modules C1-C4 + D and with optional module (A1- A3 + C + D and additional modules A4-A5 and B1-B7). That means that all processes needed for raw material extraction, manufacturing, transport, usage and end-of-life are included in the study. All modules (A1-D) are declared, although some modules (B1-B5 and B7) do not have any environmental aspects. Infrastructure is excluded except for the energy modelled with primary data in the EPD.



Detailed information on Life cycle

(A1-A2) Primary data have been gathered by ateljé Lyktan from their main suppliers, which reflects their type and amount of electricity use. The majority of the suppliers are located in Europe and transport of raw materials are done by lorry from suppliers' sites to ateljé Lyktan's manufacturing site in Åhus. However, the supplier of the LED is located in the US, and the supplier of the transformer is located in China, both of which are distributed through air and lorry.

(A3) ateljé Lyktan's manufacturing takes place in Åhus, Sweden, where the components are manually assembled of the to shape the final product. As for the Vigg luminaire, most of the components needed are purchased ready-as-is from the suppliers and does not involve much manufacturing processes in the factory. The only part of the processes that involves more than an assembly, is the Represents cutting and threading of the steel rod, which is listed within the 'Body & accessories' section. The finished products are packaged into cardboard boxes, and palletized before being sent to customers. The electricity mix for ateljé Lyktan's manufacturing has been modelled using hydro-power electricity for Sweden according to certifications. This is represented using the ecoinvent dataset "Electricity, high voltage {SE}| electricity production, hydro, run-of-river | Cut-off, S". The carbon footprint of the electricity mix is 4,36 g CO₂-eq per kWh. Allocation of primary data was done for the manufacturing processes in the A3 module. All the data was obtained per year and allocated by number of produced Vigg luminaires compared to the total yearly production of luminaires.

(A4) ateljé Lyktan's main customers are located in southern and middle parts of Sweden, and therefore Stockholm was used as approximation to represent the location of the company's main customers. The finished products are therefore transported a distance of 560 km to customers from ateljé Lyktan's facility located in Åhus to Stockholm. This was represented by the ecoinvent dataset "Transport, freight, lorry 16-32 metric ton, EURO6 {RER}| transport, freight, lorry 16-32 metric ton, EURO6 | Cut-off, U".

Other mandatory information from table 10 from section 7.3.2.1 in EN15804+A2 is declared here:

- Fuel type and amount: diesel, 0,0366 per tkm,
- Capacity utilization: ca 50%
- Bulk density of transported goods: ca 400 kg/m³
- Volume capacity utilization factor: <1

(A5) Installation of the product is assumed to occur in a way that has no environmental impact, e.g. by hand. What is considered for the installation is the waste treatment of the packaging materials that comes with the product, which follows the end-of-life treatment in module C.

(B1-B7) It is assumed that there are no significant environmental aspects during the installation of the products, but as the products are a luminaire to be used to illuminate an office space, the products electricity use will be accounted for in module B6. For the use phase, the luminaire is assumed to be installed in Sweden (ateljé Lyktan's main market) in an office environment. The lifetime energy consumption of 200 kWh was calculated by multiplying the reference service life (RSL=20 years) with the number of use hours per year (2500 hours in an office environment, according to EN15193) and the power draw of Vigg (4W). The energy source was average electricity on the Swedish grid (37,5 g CO₂-eq/kWh), which was modelled with the ecoinvent database "Electricity, low voltage {SE}| market for electricity, low voltage | Cut-off, S".

(C1-C4) After use the product is transported to waste processing. In the C module, default values provided by the PCR 2019:14 v.2.0.1 were used for demolition/deconstruction (C1) as no primary data was obtained. The default values for transport distances to waste treatment (C2) were also

used, 80 km for materials not to be incinerated and 130 km for materials to be incinerated. The transport is modelled using the ecoinvent 3.10 dataset "Transport, freight, lorry 16-32 metric ton, EURO5 {RER} | transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U".

Other mandatory information from table 10 from section 7.3.2.1 in EN15804+A2 is declared here:

- Fuel type and amount: diesel, 0,0375 per tkm,
- Capacity utilization: ca 50%
- Bulk density of transported goods: ca 400 kg/m³
- Volume capacity utilization factor: <1

Since the majority of customers exists in Sweden, the relevant end-of-life scenario has been represented with a Swedish case. As this scenario is a mix of recycling and incineration, a 100% scenario for each waste scenario will also be declared as per PCR rules. The results for the 100% scenarios can be found in "Additional LCA results". For the waste treatment (C3), the raw materials follow the collection and recovery rate according to recycling rates (R2) used in the Circular footprint formula of PEF, as found in Annex C2. The environmental impact from recycling is not considered following the cut-off approach applied. The remaining waste follows the Swedish average scenario stated in PEF Annex C, meaning that 99% of the materials are sent to incineration, and 1% going to landfilling. Instead of declaring table 15 from section 7.3.4 in EN15804+A2, the relevant information is included here: The amount of waste collected separately is the entire weight of the product (see content declaration).

The amount of materials (in kg) collected for recycling can be found in the indicator "Materials for recycling" in module C3 under the Output flow indicators under the section for Environmental performance. The amount of materials (in kg) collected for energy recovery is 0,213 kg. The amount of materials (in kg) collected for disposal (sanitary landfill) is 0,002 kg. (D) Module D accounts for the potential environmental benefits or burdens resulting from material recycling and energy recovery during incineration.

Data quality summary according to EN 15491

The EPD is based on data collected by ateljé Lyktan from their site in Åhus, Sweden during the year 2024. The EPD is representative of the production of Vigg produced in Åhus, Sweden and data are collected directly from supplier and production site. The end-of-life stage of the EPD covers Sweden. The EPD uses representative secondary data from the Ecoinvent database, version 3.10, for the period 2011-2024. Primary data was gathered from main suppliers of cast components, which correspond to the largest weight of the product. The quality of the relevant data used for the EPD in terms of its time, geography and technology representativeness using EN 15804:2012+A2:2019, Annex E, E.1 is very good or good.

Table 1 Modules declared, geographical scope, share of primary data (in GWP-GHG indicator) and data variation

Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	GLO	GLO	GLO	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Share of primary data %	22,67%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation products %	No variation			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation site %	No variation			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Legend	Modules declared: (X = included; ND = not declared), geographical scope, share of primary data (in GWP-GHG indicator) EPD modules included (G = Generic data, P = Primary data).																

Table 2 Data quality assessment of individual datasets for Vigg

Process	Source type	Source	Reference year	Data category	Contribution to GWP/CO ₂ e result A1-A3 (including raw materials fromecoinvent)	Share of primary data, of GWP/CO ₂ e results for A1-A3
Transport of raw materials/components to core manufacturing	Collected data Generic data	EPD owner	2024	Representative secondary data	26,2%	0%
Core manufacturing	Collected data Generic data	EPD owner	2024	Primary data, Representative secondary data	25,7%	18,6%
Cast components	Collected data, Generic data	Supplier, Database	2024	Primary data, Representative secondary data	12,3%	4,1%
Driver & power supply	Collected data, Generic data	Supplier, Database	2023-2024	Representative secondary data	19,2%	0%
Rod	Generic data	Supplier, Database	2023	Representative secondary data	11,4%	0%
LED	Collected data, Generic data	Supplier, Database	2023	Representative secondary data	0,1%	0%
Heat sink cast	Generic data	Supplier, Database	2023	Representative secondary data	3,1%	0%
Other component and processes	Generic data	Database	2011-2024	Representative secondary data	2,0%	0%
Total share of Primary data of GWP-GHG results for A1-A3						22,67%

Share of primary data has been calculated according to the rules defined in the PCR. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories, more specifically it has been calculated for the GWP-GHG indicator using the Sankey Diagram-function in SimaPro and checking the input and output-flows of every process taking place in modules A1-A3. The energy used in manufacturing (A3) and supplier-specific processes (A1), and the transport of raw materials (A2) has been considered as primary data while all other data are considered as representative or proxy data. The variation of products shows how the GWP-GHG climate impact indicator varies for the included products for the modules A1-A3. As seen in the table for modules declared.

Content and life cycle information

The following table shows the material content of the Vigg luminaire and the percentage of recycled and biogenic material in the product, for the representative product with a width of 117 mm, height of 454 mm, a weight of 0,894 kg, a power-rating of 4W and a luminous flux of 200lm.

Table 3 Content declaration

Product materials	Weight (kg)	Post-consumer material (weight %)	Biogenic material	
			Weight %	kg C/product
Electronics, other metals (steel etc)	1,25E-01	0,0%	0,0%	0
Electronics, copper	2,82E-03	0,0%	0,0%	0
Plastic	9,01E-02	0,0%	0,0%	0
Aluminum	6,18E-02	0,0%	0,0%	0
Steel	1,30E-01	0,0%	0,0%	0
Zinc	4,52E-01	37,0%	0,0%	0
Copper	4,00E-03	0,0%	0,0%	0
Cork	2,80E-02	0,0%	100,0%	1,23E-02
Glass	6,84E-07	0,0%	0,0%	0
Total	8,94E-01	18,6% (Zinc)	0,031%	1,23E-02
Packaging materials	Weight (kg)	Weight-% (versus the product)	Renewable material (weight %)	
			Weight %	kg C/product
Cardboard	3,10E-01	34,7%	100,0%	1,40E-01
Pallet	2,39E-02	2,7%	100,0%	1,05E-02
Total	3,34E-01	37,4%	100,0%	1,50E-01
Substances from the candidate list of SVHC for Authorisation	EC number	CAS number	Weight % per declared unit	
No substances exceeding 0,1 wt%	-	-	-	

1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO₂.

Environmental information

All results are for the representative product Vigg with a width of 117 mm, height of 454 mm, a weight of 0,894 kg that is used for 20 years (2500 hours per year) with a power-rating of 4W and a luminous flux of 200m. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. See disclaimers below.

Table 4 Potential environmental impact – mandatory indicators according to EN 15804

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP Fossil	kg CO2 eq	3,73E+00	2,03E+00	2,00E+00	7,76E+00	1,28E-01	9,55E-03	0	0	0	0	0	6,63E+00	0	4,78E-04	1,59E-02	2,88E-01	1,53E-05	-1,35E+00
GWP Biogenic	kg CO2 eq	-4,52E-02	3,17E-04	-5,50E-01	-5,95E-01	8,87E-05	5,50E-01	0	0	0	0	0	2,04E-01	0	5,22E-08	1,09E-05	4,51E-02	3,56E-05	2,32E-02
GWP LULUC	kg CO2 eq	9,61E-03	1,55E-04	3,14E-03	1,29E-02	4,25E-05	5,39E-06	0	0	0	0	0	7,42E-01	0	4,15E-08	5,20E-06	1,64E-05	3,88E-09	-1,49E-02
GWP Total	kg CO2 eq	3,70E+00	2,03E+00	1,45E+00	7,18E+00	1,28E-01	5,60E-01	0	0	0	0	0	7,57E+00	0	4,78E-04	1,59E-02	3,33E-01	5,09E-05	-1,34E+00
ODP	kg CFC11 eq	9,12E-08	3,19E-08	2,12E-08	1,44E-07	2,55E-09	1,70E-10	0	0	0	0	0	1,98E-07	0	7,31E-12	3,16E-10	1,94E-10	3,13E-13	-1,68E-08
AP	mol H+ eq	8,01E-02	8,38E-03	1,33E-02	1,02E-01	2,67E-04	4,88E-05	0	0	0	0	0	8,10E-02	0	4,31E-06	4,98E-05	1,34E-04	7,03E-08	-1,10E-02
EP, freshwater	kg P eq	4,37E-04	4,15E-06	1,10E-04	5,50E-04	1,00E-06	8,39E-08	0	0	0	0	0	4,33E-04	0	1,68E-09	1,22E-07	4,12E-07	1,42E-10	-1,35E-04
EP, marine	kg N eq	6,70E-03	3,34E-03	2,10E-03	1,21E-02	6,25E-05	2,04E-05	0	0	0	0	0	9,50E-03	0	2,00E-06	1,66E-05	5,56E-05	5,21E-08	-2,16E-03
EP, terrestrial	mol N eq	8,36E-02	3,66E-02	2,22E-02	1,42E-01	6,92E-04	2,08E-04	0	0	0	0	0	1,22E-01	0	2,19E-05	1,82E-04	5,81E-04	2,99E-07	-2,37E-02
POCP	kg NMVOC eq	2,53E-02	1,19E-02	6,86E-03	4,41E-02	4,43E-04	6,64E-05	0	0	0	0	0	3,25E-02	0	6,53E-06	7,79E-05	1,54E-04	1,20E-07	-6,77E-03
ADPE	kg Sb eq	1,40E-03	7,80E-07	2,85E-06	1,40E-03	4,17E-07	2,56E-08	0	0	0	0	0	7,93E-04	0	1,70E-10	5,09E-08	7,19E-08	1,99E-11	-3,36E-04
ADPF	MJ	5,11E+01	2,71E+01	2,16E+01	9,97E+01	1,80E+00	1,17E-01	0	0	0	0	0	8,85E+02	0	6,25E-03	2,23E-01	1,84E-01	2,44E-04	-2,05E+01
WDP	m3 depriv.	2,19E+00	4,09E-02	2,98E-01	2,53E+00	7,48E-03	2,92E-03	0	0	0	0	0	1,29E+01	0	1,35E-05	9,15E-04	2,99E-03	4,06E-06	-8,41E-01
Acronyms	GWP: Global Warming Potential, LULUC: Land Use and Land Use Change, ODP: Ozone Depletion Potential, AP: Acidification Potential. EP: Eutrophication Potential, POCP: Photochemical Ozone Creation Potential, ADPE: Abiotic Depletion Potential – Elements, ADPF: Abiotic Depletion Potential – Fossil Fuels, WDP: Water Scarcity Footprint																		

Disclaimer 1: The results of the environmental impact indicators Abiotic depletion for fossil and non-fossil resources, Water depletion potential, Ecotoxicity-freshwater, Human toxicity-cancer, Human toxicity-non-cancer and Land use shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Disclaimer 2: The indicator GWP-GHG includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Disclaimer 3: The use of the results of modules A1-A3 without considering the results of module C is discouraged.

Disclaimer 4: The indicator Ionising radiation 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.

Table 5 Potential environmental impact – additional mandatory and voluntary indicators

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	disease inc.	3,15E-07	2,74E-08	1,50E-07	4,92E-07	9,39E-09	8,27E-10	0	0	0	0	0	4,69E-07	0	1,22E-10	1,24E-09	1,38E-09	1,60E-12	-9,17E-08
IR	kBq U-235 eq	1,64E-01	3,57E-03	2,51E-02	1,93E-01	8,32E-04	1,65E-04	0	0	0	0	0	3,10E+01	0	1,09E-06	1,02E-04	6,28E-04	1,35E-07	-1,55E-01
ETP - FW	CTUe	2,19E+02	2,12E+00	8,98E+00	2,30E+02	4,90E-01	2,01E-01	0	0	0	0	0	1,33E+02	0	8,86E-04	6,00E-02	2,53E+00	4,22E-03	-1,22E+02
HTP - C	CTUh	4,71E-08	2,69E-09	1,05E-08	6,03E-08	9,09E-10	7,88E-11	0	0	0	0	0	8,68E-08	0	1,87E-12	1,11E-10	9,15E-11	5,37E-14	-1,17E-07
HTP - NC	CTUh	5,63E-07	2,04E-08	1,78E-08	6,01E-07	1,13E-09	3,49E-10	0	0	0	0	0	6,75E-07	0	7,73E-13	1,39E-10	4,42E-09	1,87E-13	-8,92E-08
SQP	Pt	3,94E+01	2,72E+00	2,72E+01	6,93E+01	1,09E+00	5,91E-02	0	0	0	0	0	2,08E+02	0	4,39E-04	1,33E-01	6,95E-02	5,12E-04	-1,17E+01
GWP-GHG	kg CO2 eq	3,77E+00	2,03E+00	2,02E+00	7,82E+00	1,28E-01	1,07E-02	0	0	0	0	0	7,50E+00	0	4,78E-04	1,59E-02	2,88E-01	4,33E-05	-1,37E+00
Acronyms	PM: Particulate Matter, IRP: Ionizing Radiation - Human Health, ETP-FW: Ecotoxicity Potential – Freshwater, HTP-C: Human Toxicity Potential – Cancer, HTP-NC: Human Toxicity Potential – Non-Cancer, SQP: Soil Quality Potential Index, GWP-GHG: Global Warming Potential, Greenhouse Gases																		

Use of resources

Calculated according to option B in Annex 3 of the PCR.

Table 6 Use of resources and energy for module A-D, per functional unit

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	1,35E+01	1,13E-01	3,93E+01	5,29E+01	3,09E-02	4,44E-03	0	0	0	0	0	6,06E+02	0	3,84E-05	3,79E-03	1,81E-02	6,19E-06	-6,26E+00
PERM	MJ	5,32E-01	0,00E+00	5,31E+00	5,84E+00	0,00E+00	-4,25E+00	0	0	0	0	0	0,00E+00	0	0,00E+00	0,00E+00	-4,26E-01	0,00E+00	0,00E+00
PERT	MJ	1,40E+01	1,13E-01	4,46E+01	5,87E+01	3,09E-02	-4,24E+00	0	0	0	0	0	6,06E+02	0	3,84E-05	3,79E-03	-4,07E-01	6,19E-06	-6,26E+00
PENRE	MJ	5,45E+01	2,88E+01	2,30E+01	1,06E+02	1,92E+00	1,25E-01	0	0	0	0	0	8,88E+02	0	6,64E-03	2,38E-01	1,96E-01	2,60E-04	-2,16E+01
PENRM	MJ	2,79E+00	0,00E+00	0,00E+00	2,79E+00	0,00E+00	0,00E+00	0	0	0	0	0	0,00E+00	0	0,00E+00	0,00E+00	0,00E+00	-2,23E+00	0,00E+00
PENRT	MJ	5,73E+01	2,88E+01	2,30E+01	1,09E+02	1,92E+00	1,25E-01	0	0	0	0	0	8,88E+02	0	6,64E-03	2,38E-01	1,96E-01	-2,23E+00	-2,16E+01
SM	kg	1,67E-01	0,00E+00	0,00E+00	1,67E-01	0,00E+00	0,00E+00	0	0	0	0	0	0,00E+00	0	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	0,00E+00	0	0	0	0	0	0,00E+00	0	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	0	0	0	0	0,00E+00	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	1,03E-01	1,20E-03	6,73E-03	1,11E-01	2,21E-04	1,82E-05	0	0	0	0	0	2,89E-02	0	3,63E-07	2,70E-05	4,04E-05	2,46E-07	-6,62E-02
Abbreviations	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total Use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total Use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = use of net fresh water																		

Waste production and output flows

Waste production

Table 7 Waste production¹ for module A1-D, per declared unit

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0	0	0	0	0	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-Hazardous waste	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0	0	0	0	0	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Radioactive waste	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0	0	0	0	0	0	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Output flows

Table 8 Output flows for module A-D, per declared unit

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for reuse	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,73E-01	0	0	0	0	0	0,00E+00	0	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,33E-01	0	0	0	0	0	0,00E+00	0	0,00E+00	0,00E+00	6,79E-01	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0	0	0	0	0	0,00E+00	0	0,00E+00	0,00E+00	0,00E+00	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	9,74E-01	0	0	0	0	0	0,00E+00	0	0,00E+00	0,00E+00	-9,74E-01	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,27E+00	0	0	0	0	0	0,00E+00	0	0,00E+00	0,00E+00	-2,27E+00	0,00E+00	0,00E+00

¹ The reported waste production are flows leaving the system boundary. Since waste treatment processes are part of the system boundary, the indicators are here reported as zero, according to Environdec's "guidance on the resource use and waste indicators" (<https://environdec.com/resources/indicators>)

Additional scenarios for Modules A5, C1-C4 & D

Table 9 Potential environmental impact – mandatory indicators according to EN 15804 – 100% recycling

100% recycling		Results per declared unit					
Indicator	Unit	A5	C1	C2	C3	C4	D
GWP Fossil	kg CO2 eq	8,81E-03	4,78E-04	1,38E-02	9,01E-03	0E+00	-1,76E+00
GWP Biogenic	kg CO2 eq	5,50E-01	5,22E-08	9,49E-06	-2,08E-05	0E+00	1,06E-01
GWP LULUC	kg CO2 eq	5,14E-06	4,15E-08	4,52E-06	1,52E-05	0E+00	-1,73E-02
GWP Total	kg CO2 eq	5,59E-01	4,78E-04	1,39E-02	9,00E-03	0E+00	-1,67E+00
ODP	kg CFC11 eq	1,55E-10	7,31E-12	2,75E-10	8,30E-11	0E+00	-2,74E-08
AP	mol H+ eq	4,64E-05	4,31E-06	4,33E-05	5,80E-05	0E+00	-1,40E-02
EP, freshwater	kg P eq	7,82E-08	1,68E-09	1,06E-07	3,30E-07	0E+00	-1,74E-04
EP, marine	kg N eq	1,96E-05	2,00E-06	1,44E-05	1,63E-05	0E+00	-2,81E-03
EP, terrestrial	mol N eq	2,00E-04	2,19E-05	1,59E-04	1,84E-04	0E+00	-3,06E-02
POCP	kg NMVOC eq	6,27E-05	6,53E-06	6,78E-05	5,37E-05	0E+00	-9,22E-03
ADPE	kg Sb eq	2,32E-08	1,70E-10	4,43E-08	6,09E-08	0E+00	-4,40E-04
ADPF	MJ	1,06E-01	6,25E-03	1,94E-01	1,22E-01	0E+00	-2,82E+01
WDP	m ³ depriv.	2,88E-03	1,35E-05	7,97E-04	1,26E-03	0E+00	-1,16E+00
Acronyms	GWP: Global Warming Potential, LULUC: Land Use and Land Use Change, ODP: Ozone Depletion Potential, AP: Acidification Potential. EP: Eutrophication Potential, POCP: Photochemical Ozone Creation Potential, ADPE: Abiotic Depletion Potential – Elements, ADPF: Abiotic Depletion Potential – Fossil Fuels, WDP: Water Scarcity Footprint						

Table 10 Potential environmental impact – mandatory indicators according to EN 15804 – 100% incineration

100% incineration		Results per declared unit					
Indicator	Unit	A5	C1	C2	C3	C4	D
GWP Fossil	kg CO2 eq	1,18E-02	4,78,E-04	2,25E-02	2,90E-01	0E+00	4,48E-01
GWP Biogenic	kg CO2 eq	5,50E-01	5,22,E-08	1,54E-05	4,10E-02	0E+00	1,74E-02
GWP LULUC	kg CO2 eq	6,12E-06	4,15,E-08	7,35E-06	1,12E-05	0E+00	5,56E-05
GWP Total	kg CO2 eq	5,62E-01	4,78,E-04	2,25E-02	3,31E-01	0E+00	4,65E-01
ODP	kg CFC11 eq	2,15E-10	7,31,E-12	4,47E-10	3,32E-10	0E+00	5,73E-09
AP	mol H+ eq	5,58E-05	4,31,E-06	7,04E-05	1,47E-04	0E+00	4,07E-03
EP, freshwater	kg P eq	1,01E-07	1,68,E-09	1,73E-07	1,92E-07	0E+00	4,31E-05
EP, marine	kg N eq	2,28E-05	2,00,E-06	2,34E-05	6,84E-05	0E+00	9,29E-04
EP, terrestrial	mol N eq	2,34E-04	2,19,E-05	2,58E-04	7,16E-04	0E+00	1,04E-02
POCP	kg NMVOC eq	7,74E-05	6,53,E-06	1,10E-04	2,04E-04	0E+00	2,84E-03
ADPE	kg Sb eq	3,28E-08	1,70,E-10	7,19E-08	3,14E-08	0E+00	2,44E-04
ADPF	MJ	1,49E-01	6,25,E-03	3,16E-01	2,48E-01	0E+00	5,05E+00
WDP	m ³ depriv.	3,05E-03	1,35,E-05	1,29E-03	6,90E-03	0E+00	4,41E-01
Acronyms	GWP: Global Warming Potential, LULUC: Land Use and Land Use Change, ODP: Ozone Depletion Potential, AP: Acidification Potential. EP: Eutrophication Potential, POCP: Photochemical Ozone Creation Potential, ADPE: Abiotic Depletion Potential – Elements, ADPF: Abiotic Depletion Potential – Fossil Fuels, WDP: Water Scarcity Footprint						

Table 11 Potential environmental impact – mandatory indicators according to EN 15804 – 100% landfill

100% landfill		Results per declared unit					
Indicator	Unit	A5	C1	C2	C3	C4	D
GWP Fossil	kg CO2 eq	8,99E-03	4,78E-04	1,38E-02	2,49E-03	1,44E-02	4,48E-01
GWP Biogenic	kg CO2 eq	5,50E-01	5,22E-08	9,49E-06	2,06E-06	3,60E-03	1,74E-02
GWP LULUC	kg CO2 eq	5,16E-06	4,15E-08	4,52E-06	6,48E-06	2,81E-06	5,56E-05
GWP Total	kg CO2 eq	5,59E-01	4,78E-04	1,39E-02	2,50E-03	1,80E-02	4,65E-01
ODP	kg CFC11 eq	1,58E-10	7,31E-12	2,75E-10	3,88E-11	2,00E-10	5,73E-09
AP	mol H+ eq	4,80E-05	4,31E-06	4,33E-05	2,23E-05	4,88E-05	4,07E-03
EP, freshwater	kg P eq	7,88E-08	1,68E-09	1,06E-07	1,03E-08	6,84E-08	4,31E-05
EP, marine	kg N eq	2,04E-05	2,00E-06	1,44E-05	1,03E-05	2,81E-05	9,29E-04
EP, terrestrial	mol N eq	2,08E-04	2,19E-05	1,59E-04	1,13E-04	2,10E-04	1,04E-02
POCP	kg NMVOC eq	6,52E-05	6,53E-06	6,78E-05	3,36E-05	7,76E-05	2,84E-03
ADPE	kg Sb eq	2,33E-08	1,70E-10	4,43E-08	1,90E-09	1,21E-08	2,44E-04
ADPF	MJ	1,09E-01	6,25E-03	1,94E-01	3,94E-02	1,61E-01	5,05E+00
WDP	m ³ depriv.	2,88E-03	1,35E-05	7,97E-04	1,70E-04	4,16E-03	4,41E-01
Acronyms	GWP: Global Warming Potential, LULUC: Land Use and Land Use Change, ODP: Ozone Depletion Potential, AP: Acidification Potential. EP: Eutrophication Potential, POCP: Photochemical Ozone Creation Potential, ADPE: Abiotic Depletion Potential – Elements, ADPF: Abiotic Depletion Potential – Fossil Fuels, WDP: Water Scarcity Footprint						

Potential environmental impact for Modules A5, C1-C4 & D

Table 12 Potential environmental impact – additional mandatory and voluntary indicators – 100% recycling

100% recycling		Results per declared unit					
Indicator	Unit	A5	C1	C2	C3	C4	D
PM	disease inc.	7,69E-10	1,22E-10	1,08E-09	9,45E-10	0E+00	-1,15E-07
IR	kBq U-235 eq	1,61E-04	1,09E-06	8,87E-05	5,87E-04	0E+00	-1,46E-01
ETP - FW	CTUe	1,98E-01	8,86E-04	5,22E-02	3,08E-02	0E+00	-1,54E+02
HTP - C	CTUh	7,36E-11	1,87E-12	9,67E-11	2,58E-11	0E+00	-1,30E-07
HTP - NC	CTUh	3,42E-10	7,73E-13	1,21E-10	2,00E-10	0E+00	-1,15E-07
SQP	Pt	5,29E-02	4,39E-04	1,16E-01	2,95E-02	0E+00	-2,23E+01
GWP-GHG	kg CO2 eq	9,93E-03	4,78E-04	1,39E-02	9,03E-03	0E+00	-1,79E+00
Acronyms	PM: Particulate Matter, IRP: Ionizing Radiation - Human Health, ETP-FW: Ecotoxicity Potential – Freshwater, HTP-C: Human Toxicity Potential – Cancer, HTP-NC: Human Toxicity Potential – Non-Cancer, SQP: Soil Quality Potential Index, GWP-GHG: Global Warming Potential, Greenhouse Gases						

Table 13 Potential environmental impact – additional mandatory and voluntary indicators – 100% incineration

100% incineration		Results per declared unit					
Indicator	Unit	A5	C1	C2	C3	C4	D
PM	disease inc.	1,00E-09	1,22,E-10	1,76E-09	2,39E-09	0E+00	2,21E-08
IR	kBq U-235 eq	1,80E-04	1,09,E-06	1,44E-04	3,62E-04	0E+00	-1,99E-02
ETP - FW	CTUe	2,09E-01	8,86,E-04	8,48E-02	2,65E+00	0E+00	7,28E+01
HTP - C	CTUh	9,46E-11	1,87,E-12	1,57E-10	1,75E-10	0E+00	2,06E-08
HTP - NC	CTUh	3,68E-10	7,73,E-13	1,97E-10	4,27E-09	0E+00	5,14E-08
SQP	Pt	7,80E-02	4,39,E-04	1,88E-01	2,62E-01	0E+00	2,64E+00
GWP-GHG	kg CO2 eq	1,29E-02	4,78,E-04	2,25E-02	2,90E-01	0E+00	4,50E-01
Acronyms	PM: Particulate Matter, IRP: Ionizing Radiation - Human Health, ETP-FW: Ecotoxicity Potential – Freshwater, HTP-C: Human Toxicity Potential – Cancer, HTP-NC: Human Toxicity Potential – Non-Cancer, SQP: Soil Quality Potential Index, GWP-GHG: Global Warming Potential, Greenhouse Gases						

Table 14 Potential environmental impact – additional mandatory and voluntary indicators – 100% landfill

100% landfill		Results per declared unit					
Indicator	Unit	A5	C1	C2	C3	C4	D
PM	disease inc.	8,14E-10	1,22E-10	1,08E-09	6,30E-10	1,13E-09	2,21E-08
IR	kBq U-235 eq	1,61E-04	1,09E-06	8,87E-05	2,67E-04	7,76E-05	-1,99E-02
ETP - FW	CTUe	1,98E-01	8,86E-04	5,22E-02	5,10E-03	2,81E+00	7,28E+01
HTP - C	CTUh	7,43E-11	1,87E-12	9,67E-11	1,02E-11	3,43E-11	2,06E-08
HTP - NC	CTUh	3,42E-10	7,73E-13	1,21E-10	5,19E-12	1,11E-10	5,14E-08
SQP	Pt	5,31E-02	4,39E-04	1,16E-01	3,82E-03	3,15E-01	2,64E+00
GWP-GHG	kg CO2 eq	1,01E-02	4,78E-04	1,39E-02	2,50E-03	1,72E-02	4,50E-01
Acronyms	PM: Particulate Matter, IRP: Ionizing Radiation - Human Health, ETP-FW: Ecotoxicity Potential – Freshwater, HTP-C: Human Toxicity Potential – Cancer, HTP-NC: Human Toxicity Potential – Non-Cancer, SQP: Soil Quality Potential Index, GWP-GHG: Global Warming Potential, Greenhouse Gases						

Summary

Upon analysing the data, it becomes evident that the life cycle phase that has the largest contribution is the use phase, followed by the raw materials. The high impact in use phase which consumes 0,2 MWh over the products lifetime. The impacts from the raw material phase stems from the production of the driver and power supply as well as body components such as the die cast zinc and steel.

When only considering the climate impact caused by production of raw materials, the largest contribution can be found be for the production of the driver and power supply, with an impact of approximately 40%, followed by the body components from zinc and steel, with an impact of 27%.

The largest material impact is attributed to the extraction and refinement and extraction of metals utilized in electronics, such as copper, silver, tin, and gold. However, the most significant source to the Resource use, minerals and metals, as well as Resource use, fossil, is the energy use in the use phase.

Abbreviations

Table 15 A list of commonly used abbreviations

Abbreviation	Definition
General Abbreviations	
EN	European Norm (Standard)
EPD	Environmental Product Declaration
EF	Environmental Footprint
GPI	General Programme Instructions
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PCR	Product Category Rules
c-PCR	Complementary Product Category Rules
CEN	European Committee for Standardization
CPC	Central product classification
GHG	Greenhouse Gas
PEF	Product Environmental Footprint
Environmental Impact Indicators (EN 15804)	
GHG	Greenhouse Gas
GWP	Global Warming Potential (kg CO ₂ eq.)
GWP-fossil	Global Warming Potential from fossil sources (kg CO ₂ eq.)
GWP-biogenic	Global Warming Potential from biogenic sources (kg CO ₂ eq.)
GWP-luluc	Global Warming Potential from land use and land use change (kg CO ₂ eq.)
GWP-total	Total Global Warming Potential (kg CO ₂ eq.)
GWP-GHG	Global Warming Potential for greenhouse gases (kg CO ₂ eq.)
ODP	Ozone Depletion Potential (kg CFC-11 eq.)
AP	Acidification Potential (mol H ⁺ eq.)
EP	Eutrophication Potential

EP-freshwater	Freshwater eutrophication potential (kg P eq.)
EP-marine	Marine eutrophication potential (kg N eq.)
EP-terrestrial	Terrestrial eutrophication potential (mol N eq.)
POCP	Photochemical Ozone Creation Potential (kg NMVOC eq.)
ADP	Abiotic Depletion Potential
ADP-minerals&metals	Abiotic depletion potential for non-fossil resources (kg Sb eq.)
ADP-fossil	Abiotic depletion potential for fossil resources (MJ)
WDP	Water Deprivation Potential (m ³)
Resource Use Indicators	
PERE	Renewable primary energy (excluding as raw materials) (MJ)
PERM	Renewable primary energy used as raw materials (MJ)
PERT	Total renewable primary energy (MJ)
PENRE	Non-renewable primary energy (excluding as raw materials) (MJ)
PENRM	Non-renewable primary energy used as raw materials (MJ)
PENRT	Total non-renewable primary energy (MJ)
SM	Use of secondary material (kg)
RSF	Use of renewable secondary fuels (MJ)
NRSF	Use of non-renewable secondary fuels (MJ)
FW	Use of net fresh water (m ³)
HW	Hazardous Waste (disposed) (kg)
NHW	Non-Hazardous Waste (disposed) (kg)
RW	Radioactive Waste (disposed) (kg)
Output Flow Indicators	
CFR	Components for Reuse (kg)
MR	Material for Recycling (kg)
MER	Materials for Energy Recovery (kg)
EEE	Exported Energy, Electricity (MJ)
EET	Exported Energy, Thermal (MJ)
Lifecycle Stages / Modules	
A1	Raw material supply
A2	Transport

A3	Manufacturing
A4	Transport to site
A5	Construction/Installation
B1	Use
B2	Maintenance
B3	Repair
B4	Replacement
B5	Refurbishment
B6	Operational energy use
B7	Operational water use
C1	Deconstruction/Demolition
C2	Transport to waste processing
C3	Waste processing
C4	Disposal
D	Reuse-Recovery-Recycling potential
Other Relevant Terms	
SVHC	Substances of Very High Concern
EC No.	European Community Number
CAS No.	Chemical Abstracts Service Number
MJ	Megajoule
kg	Kilogram
m ³	Cubic Meter
NMVOC	Non-Methane Volatile Organic Compounds
Sb eq.	Antimony Equivalents
P eq.	Phosphorus Equivalents
N eq.	Nitrogen Equivalents
CFC-11 eq.	Chlorofluorocarbon-11 Equivalents
CO ₂ eq.	Carbon Dioxide Equivalents
kg C	Kilograms of Carbon
kg CO ₂ eq.	Kilograms of Carbon Dioxide Equivalent
ND	Not Declared

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Version history

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