

## **Environmental Product Declaration**

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

conditions change.

## Elbow Switches with Aluminium Frame by JC Kontakter AB

Covering 7 different variations of elbow switches, including:

- JCK207 standard size
- JCK217 standard size
- JCK218 standard size
- JCK207 400mm size
- JCK217 400mm size
- JCK207 600mm size
- JCK217 600mm size



Programme:
Programme operator:
EPD registration number:
Publication date:
Valid until:
Multiple product
grouping

The International EPD\* System, <u>www.environdec.com</u> EPD International AB EPD-IES-0020236 2025-04-22 2030-04-22 EPD of multiple products, based on weighted average results *An EPD should provide current information and may be updated if* 







## **General information**

### Programme information

Programme:	EPD International AB
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#### Accountabilities for PCR, LCA and independent, third-party verification

#### Product Category Rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR): PCR 2019:14, Construction Products, version 1.3.4

UN CPC code: 42999 - Metal goods n.e.c.

PCR review was conducted by: The Technical Committee of the International EPD® System. See <u>www.environdec.com</u> for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile.

The review panel may be contacted via the Secretariat <u>www.environdec.com/contact</u>

Life Cycle Assessment (LCA)

LCA accountability: Alexander Munge, CHM Analytics AB

Third-party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via EPD verification by individual verifier

Third-party verifier: Katrin Molina-Besch, Miljögiraff AB

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

□ Yes 🛛 No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.





## Information on the use of the EPD

EPDs within the same product category but registered in different EPD programmes, 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 characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Results of modules A1-A3 should not be used without considering the results of module C.

This EPD follows additional requirements for construction products considered as Electronic or Electric Equipment.

The use of the EPD is restricted to the products defined in the Product Information chapter of this EPD. The results are based on weighted average results to account for the difference in production volume of the various products. In order to see the impacts from the specific product in this EPD, see chapter of additional environmental information for conversion factors. Contact JC Kontakter AB directly for information if this EPD is valid for a specific purchase.





## **Contact information**

## Owner of the EPD

JC Kontakter AB Adress: Hagelvädersgatan 11, 418 34 Gothenburg

## Contact

Peter Stangmo Mail: <u>peter@jcgt.se</u>

## Description of the organisation

JC Kontakter is a family-owned business specialized in design and manufacturing of elbow switches for automatic doors. The company was founded in 1984 and is now run by the second generation within the family. The business idea is built upon their vision of being the market leaders and they are therefore focused on a few products that is marketed and distributed to retailers in Sweden and Europe.

## Name and location of production site

JC Kontakter AB manufacturing site Hagelvädersgatan 11 418 34, Gothenburg Sweden



## **Product information**

### Product name

JC Kontakter AB designs and manufactures elbow switches for automatic doors in Gothenburg, Sweden. The product portfolio covers a wide variety of different elbow switches, consisting of metal and plastic frames. The products studied are the following elbow switches:

Product	Frame material	Sizes
JCK 207	Aluminium frame	245 mm (standard size), 400 mm, and 600 mm
JCK 217	Aluminium frame	245 mm (standard size), 400 mm, and 600 mm
JCK 218	Aluminium frame	245 mm (standard size)

## **Product description**

JC Kontakter AB is a manufacturer of elbow switches used for buildings to operate doors. There are various customizations that are available to tailor the elbow switches, including engraving details on the elbow switches.

The results are based on a weighted average in accordance to PCR 2019:14 v. 1.3.4.

The UN CPC classification for the product is 42999 - Metal goods n.e.c. This classification is applicable to all variants of the elbow switches.

The studied system is a type b) EPD in PCR 2019:14 v. 1.3.4 (Cradle-to-gate with options module C1-C4, module D and optional modules A4, A5, and B1-B7). Modules B1-B7 are included as mandatory in accordance with PCR2019:14 v.1.3.4 for Electric and Electronic Equipment (EEE). All activities within the modules take place in Sweden, with the exception of raw material extraction and refinement at supplier site, as well as transport from supplier to JC Kontakter, which is global.

The products have the following physical properties:

Table 1: Physical properties of the studied product

Product	JCK 207, 217, & 218 (standard)	JCK 207 & 217 (400 mn length)	n JCK 207 & 217 (600 mm length)
Weight, in g	30	5 49	730
Nominal rated current		12 V, 6A (Resistive) 12 V, 6A (Inductive, L/R 5 m 24V, 6A (Resistive) 24V, 5A (Inductive, L/R ms	s)
Lowest rated current		1 mA/4 V DC	

The EPD is declared as an EPD of multiple products based on the weighted average results, covering all products described above, in accordance with chapter 2.2.2.1 from PCR 2019:14 v. 1.3.4 (The International EPD Programme, 2024). The product is not considered an identical product as the end product is sold to customers as different types of products.

## Geographical scope

The input material is purchased from tier-1 suppliers in Sweden, which is where the use phase and end-of-life treatment is assumed to take place as well based on primary customer locations. Transportation and processing from tier-2 suppliers located in other regions of the world (e.g. USA, South Korea, and other parts of Europe) have also been accounted for.



## **LCA** information

## **Declared unit**

The declared unit is one unit elbow switch. The conversion factor to mass can be seen in the table above stating the weight per product variant.

## **Reference service life**

RSL is not applicable as the LCA and subsequent EPD is based on a declared unit in accordance with PCR 2019:14 v. 1.3.4. However, as modules B1-B7 are included, an estimated product lifetime is included to account for the amount of replacements required in module B4. The estimated product lifetimes is 15 years, based on a study on the product where the micro-switch needs to be replaced after a set amount of interactions.

### **Time representativeness**

Specific data collected for production taking place during the period 1<sup>st</sup> September 2023 - 1<sup>st</sup> September 2024. The generic data used from ecoinvent 3.10 and Industry data 2.0 are all still valid and have less than 6 years difference from the last update of the dataset to the publication of this EPD.

## Database(s) and LCA software used

The LCA was modelled in SimaPro 9.6 using ecoinvent 3.10 (EN15804 system library) as the primary database.

## Description of system boundaries

The studied system is a type b) EPD in PCR 2019:14 v. 1.3.4 (Cradle-to-gate with options module C1-C4, module D and optional modules A4, A5, and B1-B7).

### A1-A3 Cradle-to-gate

Modules A1-A3 presents the production of the product variants covered by this EPD. All raw materials from suppliers are transported to JC Kontakter ABs manufacturing site in Gothenburg, Sweden. At the manufacturing site, the components are adjusted and assembled to the final product before being sent to end customer for installation.

The transportation from supplier to JC Kontakter ABs manufacturing facility is presented below:

Table 2: Material transport distances

Material	Country of origin	Distance (km) Type of transport
Tape micro-switch	Germany	220 Hybrid diesel/electric truck
Tape distance	USA	12 390 Diesel truck (20) + Shipping (12 370)
Rubber d-profile list	Denmark	503 Diesel truck
Micro-switch	France	2 198 Diesel truck (+HVO100)
Endcap screw	Taiwan	22 900 Electric van (0.5) + Shipping (22 900)
Endcap	Sweden	34 Electric van
Distance micro-switch	USA	13 300 Diesel truck (20) + Shipping (13 280)
Damping tape	UK	1 770 Diesel truck (20) + Shipping (1 750)
Damping film	Germany	970 Diesel truck
Connection terminal mounting screw	Germany	1 229 Electric van (0.5) + Diesel truck (1 229)
Connection terminal	Sweden	234 Diesel truck
Aluminium frame	Sweden	234 Diesel truck





In module A3, the electricity consumption, packaging material, consumables, and waste generated from manufacturing is included. The electricity consumption is based on the energy certificate provided by the electricity supplier for the reference time period of this EPD. The electricity consumption was modelled by taking the share of 42.5% nuclear power and 57.5% renewables. The GWP-GHG impact of the modelled electricity mix is 0.0285 kg CO<sub>2</sub>-eq/kWh.

#### A4 Transport to customer

The transportation to customer will vary depending on the location, however, in this EPD the distance to the three largest customers was taken and the distance was averaged. The average distance was estimated to 246 km, and the transportation method applied is a EURO6 truck.

#### A5 Installation

No activity is modelled here as the installation is done manually by hand. However, the treatment of packaging waste is modelled here in accordance with PCR 2019:14 v.1.3.4, based on the Swedish scenario that 75% of cardboard is recycled and the remaining waste streams after recycling is sent to either landfill (1.4% of remaining material) or incineration (98.6%) based on the PEF R2 recycling rates (European Commission, 2021).

#### Modules B1, B2, B3, B5, and B7

There is no activity modelled for the use phase (module B1), as the electricity consumption of the product is modelled in module B6. For modules B2 (maintenance), B3 (repair), B5 (refurbishment), and B7 (water use), no activity is modelled as it is not relevant for the products.

#### **B4 Replacement**

Over the course of the product lifetime of 15 years, some parts of the product are replaced. The parts replaced are the micro-switch, connection terminal, mounting screws, and tape.

#### B6 Energy use

This chapter covers the electricity consumption during product usage. When the product is used, i.e. when a person presses the elbow switch, the micro-switch closes the circuit and an electrical signal is transferred through to open the door. The product itself does not use electricity, only opens/closes the circuit through the micro-switch. When the elbow switch is pressed, it is the only time when electricity is transferred through the system for operating, whereas the remainder of the time the product is idle.

To calculate the electricity consumption during use of the product, the maximum power available is based on the specifications 24V and 6A (AC), resulting in 0.14 kW. Assuming the activation duration lasts approximately 2 seconds whenever the elbow switch is triggered, the energy consumption per usage is approximately 0.14 kW \* 2/3600 hours = 0.00008 kWh. This value is used to model the electricity consumption per use.

#### C1 Deconstruction

The product is manually dismantled at the end-of-life and therefore no activity is modelled in this module.





#### C2 Transport to waste processing

The transportation to waste treatment facility is assumed to be 50km, however this value can vary significantly depending on where the customer is located.

#### C3 Waste processing for reuse, recovery and/or recycling

The waste pre-processing scenario is modelled based on the treatment of the frames (as they represent a significant portion of the product weight), prior to recycling. The aluminium frames are assumed to be collected, sorted, cleaned, and pressed, being prepared for melting as post-consumer aluminium. For the other materials, no pre-processing was assumed to be done prior to recycling and final disposal.

After the recycling stream of the materials are separated, the remaining materials are either sent to landfill, or incineration.

#### C4 Final disposal

Module C4 represents the landfilling and incineration of the remaining materials that was not sent to recycling. The end-of-life treatment for the materials are based on the PEF R2 recycling rates and final disposal for Sweden, as described for module A5 (treatment of product packaging waste). The corresponding rates of end-of-life treatment can be seen in the table below:

Activity	Share of materials	Comment				
Recycling	Ferro metals - 81.0%	Based on PEF R2 recycling rate.				
	Aluminium - 76.2%	Based on PEF R2 recycling rate.				
	Plastics - 53.2%	Based on PEF R2 recycling rate.				
Landfill	Ferro metals - 0.3%	Based on landfill rate for Sweden from PEF R2 recycling rate. Landfill rate is 1.4% of material not recycled. Therefore, the values in this table is calculated by taking the amount remaining after recycling and multiplying by				
	Aluminium - 0.3%					
	Plastics - 0.6%	1.4%.				
Incineration	Ferro metals - 18.7%	Based on incineration rate for Sweden from PEF R2				
	Aluminium - 23.5%	recycled. Therefore, the values in this table is calculated by taking the amount remaining after recycling and				
	Plastics - 46.2%	multiplying by 98.6%.				

Table 3: Overview of end-of-life treatment for material types used as input in the products



#### D Benefits and loads beyond the product system

The scenario for module D is calculating the net benefits and loads of avoiding production of new aluminium based on the recycling rate of the materials described in chapter 4.3.13.

The D module is calculated with a formula originally proposed in EN 15804 and adjusted with a factor for material yield (Y) in PCR:2019:14.

Formula for calculating net benefits and loads for export of secondary materials (recycling of materials):  $e_1 = \Sigma Y \cdot (M_{MR,out} - M_{MR,in}) \cdot (E_{MR after EoW out} - E_{VM Sub out} \cdot \frac{Q_{R,out}}{Q_{Sub}})$  (Eq.1) No benefits or loads from export of energy. The difference between the secondary material (SM) is attributed as a bonus or load (All modules):

Table 4: Incoming and exiting secondary material

Product	Incoming post-consumer SM, in kg	Exiting SM, in g	
JCK207, 217, 218 standard size	C	0	203
JCK207, 217 400mm size	C	0	341
JCK207, 217 600mm size	C	0	520

#### System diagram

The studied system is a type b) EPD in PCR 2019:14 v. 1.3.4 (Cradle-to-gate with options module C1-C4, module D and optional modules A4, A5, and B1-B7). Module A1 is represented by the extraction and processing of raw materials and components prior to being transported (module A2) to JC Kontakter ABs manufacturing facility in Gothenburg. Module A3 represents the processing of the materials and assembly of the components to the final product before being packaged and sent to customer (A4). Module A5 consists solely of the waste treatment of the product packaging.

Modules B1-B7 represents the use phase of the product. Module C1-C4 includes the dismantling of the product (done manually so there is no activity modelled), transport to waste processing, waste processing and eventually the final disposal of the materials that are not recycled. See the figure below for an overview of the modules.



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System boundary		
Modules A1-A5	Modules B1-B7	Modules C1-C4
A1 - Raw material extraction and component production as supplier site	B1, B2, B3, B5, B7 - No activity in these modules as they are not relevant for the elbow contacts	C1 - Disassembly of product at customer site. No activity modelled as it is done manually
<b>A2</b> - Transportation from supplier to JC Kontakter AB	<b>B4 -</b> Parts replacement during 15 year estimated lifespan of elbow contacts	C2 - Transportation from customer site to waste treatment facility
A3 - Production and assembly of elbow contacts	<b>B6</b> - Electricity consumption of product	C3 - Treatment of materials for recycling
A4 - Transport to end customer		C4 - Final disposal
<b>45 -</b> Waste treatment of packaging material		
1		1
Input of natural resources	Emissions to air, water, and soil	D - Loads and benefits beyond the system boundary

Figure 1: Included modules in the system boundary and exchange to nature

The system boundary to nature is set to include those processes that provide the material and energy inputs into the system and the following manufacturing, and transport processes up to the factory gate as well as the processing of any waste arising from the processes. Note that infrastructure is included as part of the ecoinvent 3.10 datasets, including e.g. infrastructure in electricity generation.

## Assumptions

This chapter deals with general assumptions that are used throughout the LCA study.

• Road transports not under JC Kontakter ABs control are assumed to be performed by Euro 6 class vehicles.





## **Cut-off rules**

The cut-off criteria are in accordance with PCR 2019:14 v. 1.3.4 (The International EPD Programme, 2024), therefore a maximum of 1% of the renewable and non-renewable primary energy use and max 1% of the total mass input of a specific unit are excluded. For a full module, the combined cut-off of all unit processes do not exceed 5%. Particular care should be taken to include materials or processes that have the potential to cause significant emissions into air, water, or soil for any of the declared LCIA categories. No cut-offs were implemented in this LCA except for the cut-off defined in the EN15804+A2:2019 EPD used as input, as they are indirectly included by extension in this LCA.

## Allocation

The A3 flows for electricity and consumable consumptions were allocated based on the amount of units produced. Since the products have similar economic value, application of allocation based on amount of units produced is permitted in accordance with PCR 2019:14 v. 1.3.4 (The International EPD Programme, 2024).

The allocation is calculated by taking the total value of the electricity, measured by reading values from the devices, divided by the reported total amount of products processed at each device. Through this calculation, the amount of electricity per product is retrieved.

An allocation procedure for the consumables was used as well, where the lubricant for the sawing machine is divided over the total amount of JCK 207, 217, and 218 products over one year. This is a conservative assumption as there are other products that use the machine, however the amount of lubricant per declared unit is almost negligible and therefore considered acceptable.







## Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

Table 5: Declared modules for the life cycle

	Product stage			uct stage Construction Use Stage End of life stage process stage							Resource recovery stage						
	Raw Material Supply	Transport to manufacturing	Manufacturing	Transport to customer	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction / Demolition	Transport to waste management	Waste processing	Final Disposal	Reuse - Recovery - Recycling - potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	х	х	×	х	х	х	х	х	х	х	х	х	х	х	х	х	х
Geography	GLO	GLO	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Specific data used	48.6%																
Variation - Products	+91.7%																
Variation - Sites	0%																

X = Module declared ND = Module not declared

The specific data was calculated by taking the GWP-GHG impacts from the energy flows covered in module A3 and dividing it by the total A1-A3 impact. For the products JCK207, 217, and 218, the impact for the aluminium frames were also considered as specific data, however, the input EPD did not specify the share specific data and therefore an assumed value of 50% was taken.

The variation between products is calculated by taking the GWP-GHG impact for modules A1-A3 for the weighted average and comparing with the highest GWP-GHG impact for all products covered in the LCA in accordance with PCR 2019:14 v.1.3.4. The variation in sites is set to 0% as the study only looks at one production site.

The variation in products is significantly higher than the 10% stated in PCR 2019:14 v. 1.3.4, however, for the products JCK207, 217, and 218, almost all the produced products are below the weighted average impact for products with aluminium frame. Therefore, it is considered acceptable to cover the products in the same EPD.



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## **Description of production activities**

This chapter describes the production of the elbow switches of this EPD in further detail. All modules declared are represented by one or several datasets, with the exception of modules B1, B2, B3, B5, B7, and C1, which have no activities included.

The end-of-waste (EoW) criteria are applied as described in Annex B of EN 15804+A2:2019. No burdens are declared for material that has reached the EoW point for flows exiting the system boundaries for JC Kontakter AB. As these flows are generally part of modules A1-A3, they must be dealt with through allocation unless it can be avoided. However, since there is no waste generated in these modules that exit the system boundary, there is no allocation required.

Raw materials and components are sent from various supplier sites to the JC Kontakter's production facility in Gothenburg Sweden. The components are either sawn or cut into the correct specifications depending on the product. This includes, for the product JCK 207, 217, and 218, cutting down the profiles to the relevant size, trimming the connection terminal from 12 poles to 2 poles, cutting rubber d-profile list, tape micro-switch, distance micro switch, tape distance, damping tape, and damping film. The components are then assembled together to produce the elbow contact.

Once the product is assembled, it is packaged into cardboard boxes and sent to be transported to the customers. The aluminium and cable waste from the manufacturing process is collected and sold to companies specialized in recycling.

The end-of-life phase is modelled using relevant scenarios combined with generic datasets representative of the region, in this case Sweden.



## **Content declaration**

Below is an overview of the purchased materials that end up in the final product, presented as amount per declared unit. Each product covered in this EPD is presented below. The values presented are the average amounts, as well as the ranges which are presented in parentheses. The ranges for certain product components are based on the standard size (lowest value) and the 600mm (highest value).

Product components	Weight, g	Post-consumer, recycled material, weight-% of product	Biogenic material, weight-% of product	Biogenic material, kg C/declared unit
Aluminium	267 (266-682)	0%	0%	0
Polyoxymethylene copolymer	22.4	0%	0%	0
Carbon black	0.5	0%	0%	0
Titanium dioxide	1.3	0%	0%	0
Zinc oxide	0.5	0%	0%	0
Other chemicals <sup>1</sup>	0.5	0%	0%	0
Silicon	2.5	0%	0%	0
Copper	0.5 (0.5-1.0)	0%	0%	0
Polyvinyl chloride (PVC)	0.4 (0.4-0.8)	0%	0%	0
Nylon 6-6 (PA66)	09 (0.9-1.8)	0%	0%	0
Brass	1.4 (1.4-2.8)	0%	0%	0
Chromated steel	0.9 (0.9-2.0)	0%	0%	0
Steel, low-alloyed	6.6 (6.6-7.2)	0%	0%	0
Synthetic rubber	0.7 (0.7-1.4)	0%	0%	0
Polyethylene terephthalate (PET)	0.1	0%	0%	0
Acrylic	0.3	0%	0%	0
Total product weight	306 (305-730)			

Table 6: Overview of input material, pre- and post-consumer scrap, and biogenic content in material

No Substances of Very High Concern (SVHC) in accordance with the Candidate List of SVHC from the European Chemicals Agency that constitutes more than 0.1% of the weight of the product is included in the products. For packaging material, see the table below:

Table 7: Overview of packaging material used for end products

Packaging materials	Weight, g	Weight-% (versus product)	Biogenic material, kg C/product
Corrugated board (standard size)	38.7	13%	0.14
Corrugated board (400 mm long JCK 207 & 217)	61.2	12%	0.22
Corrugated board (600mm long JCK 207 & 217)	91.2	12%	0.33
EU Pallet	8.3	1-3%	0.03
Total weight of packaging	47.1 (47.0-99.5)	38% (38-40%)	0.17 (0.17-0.36)

<sup>1</sup> From endcaps supplier, stated as confidential and therefore unknown what chemicals are used



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## **Results of performance indicators**

When analysing the results, the impacts from all modules should be considered. The estimated impact results provide an indication, but should be seen as relative statement, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity non-cancer, and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is due to the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological, and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making processes.

#### Mandatory LCIA indicator results

This chapter presents all results that are mandatory to present in the LCA end EPD report of an EPD according to EN 15804+A2. All results shown are per declared unit and represent the weighted average. All referenced emission factors are based on the environmental footprint package 3.1 (E.F. 3.1).

The results for A1-A3 should not only be analysed at face value without considering the impacts represented by module C. Module D presents negative values for almost all indicators, indicating a potential benefit of recycling the material used for the frames in the product as opposed to producing new frames, based on the scenario described previously.

Table 8: Mandatory impact category results for weighted average results. Results are presented per declared unit.

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP - Fossil	kg CO2 eq	3.39E+00	1.43E-02	1.76E-02	0.00E+00	0.00E+00	0.00E+00	2.41E-01	0.00E+00	4.04E-05	0.00E+00	0.00E+00	2.92E-03	8.12E-02	1.53E-01	-3.87E+00
GWP- Biogenic	kg CO2 eq	1.17E-01	9.67E-06	3.86E-02	0.00E+00	0.00E+00	0.00E+00	1.64E-02	0.00E+00	7.83E-07	0.00E+00	0.00E+00	2.14E-05	2.91E-03	2.13E-01	0.00E+00
GWP- Land use and LU change	kg CO2 eq	1.33E-02	4.76E-06	2.87E-06	0.00E+00	0.00E+00	0.00E+00	3.50E-04	0.00E+00	3.35E-07	0.00E+00	0.00E+00	9.71E-07	6.78E-05	2.45E-05	-1.13E-02
GWP - total	kg CO2 eq	3.52E+00	1.43E-02	5.63E-02	0.00E+00	0.00E+00	0.00E+00	2.58E-01	0.00E+00	4.15E-05	0.00E+00	0.00E+00	2.94E-03	8.42E-02	3.66E-01	-3.89E+00
Ozone depletion	kg CFC11 eq	3.56E-08	2.85E-10	1.87E-11	0.00E+00	0.00E+00	0.00E+00	1.30E-08	0.00E+00	1.60E-12	0.00E+00	0.00E+00	5.80E-11	8.37E-10	1.45E-10	-1.90E-08
Acidification	mol H+ eq	6.09E-03	2.98E-05	1.19E-05	0.00E+00	0.00E+00	0.00E+00	1.76E-03	0.00E+00	2.71E-07	0.00E+00	0.00E+00	6.07E-06	3.24E-04	8.92E-05	-2.46E-02
Eutrophication, freshwater	kg P eq	9.04E-05	1.12E-07	3.08E-08	0.00E+00	0.00E+00	0.00E+00	2.59E-05	0.00E+00	1.07E-09	0.00E+00	0.00E+00	2.28E-08	1.56E-06	2.48E-07	-1.17E-04
Eutrophication, marine	kg N eq	3.79E-03	6.98E-06	5.81E-06	0.00E+00	0.00E+00	0.00E+00	1.77E-04	0.00E+00	7.64E-08	0.00E+00	0.00E+00	1.42E-06	5.70E-05	4.34E-05	-3.90E-03
Eutrophication, terrestrial	mol N eq	4.62E-02	7.73E-05	5.55E-05	0.00E+00	0.00E+00	0.00E+00	2.08E-03	0.00E+00	1.03E-06	0.00E+00	0.00E+00	1.57E-05	6.55E-04	4.10E-04	-4.31E-02
Photochemical ozone formation	kg NMVOC eq	4.21E-03	4.96E-05	1.45E-05	0.00E+00	0.00E+00	0.00E+00	6.74E-04	0.00E+00	2.31E-07	0.00E+00	0.00E+00	1.01E-05	2.15E-04	1.08E-04	-1.34E-02
Resource use, minerals, and metals <sup>2</sup>	kg Sb eq	2.22E-05	4.65E-08	2.78E-09	0.00E+00	0.00E+00	0.00E+00	1.61E-05	0.00E+00	1.42E-10	0.00E+00	0.00E+00	9.49E-09	1.80E-06	2.20E-08	1.77E-05
Resource use, fossils <sup>2</sup>	MJ	7.54E+01	2.02E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.56E+00	0.00E+00	9.98E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.63E+01
Water use <sup>2</sup>	m3 depriv.	3.55E+00	1.14E-03	1.16E-03	0.00E+00	0.00E+00	0.00E+00	2.64E+00	0.00E+00	1.31E-04	0.00E+00	0.00E+00	4.60E-05	3.33E-03	9.92E-03	-6.95E-01

<sup>&</sup>lt;sup>2</sup> The results of this environmental impact indicator shall be used with care as the uncertainties of the results are high and as there is limited experience with the indicator.



### Additional LCIA indicator results

This chapter presents all indicators that are mandatory to present in the LCA report but optional to present in the EPD according to EN 15804+A2.

Table 9: Additional impact category results for weighted average results. Results are presented per declared unit

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	disease inc.	6.22E-08	1.05E-09	1.11E-10	0.00E+00	0.00E+00	0.00E+00	6.95E-09	0.00E+00	3.13E-12	0.00E+00	0.00E+00	1.70E-10	4.33E-09	8.24E-10	-3.25E-07
lonising radiation <sup>3</sup>	kBq U-235 eq	1.05E+00	9.30E-05	7.47E-06	0.00E+00	0.00E+00	0.00E+00	1.06E-02	0.00E+00	3.57E-04	0.00E+00	0.00E+00	1.89E-05	1.49E-03	5.72E-05	-2.08E-02
Ecotoxicity, freshwater <sup>2</sup>	CTUe	5.66E+00	5.49E-02	7.58E-02	0.00E+00	0.00E+00	0.00E+00	2.67E+00	0.00E+00	1.60E-04	0.00E+00	0.00E+00	1.12E-02	4.48E-01	6.25E-01	-8.41E+00
Human toxicity, cancer <sup>2</sup>	CTUh	5.56E-09	1.02E-10	2.25E-11	0.00E+00	0.00E+00	0.00E+00	2.90E-09	0.00E+00	2.01E-13	0.00E+00	0.00E+00	2.07E-11	4.51E-10	1.73E-10	-5.88E-09
Human toxicity, non-cancer <sup>2</sup>	CTUh	2.72E-08	1.30E-10	2.13E-10	0.00E+00	0.00E+00	0.00E+00	1.42E-08	0.00E+00	7.57E-13	0.00E+00	0.00E+00	2.58E-11	1.65E-09	1.69E-09	-1.13E-08
Land use <sup>2</sup>	Pt	7.31E+01	1.22E-01	8.14E-03	0.00E+00	0.00E+00	0.00E+00	1.21E+00	0.00E+00	3.31E-03	0.00E+00	0.00E+00	2.47E-02	5.44E-01	6.72E-02	-5.02E+00

### GWP-GHG according to IPCC 2021

This chapter presents the results according to IPCC 2021 without any biogenic uptake.

Table 10: GWP-GHG results for weighted average results. Results are presented per declared unit.

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP - GHG	kg CO2 eg	3.40E+00	1.43E-02	1.76E-02	0.00E+00	0.00E+00	0.00E+00	2.41E-01	0.00E+00	4.07E-05	0.00E+00	0.00E+00	2.92E-03	8.13E-02	1.53E-01	-3.89E+00

#### Use of resources

This chapter presents the use of material and energy resources by the product system. The results are based on option A in annex 3, guidance to calculating the primary energy use indicators as described in PCR 2019:14 v.1.3.4 (The International EPD Programme, 2024). As described in the PCR, in option A the energy use as raw materials is declared as input to the module where it enters the product system and as an equally large output from the product system where it exits the product system. Outputs in the form of waste is reported as an input in the indicator for energy used as energy carriers. Note that the results presented below is based on background data from the EN 15804 library in SimaPro 9.6.

<sup>&</sup>lt;sup>3</sup> 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.



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#### Table 11: Use of resources for weighted average results. Results are presented per declared unit

Impact cates	gory	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Primary Energy	Use as energy carrier	MJ	5.07E+01	3.46E-03	6.43E-01	0.00E+00	0.00E+00	0.00E+00	1.12E+00	0.00E+00	9.87E-04	0.00E+00	0.00E+00	7.04E-04	7.28E-02	3.14E-03	-3.75E+00
Resources - Renewable	Used as raw materials	MJ	6.45E-01	0.00E+00	-6.45E-01	0.00E+00	0.00E+00										
	Total	MJ	5.13E+01	3.46E-03	-2.81E-03	0.00E+00	0.00E+00	0.00E+00	1.12E+00	0.00E+00	9.87E-04	0.00E+00	0.00E+00	7.04E-04	7.28E-02	3.14E-03	-3.75E+00
Primary Energy Resources - Non- Repewable	Use as energy carrier	MJ	6.73E+01	2.02E-01	1.87E-05	0.00E+00	0.00E+00	0.00E+00	3.57E+00	0.00E+00	9.98E-03	0.00E+00	0.00E+00	3.48E-06	4.24E-04	1.05E+00	-3.63E+01
	Used as raw materials	MJ	1.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.06E+00	0.00E+00
	Total	MJ	6.84E+01	2.02E-01	1.87E-05	0.00E+00	0.00E+00	0.00E+00	3.57E+00	0.00E+00	9.98E-03	0.00E+00	0.00E+00	3.48E-06	4.24E-04	-5.70E-03	-3.63E+01
Other categories	Secondary Material	kg	5.22E-02	9.35E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-03	0.00E+00	2.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-01
	Renewable Secondary Fuels	MJ	8.97E-03	1.18E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E-04	0.00E+00	1.05E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.25E-05
	Non- Renewable Secondary Fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Net Use of Fresh Water	m³	2.92E-01	2.80E-05	3.47E-05	0.00E+00	0.00E+00	0.00E+00	6.21E-02	0.00E+00	3.21E-06	0.00E+00	0.00E+00	2.59E-06	2.36E-04	2.84E-04	-1.85E-02

#### Waste production

This chapter presents all the waste that is generated in the product system. Since ecoinvent is used as the main database, the waste management is contained within the system boundaries and no waste generation is reported<sup>4</sup>. The only waste generation is based on the input EPD used for the aluminium frames.

Table 12: Waste generated exiting the system boundary. Results are presented per declared unit.

Waste production	Unit	A1-A3
Hazardous Waste Disposed	Kg	4.25E-02
Non-Hazardous Waste Disposed	Кд	3.10E+00
Radioactive Waste Disposed	Kg	5.60E-03

### **Output flows**

This chapter presents flows that exit the system boundary that are not waste.

Table 13: Other flows exiting the system boundary for weighted average results. Results are presented per declared unit.

Waste production	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for reuse	kg	0.00E+00														
Material for recycling	kg	4.08E-01	0.00E+00	2.52E-04	0.00E+00											
Materials for energy recovery	kg	2.62E-03	0.00E+00													
Exported energy, electricity	MJ	2.78E-02	0.00E+00													
Exported energy,	MJ	5.28E-02	0.00E+00													

<sup>&</sup>lt;sup>4</sup> A detailed description of this can be read at the bottom of this page: <u>https://www.environdec.com/resources/indicators</u>



### **Biogenic carbon content**

This chapter presents the carbon content in the products and the packaging, for details about the biogenic content in the product see chapter content declaration.

### Variation in impact indicators

This chapter presents the variation in each impact indicator result in accordance with PCR 2019:14 v.1.3.4. The largest impact per indicator is compared to the weighted average results.

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP - Fossil	kg CO2 eq	192%	238%	254%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	100%
GWP- Biogenic	kg CO2 eq	102%	238%	200%	N/A	N/A	N/A	200%	N/A	100%	N/A	N/A	238%	256%	242%	N/A
GWP- Land use and LU change	kg CO2 eq	153%	238%	254%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	242%	100%
GWP - total	kg CO2 eq	189%	238%	217%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	100%
Ozone depletion	kg CFC11 eq	138%	238%	239%	N/A	N/A	N/A	188%	N/A	100%	N/A	N/A	238%	256%	241%	100%
Acidificatio n	mol H+ eq	133%	238%	235%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	100%
Eutrophicat ion, freshwater	kg P eq	174%	238%	245%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	100%
Eutrophicat ion, marine	kg N eq	172%	238%	235%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	100%
Eutrophicat ion, terrestrial	mol N eq	163%	238%	233%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	100%
Photochem ical ozone formation	kg NMVOC eq	123%	238%	234%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	100%
Resource use, minerals,	kg Sb eq	191%	238%	242%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	256%
Resource use, fossils	MJ	162%	238%	N/A	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	N/A	N/A	N/A	100%
Water use	m3 depriv.	175%	238%	255%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	242%	100%
Particulate matter	disease inc.	117%	238%	234%	N/A	N/A	N/A	198%	N/A	100%	N/A	N/A	238%	256%	241%	100%
lonising radiation	kBq U-235 eq	101%	238%	237%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	100%
Ecotoxicity, freshwater	CTUe	158%	238%	248%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	100%
Human toxicity, cancer	CTUh	158%	238%	239%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	100%
Human toxicity, non-cancer	CTUh	154%	238%	244%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	242%	100%
Land use	Pt	105%	238%	249%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	100%
GWP - GHG	kg CO2 eq	192%	238%	254%	N/A	N/A	N/A	199%	N/A	100%	N/A	N/A	238%	256%	241%	256%

Table 14: Variation in impact indicators

The table above shows that most indicators exceed the 10% difference threshold described in PCR 2019:14 v.1.3.4, however, the variation in the products is only the length of the elbow switch. Therefore, it is considered acceptable to include the products in the product grouping despite the large variation in indicator results.



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## Additional Environmental Information

In order to evaluate the GWP-GHG results of each product covered in this LCA and subsequent EPD, conversion factors for each variant of the product is presented below, in accordance with PCR 2019:14 v. 1.3.4. The conversion factors N/A at some modules represent the omittance of any activity modelling in the module, therefore the factor would be 0 divided by 0 and mathematically incorrect.

Table 15: Conversion factors for each product variation.

Product	Unit	A1-A3	A4	A5	B1	B2	<b>B</b> 3	B4	B5	B6	B7	C1	C2	C3	C4	D
JCK207, 217, 218 Standard size	Kg CO2 eq	1.00	1.00	1.00	N/A	N/A	N/A	1.00	N/A	1.00	N/A	N/A	1.00	1.00	1.00	1.00
JCK207, 217, 218 400mm size	Kg CO2 eq	1.44	1.61	1.67	N/A	N/A	N/A	1.99	N/A	1.00	N/A	N/A	1.61	1.68	1.62	1.68
JCK207, 217, 218 600mm size	Kg CO2 eq	1.92	2.38	2.54	N/A	N/A	N/A	1.99	N/A	1.00	N/A	N/A	2.38	2.56	2.41	2.56



## References

EPD International. (2021). General Programme Instructions of the International EPD System, Version 4.0.

European Commission. (2021). PEF Recycling factors.

- European Committee for Standardization. (2021). Sustainability of construction works -Environmental Product declarations - Core rules for the product category of construction products (EN 15804:2012+A2:2019/AC:2021).
- International Organization for Standardization [ISO] . (2006a). Environmental labels and declarations Type III environmental declarations Principles and procedures (ISO 14025:2010).
- International Organization for Standardization [ISO]. (2006b). Environmental management - Life cycle assessment - Principles and framework (ISO 14040:2006).
- International Organization for Standardization [ISO]. (2006c). Environmental labels and declarations Type III environmental declarations Requirements and guidelines (ISO 14044:2006).

Munge, A. (2025). Life Cycle Assessment of Elbow switches By JC Kontakter AB.

The International EPD Programme. (2024). *Product category rules of construction products* 2019:14, version 1.3.4.