Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021, ISO 21930 for:

Aluminum cable management products

EPD of multiple products, based on the average results of the product group, including: Straight Swage Ladder Tray, Swage Ladder Tray Fittings, Straight I-Beam Ladder Tray,I-Beam Ladder Tray Fittings, I-Beam Ladder Tray Accessories & Hardware, Straight Trof Tray, Trof Tray Fittings, Straight Channel Tray, Channel Tray Fittings, Channel Tray Accessories & Hardware, Swage Ladder & Trof Tray Accessories & Hardware.

from

Atkore

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB; EPD is registered through aligned regional hub: EPD North America (www.epdna.com)
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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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 v1.3.4*
PCR review was conducted by: *The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact*
Life Cycle Assessment (LCA)
AILCA accountability: *Marcella Volta, ERM, marcella.volta@erm.com*
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: *Matt Fishwick, Fishwick Environmental Ltd* 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.

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.

Company information

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Description of the organization: Atkore is a leading manufacturer of electrical and critical infrastructure products for commercial, industrial, data center, telecommunications, water, and solar applications. Significant product categories include metal conduit, plastic conduit, electrical cable and flexible conduit, metal framing, and cable management systems.
Website: https://www.Atkore.com

Product-related or management system-related certifications: NEMA[1], UL/cUL[2], CSA[3], NEC[4], ASTM[5], and AA[6]
Name and location of production site(s):
Minto, Australia
Hamilton, New Zealand
Atlanta, GA -USA
Houston, TX -USA
Philadelphia, PA -USA

Product information

Product name: Aluminum cable management products
Product identification: Aluminum Cable Management Products made of aluminum. Products are provided in different shapes: welded cable ladders, swaged cable ladders, cable Trofs, and cable channel trays.

Welded Cable Ladder

Swaged Cable Ladder

[1] NEMA: National Electrical Manufacturers Association is ANSI-accredited Standards Developing Organization.
[2] UL/cUL: UL standards (Underwriters Laboratories Inc.).
[3] CSA Standards: CSA Group's Standards Development organization.
[4] NEC: The National Electrical Code.
[5] ASTM International: International Standards organization.
[6] AA: The Aluminium Association

Cable Trof Tray **Cable Channel Tray**

Figure 1: Aluminum cable management products

Tensile strength: 33 ksi
Yield strength: 28 ksi
Material density: 2712 kg/m3

Product description: Extruded aluminum is manufactured into different shapes including welded cable ladders, swaged cable ladders, cable Trofs, and cable channel trays. Applicable regional standards include NEMA, UL/cUL, CSA, NEC, ASTM, and AA for supporting electrical infrastructure from source to termination. Offered as Atkore brands: Cope®, US Tray®, and Unistrut®. Product families included in this study are listed below:

- **Straight Swage Ladder Tray**
- **Swage Ladder Tray Fittings**
- **Straight I-Beam Ladder Tray**
- **I-Beam Ladder Tray Fittings**
- **I-Beam Ladder Tray Accessories & Hardware**
- **Straight Trof Tray**
- **Trof Tray Fittings**
- **Straight Channel Tray**
- **Channel Tray Fittings**
- **Channel Tray Accessories & Hardware**
- **Swage Ladder & Trof Tray Accessories & Hardware.**

Further information can be found at https://www.atkore.com/Products/Cable-Tray-Systems.

Aluminum cable management products are produced in 5 sites. For each site, raw materials, packaging, ancillary material, energy consumption and waste production were measured at the factory level.
The EPD is an EPD of multiple products based on the average product in each site and presents results as averages for annual productions from each site having similar productions (having same core material and similar manufacturing processes). The average was calculated as a weighted average based on production volume from each site. Where different products were manufactured in the same site, the inputs and outputs were allocated based on mass. The different products were grouped based on the materials and production processes used.

According to the PCR 2019:14 variance within each site must be less than 10% for all mandatory impact categories. Product groups were organized based on the main material used, therefore the variance within any given site will mainly be associated with processing requirements.
Energy contribution is below 10% for all impact categories, ensuring the difference in impact between the average product and variants of this group is kept below 10%. To evaluate the impact of these in case of variation, a worst-case sensitivity analysis was carried out where energy use was increased by 50% in each site. Results for GWP are <1.5% in all sites. No other impact categories showed variance of more than 10% under this scenario.

UN CPC code: 42190

Geographical scope: Global

LCA information

Declared unit:
The declared unit is **1 kg of average aluminum cable management products**.

Reference service life:
Not applicable.

Time representativeness:
Primary data for the core process was gathered for one year of operation (2023)

Database(s) and LCA software used:
The LCA software SimaPro (version 9.5.0.0) was used to build a model for the product systems under investigation using specific and generic inventory data. Primary data used was based on the manufacturer's specific data inventory. The secondary data was sourced from the LCI database ecoinvent v3.9.1 (cut-off) (ecoinvent, 2020). In addition, SimaPro was used to apply characterization models and factors from the impact assessment methods to generate LCIA results.

Description of system boundaries:
This study is a cradle-to-gate (A1-A3) with modules C1-C4 and module D, carried out based on EN15804+A2 and the relevant PCR 2019:14 version 1.3.4 (Construction Products). The study comprises extraction of raw materials, transportation of raw materials to manufacturing plant, and the manufacturing of the product itself. This also includes the end-of-life of the product and the benefits and loads arising from the product life cycle.

The life cycle stages descriptions are shown below Figure 2. Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation are presented in Table 1.

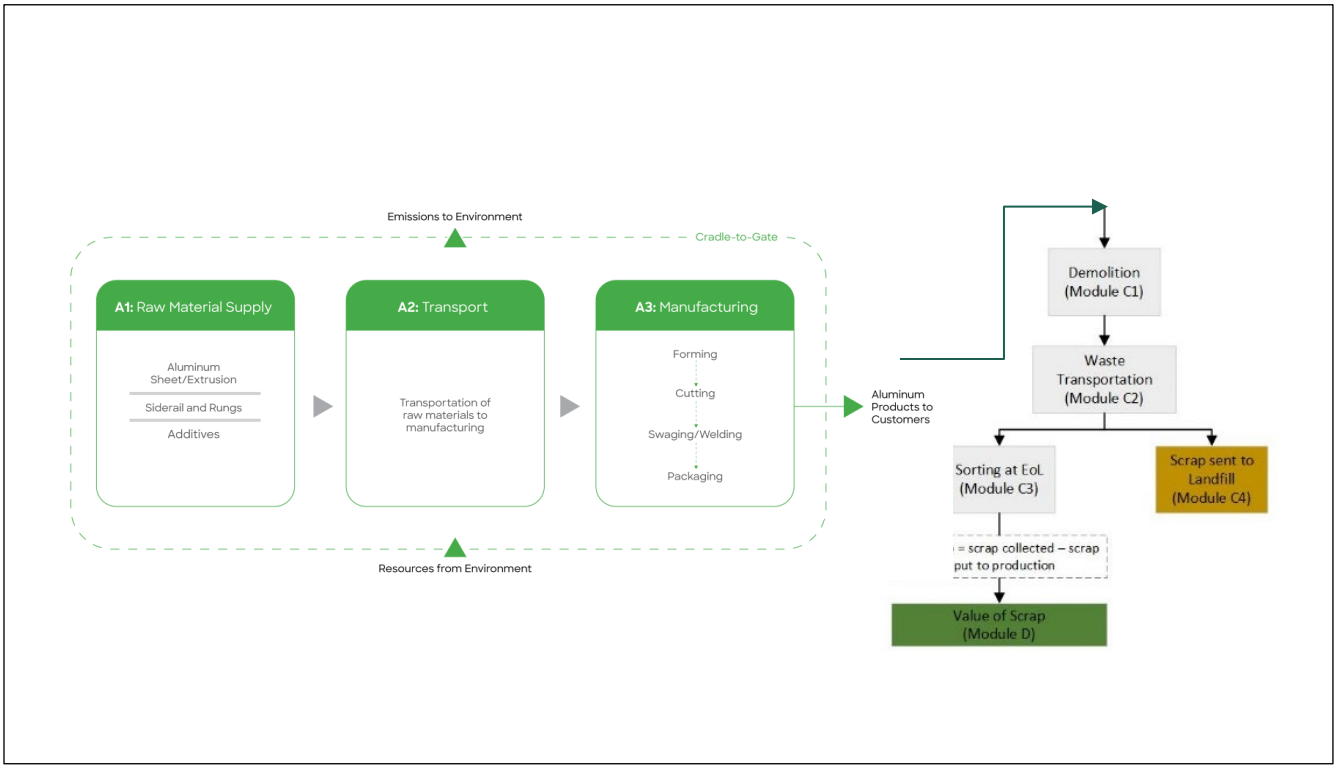

Figure 2 System boundary of the life cycle assessment for Aluminum cable management products

The life cycle stages included within the system boundaries are:

- **A1. Raw materials supply**
  - Raw materials extraction and production used for products manufacturing in Atkore sites are included in this module. Raw materials used are aluminum extruded.
  - Generation of electricity and heat from primary energy resources, also including their extraction, refining and transport according to EN 15804 +A2 (BS EN 15804:2012+A2:2019, 2019)[7]
- **A2. Transport**
  This stage includes the transportation of all raw materials, auxiliaries and outbound packaging from suppliers to production site by truck.
- **A3. Manufacturing**
  - Packaging of the finished product in cardboard boxes, polypropylene film and steel.
  - Treatment of waste generated from the manufacturing processes up to the end-of-waste state.
  - Generation of electricity and heat from primary energy resources, also including their extraction, refining and transport according to ISO 21930 (ISO 21930, 2017)[1]

  The manufacturing of aluminum cable management products includes several processes: Forming, Cutting, Swaging/Welding.
- **C1. Deconstruction and demolition**
  Products at the end-of-life are deconstructed manually, and therefore no burdens are applied.
- **C2. Transport to waste processing**

[7] Results of modules A1-A3 shall be declared in aggregated form in EPD as required by Product Category Rule (PCR, 2019:14). This solves the problem that EN 15804 and ISO 21930 assign some processes (e.g., generation of electricity) to different modules. By declaring modules A1-A3 in aggregated form, the EPD can conform to both EN 15804 and ISO 21930.

Accounts for transportation of waste e.g. to recycling site or to final disposal.

- **C3. Transport to waste processing**
  Sorting, collection, processing of waste fabricated products for the different routes (reuse, recycling, energy recovery, final disposal) at a waste processing facility.
- **C4. Waste disposal**
  Final disposal at disposal site, including any required pre-treatment and the management of the disposal facility.
- **D. Potential benefits and loads beyond the system boundary, expressed as net impacts and benefits**
  Benefits and burdens associated with recovery/recycling that affects previous or future life cycles.

Cut-off rules:

Exclusions considered in the study:

- Materials contributing less than 1% of mass: Lubricants used in the manufacturing process.
- Specific exclusions
  - Pallets for packaging: pallets are often re-used multiple times and numbers of uses was not always available. Pallets are considered as capital goods.
  - Water consumption for sanitary use and natural gas consumption for office heating.
- General exclusions: processes of infrastructure or capital goods; personal related activities, research and development related activities and maintenance operations.

Assumptions and limitations:

- Gases used in production: production of welding gases (argon and helium) were modelled together with related emissions to air as they do not end up in the final product.
- Transport data: when primary data on distance travelled and mode of transport from suppliers to Atkore's site were not available, 100 km by a 16–32-ton EURO 5 truck was assumed.
- Secondary material: where recycled content data were available as official declaration from suppliers, these were used and modelled. Where such information was not available, the ecoinvent dataset was used as representative of global aluminum production.
- End-of-life scenarios: end-of-life was modelled based on information from prEN 17662 (prEN 17662 , 2021), considering 90% to recycling and 10% to landfill.

Electricity: Purchased electricity used in the manufacturing process of module A3 has been modelled as residual mix for all sites. The weighted average electricity mix climate impact as GWP-GHG indicator is 0.468 kg CO_2 eq./kWh.

Allocation:

Mass allocation was used in preference to economic allocation to assign energy and packaging to specific product groups within each site.

Most sites produce several types of products with several different materials belonging to the same category. While raw materials and waste were provided in specific product groups (e.g., aluminum for aluminum cable management products), energy consumption and outbound packaging were available at plant level. Therefore, allocation was used to assign energy and packaging to the specific product groups.

In the case of end-of-life allocation of generic data, the ecoinvent v3.9.1 with a cut-off by classification end-of-life allocation method was used. In this approach, environmental burdens and benefits of recycled/reused materials are given to the product system consuming them, rather than the system providing them, and are quantified based on recycling content of the material under investigation.

For module D, there was no consideration of scrap inputs that have undergone co-product allocation (e.g. for pre-consumer scrap). Co-product allocation for scrap from manufacturing process (module A3) was not conducted as scrap is sent to off-site recycling.
In the case of end-of-life allocation of generic data, the ecoinvent v3.9.1 with a cut-off by classification end-of-life allocation method was used.

Data quality:
Data quality has been assessed using the quality matrix adapted from Weidema et al. (2013). Data quality indicators were applied whereby key data were assigned scores between 1 (best) and 5 (worst). Data quality value obtained is 3.14.

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

Table .1 Description of the system boundary according to the PCR.

	Product stage			Construction process stage		Use stage							End of life stage					Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	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	x	x	x	ND	ND	ND	ND	ND	ND	ND	ND	ND	x	x	x	x		x
Geography	AUS, NZ, USA	AUS, NZ, USA	AUS, NZ, USA	-	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO		GLO
Specific data used	1.23%			-	-	-	-	-	-	-	-	-	-	-	-	-		-
Variation – products	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-		-
Variation – sites	4% / -34%			-	-	-	-	-	-	-	-	-	-	-	-	-		-

Key: X: included in LCA; ND: module not declared; NR: module not relevant

Content information

Product components	Weight, (%)	Weight range, (%)	Post-consumer material, weight-%	Weight biogenic carbon, kg C/kg	Weight biogenic carbon, Kg CO_2 eq./DU
Aluminum	99.9%	94.6%-100%	29.20%	0	0
Coating	<1%	0%-5.38%	0%	0	0
TOTAL	100%		29.20%	0	0
Packaging materials	**Weight, (%)**	**Weight range, (%)**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**	**Weight biogenic carbon, Kg CO_2 eq./DU**
Cardboard	98.8%	98%-100%	0.65%	4.94E-04	1.81E-03
PE film	0.76%	0%-1%	0.01%	0	0
Steel	0.48%	0%-2%	0.00%	0	0
TOTAL	100%		0.66%	4.94E-04	1.81E-03

Dangerous substances from the candidate list of SVHC for Authorization	EC No.	CAS No.	Weight-% per declared unit
Not applicable	N/a	N/a	N/a

No substance, listed in the Candidate List of Substances of Very High Concern for Authorization under the REACH Regulations are used in this product, either above the threshold limit or above 0.1% (wt/wt).

Results of the environmental performance indicators

This EPD contains environmental information for the declared unit of 1kg of aluminum cable management products indicator values calculated using the methods specified in EN 15804:2019+A2, covering environmental impact potentials, resource and energy use, and waste generation for all declared modules; the A1 - A3 modules are shown on an aggregated basis.

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

Mandatory impact category indicators according to EN 15804 + A2[8]

Results per 1 kg of aluminum cable management products							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	1.54E+01	0.00E+00	1.54E-02	0.00E+00	3.27E-03	-1.11E+01
GWP-biogenic	kg CO_2 eq.	5.30E-02	0.00E+00	2.21E-06	0.00E+00	5.14E-05	-1.97E-03
GWP-luluc	kg CO_2 eq.	4.34E-02	0.00E+00	5.29E-07	0.00E+00	3.49E-06	-3.31E-02
GWP-total	kg CO_2 eq.	1.55E+01	0.00E+00	1.54E-02	0.00E+00	3.33E-03	-1.11E+01
ODP	kg CFC 11 eq.	1.48E-07	0.00E+00	2.10E-10	0.00E+00	2.25E-11	-1.02E-07
AP	mol H^+ eq.	1.02E-01	0.00E+00	4.50E-05	0.00E+00	2.10E-05	-7.48E-02
EP-freshwater	kg P eq.	5.05E-03	0.00E+00	3.04E-07	0.00E+00	1.03E-06	-3.45E-03
EP-marine	kg N eq.	1.65E-02	0.00E+00	1.66E-05	0.00E+00	5.38E-06	-1.20E-02
EP-terrestrial	mol N eq.	1.70E-01	0.00E+00	1.76E-04	0.00E+00	5.73E-05	-1.24E-01
POCP	kg NMVOC eq.	5.27E-02	0.00E+00	6.31E-05	0.00E+00	1.79E-05	-3.82E-02
ADP-minerals&metals*	kg Sb eq.	3.15E-05	0.00E+00	9.15E-10	0.00E+00	4.23E-10	5.32E-05
ADP-fossil*	MJ	1.50E+02	0.00E+00	2.05E-01	0.00E+00	3.67E-02	-1.04E+02
WDP*	m^3	2.15E+00	0.00E+00	2.91E-04	0.00E+00	3.26E-04	-8.08E-01
Acronyms	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; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption						

[8] ”EN 15804 reference package” is based on EF 3.1 version

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional mandatory and voluntary impact category indicators**

Results per 1 kg of aluminum cable management products							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[9]	kg CO_2 eq.	1.55E+01	0.00E+00	1.54E-02	0.00E+00	3.28E-03	-1.11E+01
Global warming potential [10]	[kg CO2 eq.]	1.54E+01	0.00E+00	1.53E-02	0.00E+00	3.26E-03	-1.10E+01
Ozone layer depletion[10]	[kg CFC-11 eq.]	1.39E-07	0.00E+00	1.67E-10	0.00E+00	1.87E-11	-9.70E-08
Acidification[10]	[kg SO2 eq.]	8.61E-02	0.00E+00	3.38E-05	0.00E+00	1.67E-05	-6.32E-02
Eutrophication[10]	[kg PO4--eq]	2.19E-02	0.00E+00	6.98E-06	0.00E+00	5.09E-06	-1.50E-02
Photochemical oxidant formation[10]	[kg NMVOC] *	5.27E-02	0.00E+00	6.31E-05	0.00E+00	1.80E-05	-3.82E-02
Global warming potential[11]	[kg CO_2 eq.]	1.52E+01	0.00E+00	1.52E-02	0.00E+00	3.23E-03	-1.09E+01
Ozone depletion[11]	[kg CFC-11 eq.]	2.18E-07	0.00E+00	2.22E-10	0.00E+00	3.14E-11	-1.54E-07
POCP[11]	[kg O_3 eq.]	9.71E-01	0.00E+00	1.02E-03	0.00E+00	3.27E-04	-7.11E-01
Acidification[11]	[kg SO_2--eq]	8.68E-02	0.00E+00	4.03E-05	0.00E+00	2.44E-05	-6.37E-02
Eutrophication[11]	[kg N] *	4.18E-02	0.00E+00	5.78E-06	0.00E+00	8.53E-06	-2.82E-02

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*
*** It shall be clear in the EPD that the indicators and characterization methods are from EN15804:2012+A1:2013, but other LCA rules (system boundaries, allocation, etc.) are according to EN 15804:2012+A2:2019; i.e., the results of the "A1 indicators" shall not be claimed to be compliant with EN 15804:2012+A1:2013.*

[9] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.
[10] The indicator is calculated using the methods specified in EN 15804+A1 and ISO 21930:2017
[11] The indicator is calculated using the methods specified in ISO 21930:2017 (TRACI 2.1)

Resource use indicators

Results per 1 kg of aluminum cable management products							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.47E+01	0.00E+00	3.01E-04	0.00E+00	3.36E-03	-1.03E+01
PERM	MJ	9.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.48E+01	0.00E+00	3.01E-04	0.00E+00	3.36E-03	-1.03E+01
PENRE	MJ	1.59E+02	0.00E+00	2.18E-01	0.00E+00	3.91E-02	-1.10E+02
PENRM	MJ	2.17E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.59E+02	0.00E+00	2.18E-01	0.00E+00	3.91E-02	-1.10E+02
SM	kg	2.92E-01	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
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	9.04E-02	0.00E+00	1.05E-05	0.00E+00	1.49E-05	-4.80E-02
Acronyms	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 re-sources; 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 indicators

Results per 1 kg of aluminum cable management products							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	2.71E-03	0.00E+00	1.38E-06	0.00E+00	8.82E-08	4.57E-03
Non-hazardous waste disposed	kg	2.59E+00	0.00E+00	5.39E-05	0.00E+00	1.08E-01	-1.91E+00
Radioactive waste disposed	kg	9.22E-05	0.00E+00	7.35E-09	0.00E+00	5.59E-08	-3.66E-05

Output flow indicators

Results per 1 kg of aluminum cable management products							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	3.82E-02	0.00E+00	0.00E+00	9.00E-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
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00

Other environmental performance indicators

Results per 1 kg of aluminum cable management products							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PM	disease inc.	1.25E-06	0.00E+00	1.03E-09	0.00E+00	3.28E-10	-9.43E-07
IR	kBq U-235 eq	3.78E-01	0.00E+00	3.70E-05	0.00E+00	2.29E-04	-1.50E-01
ETF-fw	CTUe	9.20E+01	0.00E+00	2.16E-01	0.00E+00	1.68E+00	-3.38E+01
HTP-c	CTUh	1.90E-08	0.00E+00	1.15E-12	0.00E+00	2.63E-12	-1.41E-08
HTP-nc	CTUh	2.97E-07	0.00E+00	1.11E-10	0.00E+00	3.41E-11	-1.89E-07
SQP	Pt	1.21E+01	0.00E+00	7.94E-04	0.00E+00	2.54E-02	-6.36E+00
Acronyms	PM = Particulate matter emissions; IR = Ionizing radiation, human health; ETF-fw = Eco-toxicity (freshwater); HTP-c = Human toxicity, cancer effects; HTP-nc = Human toxicity, non-cancer effects, SQP = Soil quality potential/ Land use related impacts						

References

General Program Instructions of the International EPD® System. Version 4.0.

BS EN 15804:2012+A2:2019. (2019). *Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products .*

ecoinvent. (2023). *ecoinvent Databases*. Retrieved from ecoinvent web site: https://www.ecoinvent.org/login-databases.html

EN 15804+A1. (n.d.). *EN 15804:2012+A1:2013.*

Environdec GPI. (2021). *GENERAL PROGRAMME INSTRUCTIONS FOR THE INTERNATIONAL EPD® SYSTEM.*

Hauschild M, G. M. (2011). *Recommendations for Life Cycle Impact Assessment in the European context - based on existing environmental impact assessment models and factors.* Luxembourg: European Commission.

ISO 14025. (2006). *Environmental labels and declarations – Type III environmental declarations – Principles and procedures.* Geneva: International Organization for Standardization.

ISO 14040. (2006a:2020). *ISO 14040+A1: Environmental management – Life cycle assessment – Principles and framework.* Geneva: International Organization for Standardization.

ISO 14044. (2006b:2020). *ISO 14044+A1+A2: Environmental management – Life cycle assessment – Requirements and guidelines.* Geneva: International Organization for Standardization.

ISO 21930. (2017). *Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services.*

PCR. (2019:14). *Construction Products (BS EN 15804:2012+A2:2019) version 1.3.4.* IVL Swedish Environmental Research Institute, the Secretariat of EPD International. Retrieved from https://environdec.com/pcr-library

prEN 17662 . (2021). *Product category rules complementary to EN 15804 for Steel, Iron and Aluminium structural.*

Worldsteel. (2021). *Worldsteel Life Cycle Inventory Study for Steel Industry Products .* Retrieved from https://worldsteel.org/steel-topics/life-cycle-thinking/

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