

Environmental Product Declaration

 **EPD**
INTERNATIONAL EPD SYSTEM



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

H07Z1-U / H07Z1-R / H07Z1-K power cables with HFFR insulation

From TT Kabeli d.o.o.



Programme:

Programme operator:

Type of EPD:

EPD registration number:

Version date:

Validity date:

The International EPD System, www.environdec.com

EPD International AB

EPD of multiple products, based on representative product

EPD-IES-0032611

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An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com



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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Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): <i>PCR 2019:14 Construction products (EN 15804+A2) (version 2.0.1) (2.0.1), UN CPC code - 46 - Electrical machinery and apparatus, 4634 - Other electric conductors, for a voltage not exceeding 1000 V</i>
PCR review was conducted by: <i>The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: C Rob Rouwette (chair), Noa Meron (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/contact.</i>
c-PCR: <i>PCR 2019:14-c-PCR-019 Electrical cables and wires (for construction sector) (c-PCR to PCR 2019:14) (Adopted from EPD Norway) (2022-03-01)</i>
c-PCR review was conducted by: <i>The PCR (version 2.0) was adopted 2022-10-12 as a c-PCR under PCR 2019:14, after being reviewed and accepted by the Technical Committee of EPD International acting as PCR Review Panel for the adoption process. Review chair was Nasser Ayoub, DCarbon Egypt.</i>

Third-party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:
☒ Individual EPD verification without a pre-verified LCA/EPD tool
Third-party verifier: Mari Kirss, Meetripuu OÜ
Approved by: 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 published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

INFORMATION ABOUT EPD OWNER

Owner of the EPD: TT Kabeli d.o.o.

Address: Knešpolje bb, Široki Brijeg, Bosnia and Herzegovina

Contact: Eugen Šušak, info@ttcables.com

Address and contact information of the LCA practitioner commissioned by the EPD owner:
Urté Valdavičė, UAB Vesta Consulting, info@vestaconsulting.lt

Description of the organization: TT Kabeli d.o.o., operating as TT Cables, is a leading producer of low-voltage cables in Southeast Europe. Established in 2007, the company has expanded its reach to supply major wholesalers and cable specialists across Europe, Africa, the Middle East, and North America. Headquartered in Široki Brijeg, Bosnia and Herzegovina, TT Cables has established subsidiaries in Lithuania, Serbia, Croatia, Austria, Germany, the United Kingdom, Turkey, Italy, North Macedonia and Romania to enhance market coverage and customer service. TT Cables offers a diverse product range, including power cables up to 1kV, armoured cables, installation cables, and solar cables, exporting to over 50 countries worldwide.

Product-related or management system-related certifications: TT Kabeli d.o.o. (TT Cables) holds several important certifications related to quality, environmental management, occupational health and safety, and energy management:

- **ISO 9001** – Quality Management System, ensuring consistent product quality and customer satisfaction.
- **ISO 14001** – Environmental Management System, demonstrating commitment to sustainable and environmentally responsible practices.
- **ISO 27001** - Information Security Management System, ensuring the confidentiality, integrity, and availability of information and protecting sensitive data.
- **ISO 45001** – Occupational Health and Safety Management System, ensuring a safe working environment and reducing workplace risks.
- **ISO 50001** – Energy Management System, aimed at improving energy efficiency and reducing energy consumption.

PRODUCT INFORMATION

Product name: H07Z1-U / H07Z1-R / H07Z1-K power cables with HFFR insulation

Product group: This EPD covers multiple products of power cables with HFFR insulation. Series of cables that falls into the product group is listed in Annex 1

Representative product: The reference product **H07Z1-R 1x1,5** was chosen to represent the product group, because of the highest share in the production quantities by mass within the cables in the group in 2025.

UN CPC code: 46 - Electrical machinery and apparatus, 4634 - Other electric conductors, for a voltage not exceeding 1000 V

Product description: The declared products include halogen-free insulated copper cables of the H07Z1-K, H07Z1-U and H07Z1-R types. The conductors are made of copper and comply with EN 60228: H07Z1-K uses class 5 flexible conductors, while H07Z1-U and H07Z1-R use class 1 or class 2 conductors. The cables are insulated with halogen-free thermoplastic/polyolefin compound, type TI 7 according to EN 50363-7, with H07Z1-K also specified as UV resistant. Core identification is in accordance with EN 50525-1. The products are manufactured according to the applicable cable standards EN 50525-3-31 and, where relevant, IEC 60227. Halogen-free performance is assessed

according to EN 60754-1 and EN 60754-2, while the reaction-to-fire classification under the Construction Products Regulation is declared according to EN 50575 and EN 13501-6.

Products application: The declared H07Z1-K, H07Z1-U and H07Z1-R cables are intended for use in fixed wiring applications with rated voltages up to and including 450/750 V. They are suitable for wiring of lamps, devices, switchgear cabinets, distribution boxes and similar electrical installations. The cables can be installed in conduits, fixed on surfaces, embedded in or under plaster, or placed in closed installation ducts and analogous systems. Due to their halogen-free insulation and resistance to flame propagation, they are particularly suitable for buildings and areas where reduced emission of corrosive smoke and gases is required in the event of fire, such as public buildings with high occupancy or valuable assets, including hospitals, cinemas, schools and similar facilities. The products are intended for use in dry rooms. Further guidance on application is provided in EN 50565 for cables with a rated voltage not exceeding 450/750 V.

Products technical specifications:

Technical Characteristics	Standards	H07Z1-K	H07Z1-U, H07Z1-R
CPR class	EN 50575, EN 13501-6	B2ca-s1,d1,a1	B2ca-s1,d1,a1
Test voltage	EN 50525-1	2,5 kV	2,5 kV
Rated voltage	EN 50525-1, EN 50525-3-31	450/750 V	450/750 V
Bending radius (min.)	EN 50565-1	5D	5D
Min. Laying temperature	EN 50565-2	5°C	5°C
Max. conductor temperature	EN 50525-3-31	70°C	70°C
Max. Short circuit temperature	EN 50565-2	160°C	160°C

Name and location of production site(s): Knešpolje bb, Široki Brijeg, Bosnia and Herzegovina

References to any relevant websites for more information or explanatory materials: Visit <https://www.ttcables.com/> to learn more.

CONTENT DECLARATION

The tables below represent the product and packaging material content information for 1 meter of the representative product **H07Z1-R 1x1,5**.

Product content	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C / product
Copper (conductor)	1,34E-02	0	0	0
HFFR (insulation)	8,48E-03	0	0	0
MB-PE (insulation colour)	1,23E-04	0	0	0
TOTAL	2,20E-02	0	0	0

Note. According to the manufacturer data, scrap copper accounts for 33% of the copper input, which corresponds to 20,10% of the total product mass. As the origin of the scrap copper is not specified, this value is reported as recycled/scrap material content and not specifically as post-consumer recycled content.

The reference product is delivered in coils secured with thermal foil, placed on a EUR-flat pallet and wrapped with stretch film. Product labels are applied as part of the packaging. For larger cross-sections, the product may be delivered on wooden drums without a pallet. The packaging components declared in the table below represent the reference product delivered in coils. Thermal foil, labels and stretch film are not declared separately, as they are considered negligible and are excluded according to the cut-off criteria. Only the EUR-flat pallet is declared due to its significant mass contribution.

Packaging materials	Weight, kg	Weight-% (versus the product)	Biogenic material, kg C / product
¹ Eur-flat pallet	8,66E-04	3,94	3,59E-04
TOTAL	8,66E-04	3,94	3,59E-04

¹ Global Warming Potential biogenic: -1,52 kg CO_{2e} / kg

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

The product does not contain any substances from the SVHC candidate list in concentrations exceeding 0.1% of its weight.

LCA INFORMATION

Declared unit: the declared unit of the study is 1 meter of the product supplied to the client. The mass of the product per declared unit is 0,02 kg.

Reference service life: The reference service life of the product is assumed to be 30 years.

Time representativeness: primary data was collected internally. The production data refers to the time period of January 2025 – December 2025.

Geographical scope: Europe

Database(s) and LCA software used: The used databases are Ecoinvent 3.11 and One click LCA 7.6. The Ecoinvent database provides the life cycle inventory data for the raw and processed materials obtained from the background system. The LCA software used is One Click LCA version 0.52.3.

Description of system boundaries: Cradle to gate with options, modules C1-C4, module D and with additional modules A4-A5.

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

	Product stage			Constructio n 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	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x	
Geography	EU	EU	BA	EU	EU	-	-	-	-	-	-	-	EU	EU	EU	EU	EU	
Primary data used	3,43%			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Variation – products	-1 % / + 198%			-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Variation – sites	ND			-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Description of the system boundary (X = Included in LCA; ND = Module Not declared)

Note. Based on PCR 2019:14 Construction products section 2.2.2.4. Table 2 for type b) EPD B module is optional to declare, therefore excluded due to lack of relevance.

Data quality: The EPD covers products manufactured in one factory in Široki Brijeg (Bosnia and Herzegovina) which provided data for the period of January 2025 – December 2025. The data collection has been done internally and thoroughly. The data is based on yearly production amounts and extrapolations of measurements on specific machines and plants. The EPD covers raw material supply and transport, product manufacturing, transportation to the customer, installation at the construction site, and end-of-life on a European scale. During the manufacturing process, copper is processed through wire drawing and conductor stranding, followed by insulation extrusion. The cable is then tested to ensure compliance with electrical and mechanical requirements, after which it is packaged and prepared for distribution. The site is powered by electricity from renewable sources, additionally diesel and LPG

for mobile machinery is used. Background data was sourced from the ecoinvent 3.11 database. No poor or very poor data was found during the assessment of relevant data using PEF method (EN 15804:2012+A2:2019, Annex E, only E.2). The data quality assessment is done in accordance with EN 15941:2024. Overall, the data quality can be described as good. The EN 15804 reference package used is based on EF 3.1.

Share of primary data used: The share of primary data is calculated based on GWP-GHG results. 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. Declaration of data sources, reference years, data categories, and share of primary data is presented below.

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Production of raw materials (A1)	Database	Ecoinvent v. 3.11	1993-2024	Secondary data	-
Transport of raw materials to manufacturing site (A2)	Database	Ecoinvent v. 3.11	2009-2024	Primary data	3,06%
Production of packaging (A3)	Databases	Ecoinvent v. 3.11	2022-2024	Secondary data	-
Energy used in manufacturing of product (A3)	Database	Ecoinvent v. 3.11	1996-2024	Primary data	0,37%
Waste treatment (A3)	Database	Ecoinvent v. 3.11	2006-2024	Secondary data	-
Total share of primary data, of GWP-GHG results for A1-A3					3,43%

Note. Ecoinvent datapoints are based on older background flows, but updated in 2024 (v.3)

Cut-off criteria: The study does not exclude any modules or processes that are mandatory according to the applicable standards and PCR. No hazardous materials or substances are excluded. All major raw materials and energy inputs, as well as emissions and outputs from the unit processes for which data is available, are included in the calculation. In line with the PCR requirements, the total excluded input and output flows do not exceed 5% of the total mass or energy across the life cycle. The excluded flows represent approximately 0,39% of the total mass across the life cycle and consist of packaging materials (coils, thermal foil, labels, stretch film) and minor auxiliary materials (waste oil and water).

Allocation, estimates and assumptions:

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. In this study, as per EN 15804:2012+A2:2019, allocation is conducted in the following order:

1. Allocation should be avoided
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small
3. Allocation should be based on economic values

The allocations used in this study follow the system model 'Allocation, cut-off, 15804:2012+A2:2019'.

The methodological choices for allocation for reuse, recycling and recovery have been set according to the polluter pays principle (PPP).

Scenarios included in the LCA are based on realistic scenarios which are currently in use and are representative for one of the most likely scenario alternatives.

The environmental impacts of capital goods (e.g., production equipment, recycling machinery) and infrastructure (e.g., recycling facilities, transportation systems) have not been included in this assessment.

Calculation rules for averaging data:

The EPD is an EPD of multiple products, based on a representative product. **H07Z1-R 1x1,5** cable was chosen as representative product for the product group, because of the highest share in the production quantities by mass within the cables in the group in the analysed period. The EPD does not claim compliance with ISO 21930, therefore variations above 10% are allowed. Applying a representative product ensures fair market representation and supports practical decision-making without skewing results toward extreme cases.

The calculations are based on the production mass.

Product life cycle

Product stage (A1-A3)

A1: This module considers the extraction and processing of raw materials.

A2: The raw materials are transported to the manufacturing plant. In this case the model includes road transportation of each raw material.

A3: This module includes the manufacture of products and packaging. It has considered all the energy consumption and waste generated in the production plant.

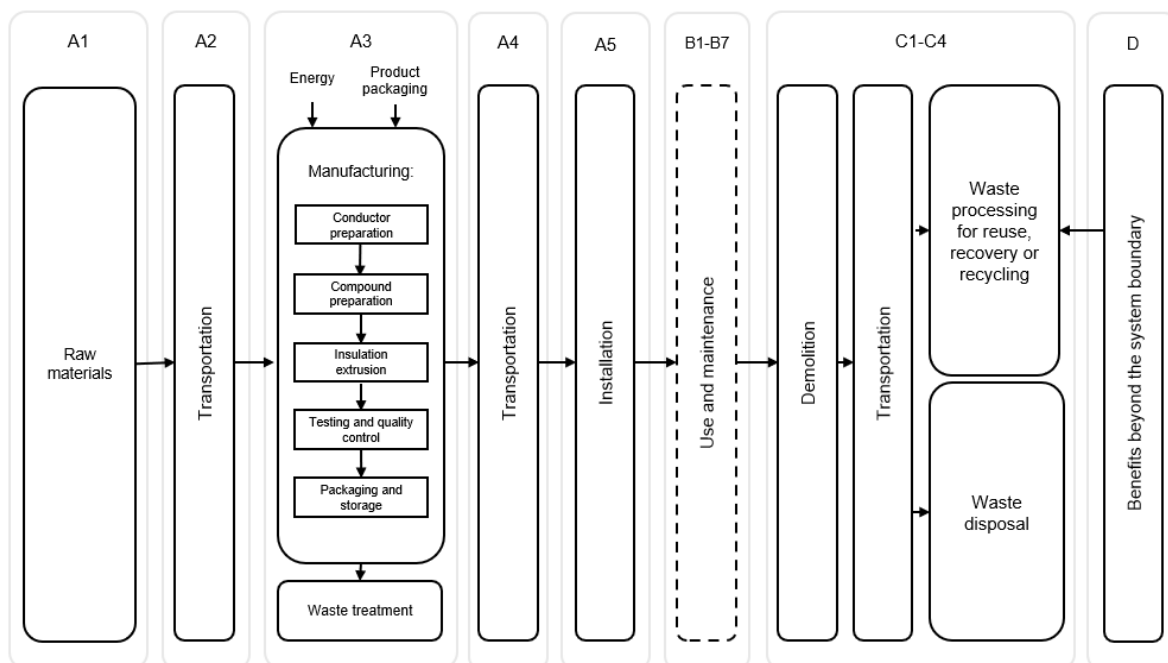
Manufacturing process

The manufacturing of H07Z1-U, H07Z1-R and H07Z1-K power cables begins with the preparation of copper conductors in accordance with EN 60228. Depending on the cable type, solid, stranded or flexible stranded copper conductors are used to provide electrical conductivity and mechanical stability.

The conductors are insulated by extrusion of a halogen-free HFFR thermoplastic compound, type TI 7 according to EN 50363-7. Where required, PE colour masterbatch is added to achieve the specified core identification in accordance with EN 50525-1. The insulation provides electrical protection, flame-retardant performance and reduced emission of smoke and corrosive gases in case of fire.

After extrusion, the cables are cooled and subjected to quality control procedures, including dimensional, visual and electrical checks. The finished single-core cables are then wound onto coils, reels or drums and prepared for storage and distribution. The process includes electricity use, auxiliary materials, packaging and production waste management.

See the system diagram below.



Note. The dashed lines indicated that use stage (B1–B7 modules) were not assessed, as their inclusion is not applicable for this type of EPD (as specified in PCR 2019:14 Construction products (EN 15804+A2), version 2.0.1).

Manufacturing energy scenario documentation

Scenario parameter	Value	Source
Electricity generated from hydropower	0,0236 kg CO ₂ e / kWh	Data sources: ecoinvent 3.11 Country: Bosnia and Herzegovina
Diesel	0,3600 kg CO ₂ e / kWh	Data sources: ecoinvent 3.11 Country: World
LPG	0,3323 kg CO ₂ e / kWh	Data sources: ecoinvent 3.11 Country: World

Construction process stage (A4-A5)

A4: Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

Transportation scenario documentation

Scenario parameter	Value
Vehicle type used for transport	EURO 6 truck with a trailer with an average load of >32t
Distance	1936 km
Capacity utilization (inc. empty return)	100 %
Bulk density of transported products	Not declared

A5: Environmental impacts from installation into the building (A5) include the product installation losses, emissions of energy use in installation and generation of waste at the construction site. Wood packaging waste is assumed to be collected and treated according to typical European waste management scenarios, with 32% recycled, 30% incinerated, and 38% disposed of in landfill. Installation is assumed to be carried out manually; therefore, no energy use is included. No product losses during installation are assumed based on manufacturer information, as cables are installed to required lengths and material wastage is considered negligible (<1%).

Installation of the product in the building scenario documentation

Scenario parameter	Value
Ancillary materials for installation, kg	-
Water use, m ³	-
Other resource use, kg	-
Quantitative description of energy type (regional mix) and consumption during the installation process, kWh	-
Waste materials on the building site before waste processing, generated by the product's installation, kg	-
<i>Eur-flat pallet</i>	<i>8,66E-04 kg</i>
Output materials as result of waste processing at the building site), kg	
<i>Recycling</i>	<i>2,9E-04 kg</i>
<i>Incineration with energy recovery</i>	<i>2,7E-04 kg</i>
<i>Disposal</i>	<i>3,4E-04 kg</i>
Direct emissions to ambient air, soil, and water, kg	-

Use stage (B1-B7)

B1-B7: This EPD does not cover the Use stage.

End of life stage (C1-C4, D)

C1: Deconstruction, dismantling, demolition

Machinery operations related to de-installation are assumed to be zero, indicating manual execution.

C2: Transport of the discarded product to the processing site

It is assumed that no mass loss occurs during the use phase; therefore, the product at end of life has the same weight as the declared product. All end-of-life products are considered to be transported to the nearest available waste management facilities, such as recycling, incineration or landfill sites. The transport distances to the nearest recycling or disposal facility (80 km) or incineration plant (130 km) and the transport mode (lorry) are based on the reference values provided in PCR 2019:14, Table 4.

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

At the end of life, it is assumed that 90% of copper wire is collected and sent to recycling, while 60% of polymer materials are collected and treated via incineration with energy recovery (R1, >60%). These assumptions are based on typical European waste treatment practices and literature data on material-specific recovery rates, reflecting established recycling systems for metals and common treatment routes for polymer fractions.

C4: Discharge (disposal)

It is assumed that 40% of polymer material, 10 % of copper wire is not suitable for recycling (e.g. cannot be separated) and are sent for disposal in landfill.

End of life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	2,20E-02
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	1,21E-02
Recovery process – kg for energy recovery	5,16E-03
Disposal (total) – kg for final deposition	4,78E-03
Scenario assumptions e.g. transportation	Transported 80 km to recycling / disposal and 130 km to incineration plant with an average lorry.

Note. Yield factor = 0,9 (assuming 10% of material is lost in the recovery process)

Benefits and loads beyond the system boundary (D):

In accordance with EN 15804, Module D reflects the benefits beyond the system boundary associated with material recovery and energy substitution from waste streams generated in modules A3, A5 and at end-of-life (C3). Metals are assumed to be recovered and recycled, resulting in avoided primary material production. Polymer materials are assumed to be partially incinerated with energy recovery (R1 >60%), generating heat and electricity that substitute average European energy mixes. In addition, wood packaging waste contributes to energy recovery and material substitution through downcycling (e.g. mulch), avoiding conventional production.

A yield factor of 0,9 is applied, assuming 10% losses during recovery processes.

ENVIRONMENTAL PERFORMANCE

LCA results of the product(s) - main environmental performance results

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. The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

A comma (",") is used as the decimal separator throughout this report. ND = Module Not declared.

The results are presented for 1 meter of reference product **H07Z1-R 1x1,5**. The mass of the representative product per declared unit is 0,02 kg/m.

Core environmental impact indicators – EN 15804:2012+A2:2019, EF 3.1

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO ₂ e	9,37E-02	4,52E-03	1,40E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,06E-04	1,26E-02	2,33E-03	-4,33E-02
GWP – fossil	kg CO ₂ e	9,47E-02	4,51E-03	3,11E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,06E-04	1,26E-02	1,63E-04	-4,32E-02
GWP – biogenic	kg CO ₂ e	-1,06E-03	2,66E-06	1,37E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,21E-07	8,04E-07	2,17E-03	-5,53E-05
GWP – LULUC	kg CO ₂ e	1,56E-04	1,68E-06	4,86E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,67E-08	4,33E-07	4,19E-08	-8,47E-05
Ozone depletion pot.	kg CFC ₁₁ e	4,66E-09	1,02E-10	4,55E-13	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,66E-12	7,53E-12	1,19E-12	-3,62E-10
Acidification potential	mol H ⁺ e	5,84E-03	1,10E-05	1,68E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,00E-07	6,07E-06	5,16E-07	-3,53E-03
EP-freshwater	kg Pe	3,06E-05	3,30E-07	9,08E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,50E-08	2,22E-07	2,45E-07	-3,05E-04
EP-marine	kg Ne	2,81E-04	2,88E-06	1,74E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,31E-07	2,33E-06	3,11E-06	-1,79E-04
EP-terrestrial	mol Ne	4,05E-03	3,12E-05	6,60E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,42E-06	2,18E-05	1,62E-06	-2,52E-03
POCP ("smog")	kg NMVOCe	1,17E-03	1,83E-05	2,21E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,36E-07	5,85E-06	1,17E-06	-6,97E-04
ADP-minerals & metals*	kg Sbe	1,39E-04	1,34E-08	8,18E-11	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,12E-10	2,01E-08	9,73E-11	-4,50E-05
ADP-fossil resources*	MJ	1,31E+00	6,84E-02	4,52E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,12E-03	6,00E-03	1,13E-03	-5,34E-01
Water use*	m ³ e depr.	7,23E-02	3,98E-04	1,55E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,81E-05	8,93E-04	4,83E-05	-3,63E-02
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															

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

Additional (optional) environmental impact indicators – EN 15804:2012+A2:2019, EF 3.1

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	1,41E-08	4,48E-10	3,22E-12	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,04E-11	5,92E-11	8,08E-12	-8,31E-09
Ionizing radiation*	kBq U235e	1,03E-02	7,66E-05	1,09E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,49E-06	3,56E-05	1,41E-06	-4,13E-03
Ecotoxicity (freshwater)	CTUe	5,19E+01	5,89E-02	6,52E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,68E-03	4,67E-02	1,71E-01	-3,37E+01
Human toxicity, cancer	CTUh	1,05E-09	7,51E-13	1,47E-14	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,42E-14	1,30E-12	5,94E-14	-3,42E-10
Human tox. non-cancer	CTUh	7,66E-08	4,40E-11	8,06E-13	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,01E-12	5,35E-11	9,28E-12	-3,49E-08
SQP (Land use related impacts/soil quality)	-	2,08E+00	6,88E-02	4,69E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,13E-03	7,71E-03	2,38E-03	-1,11E+00

* Disclaimer: 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

Resource use indicators

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy	MJ	4,93E-01	1,05E-03	1,32E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,81E-05	7,68E-04	3,12E-02	-1,56E-01
Renew. PER as material	MJ	1,36E-02	0,00E+00	-1,36E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,00E-03
Total use of renew. PER	MJ	5,06E-01	1,05E-03	-4,00E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,81E-05	7,68E-04	3,12E-02	-1,53E-01
Non-re. PER as energy	MJ	1,13E+00	6,85E-02	4,53E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,12E-03	1,83E-01	1,93E-02	-5,34E-01
Non-re. PER as material	MJ	1,50E-01	0,00E+00	-8,99E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	-8,92E-02	-5,95E-02	0,00E+00
Total use of non-re. PER	MJ	1,28E+00	6,85E-02	-4,46E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,12E-03	9,38E-02	-4,02E-02	-5,34E-01
Secondary materials	kg	3,75E-03	2,89E-05	2,90E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,32E-06	6,64E-06	3,56E-07	-1,38E-02
Renew. secondary fuels	MJ	6,06E-04	3,81E-07	3,08E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,74E-08	2,80E-07	6,96E-09	-1,24E-05
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m³	2,42E-03	9,24E-06	-1,14E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,21E-07	1,56E-05	-1,26E-05	-1,23E-03
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															

Note: Option A was chosen for the calculations of the primary energy indicators. according to on Annex 3 of PCR 2019:14

Waste indicators

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	2,89E-02	9,98E-05	2,95E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,55E-06	2,15E-04	2,28E-06	-1,63E-02
Non-hazardous waste	kg	1,75E+00	2,04E-03	1,21E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,28E-05	6,69E-03	4,78E-03	-1,06E+00
Radioactive waste	kg	3,57E-06	1,88E-08	2,70E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,58E-10	9,08E-09	3,41E-10	-1,08E-06

Output flow indicators

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	1,10E-03	0,00E+00	2,90E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	1,21E-02	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	9,32E-03	0,00E+00	1,43E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	5,39E-02	0,00E+00	0,00E+00
Exported energy, electricity	MJ	3,16E-03	0,00E+00	6,00E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	1,83E-02	0,00E+00	0,00E+00
Exported energy, thermal	MJ	6,16E-03	0,00E+00	8,30E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	3,16E-02	0,00E+00	0,00E+00

Additional indicator – GWP-GHG

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG*	kg CO ₂ e	9,48E-02	4,51E-03	3,12E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,06E-04	1,26E-02	1,63E-04	-4,33E-02

* Disclaimer: 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 CO₂ is set to zero.

Additional LCA results (other environmental performance results) of the product(s)

Additional results for end-of-life 100% scenarios for modules C1-C4, D

End-of-life scenario documentation

Scenario parameter	Value (100% recycling)	Value (100% incineration)	Value (100% disposal)
Collection process – kg collected separately	0,02 kg	0,02 kg	0,02 kg
Collection process – kg collected with mixed waste	-	-	-
Recovery process – kg for re-use	-	-	-
Recovery process – kg for recycling	0,02 kg	-	-
Recovery process – kg for energy recovery	-	0,02 kg	-
Disposal (total) – kg for final deposition	-	-	0,02 kg
Scenario assumptions e.g. transportation	80 km	130 km	80 km

Note. Yield factor = 0.9 (assuming 10% of material is lost in the recycling process)

Mandatory impact category indicators according to EN 15804 (corresponding scenario 100% recycling)

Results per declared unit						
Indicator	Unit	C1	C2	C3	C4	D
GWP- total	kg CO ₂ eq.	0,00E+00	1,83E-04	8,54E-03	0,00E+00	-5,13E-02
GWP-fossil	kg CO ₂ eq.	0,00E+00	1,83E-04	8,47E-03	0,00E+00	-5,10E-02
GWP-biogenic	kg CO ₂ eq.	0,00E+00	8,10E-08	5,75E-05	0,00E+00	-3,28E-04
GWP- luluc	kg CO ₂ eq.	0,00E+00	7,38E-08	1,31E-05	0,00E+00	3,47E-05
ODP	kg CFC 11 eq.	0,00E+00	3,57E-12	5,38E-11	0,00E+00	-7,26E-10
AP	mol H+ eq.	0,00E+00	5,18E-07	1,95E-05	0,00E+00	8,27E-04
EP-freshwater	kg P eq.	0,00E+00	1,37E-08	2,44E-06	0,00E+00	-1,08E-01
EP- marine	kg N eq.	0,00E+00	1,53E-07	5,42E-06	0,00E+00	-2,40E-05
EP-terrestrial	mol N eq.	0,00E+00	1,66E-06	3,85E-05	0,00E+00	-1,27E-04
POCP	kg NMVOC eq.	0,00E+00	8,16E-07	1,23E-05	0,00E+00	-7,95E-05
ADP-minerals & metals	kg Sb eq.	0,00E+00	5,31E-10	5,54E-08	0,00E+00	-2,13E-06
ADP-fossil	MJ	0,00E+00	2,73E-03	6,14E-02	0,00E+00	-8,89E-01
WDP	m ³	0,00E+00	1,49E-05	1,87E-03	0,00E+00	1,01E-02

Mandatory impact category indicators according to EN 15804 (corresponding scenario 100% incineration)

Results per declared unit						
Indicator	Unit	C1	C2	C3	C4	D
GWP- total	kg CO ₂ eq.	0,00E+00	2,91E-04	5,23E-02	0,00E+00	-2,35E-02
GWP-fossil	kg CO ₂ eq.	0,00E+00	2,91E-04	5,23E-02	0,00E+00	-2,33E-02
GWP-biogenic	kg CO ₂ eq.	0,00E+00	1,71E-07	3,40E-06	0,00E+00	-2,31E-04
GWP- luluc	kg CO ₂ eq.	0,00E+00	1,09E-07	4,11E-07	0,00E+00	-2,35E-05
ODP	kg CFC 11 eq.	0,00E+00	6,60E-12	1,66E-11	0,00E+00	-2,11E-10
AP	mol H+ eq.	0,00E+00	7,07E-07	1,20E-05	0,00E+00	-7,42E-05
EP-freshwater	kg P eq.	0,00E+00	2,13E-08	1,72E-07	0,00E+00	-7,94E-03
EP- marine	kg N eq.	0,00E+00	1,86E-07	6,80E-06	0,00E+00	-2,08E-05
EP-terrestrial	mol N eq.	0,00E+00	2,01E-06	5,79E-05	0,00E+00	-1,98E-04
POCP	kg NMVOC eq.	0,00E+00	1,18E-06	1,46E-05	0,00E+00	-5,98E-05
ADP-minerals & metals	kg Sb eq.	0,00E+00	8,67E-10	3,65E-09	0,00E+00	-1,71E-07
ADP-fossil	MJ	0,00E+00	4,42E-03	9,84E-03	0,00E+00	-3,34E-01
WDP	m ³	0,00E+00	2,57E-05	3,48E-03	0,00E+00	-4,72E-03

Mandatory impact category indicators according to EN 15804 (corresponding scenario 100% disposal)

Results per declared unit						
Indicator	Unit	C1	C2	C3	C4	D
GWP- total	kg CO ₂ eq.	0,00E+00	1,83E-04	0,00E+00	5,96E-03	-3,36E-03
GWP-fossil	kg CO ₂ eq.	0,00E+00	1,83E-04	0,00E+00	4,75E-04	-3,35E-03
GWP-biogenic	kg CO ₂ eq.	0,00E+00	8,10E-08	0,00E+00	5,48E-03	-7,76E-06
GWP- luluc	kg CO ₂ eq.	0,00E+00	7,38E-08	0,00E+00	1,42E-07	1,66E-06
ODP	kg CFC 11 eq.	0,00E+00	3,57E-12	0,00E+00	4,77E-12	6,87E-12
AP	mol H+ eq.	0,00E+00	5,18E-07	0,00E+00	1,75E-06	5,79E-05
EP-freshwater	kg P eq.	0,00E+00	1,37E-08	0,00E+00	6,26E-07	-7,93E-03
EP- marine	kg N eq.	0,00E+00	1,53E-07	0,00E+00	8,03E-06	-1,94E-06
EP-terrestrial	mol N eq.	0,00E+00	1,66E-06	0,00E+00	5,95E-06	-1,06E-05
POCP	kg NMVOC eq.	0,00E+00	8,16E-07	0,00E+00	3,63E-06	-1,16E-06
ADP-minerals & metals	kg Sb eq.	0,00E+00	5,31E-10	0,00E+00	3,40E-10	-1,51E-07
ADP-fossil	MJ	0,00E+00	2,73E-03	0,00E+00	4,40E-03	-3,37E-02
WDP	m ³	0,00E+00	1,49E-05	0,00E+00	1,90E-04	8,24E-04

Variation of core environmental performance indicators

In accordance with the regulations, the variation between the highest and lowest environmental impact indicator results (mandatory and additional) for modules A to C is declared.

The thickest cable within the product group is assumed to have the highest environmental impact results and the thinnest cable is assumed to have the lowest environmental impact results. The variation between products is mainly subjected to material weight, due to green energy in production.

LCA result of one declared unit product (A-C)	Unit	Min	Representative	Max
GWP – total	kg CO ₂ eq.	-0,90%	1,23E-01	198,26%
GWP – fossil	kg CO ₂ eq.	-0,09%	1,20E-01	198,29%
GWP – biogenic	kg CO ₂ eq.	-0,07%	2,83E-03	196,31%
GWP – LULUC	kg CO ₂ eq.	-0,03%	1,58E-04	198,65%
Ozone depletion pot.	kg CFC 11 eq.	-0,42%	5,33E-09	198,48%
Acidification potential	mol H+ eq.	-0,01%	5,85E-03	198,74%
EP-freshwater	kg P eq.	-0,38%	2,99E-05	198,58%
EP-marine	kg N eq.	-0,38%	2,91E-04	198,67%
EP-terrestrial	mol N eq.	-0,02%	4,11E-03	198,70%
POCP ("smog")	kg NMVOC eq.	-0,04%	1,25E-03	198,63%
ADP-minerals & metals	kg Sb eq.	0,00%	1,39E-04	198,75%
ADP-fossil resources	kg CO ₂ eq.	-0,66%	1,75E+00	198,05%
Water use	kg CO ₂ eq.	-0,15%	7,24E-02	198,64%
Particulate matter	Incidence	-0,08%	1,43E-08	198,69%
Ionizing radiation	kBq U235e	-0,03%	1,03E-02	198,54%
Ecotoxicity (freshwater)	CTUe	0,00%	5,21E+01	198,74%
Human toxicity, cancer	CTUh	0,00%	1,05E-09	198,74%
Human tox. non-cancer	CTUh	0,00%	7,67E-08	198,75%
SQP	-	-0,08%	2,14E+00	198,63%
GWP-GHG	kg CO ₂ eq.	-0,09%	1,20E-01	198,29%

Note. For example, if the variation between the values 9 and 10 is calculated, the following calculation shall be made: $1/9.5 \cdot 100 = 10.526... \% \approx 11\%$ (with two decimals).

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
EN	European Norm (Standard)
EPD	Environmental Product Declaration
EF	Environmental Footprint
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
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	Use of renewable primary energy excluding renewable primary energy resources used as raw materials (MJ)
PERM	Use of renewable primary energy resources used as raw materials (MJ)
PERT	Total use of renewable primary energy resources (MJ)
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (MJ)
PENRM	Use of non-renewable primary energy resources used as raw materials (MJ)
PENRT	Total use of non-renewable primary energy resources (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)
Waste Indicators	
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	

Abbreviation	Definition
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
MJ	Megajoule
kg	Kilogram
m ³	Cubic Meter
NM VOC	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
REACH	Registration, Evaluation, Authorisation, and Restriction of Chemicals
ppm	Parts per million
PEF	Product Environmental Footprint
PPP	Polluter pays principle
EU	Europe
GLO	Global

REFERENCES

- a) ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.
- b) ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.
- c) ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.
- d) General Programme Instructions of International EPD System (version 5.0.1) (2025-02-07)
- e) PCR 2019:14 Construction products (EN 15804+A2) (version 2.0.1) (2025-06-05)
- f) PCR 2019:14-c-PCR-019 Electrical cables and wires (for construction sector) (c-PCR to PCR 2019:14) (Adopted from EPD Norway) (2022-03-01)
- g) EN 15804+A2 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.
- h) EN 15941:2024. Sustainability of construction works – Data quality for environmental assessment of products and construction works – Selection and use of data.
- i) Life-cycle assessment background report " H07Z1-U / H07Z1-R / H07Z1-K power cables with HFFR insulation"
- j) Ecoinvent v3.11 (2024), One Click LCA 7.6 databases.
- k) One Click LCA version 0.52.3. LCA software.

VERSION HISTORY

Original Version of the EPD, 2026-06-15

ANNEX 1

Series of cables that falls into the product group are presented below.

H07Z1-U

- H07Z1-U 1x1,5
- H07Z1-U 1x2,5
- H07Z1-U 1x4
- H07Z1-U 1x6
- H07Z1-U 1x10

H07Z1-R

- H07Z1-R 1x1,5
- H07Z1-R 1x2,5
- H07Z1-R 1x4
- H07Z1-R 1x6
- H07Z1-R 1x10
- H07Z1-R 1x16
- H07Z1-R 1x25
- H07Z1-R 1x35
- H07Z1-R 1x50
- H07Z1-R 1x70
- H07Z1-R 1x95
- H07Z1-R 1x120
- H07Z1-R 1x150
- H07Z1-R 1x185
- H07Z1-R 1x240
- H07Z1-R 1x300
- H07Z1-R 1x400
- H07Z1-R 1x500
- H07Z1-R 1x630

H07Z1-K

- H07Z1-K 1x1,5
- H07Z1-K 1x2,5
- H07Z1-K 1x4
- H07Z1-K 1x6
- H07Z1-K 1x10
- H07Z1-K 1x16
- H07Z1-K 1x25
- H07Z1-K 1x35
- H07Z1-K 1x50
- H07Z1-K 1x70
- H07Z1-K 1x95
- H07Z1-K 1x120
- H07Z1-K 1x150
- H07Z1-K 1x185
- H07Z1-K 1x240



INTERNATIONAL EPD SYSTEM

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