Environmental Product Declaration

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

BFSI PH 120 / (N)HXH (FRHF) FE180/E90 PH 120 – halogen-free, low smoke, fire resistant power cables with Cu conductors

from TT kabeli d.o.o.

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	EPD-IES-0022411
Publication date:	2025-05-21
Valid until:	2030-05-21

EPD of multiple products, based on a representative product
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 15804:2012+A2:2019 serves as the Core Product Category Rules (PCR)
PCR 2019:14 Construction Products (EN 15804:2012+A2:2019), Version 1.3.4. (2024-04-30) 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)
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)
LCA accountability: Urtė Valdavičė, UAB Vesta consulting
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: Jaka Jelenc (EPD Lead verifier), Camilla Landén 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

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

Contact: Eugen Šušak, info@ttcables.com

Description of the organisation: 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, 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. More information can be found here: https://www.ttcables.com/

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 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.

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

Product information

Product name: BFSI PH 120 / (N)HXH (FRHF) FE180/E90 PH 120 – halogen-free, low smoke, fire resistant power cables with Cu conductors.

Product group: The EPD covers BFSI PH 120 and (N)HXH (FRHF) FE180/E90 PH 120 cables.

Representative product: **BFSI 4x16 RM/16 PH 120** cable 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 2024.

Representative product description: The BFSI cables are advanced halogen-free, fire-resistant solutions designed for demanding electrical installations where safety and performance under fire conditions are critical. The BFSI cables features copper conductors (Class 2, according to EN 60228). The conductors are insulated with a dual-layer system consisting of mica tape and an outer layer of XLPE (cross-linked polyethylene) compound. A bedding layer, made of either an extruded elastomere or plastomere halogen-free compound or plastic halogen-free tape, is applied over the insulation. The cable includes a concentric conductor composed of copper (Cu) wires with a counter helix of copper (Cu) tape. The outermost layer is a sheath made of HFFR (Halogen-Free Flame Retardant) compound, type ST8 according to IEC 60502-1.

Series of cables that falls into the product group is listed in Annex 1

Representative product application areas: The **BFSI 4x16 RM/16** cable is engineered for critical installations in high-safety areas, such as industrial complexes, power stations, public buildings, hotels, underground railway systems, and hospitals. It is ideal for use indoors, in cable ducts, underground, and

in open-air settings. Although not designed for use in water, the cable can be laid directly in the ground when installed properly in accordance with the REN Leaf 9000 guidelines.

Representative product technical data:

Technical Characteristics	Standards	BFSI Cables
Test Voltage	HD 604 5D, IEC 60502-1	4 kV
Rated Voltage	HD 604 5D, IEC 60502-1	0.6/1 kV
Bending Radius (Min)	HD 604 5D, IEC 60502-1	Single-core: 15D, Multicore: 12D
Min. Laying Temperature	HD 604 5D, IEC 60502-1	-20°C
Lowest Temperature for Fixed Installation	HD 604 5D, IEC 60502-1	-40°C
Max. Working Temperature	HD 604 5D, IEC 60502-1	90°C
Max. Short-Circuit Temperature	HD 604 5D, IEC 60502-1	250°C
Circuit Integrity (E90)	DIN 4102-12	According to DIN 4102-12

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

Geographical scope: Global

LCA information

Declared unit: in accordance with the PCR the declared unit is 1 meter. The mass of the representative product per declared unit is 1,002 kg.

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

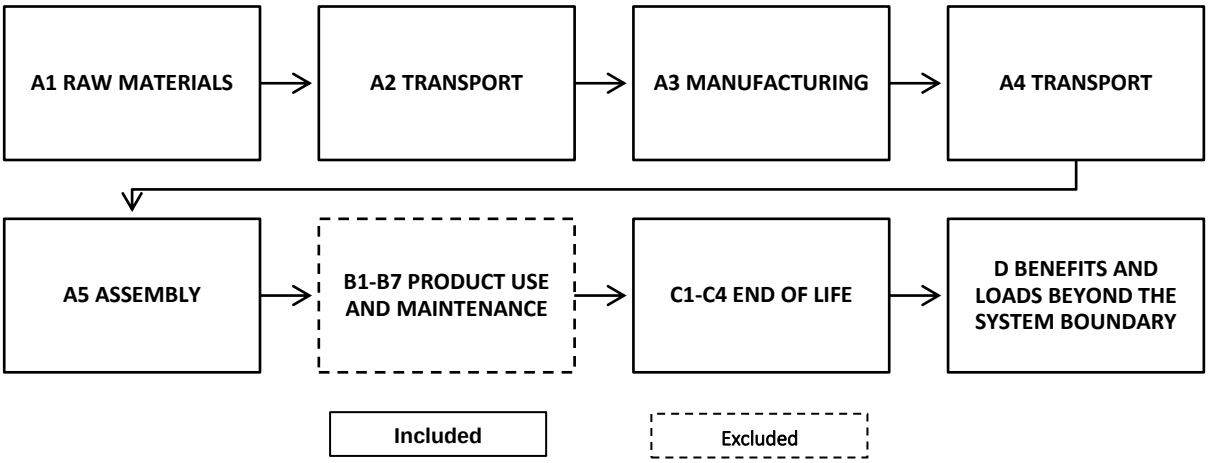
Time representativeness: Primary data was collected internally. The production data refers to the time period of 2024. This is the last full year data.

Database(s) and LCA software used: The Ecoinvent database provides the life cycle inventory data for the raw and process materials obtained from the background system. The used database is Ecoinvent 3.10.1. The LCA software used is One Click LCA.

Data quality: The foreground data collected internally is based on yearly production amounts and extrapolations of measurements on specific machines and plants. Overall, the data quality can be described as good. The primary data collection has been done thoroughly.

Description of system boundaries: the EPD cover the cradle to gate with options scope with following modules: A1 (Raw material supply), A2 (Transport), A3 (Manufacturing), A4 (Transport), A5 (Installation), C1 (Deconstruction), C2 (Transport at end-of-life), C3 (Waste processing), C4 (Disposal) and D - benefits and loads beyond the system boundary in accordance with EN 15804:2012+A2:2019.

System diagram:



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

	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	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	GL	EU	BA	EU	EU	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Specific data used	2,64%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	+168 / -136%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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.

Cut-off criteria: The study does not exclude any modules or processes which are stated mandatory in the Standards and PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes for which data is available are included in the calculation. There is no neglected unit process more than 1% of total mass and energy flows. The total excluded input and output flows do not exceed 5% of energy usage or mass.

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 in the Ecoinvent 3.10.1 datasets used in this study follow the Ecoinvent system model 'Allocation, cut-off, EN15804'. 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.

Calculation rules for averaging data: The EPD is an EPD of multiple products, based on a representative product. **BFSI 4x16 RM/16 PH 120** 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.

Product life cycle

Product stage (A1-A3)

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

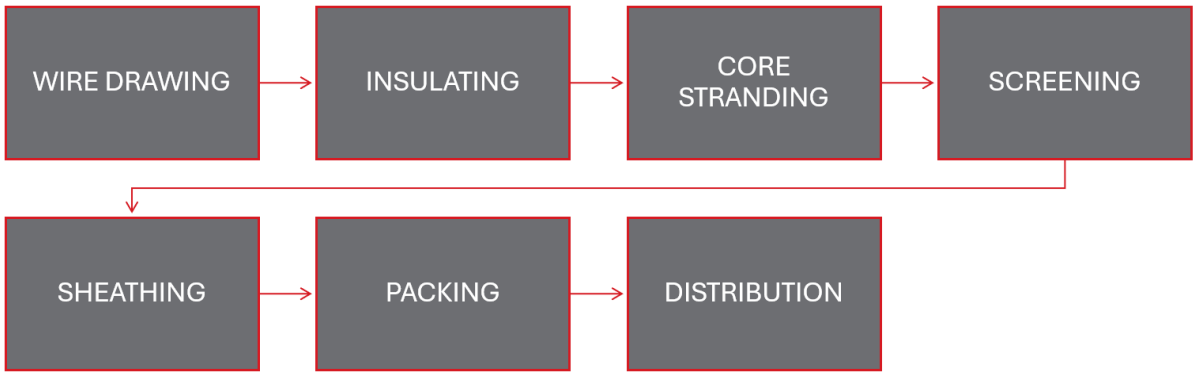
A2: The raw materials are transported to the manufacturing plant. In this case the model includes road transportation of each raw material.

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 process of BFSI cables involves a carefully controlled sequence to ensure compliance with electrical, mechanical, and fire safety standards. First, the process begins with the formation of Class 2 stranded copper conductors, as per EN 60228, chosen for their superior conductivity and flexibility. Next, these conductors are wrapped with a mica tape, providing a primary barrier against fire. An XLPE (cross-linked polyethylene) insulation layer is then extruded over the taped conductors, ensuring high thermal and electrical resistance. Following insulation, an extruded bedding layer made of elastomere or plastomere is applied; this may also include halogen-free compounds or halogen-free tapes to enhance flame-retardant and low-smoke characteristics. Subsequently, a concentric conductor is constructed by helically winding copper wires and reinforcing them with a counter-helix of copper tape, which improves electromagnetic shielding and fault current capacity. The next step is the application of the outer sheath, using Halogen-Free Flame Retardant (HFFR) material, type ST8 as per IEC 60502-1, which offers mechanical protection and ensures the cable meets stringent fire performance standards. After sheathing, the cables undergo quality testing and inspection to verify compliance. Once approved, they are packaged, typically on drums or reels to prevent damage during handling. The final stage is distribution, where the packaged cables are stored, logged, and shipped to customers or project sites according to demand.

The manufacturing process diagram is presented below.



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.

A5: Environmental impacts from installation into the building (A5) include the generation and treatment of packaging waste at the construction site (100% incineration rate with energy recovery). No product losses during installation stage are estimated, based on client's data. No energy use has been quantified since installation in buildings is often done by manual labour. No paint or other surface treatment for product is assumed.

Use stage (B1-B7)

This EPD does not cover the use phase.

Product end of life (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 estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed to have the same weight as the declared product. All the end-of-life products are assumed to be sent to the closest facilities such as recycling and incineration. Transportation distance to the closest disposal area is estimated as 100 km and the transportation method is assumed as lorry which is the most common option.

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

In end-of-life, it is assumed that 60 % of polymer material is collected and sent to incineration facility for energy recovery (R1, >60%) and 90 % of copper wire is collected and sent to a recycling site. Product packaging after installation (A5) will also be incinerated with energy recovery.

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.

Benefits and loads beyond the system boundary (D):

In the end-of-life scenario D, copper is recovered and recycled into post-consumer copper, offsetting the need for virgin copper production. Additionally, a portion of the product and its packaging is incinerated with energy recovery, reducing the demand for non-renewable energy sources such as natural gas.

Content information

The table below represents the product and packaging material content information for 1 meter of the representative product **BFSI 4x16 RM/16 PH 120**.

Product components	**Weight, kg/m**	**Post-consumer material, weight-%**	**Biogenic material, weight-% and g C/kg**
Copper (conductor)	6,05E-01	0	0
XLPE (insulation)	4,58E-02	0	0
HFFR (Sheath)	3,07E-01	0	0
XLPE catalyst	2,29E-03	0	0
MB-XLPE (colour insulation)	4,58E-04	0	0
MB-EVA (bedding)	4,73E-03	0	0
PP tape (bedding)	2,65E-03	0	0
Mica tape (insulation)	2,17E-02	0	0
Cu tape (concentric conductor)	1,24E-02	0	0
TOTAL	**1,00E+00**	**0**	**0**
Packaging materials	**Weight, kg/m**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C**
[1]Wooden drum (wood)	2,79E-01	27,8	[2] 1,85E+00
Wooden drum (metal)	8,62E-03	0,86	0
Thermal cap	8,80E-04	0,09	0
TOTAL	**2,88E-01**	**28,78**	**1,85E+00**

[1]Global Warming Potential biogenic: -1.81 kg CO_2e / kg
[2] Conversion factor for converting kg CO_2 to kg C: 44/12 = 3.67

All EPDs products do not contain any REACH SVHC substances in amounts greater than 0.1% (1000 ppm).

Results of the environmental performance indicators

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.

Usage of results from A1-A3 without considering the results of module C is not encouraged.

The declared unit is 1 m of **BFSI 4x16 RM/16 PH 120** cable. The mass of the representative product per declared unit is 1,002 kg/m.

Mandatory impact category indicators according to EN 15804:2012+A2:2019 (Reference package EF3.1)

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	6,02E+00	2,58E-01	5,12E-01	0,00E+00	1,04E-02	5,62E-01	8,24E-03	-1,33E+00
GWP-fossil	kg CO_2 eq.	6,51E+00	2,58E-01	7,46E-03	0,00E+00	1,04E-02	5,62E-01	8,23E-03	-1,33E+00
GWP-biogenic	kg CO_2 eq.	-5,05E-01	0,00E+00	5,05E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-luluc	kg CO_2 eq.	1,13E-02	1,01E-04	2,40E-06	0,00E+00	4,03E-06	1,94E-05	2,95E-06	1,58E-03
ODP	kg CFC 11 eq.	3,27E-07	5,39E-09	1,12E-10	0,00E+00	2,16E-10	3,68E-10	6,56E-11	9,39E-09
AP	mol H^+ eq.	4,04E-01	6,10E-04	5,35E-05	0,00E+00	2,45E-05	2,72E-04	2,94E-05	3,55E-02
EP-freshwater	kg P eq.	3,40E-02	1,81E-05	2,15E-06	0,00E+00	7,24E-07	9,64E-06	1,17E-05	-4,32E+00
EP-marine	kg N eq.	2,01E-02	1,60E-04	2,65E-05	0,00E+00	6,42E-06	1,04E-04	2,21E-04	-2,26E-04
EP-terrestrial	mol N eq.	2,77E-01	1,73E-03	2,57E-04	0,00E+00	6,94E-05	9,73E-04	9,50E-05	3,03E-03
POCP	kg NMVOC eq.	8,17E-02	1,06E-03	7,18E-05	0,00E+00	4,25E-05	2,61E-04	5,64E-05	1,85E-03
ADP-minerals&metals*	kg Sb eq.	9,67E-03	7,39E-07	1,77E-08	0,00E+00	2,96E-08	9,12E-07	6,25E-09	-7,41E-05
ADP-fossil*	MJ	9,71E+01	3,88E+00	8,44E-02	0,00E+00	1,56E-01	2,72E-01	6,04E-02	-1,08E+01
WDP*	m^3	4,66E+00	1,99E-02	9,63E-03	0,00E+00	7,97E-04	3,91E-02	5,74E-04	6,09E-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								

** 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 declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG	kg CO2 eq.	6,52E+00	2,58E-01	7,46E-03	0,00E+00	1,04E-02	5,62E-01	8,24E-03	-1,33E+00
Particulate matter	Incidence	9,42E-07	2,52E-08	8,11E-10	0,00E+00	1,01E-09	2,63E-09	4,26E-10	1,45E-07
Ionizing radiation	kBq U235e	6,39E-01	4,68E-03	9,91E-05	0,00E+00	1,88E-04	1,59E-03	1,27E-04	1,78E-01
Ecotoxicity (freshwater)	CTUe	3,56E+03	4,57E-01	3,57E-02	0,00E+00	1,83E-02	1,18E+00	1,53E+00	4,00E+01
Human toxicity, cancer	CTUh	1,57E-01	4,30E-11	8,84E-12	0,00E+00	1,73E-12	5,78E-11	4,92E-12	-1,78E-08
Human tox. non-cancer	CTUh	4,12E-01	2,51E-09	5,90E-10	0,00E+00	1,01E-10	2,39E-09	7,32E-10	6,70E-07
SQP	-	1,70E+02	3,91E+00	5,62E-02	0,00E+00	1,57E-01	3,51E-01	1,14E-01	1,94E+01

Resource use indicators

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,33E+01	6,32E-02	-4,88E+00	0,00E+00	2,53E-03	3,52E-02	-1,41E+00	-6,77E+00
PERM	MJ	2,84E+00	0,00E+00	-2,84E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,62E+01	6,32E-02	-7,72E+00	0,00E+00	2,53E-03	3,52E-02	-1,41E+00	-6,77E+00
PENRE	MJ	8,09E+01	3,88E+00	8,44E-02	0,00E+00	1,56E-01	-8,12E+00	-8,65E-01	-7,58E+00
PENRM	MJ	1,51E+01	0,00E+00	-4,27E-02	0,00E+00	0,00E+00	-9,04E+00	-6,03E+00	0,00E+00
PENRT	MJ	9,60E+01	3,88E+00	4,18E-02	0,00E+00	1,56E-01	-1,72E+01	-6,89E+00	-7,58E+00
SM	kg	2,59E-01	1,68E-03	1,12E-04	0,00E+00	6,73E-05	2,99E-04	1,90E-05	5,44E-01
RSF	MJ	1,73E-03	2,12E-05	4,64E-07	0,00E+00	8,49E-07	1,26E-05	3,39E-07	2,85E+00
NRSF	MJ	6,69E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	1,86E-01	5,73E-04	6,45E-05	0,00E+00	2,30E-05	7,08E-04	-5,67E-04	2,35E-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								

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

Waste indicators

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1,66E+00	5,61E-03	1,93E-03	0,00E+00	2,25E-04	1,05E-02	1,47E-04	-6,21E-01
Non-hazardous waste disposed	kg	1,23E+02	1,12E-01	2,97E-01	0,00E+00	4,51E-03	2,94E-01	7,88E-01	1,82E+01
Radioactive waste disposed	kg	2,46E-04	1,16E-06	2,46E-08	0,00E+00	4,64E-08	4,08E-07	3,10E-08	-4,32E-04

Output flow indicators

Results per declared unit									
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**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	0,00E+00	0,00E+00
Material for recycling	kg	4,37E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,44E-01	0,00E+00	0,00E+00
Materials for energy recovery	kg	0,00E+00	0,00E+00	2,88E-01	0,00E+00	0,00E+00	2,31E-01	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	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	0,00E+00	0,00E+00

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.

Variation of results		
Indicator	**Unit**	**A – C**
GWP-total	kg CO_2 eq.	191%
GWP-fossil	kg CO_2 eq.	191%
GWP-biogenic	kg CO_2 eq.	-
GWP-luluc	kg CO_2 eq.	195%
ODP	kg CFC 11 eq.	194%
AP	mol H^+ eq.	197%
EP-freshwater	kg P eq.	164%
EP-marine	kg N eq.	196%
EP-terrestrial	mol N eq.	197%
POCP	kg NMVOC eq.	196%
ADP-minerals&metals	kg Sb eq.	197%
ADP-fossil	MJ	189%
WDP	m^3	196%

Variation results		
Indicator	**Unit**	**A – C**
GWP-GHG	kg CO2 eq.	191%
Particulate matter	Incidence	196%
Ionizing radiation	kBq U235e	195%
Ecotoxicity (freshwater)	CTUe	197%
Human toxicity, cancer	CTUh	179%
Human tox. non-cancer	CTUh	179%
SQP	-	188%

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

Additional environmental information

Manufacturing energy scenario documentation

Scenario parameter	Global warming potential (A1-A3) value	Source
Renewable energy mix	0.0074 kg CO_{2e} / kWh	Elektroprivreda BiH d.d. Sarajevo (EPBIH) energy generation power balance (2022) https://www.epbih.ba/eng/page/about-company#power-balance Data source: ecoinvent 3.10.1
Market for diesel, burned in building machine (Reference product: diesel, burned in building machine)	0.0278 kg CO_{2e} / kWh	Country: World Data source: ecoinvent 3.10.1
Market for propane, burned in building machine (Reference product: propane, burned in building machine)	0.0262 kg CO_{2e} / kWh	Country: World Data source: ecoinvent 3.10.1

Transport to the building site scenario documentation

Scenario information	Value
Vehicle type used for transport	Market for transport, freight, lorry >32 metric ton, EURO6
Distance, km	1936
Capacity utilisation (including empty returns), %	100
Weight of transported products with packaging	1,29E+00 kg/m
Volume capacity utilisation factor	1

End-of-life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	1,00E+00
Collection process – kg collected with mixed waste	-
Recovery process – kg for re-use	-
Recovery process – kg for recycling	5,44E-01
Recovery process – kg for energy recovery	2,31E-01
Disposal (total) – kg for final deposition	2,27E-01
Scenario assumptions e.g. transportation	Dismantled product is transported 100 km

References

Standards and PCR

1. General Programme Instructions of the international EPD® system. Version 4.0.
2. PCR 2019:14 Construction Products (EN 15804:2012+A2:2019) version 1.3.4 (2024-04-30)
3. 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)
4. EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.
5. ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.
6. ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.
7. ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.
8. Cables LCA background report.

Data references:

1. One Click LCA tool
2. Ecoinvent database v3.10.1 (2024)

Annex 1

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

- BFSI 4x16 RM/16 / PH 120
- BFSI 4x70 SM/35 / PH 120
- BFSI 4x35 SM/16 / PH 120
- BFSI 4x25 RM/16 / PH 120
- BFSI 4x120 SM/70 / PH 120
- BFSI 4x10 RM/10 / PH 120
- BFSI 3x50 RM/25 / PH 120
- BFSI 3x25 RM/16 / PH 120
- BFSI 3x16 RM/16 / PH 120

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