GlobalEPD

A VERIFIED ENVIRONMENTAL DECLARATION

AENOR

ECO PLATFORM EPD VERIFIED

EPD INTERNATIONAL EPD SYSTEM

EPD® International ref. number
EPD-IES-0025882

CABLES

AFIRENAS X RZ1-K (AS) 0.6/1 kV
AFIRENAS MULTIPLE RZ1-K (AS) 0.6/1 kV
AFIRENAS DI-X RZ1-K (AS) 0.6/1 kV

Environmental Product Declaration

EN ISO 14025:2010
EN 15804:2012+A2:2019

Date of issue:	2025-07-30
Expiration Date:	2030-07-29

The declared validity is subject to registration and publication in www.aenor.com

Registration code: GlobalEPD EN15804-153

MIGUELEZ, S.L.U.

Miguélez CABLES

AFIRENAS X RZ1-K (AS) 0,6/1 kV

AFIRENAS DI-X RZ1-K (AS) 0,6/1 kV

The holder of this Statement is responsible for its content, as well as for keeping during the period of validity the supporting documentation that justifies the data and statements that are included.

Holder of the Declaration

MIGUELEZ, S.L.U.

Avda. Párroco Pablo Díez, 157
24010 – León
Spain

Tel. (+34) 987 84 51 00
Mail: miguelez@miguelez.com
Web: www.miguelez.com

LCA Study

Miranda de Ebro Technology Centre Foundation, CTME

Pol. Ind. Bayas
C/ Montañana, R60-61
09200 - Miranda de Ebro
Spain

Tel. (+34) 947 33 15 15
Mail secretaria@ctme.es
Web www.ctme.es

GlobalEPD Program Manager

AENOR CONFIA, S.A.U.

C/ Génova 6
28004 – Madrid
Spain

Tel. (+34) 902 102 201
Mail: aenordap@aenor.com
Web: www.aenor.com

AENOR is a founding member of ECO Platform, the European Association of Environmental Product Declaration Verification Programmes.

The European Standard EN 15804:2012+A2:2019 serves as CPR
Independent verification of the declaration and data, in accordance with the EN ISO 14025:2010 Standard ☐ Internal ☒ External
Verification Body AENOR Product certification body accredited by ENAC with accreditation No. 1/C-PR468

1. General information

1.1. The organization

MIGUÉLEZ is a leading Spanish company in the manufacture of low voltage electrical cables.

Founded in 1951 in León, the company has expanded globally, consolidating itself in Europe, Latin America, and other regions, thanks to its focus on innovation, quality, and adaptation to market needs.

Its offer covers a wide range of products that include specific cables to meet the requirements of sectors such as construction, infrastructure and civil engineering works.

The company stands out for its commitment to the quality and safety of its products, complying with international standards.

At the same time, it has an extensive infrastructure for marketing and logistics, made up of a network of fifteen logistics centres, nine of them in Spain. The Cable Logistics Centre, with 32,000 m², inaugurated in 2019, located in the Villadangos del Páramo Industrial Estate (León) and considered one of the most modern in Europe, from which Europe, America and the rest of the world is supplied.

MIGUÉLEZ is committed to the highest quality. Since 1995, it has been AENOR and IQNET certified for its Quality Management System (QMS) according to the ISO 9001 standard, which guarantees excellence in production processes.

It has a strong commitment to sustainability and respect for the environment. Its production processes integrate measures to reduce environmental impact, including the recycling of materials and the use of renewable energies. In its global strategy, the company also prioritizes proximity to the customer, providing a technical service that guarantees a quick and personalized response. Thanks to these values and its innovative vision, MIGUÉLEZ has positioned itself as a benchmark in the electrical cable sector, contributing to infrastructure projects worldwide.

Its production centre, with a surface area of more than 100,000 m2, is located in Trobajo del Camino (León - SPAIN).

It also has product quality certifications issued by entities such as AENOR, <HAR>, UL, LCIE, BUREAU VERITAS and CESMEC, among others, as well as numerous approvals from some of the most prestigious public and private institutions.

As a company committed to the environment, MIGUÉLEZ complies with Corporate Social Responsibility (CSR) standards, ensuring sustainable and ethical practices and participates in several initiatives in the electricity sector for the preservation of the planet, as demonstrated by the active collaboration with various environmental committees of different public and private organizations and institutions. In addition, the environmental actions are reflected in the Environmental Management System (EMS) that it has implemented in accordance with the ISO 14001 standard.

For this reason, all its products comply with the RoHS Directive on the Restriction of Certain Hazardous Substances in Electrical and Electronic Equipment, thus offering effective, sustainable and environmentally friendly solutions.

1.2. Scope of the Declaration

This Environmental Product Declaration, hereinafter EPD, represents the environmental profile of the range of AFIRENAS X, AFIRENAS MULTIPLE and afirenas di-x RZ1-K (AS) 0.6/1 kV low-voltage electrical cables (Article Group 207; 209). It provides information on the results of the potential environmental impact related to the life cycle of the representative product of the range, selected for being the one with the highest production and sales of the range, together with the cable with the lowest and highest environmental load, in order to determine the range of environmental impacts of the range of cables under study.

This range of cables is manufactured entirely in the MIGUÉLEZ production plant, located in Trobajo del Camino (León, Spain). It is a EPD, which covers a range of products consisting of RZ1-K (AS) 0.6/1 kV type low voltage cable, manufactured by MIGUÉLEZ in accordance with:

- UNE 21123-4 Standard. Electrical cables for industrial use with an assigned voltage of 0.6/1 kV. Part 4: Cables with cross-linked polyethylene insulation and polyolefin sheath.
- IEC 60502-1 standard. Extruded insulated power cables and their accessories for nominal voltages from 1 kV to 30 kV.

The AFIRENAS X, AFIRENAS MULTIPLE and AFIRENAS DI-X RZ1-K (AS) 0.6/1 kV product range complies with the safety requirements set out in the Low Voltage DIRECTIVE 2014/35/EU of 26 February 2014 on the harmonisation of the laws of the Member States relating to the placing on the market of electrical equipment intended for use within certain voltage limits.

1.3. Lifecycle and compliance.

This EPD has been developed and verified in accordance with UNE - EN 15804:2012+A2:2020 Sustainability in construction. Environmental product declarations. Basic Product Category Rules for Construction Products, UNE-EN ISO 14025:2010 Environmental Labels and Declarations. Type III environmental declarations. Principles and procedures.

CPR Information

CATEGORY RULES INFORMATION PRODUCT	
Descriptive title	Sustainability in construction. Environmental product declarations. Basic Product Category Rules for Building Products
Date of issue	2020
Code and version	UNE-EN 15804:2012+A2:2020
Conformity	UNE-EN 15804:2012 + A2:2020
Program Manager	AENOR

This Environmental Statement includes the following stages of the life cycle:

Limits of the system.
Information modules considered

Product stage	A1	Supply of raw materials	X
	A2	Transport to factory	X
	A3	Manufacturing	X
Construction	A4	Transport to the construction site	X
	A5	Installation/Construction	X
Stage of use	B1	Use	MNA
	B2	Maintenance	MNA
	B3	Reparation	MNA
	B4	Substitution	MNA
	B5	Rehabilitation	MNA
	B6	In-Service Energy Use	X
	B7	Use of water in service	MNA
End of life	C1	Deconstruction/demolition	MNA
	C2	Transport	X
	C3	Waste treatment	X
	C4	Elimination	X
	D	Potential for reuse, recovery and/or recycling	X

X = Module included in the LCA;
MNA = Module not applicable, module equal to zero.

This EPD may not be comparable with those developed in other Programmes or according to different reference documents. Thus, this EPDmay not be comparable if the data source is different (e.g. databases), not all information modules are included or are not based on the same scenarios. The comparison of construction products must be made on the same function, the same functional unit and at the level of the building (engineering or architectural work), including the performance of the product throughout its life cycle, and the specifications of section 6.7.2 of the UNE-EN ISO 14025 Standard.

2. The product

2.1. Product Identification

UN CPC: 463;

MIGUELEZ Code: Group of Articles 207 and 209

The product is made up of three main elements:

Electrical conductor: Made up of several annealed copper wires wired together, it is the component responsible for transporting the electric current.

Insulation: An enveloping layer of extruded insulating material applied directly to the conductor and whose main functions are to withstand the electrical voltage and contain the current within the conductor, minimizing current leakage, short circuits and/or ground faults.

Sheath: Outer wrapping layer that protects insulated conductors and cable from mechanical damage and environmental or external influences.

The standard technical designation is **RZ1-K (AS) 0.6/1 kV.**

Power cable manufactured with the following construction description:

- Conductor: Annealed copper, class 5.
- Insulation: Cross-linked polyethylene (XLPE).
- Internal Fill/Sheath: Optional for multi-conductor cables. Halogen-free material compatible with the operating temperature of the cable and with the insulation and sheath material
- Outer Shell: Halogen-free thermoplastic polyolefin, type ST8 and type DMZ-E.

The range is available in single-core or multi-conductor cable formations with the following configurations:

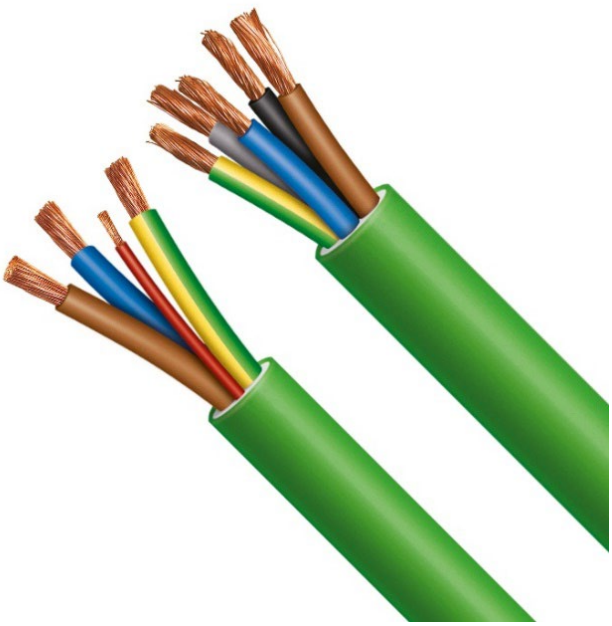
1X(1,5-...-500) mm² / 2X(1,5-...-240) mm² / (3-4)X o G(1.5-...-240) mm² / 5G(1.5-...-240) mm² / (6-...-30) X o G1.5^{mm2} / (6-...-20) X o G2.5 mm2.

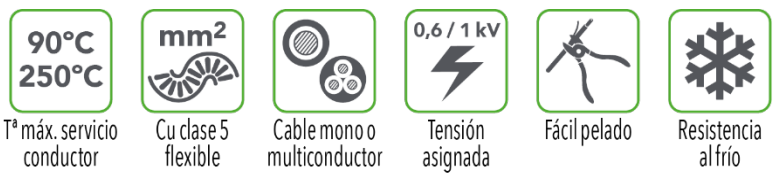
Range represented by:

- Increased production:
  - *Product Short Code*: 82070312-50
  - **AFRINEN X RZ1-K (AS) 0.6/1 kV 3G2.5 mm2**

Additional information is accompanied by the maximum variation within the range, which is obtained from the environmental impact values of:

- Minimal:
  - *Product Short Code*: 82070101-50
  - **AFIRENAS X RZ1-K (AS) 0.6/1 kV 1X1.5 mm2**
- Maximum:
  - *Product Short Code*: 82070512400
  - **AFRINE X RZ1-K (AS) 0.6/1 kV 5G240 mm2**





2.2. Product performance

RZ1-K (AS) 0.6/1 kV cables are particularly suitable for use in public places, general power lines, individual branches, distribution networks, connections, public lighting installations and industrial installations. In general, its installation is recommended whenever there is a significant risk of fire or where a low emission of smoke and corrosive toxic gases is required in the event of one occurring.

Their high flexibility makes them particularly practical in systems with complex geometry.

Product performance

BENEFIT	RESULT
Assigned Voltage (U0/A)	0.6 / 1 kV AC (1.5 kV DC)
Max. conductor temperature*	90 ºC / 250 ºC (t≤5s)
Reaction to Fire (CPR) EN 50575 and EN 13501-6	Cca-s1b,d1,a1
Opacity of the fumes EN 61034-2 and IEC 61034-2	Light transmittance > 60%
Acidity and conductivity of gases EN 60754-2 and IEC 60754-2	pH>4.3 conductivity < 2.5 µS/mm
Non-flame spreader EN 60332-1-2 and IEC 60332-1-2	Meets
Non-flame spreader EN 60332-1-2 and IEC 60332-1-2	Meets
Non-fire spreader EN 50399 (Cca), EN 60332-3-24 and IEC 60332-3-24	Meets
Halogen-free EN 60754-1 and IEC 60754-1 EN 60684-2 and IEC 60684-2	HCl < 0.5% Fluoride < 0.1%

* Normal/Short Duty (T≤ 5S)

2.3. Product Composition

The cables have the following composition:

Product Composition

MATERIAL	AFIRENAS X RZ1-K (AS) 0.6/1 kV
Copper*	23% - 82%
Polyolefin1	18% - 77%
Packing	***< 1.3% vs product***
Wood	< 0.97%
Cardboard	< 0.05%
Film**	< 0.29%

**0%, 33%; 100% recycled and ** 45% recycled*

[1] includes XLPE and halogen-free thermoplastic polyolefin.

The product does not use hazardous substances listed in the "Candidate List of Substances of Very High Concern (SVHC) for authorisation" in a percentage greater than 0.1% of the weight of the product.

AFIRENAS X **RZ1-K (AS) 0,6/1 kV**

AENOR | CPR Cca-s1b,d1,a1 | ZH: No propagador del incendio, libre de halógenos con emisión de humos y opacidad reducida — IEC 60332-1-2, IEC 60332-3-24, IEC 60754-1, IEC 60754-2, IEC 61034-2

AFIRENAS DI-X **RZ1-K (AS) 0,6/1 kV**

AENOR | CPR Cca-s1b,d1,a1 | ZH: No propagador del incendio, libre de halógenos con emisión de humos y opacidad reducida — IEC 60332-1-2, IEC 60332-3-24, IEC 60754-1, IEC 60754-2, IEC 61034-2

Código	Nº de conductores y sección nominal mm^2	Espesor aislamiento mm	Diámetro exterior mm	Peso kg/km	Resistencia eléctrica máx. a 20ºC en CC Ω/km
82070101-50	1 X 1,5	0,7	6,0	50	13,3
82070101-50	1 X 1,5	0,7	6,0	50	13,30
82070102-50	1 X 2,5	0,7	6,4	59	7,98
82070100040	1 X 4	0,7	6,7	72	4,95
82070100060	1 X 6	0,7	7,6	102	3,30
82070100100	1 X 10	0,7	8,7	146	1,91
82070100160	1 X 16	0,7	9,7	205	1,21
82070100250	1 X 25	0,9	11,2	292	0,78
82070100350	1 X 35	0,9	12,3	287	0,55
82070100500	1 X 50	1,0	14,1	530	0,39
82070100700	1 X 70	1,1	15,9	720	0,27
82070100950	1 X 95	1,1	18,0	954	0,21
82070101200	1 X 120	1,2	19,7	1190	0,16
82070101500	1 X 150	1,4	22,0	1474	0,13
82070101850	1 X 185	1,6	24,3	1798	0,11
82070102400	1 X 240	1,7	27,0	2330	0,08
82070103000	1 X 300	1,8	31,5	2900	0,06
82070104000	1 X 400	2,0	35,0	3650	0,05
82070105000	1 X 500	2,2	42,5	5010	0,04
82070201-50	2 X 1,5	0,7	9,5	128	13,30
82070202-50	2 X 2,5	0,7	11,0	178	7,98
82070200040	2 X 4	0,7	12,0	228	4,95
82070200060	2 X 6	0,7	12,9	267	3,30
82070200100	2 X 10	0,7	15,5	420	1,91
82070200160	2 X 16	0,7	17,9	580	1,21
82070200250	2 X 25	0,9	20,6	861	0,78
82070311-50	3 G 1,5	0,7	10,3	156	13,30
82070312-50	3 G 2,5	0,7	11,3	197	7,98
82070310040	3 G 4	0,7	12,6	265	4,95
82070310060	3 G 6	0,7	13,9	341	3,30
82070310100	3 G 10	0,7	16,8	531	1,91
82070300160	3 X 16	0,7	18,4	710	1,21
82070300250	3 X 25	0,9	21,7	1018	0,78
82070300350	3 X 35	0,9	23,8	1350	0,55
82070411-50	4 G 1,5	0,7	10,9	177	13,30
82070412-50	4 G 2,5	0,7	12,1	229	7,98
82070410040	4 G 4	0,7	13,9	316	4,95
82070410060	4 G 6	0,7	15,4	422	3,30
82070410100	4 G 10	0,7	18,0	636	1,91
82070400160	4 X 16	0,7	20,7	888	1,21
82070400250	4 X 25	0,9	24,0	1275	0,78
82070400350	4 X 35	0,9	27,5	1728	0,55
82070400500	4 X 50	1,0	32,9	2418	0,39
82070400700	4 X 70	1,1	38,1	3329	0,27
82070400950	4 X 95	1,1	42,6	4344	0,21
82070401200	4 X 120	1,2	51,7	6008	0,16

Código	Nº de conductores y sección nominal mm^2	Espesor aislamiento mm	Diámetro exterior mm	Peso kg/km	Resistencia eléctrica máx. a 20ºC en CC Ω/km
82070511-50	5 G 1,5	0,7	12,0	213	13,30
82070512-50	5 G 2,5	0,7	13,4	280	7,98
82070510040	5 G 4	0,7	14,9	377	4,95
82070510060	5 G 6	0,7	16,9	513	3,30
82070510100	5 G 10	0,7	20,0	773	1,91
82070510160	5 G 16	0,7	22,7	1098	1,21
82070510250	5 G 25	0,9	27,0	1577	0,78
82070510350	5 G 35	0,9	30,2	2111	0,55
82070510500	5 G 50	1,0	35,8	2913	0,39
82070510700	5 G 70	1,1	39,1	4576	0,27
82070510950	5 G 95	1,1	44,2	5893	0,21
82090410254	2 X 25 + 1 G 16 + 1 X 1,5	0,9 / 0,7 / 0,7	20,9	930	0,780 / 1,21 / 13,3
82090410103	3 G 10 + 1 X 1,5	0,7	16,0	480	1,91 / 13,3
82090410163	3 G 16 + 1 X 1,5	0,7	17,9	666	1,21 / 13,3
82090410253	3 G 25 + 1 X 1,5	0,9 / 0,7	21,3	977	0,780 / 13,3
82090410353	3 G 35 + 1 X 1,5	0,9 / 0,7	23,8	1293	0,554 / 13,3
82090410503	3 G 50 + 1 X 1,5	1,0 / 0,7	29,4	1927	0,386 / 13,3
82090610108	5 G 10 + 1 X 1,5	0,7	20,0	741	1,91 / 13,3
82090610168	5 G 16 + 1 X 1,5	0,7	22,8	1095	1,21 / 13,3
82090610258	5 G 25 + 1 X 1,5	0,9 / 0,7	25,8	1487	0,780 / 13,3
82090610358	5 G 35 + 1 X 1,5	0,9 / 0,7	29,7	2041	0,554 / 13,3
82070611-50	6 G 1,5	0,7	12,9	224	13,3
82070612-50	6 G 2,5	0,7	14,1	292	7,98
82070711-50	7 G 1,5	0,7	12,9	240	13,3
82070712-50	7 G 2,5	0,7	14,1	317	7,98
82070811-50	8 G 1,5	0,7	14,1	270	13,3
82070812-50	8 G 2,5	0,7	15,5	358	7,98
82071011-50	10 G 1,5	0,7	16,2	331	13,3
82071012-50	10 G 2,5	0,7	17,8	441	7,98
82071211-50	12 G 1,5	0,7	16,7	378	13,3
82071212-50	12 G 2,5	0,7	18,4	507	7,98
82071411-50	14 G 1,5	0,7	17,7	422	13,3
82071412-50	14 G 2,5	0,7	19,5	571	7,98
82071611-50	16 G 1,5	0,7	18,6	466	13,3
82071612-50	16 G 2,5	0,7	20,5	635	7,98
82071811-50	18 G 1,5	0,7	19,8	519	13,3
82071812-50	18 G 2,5	0,7	21,8	709	7,98
82071911-50	19 G 1,5	0,7	20,2	541	13,3
82071912-50	19 G 2,5	0,7	22,3	740	7,98
82072011-50	20 G 1,5	0,7	20,6	562	13,3
82072012-50	20 G 2,5	0,7	22,8	771	7,98
82072411-50	24 G 1,5	0,7	22,3	669	13,3
82072711-50	27 G 1,5	0,7	23,3	732	13,3
82073011-50	30 G 1,5	0,7	24,3	794	13,3

NOTES:

The dimensional and weight values indicated are approximate and subject to normal manufacturing tolerances.

Product short code. It must be completed with the characters corresponding to the "exterior color" and "packaging" of the product. Please refer to the "Product Coding" section in the technical annexes on our website.

You can also consult the CPR-rated range and the one covered by the certifications indicated for each product, as well as much more information on the website: www.miguelez.com

With regard to the applications and installation methods indicated, the requirements established by the regulations, legislation and/or standards applicable in each particular case must be met.

3. LCA information

3.1. Life Cycle Analysis

The Life Cycle Analysis Report that supports this EPD has been developed by CTME, in accordance with the ISO 14040:2006 and ISO 14044:2006 standards, with a retrospective attributional approach, applying the principle of "modularity" and the "polluter pays" principle.

This Environmental Product Declaration is of the "cradle to grave and module D" type and has been prepared following the General Rules of the GlobalEPD program, as well as the requirements of the UNE-EN 15804:2012+A2:2020 standard.

3.2. Functional unit

Transmit energy expressed for 1A over a distance of 1 km during its reference lifetime, with the following unit fluxes:

- 1 km for manufacturing and end-of-life phases within system boundaries and benefits and impacts outside system boundaries.
- 1 km and 1A for the use stage.

3.3. Reference Shelf Life (RSL)

The reference useful life is set at 50 years and a use of 70%, given the intended use for this range, buildings with a high level of safety (PSR-001-ed4-EN2022.11.16).

These values do not constitute a presumption of the performance of the cables or the characterization of their potential useful life.

3.4. Allocation criteria

The processes of each of these manufacturing lines are clearly differentiated, so the unit processes have been divided in order to avoid the assignment of loads. However, there are no data available to quantify the inventory by unit processes, so electricity and water consumption, emissions of pollutants into the atmosphere and waste are distributed based on the physical relationship of length (km) and mass (kg).

It is worth mentioning at this point that the ecoinvent database has been taken in the "Cut Off" model, from an attributional approach.

No cut-off criteria apply.

3.5. Representativeness, quality and selection of data

The LCA has been carried out based on specific data for the year 2022, provided by MIGUÉLEZ from the only production centre located in Trobajo del Camino (León).

As a generic data source, the SimaPro v 9.5.0.1 software has been used together with the Ecoinvent version 3.9.1 database. In the evaluation method, the characterization factors of the CE-JRC in its version EF3.1 have been applied.

Applying the criteria of the UN Global Environmental Guidelines on the Development of LCA Databases, the result of the data quality assessment is to:

Primary data,

- The geographical, technical and temporal representativeness is very good, since the primary data are less than 3 years old, are collected directly from the technology applied in the company and are specific to the area studied.
- The supplier's residual electrical profile has been taken for the processes of module A3, as there is no GoOs, (0.270 kg_{CO2} eq/kWh). In module B6, an average profile of the countries of use has been drawn up based on sales.

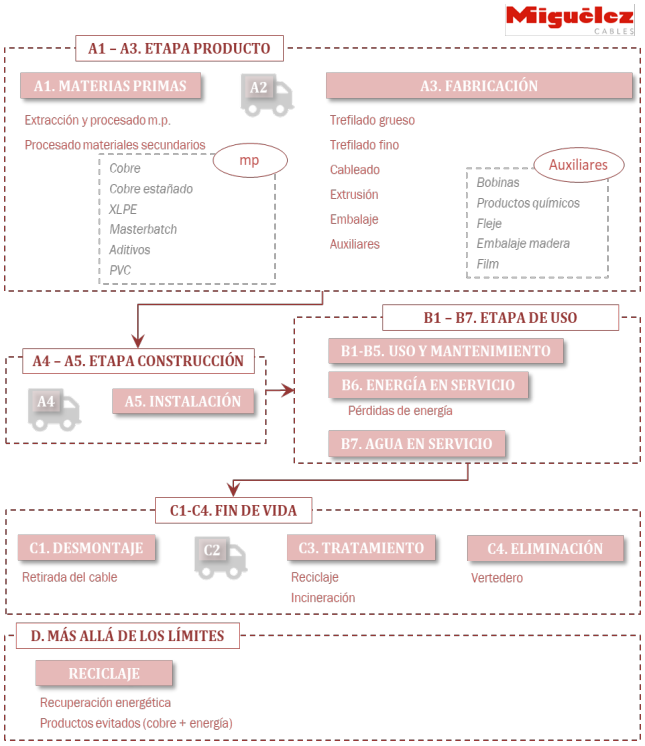
Generic data,

- The geographical scope of the data corresponds to average data from the largest area in which the studied area is included. Rating: Good.
- They are representative of production technology or similar technologies, e.g. in the manufacture of colour additives. Rating: Good.
- Generic data updated to January 2023 have been taken. Rating: Very good.

This environmental product declaration has a GLOBAL geographical scope, however, the geographical representativeness is Spanish for module A3, European for modules A1, A2, A4, C3 and C4 and global for modules A5, B6, C1, C2 and D.

4. System limits, scenarios, and additional technical information

The establishment of the limits of the product system follows the principle of modularity of the UNE-EN 15804+A2 standard, so that the environmental aspects and impacts are declared at the stage of the life cycle in which they appear, with a retrospective attributional approach. Changes in flows in a given time window are studied, reflecting past and present events, studying: product stage (A1-A3), construction stage (A4-A5); use stage (B1-B7), end-of-life stage (C1-C4), and benefits and burdens beyond system boundaries (D).



System limits

The following are excluded from the system limits:

- The infrastructure, nor the burdens due to human activities.
- Containers and packaging of auxiliary substances.
- Long-term issuances.

4.1. Product Stage (A1-A3)

This stage includes the extraction of resources from nature and the treatment of raw materials (*module A1*), together with transport to the manufacturer (*module A2*), i.e. transports to the factory gate and internal transport.

In addition, it includes the door-to-door stage (*module A3*), which includes the manufacturing operations and consumables used during production, as well as the treatment of waste until the end of the waste condition.

4.2. Construction Stage (A4-A5)

The distribution process (*module A4*) is calculated based on the product weight and the average distance based on sales. On the other hand, taking into account the wide range of possible installations of these products (*module A5*), the installation operations are not quantified, the end-of-life treatment of the packaging and the waste from the installation phase (manufacture, transport and end-of-life of the waste) is included. Taking as a default value that 5% of the product is considered as product waste at the installation stage. (PSR-001-ed4-EN2022.11.16).

4.3. Stage of use (B1-B7)

Only module B6 is declared as the energy losses during use, the other modules are not applicable and are declared with a value of zero. (PSR-001-ed4-EN2022.11.16).

Energy consumption translates into losses due to the Joule effect over time.

$$E = R_L \cdot I^2 \cdot \Delta t$$

Where

E, energy (J/km)

RL, linear resistance (Ω/km)

I, Current Intensity (A)

Δt, usage time =

Lifespan (years) x Usage Ratio (%) x 365 x 24 x3600

In the case of multiconductors, and assuming a balanced system, the losses of each conductor must be included considering a current intensity of 1A in each conductor except in the protection conductor. Therefore, the number of active conductors in the cable is included.

The user of the EPD must calculate the exact impact of use, based on the actual usage scenario, considering, therefore, the number of conductors of the product with respect to the declared and reference to be calculated and the declared impact for 1A and 1 km.

4.4. End-of-life stage (C1-C4)

The particularities of this product category, i.e. the wide range of possible ways of installing the product, means that there are also a large number of scenarios for cable removal processes at the end-of-life stage. This singularity causes the sector to classify the removal or dismantling phase (*module C1*) as "not applicable" and, therefore, it appears with a zero value in the impact results table, (PSR-001-ed4-EN2022.11.16). The impact derived from this phase must be calculated by the user of the EPD

The *C2 transport module* corresponds to the transfer of waste from the facility to the waste treatment plant or to the final disposal point. Module *C3* corresponds to the process of waste treatment (shredding and separation) and recycling of materials. The portion of product that is not recovered is disposed of by landfill (*module C4).*

End-of-life scenario

MODULE	SCENARIO USED
C1	"Not applicable"
C2	50 km Cargo truck 16 - 32 t EURO 6.
C3	Separation of waste into fractions. Treatment of waste fractions until they reach an end-of-waste status and become materials for recycling. Municipal incineration with energy recovery for non-recycled waste.
C4	Discharge of ashes from incineration.

The cable recovery scenario used in the modelling of this LCA is based on recycling ratios presented in the European Environmental Footprint for this product category.

Recovery ratios

MATERIAL	COPPER	PLASTIC	SILICONE
Recycling	95%	70%	0%
Energy recovery	0%	12%	50%
Landfill disposal	5%	18%	50%

4.5. Benefits and burdens beyond system limits, (module D)

Once the copper material reaches the condition of end of waste, it has the functional equivalence to be used directly without the need to carry out any specific treatment. The energy recovered in the energy recovery of the cable insulation material is considered in this module.

A1-A3 waste, which goes to recovery (either recycling or energy recovery) has not been included in this module.

	ETAPA PRODUCTO			ETAPA CONSTRUCCIÓN	
	Suministro materias primas	Transporte	Fabricación	Transporte	Instalación
Módulo	A1	A2	A3	A4	A5
Declarado	✓	✓	✓	✓	✓
Geografía	EU	EU	ES	EU	GLO
Datos específicos	> 90%				

	ETAPA DE USO						
	Uso	Mantenimiento	Reparación	Sustitución	Rehabilitación	Uso de energía	Uso de agua
Módulo	B1	B2	B3	B4	B5	B6	B7
Declarado	✓*	✓*	✓*	✓*	✓*	✓	✓*
Geografía	--	--	--	--	--	GLO	--

	FIN DE VIDA				MÁS ALLÁ
	Demolición	Transporte	Tratamiento residuos	Eliminación	Potencial reciclaje, y recuperación
Módulo	C1	C2	C3	C4	D
Declarado	✓*	✓	✓	✓	✓
Geografía	GLO	GLO	EU	EU	GLO

✓*Not applicable. Modulus equal to 0
ES: Spain; EU: Europe; GLO: Global

5. Declaration of the environmental parameters of LCA and LCI

Environmental impacts for AFIRENAS X RZ1-K (AS) 0.6/1 kV. Representative

82070312-50--- AFIRNAS X RZ1-K(AS) 0.6/1 kV 3G2.5 mm2, Transmit energy expressed in 1 A, over a distance of 1 km, for 50 years and a usage rate of 70 %.

PARAMETER	UNITS	A1 – A3	A4	A5	B6	C2	C3	C4	D
GWP-total	kg CO2 eq	5,54E+02	1,48E+01	1,92E+00	4,00E+02	1,47E+00	6,00E+01	9,76E-02	-5,32E+02
GWP-fossil	kg CO2 eq	5,52E+02	1,48E+01	1,91E+00	3,91E+02	1,47E+00	5,99E+01	9,74E-02	-5,30E+02
GWP-biogenic	kg CO2 eq	1,72E+00	9,40E-04	1.61E-01	4,46E+00	9,60E-05	5.97E-02	1.92E-04	-1,24E+00
GWP-luluc	kg CO2 eq	1.84E-01	3.60E-04	2,56E-03	4,55E+00	2.88E-05	5,30E-02	6.23E-06	-7.21E-01
ODP	kg CFC11 eq	2.07E-06	2.99E-07	2.21E-08	7,88E-06	3.18E-08	5.84E-07	1.31E-09	-5.04E-06
AP	mol H+ eq	5,22E+00	1.55E-01	6.74E-03	1,86E+00	1.85E-03	1.31E-01	8,53E-04	-3,04E+01
EP-freshwater	kg P eq	2.92E-02	1.16E-05	6.21E-05	1.20E-02	1.16E-06	1.30E-03	3.89E-06	-1.32E-01
EP-marine	kg N eq	6,00E-01	3.89E-02	1.27E-03	3.17E-01	4.59E-04	2.53E-02	3.60E-04	-1.47E+00
EP-terrestrial	mol N eq	6,58E+00	4.26E-01	1.37E-02	3,46E+00	4.47E-03	2.78E-01	3.92E-03	-2,12E+01
POCP	Kg NMVOC eq	2,62E+00	1.30E-01	5.07E-03	1,23E+00	3.47E-03	8,35E-02	1.22E-03	-6,44E+00
ADP-minerals& metals [2]	kg Sb eq	1.59E-01	4.16E-07	5.79E-08	3.65E-05	5.06E-08	3.01E-06	3.45E-09	-3.86E-01
ADP-fossil [2]	MJ	1,32E+04	1,98E+02	2,51E+01	1,44E+04	1,96E+01	3,50E+02	1,21E+00	-1,11E+04
WDP [2]	m3	5,41E+02	1.79E-01	2.10E-01	2,35E+02	1.79E-02	5,98E+00	1.65E-03	-6,31E+02

GWP - total: Global warming potential; **GWP - fossil**: Global warming potential of fossil fuels; **GWP - biogenic**: Biogenic Global Warming Potential; **GWP - luluc** : Global warming potential of land use and land use change; **ODP**: Stratospheric ozone depletion potential; **AP:** Acidification potential, accumulated surplus; **EP-freshwater**: Eutrophication potential, fraction of nutrients that reach the final freshwater compartment; **EP-marine**: Eutrophication potential, fraction of nutrients that reach the final compartment of seawater; **EP-terrestrial**: Eutrophication potential, accumulated surplus; **POCP:** Tropospheric ozone formation potential; **ADP-minerals&metals** Abiotic resource depletion potential for non-fossil resources; **APD-fossil**: Abiotic resource depletion potential for fossil resources; **WDP**: Water deprivation potential (user), water-weighted deprivation consumption. **NR:** Not relevant.

The results of modules B1, B2, B3, B4, B5 and C1 are not presented in the table because they are zero (0.00E+00).

The estimated impact results are relative and do not indicate the final value of the impact categories, nor do they refer to threshold values, safety margins or risks.

Additional environmental impacts for AFIRENAS X RZ1-K (AS) 0.6/1 kV. Representative

82070312-50--- AFIRNAS X RZ1-K(AS) 0.6/1 kV 3G2.5 mm2, Transmit energy expressed in 1 A, over a distance of 1 km, for 50 years and a usage rate of 70 %.

PARAMETER	UNITS	A1 – A3	A4	A5	B6	C2	C3	C4	D
PM	Incidence of diseases	9,46E-05	9,22E-07	1.03E-07	8,69E-06	8,86E-08	1.10E-06	2.22E-08	-6,93E-05
IRP [1]	kBq U235 eq	2,15E+01	2.87E-02	6,92E-02	1,38E+02	3.11E-03	1,47E+00	3.16E-04	-2,27E+01
ETP-fw [2]	CTUe	2,20E+03	9,90E+01	6,76E+00	6,63E+02	9,55E+00	1,30E+03	9,51E-01	-2,05E+04
HTP-c [2]	CTUh	6,53E-07	1.38E-09	2.24E-10	5.93E-08	9,36E-11	5.93E-09	7,57E-09	-4,44E-06
HTP-nc [2]	CTUh	3.66E-05	1.05E-07	1.50E-08	1.82E-06	1.05E-08	2.82E-07	2.67E-07	-3.97E-04
SQP [2]	-	5,22E+02	3.47E-01	1,59E+00	9,26E+02	3.72E-02	3,69E+01	6,73E+00	-8,12E+03

PM: Potential incidence of diseases due to particulate matter (PM) emissions; **IRP** : Exposure efficiency of human potential relative to U235; **ETP-fw** : Comparative toxic unit potential for ecosystems - freshwater; **HTP-c** : Comparative toxic unit potential for ecosystems - carcinogenic effects; **HTP-nc** : Comparative toxic unit potential for ecosystems - non-carcinogenic effects; **SQP** : Soil Quality Potential Index; **NR:** Not relevant

Notice 1: This impact category deals primarily with the eventual impacts of low doses of ionizing radiation on human health from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The potential for ionizing radiation in the soil, due to radon or some building materials, is not measured with this parameter either.

Notice 2: The results of this environmental impact indicator should be used with caution, as the uncertainties of the results are high and experience with this parameter is limited.

Resource usage for AFIRENAS X RZ1-K (AS) 0.6/1 kV. Representative

82070312-50--- AFIRNAS X RZ1-K(AS) 0.6/1 kV 3G2.5 mm2, Transmit energy expressed in 1 A, over a distance of 1 km, for 50 years and a usage rate of 70 %.

PARAMETER	UNITS	A1 – A3	A4	A5	B6	C2	C3	C4	D
PEARS	MJ	5,56E+02	4.66E-01	1,90E+00	3,07E+03	5.14E-02	4,18E+01	7.51E-03	-1,32E+03
PERM	MJ	1,09E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	**MJ**	**5,67E+02**	**4.66E-01**	**1,90E+00**	**3,07E+03**	**5.14E-02**	**4,18E+01**	**7.51E-03**	**-1,32E+03**
PENRE	MJ	1,33E+04	1,98E+02	2,51E+01	1,44E+04	1,96E+01	3,50E+02	1,21E+00	-1,11E+04
PENRM	MJ	5,97E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4,89E+03	0.00E+00	0.00E+00
PENRT	**MJ**	**1,92E+04**	**1,98E+02**	**2,51E+01**	**1,44E+04**	**1,96E+01**	**-4,54E+03**	**1,21E+00**	**-1,11E+04**
SM	Kg	6,74E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m3	8,95E+00	8.04E-03	9,04E-03	8,26E+00	8,18E-04	8,12E-01	7,19E-05	-1.29E+01

PERE: Use of renewable primary energy excluding renewable primary energy resources used as feedstock; **PERM:** Use of renewable primary energy used as feedstock; **PERT:** Total use of renewable primary energy; **PENRE:** Use of non-renewable primary energy, excluding non-renewable primary energy resources used as feedstock; **PENRM:** Use of non-renewable primary energy used as feedstock; **PENRT:** Total use of non-renewable primary energy; **SM:** Use of secondary materials; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW**: Net use of piped water resources; **NR:** Not relevant

Waste categories for AFIRENAS X RZ1-K (AS) 0.6/1 kV. Representative

82070312-50--- AFIRNAS X RZ1-K(AS) 0.6/1 kV 3G2.5 mm2, Transmit energy expressed in 1 A, over a distance of 1 km, for 50 years and a usage rate of 70 %.

PARAMETER	UNITS	A1 – A3	A4	A5	B6	C2	C3	C4	D
HWD	Kg	1.79E-01	1.20E-03	8,33E-05	1.77E-02	1.29E-04	5,68E-04	7.12E-06	-1.58E-02
NHWD	Kg	1,25E+01	1.02E-02	2.34E-01	7,51E+00	9,54E-04	4,53E+00	3.11E+01	-1,19E+02
RWD	Kg	5.52E-02	1.45E-05	4.42E-05	1.36E-01	1.68E-06	9,49E-04	1.96E-07	-1.50E-02

HWD: Hazardous waste disposed of; **NHWD**: Non-hazardous waste disposed of; **RWD**: Radioactive waste disposed of; **NR:** Not relevant

Output flows for AFIRNAS X RZ1-K (AS) 0.6/1 kV. Representative

82070312-50--- AFIRNAS X RZ1-K(AS) 0.6/1 kV 3G2.5 mm2, Transmit energy expressed in 1 A, over a distance of 1 km, for 50 years and a usage rate of 70 %.

PARAMETER	UNITS	A1 – A3	A4	A5	B6	C2	C3	C4	D
CRU	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
MFR	Kg	1,41E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1,50E+02	0.00E+00	0.00E+00
MER	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1,33E+02	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7,16E+02	0.00E+00	0.00E+00

CRU: Components for reuse; **MFR**: Materials for recycling; **MER:** Materials for energy recovery; **EE:** Exported energy; **NR:** Not relevant

Information on the biogenic carbon content AFIRENAS X RZ1-K (AS) 0.6/1 kV. Representative

82070312-50--- AFIRNAS X RZ1-K(AS) 0.6/1 kV 3G2.5 mm2, Transmit energy expressed in 1 A, over a distance of 1 km, for 50 years and a usage rate of 70 %.

BIOGENIC CARBON CONTENT	UNITS	Profit per declared functional unit
Biogenic carbon content product - KgC	Kg C	0.00E+00
Biogenic Carbon Content Packaging - KgC	Kg C	4.32E-02

Information on variability in AFIRENAS X RZ1-K (AS) 0.6/1 kV

The maximum variability of the environmental impact results within the range is presented below.

	PARÁMETRO	UNIDADES	A1 – A3	A4	A5	B6	C2	C3	C4	D
Climate change	GWP-total	kg CO_2 eq	177%	194%	193%	192%	194%	189%	178%	145%
Climate change - Fossil	GWP-fossil	kg CO_2 eq	177%	194%	193%	192%	194%	189%	178%	145%
Climate change - Biogenic	GWP-biogenic	kg CO_2 eq	163%	194%	66%	192%	194%	193%	178%	139%
Climate change - LuLUc	GWP-luluc	kg CO_2 eq	179%	194%	194%	192%	194%	194%	178%	147%
Ozone depletion	ODP	kg CFC11 eq	186%	194%	193%	192%	194%	186%	178%	138%
Acidification	AP	mol H+ eq	143%	194%	194%	192%	194%	193%	178%	152%
Eutrophication, freshwater	EP-freshwater	kg P eq	142%	194%	194%	192%	194%	194%	178%	151%
Eutrophication, marine	EP-marine	kg N eq	156%	194%	194%	192%	194%	193%	178%	149%
Eutrophication, terrestrial	EP-terrestrial	mol N eq	155%	194%	194%	192%	194%	193%	178%	150%
Photochemical ozone formation	POCP	Kg NMVOC eq	165%	194%	193%	192%	194%	193%	178%	146%
Resource use, minerals&metals	ADP-minerals& metals	kg Sb eq	178%	194%	193%	192%	194%	186%	178%	200%
Resource use, fossils	ADP-fossil	MJ	179%	194%	193%	192%	194%	193%	178%	165%
Water use	WDP	m^3	167%	194%	194%	192%	194%	192%	178%	140%

References

[1] General Instructions of the GlobalEPD Program 3rd revision 09-10 2023.

[2] UNE-EN ISO 14025:2010 Environmental labels. Type III environmental declarations. Principles and procedures (ISO 14025:2006).

[3] Standard UNE-EN 15804:2012+A2:2020 Sustainability in construction. Environmental product declarations. Basic product category rules for building products.

[4] UNE-EN ISO 14040 standard. Environmental Management. Life Cycle Analysis. Principles and frame of reference. 2006.

[5] UNE-EN ISO 14044 standard. Environmental Management. Life Cycle Analysis. Requirements and guidelines. 2006.

[6] PSR-0001-ed4-EN-2022 11 16. (16 de 11 de 2022). Specific rules for wires, cables and accessories. Paris, France: PEPecopassport program. Association PEP

[7] WEEE Directive. (2012, 07, 24). Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE). Strasbourg, France: Official Journal of the European Union.

[8] UNE EN 16449 (June 2014). UNE EN 16449:2014. Wood and wood products. Calculation of the biogenic carbon content of wood and conversion to carbon dioxide. Madrid, Spain: UNE Spanish Association for Standardization.

[9] Life cycle analysis for cables and conductors of the Miguélez Group, 2023-2024. CTME.

Index

1. General information....3
2. The product....2
3. LCA information....10
4. System limits, scenarios, and additional technical information....12
5. Declaration of the environmental parameters of LCA and LCI....15

References....20

AENOR

Una declaración ambiental verificada

GlobalEPD