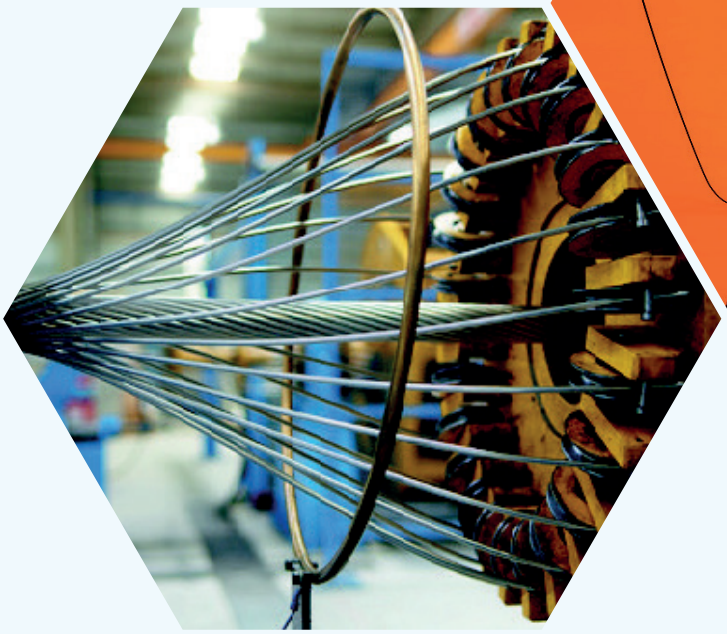
ENVIRONMENTAL PRODUCT DECLARATION

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

Aluminium Conductor Steel Reinforced (ACSR)
Parrot Conductor

from

Midal Cables



Programme :	EPD Turkey. a fully aligned regional programme www.epdturkey.org	The International EPD® System www.environdec.com
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Geographical Scope:	Global	

TURKEY EPD®

ENVIRONMENTAL PRODUCT DECLARATIONS

Midal Cables Turkey

Program Information

Programme	EPD Turkey, a fully aligned regional programme SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15 34415 Kağıthane/Istanbul TURKEY www.epdturkey.org info@epdturkey.org	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com

Product Category Rules (PCR):
2019:14 Version 1.0. 2019-12-20. Construction Products and Construction Services
EN 15804:2012 + A2:2019 Sustainability of Construction Works

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process certification EPD verification ☑

Third party verifier: Vladimír Kočí, PhD
Approved by: The International EPD® System

System Boundaries :
Cradle to gate with Options

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 from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company Information

Midal Kablo Sanayi ve Ticaret A.Ş. is established in 2011 in Turkey and started production by the 2nd Q of 2012 with investment from Midal Cables Group, by far the highest Aluminium Wire Rod and Aluminium Overhead line production capacity in the world.

Midal Cables Group draws the attention with their single-product groups despite the fact that the Company has the highest aluminium processing capacity in the world for the production of energy products.

Midal Kablo Sanayi ve Ticaret A.Ş. is the only production facility in Turkey on Aluminium Overhead Line production. Its production focus is on Aluminium Overhead lines and able to produce all kinds of Aluminium and Aluminium Derivatives Overhead Line conductor in all dimensions compliant to all standards.

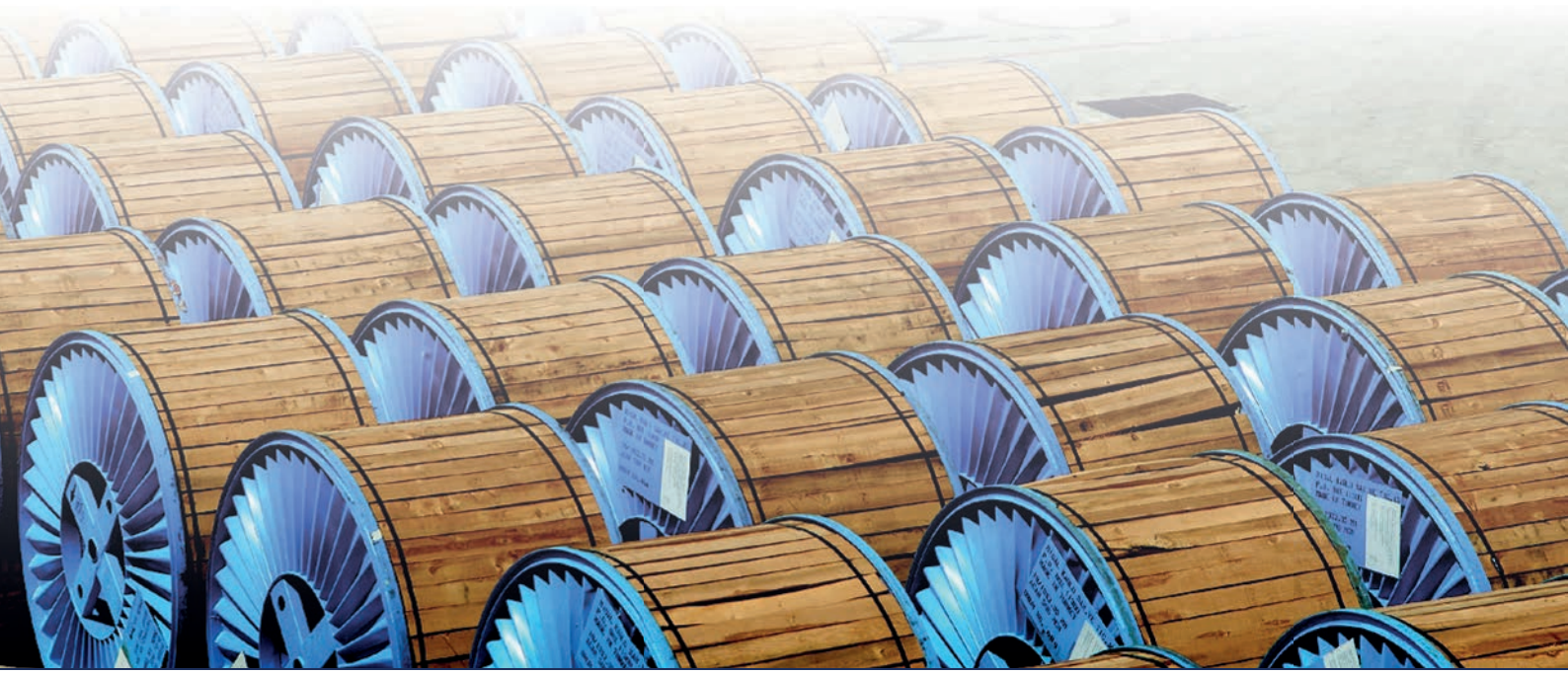
Midal Kablo Sanayi ve Ticaret A.Ş. has been exported to many countries around the world. With its sales performance in 2012 and 2013, it received "Technical Competence" accolade for exporting whole its production.

The company started to serve the domestic market due to demand created by increasing energy investment after 2013. As a result its share of the domestic market increased while continuing the export performance.

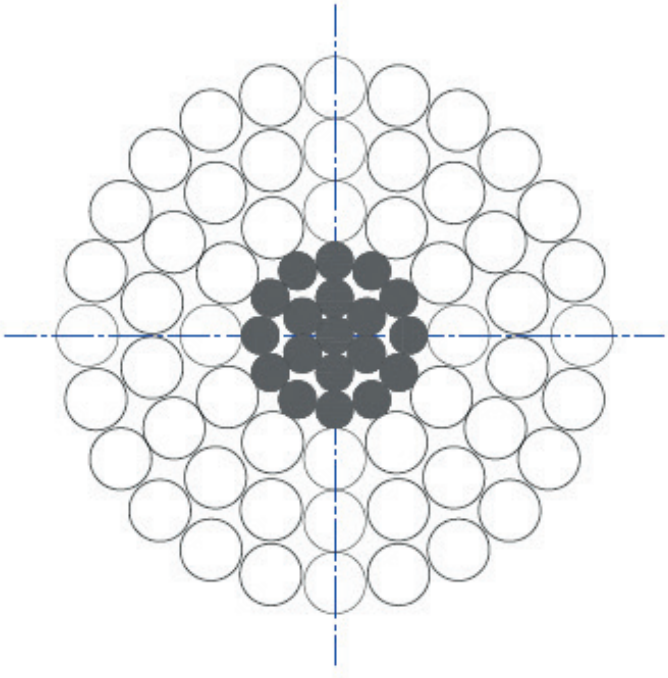
As the company always ranked among top 1000 firms in export in Turkey compiled by Turksih Exporters Assembly (TIM) each year since its establishment in 2012. It also always ranked among the first 25 exporter firms all the times in Iron and Non-Iron Metals Group Also including year 2017. It has been top exporter since and has always made the highest amount of export in its industry in the same period.

Midal Kablo Sanayi ve Ticaret A.Ş. makes production at ASTM. CAN/CSA. DIN. NFC. IEC and BS EN standards and produces all the products involved in the relevant standards.

The foreign market share of the Company is considerably high since it is "first choice" supplier in many countries primarily UK, Finland, Norway, Germany, Netherlands, Canada and Brazil. It is also leading the market share in Turkish domestic market.



Product Information



ACSR Parrot Conductor Section View

Type	Position	Size
Steel Wire	Center Wire	01 x 2.55 mm
Steel Wire	1. Wire	06 x 2.55 mm
Steel Wire	2. Wire	12 x 2.55 mm
Aluminum Wire	3. Wire	12 x 4.25 mm
Aluminum Wire	4. Wire	18 x 4.25 mm
Aluminum Wire	5. Wire	24 x 4.25 mm

Manufactured in EN 50182 and ASTM B232 standards, ACSR Parrot is produced with steel and aluminum wires. The weight of parrot conductors is 2.88 kg per m.

UN CPC Code: 46350

ACSR (Aluminium Conductor Steel Reinforced)

Aluminium Conductor Steel Reinforced (ACSR) is concentrically stranded conductor with one or more layers of hard drawn 1350-H19 aluminium wire on galvanized steel wire core. The core can be single wire or stranded depending on the size. Steel core wire is available in Class A , B or Class C galvanization for corrosion protection. Additional corrosion protection is available through the application of grease to the core or infusion of the completed conductor with grease.

The proportion of steel and aluminium in an ACSR conductor can be selected based on the mechanical strength and current carrying capacity demanded by each application.

ACSR conductors are recognized for their record of cost. dependability and favourable strength / weight ratio. ACSR conductors combine the light weight and good conductivity of aluminium with the high tensile strength and ruggedness of steel. In line design. this can provide higher tensions, less sag, and longer span lengths than obtainable with most other types of overhead conductors.

Midal manufacture and supply ACSR on non-returnable wooden/steel reels or returnable steel reels depending on customer requirement.

Features

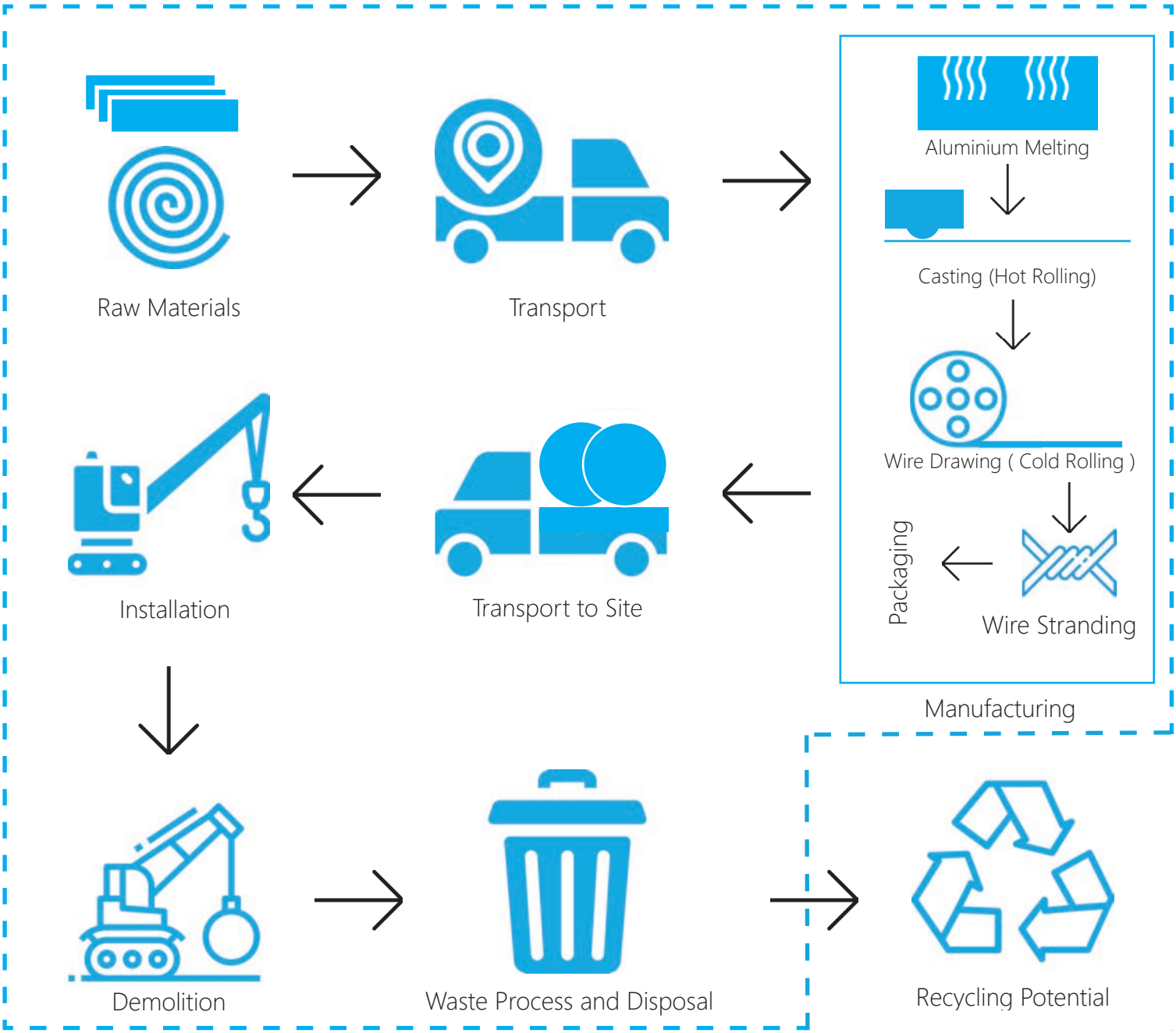
> High tensile strength
> Better sag proporties
> Economic design
> Best suited for transmission lines with long spans

LCA Information

Functional Unit	1 m Parrot transmission cable with 0.038 Ω/km maximum DC resistance at 20 °C
Time Representativeness	2019
Database(s) and LCA Software Used	Ecoinvent 3.5., SimaPro 9.0

The inventory for the LCA study is based on the 2019 production figures for ACSR Parrot Conductors collected from Midal Cables production plants.

System Boundary



Description of System Boundary

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw Materials Supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	Transport	Waste processing	Disposal	Reuse-Recycling-Recovery Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

Description of the system boundary (X = Included in LCA. MND= Not Declared)

A1 : Raw Material Supply
This stage includes raw material extraction and pre-treatment processes before production. For conductors, production starts with intermediary products such as steel and aluminum metals and other materials, mainly locally sourced but some transported from other parts of the world.

A2 : Transportation
This stage is relevant for delivery of raw materials and intermediary products to factory gate. Transport direct from producer or producer to warehouses/intermediaries then to the factory were taken into account. Forklift usage within the factory is also included.

A3 : Manufacturing
This stage starts with aluminum melting and continuous casting for the production of aluminum wire. Production continues with wire drawing (cold rolling) after casting (hot rolling). Finally, aluminum and steel wires are combined on the wire stranding machine.

A4 : Transport to Site
This stage involves transportation of conductors to the construction site.

A5 : Installation
This stage includes the installation of conductors in the construction site. For installing 1 km conductor, 1 hr installation time is assumed by using mobile crane with 92 kW engine.

C1 : Deconstruction. Demolition
This stage includes the demolition of conductors in the construction site. For uninstalling 1 km conductor, 1 hr uninstallation time is assumed by using mobile crane with 92 kW engine.

C2 : Transport
This stage includes the transportation of the discarded conductors to final disposal. Average distance from demolition site to waste processing site for final disposal is assumed to be 100 km.

C3 : Waste Processing
This stage includes disassembly for recycling of the conductors. Aluminium wires and steel wires are separated from each other.

C4 : Disposal
Disposal is the final stage of product life. Conductors end up at recycling plant after construction and demolition as their final fate and modelled as such for this EPD. It is assumed that only 1% of the products send to the landfill.

D : Recycling Potentials
Due to the nature of the product where it is collected without any loss during disassembly/disposal stage, recycling rate was assumed to be 99%.

More Information

The results of the LCA with the indicators as per EPD requirement are given in the following pages for product manufacture (A1, A2, A3). construction process stage (A4, A5), end of life stage (C1, C2, C3, C4) and recyclinng benefits and loads beyond the system boundaries (D).

All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while fresh water use is calculated with selected inventory flows in SimaPro according to the PCR.

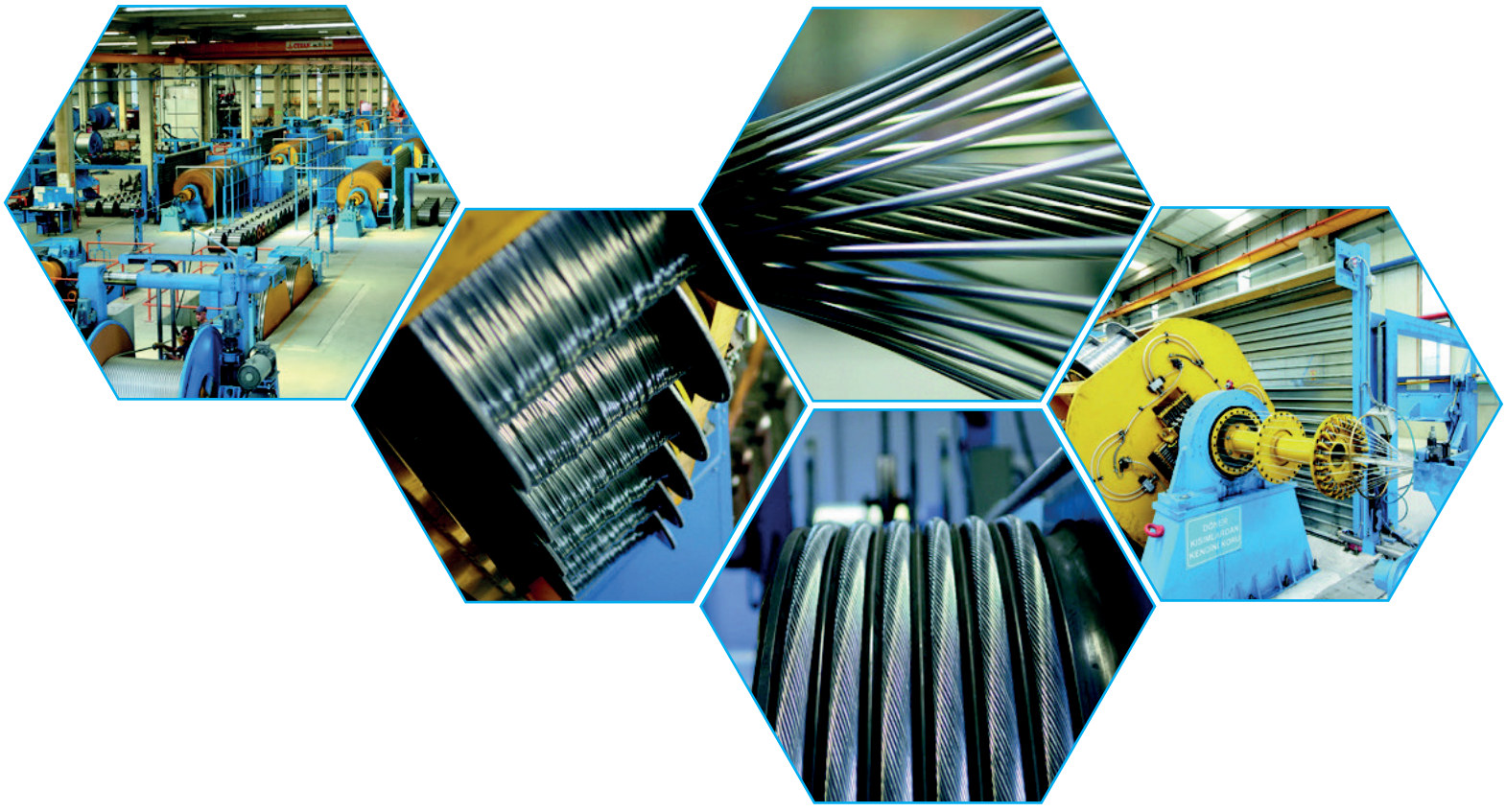
Hazardous and non-hazardous waste amounts were also allocated from 2019 total waste amounts.

Transport is allocated according to tonnages for almost all raw materials bought by Midal Cables.

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in conductors. either above the threshold for registration with the European Chemicals Agency or above 0.1 % (wt/wt).

Products Content Information

Materials	%
Aluminium	74
Steel	26



Resource use for 1 m ACSR Parrot									
Resource	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	368	5.64	0.444	0.444	0.414	11.5	0.011	-350
PERM	MJ	0	0	0	0	0	0	0	0
PERT	MJ	368	5.64	0.444	0.444	0.414	11.5	0.011	-350
PENRE	MJ	51.6	0.092	0.003	0.003	0.004	2.12	405E-6	-48.3
PENRM	MJ	0	0	0	0	0	0	0	0
PENRT	MJ	51.6	0.092	0.003	0.003	0.004	2.12	405E-6	-48.3
SM	kg	1.00	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	0.149	0.001	39.0E-6	39.0E-6	89.2E-6	0.004	8.74E-06	-0.142
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water.								

Waste and output flows for 1 m ACSR Parrot									
Flow	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	kg	0.027	0	0	0	0	0	0	0
NHWD	kg	0.060	0	0	0	0	0	0	0
RWD	kg	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0.067	0	0	0	0
MFR	kg	0	0	0	0.246	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0	0	0	0
Acronyms	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal								
Legend	A1: Raw Material Supply. A2: Transport. A3: Manufacturing. A1-A3: Sum of A1. A2. and A3. A4: Transport to Site. A5: Installation, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.								

Environmentals Impacts for 1 m ACSR Parrot									
Impact Category	**Unit**	**A1-A3**	**A4**	**A5**	**C1**	**C2**	**C3**	**C4**	**D**
GWP - Total	**kg CO_2 eq**	39.9	0.376	0.031	0.031	0.026	1.03	0.022	-38.4
GWP - Fossil	**kg CO_2 eq**	39.7	0.376	0.031	0.031	0.026	1.02	0.002	-38.1
GWP - Biogenic	**kg CO_2 eq**	0.067	173E-6	5.40E-6	5.40E-06	8.26E-06	0.002	0.020	-0.064
GWP - Luluc	**kg CO_2 eq**	0.159	148E-6	2.61E-6	2.61E-06	6.63E-06	0.009	456E-9	-0.146
ODP	**kg CFC-11 eq**	1.19E-06	65.2E-9	5.51E-9	5.51E-09	4.97E-09	35.1E-9	93.0E-12	-1.08E-06
AP	**mol H+ eq**	0.257	0.006	322E-6	322E-6	111E-6	0.006	5.37E-06	-0.243
EP - Freshwater	**kg P eq**	0.014	40.0E-6	1.41E-6	1.41E-06	2.03E-06	0.001	4.92E-07	-0.014
EP - Freshwater	**kg PO^4 eq**	0.041	121E-6	4.27E-6	4.27E-06	6.17E-06	0.003	1.49E-06	-0.041
EP - Marine	**kg N eq**	0.042	0.001	140E-6	140E-6	3.26E-05	0.001	5.15E-05	-0.039
EP - Terrestrial	**mol N eq**	0.438	0.013	0.002	0.002	359E-6	0.009	1.44E-05	-0.409
POCP	**kg NMVOC**	0.128	0.004	421E-6	421E-6	115E-6	0.003	1.01E-05	-0.122
ADPE	**kg Sb eq**	123E-6	383E-9	10.2E-9	10.2E-9	48.4E-9	106E-9	604E-12	-119E-6
ADPF	**MJ**	368	5.64	0.444	0.444	0.414	11.5	0.011	-350
WDP	**m^3 depriv.**	6.44	0.039	0.002	0.002	0.003	0.431	372E-6	-5.67
PM	**disease inc.**	2.96E-06	22.4E-9	8.42E-9	8.42E-09	2.37E-09	23.6E-9	61.7E-12	-2.85E-06
IR	**kBq U-235 eq**	1.23	0.031	0.002	0.002	0.002	0.010	67.5E-6	-1.08
ETP - FW	**CTUe**	39.2	0.654	0.006	0.006	0.087	0.296	0.003	-34.0
HTTP - C	**CTUh**	2.75E-06	2.36E-9	224E-12	224E-12	174E-12	6.80E-09	61.4E-12	-2.36E-06
HTTP - NC	**CTUh**	8.71E-06	41.3E-9	899E-12	899E-12	4.76E-09	69.5E-9	124E-12	-7.13E-06
SQP	**Pt**	138	5.37	0.024	0.024	0.711	0.700	0.027	-105
Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-fw: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use.								
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A1-A3: Sum of A1, A2, and A3. A4: Transport to Site, A5: Installation, C1: De-Construction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Benefits and Loads Beyond the System Boundary.								
Eutrophication-freshwater is provided both in P and PO_4 units.									

References

/GPI/General Programme Instructions of the International EPD® System. Version 3.01.

/ISO 9001:2015/ Quality management systems - Requirements

/ISO 14020:2000/ Environmental labels and declarations — General principles

/EN 15804/ EN 15804:2012 + A2:2019. Sustainability of Construction Works

/ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

/ISO 14040/44/ DIN EN ISO 14040:2006-10. Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

/PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL Swedish Environmental Research Institute. Swedish Environmental Protection Agency. SP Trä. Swedish Wood Preservation Institute. Swedisol. SCDA. Svenskt Limträ AB. SSAB. The International EPD System. 2019:14 Version 2.0. DATE 2019-12-20

/The International EPD® System/ The International EPD® System is a programme for type III environmental declarations. maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025.www.environdec.com

/Ecoinvent / Ecoinvent Centre. www.Eco-invent.org

/TLCID / Turkish Life Cycle Inventory Database. www.tlcid.org

/SimaPro/ SimaPro LCA Software. Pré Consultants. the Netherlands. www.pre-sustainability.com

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