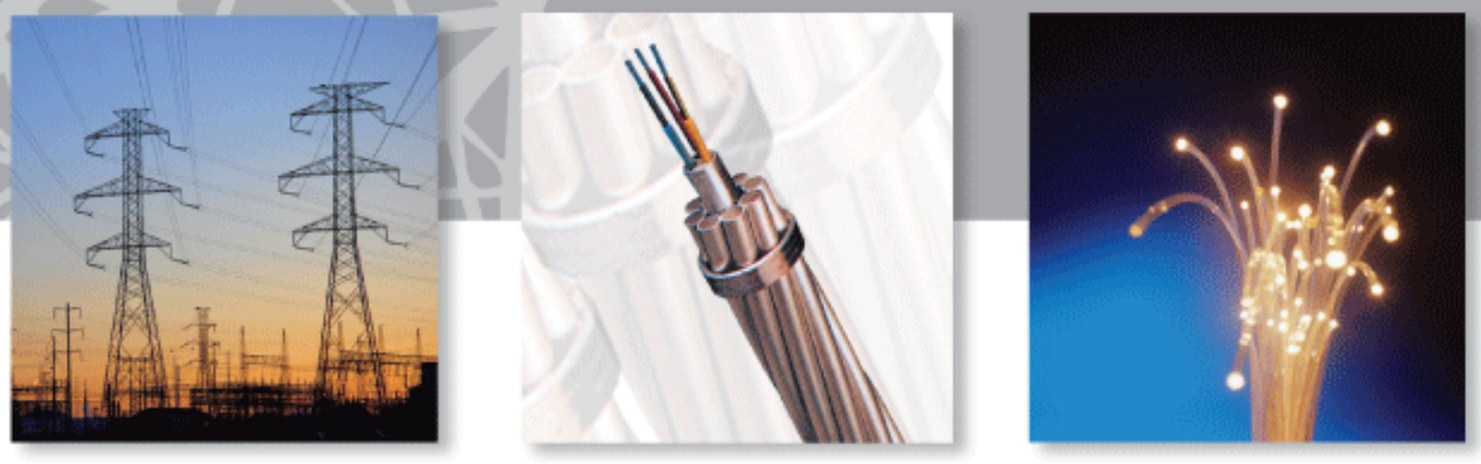


OPTICAL GROUND WIRE (OPGW)

www.elsewedy.com

ELSEWEDY CABLES

INDEX

ELSEWEDY CABLES IN BRIEF 2

GROUP HISTORY 4

GROUP STRUCTURE 5

SINGLE STRANDING LAYER, CENTRAL SST OPGW 6
[SM-MFOA 45 29-3 26-1S ACS-24SMF]

DOUBLE STRANDING LAYERS, CENTRAL SST OPGW 8
[SM-MFOA 117-58-16-1S AA-ACS-24SMF]

DOUBLE STANDING LAYERS, CENTRAL ACST OPGW 10
[SM-MFOA 131-29-16.1-1S AA-ACS-24SMF]

DOUBLE STRANDING LAYERS, LATERAL POSITION SST OPGW 12
[SM-MFOA 83-23-14-0.5S ACS-24SMF]

OPGW INSTALLATION PROCEDURE 14

ELSEWEDY CABLES CONTACTS 20

ELSEWEDY CABLES IN BRIEF

Elsewedy Cables was established in 1984 and is considered as one of the oldest and most successful industrial and trading business groups across the Middle East and Africa in the fields of energy, plastics and contracting. Elsewedy Cables is specialized mainly in Wires, Cables, Telecom Solutions, Electrical Products, Turnkey Projects and recently Energy Generation. The group's turnover has been rapidly rising during the past few years to reach $ 1.5 billion in 2007, also, the production capacity is the second highest one in the region, with 125000 tons/annum, expecting 212000 tons/annum in 2008.

Although the company began as an Egyptian local manufacturer, it has branched out regionally and internationally to include 23 production facilities for cables and electrical products that are located in 12 contries (Egypt, Sudan, Algeria, Zambia, Ghana, Syria, Saudi Arabia, Qatar, Libya, Slovenia, India and Malaysia), and it currently export its wide range of high quality and safe products to more than 110 countries worldwide. Additionally, the group's outstanding human potential, which is more than 5000 employees, and its solid financial postioin, along with the strong geographical prsensce, have heavily contributed to the group's success and prosperity.

To strengthen its position world wide, and following the corporate strategy, on the one hand, Elsewedy Cables fully acquired by the end of 2007 ISKRAEMECO, a leader manufacturer of electrometers and currently the third largest player in the European market and the seventh largest globally; on the other hand, Elsewedy Cables is involved with 74% ownership jointly with Glencore International in a 850 $US million project for the construction of a copper smelter to be located in Egypt.

Further more, Elsewedy Cables provides a complete portfolio of solutions and advanced technologies for sectors as diverse as the automotive and aerospace industries, railways, buildings, telecommunication and energy networks, oil and gas, submarine power systems, etc. Accordingly, Elsewedy Cables is divided in three segments in order to cover all those sectors: Wires & cables, electrical products, and turn-key projects. The group has obtained quality certificates from the most reputable laboratories, among them: ISO 9001-2000, ISO 14001, QS 9000, KEMA.

Quality and safety are so much considered. Elsewedy Cables adopted a policy that assures maximum effectiveness and efficiency through processes and systems ensuring that every aspect of each company's activity is aligned to satisfy customer needs and all other objectives without wasting effort and with the use of the full potential of every person. Our organizational philosophy believes that customer satisfaction, health, safety, environmental considerations, and business objectives are mutually dependent.

In the industrial sector, we currently supply approximately 56% of Egypt's global market share of power cables, telecommunication cables, and lighting industries. In the export sector, as part of a worldwide marketing plan, Elsewedy Cables has branches throughout Africa, Middle East, Gulf Area, Europe, and Asia. Consistently showing dramatic increases; Egypt enjoys an important number of trade agreements with most of those countries (EU Agreement, Arab Free Trade Agreement, COMESA Agreement). Nowadays, Elsewedy Cables is exporting approximately 60% of its total turnover (export value of 550 $US million in 2006, 1 $US billion in 2007). For that reason, the group is concentrating efforts and making investments to target market segments and countries world wide with strong growth potential, such as Europe, Asia, or Latin America, although strengthen its leadership in Africa and Middle East.

Elsewedy Cables' mission is to become world expert in cables, with a strong financial basis and technical advanced product portfolio, making it an attractive partner for all its stakeholders: Shareholders, customers, suppliers, and employees.

GROUP HISTORY

1938	ELSEWEDY family started its business as a trader in electrical equipment.
1960	The business was developed further by turning into a distributor for the only cables manufacturer at that time.
1984	Based on their experience in that field, the Family decided to build Egypt's first private sector cables factory "ARAB CABLES".
1986	Arab cables started production, as Egypt's and the Middle East's first private sector cables supplier.
1986-96	Arab cables' capacity quadruples from around 6.000 tons of copper cables in 1986 to 30.000 tons in 1996.
1996	ELSEWEDY family established their second cables factory, "EGYTECH CABLES", which is the most advanced cables production facility in the Middle East with an annual production capacity of 30.000 tons of copper cables and 15.000 tons of aluminum cables. ELSEWEDY family established their first plant for producing PVC compounds and master batch for cables insulation "SEDPLAST" considered as major component for the production of cables.
1997	ELSEWEDY family established "UNITED INDUSTRIES", the company consists of three different factories specialized in the production of special cables (first factory in Egypt), Winding Wires & Fiber Glass Poles. ELSEWEDY family established "ELASTIMOLD EGYPT", as a joint venture with Elastimold, a unit of Thomas & Betts, one of the leading companies worldwide in the field of cable accessories, to produce power cable joints and Modular Terminators.
1998	ELSEWEDY family Established "UNITED METALS CO." Egypt's first factory to produce High Grade Copper Rods, the main component in the production of cables conductors. The factory is considered as the largest copper rod factory in the Middle East region. ELSEWEDY family established "ELSEWEDY SEDCO", as the first and only factory in Africa and the Middle East producing cable accessories.
2002	ELSEWEDY CABLES their first cable factory outside Egypt "GIAD ELSEWEDY CABLES" in partnership with the Sudanese company Giad for the production of power cables, over head conductors and telephone cables.
2003	ELSEWEDY CABLES further enhances their facilities outside Egypt by establishing the "SUDANESE EGYPTIAN ELECTRICAL INDUSTRIES CO" in partnership with Sudanese electricity authority. SUDATRAF (specialized in manufacturing transformers, electrical panels & cables joint and terminators).
2004	Together ELSEWEDY CABLES Group & Italsmea company (Italy) established a joint venture for the manufactory of explosion proof electrical equipment. "Italsmea ELSEWEDY co".
2005	ELSEWEDY established the Syria's latest cables factory "ELSEWEDY CABLES SYRIA" specialized in power cables manufacturing up to 400 kv , relying on the growth in the area of: Syria, Lebanon, Jordan, Iraq, Iran, Palestine and all Arab countries near by.
2006	ELSEWEDY CABLES penetrated Ghana, by establishing "ELSEWEDY ELECTRIC-GHANA" the factory is specialized in Fiber Glass Road Lighting Poles manufacturing.
2007	ELSEWEDY CABLES established two new factories: 1 "ELSEWEDY CABLES SAUDI ARABIA" specialized in wires and cables. 2 "ELSEWEDY ELECTRIC SYRIA" specialized in transformers. In addition to acquisition of ISKRAEMECO Specialized in energy measurement & management systems.
2008	ELSEWEDY CABLES established two new factories: 1 "ELSEWEDY CABLES QATAR" specialized in power cables "Low & Medium". 2 "ELSEWEDY CABLES ALGERIA" specialized in power cables "Low & Medium" in addition to instrumentation cables.

GROUP STRUCTURE

ELSEWEDY CABLES

- Wires & cabels
- Electrical Products
  - SEDCO
  - Elastimold Egypt
  - Elsewedy Transformers Egypt
  - Sudanese Egyptian Electrical Industries
  - Elsewedy Electric Syria
  - Elsewedy Electric Ghana
  - Elsewedy Electric Zambia
  - Elsewedy Electric Nigeria
  - ISKRAEMECO
- Turn Key Projects
  - Elsewedy Electric Transmission & Distribution
  - PSP Power System Project
- United Metals
- Sedplast
- Egyplast
- United Wires
- Red Sea Copper
- Arab Cables
- Egytech Cables
- United Industries
- Elsewedy Cables Egypt
- Giad Elsewedy Cables
- Elsewedy Cables Syria
- Elsewedy Cables Algeria
- Elsewedy Cables Saudi Arabia
- Libya Cables

SINGLE STRANDING LAYER, CENTRAL SST OPGW

SM-MFOA 45 29-3 26-1S ACS-24SMF

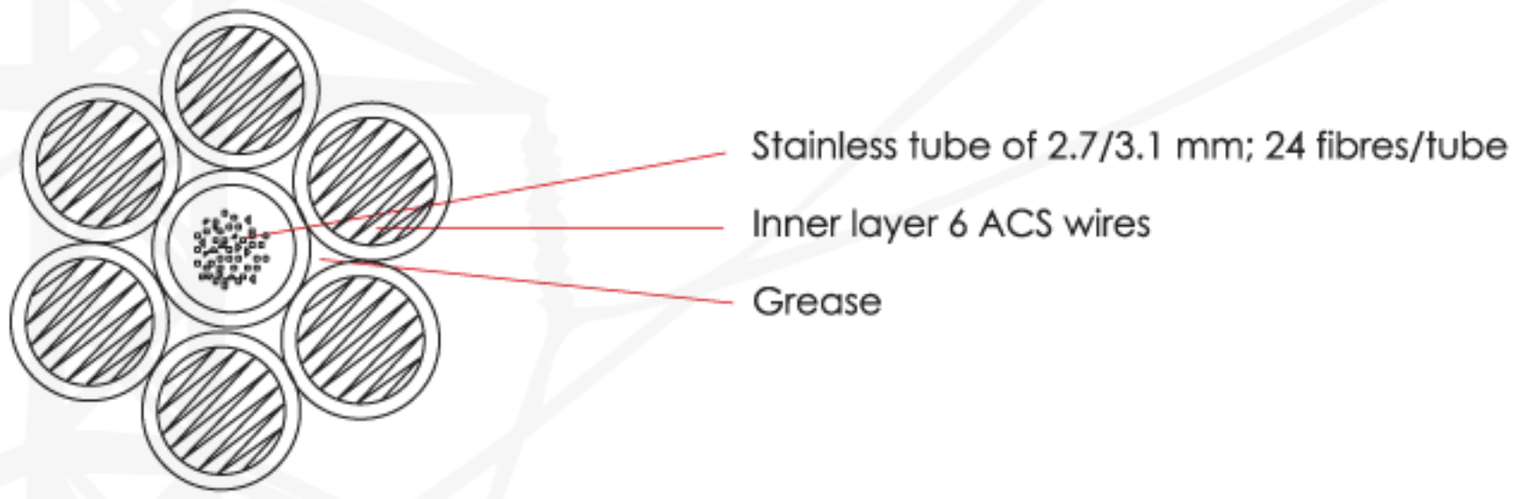
APPLICATION

These cables are suitable for installation as optical ground wire in powerline installations.
The cable acts as an normal ground wire protecting phase wires from lighting strikes and carries earth fault currents.
The cable provides also an optic path in powerline installations for telecommunication needs.

FEATURES

- Installation in the same way as normal ground wire with conventional machinery.
- Most reliable optic solution for fibre optic utilities.
- Best solution in old ground wire replacement and in new line constructions.
- Low cost

CROSS SECTIONAL DIAGRAM



CONSTRUCTION

Optical fibre : For fibre specification see optical characteristics.

Secondary coating : The secondary coating consists of one laser welded stainless steel tube. Every fibre is uniquely identified by a fibre colour and for fibre counts above 12 fibres with a coloured fibre bundle yarn.
The tube is filled with a water-repellent filling compound.

Central element	: 1 stainless steel tube	: 3.1 mm
First layer	: 6 ACS wires (20SA)	: 3.1 mm
	: Direction layer	: "Right "

Grease : The interstices of the cable core are filled with grease according to BS EN 50182 ANNEX B figure B.1-d

All values in this product data sheet are nominal unless otherwise stated.

TECHNICAL CHARACTERISTICS

Number of tubes	1	
Number of fibres / tube	24	
Cable ø	9.3	mm
Cable weight	326	kg/km
Supporting cross-section	45.29	mm^2
ACS cross-section	45.29	mm^2
Calculated breaking load (UTS)	54.61	kN
Modulus of elasticity	161.99	kN/mm^2

Other types can be provided upon specified request.

Coefficient of thermal expansion .10^{-6}	13	1/K
Permissible tensile stress acc.		
Everyday stress	192.9	N/mm²
Maximum tensile stress	506.4	N/mm²
Endurance tensile stress	868.2	N/mm²
Nominal short-time current IEC 724 at		
Initial/Final temperature 200 °C (initial 50 °C)	3.26	kA, 1 s.
D.C. resistance at 20 °C	1.87	Ω/km
Transport, storage, operation	- 40 to + 80	°C
Installation	- 10 to + 50	°C

OPTICAL CHARACTERISTICS (CABLED MAX. VALUES)

Fibre type		Single mode		
Acc. to specification		ITU-T G.652		
Mode field diameter		9.2 ± 0.5		µm
Cladding diameter		125 ± 1		µm
Coating diameter		245 ± 10		µm
Wavelength	1310	1285-1330	1550	nm
Attenuation coefficient	0.38	0.40	0.25	dB/km
Dispersion	-	3.5	18.0	ps/nm.km
PMD		0.5		$ps.km^{-½}$

FIBRE COLOURING

Fibre No.	1	2	3	4	5	6
Fibre colour	Blue	Orange	Green	Brown	Grey	White
Fibre No.	7	8	9	10	11	12
Fibre colour	Red	Black	Yellow	Violet	Rose	Turquoise

Customised colouring upon request

BINDER YARN COLOURING

Fibre bundle	1	2
Yarn colour	Blue	Orange

TESTING AND INSPECTION

Testing will comprise the following:

Optical characteristics (each cable length)	Attenuation (Single mode at 1310 / 1550nm)
Mechanical characteristics	Diameter of cable
Electrical characteristics	DC resistance
Visual inspection of cable	Colouring / markings of fibres / tubes

The mechanical characteristics and visual inspection shall be carried out with a frequency of 1 out of 10 drums, starting with the first drum. The first drum shall always be checked when the quantity is less than 10 drums.

Certified test results are provided upon request.

If testing and inspection to be carried out by third parties is required, such parties will be nominated and paid by the Purchaser.

PACKING

Standard length	≥ 3000	m
Length tolerance	+/-100, we reserve the right to deliver up to a maximum of 10 % of the ordered quantity in shorter lengths with a minimum of 2000 m / drum.	m
Sealing of cable ends	To prevent ingress of moisture the cable ends are sealed with heat shrinkable end caps.	
Protection / Packing	The reel shall be lagged with strong wooden battens so as to prevent the OPGW from damage in ordinary handling and shipping.	

Other types can be provided upon specified request.

ELSEWEDY CABLES

DOUBLE STRANDING LAYERS, CENTRAL SST OPGW

SM-MFOA 117-58-16-1S AA-ACS-24SMF

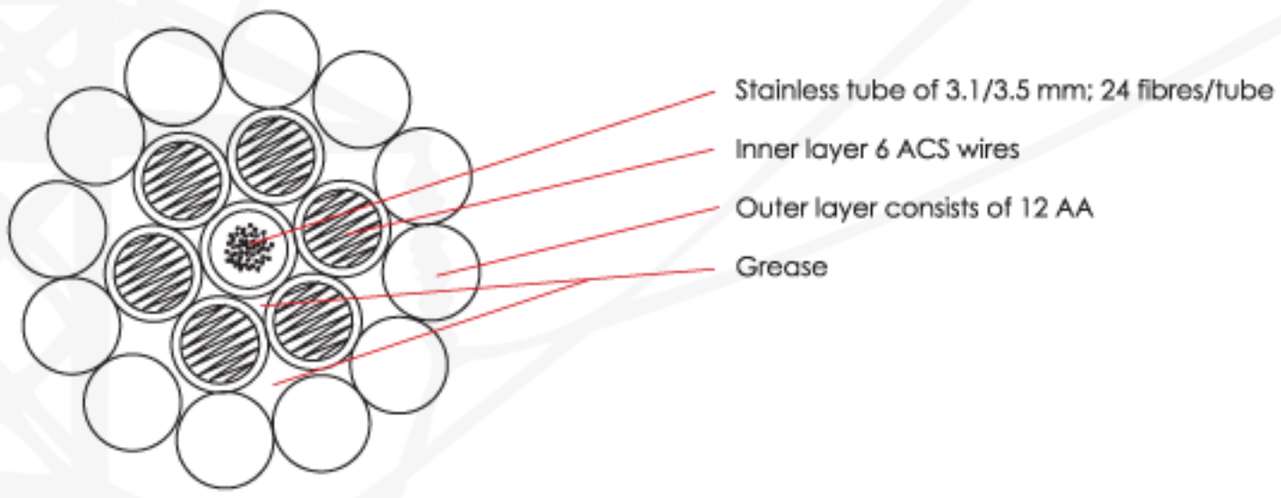
APPLICATION

These cables are suitable for installation as optical ground wire in powerline installations.
The cable acts as an normal ground wire protecting phase wires from lighting strikes and carries earth fault currents.
The cable provides also an optic path in powerline installations for telecommunication needs.

FEATURES

- Installation in the same way as normal ground wire with conventional machinery.
- Most reliable optic solution for fibre optic utilities.
- Best solution in old ground wire replacement and in new line constructions.
- Low cost

CROSS SECTIONAL DIAGRAM



CONSTRUCTION

Optical fibre : For fibre specification see optical characteristics.
Secondary coating : The secondary coating consists of one laser welded stainless steel tube. Every fibre is uniquely identified by a fibre colour and for fibre counts above 12 fibres with a coloured fibre bundle yarn.

The tube is filled with a water-repellent filling compound.

Central element : 1 stainless steel tube : 3.5 mm
First layer : 6 ACS wires (20SA) : 3.52 mm
: Direction layer : "Left "
Second layer : 12 aluminium alloy (AA) wires : 3.52 mm
: Direction layer : "Right "
Grease : The interstices of the cable core are filled with grease according to IEC 1089 ANNEX C figure C.2

The interstices of the cable core are filled with grease according to IEC

TECHNICAL CHARACTERISTICS

Number of tubes	1	
Number of fibres / tube	24	
Cable ø	17.58	mm
Cable weight	749	kg/km
Supporting cross-section	175.17	mm^2
AA cross-section	116.78	mm^2
ACS cross-section	58.39	mm^2
Calculated breaking load (UTS)	104.4	kN
Modulus of elasticity	92.0	kN/mm^2
Coefficient of thermal expansion $.10^{-6}$	17.13	1/K
Permissible tensile stress acc.		
Everyday stress (16%)	95.3	N/mm^2
Maximum tensile stress	242.3	N/mm^2
Endurance tensile stress	415.4	N/mm^2

Other types can be provided upon specified request.

Nominal short-time current IEC 724 at		
Initial/Final temperature 30 / 200 °C	16.1	kA, 1 s.
D.C. resistance at 20 °C	0.24	Ω/km
Transport, storage, operation	- 40 to + 80	°C
Installation	- 10 to + 50	°C

OPTICAL CHARACTERISTICS (CABLED MAX. VALUES)

Fibre type	Single mode			
Acc. to specification	ITU-T G.652.B			
Mode field diameter	9.2 ± 0.5			µm
Cladding diameter	125 ± 1			µm
Coating diameter	245 ± 10			µm
Wavelength	1310	1285-1330	1550	nm
Attenuation coefficient	0.34	0.40	0.21	dB/km
Dispersion	-	3.5	17.5	ps/nm.km
PMD		0.2		$ps.km^{-½}$

FIBRE COLOURING

Fibre No.	1	2	3	4	5	6
Fibre colour	Blue	Orange	Green	Brown	Grey	White
Fibre No.	7	8	9	10	11	12
Fibre colour	Red	Black	Yellow	Violet	Rose	Turquoise

Customised colouring upon request

BINDER YARN COLOURING

Fibre bundle	1	2
Yarn colour	Blue	Orange

TESTING AND INSPECTION

Testing will comprise the following:

Optical characteristics (each cable length)	Attenuation (Single mode at 1310 / 1550nm)
Mechanical characteristics	Diameter of cable
Electrical characteristics	DC resistance
Visual inspection of cable	Colouring / markings of fibres / tubes

The mechanical characteristics and visual inspection shall be carried out with a frequency of 1 out of 10 drums, starting with the first drum. The first drum shall always be checked when the quantity is less than 10 drums.

Certified test results are provided upon request.

If testing and inspection to be carried out by third parties is required, such parties will be nominated and paid by the Purchaser.

PACKING

Standard length	≥ 3000	m
Length tolerance	+/-100, we reserve the right to deliver up to a maximum of 10 % of the ordered quantity in shorter lengths with a minimum of 2000 m / drum.	m
Sealing of cable ends	To prevent ingress of moisture the cable ends are sealed with heat shrinkable end caps.	
Protection / Packing	The reel shall be lagged with strong wooden battens so as to prevent the OPGW from damage in ordinary handling and shipping.	

Other types can be provided upon specified request.

ELSEWEDY CABLES

DOUBLE STANDINGS LAYERS, CENTRAL ACST OPGW

SM-MFOA 131-29-16.1-1S AA-ACS-24SMF

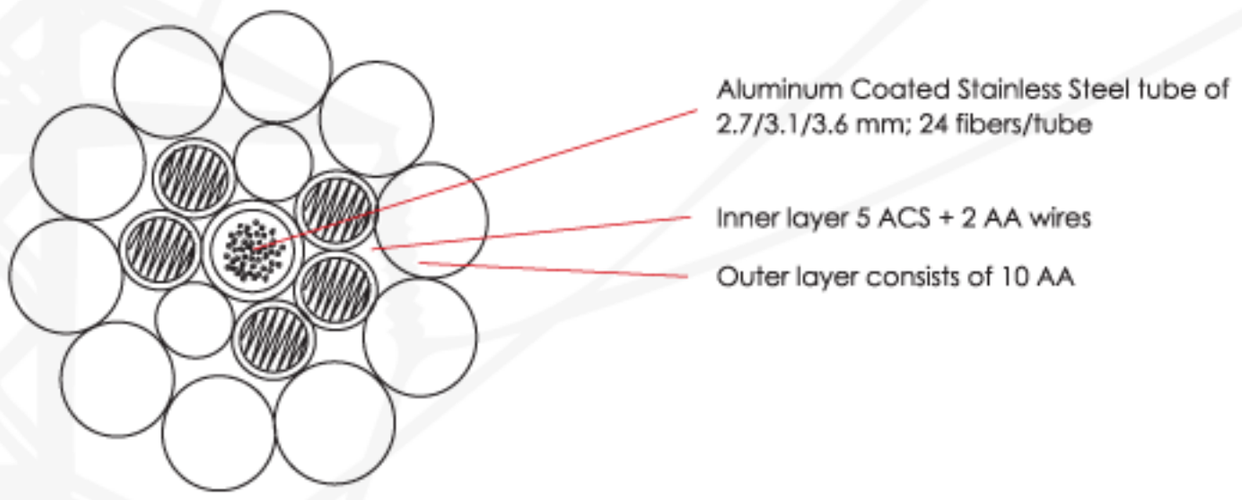
APPLICATION

These cables are suitable for installation as optical ground wire in powerline installations. The cable acts as an normal ground wire protecting phase wires from lighting strikes and carries earth fault currents.
The cable provides also an optic path in powerline installations for telecommunication needs.

FEATURES

- Installation in the same way as normal ground wire with conventional machinery.
- Most reliable optic solution for fibre optic utilities.
- Best solution in old ground wire replacement and in new line constructions.
- Low cost

CROSS SECTIONAL DIAGRAM



CONSTRUCTION

Optical fibre : For fibre specification see optical characteristics.
Secondary coating : The secondary coating consists of one laser welded stainless steel tube. Every fibre is uniquely identified by a fibre colour and for fibre counts above 12 fibres with a coloured fibre bundle yarn.
The tube is filled with a water-repellent filling compound.

Central element	: 1 Aluminium Coated stainless steel tube	: 3.6 mm
First layer	: 5 ACS wires (20SA)	: 2.75 mm
	2 aluminium alloy (AA) wires	: 2.75 mm
	: Direction layer	: "Left "
Second layer	: 10 aluminium alloy (AA) wires	: 3.9 mm
	: Direction layer	: "Right "

All values in this product data sheet are nominal unless otherwise stated.

TECHNICAL CHARACTERISTICS

Number of tubes	1	
Number of fibres / tube	24	
Cable ø	16.9	mm
Cable weight	589	kg/km
Supporting cross-section	161.04	mm^2
AA cross-section	131.34	mm^2
ACS cross-section	29.70	mm^2
Calculated breaking load (UTS)	74.43	kN
Modulus of elasticity	76.58	kN/mm^2
Coefficient of thermal expansion $.10^{-6}$	19.10	1/K
Permissible tensile stress acc.		
Everyday stress (16%)	73.90	N/mm^2
Maximum tensile stress	194.10	N/mm^2
Endurance tensile stress	332.80	N/mm^2

Other types can be provided upon specified request.

Nominal short-time current IEC 724 at		
Initial/Final temperature 20 / 200 °C	16.23	kA, 1 s.
D.C. resistance at 20 °C	0.23	Ω/km
Transport, storage, operation	- 40 to + 80	°C
Installation	- 10 to + 50	°C

OPTICAL CHARACTERISTICS (CABLED MAX. VALUES)

Fibre type	Single mode			
Acc. to specification	ITU-T G.652.B			
Mode field diameter	9.2 ± 0.5			µm
Cladding diameter	125 ± 1			µm
Coating diameter	245 ± 10			µm
Wavelength	1310	1285-1330	1550	nm
Attenuation coefficient	0.34	0.40	0.21	dB/km
Dispersion	-	3.5	17.5	ps/nm.km
PMD		0.2		$ps.km^{-½}$

FIBRE COLOURING

Fibre No.	1	2	3	4	5	6
Fibre colour	Blue	Orange	Green	Brown	Grey	White
Fibre No.	7	8	9	10	11	12
Fibre colour	Red	Black	Yellow	Violet	Rose	Turquoise

Customised colouring upon request

BINDER YARN COLOURING

Fibre bundle	1	2
Yarn colour	Blue	Orange

TESTING AND INSPECTION

Testing will comprise the following:

Optical characteristics (each cable length)	Attenuation (Single mode at 1310 / 1550nm)
Mechanical characteristics	Diameter of cable
Electrical characteristics	DC resistance
Visual inspection of cable	Colouring / markings of fibres / tubes

The mechanical characteristics and visual inspection shall be carried out with a frequency of 1 out of 10 drums, starting with the first drum. The first drum shall always be checked when the quantity is less than 10 drums.

Certified test results are provided upon request.

If testing and inspection to be carried out by third parties is required, such parties will be nominated and paid by the Purchaser.

PACKING

Standard length	≥ 3000	m
Length tolerance	+/-100, we reserve the right to deliver up to a maximum of 10 % of the ordered quantity in shorter lengths with a minimum of 2000 m / drum.	m
Sealing of cable ends	To prevent ingress of moisture the cable ends are sealed with heat shrinkable end caps.	
Protection / Packing	The reel shall be lagged with strong wooden battens so as to prevent the OPGW from damage in ordinary handling and shipping.	

Other types can be provided upon specified request.

DOUBLE STRANDING LAYERS, LATERAL POSITION SST OPGW

SM-MFOA 83-23-14-0.5S ACS-24SMF

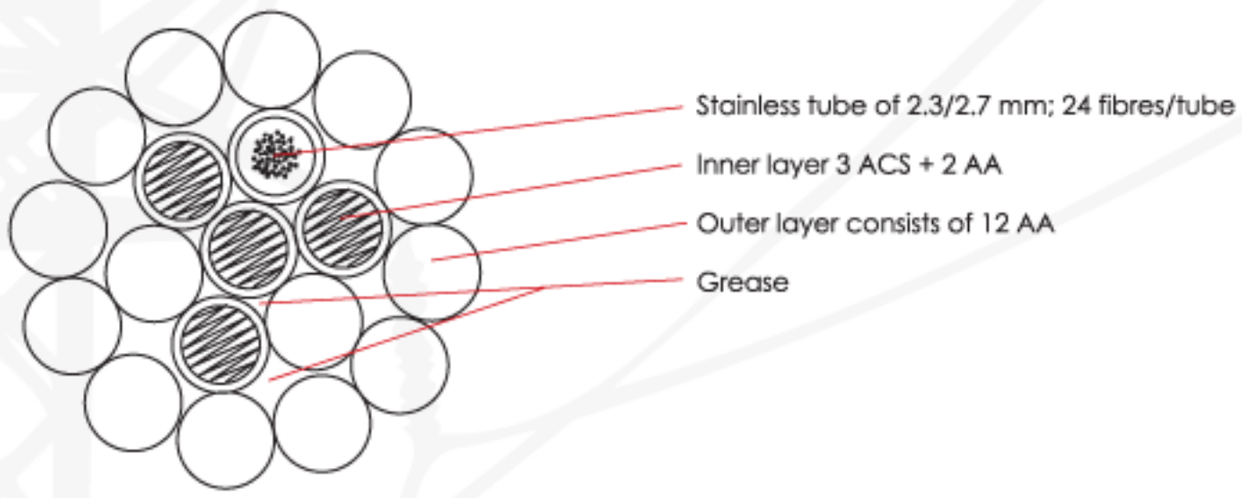
APPLICATION

These cables are suitable for installation as optical ground wire in powerline installations. The cable acts as an normal ground wire protecting phase wires from lighting strikes and carries earth fault currents.
The cable provides also an optic path in powerline installations for telecommunication needs.

FEATURES

- Installation in the same way as normal ground wire with conventional machinery.
- Most reliable optic solution for fibre optic utilities.
- Best solution in old ground wire replacement and in new line constructions.
- Low cost

CROSS SECTIONAL DIAGRAM



CONSTRUCTION

Optical fibre : For fibre specification see optical characteristics.
Secondary coating : The secondary coating consists of one laser welded stainless steel tube. Every fibre is uniquely identified by a fibre colour and for fibre counts above 12 fibres with a coloured fibre bundle yarn.
The tube is filled with a water-repellent filling compound.

Central element	: 1 ACS wires (20SA)	: 2.75 mm
First layer	: 1 stainless steel tube	: 2.7 mm
	3 ACS wires (20SA)	: 2.75 mm
	: 2 aluminium alloy (AA) wires	: 2.75 mm
	: Direction layer	: "Left "
Second layer	: 12 aluminium alloy (AA) wires	: 2.75 mm
	: Direction layer	: "Right "

Grease : The interstices of the cable core are filled with grease according to IEC 1089 ANNEX C figure C.2

All values in this product data sheet are nominal unless otherwise stated.

TECHNICAL CHARACTERISTICS

Number of tubes	1	
Number of fibres / tube	24	
Cable Ø	13.75	mm
Cable weight	412	kg/km
Supporting cross-section	106.9	mm^2
AA cross-section	83.15	mm^2
ACS cross-section	23.67	mm^2
Calculated breaking load (UTS)	53.1	kN
Modulus of elasticity	80.67	kN/mm^2
Coefficient of thermal expansion $.10^{-6}$	18.54	1/K
Permissible tensile stress acc.		
Everyday stress	79.5	N/mm^2
Maximum tensile stress	208.6	N/mm^2
Endurance tensile stress	357.5	N/mm^2

Other types can be provided upon specified request.

Nominal short-time current IEC 724 at		
Initial/Final temperature 40 / 200 °C	14.0	kA, 0.5 s.
D.C. resistance at 20 °C	0.360	Ω/km
Transport, storage, operation	- 40 to + 80	°C
Installation	- 10 to + 50	°C

OPTICAL CHARACTERISTICS (CABLED MAX. VALUES)

Fibre type	Single mode			
Acc. to specification	ITU-T G.652			
Mode field diameter	9.2 ± 0.5			µm
Cladding diameter	125 ± 1			µm
Coating diameter	245 ± 10			µm
Wavelength	1310	1285-1330	1550	nm
Attenuation coefficient	0.38	0.40	0.25	dB/km
Dispersion	-	3.5	18.0	ps/nm.km
PMD		0.5		$ps.km^{-½}$

FIBRE COLOURING

Fibre No.	1	2	3	4	5	6
Fibre colour	Blue	Orange	Green	Brown	Grey	White
Fibre No.	7	8	9	10	11	12
Fibre colour	Red	Black	Yellow	Violet	Rose	Turquoise

Customised colouring upon request

BINDER YARN COLOURING

Fibre bundle	1	2
Yarn colour	Blue	Orange

TESTING AND INSPECTION

Testing will comprise the following:

Optical characteristics (each cable length)	Attenuation (Single mode at 1310 / 1550nm)
Mechanical characteristics	Diameter of cable
Electrical characteristics	DC resistance
Visual inspection of cable	Colouring / markings of fibres / tubes

The mechanical characteristics and visual inspection shall be carried out with a frequency of 1 out of 10 drums, starting with
the first drum. The first drum shall always be checked when the quantity is less than 10 drums.

Certified test results are provided upon request.

If testing and inspection to be carried out by third parties is required, such parties will be nominated and paid by the Purchaser.

PACKING

Standard length	≥ 3000	m
Length tolerance	+/-100, we reserve the right to deliver up to a maximum of 10 % of the quantity in shorter lengths with a minimum of 2000 m / drum.	m
Sealing of cable ends	To prevent ingress of moisture the cable ends are sealed with heat shrinkable end caps.	
Protection / Packing	The reel shall be lagged with strong wooden battens so as to prevent the OPGW from damage in ordinary handling and shipping.	

Other types can be provided upon specified request.

ELSEWEDY CABLES

OPGW INSTALLATION PROCEDURE

INTRODUCTION

We as (Elsewedy Cables) one of the most advanced and leading cables manufacturer in the Middle East & Africa has a great history in engineering, implementing and managing major fiber optic networks in Egypt thanks to our well established partnership with our principles all over the world. Our major business partner is DRAKA NKF TELECOM (Netherlands) for producing Optical Ground Wires (OPGW). Due to the necessity of having OPGW, we decide to start to produce, instal and maintain the OPGW by doing the relenat sercvice on turn-key bases.

Elsewddy Cables frame, mainly, outlines the OPGW & Optical fiber cables in an evolved, innovated, state-of-the Art and latest technology Modules. The advanced Technology provided reflects wide latitude of matching and conformity with the supper design and luxury planning.

Generally, Elsewedy Cables follows the customer's specification to meet the stated requirements. We are offering our inhouse produced OPGW cables as, a perfect match solution to the required specifications with much more features to serve the advanced telecommunication application through optical fibers..

Furthermore, we cover the customer's scope of supply completely with state-of ñthe art technology of OPGW, optical fiber cables, fittings and accessories to fullfil the projects turn-key activities.

INSTALLATION OF OPGW CABLES

Important factors to be taken into account during stringing
The general method of installation is shown in Figure 2.

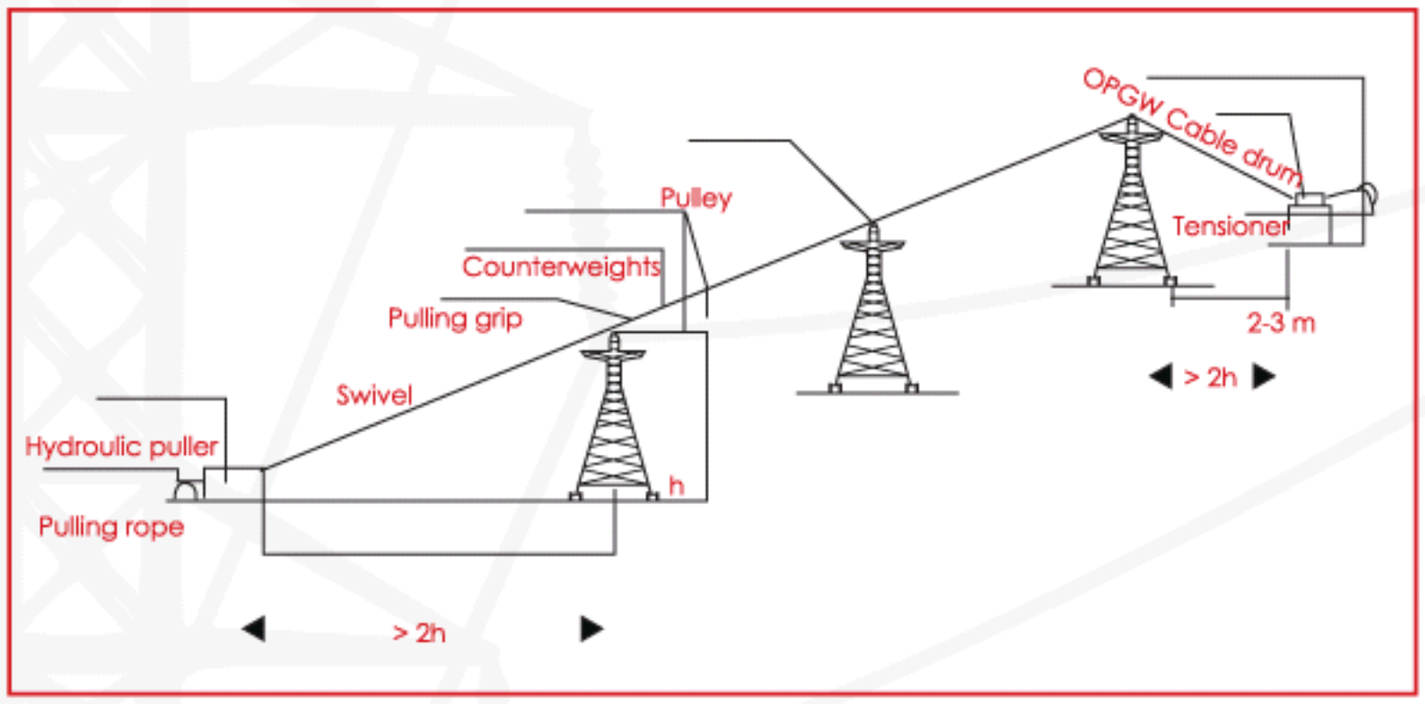


Fig. 2

As a rule, one drum at a time of OPGW cable is installed. In case of any difficulties, the Egytech Cables El Sewedy supervisors have to be contacted. He will give the correct guidelines to proceed with the OPGW cable installation.
Please refer to figure 3 to 7 to see the installation tools, components and elements.

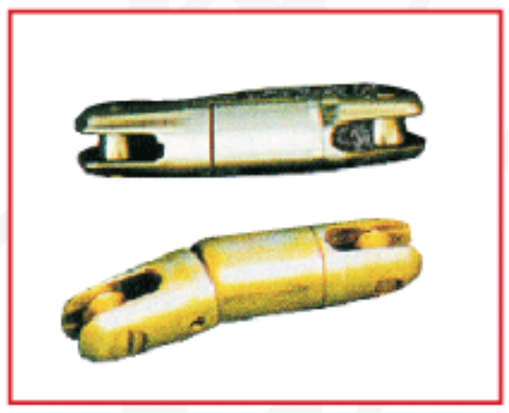


Fig. 3: Swivel

Fig. 4: Pulley

Fig. 5: Pulling grip

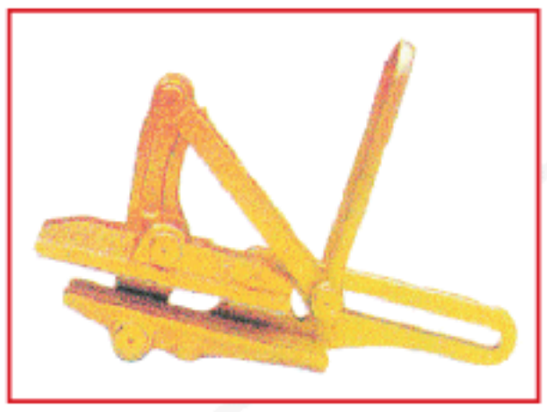


Fig. 6: Clamp

Fig. 7: Pulling Rope

1 BASIC CONTROLS

Strict controls must be established during installation to ensure that it is performed correctly, without excess tension, twist of the OPGW, unsuitable compression, regulating a correct sagging. Neither the fibers nor the Fibers tube (Stainless Steel Tube or Aluminum Tube) will be damaged.

The tensioner and the puller should be placed at a distance from the first tower pulley which is equivalent to at least twice the height of the pulley (see figure 2 and figure 8).

Location of tensioner and drum

Fig. 8

Intermediate control points should be established, with the necessary precautions that are required at critical points during installation (beginning/end of drum, angles, etc.).

During installation, the OPGW cable should not strike nor graze any objects other than the pulleys.

No obstacles must prevent the pulleys from rotating in the correct way.

The minimum bending / twisting radius must be controlled during all installation operations. Please refer to figure 9 for anti – twisting devices.

Fig. 9

Ensure that the metal part of the pulleys do not make contact with the cable to prevent it from being damaged.

2 STRINGING SPEED

The maximum permissible stringing speed is 40 meters per minute. It always depends on the stringing conditions and must be reduced to avoid damages to the optical fibers, the aluminum tube and the OPGW cable.

3 PULLING TENSION

The recommended pulling tension shall be lower than 1.5 times the weight (kg) of 1 km OPGW cable length.

4 MINIMUM BENDING RADIUS

The minimum bending radius is in the whole situations as follows:

- on tensioner reels — 40 times the cable diameter
- during installation — 400 mm
- after installation — 20 times the cable diameter

Please refer to figure 10 for puller / tensioner machines and figure 11 to see the Ground connection of the OPGW cable at the tensioner outlet.

Fig. 10

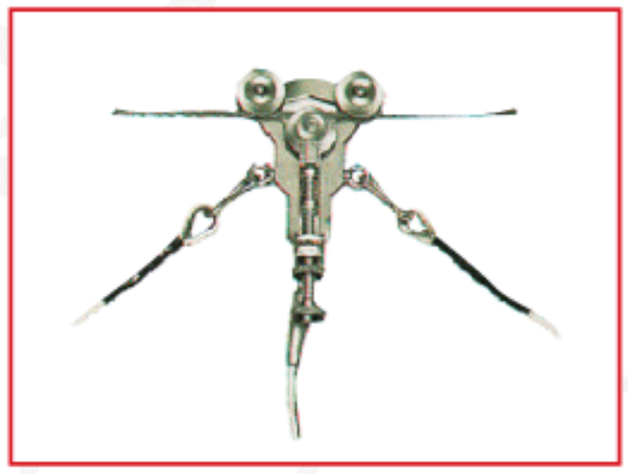


Fig. 11

5 COMMUNICATIONS DURING STRINGING

The personnel located at the puller, the tensioner, the pulley crossings and the cable ends are in communication at all times by communication system.

6 SAGGING OF THE CABLE

Generally, the methods used to obtain the correct sag values of the OPGW cables are the same used for conventional ground wire cables. The specific recommendations are as follows:

Pulling is performed by a preformed fitting or tension clamp (in intermediate spans) or with the pull jacket at the end.

Sagging of the cable and fittings instalation are always performed after stringing. At this time, the attachment fittings are also installed to prevent damage to the OPGW cable.

The installer is responsible for any damage to the OPGW cable that may occur due to failure cause by incorrect application of the previous points.

If the tension and sags are different from the expected values, the stringing or sagging should be halted. The Egytech Cables supervisor and the project leader will be consulted in order to safely continue the installation operations.

7 INSTALLATION OF FITTINGS AND ACCESSORIES

The fittings: tension clamps, suspensions, earthling clamps, dampers, etc. should be installed in accordance with the manufacturer's instructions and using the appropriate tools.

8 PERSONNEL TRAINING

All personnel who participate in the installation of the OPGW cable should be informed of handling problems and installation procedures for the OPGW cable.

It is responsibility of the installer to assure the correct instruction to the whole personnel involved in the installation works.

9 SUPERVISION

The supervisor designated by Egytech Cables El Sewedy will be responsible for ensuring compliance with all of the points indicated in this document as well as all required standards applicable to the specific installation.

The supervisor will communicate to Egytech Cables El Sewedy any non-conformity detected in the cable or cable installation procedures.

If a situation occurs that is not covered in the present installation procedure, whenever this occurs with an OPGW cable, the Supervisor will determine whether or not the action is correct.

The supervisor will request the installer to provide a descriptive list of the components to be used for installation. Moreover, he will verify that these components are sufficient and adequate.

10 SPLICES

After the stringing of the OPGW and the optical measurements done after installation, the fibers inside OPGW cable will be spliced.

11 TRANSMISSION TEST DURING THE INSTALLATION PHASES

Prior to as well as during the installation phases, the transmission characteristics of the fibre optic cables are verified in order to ensure proper installation and be sure that the final tests are within the specified range of tolerances.

12 MEASUREMENTS BEFORE OPGW CABLE INSTALLATION

Prior to OPGW cable installation, each optical fibres is verified using OTDR.

The attenuation values recorded are registered in "Attenuation test during installation phase"

document and saved on an electronic diskette. This computer register is kept by Egytech Cables El Sewedy.

The attenuation values recorded are registered in a document and are also saved on an electronic diskette. This computer register is kept by EGYTECH CABLES EL SEWEDY. It is suitably identified and referenced.

13 SPLICES MEASUREMENT

After splicing, each joint is optically verified using OTDR in order to ensure that the attenuation
values are within the required margins.

The attenuation values recorded are registered in a document, "Splice attenuation test" and are also saved on an electronic diskette. This computer register is kept by EGYTECH CABLES EL SEWEDY. It is suitably identified and referenced.

14 MEASUREMENTS AFTER INSTALLATION

After the cable has been installed, and prior to the splices, each of the cable fibers are verified once again using OTDR.

15 FINAL ACCEPTANCE TEST

After installation, a final measurement of the transmission characteristics is done and the values are duly recorded. A copy of this document is submitted to the customer.

These measurements are also recorded and kept by EGYTECH CABLES EL SEWEDY.

16 HEALTH & SAFETY

The supervisor designated by EGYTECH CABLES EL SEWEDY is responsible for compliance with the general Health and Safety standards for EGYTECH CABLES EL SEWEDY or the requirements stipulated by contract, if any.

17 ENVIRONMENT

17.1 WITHDRAWAL OF SPECIAL WASTE (TOXIC AND DANGEROUS)

If any type of special waste such as oil, grease, solvents, saturation of gloves or rags, etc. are produced during cable installation, proceed as follows:

- Place in heavy-duty carboys or steel drums, indicating what type of waste it is.

17.2 WITHDRAWAL OF NON-SPECIAL OR INERT WASTE

- If there are excess materials or waste such as aluminum, optical fiber, plastic, wood, iron, etc., whenever possible, this should be sent to an authorized recycler or a controlled dumping ground.

- Regardless of the amount, the waste should never be abandoned. Moreover, the area should be cleaned when the work is finished.

CERTIFICATES

برنامج تحديث الصناعة
INDUSTRIAL MODERNISATION PROGRAMME

National Awards For Excellence

Certificate

The Industrial Modernization Programme Certifies That

El Sewedy Cables

Is the Role Model Of

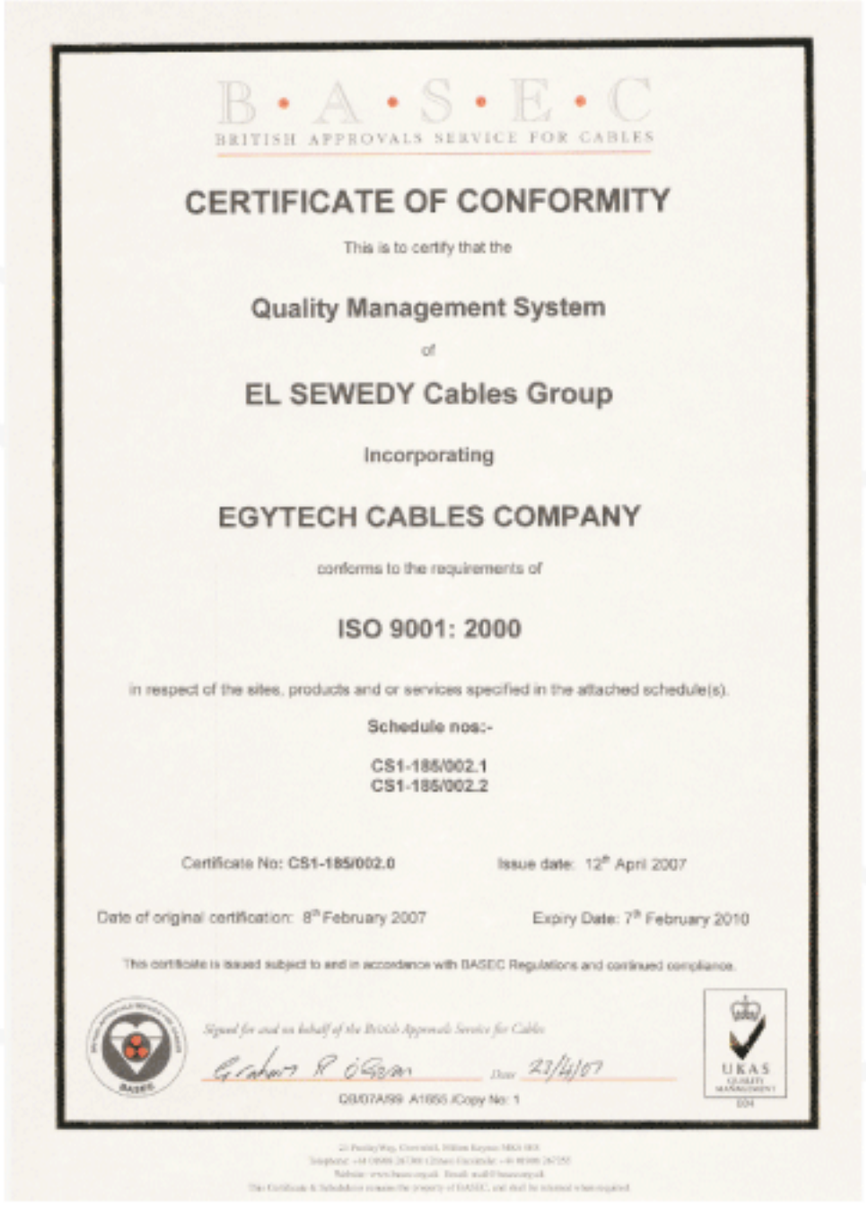
large Size Enterprises

Therefore It is Considered the

2005 WINNER

Of The National Award for Excellence in Export

Helmy Abouleish
IMC Managing Council Member



B • A • S • E • C
BRITISH APPROVALS SERVICE FOR CABLES

CERTIFICATE OF CONFORMITY

This is to certify that the

Quality Management System

of

EL SEWEDY Cables Group

Incorporating

EGYTECH CABLES COMPANY

conforms to the requirements of

ISO 9001: 2000

in respect of the sites, products and or services specified in the attached schedule(s).

Schedule nos:-

CS1-185/002.1
CS1-185/002.2

Certificate No: **CS1-185/002.0** Issue date: 12th April 2007

Date of original certification: 8th February 2007 Expiry Date: 7th February 2010

This certificate is issued subject to and in accordance with BASEC Regulations and continued compliance.

Signed for and on behalf of the British Approvals Service for Cables

Graham R Gibson Date 23/4/07

GB/07A/99 A1655 /Copy No: 1

UKAS QUALITY MANAGEMENT 004

Certificate EG07/00021 EM

SGS

The management system of

Egytech Cables (El Sewedy)

10th of Ramadan city, Zone A3 – Cairo - Egypt

has been assessed and certified as meeting the requirements of

ISO 14001:2004

For the following activities

Design, manufacture and installation of control and low voltage cables up to 1Kv, medium voltage cables up to 36Kv, high voltage cables up to 150Kv, extra high voltage cables up to 220Kv and overhead transmission lines.

Further clarifications regarding the scope of this certificate and the applicability of ISO 14001:2004 requirements may be obtained by consulting the organization

This certificate is valid from 15 February 2007 until 17 December 2009
Issue 1. Certified since 18 December 2003

Authorised by

P. Earl

SYSTEM CERTIFICATION ISO 14001:2004 SGS

UKAS QUALITY MANAGEMENT 005

SGS United Kingdom Ltd Systems & Services Certification
Rossmore Business Park Ellesmere Port Cheshire CH65 3EN UK
t +44 (0) 151 350 6666 f +44 (0) 151 350 6600 www.sgs.com

Page 1 of 1

SGS SGS SGS

ELSEWEDY CABLES

Elsewedy Cables Contacts

Elsewedy Cables Head Office
Local
14 Baghdad st. –EL Korba – Heliopolis . Cairo . Egypt
Tel.: +(202) 22909430 Fax: +(202) 22917078
Email: info@elsewedy.com
Export
14 Baghdad st. –EL Korba – Heliopolis . Cairo . Egypt
Tel.: +(202) 26904310/1-2-3 Fax: +(202) 24170173
Email: export@elsewedy.com

Wires & cables Sector:

Arab Cables (Power Cables)
14 Baghdad St. El Korba, Heliopolis, Cairo Egypt
Tel.: +(202) 22909430 - 24187371 - 24187372, 24187361, 24187362
Fax: +(202) 22917078
E-mail: acc@elsewedy.com

Egytech cables (Power Cables)
16 Baghdad St. El Korba, Heliopolis, Cairo - Egypt
Tel. : +(202) 24148366, 24148370 Fax: +(202) 24148373
E-mail: egy@elsewedy.com

United Industries
(Enameled Wires - Special Cables - Fiber Glass Poles)
Add. 68 El Tayran St., Nasr City, Cairo
Tel. : +(202) 22 60 3196 - 22 61 8908 - 24 01 3606
Fax: +(202) 22 62 0473
E-mail: uic-sales@uic-elsewedy.com, uic-marketing@uic-elsewedy.com

United Metal (Copper Rods)
14 Baghdad St.El Korba, Heliopolis, Cairo - Egypt
Tel.: +(202) 24148369 - 22916507 Fax: +(202) 24196116
E-mail: umc@elsewedy.com

Sedplast (PVC Compounds)
13, El Obour Bldg's. Salah Salem St. Nasr City, Cairo -Egypt
Tel.: +(202) 22623411, 22605405 Fax: +(202) 22623442
E-mail: sedplast@elsewedy.com

Egyplast
Elsewedy for Plastic Industry EGYPLAST Obour
Buildings #13, Salah Salem Street, Nasr City, Cairo, Egypt
Tel.: +(202) 22632411 – 22632442 Fax: +(202) 24033285

United Wires
10th of Ramadan City, Zone A3, El-Sharkia, Egypt
Tel.: +(2015) 411944 Fax: +(2015) 411941
E-mail: info.wire@elsewedy.com

Giad Elsewedy (Power Cables)
Al Hourea St. Al Khartoum, Sudan
Tel.: +249 183 2764117/8 Fax: +249 183 2764116
E-mail:giad@elsewedy.com

Elsewedy Cables Egypt (Power Cables)
16 Baghdad St. El Korba, Heliopolis, Cairo - Egypt
Tel. : +(202) 24148366, 24148370 Fax: +(202) 24148373
E-mail: egy@elsewedy.com

Elsewedy Cables Syria (Power Cables)
139, Kafr Sousa Bldg's (Main Rood), DAMASCUS, SYRIA- RO.BOX: 36633
Tel.: +963 11 25850207-25850212 Fax: +963 11 25850206
E-mail: syria@elsewedy.com

Elsewedy Cables Saudi Arabia (Wires & Cables)
Nassar Center, King Fahd Road, Al-Aziziah,
P.O. Box: 16582 Jeddah 21474, Saudi Arabia.
Tel.: +966 2 66 87 488 - 499
Fax.: +966 2 66 87 480
Website: www.elsewedy.com
Email:ksa@elsewedy.com
Short number : 9200-11-899

Elsewedy Cables Algeria (Power Cables)
153 rue Ali Khodja, El Biar, Alger, Algérie.
Tel.:+213 21 92 40 05/07 Fax: +213 21 92 39 97
E-mail: algeria@elsewedy.com

Elsewedy Cables Qatar (Power Cables)
Nuiaja area, villa # 36 N.B.S. D-ring road, P.O. Box 3988, Doha - Qatar.
Tel +974 4652645 \ 4568612 Fax +974 4653892 \ +974 5899047
E-mail: a.fathy@elsewedy.com

Electrical Products Sector:

SEDCO (Cables Accessories)
13, El Obour Bldg's, Salah Salem St. Nasr City, Cairo -Egypt
Tel.: +(202) 24023683 - 22626763 Fax: +(202) 22639155
E-mail: Sedco@elsewedy.com

Elastimold
Elastimold Egypt Elsewedy - Elastimold J.V. (Cables Accessories)
13, El Obour Bldg's, Salah Salem St. Nasr City, Cairo -Egypt
Tel.: +(202) 24023683 - 22626763 Fax: +(202) 22639155
E-moil: elastimold@elsewedy.com

Sudanese Egypt Electrical Industries SUDATRAF (Transformers)
El Kuwaiti Buildings -4th tower - 7th stage Khartoum
Sudan P.O.B 1380 Khartoum
Tel.: +249 183 2764118

Elsewedy Electric Ghana (Fiber Glass Poles)
9, Light Industrial Area No. A/36/2B Tema - Ghana
Tel.: +022311101 -311102 Fox: +022311103
E mail: ghana@elsewedy.com

Elsewedy Electric Syria (Transformers)
Tel: +963 11 5850 215 Fax: +963 11 5850 216
Email: elsewedy-sales@elsewedy.com

Elsewedy Transformers (Transformers)
14 Baghdad St. El Korba, Heliopolis, Cairo - Egypt
Tel.: +(202) 24144380 - 24144381 Fax: +(202) 22905844 - 24144383
E-mail: uic-sales@uic-elsewedy.com, uic-marketing@uic-elsewedy.com

Italsmia (Explosion Proof Equipment)
Tel.: +(2015) 411141 Fax: +(2015) 411142
E mail: italsmea@elsewedy.com

ISKRAEMECO (Meters)
Iskraemeco Savska loka 4 SI-4000 Kranj, Slovenia
Phone: +386 4 206 40 00
E-mail: info@iskraemeco.si

Turn Key Projects Sector:

Power System Projects (PSP)
31, Ramy Tower, El Shatr EL Sades, Zahraa El Maadi, Cairo, Egypt.
Tel.: +(202) 25215810 / 20 / 30 Fax: +(202) 25165122
E-mail: psp@elsewedy.com

Elsewedy Electric Transmission & Distribution
Add. 68 El Tayran St., Nasr City, Cairo
Tel.: +(202) 22 60 3196 - 22 61 8908 - 24 01 3606
Fax: +(202) 22 62 0473
E-mail: sh.ali@elsewedy.com

International Operations Sector:

Jordan & Iraq
Elsewedy Cables - Jordan & Iraq
38, Abd Allah Ghosha st., Al-Husseiny complex, Amman, Jordan
3rd floor, office # 311
Tel: +962 6 5853802 Fax: +962 6 5853804
E-mail: jordan@elsewedy.com

Malawi
Elsewedy Cables - Southern Africa
E263 Post Dot Net Blantyre-Malawi
Tel: +265 1 878 878 Fax: +265 1 878 788 Cell: +265 9 788 87
E-mail: malawi@elsewedy.com

Ethiopia
Elsewedy Cables - Ethiopia
Ries Engineering Share Company
P.O Box 1116 ,Debrezeit Road Addis Ababa, Ethiopia
Tel: +251 11 440 17 39 Fax: +251 11 442 06 67
E-mail: ethiopia@elsewedy.com

Kuwait
Elsewedy Cables - Kuwait
Al Kazemi International for General Trading & Contracting
Al Salmeya, Laila Tower, 4th floor PO Box 403 Safat, 13005 Kuwait
Mob: +965 7861325 Fax: +965 6723196
E-mail: Kuwait@elsewedy.com

UAE
Elsewedy Cables - Emirates
Business Avenue Building – Sheikh Rashid Road
PO Box 90305 Dubai, UAE 3rd Floor – Office no. 312
Tel: +971 42955905 Fax: +971 42955135
E-mail: uae@elsewedy.com

Yemen
Elsewedy Cables - Yemen
Hadda Towers - Hadda P.O. BOX: 888-Tower No.6
7th Floor- Office No.13-Sanna-Yemen
Tel: +9671 430852 Mobile: +2 0101691557 +967 734023861
Fax: +967 1-430853
Email : h.talat@elsewedy.com

Guinea
Elsewedy Electric - Guinea
Equatorial Pork Of Africa, Caracoles,
Beside Military Camp, Malabo, Equatorial Guinea
Tel.: +(240) 096 569 Fax: +(240) 096 569
E-mail: eq.guinea@elsewedy.com

Nigeria
Elsewedy Electric - Nigeria
10 Bauchi Close Agbara Estate, Ogun State Lagos-Nigeria
Tel.: +234 7033475772

Libya
Elsewedy Cables - Libya
Gergarash -Hay El Andalous, Tripoli-Libya
Tel: +218 91 325 96 25
E-mail: Libya@elsewedy.com

India
Elsewedy Cables - India
Office No. 412, 'A' Wing, Sagartech Plaza,
Andheri-kurla Road, Andheri (East) Mumbai-400072, India
Tel.: +91 22 65283183 / 66790130 FAX NO +91 22 66790131

ELSEWEDY CABLES
E-mail: info@elsewedy.com
www.elsewedy.com
19159
2008