

ELEGAR photovoltaic Cables & Systems

# THE QUALITY CONNECTION

Elegar Kerpen Kabel India Pvt. Ltd (Formerly LEONI Cable Solutions (India) Pvt. Ltd)

www.elegar-kerpen.com



We connect technology, efficiency & ecological awareness already today.

## SOLAR Exergie Konnect Clean cables for clean energy.

Whether it is an off-grid application or a grid connected PV-System – our cables meet the same high expectations that are demanded from the solar modules – which are a long service life and high weather resistance.

Our double insulated, electron-beam cross-linked cables meets the highest requirements for solar cables in the most important photovoltaic markets of Europe and the USA and can be used unrestrictedly as a module or connecting cable.

Our products have both TÜV approval for the European market.

### Issue: January 2024 © ELEGAR KERPEN

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### We reserve the right to make technical modifications, typographical errors and mistakes.

The current version of the catalogue is downloadable under www.elegar-kerpen.com

### Safety instructions

Cables are to be used for the designated applications only. In case of failure or damage to the cable or connector, switch off power immediately and replace all damaged parts. Maintenance, repair and replacement of the cables and connectors may only be carried out by authorised and trained personnel.

### Waiver

While the information contained in this document has been carefully compiled to the best of our knowledge, it is not intended as a representation or warranty of any kind on our part regarding the suitability of the products concerned for any particular use or purpose and neither shall any statement contained herein be construed as a recommendation to infringe any industrial property rights or as a license to use any such rights. The suitability of each product for any particular purpose must be checked beforehand with our specialists. Our policy is one of continuous material and product development. We reserve the right to offer alternatives consistent with our manufacturing programme at the time of enquiry. All information concerning material properties, Fire performance, construction, electrical and technical data, prices etc. reflects our current level of knowledge and is provided without obligation. Dimensions and weights are only given as a guide. The specifications may change any time without prior notice.

### General conditions of sale and delivery

We refer to the currently valid General conditions of sale and delivery which can be obtained from the respective companies.

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Some of the terms used in this document are not used consistently in the industry. Elegar Kerpen, however, endeavours to use terminology consistently in the interests of transparent business relationships and customer communication. In order to avoid difficulties in their interpretation, we refer you to the definitions of the terms used by us available at www.elegar-kerpen.com

The current version at the time this document was sent is the binding version. These definitions form part of the contract. If the terms defined there are used in this document, they have the meaning given there. We will be pleased to provide you with a list of these definitions if required.



## Aboutus

Elegar Kerpen Kabel India Pvt. Ltd (Formerly LEONI Cable Solutions (India) Pvt. Ltd), a leading progressive cable manufacturer located in Pune, India. With a sprawling 3,00,000 sqft facility, we specialize in designing, developing and producing high-quality cables that enable seamless communication, drive technological advancements and empower industries worldwide.

As an ISO 9001, ISO 14001 and ISO 45001 certified company, we adhere to the highest quality standards. Our cables are manufactured in compliance with various national and international standards such as CPR, IS, RDSO, IEC, BS, ASTM, EN, VDE, DIN, UL, JSS, NF, MIL, EAC & as per customer specifications. This ensures that our products meet global requirements and exceed expectations.

With our extensive expertise, we export our cables to over 40 countries, serving diverse sectors including Solar & Windpower, Transportation, Defense, Oil & Gas, Process Industry, OEM/Customised Solutions and many more. Our commitment to excellence and customer satisfaction has earned us a strong reputation in the global market.

Setting us apart is our state-of-the-art E-beam line featuring hybrid crossfire technology, a unique offering in India. This cutting-edge facility further enhances our capabilities, allowing us to deliver unmatched performance and reliability in our cable manufacturing.

## Our Mission

Our overarching objective is to achieve a sales turnover target while consistently serving 1000 customers with reliable services. Additionally, we are committed to meeting the EBITA target each year and becoming the employer of choice. Moreover, we strive to generate 15% of turnover from new products annually. These goals collectively drive our efforts and define our path towards success and growth.

## Our Vision

Become a leading, innovative & reliable cable solutions provider in data and energy transmission

**Core Values** 

FAIRNESS TRUST COLLABORATION INNOVATION





## General Information & Short history

Name of Organization	:	Elegar Kerpen Kabel India Pvt. Ltd (Formerly LEONI Cable Solutions (India) Pvt. Ltd)
Year of Incorporation Year of Commencement of Production		2006 2013
Location of Headquarter	:	Elegar Kerpen Kabel India Private Limited Formerly LEONI Cable Solutions (India) Pvt. Ltd Indospace Rohan Industrial Park, Gat no. 428, Village Mahalunge, Off Chakan-Talegaon road, Taluka Khed, Pune-410501, Maharashtra, India
Contact No	:	+917030963540 Email: contact@elegar-kerpen.com Website: www.elegar-kerpen.com
Managing Director	:	Mr. Hemant K Mehta



2006	: LEONI Special Cables (India) Pvt. Ltd formed in Mumbai. 100% Subsidiary of LEONI AG, Germany.
2008	: LEONI Special Cables (India) Pvt. Ltd changes to LEONI Cable Solutions (India) Private Limited.
2012	: Setup of a Greenfield plant in Chakan Industrial Area of Pune.
2013	: Auto cables & Industrial cables commercial production begins.
2019	: EAC Approval Received; IS-694 Approval Received for Single & Multi-core cables.
2022	: Acquired By Ravicab Cables Private Limited
2023	: Rebranded from LEONI Kerpen to Elegar Kerpen



## Nature is brilliant. Cleanly efficient.





Trusting the only true constant – nature – makes sense and is the safest way in the long term.

Solar and wind energy are the energy sources of the future. The basic elements sun and air are natural forces that shape our climate. Using their limitless power sustainably and cleanly for the energy consumption of mankind is the great challenge facing the energy supply of the near future.

Achieving maximum efficiency is the responsibility of leading technology development companies. Innovative strength, creativity, inspiration and the courage to forge new paths are the requirements for tomorrow's clean energy world.

## Business Unit Solar- & Windpower

The business unit Solar & Windpower is aware of this task and already combines technology, innovation and ecological awareness today. Environmentally compatible manufacture for environmentally compatible energy production through renewable energy. That is our motto.

Whether it is for local production, manufacturer or grid operator, we offer our customers products, systems and project management support in line with the market.

Our worldwide presence allows us to react flexibly, quickly and competently to our customers' requirements in the most important solar and wind markets. Ambitious large projects like solar heat, solar parks and wind farms are based on more than just the development of renewable energy resources, they also involve ecological and energy awareness. Utilising nature thus also means being consistent in the long run.

For further information www.elegar-kerpen.com

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## **Green technology**

Our company aim is to combine innovation with sustainability.



Our vision is to create sustainable connections in technological harmony with the natural resources. The cycle of nature gives us the best model to emulate. It is our responsibility to learn from nature and make use of it while conserving it and treating it with care. The growing scarcity of the natural resources and the increasing burden on the environment require a rethink on all levels of society. For ELEGAR, sustainability is an integral part of group policy. We are the first cable manufacturer in the world to develop a holistic concept for "green technology".

While trends like globalisation, mobility and urbanisation also determine the markets, sustainability and global responsibility are a central credo. To be considered an innovative cable manu facturer for environmentally friendly technologies – that is our goal. At that, it is of vital interest to us to detect the needs and requirements of tomorrow today and supply the markets of the future with sustainable, future-proof solutions.

Green technology stands for the resource-conserving and low emission production of sustainable quality cables made with low-pollution elements. We constantly work at optimising the efficiency with which resources are used in the manufacturing process by deploying energy-efficient machines or taking heat recovery measures. More and more locations in our global pro duction network are environmentally certified according to the ISO 14001 standard.

As a worldwide active and leading European supplier of wires, optical fibres, cables and cable systems for communication and infrastructure projects it is our responsibility to constantly opti mise the sustainability and durability of our products, system solutions and services and thus lower the environmental load. We have to increase the amount of environmentally compatible raw materials in our cable products as well as the recyclability of processed materials or components and in doing so create end products that are developed for the environmental stand ard of tomorrow today.

In conjunction with the ecological compatibility, future tech nologies are measured in terms of efficiency, service life, emission reduction and the conservation of natural resources. Innovative cable products and systems, holistic solutions and maximum performance in project management are the added value which we offer to our customers and business partners. These are also our cornerstones for strong connections into the future

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There are various environmental directives in the European Union (EU). Directive 2012/19/EU WEEE (Waste Electrical and Electronic Equipment) regulates the disposal of electrical and electronic equipment and components. The use of certain hazardous materials in electrical and electronic devices is defined by Directive 2011/65/EU RoHS 2 (Restriction of Hazardous Substances). Chemicals and materials in general are regulated by the law on chemical substances 1907/2006/ EC REACh (Registration, Evaluation, Authorisation and Restriction of Chemicals).

This means avoiding the following substances, among others:

- Polybrominated diphenyl ether (PBDE)
- Decabromodiphenyl ether (DecaBDE)
- Perfluorooctane sulfonate (PFOS)
- Pentabromodiphenyl ether (PentaBDE)
- Octabromodiphenyl ether (OctaBDE)
- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr VI)
- Polybrominated biphenyls (PBB)

Cables and conductors and their associated connectors are only affected by Directive 2012/19/EU WEEE insofar as they are an internal part of the listed equipment and components.

Cables and conductors have now been included in 2011/65/EU RoHS 2 since 2013 for the first time (Category 11 or as an internal component of the respective product). Fiber optic cables, power cables (>250 V) and installed fixed cables e.g. in premises are not concerned. The only permissible marking according to RoHS 2 is the CE marking, which is printed on the product package.



### What does REACh mean?

REACh stands for **<u>Registration</u>**, **<u>Evaluation</u>**, **<u>Authorisa</u>**-<u>tion and Restriction of Chemicals</u>.

With REACh, the previous chemical law is basically harmonised, simplified and valid in all EU Member States.

Under REACh, there is a so-called candidate list with substance of very high concern (SVHC), which are subject to obligatory information and should be substituted in the long run. The list of candidate materials is updated twice per year by the European Chemicals Agency (ECHA) in Helsinki.



## The Elegar Kerpen PV system



Overview of our complete range of products



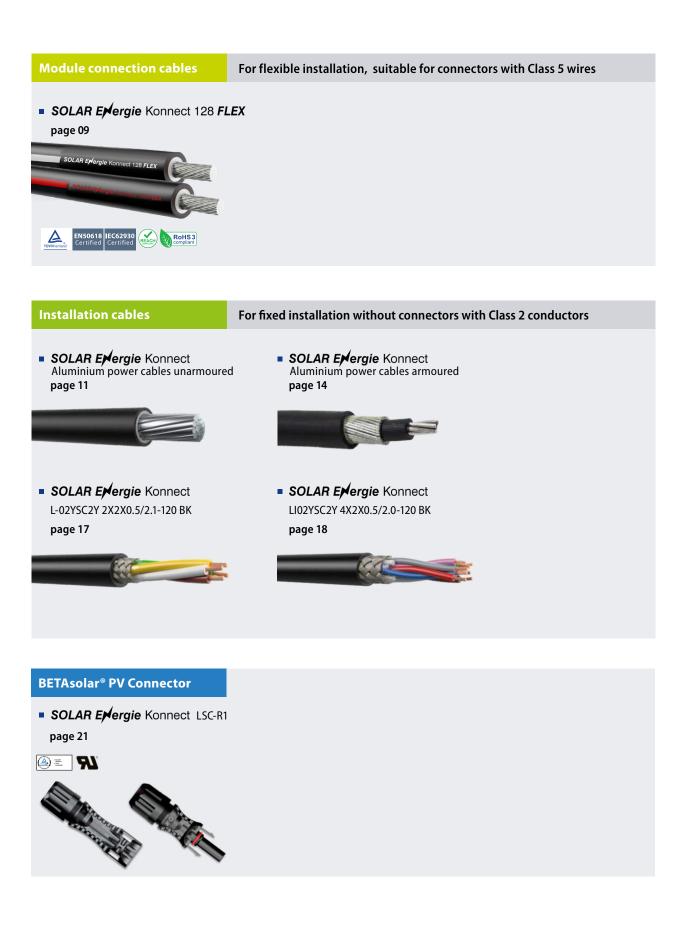




The Quality Connection

## All products at a glance







## SOLAR Evergie Konnect 128 FLEX



## SOLAR Evergie Konnect 128 FLEX

### Applications

ELEGAR photovoltaic cable used between solar modules and inverters in a photovoltaic system with a rated voltage  $U_0 = 1.5$  kV DC.

### Construction

<ul> <li>Conductor</li> </ul>	Tinned fine copper strand acc. to VDE
	0295/IEC 60228, Class 5
Insulation	XLPO, flame-retardant, halogen free,
	electron-beam cross-linked
<ul> <li>Jacket</li> </ul>	XLPO, flame-retardant, halogen free,
	electron-beam cross-linked,
	UV and ozone resistant,
	With white or red stripe marking
<ul> <li>Jacket colour</li> </ul>	• Black

### **Electrical characteristics**

Rated voltage	U <sub>0</sub> = 1500 V DC	
	(Max. permitted voltage $U_0$ 1800 V DC)	
Test voltage	6.5 kV AC 50 Hz	

### Product Features

- EN 50618 & IEC 62930
- Electron-beam cross-linked compounds
- UV, ozone and hydrolysis resistant
- High temperature resistance, the materials do not melt or flow
- Good cold flexibility
- Service life
- > 50 years at 90°C
- Compatible to all popular connectors



### **Thermal characteristics**

Operating temperature	–50 °C up to +120 °C
Max. short circuit temp.	+280 °C, +536 °F / 5 s

### **Bending radius**

Fixed installation	$> 4 \times Ø$
Occasionally moved	>5ר

### Standards / Material properties

Fire performance	IEC 60332-1
Smoke emission	IEC 61034; EN 61034-2
Low fire load	DIN 51900
Approvals	EN50618; H1Z2Z2-K, IEC 62930
Material compliant	RoHS-3, REACH
UV Resistant	BS EN50289-4-17
	Smoke emission Low fire load Approvals Material compliant

Nom. cross section	Nom. conductor Ø	Nom. outer Ø	Resistance max. at 20°C	Weight	Fire load	Part no.	
n×mm <sup>2</sup>	mm	mm	mΩ/m	kg/km	kWh/m	• White*	• Red*
1×2.5	1.95	5.00	8.21	46	0.095	201738	201739
1×4	2.45	5.50	5.09	61	0.109	201740	201741
1×6	3.00	6.10	3.39	82	0.127	201742	201743
1×10	3.90	7.20	1.95	126	0.158	201744	201745
1×16	5.00	8.50	1.24	190	0.213	201746	
1 × 25	6.20	10.40	0.79	291	0.314	201747	
1 × 35	7.70	11.90	0.56	400	0.392	201748	
1 × 50	9.70	14.30	0.39	570	0.549	201749	

\* Jacket colour black with red or white stripe

Nominal cross section	'art no.							
n×mm²	8×500 m		18×500 m		8×1000 m			
	• White*	• Red*	• White*	• Red*	• White*	• Red*		
1×4			201740V2	201741V2	201740V3	201741V3		
1×6			201742V2	201743V2	201742V3	201743V3		
1×10								

## SOLAR Erergie Konnect Aluminium power cables - unarmoured



Low voltage cable, halogen free



- Halogen-free
  - XLPE Insulation and jacket
  - UV resistant
- Simple feed, low friction of the jacket

### SOLAR Exergie Konnect Alu. cable - unarmoured

### Applications

Halogen free. UV resistant low voltage cable. Especially well suited for outdoor applications due to the very robust outer sheath.

### **Environmental properties**

**Operating Temperature** 

During operation	-5°C to +90°C
During Installation	-0°C to +50°C
Under Short Circuit Condition for 1 Sec	250°C

Under Short Circuit Condition for 1 Sec

### Construction

_		
	Conductor	Aluminium Conductor, stranded class - 2, Shape - refer table
	Insulation	XLPE
•	Core identification	1 Core: Natural 2 Core: Red & Black 3 Core: Red, Yellow & Blue 3.5 Core: Red, Yellow, Blue & Black 4 Core: Red, Yellow, Blue & Black
	Laid up	Cores laid up suitably and made circular
	Outer Sheath	PVC ST2
	Outer Sheath colour	• black

### **Fire properties**

Flammability	
- Test on Single cable	IEC 60332-1-2

### Other properties

Min. Bend Radius	20 times the OD
Packing & Order Qty Tolerance	± 5%
Marking on the cable	As per Leoni norms
Packing type	Wooden Drum with flexi wrap

### **Electrical properties** Permissible Voltage 1.5 KV Max D.C.Resistance of As per IEC 60228 conductor at 20°C High Voltage Test Core to Core 3.5 KV AC Permissible Current Rating In Air @ 40°C **Refer Table** In Ground @ 30°C (at a depth of 750mm) Short Circuit Current of **Refer Table** conductor for 1 Sec

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## SOLAR Evergie Konnect Aluminium power cables - XS

Power Core	Earth Core	Power Sqmm	Earth Sqmm	Shape	Nominal Ins Thick	Min. Outer Sheath Thickness	Approx. Cable overall Dia	Approx. Cable Weight	Short Circuit Current
					mm	mm	mm	Kg/Km	КА
1		4		Circular	0.7	1.24	6.7	50	0.38
1		6		Circular	0.7	1.24	7.3	61	0.57
1		10		Circular	0.7	1.24	8.2	77	0.94
1		16		Circular	0.7	1.24	9.3	101	1.5
1		25		Circular	0.9	1.24	11	142	2.4
1		35		Circular	0.9	1.24	12.2	177	3.3
1		50		Circular	1	1.24	13.5	222	4.7
1		70		Circular	1.1	1.24	15.9	305	6.6
1		95		Circular	1.1	1.24	17.8	389	9
1		120		Circular	1.2	1.24	19.7	482	11.3
1		150		Circular	1.4	1.4	21.6	579	14.2
1		185		Circular	1.6	1.4	24.1	720	17.5
1		240		Circular	1.7	1.4	27	915	22.6
1		300		Circular	1.8	1.4	29.9	1121	28.3
1		400		Circular	2	1.56	33.4	1412	37.7
1		500		Circular	2.2	1.56	37.8	1800	47.2
1		630		Circular	2.4	1.56	42	2265	59.4
1		800		Circular	2.6	1.72	46.9	2854	75.5
1		1000		Circular	2.8	1.88	51.9	3530	94.3
2		4		Circular	0.7	1.24	12.6	177	0.38
2		6		Circular	0.7	1.24	13.8	216	0.50
2		10		Circular	0.7	1.24	15.6	275	0.94
2		10			0.7	1.24	15.6	275	1.5
				Circular/Shaped					
2		25		Half Circle	0.9	1.4	18.3	335	2.4
2		35		Half Circle	0.9	1.4	20.2	410	3.3
2		50		Half Circle	1	1.4	22.3	506	4.7
2		70		Half Circle	1.1	1.4	25	659	6.6
2		95		Half Circle	1.1	1.56	27.4	828	9
2		120		Half Circle	1.2	1.56	30.1	1013	11.3
2		150		Half Circle	1.4	1.56	33.4	1230	14.2
2		185		Half Circle	1.6	1.72	36.7	1510	17.5
2		240		Half Circle	1.7	1.88	40.5	1896	22.6
2		300		Half Circle	1.8	2.04	44.6	2325	28.3
2		400		Half Circle	2	2.2	50.3	2975	37.7
3		4		Circular	0.7	1.24	13.2	194	0.38
3		6		Circular	0.7	1.24	14.5	239	0.57
3		10		Circular	0.7	1.24	16.5	309	0.94
3		16		Circular/Shaped	0.7	1.24	19.2	335	1.5
3		25		Sector	0.9	1.4	21.2	449	2.4
3		35		Sector	0.9	1.4	23.2	552	3.3
3		50		Sector	1	1.4	25.4	685	4.7
3		70		Sector	1.1	1.56	29.5	927	6.6
3		95		Sector	1.1	1.56	35	1230	9
3		120		Sector	1.2	1.56	36.7	1467	11.3
3		150		Sector	1.4	1.72	40.4	1779	14.2
3		185		Sector	1.6	1.88	44.4	2205	17.5
3		240		Sector	1.7	2.04	49	2811	22.6
3		300		Sector	1.8	2.2	53.6	3434	28.3



## SOLAR Evergie Konnect Aluminium power cables - XS

Power Core	Earth Core	Power Sqmm	Earth Sqmm	Shape	Nominal Ins Thick	Min. Outer Sheath Thickness	Approx. Cable overall Dia	Approx. Cable Weight	Short Circuit Current
					mm	mm	mm	Kg/Km	КА
3		300		Sector	1.8	2.2	53.6	3434	28.3
3		400		Sector	2	2.36	59.4	4315	37.7
3	1	25	16	Sector	0.9	1.4	22.8	518	2.4
3	1	35	16	Sector	0.9	1.4	24.8	621	3.3
3	1	50	25	Sector	1	1.4	27.8	793	4.7
3	1	70	35	Sector	1.1	1.56	31.7	1073	6.6
3	1	95	50	Sector	1.1	1.56	35.9	1387	9
3	1	120	70	Sector	1.2	1.56	39.8	1728	11.3
3	1	150	70	Sector	1.4	1.72	44	2067	14.2
3	1	185	95	Sector	1.6	1.88	50.5	2646	17.5
3	1	240	120	Sector	1.7	2.04	55.1	3296	22.6
3	1	300	150	Sector	1.8	2.2	58	3962	28.3
3	1	400	185	Sector	2	2.52	65.8	5023	37.7
4		4		Circular	0.7	1.24	14.3	227	0.38
4		6		Circular	0.7	1.24	15.7	281	0.57
4		10		Circular	0.7	1.24	17.9	364	0.94
4		16		Circular/Shaped	0.7	1.24	19.8	393	1.5
4		25		Sector	0.9	1.4	23.2	553	2.4
4		35		Sector	0.9	1.4	24.8	679	3.3
4		50		Sector	1	1.4	27.5	854	4.7
4		70		Sector	1.1	1.56	31.7	1172	6.6
4		95		Sector	1.1	1.56	35.2	1513	9
4		120		Sector	1.2	1.72	38.9	1861	11.3
4		150		Sector	1.4	1.88	43	2265	14.2
4		185		Sector	1.6	2.04	48.2	2862	17.5
4		240		Sector	1.7	2.2	53.8	3636	22.6
4		300		Sector	1.8	2.36	59.2	4452	28.3
4		400		Sector	2	2.68	66	5608	37.7

## **SOLAR Exergie** Konnect Aluminium power cables -armoured



Low voltage cable, halogen free

## SOLAR Exergie Konnect Alu cable - armoured

### Applications

Halogen free. UV resistant low voltage cable. Especially well suited for outdoor applications and burial directly in the ground. Due to the very robust outer sheath and the aluminium tube as humidity barrier. Aluminium tube can be used as ground wire. TÜV Rheinland 2PfG2642 approval in preparation.

### Construction

	Conductor	Aluminium Conductor, stranded
		class - 2, Shape - refer table
	Insulation	XLPE
•	Core identification	1 Core: Natural 2 Core: Red & Black 3 Core: Red, Yellow & Blue 3.5 Core: Red, Yellow, Blue & Black 4 Core: Red, Yellow, Blue & Black
•	Laid up	Cores laid up suitably and made circular
	Inner Sheath	PVC, Black
•	Armour	1 Core: Hard Drawn Aluminum Round Wire / Flat Strip Other than 1 Core: Gl Round Wire / Gl Flat Strip
	Outer Sheath	PVC ST2
	Outer Sheath colour	● black
E	lectrical properties	
Р	ermissible Voltage	1.5 KV
	Nax D.C.Resistance of onductor at 20⁰C	As per IEC 60228

### Advantages

- For direct burial
- Halogen-free
- XLPE Insulation and termigon jacket
- Termite and rodent protection
- UV resistant
- Transversal watertight
- Simple feed, low friction of the jacket
- Aluminium shield, suitable as grounding and protective earth and for EMC shielding

### **Environmental properties**

**Operating Temperature** 

During operation	-5°C to +90°C
During Installation	-0°C to +50°C
Under Short Circuit Condition for 1 Sec	250°C

### **Fire properties**

Flammability	
- Test on Single cable	IEC 60332-1-2

### Other properties

Min. Bend Radius	20 times the OD
Packing & Order Qty Tolerance	± 5%
Marking on the cable	As per Leoni norms
Packing type	Wooden Drum with flexi wrap

Permissible Voltage	1.5 KV
Max D.C.Resistance of conductor at 20⁰C	As per IEC 602
High Voltage Test Core to Core	3.5 KV AC
Permissible Current Rating In Air @ 40°C In Ground @ 30°C (at a depth of 750mm)	Refer Table
Short Circuit Current of conductor for 1 Sec	Refer Table



## SOLAR Exergie Konnect Aluminium power cables - ATA XS

Power Core	Earth Core	Power Sqmm	Earth Sqmm	Shape	Insulation Thickness	Inner sheath Thickness	Armour Dia.	Outer Sheath Thickness	Cable overall Dia	Approx. Cable Weight
					Nom.	Min.	Approx.	Min.	Approx.	Approx.
					mm	mm	mm	mm	mm	Kg'/km
1		16		Circular	0.7	0.4	0.9	1.24	12.7	182
1		25		Circular	0.9	0.4	0.9	1.24	14.4	234
1		35		Circular	0.9	0.4	1.25	1.24	16.3	308
1		50		Circular	1	0.4	1.25	1.24	17.6	364
1		70		Circular	1.1	0.4	1.25	1.24	19.8	460
1		95		Circular	1.1	0.4	4x0.8	1.4	20.8	531
1		120		Circular	1.2	0.4	4x0.8	1.4	22.5	625
1		150		Circular	1.4	0.4	4x0.8	1.4	24.4	733
1		185		Circular	1.6	0.4	4x0.8	1.4	26.7	882
1		240		Circular	1.7	0.4	4x0.8	1.4	29.6	1095
1		300		Circular	1.8	0.4	4x0.8	1.56	32.5	1320
1		400		Circular	2	0.4	4x0.8	1.56	36	1630
1		500		Circular	2.2	0.4	4x0.8	1.56	40.4	2046
1		630		Circular	2.4	0.4	4x0.8	1.72	44.6	2539
1		800		Circular	2.6	0.6	4x0.8	1.72	49.9	3162
1		1000		Circular	2.8	0.6	4x0.8	1.88	54.9	3865
2		4		Circular	0.7	0.6	0.9	1.24	14.4	339
2		6		Circular	0.7	0.6	0.9	1.24	15.6	397
2		10		Circular	0.7	0.6	1.25	1.24	18.1	571
2		16		Circular/Shaped	0.7	0.6	1.25	1.4	18.1	541
2		25		Half Circle	0.9	0.6	1.25	1.4	20.8	687
2		35		Half Circle	0.9	0.6	4x0.8	1.4	21.8	711
2		50		Half Circle	1	0.6	4x0.8	1.4	23.9	855
2		70		Half Circle	1.1	0.6	4x0.8	1.56	26.6	1056
2		95		Half Circle	1.1	0.6	4x0.8	1.56	29.2	1262
2		120		Half Circle	1.2	0.6	4x0.8	1.56	31.9	1497
2		150		Half Circle	1.4	0.6	4x0.8	1.72	35.2	1765
2		185		Half Circle	1.6	0.6	4x0.8	1.72	38.5	2119
2		240		Half Circle	1.7	0.6	4x0.8	1.88	42.3	2555
2		300		Half Circle	1.8	0.6	4x0.8	2.04	46.2	3038
2		400		Half Circle	2	0.8	4x0.8	2.36	51.9	3762
3		4		Circular	0.7	0.6	0.9	1.24	15	366
3		6		Circular	0.7	0.6	1.25	1.24	17	508
3		10		Circular	0.7	0.6	1.25	1.24	19	624
3		16		Circular/Shaped	0.7	0.6	1.25	1.24	21.7	705
3		25		Sector	0.9	0.6	4x0.8	1.4	22.8	774
3		35		Sector	0.9	0.6	4x0.8	1.4	24.8	901
3		50		Sector	1	0.6	4x0.8	1.4	27	1082
3		70		Sector	1.1	0.6	4x0.8	1.56	31.1	1397
3		95		Sector	1.1	0.6	4x0.8	1.56	36.6	1773
3		120		Sector	1.2	0.6	4x0.8	1.56	38.5	2075
3		150		Sector	1.4	0.6	4x0.8	1.72	42.2	2438
3		185		Sector	1.6	0.6	4x0.8	1.88	46	2919
3		240		Sector	1.7	0.8	4x0.8	2.04	50.8	3620
3		300		Sector	1.8	0.8	4x0.8	2.2	55.2	4294



## SOLAR Exergie Konnect Aluminium power cables - ATA XS

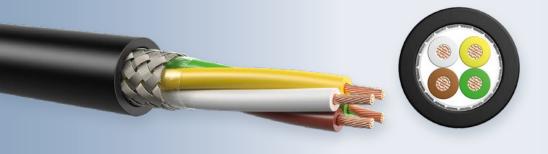
Power Core	Earth Core	Power Sqmm	Earth Sqmm	Shape	Insulation Thickness	Inner sheath Thickness	Armour Dia.	Outer Sheath Thickness	Cable overall Dia	Approx. Cable Weight
					Nom.	Min.	Approx.	Min.	Approx.	Approx.
					mm	mm	mm	mm	mm	Kg'/km
3		400		Sector	2	0.8	4x0.8	2.52	61	5249
3	1	25	16	Sector	0.9	0.6	4x0.8	1.4	24.4	867
3	1	35	16	Sector	0.9	0.6	4x0.8	1.4	26.4	1018
3	1	50	25	Sector	1	0.6	4x0.8	1.4	29.6	1252
3	1	70	35	Sector	1.1	0.6	4x0.8	1.56	33.3	1568
3	1	95	50	Sector	1.1	0.6	4x0.8	1.56	37.7	1971
3	1	120	70	Sector	1.2	0.6	4x0.8	1.72	41.6	2387
3	1	150	70	Sector	1.4	0.6	4x0.8	1.72	45.6	2756
3	1	185	95	Sector	1.6	0.8	4x0.8	1.88	52.1	3457
3	1	240	120	Sector	1.7	0.8	4x0.8	2.04	56.9	4205
3	1	300	150	Sector	1.8	0.8	4x0.8	2.2	59.8	4921
3	1	400	185	Sector	2	0.8	4x0.8	2.52	67.4	6078
4		4		Circular	0.7	0.6	1.25	1.24	16.8	496
4		6		Circular	0.7	0.6	1.25	1.24	18.2	578
4		10		Circular	0.7	0.6	1.25	1.24	20.4	707
4		16		Circular/Shaped	0.7	0.6	4x0.8	1.4	21.4	694
4		25		Sector	0.9	0.6	4x0.8	1.4	24.8	902
4		35		Sector	0.9	0.6	4x0.8	1.4	26.4	1076
4		50		Sector	1	0.6	4x0.8	1.56	29.3	1288
4		70		Sector	1.1	0.6	4x0.8	1.56	33.3	1666
4		95		Sector	1.1	0.6	4x0.8	1.56	36.8	2056
4		120		Sector	1.2	0.6	4x0.8	1.72	40.5	2477
4		150		Sector	1.4	0.6	4x0.8	1.88	44.8	2974
4		185		Sector	1.6	0.8	4x0.8	2.04	50	3647
4		240		Sector	1.7	0.8	4x0.8	2.2	55.4	4496
4		300		Sector	1.8	0.8	4x0.8	2.36	60.8	5385
4		400		Sector	2	0.8	4x0.8	2.68	67.6	6663

## SOLAR Exergie Konnect Solar L-02YSC2Y 2X2X0.5/2.1-120 BK



### Advantage

- Especially for PV applications
- UV resistant
- Low capacitance
- Suitable for long distances and direct burial



### SOLAR Exergie Konnect Solar L-02YSC2Y 2X2X0.5/2.1-120 BK

### Applications

UV resistant data cable for direct burial. Special designed for PV applications.

### Construction

<ul> <li>Conductor</li> </ul>	Stranded bare copper wire
	(20 AWG) 🖉 0.95 mm (0,037 in dia.)
Insulation	Polyethylene (PE) with skin $arnothin$ 2.1 mm
	(0,083 in dia.)
Core	4 wires twisted,
	sequence of colors: WH-BN-GN-YE,
	plastic tape, overlapped,
Shielding	braiding of tinned copper wires,
	coverage about 80%
	$\oslash$ 5.8 mm (0.228 in)
<ul> <li>Jacket</li> </ul>	Polyethylene (PE) BK,
	$\oslash$ (8.1 ±0.4) mm (0.319 ±0.016 in)
<ul> <li>Jacket colour</li> </ul>	● black

### Electrical data at 20°C

Conductor resistance	≤ 36 Ω/km
Insulation resistance	$\geq$ 5 G $\Omega^*$ km
Capacitance (1 kHz)	$\approx$ 35 nF/km
Characteristic impedance (≥ 1 MHz)	(120 ± 20) Ω
rel. velocity of propagation	≈ 80 %
Operating voltage (peak)	$\leq$ 300 V
Test voltage (wire / wire / screen rms	2000 V
50 Hz 1min)	

### Mechanical and thermal characteristics

Conductor material	acc. to DIN EN 13602 Cu-ETP-A
Screen material	acc. to DIN EN 13602 Cu-ETP-AB
Insulating material	acc. to DIN EN 50290-2-23 (VDE 0819),
	table 2/A (HD 624.3) (02Y)
Jacket material	acc. to DIN EN 50290-2-24 (VDE 0819),
	table 1/2-L/MD (HD 624.4)

### Attenuation

Frequency (MHz)	0.1	1	5	10	20
Attenuation typ. (dB/100m)	0.4	1.3	3.9	5.8	8.2
Attenuation typ. (dB/100ft)	(0.1)	(0.4)	(1.2)	(1.8)	(2.5)

### Other characteristics

- Cable for direct burial
- RoHS compliant (Directive 2011/65/EC)
- Sunlight resistant acc. to UL 444 Sec. 7.12

### Permissible temp. range

Transport and fixed instal. –40 °C (–40 °F) up to 80 °C (176 °F)				
Instal. and flexible use	–30 °C (–22 °F) up to 80 °C (176 °F)			
Min. bending radius	repeated 8 $\times \emptyset$ , single 4 $\times \emptyset$			
Weight about	56 kg/km (37,5 lb/1000ft)			

### Packaging

500 m (1640 ft) on non-returnable reel

## SOLAR Exergie Konnect Solar LI02YSC2Y 4X2X0.5/2.0-120 BK



### Advantage

- Especially for PV applications
- UV resistant
- Low capacitance
- Suitable for long distances and direct burial

## SOLAR Exergie Konnect Solar LI02YSC2Y 4X2X0.5/2.0-120 BK

### Applications

UV resistant data cable for direct burial. Special designed for PV applications.

### Construction

Stranded bare copper wire
(20 AWG) 🖉 0.95 mm (0,037 in dia.)
Polyethylene (PE) with skin $arnothing$ 2.0 mm
(0,079 in dia.), 2 wires twisted to a pair
4 pairs twisted to a core with fillers in the
gaps. Plastic tape overlapped.
braiding of tinned copper wires,
coverage about 80 %
Polyethylene (PE) BK,
$\oslash$ (10.5 $\pm$ 0.4) mm (0.413 $\pm$ 0.016 in dia.)
● black

### Mechanical and thermal characteristics

Conductor material	acc. to DIN EN 13602 Cu-ETP-A
Screen material	acc. to DIN EN 13602 Cu-ETP-AB
Insulating material	acc. to DIN EN 50290-2-23 (VDE 0819),
	table 2/A (HD 624.3) (02Y)
Jacket material	acc. to DIN EN 50290-2-24 (VDE 0819),
	table 1/2-L/MD (HD 624.4)

### Attenuation

Frequency (MHz)	0.1	1	5	10	20
Attenuation typ. (dB/100m)	0.45	1.1	2.8	3.9	5.7
Attenuation typ. (dB/100ft)	(0.1)	(0.3)	(0.9)	(1.2)	(1.7)

### Other characteristics

- Cable for direct burial
- RoHS compliant (Directive 2011/65/EC)
- Sunlight resistant acc. to UL 444 Sec. 7.12

### Electrical data at 20°C

Conductor resistance	≤ 36 Ω/km
Insulation resistance	≥5 G Ω* km
Capacitance (1 kHz)	≈40 nF/km
Characteristic impedance (≥ 1 MHz)	(120 $\pm$ 20) $\Omega$
rel. velocity of propagation	≈80 %
Operating voltage (peak)	$\leq$ 300 V
Test voltage (wire / wire / screen rms	2000 V
50 Hz 1min)	

### Permissible temp. range

Fixed installation	–40 °C (–40 °F) up to 80 °C (176 °F)
Occasionally moved	–30 °C (–22 °F) up to 80 °C (176 °F)
Min. bending radius	repeated 8 $\times \emptyset$ , single 4 $\times \emptyset$
Weight about	100 kg/km (67,0 lb/1000ft)

### Packaging

500 m (4921 ft) on non-returnable reel



## **Elegar Kerpen Interconnectivity-System**

New Technologies for DC PV-Applications

DC cables are the "life veins" of every PV system. They have to defy wind and weather conditions for many years and reliably safeguard the electricity yields. Compared to other components the DC cabling only takes 1% of the investment costs of a PV power plant - although it is one of the most important link of the electricity generation chain.

For this reason PV power plant operators and investors should pay heed to high quality and state-of-the-art DC components to enable a reliable, decades-long power generation. LEONI develops and produces innovative state-of-the-art Interconnect DC systems and all components in-house with materials of highest quality. All DC components pass through several steps of quality management to save a reliable and durable operation.

### The 1500 V DC advantage

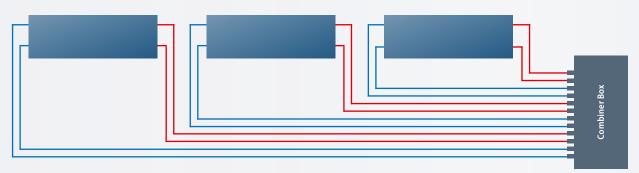
Since 2012 PV module costs have been reduced strongly, inverter costs have been halved. Although it has a big impact to PV systems, the typical "Balance of System" (BoS) design of Solar PV power plants didn't remarkably change. Along with its business partner, LEONI is developing new, intelligent ways for a more efficient System - in DC cabling and in mechanical construction. The new 1,500VDC technology is one of these important PV evolution steps that reduce the "Levelized Costs Of Electricity" (LCOE) strongly.

Large module strings with more PV panels at less cabling efforts can be realized (less solar cable, less combiner boxes, less junctions and less installation time). With 1,500VDC string length, up to 50% more PV panels can be interconnected. Furthermore the higher DC voltage is reducing the required amount of inverter stations.

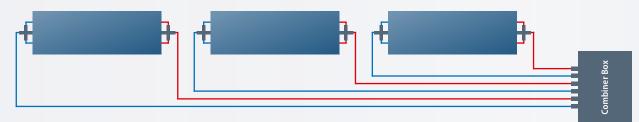
## Data-Driven grid analytics enabling more cost-effective grid operation & planning

- Simulation of the grid up to the detail
- Grid analytics lead to more cost-effective grid operation & planning
- Point hidden potential of the grid
- Prosumer behavior monitoring
- Advanced smart grid simulation
- Intelligent smart grid use
- Predictive maintenance
- Investment & operation cost reduction
- Insight to failure probability
- Maintain grid stability





**Conventional Cabling System** 



ELEGAR Interconnectivity DC String Cabling System

### The ELEGER Interconnectivity DC String Cabling System offers you a specific solution for you solar project:

- 50 % reduction of installation cables
- 25 % reduction of connectors
- 50 % reduction of installation time
- Smaller PV array junction box possible
- In-line fuses and diodes can be integrated directly into the cable

### For your reliable investment

Just get in touch with your ELEGAR Solar-Experts.

We are happy to supply you with the best and most efficient solution.

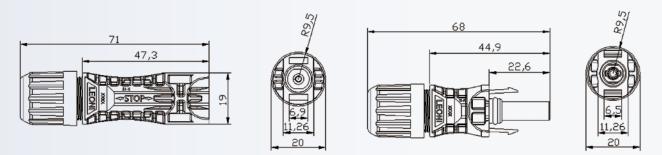
contact@elegar-kerpen.com

## SOLAR Exergie Konnect PV Connector



LSC-R1





### Technology data sheet

- Rated Voltage: 1000V / 1500V (TÜV), 1000V / 1500V (UL)
- Rated Current: 30A (4/6mm<sup>2</sup>), 22A (2.5mm<sup>2</sup>)
- Contact Resistance:  $\leq 0.3 m\Omega$
- Insulation Resistance: >3GΩ
- Protection Degree: IP68(mated), IP2X (unmated)
- Pollution Degree: 2

- Flame Class: UL94-V0
- Rated Impulse Voltage: 8KV
- Temperature Range: -40°C~+85°C
- Wire Size Range: 2.5/4.0/6.0mm<sup>2</sup> (TÜV), 14/12/10AWG (UL)
- Cable Diameter: Φ5.0~8.0mm

### Certification

- TÜV Rheinland Certificate
- UL Certificate

## Standard packaging / Transport conditions



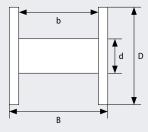
### Packaging

- Wooden packaging according to the IPPC ISPM-15 standard (Bew. Nr. CH-90055-HT-DB): All pallets and plywood reels acc. to IPPC standard ISPM15, the producer is registered as CH-90055-HT-DB.
- Fit for sea, air and land transport
- Can be stacked 2-high

### Distribution, storage, availability

Customers of ELEGAR receive their **SOLAR Exergie** Konnect Solar deliveries on schedule from the standard stock in Germany. Large buffer stocks are available there to ensure flexibility. Currently, ELEGAR manages several individual customer stocks across the world in order to avoid out-of-stock situations in the supply chain. By agreement, suitable purchase contracts can be made to create further buffer stocks on a worldwide basis, which can be tailored and managed to individual requirements.

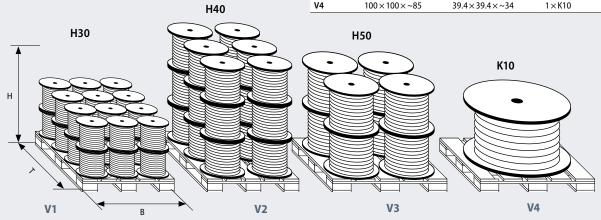
### **Standard reel dimensions**



### Standard packaging units / pallet

Reel	Flange	Core	Distance between flange	
			external	internal
	D	d	В	b
	cm	cm	cm	cm
H30	30	12	30	29
H40	40	18	30	27
H50	50	15	43	40
K10	100	50	70	60

Pallet	Dimensions W×D×H		Load	
	cm	inch	Reel / Pallet	
V1	100×120×~80	39.4×47×~32	24×H30	
V2	80×120×~105	31.5×47×~41	18×H40	
V3	100×100×~101	$39.4 \times 39.4 \times \sim 40$	8×H50	
V4	100×100×~85	39.4×39.4×~34	1×K10	



## **Smoke density**

## Flame retardant



The formation of smoke has several unpleasant consequences. On the one hand it considerably lowers the visibility in a fire event, thus impeding the people trapped inside closed rooms escape of and the efforts of the firemen to carry on their rescue and fire fighting actions. On the other hand it produces smoke poisoning because of the carbon monoxide. With respect to the formation of combustion gases, PVC performs rather poorly. However, this cannot be blamed on PVC, as is frequently assumed. In fact, it is caused by the additives included in the PVC - particularly the softening agents, which normally lead to considerable smoke production.

### **Test procedures**

The density of smoke emission can be determined by measuring of the light penetrability. Cable samples are lit with alcohol in a test chamber (cubical with an edge length of 3 m). The so formed smoke is uniformly spread by a ventilator and influences the light measuring section.

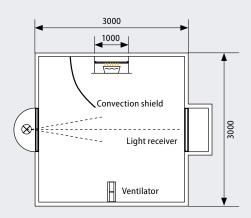
The test is considered to be passed if the following light penetrability is reached:

Hazard level	Requirements
HL 1	-
HL 2 and HL 3	60%
HL 4	70%

### **Test standards**

IEC 61034, EN 61034

### IEC 61034, EN 61034



Flame retardant cables are cables which, when installed as a single cable, although ignitable on exposure to flame source, will greatly reduce flame spread and selfextinguish once the flame source is removed.

However in a vertical cable bundle, e.g. in vertical risers, fire can spread along the cables (chimney effect). In order to avoid this danger, the so called «no flame propagating» cables should be used.

### **Test procedures**

This test procedure describes the minimum requirements for flame retardant cables and it is valid for lead wires or on single cables only.

A lead wire or a cable is being aflamed with a propane-airburner (1 kW flame).

Test duration

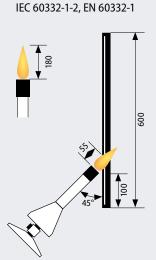
■ Ø≤25	= 60 s
■ Ø 2550	= 120 s
■ Ø 5075	= 240 s
■ Ø > <b>7</b> 5	= 480  s

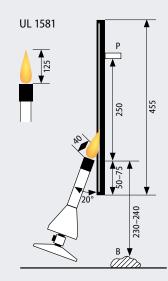
The burning cable should self-extinguish as soon as the fire source has been removed. The fire damage may not be higher than 60 cm.

The test is considered to be passed if the sample has not burned and the damage (carbonisation) has not reached any of the terminations of the sample (> 50 mm). Additional test procedures for individual cables are also undertaken in accordance with UL 1581.

### **Test standards**

IEC 60332-1, EN 60332-1





The Quality Connection

## Halogen-free



The halogens are the elements of the 7<sup>th</sup> group in the Periodic table of elements:

- Chlorine (Cl)
- Fluorine (F)
- Bromine (Br)
- Jodine (I)

Halogen-free cables must be free of chlorine, fluorine and bromine (PVC cables contain halogen, PVC = Polyvinylchloride). The halogens are an integrated component of many acids.

- HCI = Hydrochloric acid, salt acid
- HF = Hydrogenfluorid
- HBr = Hydrogenbromid

The most popular plastic containing halogens is PVC (polyvinylchloride). In case of fire or at high temperature PVC starts to degradate. Hydrochloric acid and other fission products are generated and leads to extremely aggressive corrosion. Therefore the current trend is to replace the halogen containing plastics with halogen-free ones. For instance PVC is currently being replaced at a large scale with polyolefin i.e. polyethylene. Thanks to halogen-free cables the formation of corrosive and toxic gases can be prevented.

### **Test procedures**

A sample of between 0.5 g and 1.0 g is heated in a tube. The resulting gases are released and tested for their halogen content. Using this process, all halogen-based acids, with the exception of hydrofluoric acid, are separated as hydrochloric acid.

### **Test standards**

IEC 60754-1

Corrosive gases react with moisture to produce aggressive acids which corrode metal parts and cause extensive long-term damage, even though the fire damage may only be limited; this is because corrosive gases often spread throughout a building through the ventilation system or withing whole installations. The damage may not be limited to the area immediately affected by the fire. Electronic units and electronic contacts are particularly vulnerable, as are free-standing or concrete enclosed steel constructions.

### **Test procedures**

1000 mg insulation material is burned in a combustion furnace at  $\ge$  935 °C with pre-defined air supply for over 30 minutes. By means of two gas washing containers, held in the airflow the conductivity and the pH-value are measured. Like that even small quantities of halogen containing substances can be detected and proven.

The test is considered to be passed if

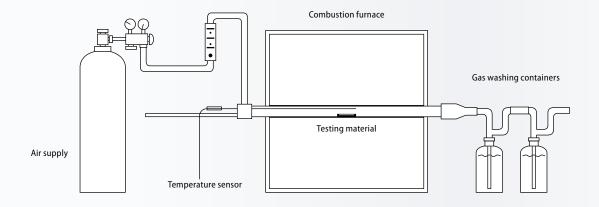
**Degree of acidity** 

of combustion gases

- the PH value > 4.3
- the conductivity < 10 µS/mm</p>

### **Test standards**

IEC 60754-2, EN 50267-2-2



## **Electron-beam cross-linking**



### **Physical cross-linking**

We cross-link our cable insulations with highenergy electrons (betarays) in our own state-of-the-art irradiation centre. These electrons cede their kinetic energy when slowed down in the polymer. Through the impact of the electrons radicals are built, which with chemical reaction interlink the molecules.

### **Cross-linked insulating materials**

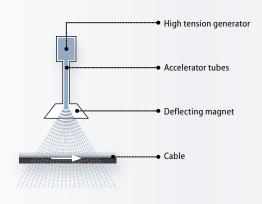
Cross-linking binds together the polymer chains by means of a chemical linking (in the amorphous phase).

This leads to a three-dimensional network. The polymer chain can no longer move freely (irrespective of temperature). Above the melting temperature the material can no longer flow but it goes into a rubber-like elastic state.

### Advantages of cross-linked insulation materials

- Increased shear and compressive strength
- Improved integrity in case of electrical failures (overload, short circuit)
- Improved resistance to chemicals
- Infusible, soldering iron resistance
- Improved impact strength and crack resistance
- Better weather and abrasionresistance

With the electron-beam accelerators the insulation materials can be cross-linked within a few seconds. The homogenous irradiation and implicit the homogenous cross-linking are ensured by thererfore especially adapted handling systems. Other than in the chemical cross-linking in the irradiation cross-linking no peroxides or hydro-silicones are incorpored into the synthetic mixtures.

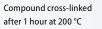




**BEFORE cross-linking:** Schematic representation of the chainforming macromolecules before crosslinking. Free movement of polymer chains (in the melt and in the solution).



AFTER cross-linking: Schematic representation of chain-forming macromolecules after cross-linking. Three-dimensional cross-linking of polymer chains (heavily impaired freedom of movement).



Compound not cross-linked after 1 hour at 200 °C



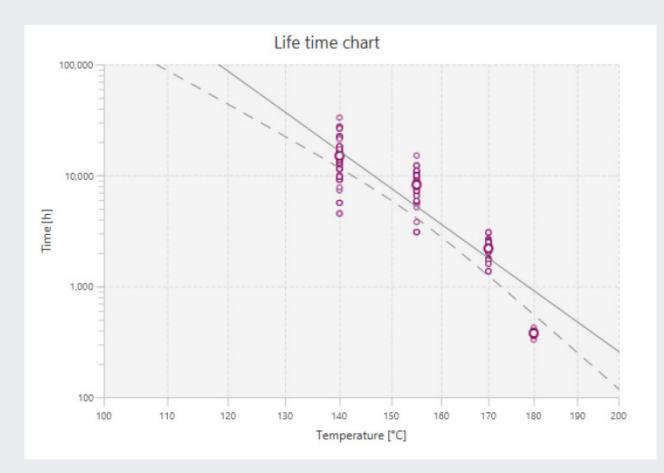
## **Electron-beam cross-linking**



Temperature index as per IEC 60216 / VDE 0304 part 21

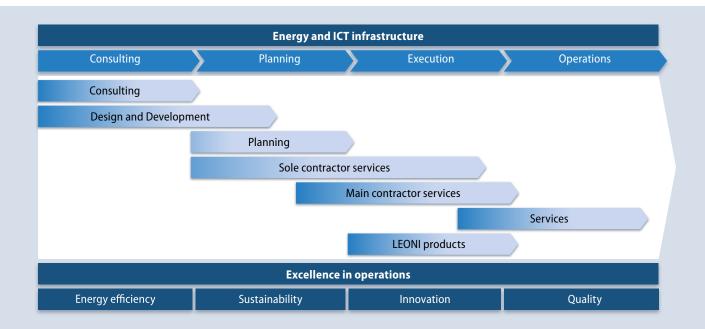
The temperature index describes the long-term performance of plastics. The temperature index defines the ageing temperature (in °C), at which the material still has an absolute elongation at break of 50 % after 20,000 hours. A 10 °C higher temperature index results in approximately doubling the service life expectation of the plastic.

In order to determine the long term temperature stability of an insulation material the different ageing times corresponding to different temperatures are measured and recorded in a so called Arrhenius-Diagram (ordinate-axis: log time, abscissa axis: the reciprocal absolute temperature). A straight line is drawn to connect the various recorded points. By prolonging the straight line until it intersects the 20,000 h axis it is possible to determine the service life or the temperature index.



## **Business Unit Building Technologies**





ELEGAR's Business Unit Building Technologies is an innova tive and independent supplier of sustainable all-in-one solutions for energy and ICT infrastructure to the international market.

In any project, being able to keep the demands of the various stakeholder groups in balance is critical for project success. Each of these stakeholders is focused on its own competencies and task areas, however.

As a consequence, the client or owner is required to orchestrate these complex interrelationships and keep an eye on everything. This is where ELEGAR can help by ensuring the optimal coordination of the various subject areas, bringing together industry-wide know-how under one roof, in a team staffed by engineers, technical architects, security consultants and construction supervisors. A well-developed project management system and tailor-made software tools provide a high degree of plannability, resulting in appreciable cost savings in the implementation phase, with a significantly reduced level of project risk. With its highly focused service portfolio, ELEGAR can offer you additional services to optimise your long-term capital investment and operating costs.

Based on our long-standing experience in the development and manufacture of special cables, we can now offer our customers a complete portfolio of services and products, culminating in the tailor-made delivery of turnkey projects for energy plant.

### We create solutions for you that offer all-round satisfaction.

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